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The relationship between anxiety and athletic performance: A test of the multidimensional anxiety and catastrophe theories

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THE RELATIONSHIP BETWEEN ANXIETY AND ATHLETIC PERFORMANCE: A TEST OF THE MULTIDIMENSIONAL ANXIETY AND CATASTROPHE THEORIES

By

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APPROVAL PAGE

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The relationship between anxiety and athletic performance has been a critical area of study in sport psychology from both practical and conceptual perspectives. New theories examining this relationship are emerging which need to be examined and compared in order for our understanding of the anxiety-athletic performance relationship to progress (Gould & Krane, in press). The primary purpose of the present study was to examine two innovative approaches concerning the relationship between anxiety and athletic performance by comparing predictions based on the multidimensional anxiety theory and catastrophe theory. The multidimensional anxiety theory predicts that cognitive and somatic anxiety will differentially and independently relate to performance while the catastrophe theory is a three-dimensional model examining the joint effects of cognitive and somatic anxiety.

A collegiate women's soccer team participated as subjects in this study (n = 19). These athletes completed the Competitive State Anxiety Inventory - 2 (CSAI-2), which measured cognitive and somatic anxiety prior to twelve matches of their competitive season. Three soccer performance measures were obtained: coach, athlete, and objective ratings of performance.

Results provided support for the multidimensional anxiety theory prediction that cognitive anxiety would be related to performance in a negative linear manner. Contrary to expectations, somatic anxiety also displayed a negative linear relationship to performance, not the curvilinear relationship found in previous studies (Burton, 1988; Gould et al., 1987).

The catastrophe theory analyses found isolated indirect support for some catastrophe theory predictions, but not for the entire model. The hypothesis that the combined effect of cognitive and somatic anxiety would account for significantly more of the performance variance than cognitive and somatic anxiety independently was not supported. However data trends were in the desired direction. Nonlinear regression analyses of the three-dimensional catastrophe model accounted for 1-3% of performance variance, less than the linear regression model examining the independent effects of cognitive and somatic anxiety. The biggest strength of the present study was that a methodological and conceptual model for examining catastrophe theory was developed.

Dedication

To Judy Weiss

"Did you ever know you were my hero? You're everything I wish I could be. I could fly higher than an eagle 'cause you are the wind beneath my wings" (Bette Midler)

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It is difficult to find the words to extend my gratitude to Dan Gould for all of his help and support throughout my doctoral studies. Dan knows how to push his students to their limits yet still get their best work from them (that's a complement). I never worked so hard as in my three years with Dan. I've gained a much broader conceptual understanding in sport psychology as well as had the opportunity to enhance my practical application of sport psychology skills while working with Dan. Dan is one of the few people who can offer strong mentorship in both of these areas. I also had the invaluable experience of studying with many respected scholars and was exposed to many different perspectives in Exercise Science/Kinesiology at both the University of Illinois and UNCG as I followed Dan across the country. As a mentor, colleague and friend, Dan has provided an ideal environment in which I could truly grow during the past three years.

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Finally, thanks to Boomer, I was forced remember that through it all, I had to get out and walk in the sun and have a little fun!

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CHAPTER I

Introduction and Review of the Literature

The arousal/anxiety-performance relationship has been one of the most researched topics in sport psychology. It is an important area because of its practical nature as well as theoretical significance. Practically, the influence of anxiety on athletic performance is almost taken for granted. Coaches and athletes have long realized that excessive levels of anxiety will interfere with athletic performance. Accordingly, sport psychologists typically have included arousal control as a primary component of mental skills training. This is evidenced by the number of chapters devoted to arousal/anxiety control in practical mental skills training books written for coaches and athletes (e.g., Garfield, 1984; Loehr, 1982; Nideffer, 1985; Orlick, 1986).

Conceptually, sport psychologists have devoted much energy toward examining the arousal/anxiety-performance relationship. During the past thirty years, sport psychologists have advanced two primary hypotheses attempting to explain this relationship: the drive theory and the inverted-U hypothesis. Most contemporary anxiety research has been predicated on the inverted-U hypothesis. Although there has been recent criticism of this hypothesis, it remains prominent in sport psychology. Even as anxiety research has progressed to a multidimensional framework, researchers have still attempted to apply inverted-U hypothesis concepts to findings (e.g., Burton, 1988; Gould, Petlichkoff, Simons, & Vevera, 1987). Currently several new theories have emerged which are applicable to the sport anxiety literature, including the multidimensional theory of anxiety (Martens, Burton, Vealey, Bump & Smith, 1990), reversal theory (Apter, 1984; Kerr, 1985), and catastrophe theory (Hardy & Fazey, 1987; Jones & Hardy, 1989).

Each of these theories has great potential to enhance our understanding of the anxiety-performance relationship. Further, each theory has an intuitive appeal, yet little, if any, empirical evidence exists to support them. The multidimensional theory of anxiety has tacit support in that some athletes may be more reactive physiologically (e.g., rapid heart rate, butterflies in the stomach) while others may be plagued by negative thoughts and worries, indicating at least two subcomponents to anxiety. Tacit knowledge also suggests that some athletes will view high arousal as a sign of being "psyched up" while others will consider it a sign of overanxiousness which will hinder performance. This is consistent with the reversal theory which suggests that arousal/anxiety should not always be considered a negative affect. Further, intuitively, when an athlete "chokes," slight decreases in anxiety will not result in performance improvements, as proposed in the inverted-U theory which notes a symmetrical, curvilinear relationship between arousal/anxiety and athletic performance. Rather, when an athlete "chokes," a dramatic change is needed in arousal/anxiety level before an improvement in performance will be detected (Hardy & Fazey, 1987). Still, he or she rarely recovers to an even mediocre level of performance. These notions are consistent with the catastrophe theory which suggests that performance will follow a different path when anxiety is increasing than when anxiety is decreasing under conditions of high cognitive anxiety.

A need exists to empirically test these arousal/anxiety-performance relationship theories. The time has come to heed recent criticism of the inverted-U hypothesis and begin to examine alternative explanations about the nature of the relationship between anxiety and performance. Reviews criticizing the inverted-U's applicability to the complex arousal/anxiety-athletic performance relationship are growing (e.g., Neiss, 1989; Weinberg, in press), yet few empirical studies have followed. Studies specifically designed to compare various anxiety theories are necessary. Hence, the present study is designed to examine the multidimensional theory of anxiety and the catastrophe theory[1].

[1] Unfortunately, there is no valid measure of reversal theory constructs in sport, which, therefore, precluded inclusion of it in the present study.

To date only two studies have provided an adequate test of the multidimensional theory (Burton, 1988; Gould, Petlichkoff, Simons, & Vevera, 1987) and no one has tested the full catastrophe model in sport psychology. Both of these theories offer great promise in advancing the understanding of the anxiety-performance relationship. In adequately testing either theory, there are several issues with which sport psychologists must contend. These include formally operationalizing arousal and anxiety constructs; addressing criticisms and limitations of the theories previously applied to the arousal/anxiety-performance relationship; and acknowledging the assumptions inherent in, logic behind, and empirical support for each theory.

The present review will address each of these points. First, anxiety-related constructs will be identified and operationally defined. Then, previous theories and hypotheses utilized in the quest to understand the relationship between athletic performance and anxiety will be examined. Finally, reasons will be advanced for the application of a relatively new theory, the catastrophe theory, to the study of the arousal/anxiety-athletic performance relationship in sport psychology.

Defining Anxiety Constructs

A long standing problem in the study of the arousal or anxiety-performance relationship has been one of semantics.

The terms arousal, stress, and anxiety have been used interchangably, although they are not necessarily synonymous. This has led to conceptual confusion because it is often difficult to determine exactly what was studied. In a review of test anxiety literature, Wine (1980) noted that the term "test anxiety" had "outlived its usefulness" and that it needed to be redefined in order to make further theoretical and measurement advances in the field. Wine stated that

> 'Anxiety' is an omnibus term, with much surplus meaning, defined quite differently by investigators of varying theoretical persuasions. The common denominator in these definitions, that of emotional or physiological reactivity, does not capture the most outstanding differences between persons who score at extremes on the test anxiety measures (p. 351).

This can also be said of the study of the arousal-performance relationship in sport psychology. Multiple usage of the terms arousal, anxiety, and stress can be found in papers by even well-respected anxiety researchers. For example, in a study of peripheral narrowing in rifle shooters in conditions of high- and low-stress conditions, Landers, Wang, and Courtet (1985) included the footnote: "although some investigators make a distinction between the terms arousal and stress, they are used interchangably in the present study" (p. 129). Their study included measures of state anxiety and physiological measures of arousal and discussed results in terms of stress and anxiety. Martens (1971, 1974), however, differentiated between arousal and stress. Arousal, as defined by Martens (1974) was "the release of potential energy...manifested at an electrocortical, autonomic, or behavioral level" (p.162) while stress was considered synonymous with anxiety, or subjectively perceived feelings of tension, apprehension, or autonomic arousal. To further the linguistic confusion among arousal, anxiety, and stress, in discussing his well known hypothesized continuum of optimal arousal for typical sports, Oxendine (1970, 1984) intermittently discussed arousal, emotional arousal, and motivation.

The interchanging of various anxiety related constructs has long been a criticism of anxiety research (e.g., Landers, 1980; Martens, 1974). The first step in eliminating the semantic confusion is to embody concise operational definitions of the various anxiety related constructs. This section of the review will present definitions for the following anxiety constructs: arousal, state anxiety, trait anxiety, cognitive anxiety, and somatic anxiety.

Arousal

Arousal typically has been referred to as physiological activation or autonomic reactivity. Landers (1980) defined arousal as "a motivational construct" or "the intensity level of behavior" (p. 77). It can be examined along a continuum from sound asleep to extremely excited (Malmo, 1959). Landers and Boutcher (1986) viewed arousal as "an energizing function that is responsible for of the body's resources for intense and vigorous activity" (p. 164). Martens (1987) more recently contended that arousal should also include mental activation. In his applied version of the reversal theory, the psychic energy theory, psychic energy was defined as "the vigor, vitality and intensity with which the mind functions" (p.92). Hence, as defined by Gould and Krane (in press), arousal is the general physiological and psychological activation of an organism which varies on a continuum from deep sleep to intense excitement.

Measurements of physiological arousal can be classified as electrophysiological, respiratory and cardiovascular, or biochemical (Hackfort & Schwenkmezger, 1989). Typical measures of arousal include heart rate, blood pressure, respiration rate, EMG, biochemical indicants such as epinephrin or adrenalin, and galvanic skin response. Hackfort and Schwenkmezger noted several advantages of using indices of physiological arousal including (1) physiological measures of arousal are independent of verbal expressive ability and are not subject to social desirability bias; and (2) arousal also can be measured during performance, through physiological measures taken while the athlete is performing, in contrast with self-report measures where performance must be interrupted in order to complete. It should also be noted that arousal has been measured through self-report measures such as the Thayer's (1967) Activation-Deactivation Checklist and Zuckerman's (1960) Affect Adjective Check List.

Anxiety

Anxiety can be considered the emotional impact or cognitive assessment of physiological arousal. Landers (1980; Landers & Boutcher, 1986) suggested that unpleasant emotional reactions may accompany arousal of the autonomic nervous system; this maladaptive condition is state anxiety. Martens (1977) suggested that state anxiety reactions would result from an objective environmental demand which was interpreted as threatening (a perceived imbalance between the demand and one's response capabilities) by an individual. Spielberger further delineated between state and trait anxiety.

Spielberger (1966, 1972) expressed that for a theory of anxiety to be adequate, it must differentiate between anxiety as a mood state and as a personality trait. It must also differentiate among the stimulus conditions antecedent to these forms of anxiety. Following this, Spielberger (1966) proposed the state-trait theory of anxiety which differentiated among state and trait anxiety. State anxiety was defined as a transitory state, or how one feels at a specific instance in a given situation, consisting of apprehension, tension, and heightened arousal. This condition varies and fluctuates proportional to the perceived threat in the immediate situation. Trait anxiety, on the other hand, was how one generally feels, or a relatively stable predisposition to perceive a wide range of situations as threatening and to respond to these with state anxiety. The state-trait theory of anxiety predicted high trait anxious individuals would react with greater state anxiety in more situations than low trait anxious individuals.

Anxiety has been typically measured with self-report questionnaires. Although there are many criticisms of self-report measures, especially their susceptibility to social desirability bias (Hackfort & Schwenkmezger, 1989; Neiss, 1989; Williams & Krane, 1989), psychological inventories became the more popular measure of anxiety because of the ease of administration, especially in field settings. Martens (1977) defended their use in stating "that the assessment of A-state [state anxiety] through self-report measures tells us more about the subject's general state of arousal than any single or composite index of physiological measures" (p.115). Another criticism of anxiety questionnaires was that they were often used with disregard for their theoretical construction (Simon & Martens, 1976). Most anxiety inventories were developed as measures of specific theories. For example, the Taylor Manifest Anxiety Scale (Taylor, 1953) was a measure of drive, but was often utilized in studies of the inverted-U hypothesis (e.g., Matarazzo, Ulett, & Saslow, 1955).

Consistent with his state-trait theory of anxiety, Spielberger developed the State-Trait Anxiety Inventory (STAI) which differentiated between state and trait anxiety. This became a popular tool in sport psychology and is still being used by some researchers. As the investigation of anxiety in sport psychology progressed, Martens (1977) expressed the need for sport specific measures of anxiety and developed the Sport Competition Anxiety Test (SCAT) to measure competitive trait anxiety. Competitive trait anxiety was defined as the "tendency to perceive competitive sport situations as threatening and to respond to these situations with feelings of apprehension and tension" (Martens, 1977, p. 23). Martens (1977) also noted the need for a sport specific measure of state anxiety, as well as a trait scale. His modification of the state scale of Spielberger's STAI resulted in the original Competitive State Anxiety Inventory (CSAI).

In summary, state anxiety is a transitory state which is characterized by feelings of apprehension and tension and heightened arousal, while trait anxiety is a general predisposition to perceive a wide range of situations as threatening and to react to these with state anxiety. Both state and trait anxiety are typically measured with self-report inventories.

<u>Differentiating Between Cognitive and Somatic Anxiety</u>

Recent anxiety literature in sport psychology has focused on the multidimensional nature of anxiety (e.g., Burton, 1988; Gould, et al., 1987; Krane & Williams, 1987a; Martens et al., 1990). This line of research stems from the work of Borkovek (1976) and Davidson and Schwartz (1976) who delineated among cognitive and somatic anxiety. Borkovek noted that there were "three separate but interacting" response components of anxiety: cognitive, physiological, and overt behavioral. Cognitive anxiety was characterized by negative concerns about performance, inability to concentrate, and disrupted attention while somatic anxiety, or perceived physiological anxiety, was characterized by perceptions of bodily symptoms of autonomic reactivity such as butterflies in the stomach, sweating, shakiness, and increased heart rate (Davidson & Schwartz, 1976; Martens et al., 1990; Kauss, 1980). The behavioral component of anxiety can be viewed as the overt physical reactions (e.g., shaking hands, changes in communication levels) or an athlete's performance.

Although previous literature in general psychology and test anxiety had differentiated between cognitive and somatic anxiety, Martens and his colleagues (1983) popularized this line of research in sport psychology with the development of the Competitive State Anxiety Inventory - 2 which consisted of separate measures of cognitive and somatic anxiety. This is the most commonly used multidimensional anxiety measure in sport psychology, but the Cognitive-Somatic Anxiety Questionnaire (Schwartz, Davidson, & Goleman, 1978) has also been utilized.

While anxiety research in sport has been utilizing multidimensional state anxiety measures, competitive trait anxiety has typically been examined through a unidimensional trait anxiety measure. Competitive trait anxiety has been defined as "a tendency to perceive competitive situations as threatening and to respond to these situations with A-state [state anxiety]" (Martens, Vealey, & Burton, 1990). Recently, a multidimensional measure of trait anxiety, delineating between cognitive and somatic trait anxiety, has been developed by Smith, Smoll, and Schutz (in press). The Sport Anxiety Scale (SAS) was developed as a sport specific measure consisting of three subscales: somatic reactions, cognitive worry, and concentration disruption. Although originally intending to develop only two subscales, the cognitive component of trait anxiety consistently split into two factors (worry and concentration disruption) during preliminary principal component and factor analyses. While univariate competitive trait anxiety has been shown to be highly correlated with state cognitive and somatic anxiety (Gould, Petlichkoff & Weinberg, 1984; Krane, 1985; Martens et al., 1990), because of the newness of the SAS, these findings have not yet been replicated within a multidimensional conception of anxiety. It would be predicted, however, that trait cognitive and somatic anxiety would be strong predictors of state cognitive and somatic anxiety respectively.

In summary, multidimensional anxiety consists of cognitive anxiety, characterized by negative thoughts, worries about performance, and disrupted attention, and somatic anxiety, or one's perceived physiological arousal. Trait anxiety has also been separated into cognitive and somatic anxiety.

<u>Metamotivational States - Telic and Paratelic States</u>

For years, state anxiety has been viewed as the negative affect, mental intensity dimension of arousal. Recently, however, Kerr (1985, 1987) has brought to the attention of European sport psychologists Apter's (1976, 1984) theory of psychological reversals, which has suggested that arousal can at times be both positive and negative. Specifically Apter's theory of psychological reversals holds that increased arousal may be interpreted as anxiety or excitement depending on one's metamotivational state. Low arousal, on the other hand, may be interpreted as boredom or relaxation. In a telic metamotivational state, the subject is goal directed and serious and high arousal is perceived as negative affect, synonymous with high state anxiety. In a paratelic, high arousal metamotivational state, however, the athlete is in an activity oriented, playful, positive affect state which is very enjoyable. In fact, Martens (1987) has labeled this positive psychic energy. Unfortunately, a valid telic metamotivational state measure has not been developed.

Stress and the Stress Process

The term stress has often been utilized as synonymous with anxiety. Martens (1971, 1977) noted the inconsistencies in the use of this term, pointing out that stress has been defined as a stimulus, intervening, or response variable. Stress has also been described as both an environmental variable and an emotional response to a specific situation (Gould & Petlichkoff, 1987). Smith and Smoll (1982) suggested that these are two distinct entities and noted that researchers must distinguish between an athlete's perception of stress and potential environmental stressors. Cofer and Appley (1964) defined stress as "the state of an organism where he (sic) perceives that his well-being (or integrity) is endangered and that he must devote all of his energies to its protection" (p. 453). This definition advocates that stress involves an interaction between the individual and the environment and that there must be a perceived threat involved. Selye (1974) further differentiated between eustress, or good stress, and distress or bad stress, suggesting that not all stressors should be perceived as negative.

In order to address the inconsistencies in the use of the term stress, a process definition has been adapted by some sport psychologists (e.g., Gould, 1987; Gould & Petlichkoff, 1987, Martens, 1977, Passer, 1982). McGrath (1970) developed a process model of stress in which stress was defined as "a substantial imbalance between (environmental) demand and response capability, under conditions where failure to meet the demand has important consequences" (p.20).

McGrath's (1970) model was composed of four interrelated stages. The first stage consisted of an environmental situation or demand placed upon an athlete which may or may not be perceived as such by different athletes (e.g., a soccer player has to compete in front of a large crowd). Thus, the second stage is the individual's perception of the environmental demand. Martens (1977) elaborated on this stage by indicating that an athlete will feel threatened if he or she perceives an imbalance between the demands of the situation and one's response capabilities. For example, a soccer field may be perceived as a place to display one's soccer skills by one player, yet be viewed as threatening by a less confident player.

The third stage in McGrath's model is the response of the individual (e.g., state cognitive anxiety, butterflies in the stomach) while the last stage is the performance or outcome of behavior (e.g., performing well, choking). Martens (1977) summarized this model as "stress is the process that involves the perception of substantial imbalance between environmental demand and response capability, under conditions where failure to meet demand is perceived as having important consequences and is responded to with increased levels of A-state" (p. 9). This model differentiated between stress and anxiety whereby stress was an environmental influence mediated by one's perceptions and anxiety was the cognitive manifestation of stress.

The advantages of viewing stress as a process include: (1) stress was defined as sequence of events leading to a specific behavior and not in an emotional context, (2) stress is viewed in a cyclical fashion, (3) stress may be viewed as positive or negative, and (4) the emphasis is placed on the athlete's perception of the situation, not merely the situation.

Summary of Anxiety Definitions

The following operational definitions of anxiety terms will be used throughout this investigation.

Arousal is defined as general physiological and psychological activation of the organism which varies on a continuum from deep sleep to intense excitement.

Stress is defined as "a substantial imbalance between (environmental) demand and response capability, under conditions where failure to meet the demand has important consequences" (McGrath, 1970, p.20).

Anxiety will be viewed as feelings of nervousness and tension associated with activation or arousal of the organism (Gould & Krane, in press).

State anxiety is a transitory state, or how one feels right now in a given specific situation, consisting of apprehension, tension, and heightened arousal (Spielberger, 1966).

Trait anxiety is how one generally feels, or a relatively stable predisposition to perceive a wide range of situations as threatening and to respond to these with state anxiety (Spielberger, 1966).

Cognitive anxiety is operationalized as negative concerns about performance, inability to concentrate, and disrupted attention (Davidson & Schwartz, 1976; Kauss, 1980; Martens et al., 1990).

Somatic anxiety is defined as perceptions of bodily symptoms of autonomic reactivity such as butterflies in the stomach, sweating, shakiness, and increased heart rate (Davidson & Schwartz, 1976; Kauss, 1980; Martens et al., 1990).

Bridging the Gap Between Arousal and Anxiety

Sport psychologists need to come to terms with the inconsistent use of arousal and anxiety related constructs. The interchanging of these terms has created considerable confusion in the literature and has helped to obscure the exact nature of the anxiety-performance relationship. By using precise operational definitions of terms, future research will be more cognizant of the differences between arousal, cognitive and somatic anxiety, and stress. It should also be realized that one cannot assume that a measure of one construct will adequately reflect another. For example, physiological arousal (e.g., heart rate) should not be confused with perceived somatic anxiety even though they may be related. It is also important to identify the theoretical distinctions for utilizing specific terms in future research.

Measurement of various anxiety-related constructs has also propagated controversy within sport psychology. The debate whether psychological anxiety inventories or psychophysiological indices of arousal are most appropriate has been ongoing in sport psychology. It has sometimes been assumed that self-report measures of anxiety were tantamount to obtaining physiological measures of arousal in terms of effects on athletic performance. Martens (1977) stated he was convinced that self-report measures would indicate more about an athlete's state of arousal than any composite of physiological indices. Landers, Wang, and Courtet (1985) suggested that physiological measures of anxiety were a more sensitive indication of the effect of anxiety on performance than was self-report anxiety (measured with Spielberger's State Anxiety Inventory). It appears that physiological measures of heart rate may be most appropriate for "sports with demand characteristics, which emphasize minimization of arousal" (Landers, Wang, & Courtet, 1985, p. 127). In sports such as shooting and archery, one's heart rate can interfere with performance by causing slight movements which will affect accuracy. However, in sports involving gross motor movements such as soccer, basketball, or swimming, one's cognitive interpretation of heart rate may be a stronger influence on performance than actual heart rate. That is, an athlete may interpret a racing heart as being pumped up for performance or as an indication of being overanxious and this interpretation will affect performance in a positive or negative direction.

More studies are needed which incorporate both self-report anxiety questionnaires and physiological measures of arousal to gain a more complete description of the anxiety-performance relationship. An important consideration of future studies is the need to utilize a specific construct and respective measurement tools consistent with the theoretical rationale of a particular study. Further, more consistent use of operational definitions will also help eliminate some of the confusion in the anxiety literature.

Gould and Krane (in press) have developed a conceptual model incorporating arousal-related terminology including stress, arousal, and cognitive and somatic anxiety (see Figure 1). The model proposes arousal ("a general physiological and psychological activation of the organism which varies on a continuum from deep sleep to intense excitement") as the central construct. Level 2 of the model delineated arousal into a physiological component and a cognitive interpretation-appraisal component. This latter cognitive interpretation-appraisal component is further differentiated into its three components: (1) somatic anxiety or an athlete's perception of his or her physiological arousal; (2) cognitive anxiety or a telic state which is an athlete's negative affect or worry; and (3) a paratelic state or positive affect cognitive appraisal component (Gould & Krane, in press). The right side of the model incorporates trait anxiety which can influence an athlete's cognitive appraisal of physiological arousal as well as actual arousal levels.

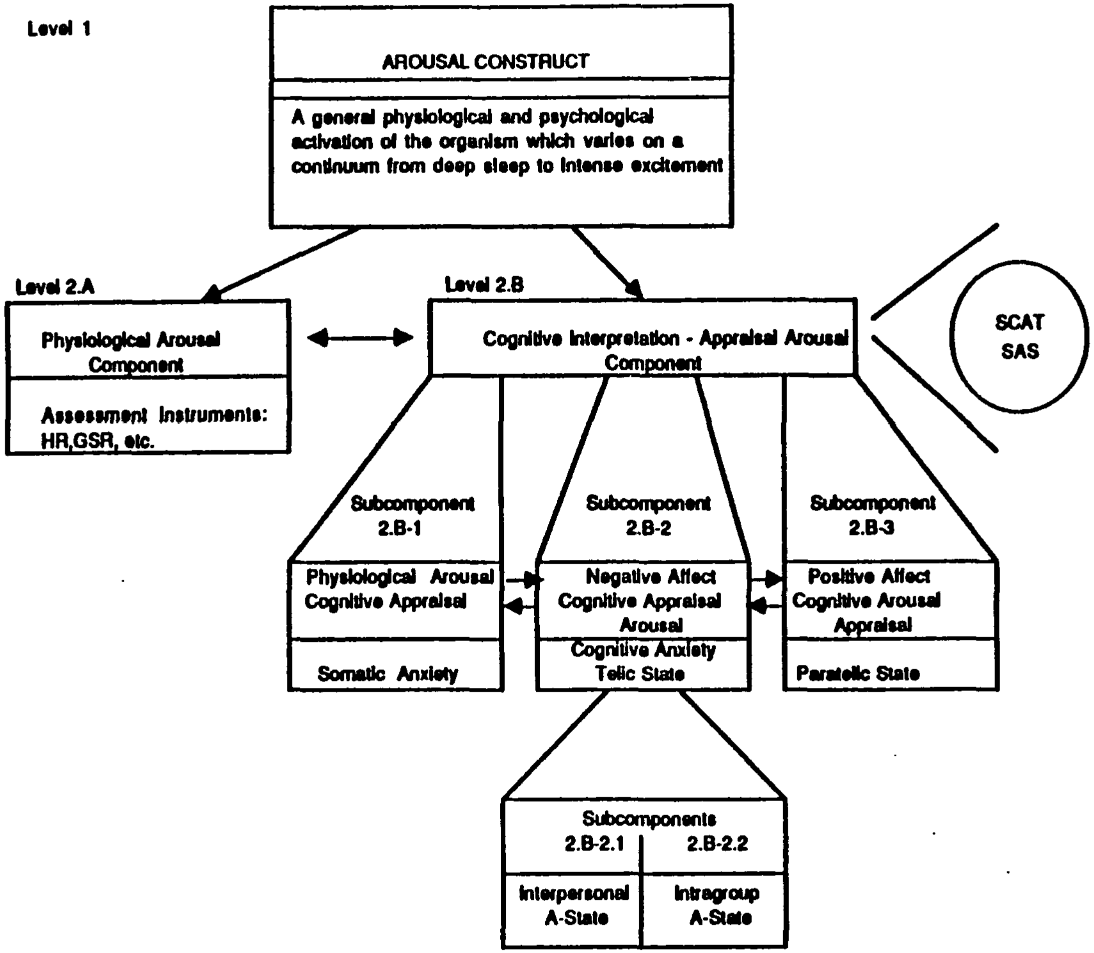

Figure 1. A Conceptual Model for Integrating Arousal Construct Terminology (from Gould & Krane, in press)

Gould and Krane (in press) stated:

> It is important to note that Level 2 of the model makes a critical distinction between physiological and psychological arousal. Specifically, physiological arousal manifestations are hypothesized to be related to, but conceptually different from, one's cognitive interpretation of the arousal construct. This is not to say that physiological arousal and cognitive appraisal of arousal components do not share common variance. In contrast, they would be expected to be correlated. It is our contention, however, that although they are correlated to some degree, they are in many ways unique. Hence, by differentiating between levels 2A [physiological arousal component and cognitive interpretation-appraisal component] and 2B [somatic anxiety, cognitive anxiety, paratelic state] of the model, researchers will not fall prey to the conceptual trap of viewing physiological arousal and state anxiety assessments as synonymous. In turn, studies can be conducted to identify common variance between these components, while at the same time determining aspects of these components that differentially relate to performance (p. 32).

The practicality of this model is that it identifies how researchers have examined different areas of the anxiety/arousal- performance relationship. This model further suggests that no specific line of research is right or wrong, merely that no research to date has encompassed all the different aspects of this elusive relationship. For example, the research of Landers and his colleagues has examined the anxiety constructs on the left side of the model (physiological arousal) while Martens and his colleagues have investigated the constructs on the right side of the model (cognitive interpretation-appraisal). Both lines of research have greatly added to our understanding of the anxiety-performance relationship, although future researchers may wish to bridge the gap between them when possible.

Arousal-Performance Relationship Hypotheses and Theories

A number of theories and hypotheses have been forwarded examining the relationship between arousal or anxiety and athletic performance. One of the first theories proposed was the drive theory which was followed by the inverted-U hypothesis. More recent theories include the multidimensional theory of anxiety, reversal theory, and catastrophe theory. In the following section, each of these theories will be discussed.

Drive Theory

The drive theory, originally proposed by Hull (1943) and modified by Spence and Spence (1966), expressed performance as a product of drive and habit strength. Drive was considered synonymous with arousal and habit strength was the dominance of the correct or incorrect task response. Thus the arousal performance relationship was expressed as linear. The dominant response early during learning would be the incorrect one, while in well-learned tasks the dominant response would be the correct one. Hence, increased arousal would be detrimental during skill acquisition, yet beneficial to a well-learned or mastered task or very simple tasks.

In a review article, Taylor (1956) cited a series of studies using a serial verbal maze learning task which supported the drive theory. As anxiety increased, subjects committed more errors during learning of this task. These errors, according to Taylor, were due to interfering response tendencies. This review also cited eight studies examining eyelid conditioning which supported the hypothesis that high anxious subjects would out-perform low anxious subjects. In over twenty-five studies reviewed by Spence and Spence (1966), all but four supported the hypothesis that arousal was positively correlated to performance.

Several years after the Spences' review, Martens (1971, 1974) conducted extensive reviews of the literature testing the drive theory motor performance relationships and found about an equal number of studies supporting and rejecting the predicted relationships between anxiety and performance.

Martens noted several criticisms of the drive theory and concluded by suggesting the abandonment of the drive theory as a theoretical approach to the anxiety-performance relationship.

Criticisms of the Drive Theory

Although many studies supported the drive theory, these employed very simple tasks. This became the basis for a common criticism of this theory: it did not seem to be sufficiently applicable to complex motor tasks (Martens, 1971, 1974; Tobias, 1980; Weinberg, 1979) and thus was considered too simplistic (Fisher, 1976). Another criticism of the drive theory was that it was very difficult to determine the habit hierarchy of correct and incorrect responses in most motor skill tasks and was thus difficult to adequately test the theory. Hence, Martens (1971, 1974) strongly rejected the use of the drive theory in motor behavior and suggested that the inverted-U hypothesis would be a better predictor of performance.

The Inverted-U Hypothesis

In 1908 Yerkes and Dodson proposed the inverted-U hypothesis to explain the relationship between arousal and performance. They suggested that heightened arousal enhanced performance to a certain point after which continued increases in arousal would lead to a detriment in performance resulting in a curvilinear relationship between arousal and performance. Duffy (1932) noted that increased muscular tension led to poorer performance of a muscular activity and that high tension would decrease response flexibility. It was concluded that "a moderate degree of tension offers the greatest advantages, since very high tension tends to be disruptive and very low tension involves lack of alertness or effort" (p. 545). Hebb (1955) further suggested that there was an optimal level of arousal where an individual would perform at one's maximum potential.

The inverted-U hypothesis has received considerable attention from sport psychologists and has been the primary explanation used in recent years to interpret the anxiety-performance relationship. Martens (1974) noted that the inverted-U hypothesis generated much research in sport psychology because: (1) "considerable evidence has been inferred to support this hypothesis," (2) "the inverted-U hypothesis has a great deal of appeal at an intuitive level," (p. 174) and (3) it provided an alternative to the drive theory.

Much of the early support for the inverted-U hypothesis was derived from the trait anxiety literature. Martens (1974) contended that most of these studies merely indirectly supported the inverted-U hypothesis because the studies did not examine three distinct levels of anxiety. Instead, they compared the performance of high trait anxious and low trait anxious subjects and assumed that moderately trait anxious subjects would follow the inverted-U pattern. A true test of the inverted-U theory would consist of examining at least three distinct levels of anxiety.

Later, several studies which included three distinct levels of anxiety supported the inverted-U hypothesis. Martens and Landers (1969), when examining performance on a tracing task involving arm steadiness, supported the hypothesis. They found junior high boys in a moderately stressful situation performed the task better than those in the low stress or high stress conditions (threat of shock). Also, moderately trait anxious boys performed better than low or high trait anxious boys. Matarazzo, Ulett, and Saslow (1955) found that seven groups who significantly differed in trait anxiety levels demonstrated performances consistent with the inverted-U curve. A study utilizing a throwing task also found subjects in a moderately stressful situation performed better than subjects in low or high stress conditions (Weinberg & Ragan, 1978).

The inverted-U hypothesis was also supported in several field studies. Klavora (1977) supported the inverted-U hypothesis with male high school basketball players. A range of optimal state anxiety was found where adequate performances were most noted. Further, two separate inverted-U curves were found for low and high trait anxious athletes. Performance of female, collegiate basketball players was also shown to follow an inverted-U pattern (Sonstroem & Bernardo, 1982). Athletes who scored the most points and had the best overall basketball performance (process) measures were those with moderate trait and state anxiety. The worst performances were exhibited by the high anxious players. Support for the inverted-U hypothesis was also found in a study of hitting performance in Little League baseball players (Lowe, 1973, cited in Martens, 1977) with best performances occurring when players were under moderate stress.

Criticisms and Problems with the Inverted-U Hypothesis

Recently the inverted-U hypothesis has been the recipient of much criticism. Contemporary researchers have argued that the inverted-U hypothesis is not capable of fully explaining the complex relationship between arousal and performance (Jones & Hardy, 1989; Neiss, 1988, Weinberg, in press). Previous studies purporting to support this hypothesis suffer from methodological, conceptual, statistical, interpretive, and practical problems (Hardy & Fazey, 1987; Neiss, 1988; Weinberg, in press). Equivocal findings were often explained by noting individual differences, task characteristics, or imprecise measurement of performance (Weinberg, in press).

Conceptual Problems. Controversy exists as to the actual nature of the inverted-U hypothesis. That is, whether it proposes a correlational relationship between arousal and performance or whether it is a causal hypothesis has been questioned (Neiss, 1988). Landers (1980) contended that the inverted-U hypothesis did not explain the relationship between arousal and performance, but that it merely noted that the relationship was curvilinear. A hypothesis is necessary which will allow for explanation and prediction concerning the exact relationship between anxiety/arousal and performance, not just the general shape of the relationship. Landers (1980) suggested "what has been missing in previous research is the role that attention plays in most sport skills" (p. 81) and suggested that the incorporation of Easterbrook's (1959) Cue Utilization theory into the inverted-U hypothesis may be particularly heuristic.

As has already been addressed, the anxiety literature has been confused by the use of several different constructs when examining the arousal-performance relationship. This has even occurred within single studies which Neiss (1988) contended is conceptually indefensible.

Hardy and Fazey (1987) also indicated the failure to recognize the multidimensional nature of anxiety in the inverted-U hypothesis as problematic. Although recently sport psychologists have advocated the adoption of a multidimensional conception of anxiety (Landers, 1980; Martens et al., 1990), researchers have attempted to examine these anxiety subcomponents within the unidimensional inverted-U model (e.g., Burton, 1988; Gould et al., 1987). Although the exact nature of the relationship between cognitive anxiety, somatic anxiety, physiological arousal, and athletic performance has not yet been determined, it is apparent that anxiety is a complex, multidimensional construct which may not be described by the simplistic, unidimensional inverted-U hypothesis.

Another conceptual problem noted by Apter (1979) was that low arousal may be associated with relaxation or boredom and that high arousal could be associated with excitement or anxiety. The inverted-U hypothesis does not differ among these states which may differentially influence performance. Apter (1976) suggested that there may be more than one system operating which influences arousal. One may demonstrate an optimal level of arousal, yet another may attempt to reduce arousal similar to the drive theory. Neiss (1988) stated

> under the pressure of observation or competition, many athletes, musicians, and dancers experience a debilitating degree of anxiety. Though this state may well include heightened physiological indicators of arousal, so too does the optimal state of readiness for motor performance -- that is, the state of being

'psyched up.' I will demonstrate that no evidence yet exists for the assumption (implicit in the inverted-U hypothesis) that the former state shows more arousal than the latter (p. 346).

Methodological Problems. A methodological problem often encountered when testing the inverted-U hypothesis has been the operational definition of performance. Too often performance has been measured by a single outcome measure which may not have been an adequate indicant of how well an athlete actually performed. For example, an athlete who placed third in an event will typically be considered successful. However, this individual may have expected to win the event, therefore he or she was not successful based on previous performance, ability, or expectations. During three days of a golf tournament, Krane (1985) found stronger correlations between performance and cognitive and somatic anxiety on the following day than between the precompetitive cognitive and somatic anxiety and subsequent performance.

In previous studies performance has often been dependent upon extraneous factors such as the skill of an opponent or field or course conditions such as the difficulty of a golf course (e.g., Gould et al., 1984; Martens et al., 1990). A more precise measure of performance would be purely a function of athletic skill, independent of outside factors. It is important that the performance measure be based on subjects' own performance and not be influenced by extraneous factors.

Gould et al. (1987) suggested that a standardized performance measure be utilized. These researchers recommended that these performance measures would be more precise and could control for extraneous factors. Comparison of a performance to one's average in golf, for example, would be a more sensitive measure of athletic performance than placement in one particular tournament (Krane & Williams, 1987a). Barnes et al. (1986) provided an example of an intraindividual performance measure, assessing swimming performance as a function of average previous times, time achieved in the current competition, and the standard deviation of the athlete's previous times.

It has further been suggested to examine subcomponents of performance to derive a more detailed analysis of the anxiety-performance relationship (Jones & Cale,1989; Jones, Cale & Kerwin, 1988). This approach has been used examining a short-term memory task and a jump task in basketball players prior to competition (Parfitt & Hardy, 1987) and simple reaction time (SRT) and discriminant reaction time (DRT) tasks in cricket players approximately 20 minutes prior to batting in a competitive match (Jones, Cale & Kerwin, 1988). While both of these studies purported to examine subcomponents of performance, neither actually measured a particular sport skill during a competitive event. Jones and his colleagues defended the use of the reaction time tasks as performance subcomponents, stating that "the two tasks were relevant to batting performance, of course, in that batting requires the ability to react quickly (ie SRT) and particularly to make rapid discriminations between different stimuli (ie DRT)" (p. 6). However, a more sport specific example is to examine soccer performance broken down into passing, heading, and shooting, as well as various defensive skills measured during actual competitive matches.

Weinberg and Hunt (1976) showed the importance of examining the process components of motor performance. They found that the quality of movement was affected by anxiety. During a throwing task, it was found that high anxious subjects used more energy and exerted this energy over a longer period of time than low anxious subjects. Unlike low anxious subjects, high anxious subjects' muscles continued to contract even after they threw the ball. Using kinematic assessments, Beuter and Duda (1985) found under high arousal, automatic and smooth movements became less smooth and efficient. These results were extended in a second study (Beuter, Duda, & Widule, 1989) indicating that more kinematic energy was used under conditions of high stress. These studies suggest that researchers may also wish to examine performance from a process perspective.

Statistical Problems. Individual differences in optimal levels of arousal have been used to explain results that have not supported the inverted-U hypothesis. However, few studies have examined these individual differences. Most anxiety studies have averaged group scores on anxiety measures which have obscured individual differences. On a practical level it has often been stated that each athlete will have a unique optimal level of arousal most beneficial to his or her peak performance. In fact, this notion is included in the instructions given to athletes on the Competitive State Anxiety Inventory - 2 (Martens et al., 1990). However, few research studies have examined intra-individual anxiety. Consistent with the procedure used by Sonstroem and Bernardo, Gould et al. (1987) and Burton (1988) reiterated the need for intra-individual statistics. This was accomplished by obtaining a mean anxiety subscale score for each athlete and then computing standard scores which were then used in subsequent analyses. In using standard scores, all anxiety scores were relative to an athlete's average. High anxiety reported by one athlete may be quite a bit lower than for another athlete, yet in both cases, their anxiety levels would be beyond their typical or optimal level of anxiety.

Interpretive Problems. Interpretation of findings in previous studies has been problematic. For example, it was often difficult to determine whether anxiety lead to poor performance or whether previous poor performance precipitated increased anxiety (e.g., Krane, 1985; Neiss, 1988; Weinberg & Genuchi, 1980). As Heyman (1982, 1984) suggested, successful performance may lead to lower anxiety levels in subsequent performance. A study of amateur male golfers showed that the golfers with a low handicap also had lower state anxiety than middle and high handicap golfers (Cook et al., 1983). Since one's golf handicap is a good indicant of skill level, it seemed premature to conclude that lower anxiety enhanced golf performance. Equally possible was that ability may have influenced state anxiety levels, unfortunately the statistical analyses in this study did not allow for investigation of causal relationships.

Practical Problems. The inverted-U has "an apparent lack of predictive validity in practical situations" (Hardy & Fazey, 1987, p. 4). Jones and Hardy (1989) designated this a problem of the "symmetry of the performance curve." That is, the inverted-U hypothesis suggests that increases in anxiety beyond one's optimal level will result in decrements of performance at similar increments. However, these investigators argued that experiential knowledge suggests that after an athlete increases anxiety beyond the optimal level, slight decreases in anxiety do not correspond to similar incremental improvements in performance (Hardy &

Fazey, 1987). That is, when an athlete "chokes," drastic measures are needed before performance will return to an even mediocre level. However, this notion is inconsistent with the inverted-U hypothesis.

Conditions Necessary to Test the Inverted-U Hypothesis

Many investigators have failed to provide adequate tests of the inverted-U hypothesis. An adequate test of the inverted-U hypothesis must meet several conditions. First, it is important that three distinctly different levels of anxiety be assessed (Gould et al., 1987; Landers, 1980; Martens, 1974). To examine the curvilinear relationship between anxiety and performance, it is necessary to have statistically differing levels of low, moderate, and high anxiety for each subject (Martens & Landers, 1970). Burton (1988) noted that a valid test of the inverted-U hypothesis also should (1) include the use of intraindividual anxiety measurement techniques, (2) "employ season- or career-based individual performance measure" and (3) obtain anxiety and performance measures from "athletes competing in real competitive events" (p. 49).

Conclusions About the Inverted-U Hypothesis

The inverted-U hypothesis, as well as some correlates, have been widely accepted in the sport psychology literature. For example, although it has generally been accepted that the optimal arousal level differs corresponding to the complexity of the task (e.g., Landers & Boutcher, 1986; Oxendine, 1970, 1984), there is little experimental research to support this. On the contrary, recent studies have not supported this notion (Burton, 1988; Ebbeck & Weiss, 1988; Krane & Williams, 1990a). However, it should be noted that each of these studies utilized between subjects analyses and did not measure three distinct levels of anxiety, thus were not true tests of the inverted-U hypothesis.

Reliance on the inverted-U hypothesis has left researchers with several unanswered questions about the anxiety-performance relationship. Because of the measurement, interpretive, and definitional problems in studies examining the inverted-U hypothesis, Neiss (1988) purported that the hypothesis was irrefutable. The proposed variability of inter-individual optimal arousal and the influence of task complexity allowed researchers to fit most data to the inverted-U curve. This was evidenced by the number of studies that applied the inverted-U hypothesis retrospectively (Kerr, 1985). Any evidence contrary to the inverted-U hypothesis could be explained by suggesting that the subjects were not sufficiently aroused or that the task was too simple or complex (Neiss, 1988). These criticisms lead Neiss to claim that "the inverted-U hypothesis has not received clear support from a single study" (p. 355).

Multidimensional Theory of Anxiety

As early as 1929 Jacobson noted two types of relaxation effects: cognitive and physiological. Cognitive effects included reduced mental and emotional activity while physiological effects included respiration slow-down, reduced heart rate, and diminished reflexes. Jacobson noted that cognitive and somatic responses were interrelated, adding that cognitive anxiety was incompatible with muscular relaxation. Consequently, it would follow that anxiety, the antithesis of relaxation, would also consist of these two subcomponents.

Davidson and Schwartz (1976) proposed two subcomponents of anxiety. They considered cognitive and somatic anxiety two distinctly different components of anxiety which independently affected performance. Contrary to Jacobson, these researchers suggested that cognitive anxiety could exist in conditions of complete muscular relaxation. For example, Borkovek (1976) further delineated among cognitive, physiological, and behavioral components of anxiety which were considered to be "separate, but interacting." In a study of arousal in parachutists, Fenz and Epstein (1967) noted that physiological arousal and psychological fear were two distinct constructs which differentially reacted during preparation for the jump.

Thus, early research has shown the need to differentiate among different anxiety subcomponents, especially cognitive and somatic anxiety. This, it was suggested, would better our understanding of the anxiety-performance relationship (Landers, 1980).

Effects of Cognitive and Somatic Anxiety

One reason for differentiating between cognitive and somatic anxiety was the implication that they had differing antecedent conditions and hence were hypothesized to differentially affect performance (Davidson & Schwartz, 1978; Martens et al., 1990). It has been suggested that somatic anxiety was a conditioned response to competitive situations and that cognitive anxiety would be reflective of negative expectations which have been found to have a powerful influence on performance (Bandura, 1977).

Cognitive anxiety has been hypothesized to interfere with performance because of its distracting properties. The concept of cognitive anxiety as negative concerns about performance, inability to concentrate and disrupted attention (Davidson & Schwartz, 1976) is consistent with previous studies noting the detrimental effects of cognitive worry. Morris, Davis, and Hutchings (1981) noted cognitive anxiety would be expected to be influenced by performance expectancies and is maintained by situational factors. Morris and Liebert (1973) found threat of failure aroused cognitive worry, but did not affect somatic anxiety, or emotionality. Cues which arouse emotionality (e.g., the test taking environment) were expected to lose their salience as one became immersed in the activity and began to refocus attention (Doctor & Altman, 1969; Morris, Davis, & Hutchings, 1981).

In the test anxiety literature, the direction-attention hypothesis noted that high test anxious individuals would perform poorly under conditions of evaluative stress due to different attentional focuses of low and high test anxious persons (Wine, 1980). Low test anxious people would remain focused on task-relevant cues while the high test anxious person's attention would be diverted by self-preoccupied worry. Further support for the distracting nature of cognitive anxiety can be found in Easterbrook's (1959) cue utilization theory which suggested that high anxiety would limit the range of task relevant cues to which one would attend.

Caruso, Dzeweltoski, Gill, & McElroy (1990) found that cognitive anxiety changes corresponded with performance feedback. Specifically, when subjects engaged in an ergometer task were given success feedback, cognitive anxiety decreased from precompetition to post competition. Conversely, when subjects were given failure feedback, cognitive anxiety increased during this time period. These findings supported those of Liebert and Morris (1967) who noticed changes in cognitive worry corresponded to changes in test taking performance.

Somatic anxiety has been hypothesized to be a classically conditioned response to competitive situations (Martens et al., 1990) and has been suggested to emanate from non-evaluative cues (Morris, Davis & Hutchings, 1981). Thus it would be expected that somatic anxiety would increase as competition approached (Burton, 1988; Martens et al., 1990). This was supported by the studies indicating an increase in somatic anxiety during the 24 hours prior to competition (Gould et al., 1984; Jones, Cale & Kerwin, 1988; Krane & Williams, 1987a, Martens et al., 1990). Further, it has been found that experienced athletes have learned to control somatic anxiety and keep it at a facilitative level (Fenz & Epstein, 1969; Krane & Williams, 1987a), lessening its potentially detrimental effects on performance.

In summary, cognitive anxiety has been suggested to negatively influence performance because of its distracting nature which diverts attention away from task-relevant cues. Cognitive anxiety has also been found to correspond with performance feedback, increasing under failure conditions. Somatic anxiety, on the other hand, has been suggested to be a classically conditioned response to the competitive environment which would dissipate, to some extent, as competition began.

Temporal Changes in Cognitive and Somatic Anxiety

Studies supporting the need to differentiate between cognitive and somatic anxiety have found that these anxiety subcomponents have differing patterns of change prior to competition. Liebert and Morris (1967), in a study of test anxiety, found emotionality, or somatic anxiety, to increase prior to test taking while worry or cognitive anxiety changes only occurred when performance changes occurred.

Martens et al. (1990) found that somatic anxiety increased and cognitive anxiety remained stable in the 24 hours prior to competition in gymnasts competing at the National Sports Festival. These results were replicated by Gould, Petlichkoff, and Weinberg (1984) with high school volleyball players and Jones, Cale, and Kerwin (1988) with club cricket players. Differential patterns of change in cognitive and somatic anxiety were found when comparing high school gymnasts to college golfers (Krane & Williams, 1987a). The golfers displayed increases in cognitive anxiety and relatively stable somatic anxiety during the 24 hours prior to competition. The gymnasts, however, displayed a decrease in cognitive anxiety and an increase in somatic anxiety during this time. Although there are some contradictory results in these studies, the differential patterns of change in cognitive and somatic anxiety support the multidimensional conception of anxiety.

Relationship Between Cognitive and Somatic Anxiety and Performance

In the test anxiety literature, worry, the conscious awareness of unpleasant feelings, and emotionality, perceived physiological arousal, were found to differentially relate to test taking performance (Morris et al., 1981). Deffenbacher (1980), in a review of the test anxiety literature, noted that worry consistently had a negative relationship with test taking performance while the relationship between emotionality and test taking was inconsistent. It was concluded that worry was the more important variable as related to test taking performance. Based on these results and Wine's (1980) cognitive attentional theory, Martens et al. (1990) hypothesized that cognitive anxiety would be more strongly related to athletic performance than somatic anxiety.

Martens et al. (1990) suggested that cognitive and somatic anxiety would differentially influence athletic performance. This hypothesis has been examined in several studies revealing varied results. Cognitive anxiety has been found to be the anxiety subcomponent most influential to collegiate wrestling performance (Gould, Petlichkoff, & Weinberg, 1984) and collegiate swimming performance (Barnes, Sime, Dienstbier, & Plake, 1986), while somatic anxiety was the best predictor of police cadet shooting performance (Gould, Petlichkoff, & Weinberg, 1984) and female high school gymnastics performance (Krane & Williams, 1987a). Finally, Burton (1988) found that somatic anxiety was a better predictor of male collegiate swimming performance early in the season, but that cognitive anxiety became the stronger predictor at mid-season and at the conference meet at the end of the season.

Gould et al. (1987) and Burton (1988) examined the relationship between cognitive and somatic anxiety and performance utilizing intraindividual analyses and standardized performance measures. Thus, these studies can be considered the best test of the multidimensional theory of anxiety in the literature. Gould and his colleagues examined pistol shooting performance in police cadets and found an inverted-U relationship between somatic anxiety and performance, while no identifiable relationship was found between cognitive anxiety and performance. Burton also found a curvilinear relationship between somatic anxiety and collegiate swimming performance, but unlike Gould et al. he found a negative linear relationship between cognitive anxiety and performance.

In conclusion, studies have supported the need to differentiate between cognitive and somatic anxiety in sport. It has been predicted that cognitive anxiety would be a stronger influence on performance than somatic anxiety, although support for this is equivocal. Some support has been found for a negative linear relationship between cognitive anxiety and athletic performance and a curvilinear relationship between somatic anxiety and performance.

Inter-Relationship of Cognitive and Somatic Anxiety

One possible reason for the seemingly equivocal results of previous studies examining cognitive and somatic anxiety in sport may lie in the fact that cognitive and somatic anxiety do not act completely independently of one another. Correlations among the anxiety subcomponents suggest that they are more than mildly related (e.g., Caruso, et al., 1990, Jones, Cale, & Kerwin, 1988; Petlichkoff & Gould, 1985). However, while these anxiety subcomponents share some common variance (20-30%), each also accounts for some unique variance. Hence, as Martens et al. (1990) suggested, cognitive and somatic anxiety would not be completely independently of one another and it would be very unlikely to have high somatic anxiety and no cognitive anxiety or vice versa.

Morris et al. (1981) suggested that cognitive and somatic anxiety would not act independent of each other, rather they would covary. This leads to the notion that when examining the anxiety-performance relationship, cognitive and somatic anxiety should be examined in a combined manner. This shared variance or interaction between cognitive and somatic anxiety may jointly affect performance. For example, although Liebert and Morris

(1967) found that cognitive worry was inversely related to test taking performance and emotionality, or somatic anxiety, was not significantly related to performance. Further analyses revealed somatic anxiety was related to performance only when cognitive anxiety was low. It appears that future research on the anxiety-performance relationship should examine the combined effects of cognitive and somatic anxiety. This is consistent with Borkovek's (1976) premise that the anxiety subcomponents may interact such that changes in one component will affect another component.

Noting the potential effects of the interaction among cognitive and somatic anxiety, Davidson and Schwartz (1978) suggested different relaxation techniques for situations of high and low cognitive and somatic anxiety. Thus, under certain situations, different relaxation strategies will be most appropriate in reducing anxiety. For example, meditation was suggested when both cognitive and somatic anxiety were low, progressive relaxation was suggested when cognitive anxiety was low and somatic anxiety was high, passive activities (e.g., reading, watching television) were suggested when cognitive anxiety was high and somatic anxiety was low, and high activity (e.g., tennis, football) was suggested when cognitive and somatic anxiety were high.

The multidimensional theory of anxiety has led to a greater understanding of the effects of anxiety on athletic performance. However, this theory is being conjoined with the inverted-U hypothesis, which is perhaps the biggest limitation of the theory. That is, even though researchers are currently examining two components of anxiety, they are still attempting to identify relationships predicated on the inverted-U theory. Cognitive and somatic anxiety have been treated as two independent subcomponents of anxiety, ignoring any possible interaction. Somatic anxiety has been predicted to have a curvilinear relationship with performance while cognitive anxiety is expected to have a negative linear relationship with performance. Although there is some support for these predictions, there also exists some contradictory findings (e.g., Gould et al., 1987 versus Burton, 1988). Perhaps examination of the combined effects of cognitive and somatic anxiety may provide better insight into the conflicting results of these and previous studies examining the multidimensional theory of anxiety.

Reversal Theory

Another exciting development applicable to the anxiety-performance literature is the reversal theory proposed by Smith and Apter (1975) and popularized in the European sport psychology literature by Kerr (1985, 1987). The basic contention of reversal theory is that the relationship between arousal and emotional affect is dependent upon one's cognitive interpretation of his or her arousal level. High arousal may be interpreted as excitement (pleasant) or anxiety (unpleasant) and low arousal may be interpreted as relaxation (pleasant) or boredom (unpleasant). One's interpretation of affect as pleasant or unpleasant is also known as hedonic tone. Because both arousal and affect vary on continuums, reversal theory predicts that two curves depict the relationship between arousal and affective pleasure (see Figure 2).

Since there are two curves on the arousal-hedonic tone graph, "another dimension of change has been introduced: that of sudden discontinuous switching from one curve to the another. Since these are opposite ways of interpreting arousal the switch can be regarded as constituting a reversal" (Apter, 1984, p. 268). Apter further explains that each curve represents a different metamotivational state or mode. A metamotivational state has been defined as a "phenomenological state characterized by a certain way of interpreting some aspect(s) of one's own motivation. Metamotivational states go in pairs of opposites, only one member of each pair being operative at a given time" (Kerr, 1985, p. 173). The telic mode is characterized by its seriousness or orientation towards a goal while the paratelic mode is characterized by playfulness or is activity oriented (Apter, 1984; Svebak & Stoyva, 1980). The telic mode can also be thought of as arousal-seeking and the paratelic as arousal avoidance. More simply, changes from one metamotivational state to the other are reversals (Kerr,

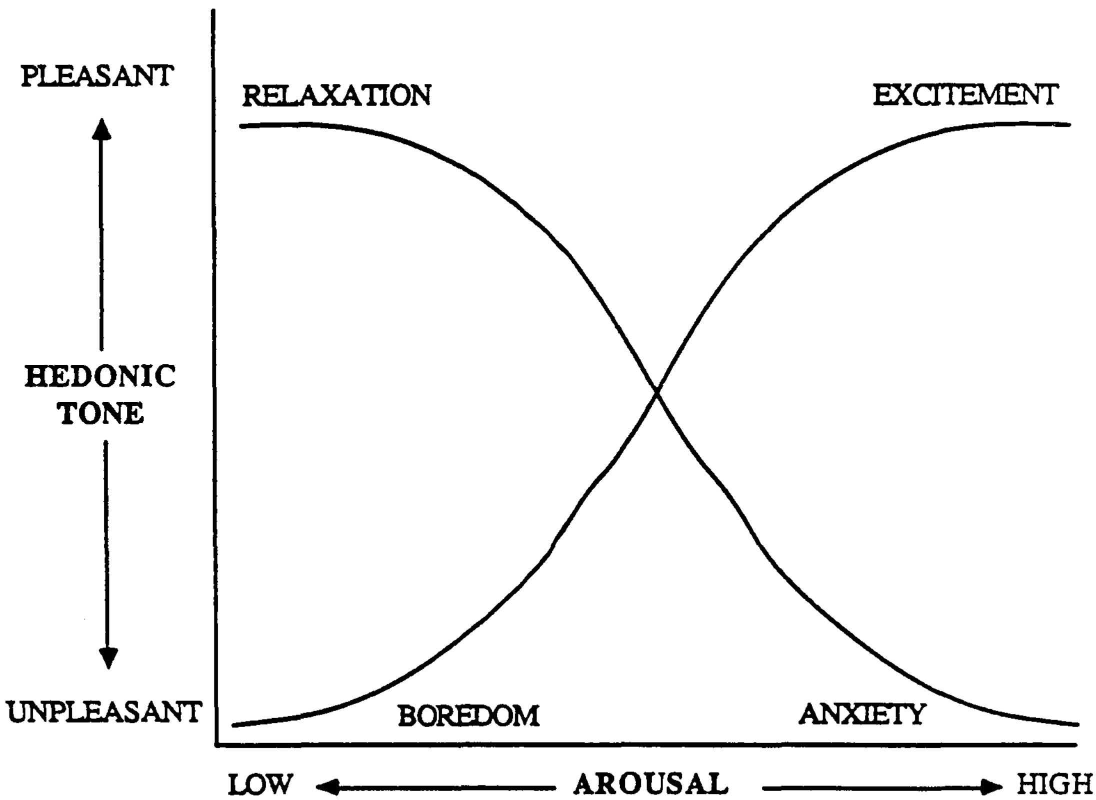

Figure 2. The Relationship Between Arousal and Affect in the Reversal Theory
(from Kerr, 1985)

1985). Apter (1984) used the example of risk-taking sports such as rock climbing or parachuting to explain these concepts. The danger involved induces a high level of arousal, in the telic mode deemed anxiety, and then when the danger is mastered the anxiety suddenly reverses and becomes excitement in the paratelic mode.

Kerr (1985) suggests that arousal and stress continuums must be viewed jointly. This results in four quadrants labeled anxiety, excitement, boredom, and relaxation (see Figure 3). The horizontal arousal continuum ranges from low to high while the vertical axis also ranges from low to high. When arousal and stress (the imbalance between environmental demands and performer response capabilities) are high, anxiety or overstimulation results. Understimulation, or boredom, occurs when stress is high and arousal is low. Conversely, when stress is low and arousal is high, excitement occurs. When both stress and arousal are low, the result is sleep.

A basic interpretation from reversal theory is that arousal is not necessarily unpleasant. Rather, depending on one's metamotivational state it can be perceived as a positive (paratelic) or negative (telic) state. Moreover, Martens (1987) has recently suggested that this distinction is fundamental to understanding the relationship between arousal and performance. In particular, Martens indicated that there is a positive linear relationship between an

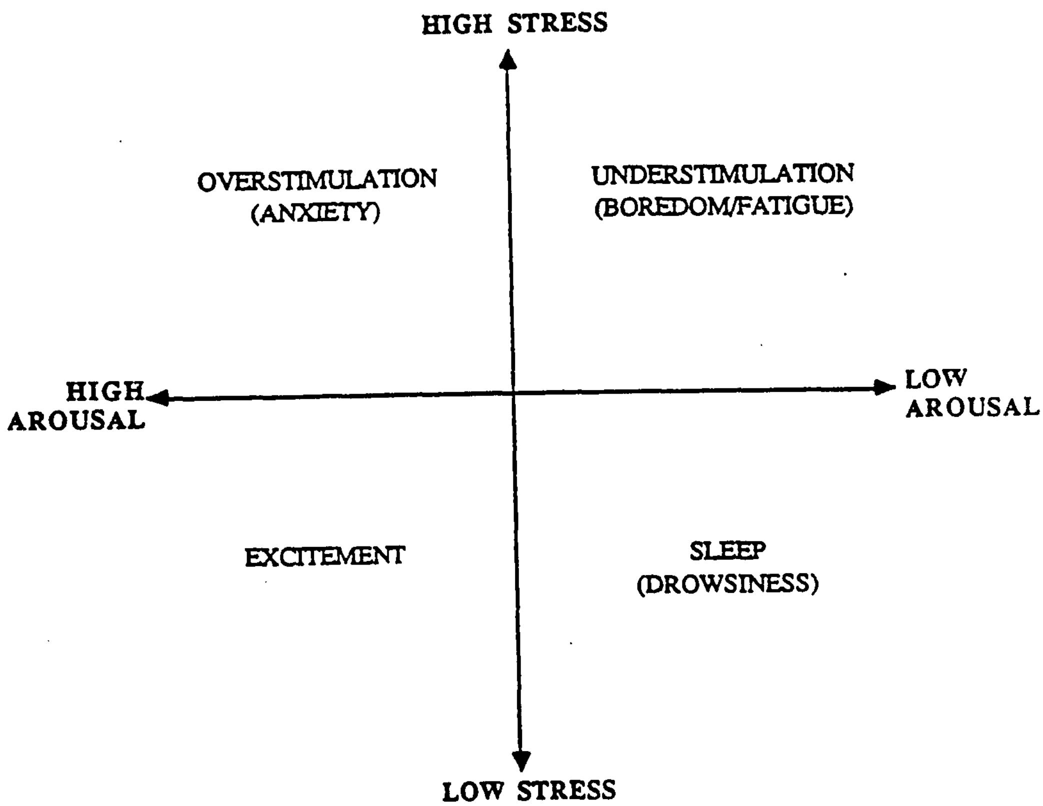

Figure 3. Reversal Theory Arousal-Stress Continuum (From Kerr, 1985)

athlete's paratelic state, or positive psychic energy, and performance, while telic, or negative psychic energy, states are associated with performance in a negative linear fashion. Additionally, Martens has indicated that athletes typically experience both positive and negative psychic energy while performing and sport psychologists have mistakenly interpreted these two metamotivational states as arousal and the inverted-U principle, then, has been incorrectly labeled and interpreted.

Unfortunately, Martens' (1987) interpretation of the reversal theory-sport performance relationship is based totally on his own tacit knowledge and the intuitive appeal of this approach. No empirical evidence exists to support its predictions. In fact, it has never been empirically examined. Additionally, Martens does not predict true reversals since positive and negative psychic energy are thought to be present at the same time (as opposed to switching from telic to paratelic state). While no evidence exists to link reversal theory to athletic performance, components of the general theory have received support in the literature. In a review of the literature Apter (1984) cited several studies supporting reversal theory predictions. Specifically, he noted "the telic-paratelic dimension would appear to have a tangible 'reality' over and above its status as a phenomenological description or an explanatory construct" (p. 283). Apter cited the work of

Svebak and colleagues which found that telic dominant subjects have been found to have increased muscular tension, task-irrelevant muscular tension, greater skin conductance, and greater heart rate in threat conditions compared to paratelic dominant subjects.

In summary then, reversal theory and Martens applied adaptation of it, psychic energy theory, offer an exciting alternative to the inverted-U hypothesis. Gould and Krane (in press) note that the strengths of the reversal theory are its intuitive appeal and the important distinction it places on the athlete's interpretation of arousal states. Current limitations include the lack of a paratelic positive psychic energy measure (assuming state anxiety is synonymous with the telic state) and the lack of any investigations designed to test its predictions. It is certainly a theory which holds tremendous potential for improving our understanding of the arousal-performance relationship.

Catastrophe Theory

An alternative to the inverted-U hypothesis, multidimensional anxiety theory, and reversal theory is the catastrophe theory (Hardy & Fazey, 1987). The inverted-U hypothesis and the catastrophe theory are similar in that both predict that increases in anxiety will facilitate performance up to an optimal level (see Figure 4). However, what occurs next differs between the two theories.

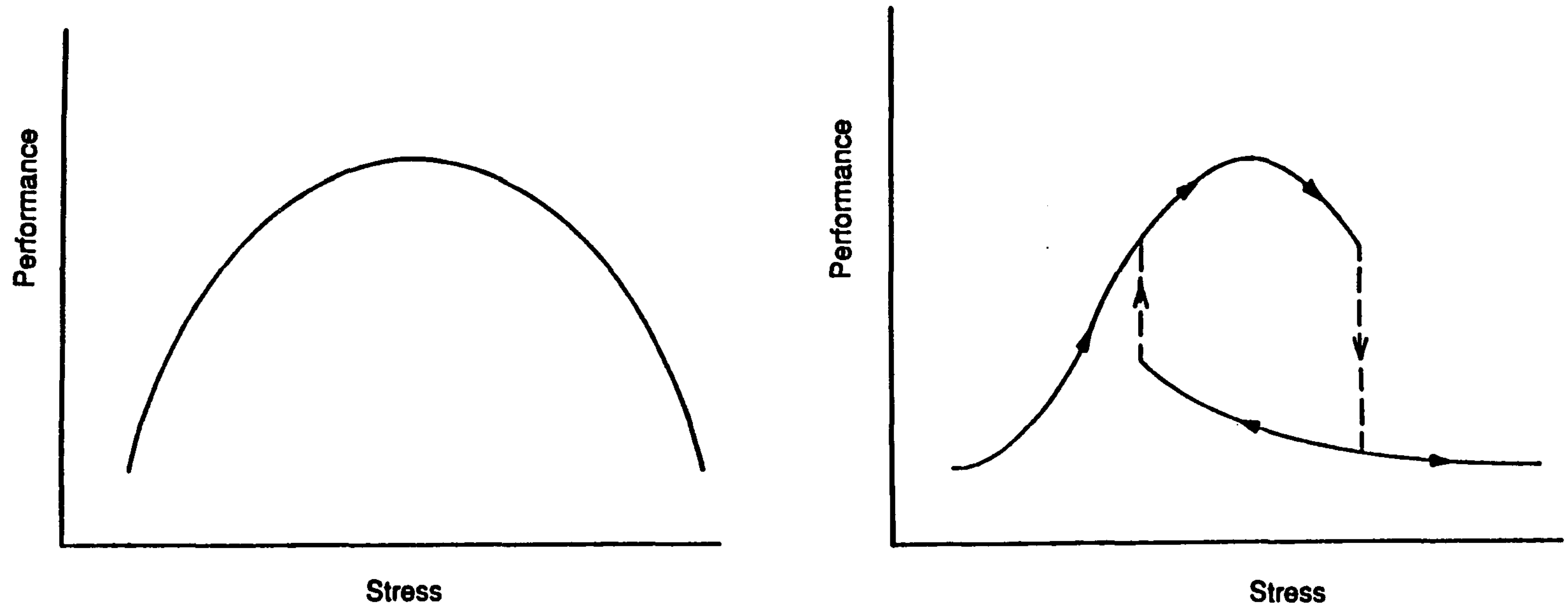

Figure 4. A comparison of inverted-U and catastrophe theory predictions
(from Hardy & Fazey)

The inverted-U hypothesis suggests that with further increases in anxiety, performance will decline in a symmetrical curvilinear manner. Thus slight over-anxiousness will result in slightly hindered performance. However, according to the catastrophe theory, when an athlete "goes over the top" there will be a large and dramatic drop in performance. Thus, it would be very difficult for athletes to recover from this "catastrophe" even to a mediocre level of performance relative to their ability.

The catastrophe theory was derived by Rene Thom (1972) as a mathematical model for describing discontinuities that occur in the physical world and was further popularized by Zeeman (1976) who showed that the model could be applied to social sciences. This model originally received a great deal of attention from scientists in fields such as physics and biology, but was suggested to have limited application to social scientific data. However, many studies have successfully applied the catastrophe model to social phenomena such as aggression (Zeeman, 1976), perceptual changes (Poston & Stewart, 1978; Stewart & Peregoy, 1983), collective bargaining (Oliva, Peters, & Murthy, 1981), public opinion (Isnard & Zeeman, 1976), anorexia nervosa (Zeeman, 1976), attitudes and social behavior (Flay, 1978), and the effect of stress on making judgments (Zeeman, 1976). Catastrophe theory has also been proposed in exercise and sport science. Edwards (1983; Gibson & Edwards, 1987) applied catastrophe theory to explain the relationship between muscular fatigue and motor performance. Stewart & Peregoy (1983) noted

> The enthusiasm is caused by the idea that catastrophe theory may provide a new way to look at human behavior with built in flexibility to adjust from person to person and from situation to situation. Catastrophe theory holds out the promise of a small number of shapes that can be used to model a large number of behaviors (p. 356).

The Cusp Catastrophe Model Applied to Athletic Performance

Several catastrophe models have been developed, the most commonly applied model, and most easily understood, being the cusp catastrophe model (see Figure 5). The cusp catastrophe model assumes that there are two subcomponents to anxiety and attempts to explain the interaction between them. This three dimensional, non-linear model consists of a normal factor, a splitting or bifurcation factor, and a dependent variable (Zeeman, 1976). The normal factor is the variable in which increases are associated with increases in the dependent variable. The normal factor has a linear relationship with the dependent variable. The splitting factor at least partially determines the effect of the normal factor on the dependent variable. That is, increases

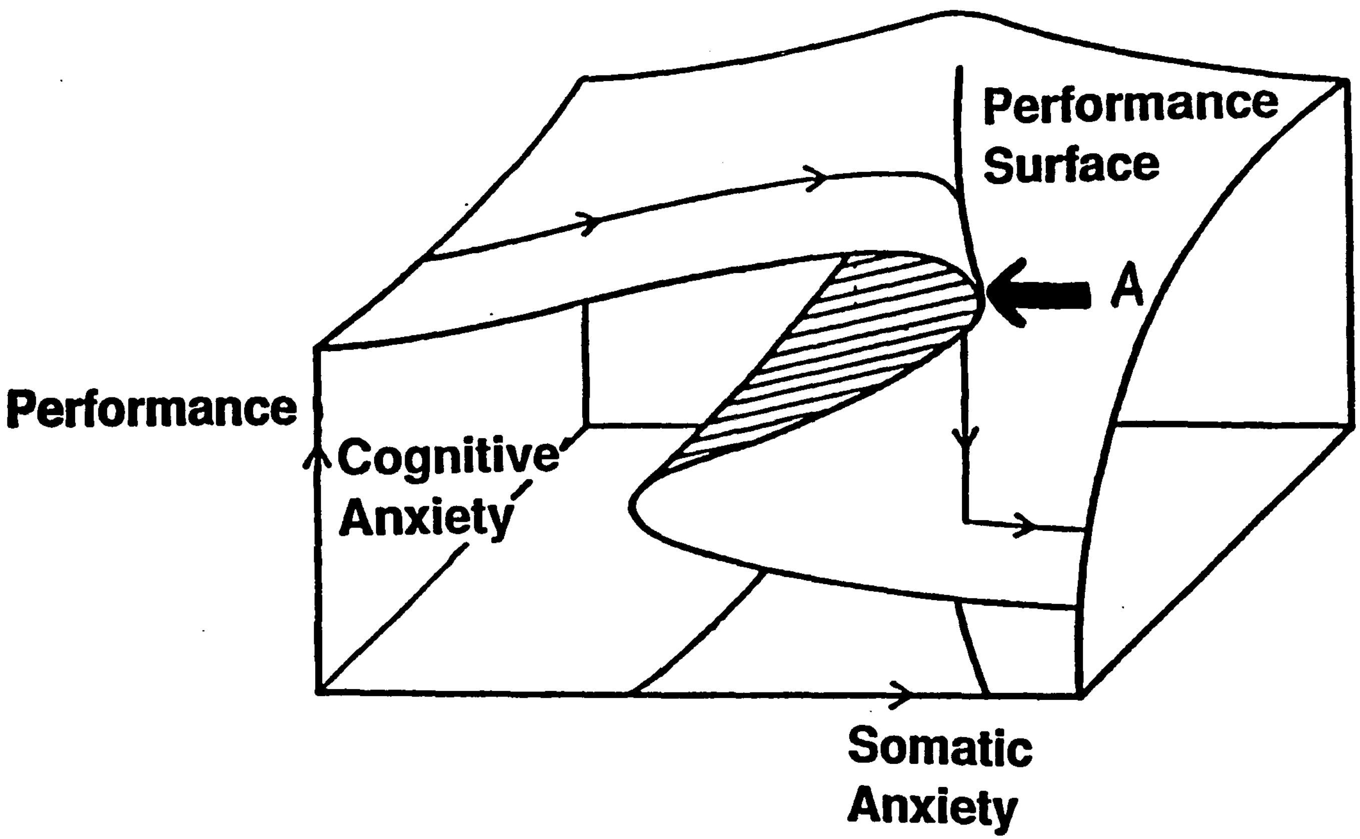

Figure 5. The three-dimensional catastrophe theory anxiety-performance relationship (modified from Hardy & Fazey, 1987)

in the splitting factor beyond a certain point will result in a change in the effect of the normal factor on the dependent variable.

Hardy and Fazey (1987) interpreted the catastrophe theory to explain the effect of cognitive anxiety and physiological arousal on athletic performance. Physiological arousal (the normal factor) is characterized by a sympathetic physiological arousal response and may "be reflected at least partially by somatic anxiety" (Hardy & Fazey, 1987, p. 9). Cognitive anxiety (the splitting factor) mediates the effects of physiological arousal and can directly influence performance. It should be noted that researchers differ in opinion whether the normal factor should be labeled physiological arousal or somatic anxiety. Hardy (in press; Hardy & Fazey, 1987) advocates the measurement of physiological arousal, however, Jones (May, 1989, personal communication) suggests the use of somatic anxiety. In the present study, somatic anxiety will be measured as the normal factor because one's perceptions of physiological arousal (somatic anxiety) is presumed to be a stronger influence on performance of most athletic events than actual physiological arousal (with the exception of sports such as archery and pistol shooting which are especially sensitive to body movements due to ones heart beat).

Examination of Figure 5 indicates somatic anxiety is on the horizontal axis. Performance, the dependent variable follows a catastrophe curve or the performance plane across the top of the figure. Cognitive anxiety forms a third axis mediating the effects of physiological arousal on performance.

Catastrophe theory predicts that somatic anxiety is not necessarily detrimental to performance, but will be associated with catastrophic effects when cognitive anxiety is high (Hardy & Fazey, 1987). It is predicted that when cognitive anxiety is low, somatic anxiety will have relatively small effects on performance. Under conditions of low cognitive anxiety, it is hypothesized that somatic anxiety will have a positive linear relationship with performance. However, when cognitive anxiety is high, somatic anxiety will have large and catastrophic effects on performance. Further, as hypothesized by Hardy and Fazey, performance will be differently affected by somatic anxiety depending on whether it is increasing or decreasing. As somatic anxiety is increasing and cognitive anxiety is low, performance will be facilitated similar to the inverted-U hypothesis. However, when cognitive and somatic anxiety are high, and an athlete has experienced a catastrophe, drastic changes in anxiety levels are necessary before performance will return to even a mediocre level. More specifically, an athlete will "choke" with smaller changes in somatic anxiety compared to when recovering from such a state. Thus performance will follow a different curve depending upon whether somatic anxiety is increasing or the athlete is attempting to come back from a catastrophe and somatic anxiety is decreasing.

Characteristics of the Cusp Catastrophe Model

Stewart and Peregoy (1983) presented four characteristics of data that can be modeled with the cusp catastrophe model. First sudden jumps will occur in the data which they termed a catastrophic jump. This is indicated by A on Figure 5. It is at this point, for example, that anxiety ceases to be facilitative to performance and inhibits subsequent performance. This catastrophic jump may practically be considered the point when an athlete "chokes."

Second, hysteresis will occur. "Hysteresis implies that the catastrophic jumps occur at different places" (Stewart & Peregoy, 1983, p. 346). Thus, performance will be differently affected by somatic anxiety depending on the level of cognitive anxiety. A catastrophic jump in performance will only occur when cognitive anxiety is high.

The third characteristic of catastrophic data is inaccessibility (shaded portion on Figure 5). A certain part of the catastrophe curve will be inaccessible for analysis because it is assumed that certain responses will not occur. The inaccessible levels of performance will always be those after an athlete has experienced a catastrophic drop and, hence, will be declining performance levels. For example, as anxiety continues to increase beyond the optimal level, the catastrophe theory proposes that performance will drop drastically. It is assumed that performance levels partway down this drop-off will not be observed, and thus are inaccessible for analysis. That is, an athlete will not have a semi-catastrophic performance. Performance will be mediocre, such as the soccer player who does not play up to his or her ability, or miserable, when an athlete cannot do anything right. Performance between these two theoretical levels will most likely not be observed.

The final characteristic is bimodality. That is, for some values of the control value or independent variable, two values of the state value will be predicted. Somatic anxiety will differently affect performance dependent upon whether cognitive anxiety is high or low. For example, when cognitive anxiety is low (e.g., CSAI-2 cog is less than 18), high somatic anxiety would be expected to be associated with better performance than when cognitive anxiety is high (e.g., CSAI-2 cog is greater than 27). Thus two performance levels would be hypothesized for a single level of somatic anxiety, dependent upon the level of cognitive anxiety. The surface where there are two possible values of the dependent variable is the bifurcation set (Hardy, in press).

Application of the Catastrophe Model to Sport

Because the application of the catastrophe theory to the anxiety-performance relationship is such a recent development, there is no direct evidence to support it. However, Hardy, Parfitt, and Pates (in press) examined the hysteresis hypothesis which proposed "physiological arousal, and the associated somatic anxiety, are not necessarily detrimental to performance. However, they will be associated with catastrophic effects when cognitive anxiety is high" (p. 7). Results revealed that increases in physiological arousal, measured by heart rate, differentially related to performance depending on whether cognitive anxiety was high or low. When cognitive anxiety was high, performance detriments were greater under high arousal than were the performance detriments when cognitive anxiety was low. This provides tangential support for the application of the catastrophe model to athletic performance. Future research is needed which will examine the model as a whole in a realistic competitive setting.

Catastrophe Theory -- A Statistical Dilemma

One problem with investigating the catastrophe model is that of statistical analysis. Poston and Stewart (1978) suggested that the "catastrophe theory may be expected to give useful analyses of more widely varying data than do the current linear models. Of course, it requires the development of comparable statistical expertise for the essentially nonlinear case before that expectation may be fulfilled" (p. 328). In response to this limitation, a promising new analysis, general multivariate methodology for estimating catastrophe models (GEMCAT) has been developed by Oliva et al. (1981) and has been successfully applied with multivariate data. This method is proposed to be superior to the previously utilized canonical correlational model (Cobb, 1978).

Flay (1978) noted that "until models are experimentally verified, catastrophe theory is no more than a suggestive mathematical metaphor which can provide neat and parsimonious accounts of diverse and seemingly contradictory empirical findings" (p. 346). Flay then specified several conditions which must be met in order to test the catastrophe model. First, pay "careful attention to all the conditions that should be met for a strong test of any hypothesized effect." For the application of the catastrophe theory to athletic performance, this includes the conditions necessary to adequately test the inverted-U hypothesis and multidimensional theory of anxiety: (1) have three distinct levels of low, moderate, and high anxiety for each subject (Martens, 1974), (2) utilize intraindividual analyses (Burton, 1988), (3) employ season-long standardized performance measures (Burton, 1988), and (4) obtain measures from athletes in real competitive situations (Burton, 1988).

The second condition specified by Flay (1978) was that "power tests should be conducted to ensure that the statistical tests used are powerful enough to detect the hypothesized effect if it occurs." This is related to the third condition that "all forces that might countervail against the occurrence of the hypothesized effect should be identified and minimized in the experimental design (p. 347)." To ensure greater power, a large sample should be utilized and attempts should be made to increase the magnitude of the effect size (Dotson, 1980). The use of a field setting, as opposed to a laboratory study, will also enhance the power in a study since greater extremes in anxiety are expected in real competitive events as opposed to a laboratory setting. It is also more likely that high levels of arousal and anxiety will be obtained in a field study, which, in turn, will lead to catastrophic occurrences. The third condition may be the most difficult to meet when conducting a field study of anxiety and athletic performance because levels of arousal and anxiety can not be manipulated.

Specific Predictions Based on the Catastrophe Model

Hardy and Fazey (1987) proposed several "testable predictions" based on the catastrophe model. These have been listed, with elaboration, below. When applied to the anxiety-athletic performance relationship, catastrophe theory would predict the following:

(1) "Physiological arousal (and the associated somatic anxiety) will not necessarily be detrimental to performance. However, they will be associated with catastrophic effects when cognitive anxiety is high" (p. 10). Hardy (in press) further suggests that under conditions of low cognitive anxiety, physiological arousal (or somatic anxiety) "should be the uniform or mildly inverted-U shaped curve" (p. 14). However, based on tacit knowledge, reversal theory, and Martens' psychic energy theory, this author suggests that under conditions of low cognitive anxiety, somatic anxiety will be facilitative to performance. That is, until an athlete begins to interpret his or her somatic anxiety in a negative manner, hence increasing cognitive anxiety, somatic anxiety will not interfere with performances of most motor sports (exceptions include sports such as shooting and archery where one's heart beat will interfere with arm steadiness).

(2) Hardy and Fazey predicted that "under conditions of high cognitive anxiety, hysteresis will occur; that is to say, performance will follow a different path as

physiological arousal [somatic anxiety] increases to the path it follows as physiological arousal [somatic anxiety] decreases. Under conditions of low cognitive anxiety, hysteresis will not occur" (p. 10). More simply, only when cognitive anxiety is high, performance will follow a different path when arousal or somatic anxiety increases than when arousal or somatic anxiety decreases. The gently sloping downward curvilinear relationship between arousal and performance (when arousal is beyond optimal levels) proposed by the inverted-U hypothesis will not be supported when cognitive anxiety is high. Rather, the anxiety-performance curve will be non-symmetrical; two separate slopes will be observed depending on whether somatic anxiety is increasing or decreasing.

(3) "Intermediate levels of performance are most unlikely in conditions of high cognitive anxiety. More precisely, performance should be bimodal under conditions of high cognitive anxiety, and unimodal under low cognitive anxiety" (Hardy & Fazey, 1987, p. 10). Hardy (in press) elaborated that when cognitive anxiety is high, "the model predicts that the effect of physiological arousal [somatic anxiety] could be either positive or negative, depending upon exactly how high cognitive anxiety is." (p. 14). Thus, for a specific level of somatic anxiety, under high cognitive anxiety conditions, two possible levels of performance may be predicted. Under conditions of low

cognitive anxiety, only one level of performance will be predicted.

(4) The final prediction by Hardy and Fazey was that "it should be possible to fit precise cusp catastrophes to real life data using the statistical methodology of Oliva et al. (1987)" (p.10).

Interrelationships Among the Inverted-U Hypothesis, Multidimensional Anxiety Theory and Catastrophe Theory

As our understanding of the anxiety-athletic performance relationship has progressed, the new theories previously discussed have been forwarded. Each new theory should be considered an outgrowth of the previous literature and has often subsumed previous theories. For example, the multidimensional anxiety theory, proposed by Martens and his colleagues (1990), grew from a dissatisfaction with the unidimensional inverted-U hypothesis. The inverted-U hypothesis suggested that there was a curvilinear relationship between a global anxiety construct and performance. The multidimensional anxiety theory further proposed two subcomponents of anxiety, cognitive and somatic, and that only somatic anxiety would be related to performance in a curvilinear manner. Hence the multidimensional anxiety theory was a logical progression beyond the inverted-U hypothesis, incorporating inverted-U hypothesis contentions.

The same relationship holds true for the multidimensional anxiety and catastrophe theories. Research examining the multidimensional anxiety theory investigated the separate relationships between cognitive anxiety and performance and somatic anxiety and performance. Dissatisfaction with the inconsistent findings in studies of multidimensional anxiety led to suggestions by Hardy and Fazey (1987) that there was a need to examine the combined effects of cognitive and somatic anxiety. Hence the catastrophe theory was proposed to explain the anxiety-athletic performance relationship. Catastrophe theory suggested that cognitive and somatic anxiety interacted to influence athletic performance. Thus, conceptually moving one step beyond the multidimensional anxiety theory while also incorporating some of its basic tenets. Catastrophe theory, consistent with the multidimensional anxiety theory, suggested that there were at least two subcomponents to anxiety which differentially affect performance. However, it continued to note that the effect of somatic anxiety on performance is dependent on the level of cognitive anxiety.

Catastrophe theory has also been related to inverted-U hypothesis. Hardy (in press) suggested that somatic anxiety would have a curvilinear relationship with performance under conditions of low cognitive anxiety. However, it should be noted that this has been suggested conceptually and has not been tested.

Investigations of catastrophe theory, in effect, can also be used to examine predictions based on the inverted-U hypothesis and multidimensional anxiety theory since each theory has been subsumed within the next. Thus, support gained for the catastrophe theory may also support some contentions based on the inverted-U hypothesis or multidimensional anxiety theory because of some common predictions. However, support for the full catastrophe model would suggest that it is a more complete anxiety theory than the inverted-U hypothesis or multidimensional anxiety theory, offering a better understanding of how anxiety relates to athletic performance.

Purpose of the Present Study

The relationship between anxiety and athletic performance has been a critical area of study in sport psychology from both practical and conceptual perspectives. Practically, virtually every coach and athlete wants to know how anxiety affects performance and how to control it. Conceptually, since the inception of sport psychology (beginning with Triplett's, 1897, social facilitation study), researchers have attempted to unravel this elusive relationship. Sport psychologists need a theory of anxiety which will better help them understand how anxiety influences performance and also improve their practical application of anxiety control techniques.

Although the inverted-U hypothesis has been the predominant conceptualization of the anxiety-athletic performance relationship, it has been experiencing increased criticism. Hence, while the inverted-U hypothesis has been very helpful and heuristic, the time has come to examine more complex models of the anxiety-performance relationship. As new theories are emerging (e.g., multidimensional theory of anxiety, reversal theory, catastrophe theory) these need to be examined and compared in order for our understanding of the anxiety-athletic performance relationship to progress (Gould & Krane, in press).

Recently, several review papers have expressed the need to re-evaluate the inverted-U hypothesis and to examine these new theories (e.g., Hardy & Fazey, 1987; Kerr, 1985; Neiss, 1988, Weinberg, in press). However, little research is being conducted to actually examine these new anxiety theories. The multidimensional theory of anxiety has received the most attention from anxiety researchers, yet only two true tests of the theory have been reported. Few tests of the reversal and catastrophe theories have been conducted. A special need exists to test these new theories in methodologically and conceptually sound environments, incorporating the suggestions offered by previous investigators.

The primary purpose of the present study is to examine two innovative approaches concerning the anxiety-performance relationship by separately testing and then comparing predictions based on the multidimensional anxiety theory and catastrophe theory. The secondary purpose of this study is to examine scale development validity issues concerning the new measure of trait anxiety, the Sport Anxiety Scale (Smith et al., in press) and the measurement of retrospective anxiety with the new Mental Readiness Form (Murphy et al., 1989). Retrospective measures of anxiety are those obtained after a competition when athletes are asked to think back to a specific event and complete an anxiety questionnaire as they were feeling at that time. Hanin (1980, 1985) has suggested that retrospective measures of anxiety provide an accurate assessment of state anxiety. Supporting the validity of retrospectively measured anxiety, Hanin (1985) did not find any significant differences between precompetitive state anxiety and retrospective anxiety measured eighteen days after a gymnastics competition. In the present study, the Mental Readiness (MRF) form will used as a retrospective measure of anxiety. The MRF is a new scale developed by Murphy and his colleagues (1998) as a shortened, version of the Competitive State Anxiety Inventory - 2 (CSAI:-2; Martens et al., 1990). The secondary purposes of the present study will be explored by examining the relationships among trait, state, and retrospective anxiety.

Specific Hypotheses of the Present Study

The present study was designed to examine the relationships among cognitive and somatic anxiety and collegiate soccer performance. The multidimensional theory of anxiety will be examined in the first phase of the study and an analysis of the catastrophe theory will comprise the second phase of the study. In the third phase of the study, several hypotheses based on the secondary purpose, to examine interrelationships among trait, retrospective, and state anxiety, will also be examined.

Thus based on the primary purposes, hypotheses consistent with the multidimensional anxiety theory are:

(1) Cognitive anxiety will be related to soccer performance in a negative linear pattern.

(2) Somatic anxiety will have a curvilinear, inverted-U relationship with soccer performance.

Based on the primary purposes, hypotheses consistent with catastrophe theory are:

(3) The data obtained will fit the catastrophe curve.

(3a) When cognitive anxiety is low, there will be a positive linear relationship between somatic anxiety and performance.

(3b) When cognitive anxiety is high the relationship between somatic anxiety and performance will follow the catastrophe curve.

Secondary purpose hypotheses were based on scale development validity issues. The finding that unidimensional trait anxiety is a strong predictor of unidimensional state anxiety (e.g., Klavora, 1977; Martens, Burton, Rivkin, & Simon, 1980; Martens & Simon, 1976; Simon & Martens, 1977; Sonstroem & Bernardo, 1980) is one of the most consistent findings in sport psychology. This relationship has also been upheld when using a unidimensional measure of trait anxiety as a predictor of state cognitive and somatic anxiety subcomponents (Crocker, Alderman, & Smith, 1988; Gould, Petlichkoff, & Weinberg, 1984; Krane, 1985; Martens et al., 1990). Thus, as part of the secondary purpose of the study, it was hypothesized that:

(4) Trait cognitive anxiety, somatic anxiety, and concentration disruption as measured by the SAS will predict state cognitive and somatic anxiety as measured by the CSAI-2.

Based on Hanin's work that suggests that retrospectively measured state anxiety is a valid measure of state anxiety and the moderate intercorrelations between the Mental Readiness Form and the CSAI-2 reported by Murphy et al. (1989), it was further hypothesized that:

(5) Retrospective measurement of cognitive and somatic anxiety measured with the MRF will be strongly correlated with state cognitive and somatic anxiety measured with the CSAI-2.

Finally, based on previous studies of cognitive and somatic anxiety, it was hypothesized that:

(6) State cognitive and somatic anxiety will be moderately to highly intercorrelated.

CHAPTER II

METHOD

Subjects

The original sample was comprised of twenty-five female Division II college soccer players at the University of North Carolina at Greensboro. During the first weeks of the pre-season, the number of athletes on the team dropped to 20 because some athletes decided not to play on the team. This final sample ($\underline{n}$ = 20) included one athlete who was injured before the season began and red-shirted (did not compete) the season and another who was injured and could not play in the last six matches. Of the remaining athletes in the final sample, ten competed in at least 10 of the 12 matches while the other athletes played less consistently. Hence, the number of subjects will vary from a low of 10 to a high of 19 depending upon the statistical procedure being employed.

Soccer players were chosen for two reasons: (1) the researcher had a good rapport with the coaching staff and the athletes and felt that these particular athletes would be more receptive to participating in the study than athletes unknown to her; and (2) little research has been conducted examining the anxiety-performance relationship in team sport athletes.

Instrumentation

All measures of anxiety and soccer performance will be explained in this section.

Competitive State Anxiety Inventory - 2. State cognitive and somatic anxiety were measured with the Competitive State Anxiety Inventory - 2 (CSAI-2) (see Appendix A). This questionnaire consists of 27 items which respondents rate on a Likert-type scale ranging from one ("not at all") to four ("very much so"). The CSAI-2 contains three subscales: cognitive anxiety, somatic anxiety, and self-confidence. Each subscale consists of nine items; hence, the lowest score was nine and the highest was 36 for each subscale. Reliability and validity of the CSAI-2 were rigorously tested by Martens et al. (1990) during scale development and has been further supported by Gould, Petlichkoff, and Weinberg (1984), Krane and Williams (1987), and Caruso et al. (1990).

Although the CSAI-2 also includes a measure of self-confidence, this subscale was not utilized in the present study. Reasons for excluding this scale include: (1) the validity of the subscale has been questioned, (2) it has been shown to be affected by social desirability bias (Krane & Williams, 1989b; Williams & Krane, 1989), and (3) although the more complex, five dimensional butterfly catastrophe model includes self-confidence, it is not included in the cusp catastrophe which will be analyzed in the present study. Hence, a shortened version of the CSAI-2 was utilized in the present study (see Appendix B). The elimination of the self-confidence subscale should not jeopardize the reliability or validity of the CSAI-2 because each subscale has been found to be independent of the others through factor analyses (R. Martens, personal communication, July 27, 1989).

Martens et al. (1990) have also developed anti-social desirability instructions which, when used in conjunction with the CSAI-2, have been found to reduce response distortion (see Appendix C). These instructions were summarized and incorporated into the verbal instructions given to athletes when the project was explained to them. The explanation of the study and directions which were read to the athletes upon introduction of this project can be found in Appendix D. The complete instructions were also read to the athletes prior to completion of the demographic questionnaire and trait measures. Finally, the shortened version of the anti-social desirability instructions appeared at the top of each CSAI-2 questionnaire. (These are the instructions that Martens et al., 1990, have provided with the CSAI-2.)

Mental Readiness Form. A retrospective measure of cognitive and somatic state anxiety was obtained with the Mental Readiness Form (MRF) (see Appendix E). The MRF is a three item measure of cognitive and somatic anxiety and self-confidence (Murphy, Greenspan, Jowdy, & Tammen, 1989). This instrument was developed as a shorter and less intrusive alternative to the CSAI-2. The MRF subscales of thoughts, bodily feelings, and self-confidence correspond with the CSAI-2 subscales. The MRF asks athletes to rate their feelings on three bipolar continuous scales:

My thoughts are:
calm ________________ worried

My body feels:
tense ________________ relaxed

I am feeling:
scared ________________ confident

Athletes mark the spot on each scale which best describes their feelings. In the form given the athletes, each scale is a 100 millimeters long. These are then scored by using a ruler to measure, from left to right, where the athlete indicated his or her feeling state. Thus, scores ranged between 0 to 100 on each subscale.

Initial research with the MRF has found it to be moderately correlated with each corresponding CSAI-2 subscale (Murphy et al., 1989). Thoughts and cognitive anxiety were correlated .63. Bodily feelings and somatic anxiety were correlated .58 and the self-confidence subscales were correlated .63. Consistent with the use of the CSAI-2 in the present study, only the thoughts and bodily feelings items were used.

Trait Cognitive and Somatic Anxiety. Trait cognitive and somatic anxiety were measured with the Sport Anxiety Scale (Smith, Smoll, & Schutz, in press) (see Appendix F). This scale includes 22 items divided into three subscales: cognitive anxiety, somatic anxiety, and disruption of concentration. The scores on each subscale range between 7 and 28 for cognitive anxiety, 9 and 36 for somatic anxiety and 5 and 20 for concentration disruption. Smith, Smoll and Schutz reported that the SAS has adequate internal reliability and construct validity. Cronbach's alphas were .91 for the cognitive anxiety scale, .86 for the somatic anxiety scale, .81 for the concentration disruption scale and .93 for the entire scale. The SAS also demonstrated high correlations with the Sport Competition Anxiety Test (r = .80 for somatic anxiety, r = .66 for cognitive anxiety, r = .47 for concentration disruption, and r = .81 for total scale) and moderately correlates with the trait scale of the State Trait Anxiety Inventory (r = .38 for somatic anxiety, r = .43 for cognitive anxiety, r = .49 for concentration disruption, and r = .48 for total scale).

Demographic Questionnaire. Background information concerning previous experience, years of participation on this team, and other pertinent information were obtained through a demographic questionnaire developed for the purposes of this study. This questionnaire is contained in Appendix G.

Performance. Three performance measures were used in this study. The first was a measure of actual performance. Trained observers recorded individual statistics on each athlete (see soccer performance score sheet in Appendix H). Performance statistics were obtained from videotaped games whenever possible. For several away matches observations were obtained during actual competition because game tapes were not available for these matches.

A systematic method was devised to gain an accurate measure of soccer performance, independent of position, which has subdivided soccer into component skills. This method was developed by the former assistant women's soccer coach at University of North Carolina at Chapel Hill (UNC-CH) who used the same instrument with their highly successful team.

A two person method of recording athlete performance has been successfully inplemented at the UNC-CH and was used in the current study. One observer verbally acknowledged when an athlete performed a specific behavior while the second observer recorded the behavior on the Soccer Performance Score Sheet. This alleviated the potential problem of a single observer missing plays because she was busy writing.

Each of the following soccer behaviors were included in an equation resulting in a single objective performance score: successful and attempted passes, loss of possession, fouls, successful and attempted headers, shots on and off the goal face, assists, and goals. A constant of positive 10 was included to insure that no negative scores were derived. Originally, the equation for determining the objective performance score included the amount of time each athlete competed in a match and was calculated with the following equation:

OBJECTIVE PERFORMANCE = (successful passes - loss of possession - fouls + gain of possession + shots on goal - shots off goal - attempted heads + successful heads + assists + goals + 10) / time played

However, this performance equation did not accurately reflect athlete performance levels. For example, athletes who played most of the game usually had lower performance scores than those athletes who played for only ten to twenty minutes. This was the result of dividing the total positive soccer behaviors by the time each athlete competed in the match. To alleviate this problem, a second equation was derived based on the author's tacit knowledge of the game and consultation with the Assistant Women's Soccer Coach who was involved in coding the objective behaviors. It was decided to eliminate time from the equation because time played would be reflected in the total objective score because players with the greatest amounts of playing time typically would have higher scores than those players with less competitive time. The modified objective performance equation was as follows:

OBJECTIVE PERFORMANCE = successful passes - loss of possession - fouls + gain of possession + 2(shots on goal) + shot off goal - attempted heads + successful heads + assists + goals + 10

Both inter-rater and intra-rater reliability were assessed through examining percent of agreement between observers. Inter-rater reliability was examined by measuring percent of agreement between the two different teams of observers and intra-rater reliability was determined by having the same set of observers view the same game tape twice. Tables 1 through 4 contain all the inter-rater and intra-rater reliability results. Average inter-rater reliability was 75.68 (range = 66.32 - 88.24) across performance categories and average intra-rater reliability for observer Pair 1 was 76.03 and observer Pair 2 was 80.95. In order to determine the reliability and consistency of observing both taped and live games, several games were observed both live and videotaped by the same set of

Table 1

Percentage of agreement for inter-rater reliability across performance categories

Game	SP[1]	LOP[2]	GOP[3]	Foul[4]	Shot On[5]	Shot Off[6]	Head Att.[7]	Head Suc.[8]	Total
2	97.22	83.78	66.67	88.88	100.0	100.0	72.73	22.22	78.94
	75.93	65.17	100.0	44.44	33.33	80.00	73.33	58.33	66.32
4	92.03	94.64	100.0	80.36	71.43	60.00	76.92	85.18	82.57
	87.57	92.59	100.0	78.57	50.00	90.91	88.89	72.73	88.24
6	97.75	60.52	60.00	66.07	80.00	100.0	73.33	66.67	75.54
	88.57	52.70	100.0	60.87	75.00	33.33	40.00	63.16	64.20
10	96.10	89.19	66.66	86.54	50.00	100.0	64.71	46.66	74.98
	68.49	91.38	100.0	70.27	100.0	66.67	47.62	66.67	76.39
12	100.0	90.76	66.67	66.10	85.71	60.00	75.00	55.00	74.91
	94.62	89.55	71.43	92.59	16.67	100.0	39.13	50.00	72.67

[1] SP - successful passes
[2] LOP - loss of possession
[3] GOP - gain of possession
[4] Foul - fouls called against a player
[5] Shot On - shots on the goal face
[6] Shot Off - shots off the goal face
[7] Head Att. - attempted head balls
[8] Head Suc. - succesfully completed head balls

Table 2

Percentage of agreement for inter-rater reliability across athletes[1]

Athlete	1	2	3	4	5	6	7	8	9
2	40.00	53.58	25.00	50.00	100.0	84.00	100.0		77.78
	81.81	50.00	33.33	83.33	44.44	60.00	65.00		81.25
4	100.0	80.00	60.00		61.11	82.86	100.0	57.14	95.24
	76.47	100.0	90.91	0	84.85	0	91.30		
6	80.00	87.50			61.76	91.67	37.03		62.50
	64.29	43.47	0		70.59	72.22	100.0		66.67
10	88.89	85.71			84.62	92.59	83.33		80.00
	100.0	78.26		33.33	93.93	86.96	61.53		80.95
12	89.47	50.00		100.0	95.00	85.19	90.32		91.67
	92.31	95.24		66.67	88.46	67.65	100.0		87.50

[1] A blank space indicates that an athlete did not compete that match.

Table 2 (con't)

Percentage of agreement for inter-rater reliability across athletes[1]

Athlete	10	11	12	13	14	15	16	17
2	77.78	75.00			50.00		94.12	0
	47.06	85.00		75.00	30.00	62.50	55.56	0
4	63.89	92.59	95.65	73.68	73.33	75.00	93.75	
	84.61		87.50	80.95	86.00	75.00	92.59	77.14
6	96.39	74.29	93.33		80.95	0	82.50	
	53.37	68.42	80.00	27.27	69.56		78.57	50.00
10	68.75	92.00	91.30	20.00	63.64	66.67	80.00	
	78.57	90.91	93.75		70.00	40.00	90.91	
12	84.85	94.74	85.71	33.33	100.0		95.23	

[1] A blank space indicates that an athlete did not compete that match.

Table 3

Percentage of agreement for intra-rater reliability across performance categories

Game	SP	LOP	GOP	Foul	Shot On	Shot Off	Head Att.	Head Suc.	Total
Observer Pair 1									
12	90.12	96.61	33.33	89.31	85.71	62.5	63.16	83.33	75.51
	89.42	92.54	100.0	92.54	20.00	77.78	50.00	90.00	76.54
Observer Pair 2 (Live to taped game)									
	92.41	95.38	50.00	86.67	100.0	42.86	68.75	78.57	76.85
	98.89	98.36	83.33	86.00	66.67	85.71	65.22	56.25	80.00

Table 4

Percentage of agreement for intra-rater reliability across athletes[1]

Athlete	1	2	3	4	5	6	7	8	9
Observer Pair 1									
12	94.12	73.33	100.0	95.24	96.42	96.88		91.67	
	86.67	95.24	100.0	84.61	67.67	94.74		56.25	
Observer Pair 2 (Live to taped)									
12	73.68	60.00	75.00	90.48	91.31	96.42		83.33	
	63.16	71.43	83.33	82.09	71.88	94.73		78.57	

[1] A blank space indicates that an athlete did not compete that match.

Table 4 (con't)

Percentage of agreement for intra-rater reliability across athletes[1]

Athlete	10	11	12	13	14	15	16	17
Observer Pair 1								
12	97.06	95.00	100.0	80.00	66.67		87.50	
	93.10	86.36	92.30	100.0		100.0	93.48	
Observer Pair 2 (live to taped)								
12	73.68	77.78	95.23	33.33	100.0		95.24	
	93.10	94.44	90.00	95.00		75.00	82.50	

[1] A blank space indicates that an athlete did not compete that match.

observers; reliability averaged 78.43 across performance categories.

A reliability index of at least 85 percent agreement is considered desirable. However, in the present study, a less robust level of reliability was deemed acceptable because of the following conditions (T. Martinek, personal communication, November 21, 1989). First, the assistant soccer coach agreed to assist in the coding of soccer skills from the videotaped games. Her expertise and knowledge of the game and the athletes allowed her to be more exact in coding specific soccer behaviors. She typically coded more behaviors than the other coder. Thus, the low reliability usually resulted from the second pair of coders noting fewer soccer behaviors than the first pair of coders. The data utilized in computing the objective performance score from all videotaped games was that which was coded by the assistant coach. The second reason for the relatively low interrater reliability was due to the small number of behaviors coded in each performance category. Most categories of soccer behaviors for each half of a match had less than ten observations. Therefore, even if the coders differed by only one observation, reliability often dropped at least ten percent. This was usually the case when reliability was exceptionally low (less than 50%); there were usually less than five observations in that category.

Additional performance measures were obtained from each individual athlete and the assistant coach. Perceived athlete performance was measured by having each athlete rate her performance on a Likert-type scale ranging from 1 to 11 based on how well she felt she played compared to her current ability. A score of 1 would mean that the athlete did not play up to her ability at all and had one of the worst games she ever played. On the other hand, a score of 11 would mean that the athlete played to the best of her ability or played the best game she had ever played. A coach rating of performance was obtained in the same manner. These forms are contained in Appendix I and J.

Procedure

Permission to approach the athletes was obtained from the head coach approximately one month prior to the beginning of pre-season practices. The rationale and procedures of this study were explained to the athletes at a team meeting during pre-season training. The athletes were told that participation was voluntary and that all information was confidential (see Appendix K for Informed Consent Form). However, upon request of individual athletes, all information gained concerning anxiety and performance was shared on an individual basis to aid their psychological skills development. It was stressed that individual information would not be shown to the athletes' coaches, but that the coaches would receive group norms at the end of the season. At the beginning of the next team practice session athletes completed the informed consent form, demographic questionnaire, and SAS.

The CSAI-2 was completed by the athletes prior to each home game of the season and three away games, with a total of 12 games being included. It was hoped that by obtaining a large number of anxiety measures against various opponents and under numerous conditions, at least three distinct levels of anxiety would be obtained by each athlete. The athletes were asked to complete the CSAI-2 approximately 20-30 minutes prior to each game. This time was chosen in conjunction with the head coach. The athletes completed the CSAI-2 in the time period after the pre-game talk by the coaches and immediately prior to their on field warm-ups. During home games, this took place in the team locker room and at away games the CSAI-2 was completed either in the locker room or on the field.

At the beginning of the practice session following each game, athletes completed the MRF and the athlete rating of performance. The assistant coach also received the coach ratings of athlete performance at this time, but completed them after the practice session.

This procedure allowed for data to be obtained on up to 18 subjects over 12 competitive matches resulting in a maximum of 216 data points. However, once taking into consideration the number of athletes that actually competed in a match and completed all the associated questionnaires, this number ranged from 100 to 150 data points. An adequate test of the catastrophe theory can be conducted with a minimum of 100-200 data points (T.A. Oliva, personal communication, May, 1989).

CHAPTER III

RESULTS

The data from the present investigation were analyzed in four phases. The first phase of the analysis consisted of the calculation of descriptive statistics on the measures used. The second phase examined hypotheses based on the multidimensional theory of anxiety and the third phase tested the catastrophe theory predictions. The fourth phase of the analyses consisted of investigation of the secondary purpose of the study and examined scale development and validity issues.

Phase 1: Descriptive Statistics

Descriptive statistics were obtained for demographic, anxiety, and performance data. Because a different number of athletes competed in each soccer match, the number of subjects included in the analyses varies. Table 5 contains the number of subjects included in the analyses for each anxiety and performance measure. Further, for all results computed for each of the twelve competitions, correlations which were statistically significant over at least six of the competitions will be deemed most meaningful.

Table 5

Number of Subjects With Anxiety and Performance Data for Each Competition

Game	State Anxiety[1]	Retrospective Anxiety[2]	Athlete Rating of Perf.	Coach Rating of Perf.[3,4]	Objective Rating of Perf.[5]
1	18	14	14	14	13
2	18	15	16	18	12
3	17	17	17	17	15
4	18	16	16	17	14
5	19	15	16	17	14
6	17	14	15	16	11
7	17	15	15	17	13
8	18	15	15	14	13
9	18	15	15	18	12
10	17	14	14	-	13
11	14	12	12	13	12
12	18	12	12	16	13

[1] May include some athletes who did not compete in that match.
[2] Completed only by athletes who competed in that match.
[3] Includes athletes who competed in first and/or second half of the match.
[4] Unfortunately, ratings of performance for competition 10 was never obtained from the coach.
[5] Includes only athletes who competed in the first half of the match. Does not include goalkeepers.

Demographic Data

The athletes ranged from 17 to 19 years of age with a mean of 18.4 (SD = .62). They had been members of the UNCG Women's Varsity Soccer team for 1 to 2 years (M = 1.59, SD = .51). Although these soccer players were inexperienced at the collegiate level, they had 9 to 15 years of soccer experience with an average of 12.18 (SD = 1.18) years.

Trait Anxiety

Trait anxiety, as measured by the Sport Anxiety Scale (SAS), is comprised of three subcomponents: trait cognitive and somatic anxiety and concentration disruption. The athletes' mean trait cognitive anxiety score was 18.00 (SD = 4.8), trait somatic anxiety was 18.53 (SD = 5.00) and concentration disruption was 8.53 (SD = 2.67). These levels of cognitive anxiety and concentration disruption were slightly higher than the normative data reported by Smith, Smoll and Schutz (in press) while somatic anxiety was lower than these norms (see Table 6). It should be noted, however, that these norms were developed for male and female high school athletes and male college athletes, but did not include female college athletes. Smith, Smoll, and Schutz also reported a composite score of trait anxiety which was a sum of the three subscales of the SAS. This was computed for the present athletes, indicating a team average trait

Table 6

Mean Trait Cognitive and Somatic Anxiety and Concentration Disruption.

	Trait Cognitive	Trait Somatic	Concentration Disruption	Total
Female Collegiate Soccer Players	18.00	18.53	8.53	44.06
High School Females*	16.21	19.97	8.36	44.54
High School Males*	15.23	19.82	8.39	43.44
College Football Players*	14.17	18.98	7.71	40.86

*From Smith, Smoll, & Schutz, in press.

anxiety level of 45.06 (SD = 10.22) ranging from 31 to 71 over individual players (the SAS ranges from 22 to 84).

State Anxiety

The team average level of state cognitive anxiety across all twelve competitions was 21.23 (SD = 2.13) and team average state somatic anxiety was 19.89 (SD = 3.54). These were both slightly higher than the state cognitive (18.40) and somatic (16.85) anxiety norms for female collegiate athletes compiled by Martens, Vealey, and Burton (1990). However, individual athletes' cognitive anxiety ranged from 9 to 35 with team averages ranging from 18.47 to 23.50 across the twelve soccer matches. Somatic anxiety ranged from 9 to 36 in individual athletes while team averages ranged between 15.05 and 24.89 (see Table 7).

Retrospective Anxiety

As a measure of retrospective state anxiety, the athletes completed the Mental Readiness Form the day after each competition. Individual athlete scores on this scale ranged from 0 to 100 on the cognitive and somatic anxiety subscales. Team averages ranged between 19.13 and 68.87 on the cognitive anxiety scale and 29.13 and 64.40 on the somatic anxiety scale. See Table 8 for the team averages for each game.

Table 7

Mean State Cognitive and Somatic Anxiety Across All Competitions

	Cognitive Anxiety			Somatic Anxiety		
Game	*M*	*SD*	Range	*M*	*SD*	Range
1	20.39	4.07	13-30	24.89	3.76	19-32
2	25.22	5.63	12-36	24.67	6.94	9-36
3	22.41	5.86	12-31	20.29	6.12	10-34
4	20.78	5.89	11-31	17.28	6.14	9-31
5	22.53	5.88	13-34	24.42	6.18	14-36
6	22.23	5.27	14-34	20.59	6.15	11-35
7	18.47	5.21	9-33	15.64	4.36	9-23
8	20.89	5.45	12-34	17.56	5.18	9-27
9	17.44	4.81	11-30	15.06	4.09	9-24
10	19.94	5.46	12-32	16.88	4.77	10-26
11	23.50	6.45	12-32	22.28	5.92	11-35
12	20.94	6.87	11-35	19.22	18.45	9-28

Table 8

Mean Team Retrospective Anxiety Scores on the Mental Readiness Form

	Cognitive Anxiety			Somatic Anxiety		
Game	M	SD	Range	M	SD	Range
1	52.71	22.08	19-100	56.43	18.29	14-85
2	68.88	25.35	22-100	64.40	30.29	8-100
3	62.23	23.28	8-100	59.23	27.29	7-100
4	27.38	24.23	0-76	30.50	24.17	0-73
5	56.20	28.62	9-98	55.00	30.25	5-99
6	55.63	24.39	20-87	60.14	21.09	23-95
7	20.27	19.49	2-66	27.40	26.63	1-81
8	46.06	28.14	2-93	55.33	31.02	1-90
9	19.13	15.52	2-60	29.13	25.57	1-77
10	51.00	23.52	8-94	58.43	17.93	26-89
11	59.50	26.51	19-93	58.50	21.86	26-95
12	45.50	20.94	6-67	59.25	18.86	12-88

Performance

Three performance measures were obtained in the present study. Table 9 contains the mean performance scores for each performance measure across all competitions. The first was the coach's rating of each athlete's performance on a 1 to 11 point Likert scale (1 = did not at all play to her ability, 11 = played to the best of her ability). Team average coach ratings ranged between 4.12 and 7.0 with a mean of 5.85 (SD = .92). The second measure of performance was each athlete's rating of her own performance on the same 11 point Likert scale. Athlete's ratings of performance averaged between 4.50 and 5.87. The athletes tended to rate their performance slightly lower than the coach. An objective rating of performance, the third measure, was obtained through observations of specific soccer behaviors during competitions. Team average objective performance scores ranged between 13.33 and 25.61 while individual scores ranged between 5 and 38.

Additionally, the objective performance measure was broken down into ten minute increments throughout the game. The objective performance measure represents the soccer behaviors that occurred in the first half of each competition (45 minutes). The ten minute objective performance measure represents the soccer behaviors that occurred during the first ten minutes of each match.

Table 9

Mean Performance Scores for Each Performance Measure Across All Competitions

Game		Coach Rating[1]	Athlete Rating	Objective Performance[2]	Objective Performance[3]	Ten Minute
1	M	6.29	5.36	18.85	0.69	12.31
	SD	.82	1.69	9.55	0.56	2.75
2	M	4.67	4.50	13.33	0.43	10.31
	SD	2.00	2.73	4.70	0.21	1.11
3	M	4.12	4.88	14.67	0.81	12.53
	SD	1.67	2.06	8.41	1.23	3.82
4	M	5.65	5.81	21.21	0.65	13.20
	SD	.86	2.17	7.23	0.21	3.73
5	M	6.65	5.56	17.28	0.68	11.50
	SD	.99	2.58	6.01	0.43	2.03
6	M	6.67	5.40	16.82	0.45	11.27
	SD	1.85	2.19	8.92	0.26	2.65
7	M	7.00	5.60	25.61	0.57	14.15
	SD	1.06	2.03	8.28	0.21	2.91
8	M	6.64	5.87	16.42	0.48	10.79
	SD	1.49	1.64	5.50	0.24	1.89
9	M	5.89	5.67	18.50	0.75	12.46
	SD	1.18	2.41	5.25	0.78	2.14

Table 9 (con't)

Mean Performance Scores for Each Performance Measure Across All Competitions

Game		Coach Rating	Athlete Rating	Objective Performance	Objective Performance (original)	Ten Minute
10	*M*		5.21	15.15	0.69	11.46
	SD		1.85	6.69	0.65	2.47
11	*M*	5.61	5.17	13.83	0.34	12.20
	SD	1.26	2.59	4.39	0.12	2.35
12	*M*	5.12	5.17	17.77	0.59	12.76
	SD	1.26	2.66	7.54	0.49	3.47

[1] Coach ratings of performance were missing for competition 10.

[2] Objective performance rating used in all subsequent analyses.

[3] Objective performance as derived from the first proposed equation which was discarded as inaccurate.

Examination of Table 9 reveals that during the first ten minutes of competition, objective scores for individual athletes fell between 7 and 20 while team averages ranged from 10.31 to 14.15.

The original objective measure of performance was also included on Table 9. This performance measure was derived from the equation originally proposed, but not used, to obtain objective performance. The original equation was not used because it was thought to inaccurately represent performance of some athletes. Better athletes often had lower performance scores than secondary players because when time played was included in this equation, those athletes who competed the greatest amount of time typically ended up with lower performance ratings.

Correlations Among Performance Measures

Pearson Product-Moment correlations were computed between each of the three performance measures to examine the interrelationships among them. Overall, intercorrelations were low with great variance, ranging from -.56 to +.37 between athlete and coach ratings of performance, -.56 to +.38 between athlete and objective rating of performance and -.54 to +.59 between coach and objective performance measures (see Table 10).

It was hoped that a composite performance score could be derived by combining the three separate measures.

Table 10

Correlations Among Performance Measures

Game	Athlete Rating of Performance - Coach Rating of Performance	Coach Rating of Performance - Objective Performance	Objective Performance - Athlete Rating of Performance
1	-.24	-.39	.29
2	-.01	.03	.44
3	.22	.17	.59**
4	.04	.45*	-.40
5	-.10	-.56**	.22
6	-.05	.18	.38
7	-.43*	.02	-.54*
8	.37	.38	-.22
9	.32	-.06	.11
10[1]			.13
11	-.56**	.32	-.18
12	.77**	.22	.12
Average	-.11	.54	.40

* $p < .05$, ** $p < .01$, *** $p < .001$.

[1] Coach ratings of performance were missing for competition 10.

Unfortunately, a composite performance measure could not be employed in subsequent analyses because of the low intercorrelations among the three performance measures. Hence, all subsequent analyses conducted in Phases 2 and 3 were computed separately for each performance measure. Results consistent across all three performance measures were deemed the most meaningful followed by those replicated with two of the performance measures.

Phase 2: Multidimensional Anxiety Theory Analyses

In this phase of the analysis, the predictions that cognitive anxiety would have a negative linear relationship with soccer performance and that the relationship between somatic anxiety and performance would be curvilinear were tested. All statistical analysis procedures used were consistent with those used by Burton (1988) and Gould et al. (1987). Specifically, the data were first examined to determine whether the necessary conditions to test this theory existed. Second, the anxiety and performance data were standardized in an effort to negate between subject differences. After completing these two procedures, tests of the specific hypotheses were conducted.

Manipulation Check

To determine if three distinct levels of cognitive and somatic anxiety were obtained, a manipulation check was completed. Consistent with the procedures of Gould et al. (1987), each athlete's anxiety scores were ranked from lowest to highest. The lowest, median, and highest scores were entered into a repeated measures ANOVA to determine whether these scores significantly differed from each other. Sonstroem and Bernardo (1980) supported this method, noting that it did not matter which particular competition invoked greater anxiety levels, just that at least three distinct levels of anxiety must be obtained. Results indicated three significantly disparate levels of cognitive anxiety, $F(2, 17) = 104.66$, $p < .001$, and somatic anxiety, $F(2, 17) = 117.74$, $p < .001$, were obtained. Scheffe's post hoc tests indicated that each of the three levels of cognitive and somatic anxiety significantly differed from each other ($p < .05$). Table 11 contains the means for low, moderate and high cognitive and somatic anxiety.

Intra-Individual Anxiety and Standardized Performance Measures

In order to allow consideration of individual differences in optimal anxiety levels (Sonstroem & Bernardo, 1980), intraindividual anxiety scores were employed. Means and standard deviations were computed for CSAI-2 anxiety subscale scores for each subject. From these averages and standard deviations, standardized cognitive and somatic

Table 11

Mean Low, Moderate, and High Cognitive and Somatic Anxiety Computed for the Manipulation Check

		Low	Moderate	High
Cognitive Anxiety	M	15.58	20.95	27.68
	SD	3.76	4.27	5.02
Somatic Anxiety	M	13.00	20.00	28.63
	SD	3.93	4.00	4.75

anxiety scores were computed and used in subsequent analyses.

Standardized performance measures were also utilized in the analyses. Separate average scores and standard deviations were obtained for each athlete's performance based on athlete ratings, coach ratings, and objective ratings from which standardized scores were computed.

Correlations Among Cognitive and Somatic Anxiety and Performance

The relationship between state cognitive and somatic anxiety and performance was initially examined through Pearson Product-Moment correlations. Examination of Tables 12 and 13 reveals that no consistent relationship between raw score state cognitive or somatic anxiety and any of the performance measures emerged across the twelve competitions.

Correlations between the first ten minutes of objective soccer performance and cognitive and somatic anxiety were also computed and are contained in Tables 12 and 13. The ten minute objective rating of performance did not appear to be more highly related to performance than objective performance measured over 45 minutes of the first half of the game. Correlations between cognitive and somatic anxiety and the ten minute objective measure of performance were not consistently higher than those using the first half objective performance measure.

Table 12

Correlations Between Raw Score Cognitive Anxiety Scores and Performance Measures.

Game	Athlete Rating of Performance	Coach Rating of Performance	Objective Performance	Ten Minute Objective Performance
1	-.17	-.14	-.26	-.04
2	.08	-.08	.16	.17
3	.09	.32	.34	.38
4	.11	-.12	.03	-.05
5	.02	-.17	-.06	-.11
6	.39	.10	.06	.12
7	-.32	.05	.33	.32
8	.09	.18	.33	-.18
9	-.74***	-.24	.32	.11
10[1]	-.15		.70**	.81***
11	.34	-.21	.32	.52
12	-.19	.24	.50*	.29

* $p < .05$, ** $p < .01$, *** $p < .001$.

[1] Coach ratings of performance were missing for competition 10.

Table 13

Correlations Between Raw Score Somatic Anxiety Scores and Performance Measures.

Game	Athlete Rating of Performance	Coach Rating of Performance	Objective Performance	Ten Minute Objective Performance
1	-.18	-.63**	-.46*	-.22
2	.06	.19	-.08	-.13
3	.33	-.05	.48*	.56
4	.25	.11	.12	.00
5	.27	-.20	-.04	-.08
6	.38	.15	.11	.42
7	.07	.08	.45	.36
8	.05	.19	.19	-.10
9	-.34	-.01	.35	.13
10[1]	-.28		.75**	.59**
11	-.47	.20	.38	.68*
12	-.09	.31	.46*	.41

* $p < .05$, ** $p < .01$, *** $p < .001$.

[1] Coach ratings of performance were missing for competition 10.

Correlations among intraindividual cognitive and somatic anxiety and each standardized performance measure were also examined. These are contained in Tables 14 and 15. No consistent relationship between the intraindividual anxiety scores and standardized performance were indicated.

In order to examine the relationships between retrospective cognitive and somatic anxiety and performance, correlations were computed between retrospective anxiety and each performance measure (see Table 16). Results indicated that retrospective cognitive and somatic anxiety were not consistently correlated with any of the performance measures.

Trend Analyses Examining Cognitive and Somatic Anxiety and Performance

Multidimensional anxiety theory predictions relative to the relationship between anxiety and athletic performance were examined by computing separate polynomial trend analyses on intra-individual cognitive and somatic anxiety for each of the standardized performance measures. Specifically, the data were tested to determine if they fit a linear or curvilinear (inverted-U) pattern. The procedure employed was consistent with that advocated by Sonstroem and Bernardo (1980). The polynomial trend analysis procedure was computed through a hierarchical multiple regression

Table 14

Correlations Between Intra-Individual Cognitive Anxiety Scores and Standardized Performance Measures.

Game	Athlete Rating of Performance	Coach Rating of Performance	Objective Rating of Performance	Ten Minute Objective Performance
1	.47*	.52*	.17	-.07
2	.13	-.04	-.53*	.24
3	-.04	-.29	.26	.02
4	.26	-.10	.01	.13
5	.00	-.01	-.51*	.39
6	-.11	-.04	-.43	-.09
7	-.37	-.18	.24	-.41
8	-.18	-.27	.09	-.27
9	-.05	-.09	-.78**	-.01
10[1]	-.16		.22	.37
11	-.22	.43	.15	-.19
12	.26	.11	.81***	-.37

* $p < .05$, ** $p < .01$, *** $p < .001$.

[1] Coach ratings of performance were missing for competition 10.

Table 15

Correlations Between Intra-Individual Somatic Anxiety Scores and Standardized Performance Measures.

Game	Athlete Rating of Performance	Coach Rating of Performance	Objective Performance	Ten Minute Objective Performance
1	-.01	.57*	-.24	-.11
2	.22	.50*	-.50	.21
3	.11	-.36	.25	.17
4	-.14	.01	.27	-.05
5	.29	.01	-.51*	.20
6	.27	.09	.08	-.07
7	-.00	-.22	.47	.14
8	-.15	-.19	.24	-.32
9	-.30	-.07	-.28	-.14
10[1]	.45		-.26	-.24
11	-.59*	.54	-.34	-.63
12	.07	.25	.42	.30

* $p < .05$, ** $p < .01$, *** $p < .001$.

[1] Coach ratings of performance were missing for competition 10.

Table 16

Correlations Between Retrospective Cognitive and Somatic Anxiety and Performance Measures

Game	Coach Rating of Performance		Athlete Rating of Performance		Objective Rating of Performance	
	Cog	Som	Cog	Som	Cog	Som
1	-.25	-.19	.27	-.07	-.07	-.09
2	.15	.12	-.32	-.27	-.06	-.11
3	-.24	-.16	-.33	-.27	.16	.18
4	-.25	-.26	-.04	-.14	-.22	-.22
5	-.01	.14	-.31	-.44*	.30	.27
6	.31	.40	-.36	-.41	.07	.21
7	-.23	-.28	.23	.20	-.09	.05
8	.18	.20	-.16	-.25	.08	-.12
9	.22	.29	-.52*	-.47*	.55*	.58*
10[1]			-.11	-.20	.56**	.23
11	.62**	.17	-.67**	-.56*	.57*	.24
12	.40	-.23	.53*	.02	.28	.13

* $p < .05$, ** $p < .01$

[1] Coach ratings of performance were missing for competition 10.

analysis which entered successive powers of the predictor variable (cognitive or somatic anxiety) into the equation to test for linear, quadradic, and cubic relationships. Statistical significance was obtained if the overall F value and the beta weight for the specific power of the predictor variable were both associated with a probability level of less than .05.

In order to include the greatest number of performance measures in the trend analyses, the computations included athletes who had complete anxiety and performance data from at least 10 soccer matches. If an athlete had complete data from more than 10 matches, the additional data were eliminated from the analyses through consulting a random numbers table and deleting data from the soccer match coinciding with the number on the random numbers table (each soccer match was numbered in the order it was played). There were nine to ten athletes who had complete anxiety and performance data from at least ten soccer matches for each of the performance measures.

Coach Ratings of Performance. Figure 6 reveals a significant negative linear trend between cognitive anxiety (n = 90), $F(1, 88) = 8.27$, $p < .01$. (The numbers on the trend analysis figures represent the number of data points occupying that specific space.) There was also a significant quadradic trend between coach ratings of

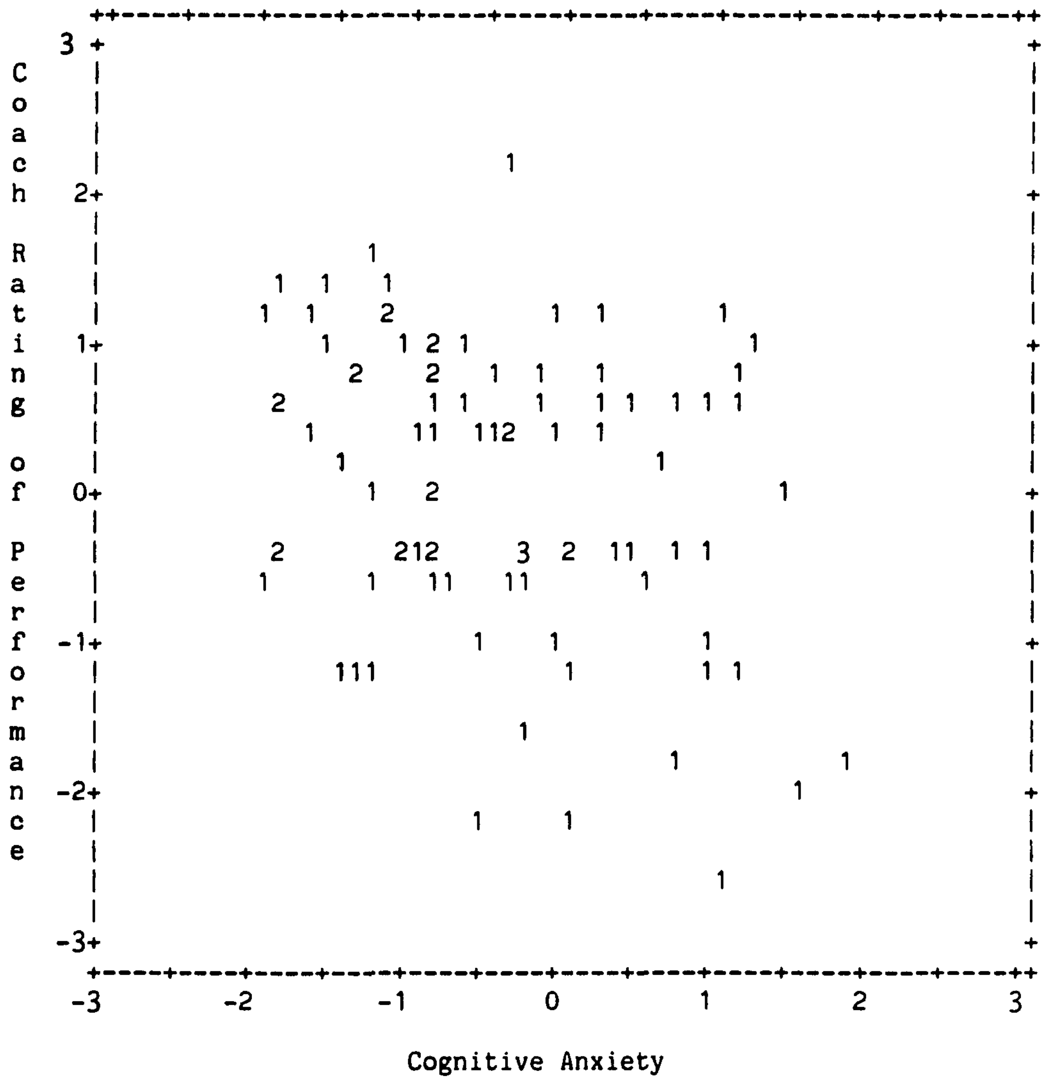

Figure 6. Polynomial Trend Analysis Between Standardized Cognitive Anxiety and Coach Ratings of Performance

performance, $F(2, 87) = 4.21$, $p < .05$, however, beta weights were only significant for the first power of cognitive anxiety, or the linear relationship (linear beta = −.29, $p = .005$, quadradic beta = −.05, $p = .64$). Better coach ratings of soccer performance were associated with low levels of cognitive anxiety. Neither significant curvilinear, $F(2, 87) = 1.31$, $p = .27$, nor linear, $F(2,87) = 1.35$, $p < .25$, relationships between somatic anxiety and coach rating of performance were found (see Figure 7).

Athlete Ratings of Performance. Performance measured by athletes' ratings ($n = 90$) was not significantly related to cognitive anxiety in a linear manner, $F(1, 87) = 0.08$, $p = .78$, or quadradic manner, $F(2, 86) = 0.24$, $p = .79$ (see Figure 8). Somatic anxiety did not have a significant linear, $F(1, 87) = 1.12$, $p = .29$ or quadradic, $F(2,86) = 2.43$, $p = .09$ relationship with athlete's ratings of performance (see Figure 9).

Objective Ratings of Performance. A significant negative linear trend was found for cognitive anxiety when performance was measured objectively ($n = 100$), $F(1, 98) = 8.06$, $p < .01$, beta = −.27, $p < .01$, as indicated in Figure 10. The quadratic relationship between cognitive anxiety and objective performance was not significant, $F(2, 97) =$

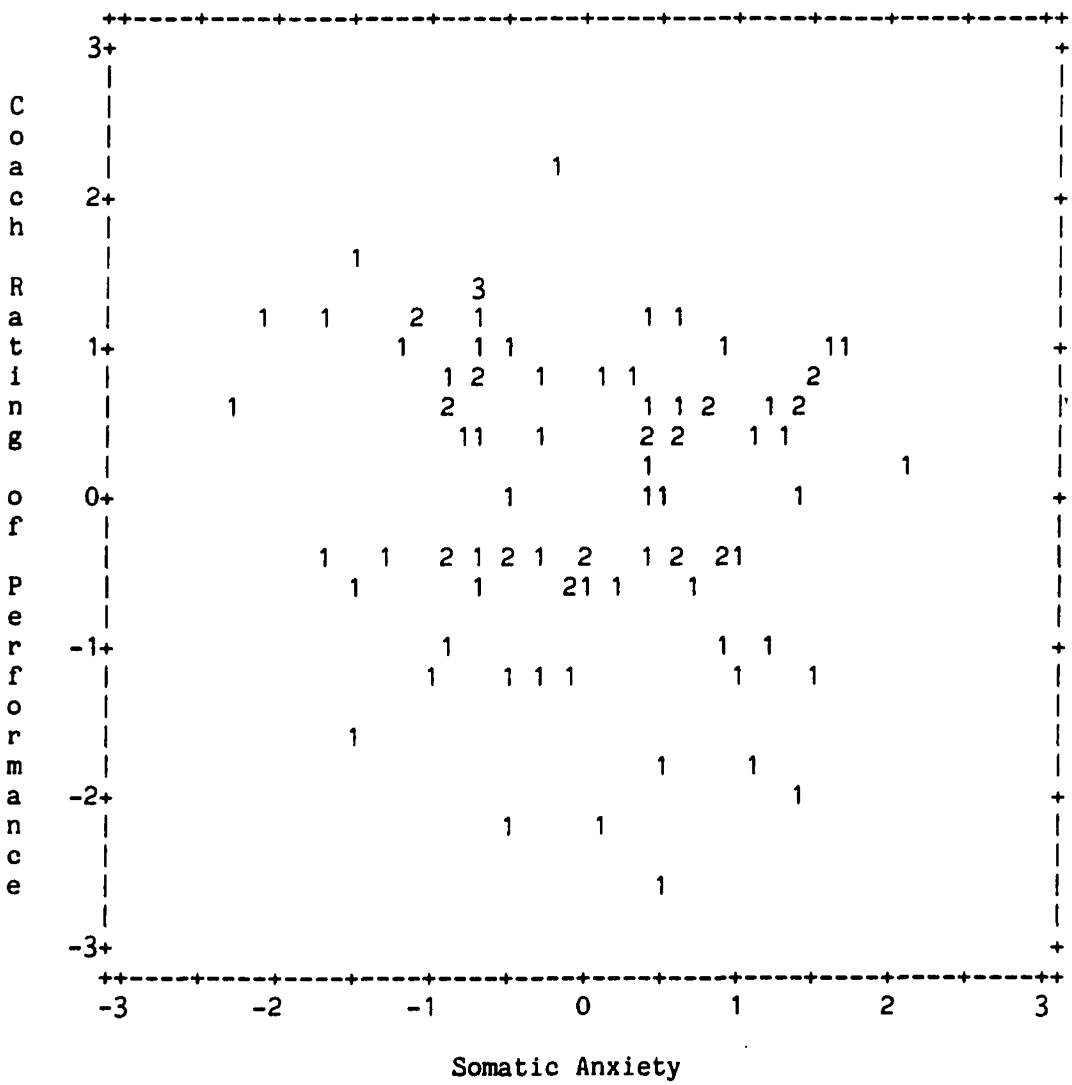

Figure 7. Polynomial Trend analysis Between Standardized Somatic Anxiety and Coach Ratings of Performance

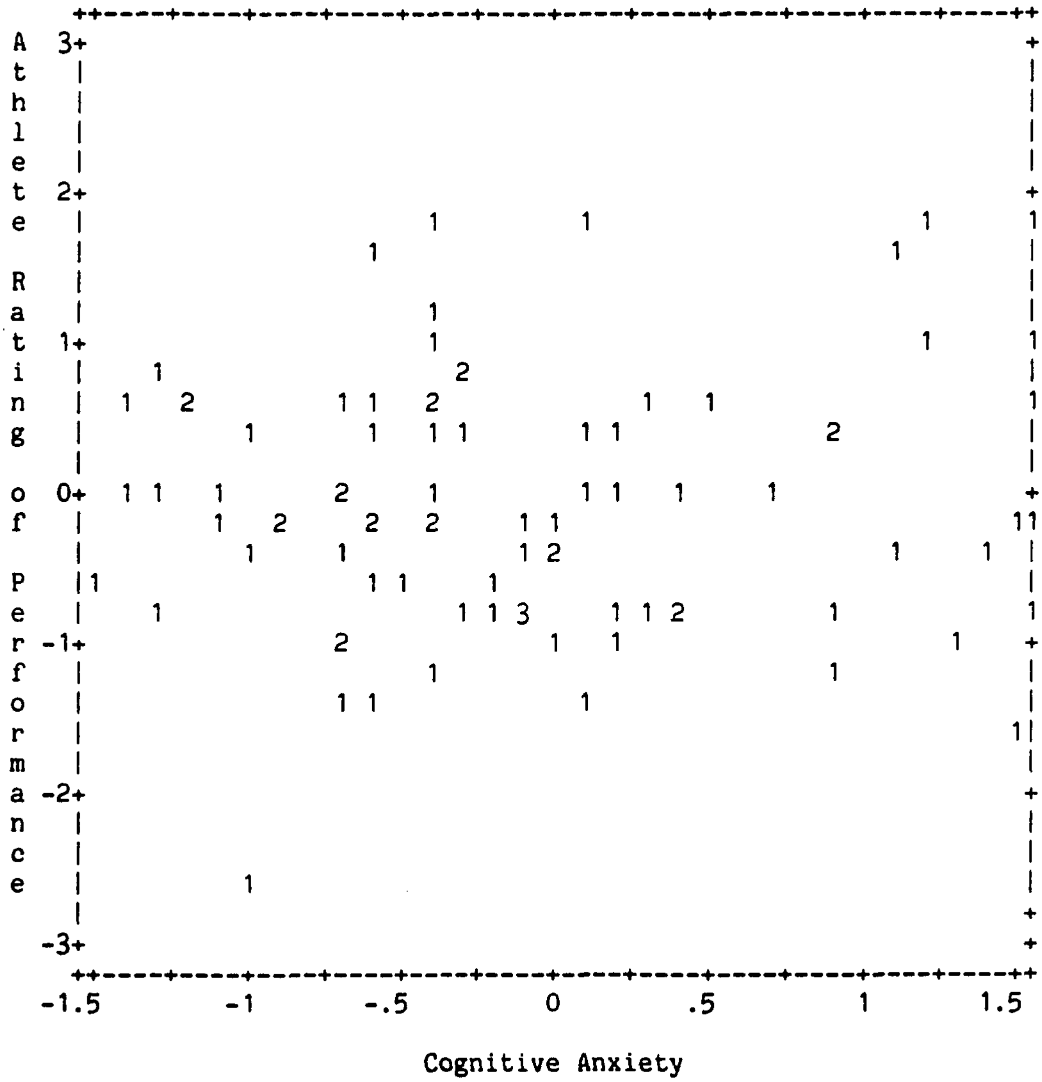

Figure 8. Polynomial Trend Analysis Between Standardized Cognitive Anxiety and Athlete Ratings of Performance

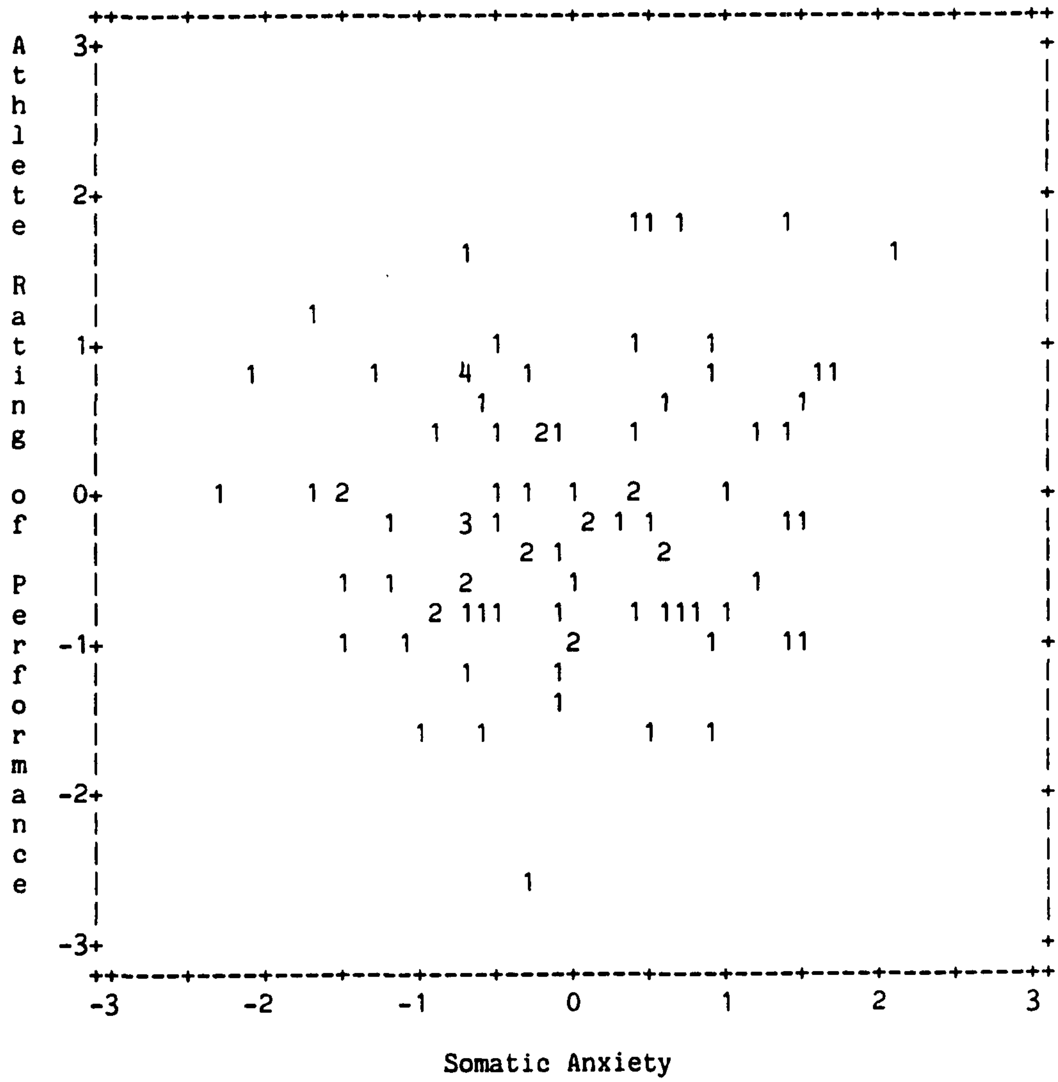

Figure 9. Polynomial Trend Analysis Between Standardized Somatic Anxiety and Athlete Ratings of Performance

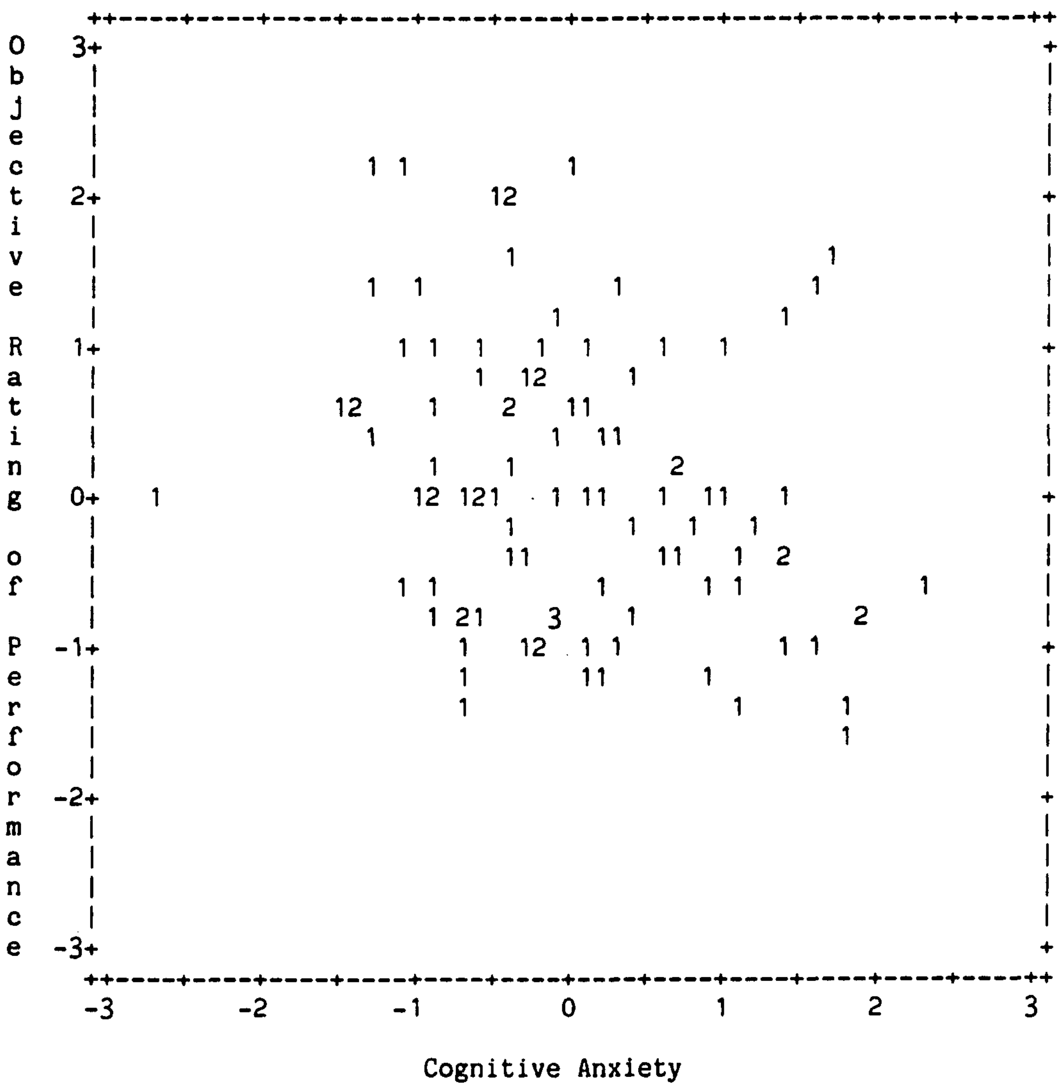

Figure 10. Polynomial Trend Analysis Between Standardized Cognitive Anxiety and Objective Ratings of Performance

4.03, $p < .05$, beta = -.03, $p = .62$. There was also a significant negative linear relationship found between somatic anxiety and the objective performance measure, $F(1, 98) = 7.29$, $p < .01$, beta = -.26, $p < .01$ (see Figure 11). Better soccer performances were observed when cognitive and somatic anxiety were low. A significant quadradic trend for somatic anxiety was not found, $F(2, 97) = 3.95$, $p = .02$, beta = .08, $p = .43$.

In summary, multidimensional anxiety theory analyses supported the prediction that cognitive anxiety would be negatively related to soccer performance as measured by two of the three performance measures. The prediction that somatic anxiety would have a curvilinear relationship with performance was not supported. Alternatively, a negative linear relationship was found between somatic anxiety and objective, but not coach or athlete, ratings of performance.

Phase 3: Catastrophe Theory Results

The third phase of the analyses examined the predictions of the catastrophe theory which hypothesized that somatic anxiety will influence performance differently when cognitive anxiety is low versus high. Originally a general multivariate methodology for estimating catastrophe models (GEMCAT), developed by Oliva, Desarbo, Day, and Jedidi (1987), was to be used to determine whether the data fit a cusp catastrophe curve. However, it was concluded

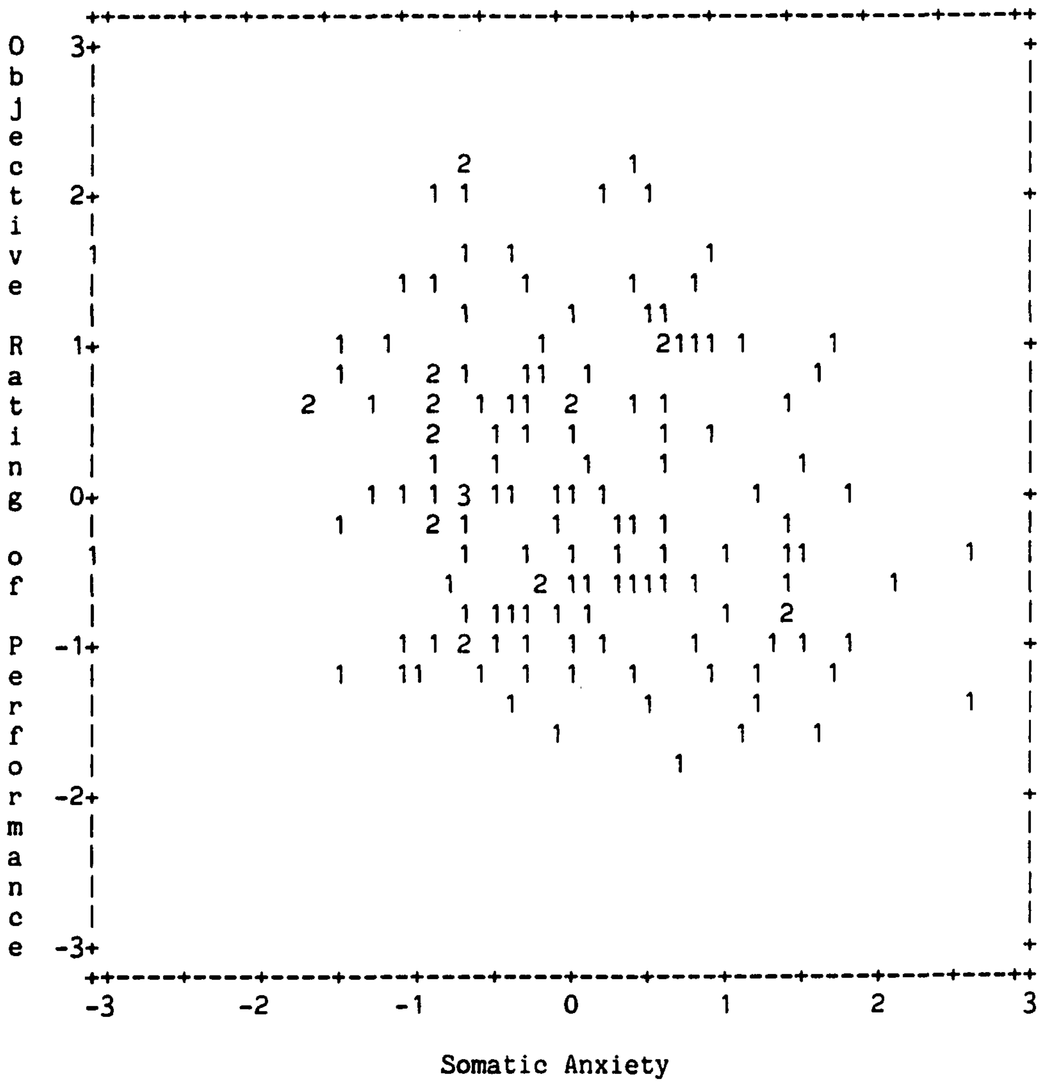

Figure 11. Polynomial Trend Analysis Between Standardized Somatic Anxiety and Objective Ratings of Performance

that because of (1) software difficulties, (2) lack of expert support and (3) lack of certainty and conviction in the GEMCAT program, it would be not be possible to use the GEMCAT program.

A catastrophe model test analysis session with Lloyd Bond (UNCG statistician), Gary Grandon (UNCG Director of Academic Computing), Marleen Pratto (UNCG Assistant Director of Academic Computing), Dan Gould (Dissertation Director) and the author resulted in a four stage catastrophe theory data analysis plan. In all cases, only standardized anxiety and performance data were examined. The first stage consisted of plotting the cognitive anxiety, somatic anxiety, and performance data and visually examining the patterns. The second stage examined the data through linear multiple regression analyses. Two equations were computed; the first included cognitive and somatic anxiety as the predictor variables and the second entered a multiplicative term of the product of cognitive and somatic anxiety as the predictor variable. These equations were compared to determine whether the combined effect of cognitive and somatic anxiety (the multiplicative term) was a stronger predictor of performance than cognitive and somatic anxiety independently. Residuals of linear multiple regression analyses were examined to compare anxiety at low and high performance levels. The residual analysis compared the observed residuals to a hypothesized residual plot. The third stage of the analyses examined the hypothesis that performance would follow a different path under conditions of high and low cognitive anxiety through a series of linear multiple regression analyses. The final stage of catastrophe theory data analysis examined a model fitting test of the catastrophe theory through a multivariate nonlinear regression analysis. Each stage of the analyses will be explained in more depth as the results of the analyses are presented below.

The data were organized so that each complete set of standardized cognitive and somatic anxiety and performance measure was input independent of a particular subject. For example, a subject who had complete data for only four of the twelve matches provided four data points to the analyses. In this way, listwise missing data were not problematic and approximately 140 data points were included in the catastrophe analyses.

Data Plots

This first stage consisted of visual inspection of the standardized cognitive anxiety, somatic anxiety, and performance data plotted with three dimensional graphics using the SASGraph three dimensional scatterplot program. The data were examined for patterns in cognitive and somatic anxiety as they relate to athletic performance. That is, would a cusp catastrophe model pattern be evident? If so, the best performances should be observed at moderate levels of cognitive and somatic anxiety or at any level of somatic anxiety as long as cognitive anxiety was low. The worst performances should occur when cognitive and somatic anxiety were both at high levels.

On each plot, somatic anxiety is on the bottom, horizontal axis ranging from high to low (left to right). Cognitive anxiety is on the axis perpendicular to somatic anxiety, on the right side of the plot, ranging from low to high (bottom to top). Ratings of performance follow the height axis on the left side of the plot with better performances being taller.

Coach Ratings of Performance Plots. Figure 12 includes all of the data points, but is difficult to detect any patterns. Therefore, the plot was subdivided into three plots based on the upper third, middle third, and lower third levels of cognitive anxiety. Visual inspection of Figures 13-15 reveals no identifiable pattern consistent with the catastrophe curve.

Athlete Ratings of Performance Plots. Examination of Figure 16 shows no obvious pattern in the cognitive anxiety, somatic anxiety, and coach ratings of performance plots with all data points. When the plots were divided into high,

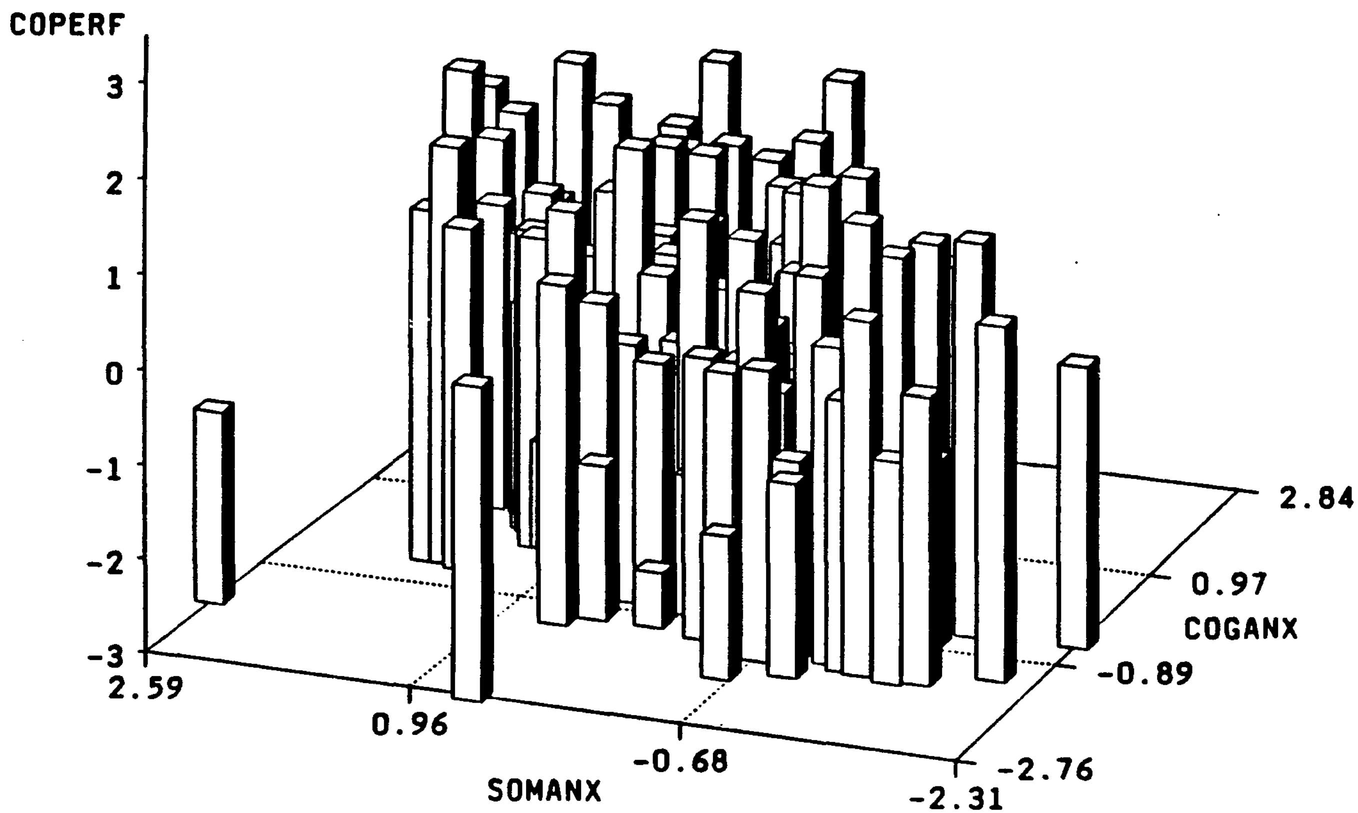

Figure 12. Three Dimensional Plot of Cognitive Anxiety, Somatic Anxiety, and Coach Ratings of Performance

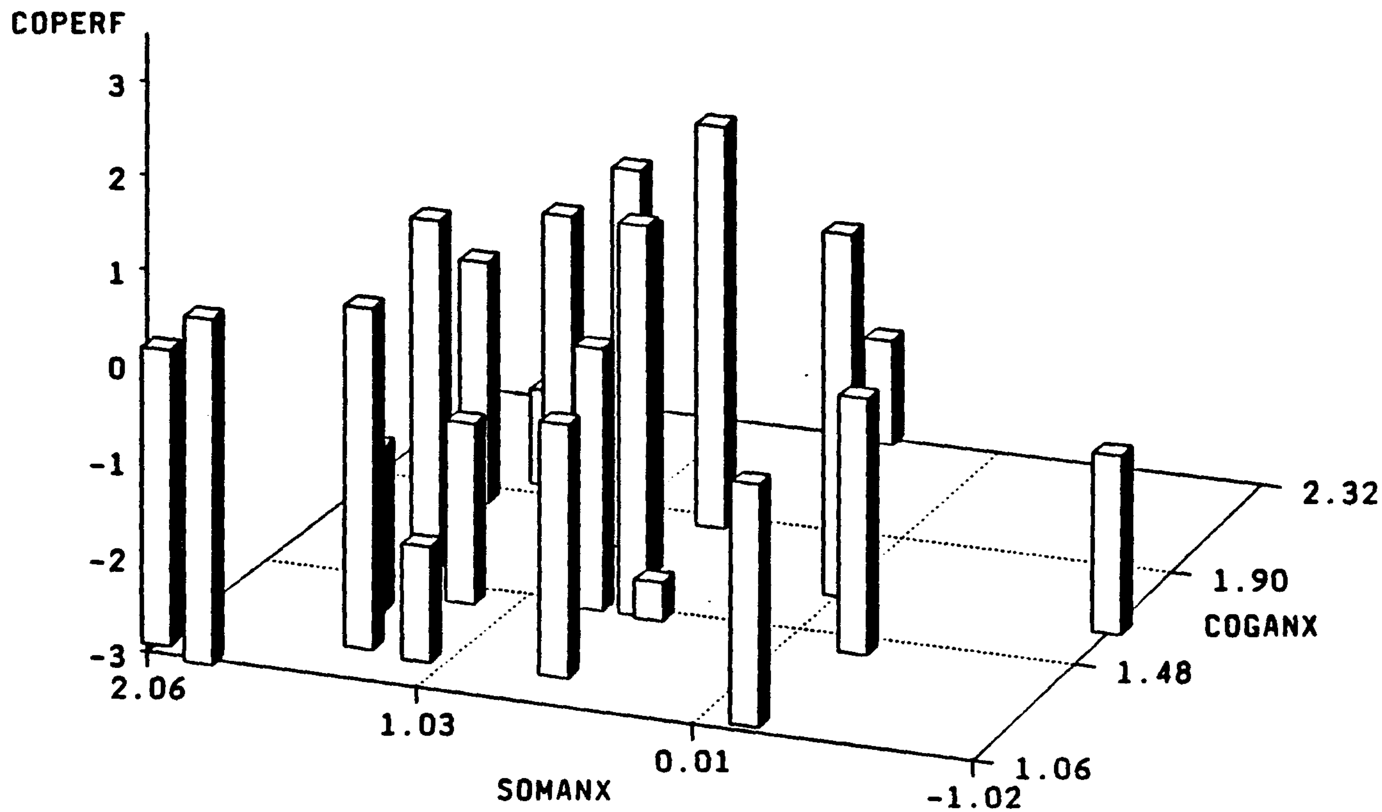

Figure 13. Three Dimensional Plot of Cognitive Anxiety, Somatic Anxiety, and Coach Ratings of Performance for High Cognitive Anxiety

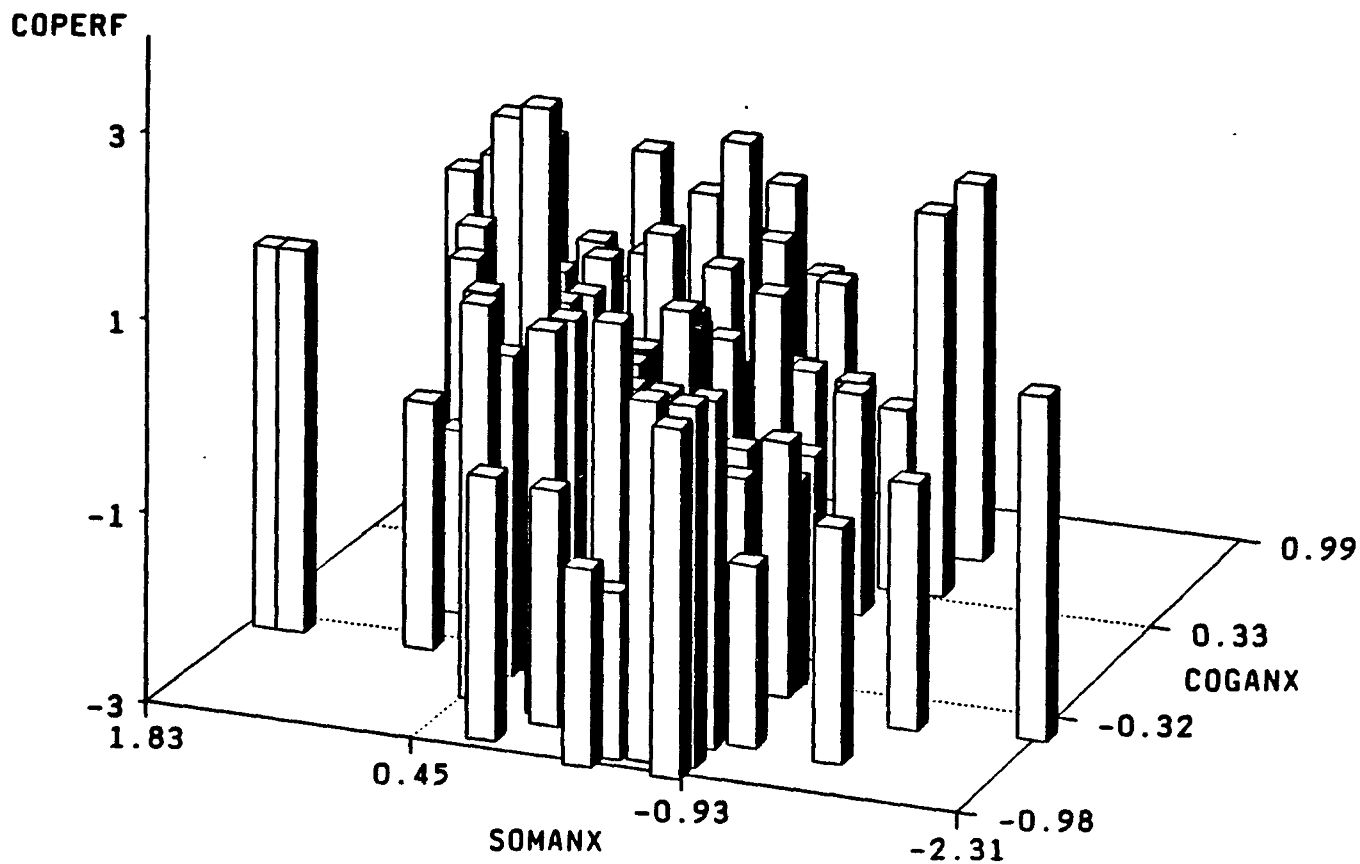

Figure 14. Three Dimensional Plot of Cognitive Anxiety, Somatic Anxiety, and Coach Ratings of Performance for Moderate Cognitive Anxiety

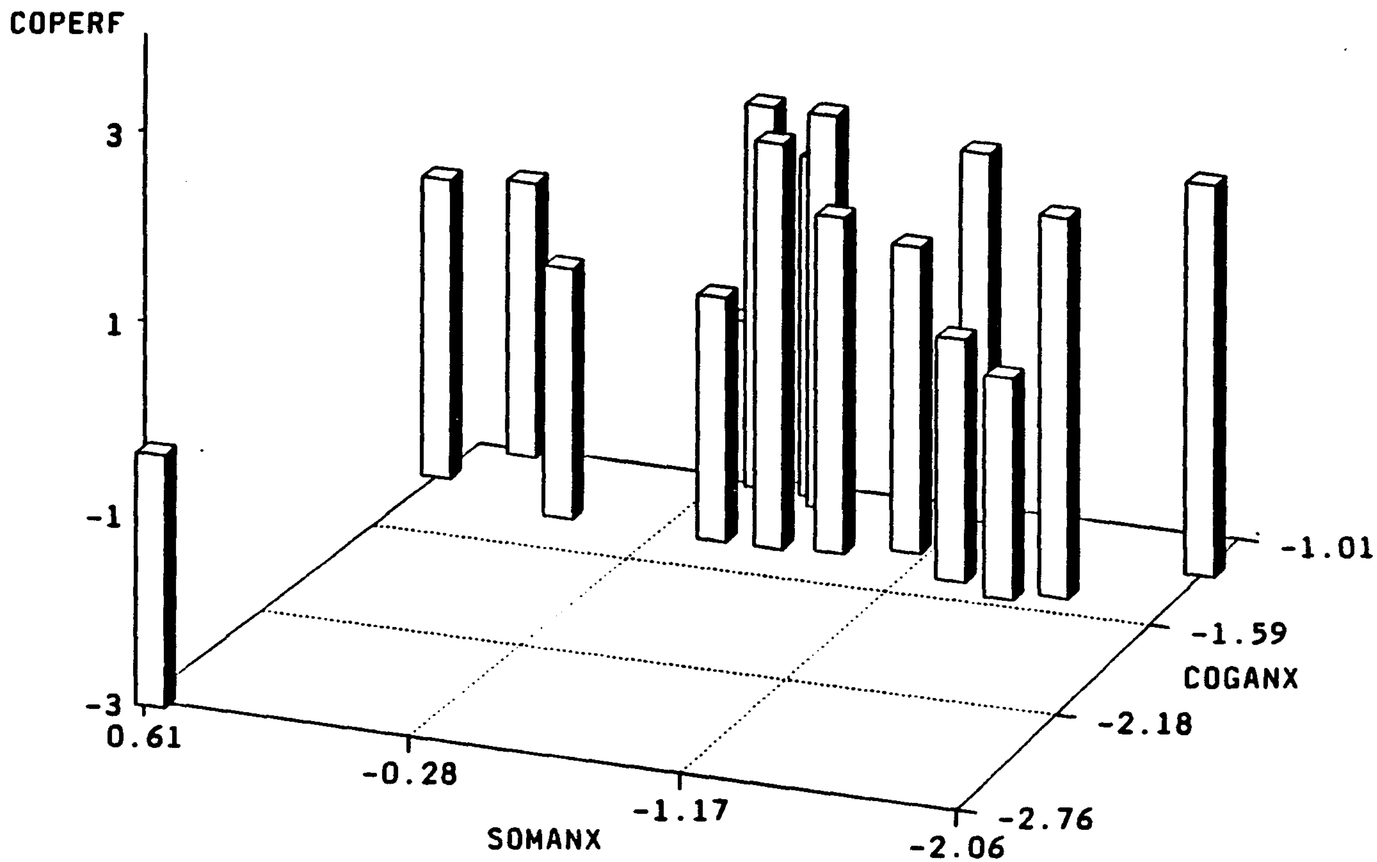

Figure 15. Three Dimensional Plot of Cognitive Anxiety, Somatic Anxiety, and Coach Ratings of Performance for Low Cognitive Anxiety

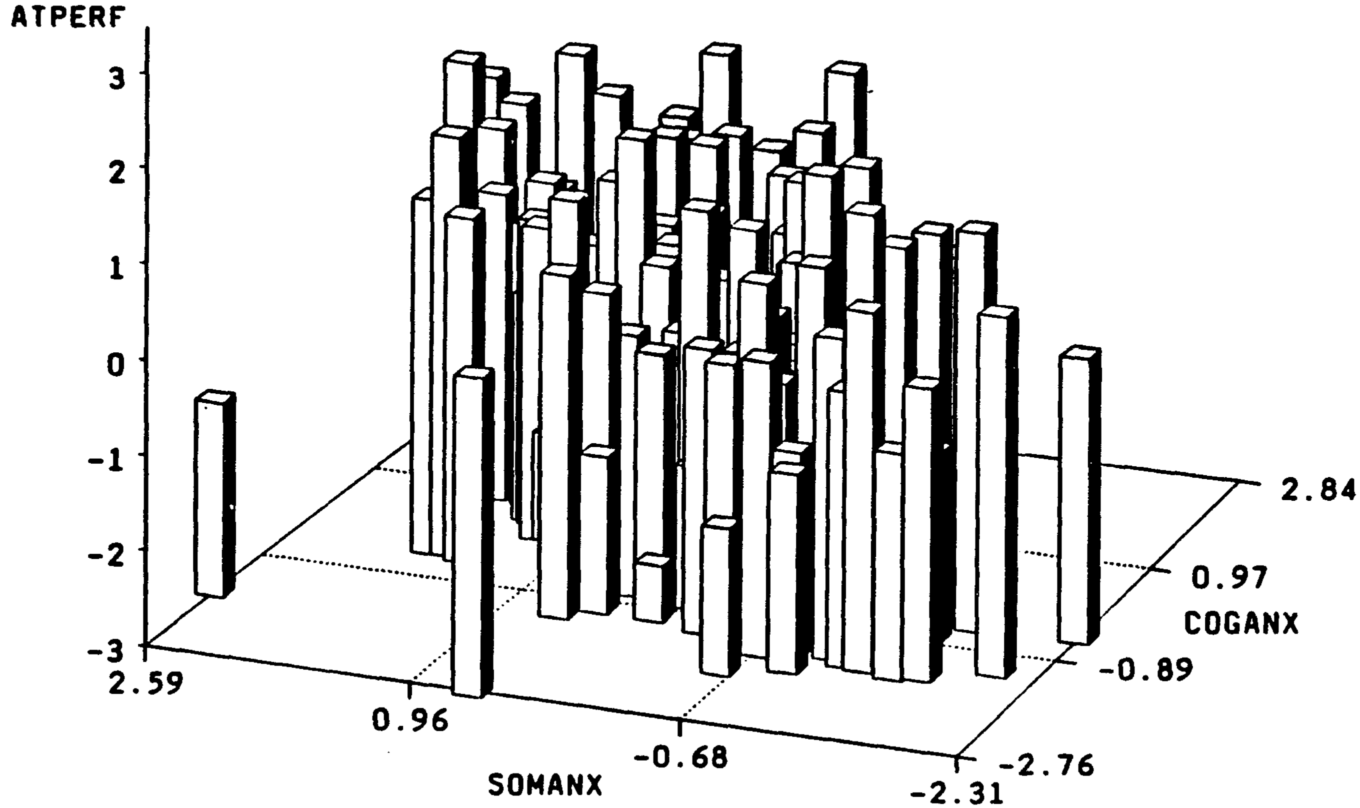

Figure 16. Three Dimensional Plot of Cognitive Anxiety, Somatic Anxiety, and Athlete Ratings of Performance

middle and low levels of cognitive anxiety, still no pattern was detectable (see Figures 17-19).

Objective Ratings of Performance Plots. Figure 20 includes all data points, but it is difficult to detect any patterns. Visual inspection of the Figures 21, 22, and 23 also reveals no identifiable pattern between cognitive and somatic anxiety and soccer performance.

Unfortunately, the data plots were not as helpful as expected in detecting catastrophe model patterns in the data. The plots of the data for coach, athlete and objective ratings of performance did not provide support for the catastrophe theory.

Regression Analyses

The second stage of the catastrophe analysis consisted of stepwise linear multiple regression analyses. Intraindividual cognitive and somatic anxiety were the predictor variables and standardized performance was the criterion variable in the first series of analyses. A second series of multiple regression analyses was computed which included a multiplicative term (cognitive anxiety x somatic anxiety) to determine if the joint effect of cognitive and somatic anxiety would enhance the prediction of performance.

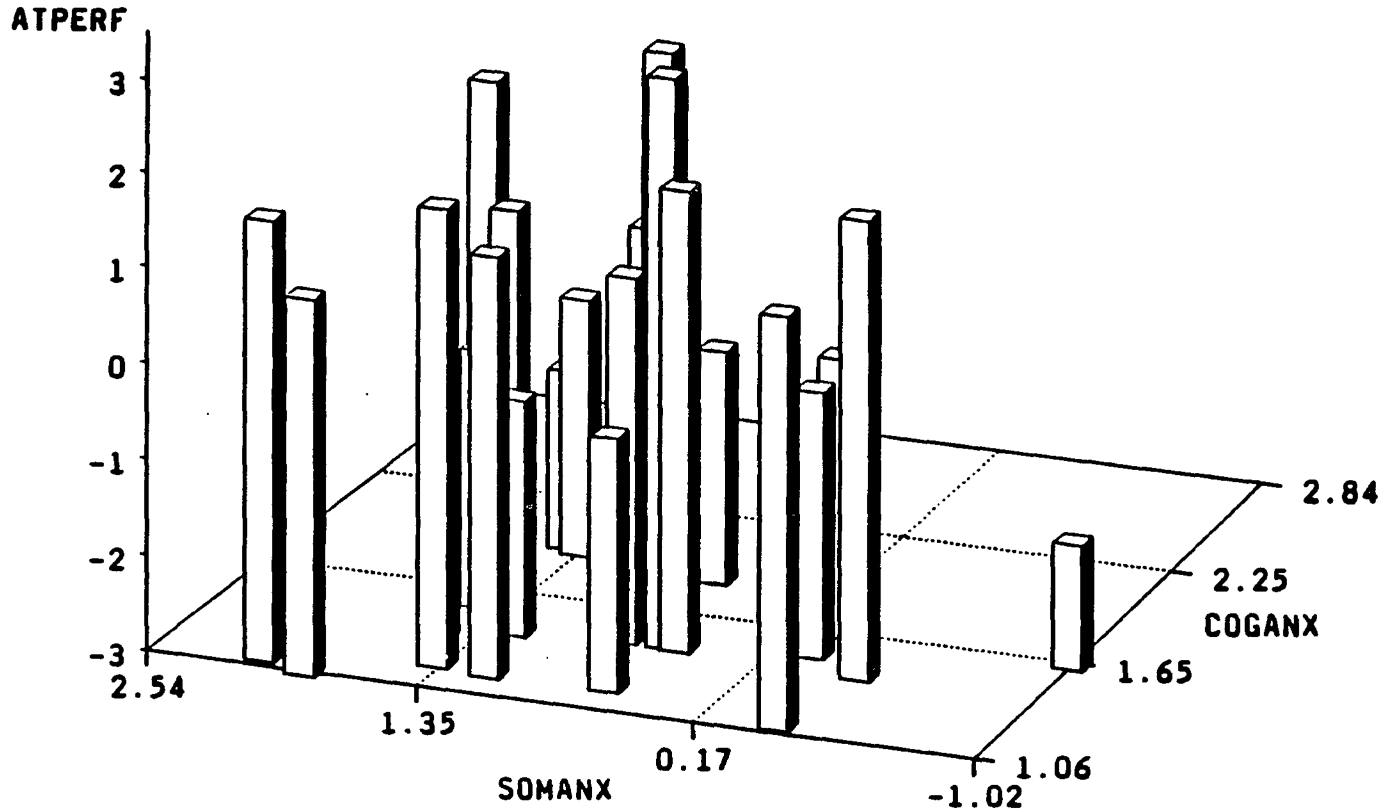

Figure 17. Three Dimensional Plot of Cognitive Anxiety, Somatic Anxiety, and Athlete Ratings of Performance for High Cognitive Anxiety

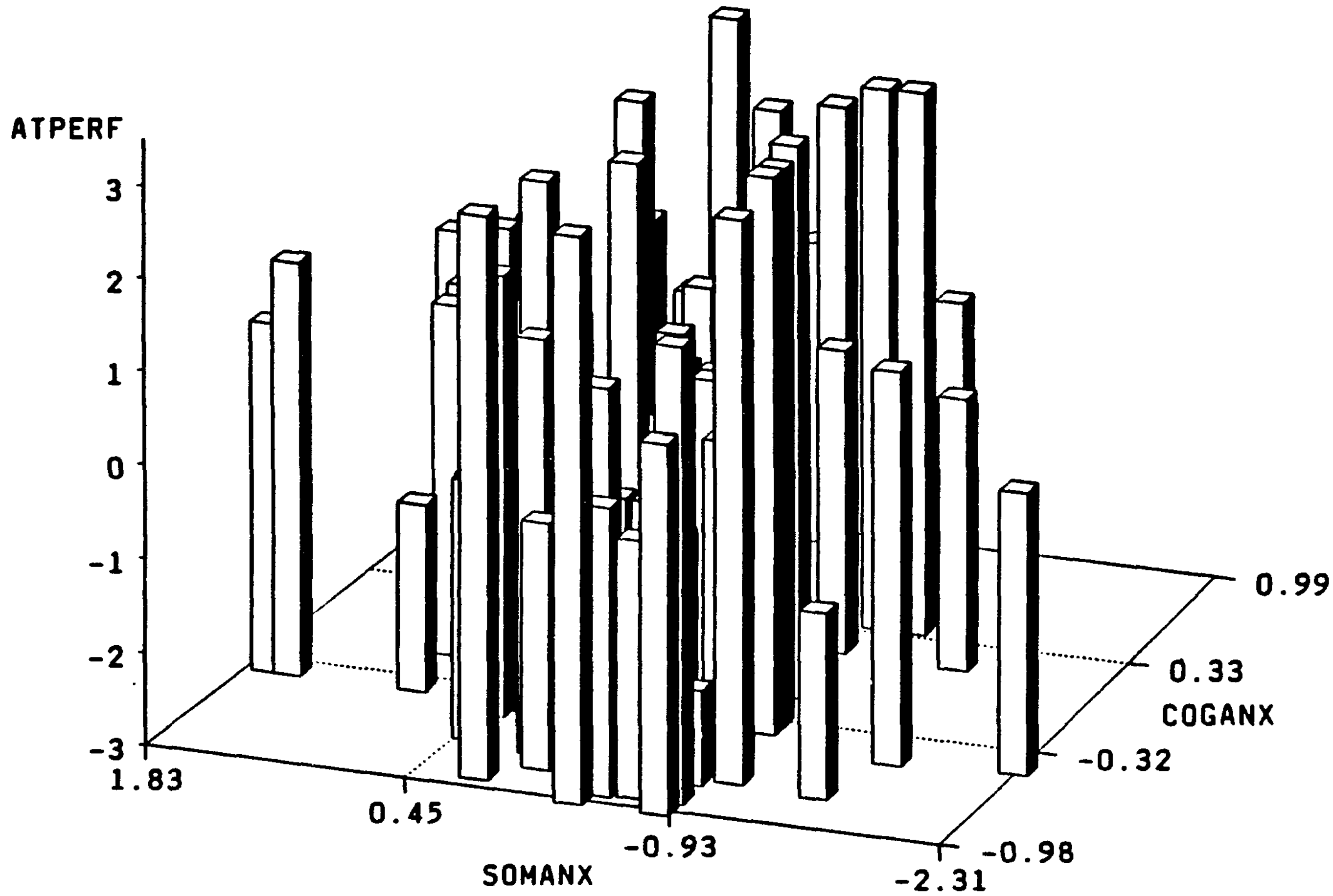

Figure 18. Three Dimensional Plot of Cognitive Anxiety, Somatic Anxiety, and Athlete Ratings of Performance for Moderate Cognitive Anxiety

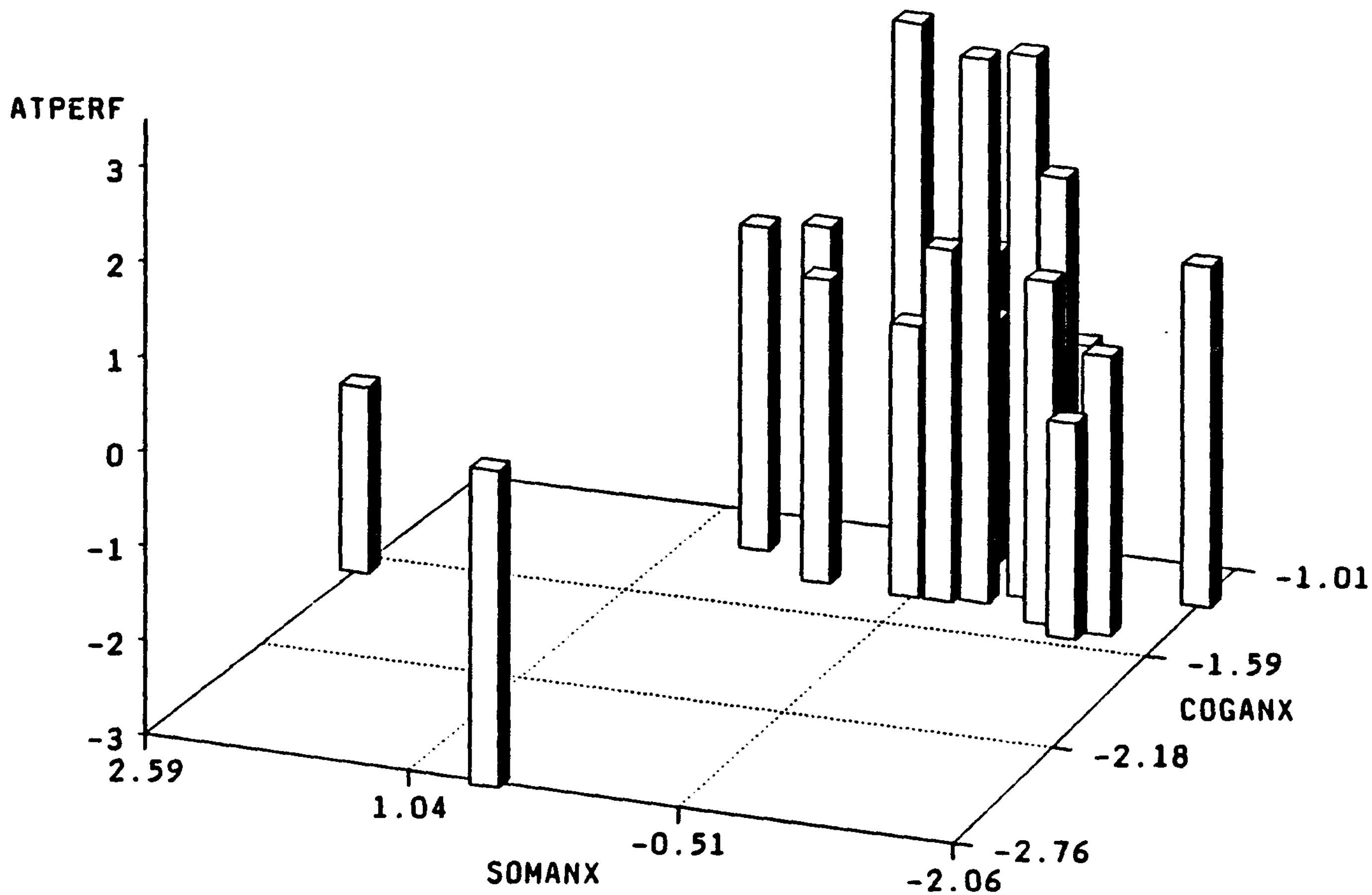

Figure 19. Three Dimensional Plot of Cognitive Anxiety, Somatic Anxiety, and Athlete Ratings of Performance for Low Cognitive Anxiety

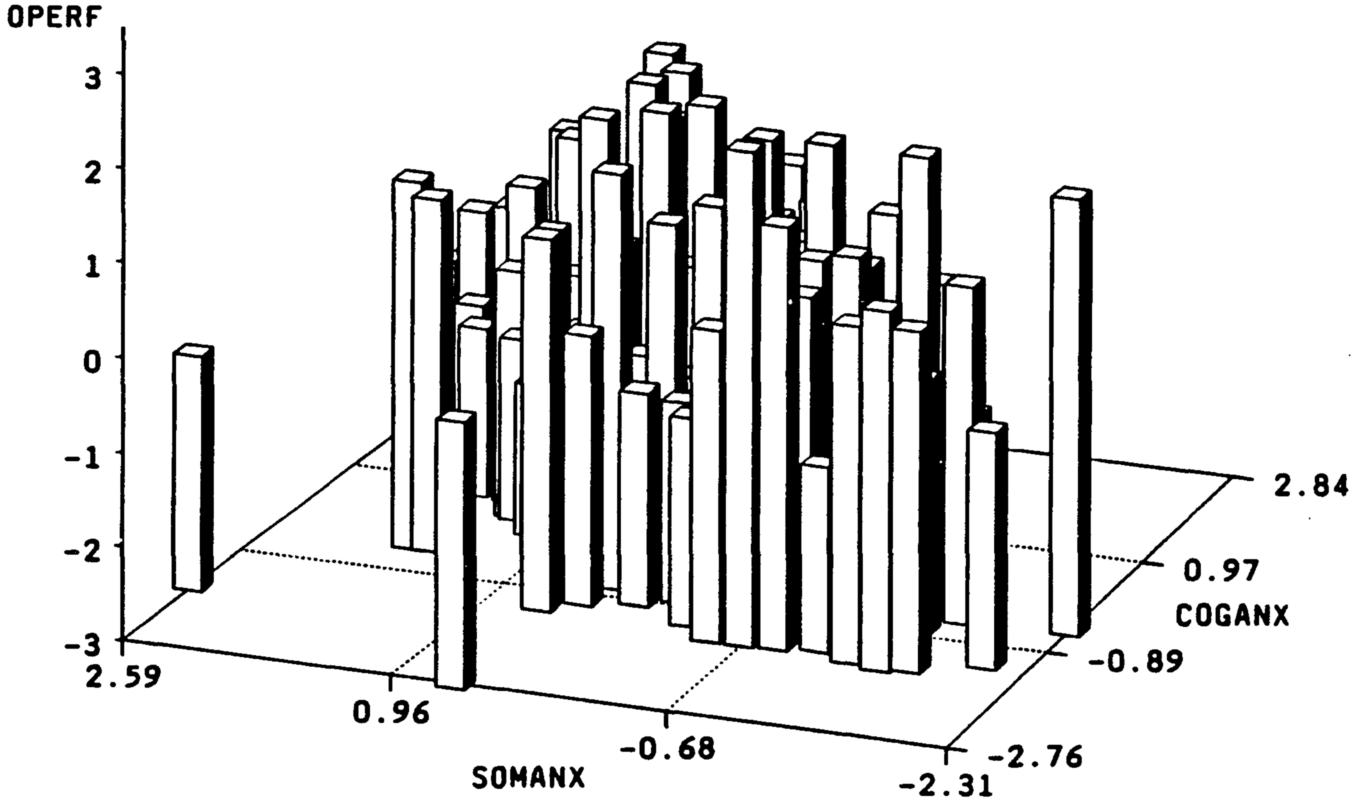

Figure 20. Three Dimensional Plot of Cognitive Anxiety, Somatic Anxiety, and Objective Ratings of Performance

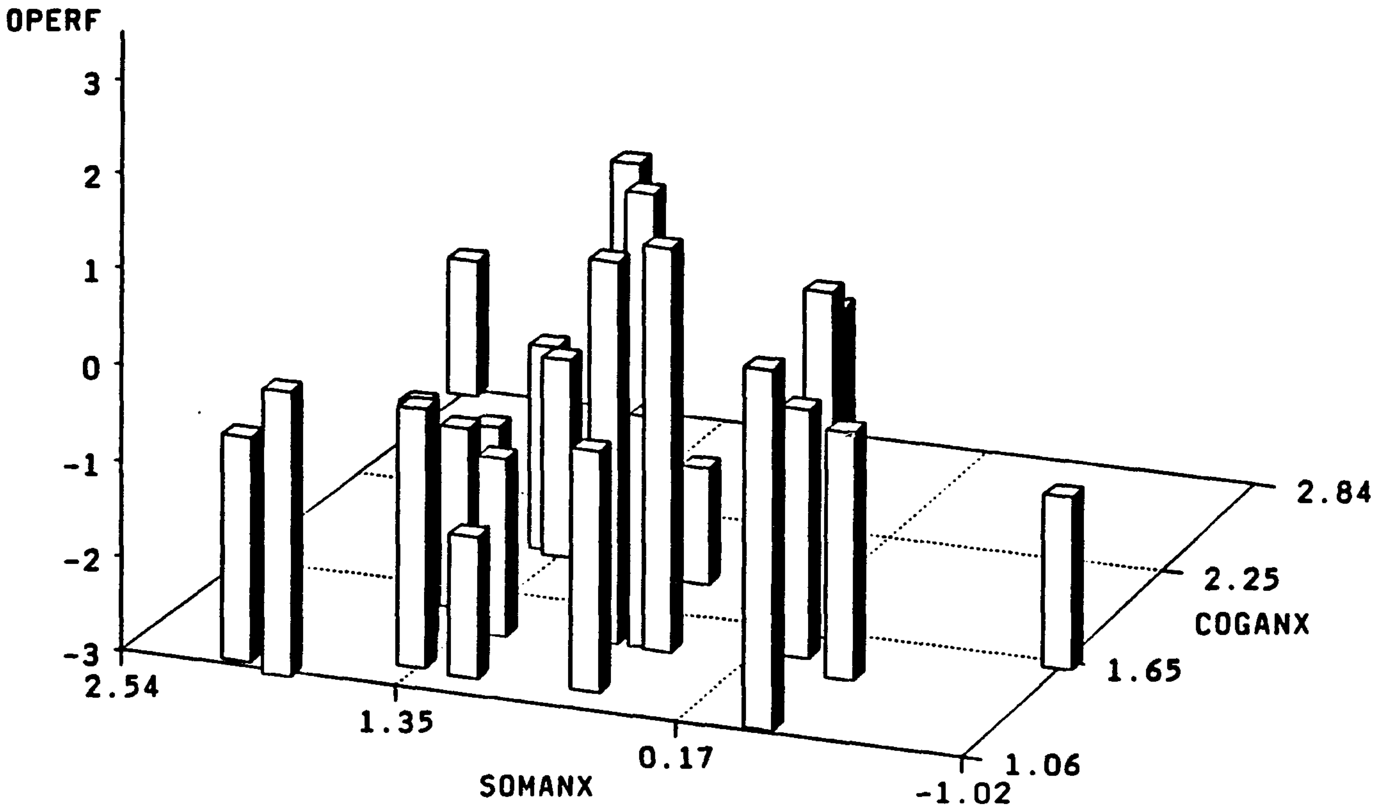

Figure 21. Three Dimensional Plot of Cognitive Anxiety, Somatic Anxiety, and Objective Ratings of Performance for High Cognitive Anxiety

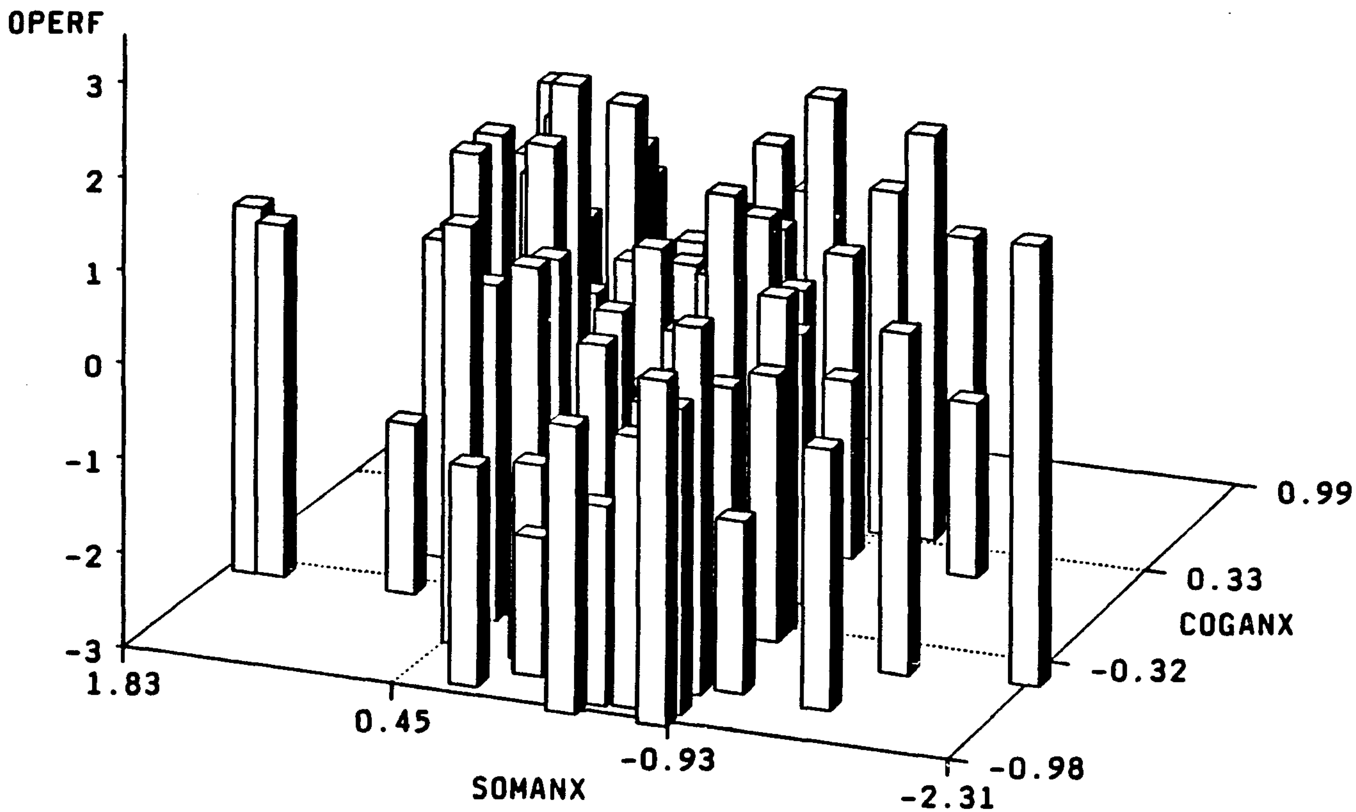

Figure 22. Three Dimensional Plot of Cognitive Anxiety, Somatic Anxiety, and Objective Ratings of Performance for Moderate Cognitive Anxiety

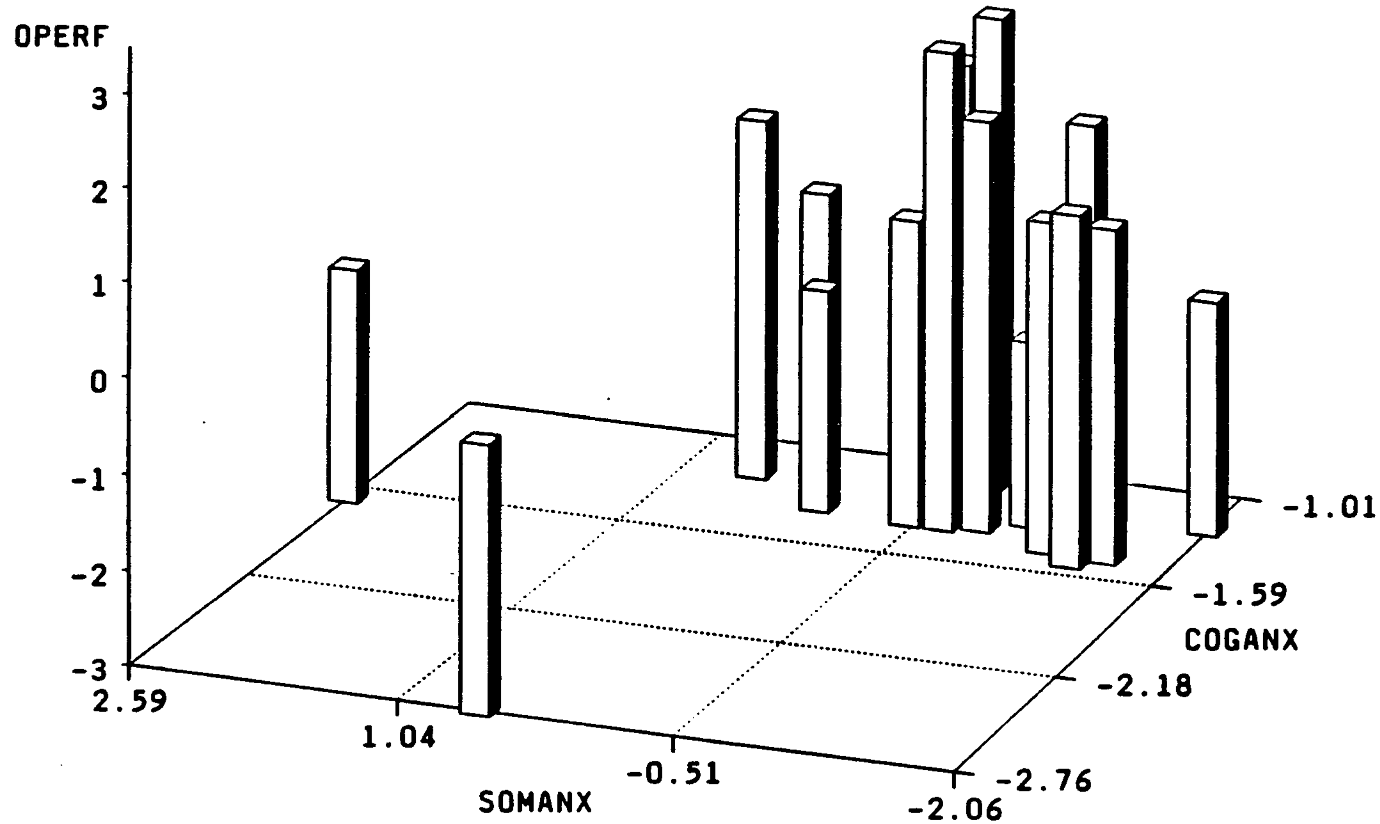

Figure 23. Three Dimensional Plot of Cognitive Anxiety, Somatic Anxiety, and Objective Ratings of Performance for Low Cognitive Anxiety

Previous research has shown that when the three subscales of the CSAI-2 (cognitive and somatic anxiety and self-confidence) were entered into regression analyses, they accounted for 2-13% of athletic performance variance (Krane & Williams, 1986; 1987b; 1988). Thus, cognitive and somatic anxiety may be expected to account for approximately ten percent of soccer performance variance. If the regression equation with the multiplicative term increased the accountable variance by even one percent over the regression equation examining cognitive and somatic anxiety independently, this should be considered meaningful. Considering that it is expected that only ten percent or less of the performance variance will be accounted for by cognitive and somatic anxiety, an increase of one percent would actually be equivalent to at least ten percent more accountable variance. On a practical level, even slight improvements in athletic performance will be noticeable and very meaningful.

A major purpose for computing the regression equations with cognitive and somatic anxiety as predictors of performance was to examine the residuals. The plot of the residuals was compared to the hypothesized residual plot in Figure 24 to determine whether the top portion of the catastrophe curve would be best described by a different

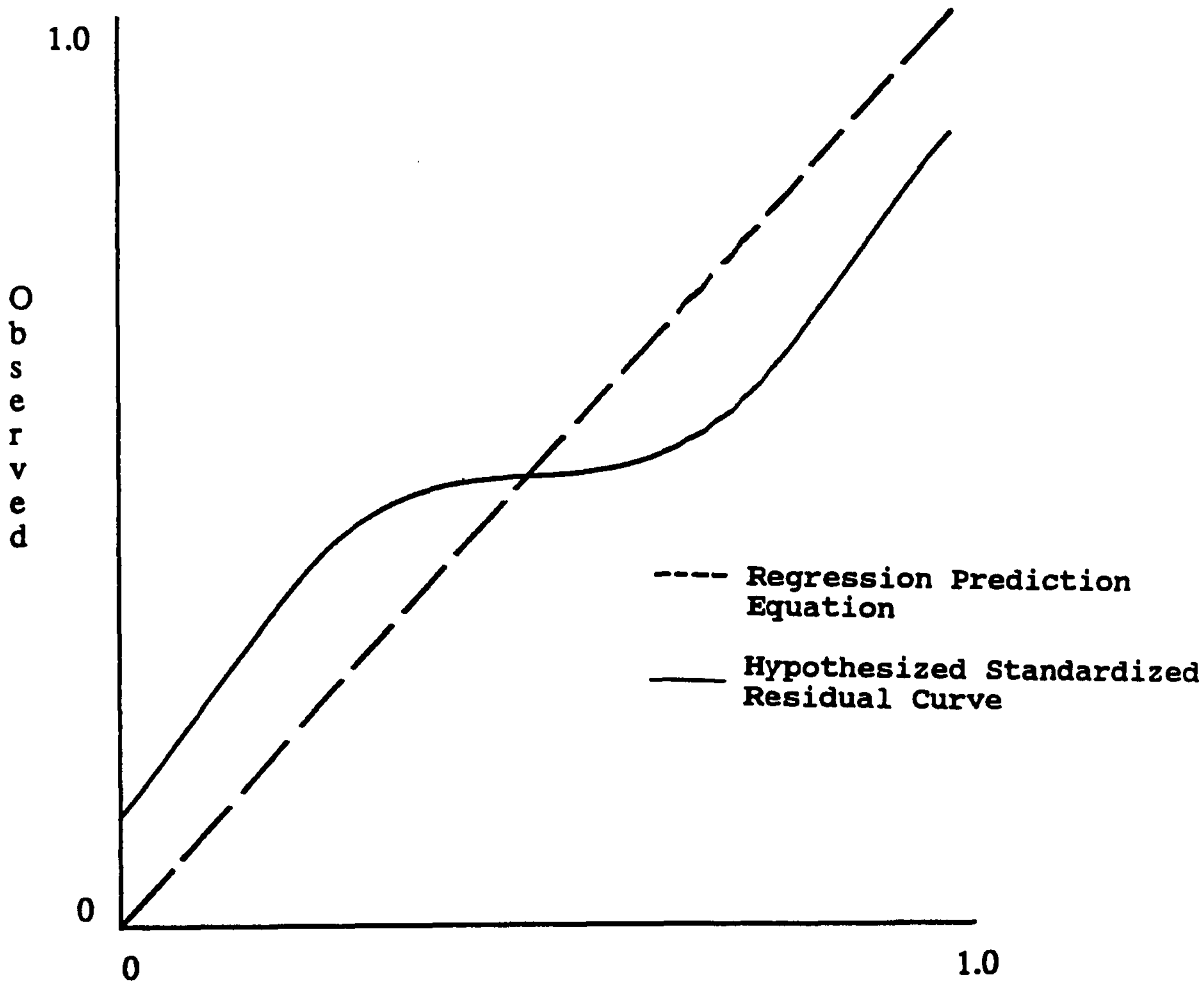

Figure 24. Hypothesized Standardized Residual Curve

regression equation than the bottom portion of the catastrophe curve. Ideally, the residuals at the lower portions of the regression line would follow a pattern of being above the regression line, then level off and ending with residuals below the regression line. This residual pattern would suggest that the data resembled a catastrophe curve. The residuals lying above the regression line would represent performances before an athlete went "over the top," or beyond her optimal level and the residuals lying below the regression line would represent less than average performances, including catastrophic or "choke" performances.

Sign tests were performed to further examine the anxiety score residuals. These tests examined whether there was a significant difference in the number of positive and negative anxiety scores at each of three levels of performance. Separate sign tests were computed for low, moderate and high performance levels. Because standardized scores were used in the analyses, scores above +1 were considered high performance, scores between +1 and -1 were moderate performance and scores below -1 were low performance. The sign tests will support the hypothesized residual curve if the following conditions are met. At high performance, there are significantly more negative anxiety scores (residuals associated with performance below the regression equation). Athletes will display lower levels of cognitive and somatic anxiety at upper levels of performance. Because moderate performances may be associated with either high or low cognitive and somatic anxiety, it is not expected that sign tests for this portion of performance will be significant. At low levels of performance, anxiety is expected to be high, as indicated by more positive than negative residuals. Athletes will display greater levels of cognitive and somatic anxiety at low levels of performance.

In summary, support will be provided for catastrophe theory predictions if: (1) multiple regression analyses including the multiplicative term account for at least one percent more accountable variance than the regression analyses examining cognitive and somatic anxiety independently, (2) the residual plots are similar to the hypothesized residual pattern shown in Figure 24, and (3) sign tests indicating more negative anxiety scores at high performance levels and more positive anxiety scores at low performance levels.

Coach Ratings of Performance. The regression equation examining cognitive and somatic anxiety as predictors of coach ratings of performance was significant, $F(2, 164) = 3.11$, $p < .05$, accounting for 3.6% of performance variance (see Table 17). The second regression equation including the multiplicative term (cognitive anxiety x somatic

Table 17

Multiple Regression Analyses Examining Cognitive and Somatic Anxiety as Predictors of Coach Ratings of Performance For All Subjects

	Order of Entry	Multiple R	R^2	Standardized Regression Coefficient	p
2 Variables*					
Cognitive Anxiety	1	.18	.033	-.218	.02
Somatic Anxiety	2	.19	.036	.067	.46
3 Variables**					
Cognitive Anxiety	1	.18	.033	-.247	.009
Cog x Som	2	.20	.041	.092	.25
Somatic Anxiety	3	.21	.044	.067	.45

* $F(2, 164) = 3.11$, $p < .05$

** $F(3, 163) = 2.51$, $p = .06$

anxiety) approached significant, $F(3,163) = 2.51$, $p = .06$. The R^2 indicated that 4.4% of performance variance was accounted for, an increase of 0.8 percent over the regression equation without the multiplicative term. Thus a trend was evident, showing the joint effect of cognitive and somatic anxiety was a stronger predictor of performance than cognitive and somatic anxiety independently, but this did not attain the apriori convention of significance. The results were in the desired direction but did not significantly support catastrophe theory.

Inspection of Figure 25 indicates that the residuals follow the hypothesized direction except at the highest levels of cognitive and somatic anxiety. Results of the high performance sign test indicated that athletes at the upper bounds of performance had significantly more negative cognitive anxiety ($z = 3.71$, $p < .001$) and negative somatic anxiety residuals ($z = 3.71$, $p < .001$) than positive residuals. There were no significant differences between positive and negative cognitive ($z = 1.25$, $p = .21$) or somatic anxiety ($z = .38$, $p = .70$) residuals at moderate performance levels. Low performances were associated with more positive cognitive anxiety ($z = 5.00$, $p < .001$) and somatic anxiety ($z = 5.00$, $p < .001$) than negative cognitive and somatic anxiety. Thus, at the higher levels of performance, athletes typically displayed lower levels of cognitive and somatic anxiety than at lower levels of

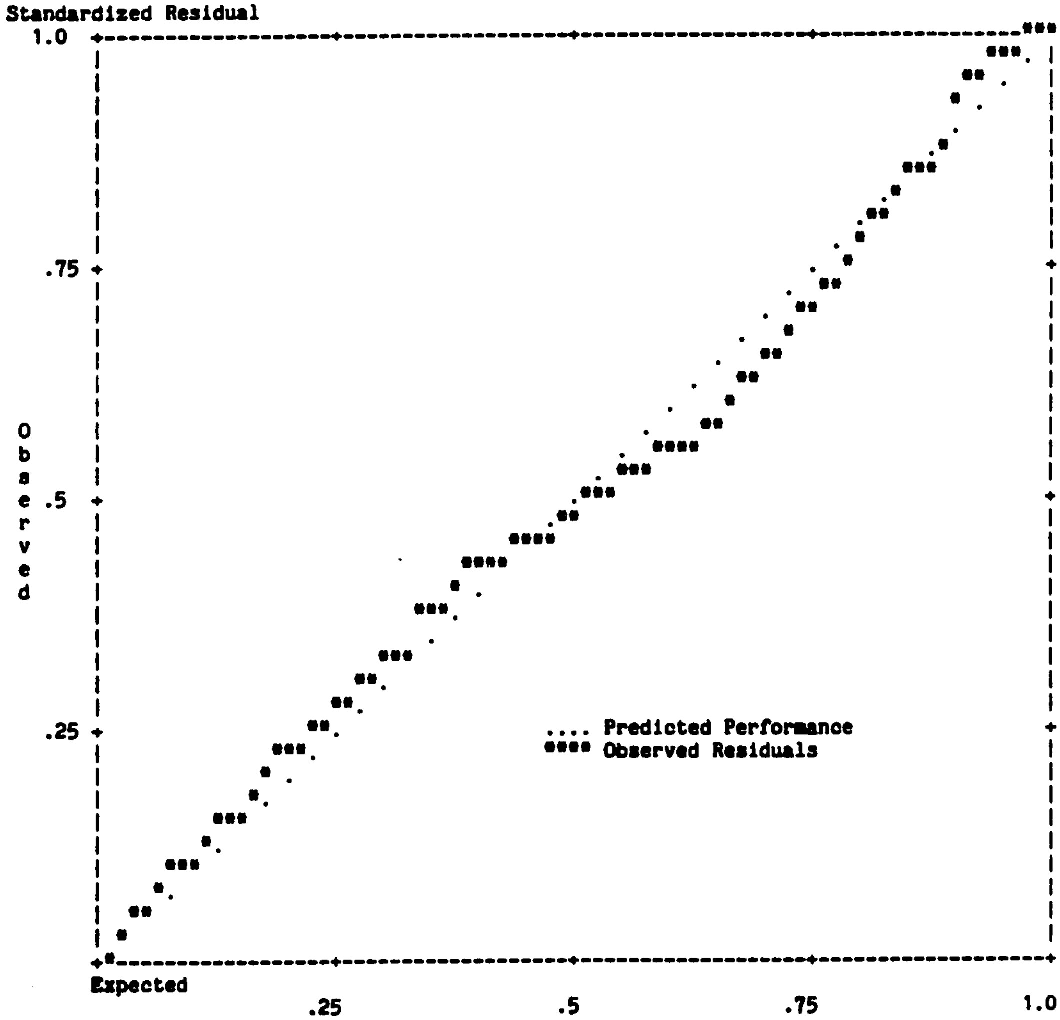

Figure 25. Standardized Residuals for Coach Ratings of Performance

performance where athletes typically displayed greater levels of cognitive and somatic anxiety. This pattern is consistent with, although less dramatic than, the hypothesized residual curve in Figure 24.

To recapitulate, the joint effects of cognitive and somatic anxiety accounted for 0.8% more performance variance than the independent effects of cognitive and somatic anxiety. The residual analysis indicated support for the hypothesized residual curve except at high levels of performance, although sign tests were in the desired directions. Thus, analyses utilizing coach ratings of performance provided some partial and indirect support for catastrophe theory predictions.

Athlete Ratings of Performance. The regression equation examining cognitive and somatic anxiety as predictors of athlete ratings of performance was not significant, $F(2, 164) = 0.19$, $p = .82$. The second multiple regression analysis, including the multiplicative term (cognitive anxiety x somatic anxiety), also was not significant $F(3,163) = 1.10$, $p = .35$ (see Table 18).

Inspection of Figure 26 indicates that the residuals did not follow any consistent pattern and therefore were not in the hypothesized direction. Results of the high performance sign test indicated that athletes at the upper levels of performance had significantly more negative cognitive anxiety ($p < .001$) and negative somatic anxiety

Table 18

Multiple Regression Analyses Examining Cognitive and Somatic Anxiety as Predictors of Athlete Ratings of Performance For All Subjects

	Order of Entry	Multiple R	R^2	Standardized Regression Coefficient	p
2 Variables*					
Somatic Anxiety	1	.04	.001	.056	.53
Cognitive Anxiety	2	.05	.002	-.033	.71
3 Variables**					
Cog x Som	1	.12	.015	.128	.09
Cognitive Anxiety	2	.13	.014	-.077	.41
Somatic Anxiety	3	.14	.019	.064	.47

* $F(2, 164) = 0.19$, $p = .82$

** $F(3, 163) = 1.10$, $p = .35$

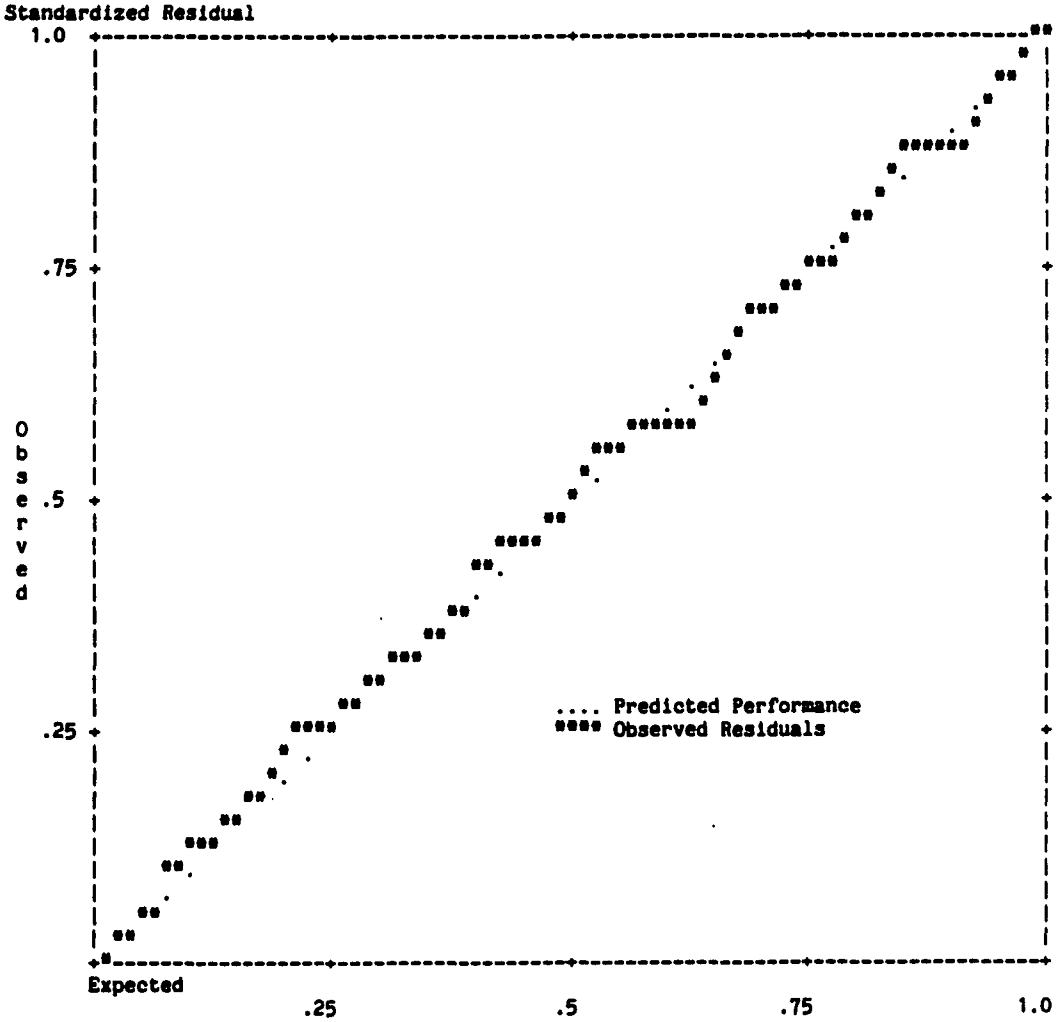

Figure 26. Standardized Residuals for Athlete Ratings of Performance

residuals ($p < .001$) than positive anxiety residuals. (When less than 25 differences are observed, the sign test uses a significance level based on the binomial distribution; a z-score is reported only if more than 25 differences are observed.) There were no significant differences between positive and negative cognitive ($z = .64$, $p = .52$) or somatic anxiety ($z = .64$, $p = .52$) residuals in the moderate performance condition. Low performances were associated with more positive cognitive anxiety ($p < .001$) and somatic anxiety ($p < .001$) than negative scores. Thus, at the higher levels of performance, athletes typically displayed lower levels of cognitive and somatic anxiety than at lower levels of performance where athletes typically displayed higher levels of cognitive and somatic anxiety.

In summation, when examining performance as measured by athlete ratings, support was not found for catastrophe theory predictions. Regression analysis including the multiplicative term did not account for more variance than the equation examining the independent effects of cognitive and somatic anxiety. Although sign tests were in the desired direction, visual inspection of the residual plots did not support the hypothesized residual curve.

Objective Ratings of Performance. The regression equation predicting objective performance was significant, $F(1, 144) = 8.07$, $p < .01$, (see Table 19) and the R^2

Table 19

Multiple Regression Analyses Examining Cognitive and Somatic Anxiety as Predictors of Objective Performance For All Subjects

	Order of Entry	Multiple R	R^2	Standardized Regression Coefficient	p
2 Variables*					
Cognitive					
Anxiety	1	.23	.053	-.158	.09
Somatic					
Anxiety	2	.26	.066	-.136	.15
3 Variables**					
Cognitive	1	.23	.053	-.139	.17
Anxiety					
Somatic	2	.26	.066	-.138	.15
Anxiety					
Cog x Som	3	.26	.069	-.050	.56

* $F(2, 143) = 5.09$, $p < .01$

** $F(3, 142) = 3.49$, $p < .05$

indicated that cognitive and somatic anxiety accounted for 6.6% of the objective performance variance. The second multiple regression analysis, which included the multiplicative term (cognitive anxiety x somatic anxiety), was significant, $F(3,142) = 3.48$, $p < .05$. The R^2 indicated that 6.9% of performance variance was accounted for, an increase of 0.3% over the regression equation without the multiplicative term. The combined effect of cognitive and somatic anxiety accounted for a only a slightly greater percentage of performance variance then cognitive and somatic anxiety independently.

Inspection of Figure 27 indicates most of the residuals of objective performance fall above the regression line for the lower two thirds of the regression line. At the upper third of the regression line, the pattern is less consistent but indicates a trend for slightly more of the residuals to fall below the regression line. This conveys that at the upper extremes of cognitive and somatic anxiety, performance is more likely to be below that predicted by the regression equation, while at most other points, performance is more likely to be above the predicted performance level.

Sign tests performed indicated that athletes at the upper levels of performance had significantly more negative cognitive anxiety ($p < .001$) and negative somatic anxiety residuals ($p < .001$) than positive residuals. There were no significant differences between positive and negative

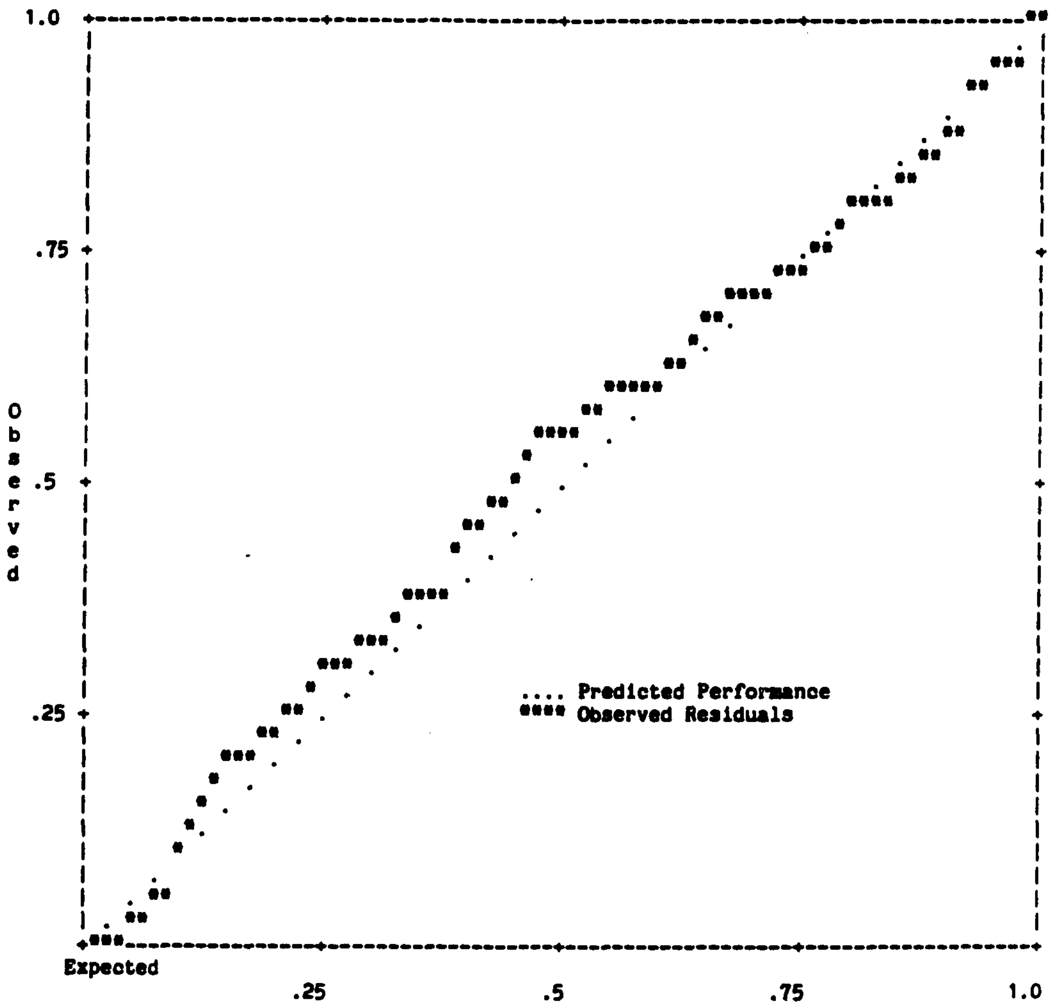

Figure 27. Standardized Residuals for Objective Ratings of Performance

cognitive ($\underline{z}$ = .31, $\underline{p}$ = .76) or somatic anxiety ($\underline{z}$ = 1.03, $\underline{p}$ = .92) residuals in the moderate performance condition. Low performances were associated with more positive cognitive anxiety ($\underline{z}$ = 4.62, $\underline{p}$ < .001) and somatic anxiety ($\underline{z}$ = 4.23, $\underline{p}$ < .001) than negative scores. Thus, at the higher levels of performance, athletes typically displayed lower levels of cognitive and somatic anxiety than at lower levels of performance where athletes typically displayed higher levels of cognitive and somatic anxiety.

In summary, the multiplicative term accounted for only .3% more variance than cognitive and somatic anxiety individually. Although a trend in the desired direction was found, apriori levels of significance were not attained for this analysis. However, the residual analysis and sign tests provided indirect support for catastrophe theory predictions.

Summary of Regression and Residual Analyses. Across the three performance measures, support was not found for the expectation that the joint effects of cognitive and somatic anxiety would account for at least a one percent increase in accountable variance over the independent effects of cognitive and somatic anxiety. Only for coach ratings of performance did the increase in accountable performance variance approach the significance convention of one percent. Visual analyses of the regression residuals provided only limited support for catastrophe theory predictions. When examining coach and objective ratings of performance, the residual curves resembled the hypothesized curve. Finally, sign tests for all three performance measures were in the desired directions. Athletes displayed lower levels of cognitive and somatic anxiety at upper levels of performance, showed no consistent pattern at moderate levels of performance and displayed greater levels of cognitive and somatic anxiety at low performance levels.

Performance Under High, Moderate, and Low Cognitive Anxiety

Because it was hypothesized that the middle portion of the cognitive anxiety, somatic anxiety and performance catastrophe curve would be inaccessible for analyses, (the catastrophe model is a discontinuous curve, breaking one condition necessary to invoke linear and nonlinear regression models) the third stage of catastrophe theory analyses included examination of two separate portions of the regression curve, leaving out the middle portion. Separate linear multiple regression analyses were computed for the upper and lower bounds of the catastrophe model. One regression equation was examined for high cognitive anxiety conditions while another was computed for low cognitive anxiety conditions. To examine the assumption that no consistent relationship will exist between cognitive and somatic anxiety at middle ranges of performance, regression equations for the moderate anxiety condition were also computed. All cases where cognitive anxiety was more than one standard deviation above the mean (a standard score of +1 or greater) were considered the high cognitive anxiety condition (n = 25). Cognitive anxiety scores one standard deviation below the mean (a standard score of -1 or below) was considered the low cognitive anxiety condition (n = 20). All standardized cognitive anxiety scores between -1 and +1 were classified as the moderate cognitive anxiety condition (n = 101).

In this analysis, if different regression equations are found to identify different portions of the data, then catastrophe theory would be indirectly supported because the model is not symmetrical. To support the catastrophe theory, the slopes of the high and low performance curves would be very different. Under conditions of high cognitive anxiety, performance should drop off drastically, resulting in high, negative beta weights for cognitive and somatic anxiety. Under low cognitive anxiety, performance should increase in a positive and less dramatic pattern indicated by low to moderate positive beta weights. If these data support the inverted-U hypothesis, the slopes and beta weights of both equations would be similar but in opposite directions. In the low cognitive anxiety condition, cognitive and somatic anxiety would be positively related to performance while in the high cognitive anxiety condition, cognitive and somatic anxiety would be negatively related to performance. As in stage two of the catastrophe theory analyses, regression equations were also computed using the multiplicative term, cognitive x somatic anxiety, to determine whether combined cognitive and somatic anxiety accounted for more performance variance than cognitive and somatic anxiety independently at each level of performance.

Coach Ratings of Performance. In the high cognitive anxiety condition, multiple regression analysis results revealed cognitive and somatic anxiety did not significantly predict coach ratings of performance, $F(1,28) = 0.63$, $p = .54$. The multiplicative term was included in a second regression equation which did not reach significance, $F(2,28) = .63$, $p = .54$ (see Table 20). In the moderate anxiety condition, cognitive and somatic anxiety did not significantly predict performance, $F(2, 109) = 1.59$, $p = .21$ (see Table 21). The inclusion of the multiplicative term did not improve predictability of performance, $F(3, 108) = 1.06$, $p = .37$. Table 22 reveals when cognitive anxiety was low, the regression equation with cognitive and somatic anxiety as predictors of performance was not significant, $F(2, 21) = 0.42$, $p = .66$. The regression equation including the multiplicative term also did not reach significance, $F(3, 20) = 1.42$, $p = .40$. Thus, this stage of the analyses did not support catastrophe theory predictions at high and

Table 20

Regression Analyses Examining Cognitive and Somatic Anxiety as Predictors of Coach Ratings of Performance for High Cognitive Anxiety

	Order of Entry	Multiple R	R^2	Standardized Regression Coefficient	*p*
2 Variables*					
Somatic					
Anxiety	1	.20	.04	.212	.27
Cognitive					
Anxiety	2	.21	.04	-.045	.81
3 Variables**					
Somatic					
Anxiety	1	.20	.04	.212	.27
Cognitive					
Anxiety	2	.21	.04	-.045	.81

* $F(2, 28) = 0.63$, $p = .54$

** $F(2, 28) = 0.63$, $p = .54$

Table 21

Multiple Regression Analyses Examining Cognitive and Somatic Anxiety as Predictors of Coach Ratings of Performance for Moderate Cognitive Anxiety

	Order of Entry	Multiple R	R^2	Standardized Regression Coefficient	p
2 Variables*					
Cognitive Anxiety	1	.15	.02	-.189	.07
Somatic Anxiety	2	.16	.03	.083	.44
3 Variables**					
Somatic Anxiety	1	.15	.02	-.190	.07
Cognitive Anxiety	2	.17	.03	.082	.44
Cog x Som	3	.17	.03	-.020	.83

* $F(2, 109) = 1.59$, $p = .21$

** $F(3, 108) = 1.06$, $p = .37$

Table 22

Multiple Regression Analyses Examining Cognitive and Somatic Anxiety as Predictors of Coach Ratings of Performance for Low Cognitive Anxiety

	Order of Entry	Multiple R	R^2	Standardized Regression Coefficient	*p*
2 Variables*					
Cognitive					
Anxiety	1	.16	.03	.143	.52
Somatic					
Anxiety	2	.20	.04	-.110	.62
3 Variables**					
Cognitive					
Anxiety	1	.16	.03	.280	.24
Somatic					
Anxiety	2	.20	.04	-2.10	.14
Cog x Som	3	.37	.13	-2.05	.19

* $F(2, 21) = 0.42$, $p = .66$

** $F(3, 20) = 1.04$, $p = .40$

low levels of cognitive anxiety when performance was measured by coach ratings.

Athlete Ratings of Performance. In the high cognitive anxiety condition, multiple regression analysis results revealed cognitive and somatic anxiety significantly predicted performance, $F(2, 24) = 4.13$, $p < .05$. The multiplicative term was included in a second regression equation which also achieved significance, $F(2, 24) = 5.09$, $p < .01$. Examination of Table 23 reveals that inclusion of the multiplicative term contributes an additional 4% accountable performance variance. In the moderate anxiety condition, cognitive and somatic anxiety did not significantly predict athlete ratings of performance, $F(2, 113) = 0.62$, $p = .54$ (see Table 24). The inclusion of the multiplicative term did not enhance predictability of performance, $F(3, 163) = 1.10$, $p = .35$. Table 25 reveals when cognitive anxiety was low, the regression equation with cognitive and somatic anxiety as predictors of performance was not significant, $F(2, 21) = 2.16$, $p = .14$. The regression equation including the multiplicative term also did not reach significance, $F(3, 20) = 1.39$, $p = .28$.

Catastrophe theory predictions were partially upheld in that the high and moderate cognitive anxiety condition when performance was measured by athlete ratings. The multiplicative term in the high cognitive anxiety condition

Table 23

Regression Analyses Examining Cognitive and Somatic Anxiety as Predictors of Athlete Ratings of Performance for High Cognitive Anxiety

	Order of Entry	Multiple R	R^2	Standardized Regression Coefficient	*p*
2 Variables*					
Cognitive Anxiety	1	.36	.13	-.448	.02
Somatic Anxiety	2	.51	.26	.365	.05
3 Variables**					
Cognitive Anxiety	1	.36	.13	-.772	.01
Cog x Som	2	.55	.30	.894	.19
Somatic Anxiety	3	.56	.31	-.363	.53

* $F(2, 24) = 4.13$, $p < .05$

** $F(3, 23) = 3.44$, $p < .05$

Table 24

Multiple Regression Analyses Examining Cognitive and Somatic Anxiety as Predictors of Athlete Ratings of Performance for Moderate Cognitive Anxiety

	Order of Entry	Multiple R	R^2	Standardized Regression Coefficient	*p*
2 Variables*					
Cognitive Anxiety	1	.07	.005	-.114	.28
Somatic Anxiety	2	.10	.01	.082	.44
3 Variables**					
Cog x Som	1	.12	.01	.138	.09
Cognitive Anxiety	2	.13	.02	-.077	.41
Somatic Anxiety	3	.14	.02	.064	.47

* $F(2, 113) = 0.62$, $p = .53$

** $F(3, 163) = 1.10$, $p = .35$

Table 25

Multiple Regression Analyses Examining Cognitive and Somatic Anxiety as Predictors of Athlete Ratings of Performance for Low Cognitive Anxiety

	Order of Entry	Multiple R	R^2	Standardized Regression Coefficient	*p*
2 Variables*					
Somatic Anxiety	1	.32	.11	-.376	.07
Cognitive Anxiety	2	.41	.17	-.260	.21
3 Variables**					
Somatic Anxiety	1	.32	.10	-.621	.67
Cognitive Anxiety	2	.41	.17	-.241	.32
Cog x Som	3	.41	.17	-.252	.87

* $F(2, 21) = 2.16$, $p = .14$

** $F(3, 20) = 1.39$, $p = .28$

showed a significant increase of 4% in accountable performance variance over cognitive and somatic anxiety as independent predictors. Further, as expected, the moderate cognitive anxiety conditions regressions were not significant.

Objective Ratings of Performance. Multiple regression analysis for the high cognitive anxiety condition revealed cognitive and somatic anxiety did not significantly predict performance, $F(1, 23) = 1.55$, $p = .23$. The second regression equation including the multiplicative term did not reach significance, $F(3, 21) = .99$, $p = .41$ (see Table 26). In the moderate anxiety condition, cognitive and somatic anxiety did not significantly predict performance, $F(2, 98) = 0.68$, $p = .51$ (see Table 27). The inclusion of the multiplicative term did not improve predictability of performance, $F(3, 97) = 0.53$, $p = .66$. Table 28 reveals when cognitive anxiety was low, the regression equation with cognitive and somatic anxiety as predictors of performance was not significant, $F(1, 18) = 0.36$, $p = .70$. The regression equation including the multiplicative term also did not reach significance, $F(3, 16) = 0.32$, $p = .81$.

Summary of Stage 3 Catastrophe Theory Analyses. Catastrophe theory predictions that the performance curve would be described by separate linear multiple regression

Table 26

Regression Analyses Examining Cognitive and Somatic Anxiety as Predictors of Objective Performance for High Cognitive Anxiety

	Order of Entry	Multiple R	R^2	Standardized Regression Coefficient	*p*
2 Variables*					
Cognitive Anxiety	1	.27	.07	-.233	.26
Somatic Anxiety	2	.35	.12	-.223	.28
3 Variables**					
Cog x Som	1	.32	.10	.150	.87
Cognitive Anxiety	2	.34	.12	-.294	.49
Somatic Anxiety	3	.35	.12	-.346	.65

* $F(2, 22) = 1.55$, $p = .23$

** $F(3, 21) = 0.99$, $p = .41$

Table 27

Multiple Regression Analyses Examining Cognitive and Somatic Anxiety as Predictors of Objective Performance for Moderate Cognitive Anxiety

	Order of Entry	Multiple R	R^2	Standardized Regression Coefficient	*p*
2 Variables*					
Cognitive Anxiety	1	.10	.01	-.088	.43
Somatic Anxiety	2	.12	.01	-.046	.44
3 Variables**					
Somatic Anxiety	1	.11	.01	-.086	.45
Cog x Som	2	.12	.01	-.050	.62
Cognitive Anxiety	3	.13	.02	-.046	.68

* $F(2, 98) = 0.68$, $p = .51$

** $F(3, 97) = 0.53$, $p = .66$

Table 28

Multiple Regression Analyses Examining Cognitive and Somatic Anxiety as Predictors of Objective Performance for High Cognitive Anxiety

	Order of Entry	Multiple R	R^2	Standardized Regression Coefficient	*p*
2 Variables*					
Cognitive Anxiety	1	.16	.03	.131	.60
Somatic Anxiety	2	.20	.04	-.123	.62
3 Variables**					
Cog x Som	1	.18	.03	.932	.61
Somatic Anxiety	2	.23	.05	.781	.66
Cognitive Anxiety	3	.24	.06	.065	.81

* $F(2, 17) = 0.36$, $p = .69$

** $F(3, 16) = 0.32$, $p = .81$

equations for high and low levels of cognitive anxiety was not supported. Patterns in the beta weights were not examined, as suggested in the second stage of catastrophe model analysis, because the regression equations for high and low performance were not significant within a single performance measure.

Testing the Fit of the Catastrophe Model

The final stage of catastrophe theory analysis consisted of computing a nonlinear multiple regression analysis to determine if the data fit the catastrophe model. This was considered an acceptable method for testing whether the data fit the catastrophe model and was suggested by W. Desarbo (personal communication, April, 13), developer of the GEMCAT procedure, as an alternative to using the GEMCAT analysis. "Nonlinear regression is used to estimate parameter values and regression statistics for models that are not linear in their parameters" (SPSSx, p. 677). Nonlinear regression programs are available in SAS or SPSSx statistical packages making them readily available, unlike the GEMCAT program written in APL. The present analysis was computed using the SPSSx Constrained Nonlinear Regression (CNLR) program. The CNLR method was chosen because it is more general, allowing for possible linear and nonlinear constraints be placed on the parameters, than the Nonlinear Regression (NLR) procedure which is also available in SPSSx.

That is, it will test both linear and nonlinear possible relationships among variables. When applying nonlinear regression, a model must be provided. The model input in the present analyses was the cusp catastrophe model developed by Thom (1975) and used in the GEMCAT analysis (Oliva et al, 1987). The cusp catastrophe model is

$$1/4z^4 - xz - 1/2\ yx^2$$

where x = the normal factor (somatic anxiety), y = the splitting factor (cognitive anxiety) and z = the dependent variable (performance). In order for this equation to be read by the SPSSx constrained nonlinear regression program (CNLR), it had to be written so that performance was a function of cognitive and somatic anxiety. The program also asks for starting values for each of the parameters in the equation. Thus the catastrophe model was solved for z (performance) and the catastrophe model equation input into the analyses was

$$z = 1/x[(az^4) - byz^2]$$

where a = .25 and b = .5. Because these values for a and b were used in the cusp catastrophe model (Thom, 1975), they were input as the starting parameters in the present analysis. A significant nonlinear regression model would support the full catastrophe model showing that the data fit the cusp catastrophe curve. Because the nonlinear regression program does not report $\underline{F}$ or $\underline{p}$ values, based on previous research examining the linear relationship between anxiety and performance, the nonlinear regression equation will be deemed significant if the $\underline{R}^2$ is greater than .10. That will indicate that the catastrophe model accounts for more performance variance than the linear combination of cognitive and somatic anxiety typically explain.

Coach Ratings of Performance. Only three iterations were computed before an optimal solution was found where both parameter estimates fell between the 95% confidence intervals. The nonlinear $\underline{R}^2$ was .006, accounting for less than 1% of the performance variance when measured by coach ratings. Hence support was not found for the full catastrophe model when performance was measured by coach ratings.

Athlete Ratings of Performance. Only three iterations were computed before an optimal solution was found where both parameter estimated fell between the 95% confidence intervals. The nonlinear $\underline{R}^2$ was .01, accounting for only 1% of the performance variance when measured by athlete ratings. Support was not found for the full catastrophe model.

Objective Ratings of Performance. Three iterations were computed before both parameter estimates fell into the 95% confidence intervals and the best fitting model was derived. The catastrophe model indicated an R^2 of .37, accounting for 3.7% of objective performance variance. This result indicated that the catastrophe model did not account for more variance in objective performance than when cognitive and somatic anxiety were examined independently. Hence, the full catastrophe model was not supported.

Summary of Catastrophe Theory Analyses

The data plots were not as useful as expected in determining whether a catastrophe model pattern was evident. No identifiable pattern was visible between cognitive and somatic anxiety and performance for all three performance measures. Support was not found for the contention that the combined effect of cognitive and somatic anxiety would be a stronger predictor of performance than cognitive and somatic anxiety independently. However, there were trends in the desired direction when performance was measured by coach and objective ratings. Comparison of the regression residuals to the hypothesized residual curve revealed coach and objective performance curves, although less dramatic, showed the expected pattern. Sign tests supported the residual analyses, indicating athletes displayed low cognitive and somatic anxiety at high levels of performance and high cognitive and somatic anxiety at low levels of performance.

The third stage of the catastrophe theory analyses examined separate regression equations for low, moderate, and high conditions of cognitive anxiety. Separate regression equations were not found for these portions of the catastrophe curve for any of the performance measures. Thus, these analyses did not support the prediction that in the low cognitive anxiety condition, cognitive and somatic anxiety would be positively related to performance with low beta weights and in the high cognitive anxiety condition, cognitive and somatic anxiety would be negatively related to performance with high beta weights.

Finally, nonlinear regression analyses were employed to examine the full catastrophe model. Results indicated that the catastrophe model accounted for 0.6 to 3.6 percent of performance variance. Thus, the nonlinear regression catastrophe model equation did not account for more variance than the linear regression analyses with cognitive and somatic anxiety as predictors of performance which accounted for 3.3 to 6.6 percent of performance variance.

Phase 4: Secondary Purpose Results

Hypotheses based on the relationships among trait, state, and retrospective anxiety were examined in this portion of the statistical analyses.

Relationship Between State and Trait Anxiety

As a secondary purpose, it was hypothesized that trait cognitive anxiety, somatic anxiety, and concentration disruption would significantly predict state cognitive and somatic anxiety. As a precursory examination of the relationships among trait cognitive and somatic anxiety, and concentration disruption and state cognitive and somatic anxiety, Pearson Product-Moment correlations were computed between trait and raw score state anxiety for each competition. Overall, state cognitive anxiety was moderately correlated with trait cognitive and somatic anxiety and concentration disruption (see Table 29). The most consistent relationship was found between concentration disruption and state cognitive anxiety which were significantly correlated on 9 of the twelve competitions while trait and state cognitive anxiety were significantly correlated on seven of the twelve matches. Both of these analyses achieved the apriori convention for overall significance by indicating significant correlations on at least six of the twelve competition. State somatic anxiety was not consistently correlated with trait cognitive or somatic anxiety. Although inconsistent, state somatic anxiety was significantly correlated with trait concentration disruption on five of the twelve competitions. Table 30 contains the correlations between state somatic anxiety and trait anxiety subcomponents for each competition.

Tables 29 and 30 also include the correlations between total trait anxiety scores and state cognitive and somatic

Table 29

Pearson Product-Moment Correlations Between State Cognitive Anxiety and Trait Anxiety Subcomponents

Game	Trait Cognitive Anxiety	Trait Somatic Anxiety	Concentration Disruption	Total
1	.69***	.73***	.41*	.79***
2	.66**	.34	.51**	.61**
3	.59**	.24	.29	.50*
4	.38	.43*	.46*	.52**
5	.49*	.54**	.48*	.62**
6	.33	.32	.36	.40
7	.30	.22	.29	.34
8	.62**	.46*	.51*	.65**
9	.43	.32	.42*	.47*
10	.47*	.28	.68**	.54**
11	.39	.11	.57*	.38
12	.41*	.17	.42*	.39

* $p < .05$, ** $p < .01$, *** $p < .001$.

Table 30

Pearson Product-Moment Correlations Between State Somatic Anxiety and Trait Anxiety Subcomponents

Game	Trait Cognitive Anxiety	Trait Somatic Anxiety	Concentration Disruption	Total
1	.41*	.53**	.24	.57**
2	.32	.22	.16	.30
3	.17	.15	.36	.24
4	.02	.17	.46*	.22
5	.33	.34	.53**	.46*
6	.21	.03	.10	.14
7	.33	.03	.27	.26
8	.32	.15	.29	.31
9	.32	.32	.44*	.42*
10	.63**	.32	.61**	.61**
11	.14	.22	.37	.26
12	.20	-.10	.46*	.17

* $p < .05$, ** $p < .01$, *** $p < .001$.

anxiety. Total trait anxiety was more consistently and more strongly correlated to cognitive anxiety than somatic anxiety. Correlations between total trait anxiety and state cognitive anxiety ranged between .34 and .79 while correlations between total trait anxiety and state somatic anxiety were lower, ranging between .14 and .61.

Canonical correlations were used to examine the relationship between the linear combinations of trait anxiety predictor variables and state anxiety criterion variables. Table 31 contains the canonical correlations for each of the twelve competitions. Results indicated a significant canonical correlation only on the first of the twelve competitions. Competition 1 canonical correlation findings revealed that the first canonical correlation was .88, accounting for 77% of the objective variance and a redundancy index of .53 and the second canonical correlation was .19, accounting for 4% of the variance with the redundancy index of .01. With both canonical correlations included, $x^2 = 19.71$, $p < .01$. Thus, both canonical correlations accounted for significant linkages between the two sets of variables. The canonical loadings for both the predictor and criterion variables are contained in Table 32 and show that the predictor variable trait somatic anxiety contributed most to the significant canonical correlation followed by trait cognitive anxiety. Concentration

Table 31

Canonical Correlations for Trait and State Anxiety for Each Competition

Game	Canonical R 1	% Variance	Canonical R 2	% Variance	p
1	.878	77	.196	04	.01
2	.729	53	.166	03	.11
3	.686	47	.376	14	.19
4	.635	40	.558	31	.09
5	.665	44	.316	10	.17
6	.449	18	.227	05	.83
7	.379	14	.260	07	.87
8	.663	44	.126	02	.31
9	.538	29	.197	20	.60
10	.727	53	.359	35	.13
11	.626	39	.448	20	.37
12	.522	27	.387	15	.45

Table 32

Canonical Loading: Competition 1 Trait Anxiety and State Anxiety Subscales

	Canonical R 1 loadings	Canonical R 2 loadings
CSAI-2 Subscales		
Cognitive anxiety	.927	-.374
Somatic Anxiety	.713	.702
SAS Subscales		
Cognitive Anxiety	.795	-.606
Somatic Anxiety	.931	.365
Concentration Disruption	.469	-.398

disruption contributed little to the canonical correlation. For the criterion variables, state cognitive anxiety contributed most to the canonical relationship while state somatic anxiety was also a significant contributor. The signs of all the loading indicate that trait cognitive and somatic anxiety were positively related with state cognitive and somatic anxiety.

Relationship Between State and Retrospective Anxiety

The hypothesis that retrospective cognitive and somatic anxiety would be moderately to highly related to state cognitive and somatic anxiety was examined through Pearson Product-Moment correlations. Results indicated moderate to high correlations between retrospective cognitive and state cognitive anxiety for five of the twelve competitions (see Table 33). Moderate correlations were found between retrospective and state somatic anxiety for four of the twelve competitions. Neither of these relationships were particularly salient as they did not achieve significance on at least half of the competitions.

Intercorrelations Between Cognitive and Somatic Anxiety

To examine the hypothesis that cognitive and somatic anxiety would be at least moderately intercorrelated, Pearson Product-Moment correlations were computed between cognitive and somatic anxiety as measured by the CSAI-2 and

Table 33

Correlations Between Retrospective (MRF) Cognitive and Somatic Anxiety and State (CSAI-2) Cognitive and Somatic Anxiety

Game	MRF Cognitive Anxiety - CSAI-2 Cognitive Anxiety	MRF Somatic Anxiety - CSAI-2 Somatic Anxiety
1	.02	.47*
2	.23	.19
3	.29	.34
4	.79***	.58**
5	.42	.30
6	.34	.01
7	.52*	.26
8	.57**	.18
9	.26	.61**
10	.53*	.67**
11	.61*	.33
12	-.22	-.29

* $p < .05$, ** $p < .01$, *** $p < .001$.

Mental Readiness Form. Table 34 shows intercorrelations between CSAI-2 cognitive and somatic anxiety were typically high across all competitions, averaging .59 and ranging from .22 to .77. Intercorrelations between cognitive and somatic anxiety measured by the MRF were even higher, ranging between .40 and .94 (M = .72).

Summary of Secondary Purpose Results

The present results did not support the hypothesis that trait cognitive and somatic anxiety and concentration disruption, measured by the SAS, would predict state cognitive and somatic anxiety measured by the CSAI-2. The most consistent correlational result was that concentration disruption was positively related to state cognitive anxiety. State cognitive and somatic anxiety were moderately correlated to retrospective cognitive and somatic anxiety on five of the twelve competitions. Thus, a trend was evident in support of Hanin's contention that retrospective measurement of anxiety would be an accurate indicant of pre-competitive anxiety. Finally, moderate to high intercorrelations were found between cognitive and somatic anxiety as measured by the CSAI-2 and the MRF.

Table 34

Intercorrelations Between Cognitive and Somatic Anxiety

Game	CSAI-2	MRF
1	.36	.43
2	.74***	.66**
3	.52**	.77***
4	.74***	.67**
5	.63**	.84***
6	.23	.85***
7	.59**	.94***
8	.63**	.82***
9	.57**	.80***
10	.67**	.72**
11	.77***	.78***
12	.63**	.40
Average	.59	.72

* $p < .05$, ** $p < .01$, *** $p < .001$.

CHAPTER IV

DISCUSSION

The present study examined the relationships among cognitive and somatic anxiety and athletic performance. Primary hypotheses based on the multidimensional anxiety theory and catastrophe theory were investigated with varied results. Although complete support was not found for either theory, stronger support was found for the multidimensional anxiety theory than the catastrophe theory. The secondary purposes examined the relationship between trait and state anxiety and between state and retrospective anxiety. Implications based on the present results will be discussed in this section.

Multidimensional Theory of Anxiety

The multidimensional theory of anxiety extends beyond the inverted-U hypothesis in that it differentiates between the cognitive and somatic anxiety subcomponents. The present study added support for the need to acknowledge at least two distinct subcomponents (cognitive and somatic) of anxiety. Consistent with previous studies (e.g., Burton, 1989; Gould, Petlichkoff, & Weinberg, 1984; 1987; Krane & Williams, 1987b; Martens et al., 1990) cognitive and somatic anxiety differentially related to performance. The consistency of this finding implores the need to continue to delineate between cognitive and somatic state anxiety and to relinquish the use of unidimensional, global state measures of anxiety in future research.

The Relationship Between Cognitive Anxiety and Athletic Performance

The hypothesized negative linear relationship between cognitive state anxiety and athletic performance was supported in the polynomial trend analyses when using two of the three performance measures (coach and objective ratings of performance). This was consistent with Burton (1988) who also found high cognitive anxiety to be detrimental to performance. As has often been suggested, cognitive anxiety appears to be distracting to performance because the athlete is focused on negative, non-task specific thoughts. As Martens (1987) suggested in his discussion of negative psychic energy, negative thoughts will always be disruptive to performance, removing the focus of attention from necessary performance cues. The notion that cognitive anxiety has a negative influence on athletic performance is one of the most consistent findings in the multidimensional anxiety theory literature.

The Relationship Between Somatic Anxiety and Performance

Contrary to previous research, an inverted-U relationship was not found between somatic anxiety and performance in the present study. Unlike the curvilinear relationship found by Burton (1988) and Gould and his colleagues (1987), the soccer players displayed a negative linear relationship between somatic anxiety and objective ratings of performance. No identifiable relationship was found between somatic anxiety and performance measured by coach or athlete ratings.

A plausible explanation for the finding that increased somatic anxiety was detrimental to performance, and an inverted-U shaped relationship was not found, may lie in the soccer players' lack of experience. All of the athletes in the present study were freshmen and sophomore with only one or two years of collegiate soccer experience. It has previously been shown that less experienced athletes typically have higher levels of somatic anxiety than their more experienced peers (Krane & Williams, 1988; Martens et al., 1990). This pattern emerged when comparing somatic anxiety levels in the soccer players to the female collegiate norms collected by Martens, Vealey, and Burton (1990). The young soccer players may not have yet determined their optimal level of somatic anxiety for peak performance at the collegiate level. Thus, their average level of somatic anxiety across the season may have been beyond their optimal level and, thus, may have been detrimental to performance.

Overall, the relationship between somatic anxiety and athletic performance is still quite dubious. That is, the exact nature of this relationship still remains elusive, although some evidence points towards a curvilinear relationship (Burton, 1988; Gould et al., 1987). If, as catastrophe theory suggests, the effect of somatic anxiety on performance is dependent upon levels of cognitive anxiety, then a consistent pattern of somatic anxiety measured independent of cognitive anxiety would not be expected. In light of catastrophe theory contentions and the lack of consistent findings concerning this relationship suggests that further conceptual contemplation is necessary. More complex theories that move beyond the multidimensional anxiety theory need to be investigated. This is further amplified by the high intercorrelations between cognitive and somatic anxiety. In the present study, cognitive and somatic anxiety shared up to 85% common variance, further reinforcing the need to examine the joint effects of cognitive and somatic anxiety on athletic performance. The catastrophe theory is one such theory which may help explain the inconsistent anxiety-athletic performance findings in the anxiety literature.

Summary of Multidimensional Anxiety Theory Findings

The present results add support to the existing literature recognizing the need to delineate between the cognitive and somatic subcomponents of anxiety. The hypothesized negative linear relationship between cognitive anxiety and athletic performance was substantiated by the present results. Contrary to previous studies, a negative linear relationship was also found between somatic anxiety and performance.

Catastrophe Theory

The application of catastrophe theory to the anxiety-athletic performance relationship is a recent development in sport psychology. Conceptually, it has been proposed that the catastrophe model offers a more complete explanation of the effects of cognitive and somatic anxiety on athletic performance than previous theories (Hardy & Fazey, 1987; Hardy, in press). Overall, the catastrophe theory was not supported in the present study; nonlinear regression analysis with the cusp catastrophe model accounted for only 1 to 3% of the performance variance. However, while the catastrophe theory was not supported, it was not resoundingly refuted as some indirect evidence for some catastrophe theory predictions were found. This suggested that a need exists to continue this line of investigation using the more complete data analysis procedures derived in this investigation. In the following sections, catastrophe theory will be discussed based on the present findings.

Analysis of the Full Catastrophe Model

The full catastrophe theory was tested by investigating whether the present data fit the catastrophe model as defined by Thom (1975). That is, a mathematical equation that describes the complete cusp catastrophe model was entered into nonlinear regression analyses as the expected parameters for the present data. This equation was not found to explain a significant portion of the obtained data.

In explaining this nonsignificant finding, it should be noted that this catastrophe equation was originally derived to explain discontinuous data which has rapid and drastic changes (e.g., changes in perception from ground to field cues). While conceptually the catastrophe model has been proposed to explain the anxiety-athletic performance relationship, this particular equation may pose some problems. As Hardy and Fazey (1987) hypothesized, a portion of the catastrophe curve will be inaccessible for analyses. Athletic performance part way down the catastrophic drop is not expected to be observed, as indicated in Figure 5. Therefore, observations of athletic performance may not fit the mathematical model proposed by Thom because there will never be values to fit the middle portion of his model. A slightly different mathematical model may be necessary which, although not exactly identical to the catastrophe theory curve, may be a more realistic and testable relationship. Hence, some modification of the catastrophe model equation may be necessary before the full catastrophe model can be adequately tested. Two separate catastrophe curves may provide a more testable situation for real life data. As indicated in Figure 28, one curve would describe the relationship between cognitive and somatic anxiety as it is increasing and a second curve would describe the relationship between decreasing anxiety and performance.

Another reason for using two separate curves to describe catastrophic data is that investigation of occurrences when an athlete is coming back from a catastrophic situation (anxiety is decreasing) would be very difficult in real competitive situations using the traditional precompetition research paradigm. That is, measurement of precompetitive state anxiety will most likely not indicate situations when an athlete is recovering from excessive anxiety. Before one can examine the effects of decreasing anxiety, an athlete would first have to "choke;" then investigation would commence. One plausible method for examining situations when an athlete is recovering from a catastrophic situation would entail the collection of a continuous series of anxiety and performance measures throughout an athletic performance. Anxiety should be measured at regular intervals throughout a performance (e.g., prior to every shot in golf or archery, retrospectively for each half mile in a cross country race) in order for the complete catastrophe model to be examined.

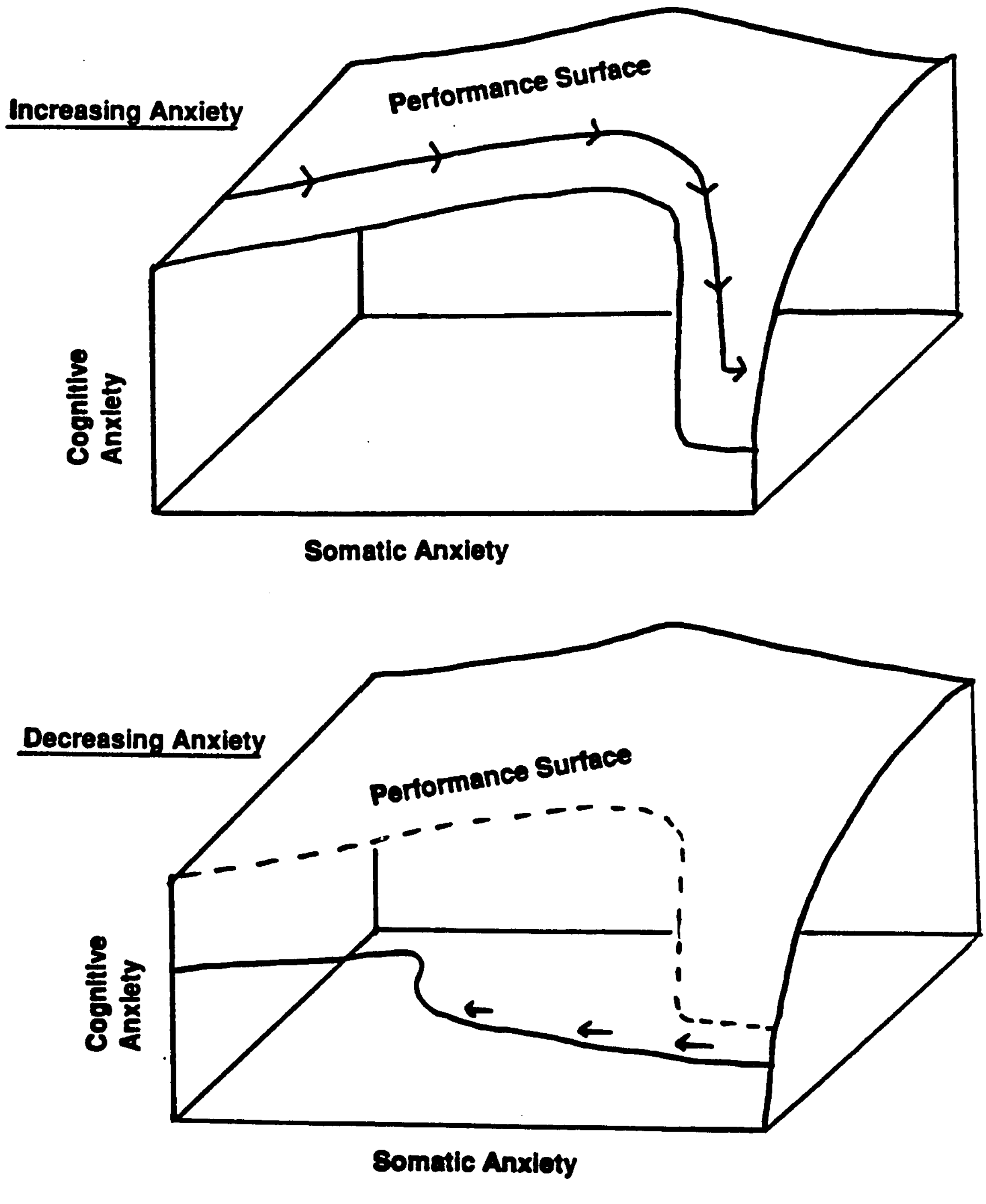

Figure 28. A Proposed Model for a More Testable and Realistic Model of Catastrophe Theory

Even then, one would have to hope (from a research point of view) that the athlete chokes before the full catastrophe model can be adequately tested.

Although there may be some problems investigating the full catastrophe model as it presently is explained, predictions based on the catastrophe theory applied to the anxiety-athletic performance relationship would remain the same as those posed by Hardy and Fazey (1987) and examined in the present study. What is being proposed is the necessity for a different mathematical method for investigating catastrophe theory predictions, not changing these predictions.

Indirect Support for Catastrophe Theory

The high intercorrelations between cognitive and somatic anxiety in the present study and found by others (e.g., Caruso et al., 1990; Krane, 1985; Petlichkoff & Gould, 1985) suggest the need for further examination of the relationship between cognitive and somatic anxiety and athletic performance. Smith (1989) pointed out the statistical problems inherent in the consistently high intercorrelations between cognitive and somatic anxiety and suggested a statistical methodology for examining the independent effects of cognitive and somatic anxiety on performance.[2] Alternatively, the high intercorrelations between cognitive and somatic anxiety may suggest the need to investigate their combined effects which is a fundamental tenet of catastrophe theory.

In the present study, a multiplicative term, which examined the combined effect of cognitive and somatic anxiety was proposed to account for more performance variance than either cognitive or somatic anxiety independently. The data did not support this contention although there were some slight trends in this direction. When combined with the high intercorrelations between cognitive and somatic anxiety, this suggests that there is a the need to further examine cognitive and somatic anxiety jointly, not as separate entities. This is the most significant difference between the multidimensional anxiety theory and catastrophe theory. As Martens et al. (1990) suggested, cognitive and somatic anxiety will not act completely independent of each other. Therefore, it is further suggested that the three dimensional component of the catastrophe model is a necessary extension of the anxiety literature.

Indirect support for the catastrophe theory was found in the analysis of the residuals of the full multiple regression analysis. The shape of the residuals curve when

[2] This procedure was not used in the present study because a minimum of 90 subjects would be needed.

examining coach ratings of performance followed the hypothesized pattern except at the very highest levels of performance. The residual curve for objective performance was also similar, yet less dramatic than the hypothesized residual curve. Sign tests indicated that the residuals for both coach and objective ratings of performance were in the hypothesized direction. When performance was high, cognitive and somatic anxiety scores were more likely to be lower than that predicted by the multiple regression equation. Conversely, cognitive and somatic anxiety were more likely to be greater than that predicted by the regression equation when performance was low. This provided some indirect support for the catastrophe theory notion that best performances will be observed under conditions of low combined cognitive and somatic anxiety.

Intuitively, examination of the combined effects of cognitive and somatic anxiety appears warranted. An athlete displaying high cognitive anxiety is likely to also experience some somatic anxiety. However, high somatic anxiety does not necessarily have to be accompanied by cognitive anxiety. An athlete may interpret high somatic anxiety as being energized or psyched up for performance, in which case it will be a positive influence on performance. In this example, the athlete would have low cognitive anxiety and the high somatic anxiety would most likely facilitate athletic performance. On the other hand, once an athlete begins to interpret this high somatic anxiety in a negative manner (e.g., as being psyched out), then cognitive anxiety will increase and performance will decrease. This notion is consistent with Marten's (1987) psychic energy theory and reversal theory. This notion is also subsumed within the catastrophe theory which predicts that somatic anxiety will have a positive linear relationship with performance under conditions of low cognitive anxiety. However, as cognitive anxiety increases and somatic anxiety is interpreted in a negative manner, the likelihood of the athlete having a catastrophic performance also increases.

Statistical Issues in Catastrophe Model Analysis

The present study also examined possible statistical analyses for analyzing catastrophic data. Recently Hardy (in press) suggested that future researchers utilize the methodology of Oliva et al. (1987) to fit catastrophe curves to real life data. An attempt was made in the present study to utilize Oliva's General Multivariate Methodology for Estimating Catastrophe Models (GEMCAT) which led to questioning its utility. The GEMCAT program was developed using Monte Carlo test data that is not available in real life. That is, the input included 30 values of the normal factor, 60 values of the splitting factor and 90 values of the dependent variable. When gathering data in actual athletic competition, only one value for each variable will be obtained for each observation. That is, there will be the same number of values for each variable. Although the catastrophe model predicts that for a specific value of somatic anxiety (the normal factor) there may be three possible values of performance (the dependent variable), in real life, only one value of performance is likely to be observed. Because attempts to write the GEMCAT program into another computer language were unsuccessful, it is not known whether the program can be accurately run with the same number of values for each variable.

Another consideration when analyzing catastrophic data lies in the recent development of nonlinear regression programs in readily available statistical packages. Both SAS and SPSSx have developed nonlinear regression programs which can analyze whether a data set fit a specified nonlinear model. These programs were made available after the GEMCAT program was written. As suggested by W. Desarbo (personal communication, April 23, 1990), a nonlinear regression program may be effective in analyzing data when utilizing the catastrophe model equation available in the GEMCAT article. SAS or SPSSx nonlinear regression programs offer a readily available method to statistically attempt to fit real data to catastrophe models.

A Methodology for Testing the Full Catastrophe Model

While the design of this study provided an adequate test of central catastrophe theory predictions, it did not provide a strong test of the full model. During the course of this investigation, it became clear that in order to actually observe a catastrophic performance, and in turn provide a strong test of the full model, anxiety and performance should be monitored continuously throughout a contest. This would allow an investigator to test the hysteresis hypothesis (performance will follow a different path when anxiety is increasing than when it is decreasing) in a field setting. The hysteresis hypothesis is the most difficult portion of catastrophe theory to investigate; studies able to examine it would provide a possible test of the full catastrophe model. It must be noted, however, that a potential problem inherent in collecting data throughout a single competition is that an athlete may not experience a catastrophe in that contest, making it impossible to test the full model.

Another methodology for investigating catastrophe theory predictions would be to collect a large number of anxiety and performance data points on athletes across many competitions, as was the case in the present study. In examining performance under varying conditions, it is more likely that an athlete will experience a catastrophic performance. However, it will not be possible to test the hysteresis hypothesis. To date, it has not been posited whether the catastrophe model is best applied to a single athletic performance or across competitions. Perhaps an approach which combines these two designs would be most useful. That is, collect individual athlete data continuously throughout several competitions. During each competition, an individual athlete's anxiety and performance would be assessed continuously, as often as possible. By doing this over several competitions under varying conditions, it is more likely that a catastrophic event would be observed. This methodology would allow for observing changes within and across performances. Hence, by combining continuous data collection both within and across contests, a full test of catastrophe theory predictions would be obtained.

Performance Assessment Concerns in Testing the Multidimensional Anxiety and Catastrophe Theories

In the present study, three performance measures were employed: coach rating of performance, athlete rating of performance and an objective measure of soccer performance. All had unexpected inconsistent and low correlations with each other. The low intercorrelations between coach, athlete, and objective ratings of performance suggests that either each measure assessed a different aspect or perspective of soccer performance or that none of the measures were valid.

Athlete ratings were assumed to be the least reliable and valid measure of performance. Based on tacit knowledge, often when asking athletes to rate their performances, they focus more on the negative aspects of their play, giving a lower performance rating than they actually deserved. More elite athletes would be better in tune with their performances and probably would be more accurate in their ratings. However, athletes may become better predictors of their performance with practice. For example, reviewing game tapes may allow athletes to observe their performance from a slightly more objective perspective. The use of a rating sheet or viewing game tapes with another person (e.g., coach or team member) may further allow the player to obtain a more accurate perspective of how well he or she performed. Finally, a more specific measure of performance may help athlete accuracy. For example, asking athletes to rate their passing, heading, and other skills during a match would force them to rate specific aspects of their performance and would give more direction when rating performances.

Although coach ratings of performance were deemed to be a better indicant of performance than athletes' rating of performance, this measure also has some limitations. Coach ratings of performance were based on the coach's subjective interpretation of an athlete's performance. This is especially critical because in the course of a soccer match, up to nineteen players may have participated. Unlike a sport such as swimming, there are few objective statistics readily available to most soccer coaches which will remind the coach how well each athlete competed. Also, some athletes may play quite well, yet go relatively unnoticed because they were not involved in many "big" plays. This became evident as the observers were coding objective soccer performances from game tapes. (The assistant coach who rated athlete performance also viewed the game tapes when recording objective performance.) The assistant coach as well as the other observers were sometimes surprised at how consistent some players performed, although they never were considered as such at the time of the game.

The third performance measure in the present study was a composite measure of specific soccer behaviors, similar to that used by Sonstroem and Bernardo (1980) in their study of basketball performance. Sonstroem and Bernardo noted that examining only points scored in basketball would not be representative of how well an athlete performed because players in different positions would have different scoring opportunities. This is even more reflective of soccer where a high scoring game approaches only four or five goals.

The use of the composite performance score based on specific soccer behaviors was also consistent with the subcomponent approach to examining performance advocated by Jones (Jones & Cale, 1989; Jones, Cale & Kerwin, 1988). Jones, Cale and Kerwin suggested that performance of specific skills directly related to the sport played by the subjects would prove more realistic in tests of the anxiety-performance relationship. In their study, subcomponents of cricket performance were measured by two types of reaction time purported to be directly related to cricket performance. Although Jones, Cale, and Kerwin argued that the reaction time tasks were directly related to cricket batting performance, they also acknowledged that the athletes may not have perceived this relevance. Therefore, the athletes may not have been determined to devote the effort and attention to the task that would be devoted to actual batting performance (Jones & Cale, 1989). The objective soccer performance measure in the present study addressed this limitation of Jones' work by measuring skills used during actual soccer matches.

A limitation of the objective performance measure in the present study was that it included predominantly offensive behaviors, focusing on "on ball" performance (behaviors when an athlete had possession or gained possession of the ball). "Off ball" behaviors (e.g., runs to become open for passes, defensive coverage of an opponent) would have been extremely difficult to accurately measure. Players who were very strong defensively, yet did not often have possession of the ball, may have been underrepresented by the objective measure. However, on teams of this calibre, all players should be strong offensively and defensively and the skills recorded were those which should be used by players on all areas of the field (except in goal). Comparison of the objective performance scores for specific athletes to how well that athlete typically performed, intuitively appeared to be accurate.

The objective measure of soccer performance utilized in the present study was considered the most accurate measure of athlete soccer performance. The use of subcomponent measures of performance and standardized scores in the present study allowed for a more precise and sensitive measure of performance compared to previous studies which examined outcome measures of performance. Further, as Burton (1988) suggested, the measure was obtained across a full soccer season which allowed for the inclusion of two to three times as many performance measures as in previous studies examining the anxiety-athletic performance relationship. For example, in his swimming study, Burton (1988) had three measures of performance from which he obtained an average performance score to utilize when computing standardized scores. An average obtained over ten games, as in this study, would be a much more accurate indicant of typical performance than one obtained over three time periods.

In support of the contention that objective performance was the most sensitive and dependable performance measure, the objective performance analyses provided the most consistent, although a minimal, support for catastrophe theory predictions. The nonlinear regression equation predicting objective ratings of performance accounted for more performance variance than the equations predicting coach or athlete ratings of performance.

The subcomponent approach to performance measurement offers researchers a method for examining the anxiety-athletic performance relationship in team sports. These types of sports have often eluded researchers in the past due to the difficulty of obtaining an accurate assessment of performance. When developing this type of performance measure, care must be taken to ensure that it accurately reflects total performance and it is advocated that performance measures be obtained during real competitive events across an entire athletic season. Further, reliability must be obtained, which includes the use of multiple trained observers. Observers should be trained prior to actual data collection and reliability levels of at least 85 percent agreement should be obtained.

Relationships Among Trait, State, and Retrospective Anxiety

The secondary purposes of this study included examining issues related to the validity of new anxiety scales. In this section, results will be discussed in terms of the relationships among trait and state anxiety and state and retrospective anxiety.

Relationship Between Trait and State Anxiety

It was hypothesized that the new measure of multidimensional trait anxiety, the Sport Anxiety Scale, developed by Smith, Smoll, and Schutz (in press), would be predictive of state anxiety. In particular, in the present study, the multidimensional subcomponents of trait anxiety were examined as predictors of state anxiety subcomponents. Results indicated trait and state cognitive anxiety were correlated on seven of twelve the competitions. Although not as consistent as desired, trait cognitive anxiety is at least mildly to moderately related to state cognitive anxiety in more than half of the competitions. Trait somatic anxiety, however, was not correlated with state somatic anxiety. This was unexpected, especially considering that six of the nine items which make up the trait and state somatic anxiety subscales were worded almost identically.

The lack of significant results on the canonical correlations between trait and state anxiety subcomponents was unexpected. It was especially surprising that in the course of twelve competitions, canonical correlations between trait and state anxiety subcomponents reached significance only once. This finding was counter to hypotheses intuitively based on the strong relationship between unidimensional measures of trait and state anxiety.

There are several possible explanations for the lack of significant findings. First, the new SAS may simply not be a good measure of trait cognitive and somatic anxiety and that a unidimensional measure of trait anxiety is adequate and parsimonious. However, it is rather premature to jump to such a strong conclusion, especially in light of the small sample size in the present study. More reasonably, it should be noted that the subjects completed the SAS prior to the start of the competitive soccer season. Because this was a second year varsity collegiate team, almost half of the athletes had never competed at this level. Therefore, many of the athletes may not have accurately assessed how they would react in this new competitive environment. One should also consider that this team was nationally ranked and freshmen who were star players in the past were often relegated to secondary positions. This may have influenced their confidence levels, which in turn would influence anxiety (Krane, Williams, & Feltz, 1986). Prior to the season, these athletes may not have predicted they would react in this manner. Correspondingly, the only significant canonical correlation between trait and state anxiety subcomponents was on the first soccer match. Possibly, had the players completed the SAS during the season after having some collegiate soccer experience, the results may have differed.

As expected, trait cognitive anxiety was found to be significantly correlated with state cognitive anxiety, but trait somatic anxiety was not correlated with trait somatic anxiety. It should be further noted that state cognitive anxiety was more consistently related to, and had higher correlations with the total trait anxiety score than with trait cognitive anxiety. This same patter, although not significant, was also noted for state somatic anxiety. These findings do not support the scale development of Smith, Smoll, and Schutz (in press) and may be used to suggest that a unidimensional measure of trait anxiety is a better predictor of state anxiety subcomponents than the new multidimensional SAS.

The most consistent trait-state anxiety correlational relationship found was between trait concentration disruption and state cognitive anxiety, with significant correlations found on 9 of the 12 testing occasions. This is supportive of previous researchers who suggested that one characteristic of cognitive anxiety was an inability to concentrate (Davidson & Schwartz, 1976, Kause, 1980; Martens et al., 1990). The relationship among cognitive and somatic anxiety and attentional style were investigated by Albrecht and Feltz (1987). Results showed that the ability to effectively narrow one's focus of attention was negatively related to cognitive and somatic anxiety. Cognitive anxiety was also positively related to internal and external attentional overload.

The present results, coupled with the results of Albrecht and Feltz (1987), provide indirect support for the attention distraction hypotheses. Wine (1980) proposed that cognitive anxiety would interfere with performance due to an inappropriate attentional focus while Easterbrook's (1959) cue-utilization theory suggested that high anxiety would limit one's range of attentional focus. Both of these theories suggest that attentional focus and concentration are influenced by cognitive anxiety which, in turn, influences athletic performance. Future research may wish to examine a state measure of concentration disruption in assessing its relationship with state cognitive anxiety.

Few studies have investigated **why** the relationship between anxiety and performance exists. Often studies have investigated the shape and direction of the relationship yet have not delved into the conceptual issue of what causes anxiety to impact upon performance. It appears that cognitive anxiety is related to attentional focus and investigation of the concentration disruption scale of the SAS and its relationship to state anxiety subcomponents may offer some insight into how anxiety impacts upon athletic performance.

Relationships Among State and Retrospective Cognitive and Somatic Anxiety

Hanin (1980; 1989) has suggested that anxiety measured retrospectively would accurately assess competitive state anxiety. Measures of retrospective cognitive and somatic anxiety were included in the present study to examine the hypothesis that retrospectively measured anxiety would be an accurate indicant of pre-competitive state anxiety.

Correlations between state and retrospective cognitive and somatic anxiety did not obtain the criterion of significance of being correlated on at least 6 of the 12 competitions. However, the relationship between state and retrospective cognitive anxiety approached the criterion of significance, being moderately correlated 5 of 12 competitions, while state somatic anxiety was moderately correlated with retrospective somatic anxiety on only 4 of 12 occasions. This does not provide support for Hanin's contention that anxiety measured retrospectively, after a competition, would be an accurate measure of pre-competitive anxiety levels. Further, correlations between state anxiety and performance and between retrospective anxiety and performance were low and inconsistent.

The low intercorrelations between state and retrospective anxiety may be related to the measurement of retrospective anxiety in the present study. State anxiety was measured with the CSAI-2 while retrospective anxiety was measured with the new Mental Readiness Form (MRF). The use of two different measurement instruments confound the findings. It is difficult to discern whether the measurement tool or the timing of administration of the questionnaires influenced the results. Hanin (1980, 1989) used the same questionnaire, the Russian Adaptation of Spielberger's State-Trait Anxiety Inventory (STAI-R; Hanin & Spielberger, 1983), for measurement of both state and retrospective anxiety which probably influenced his high correlations between the two measures. There is also a question as to the validity of the MRF. To date only one study has been reported which employed the MRF to support its reliability and validity. Murphy and his colleagues (1989) found only moderate correlations between the CSAI-2 and MRF subscales on a sample of 105 junior and senior elite athletes. More studies are needed to support the validity of the MRF before any sound conclusions can be derived from its use.

Summary of Secondary Purpose Findings

Contrary to expectations, trait cognitive anxiety, somatic anxiety, and concentration disruption did not predict state cognitive and somatic anxiety. This finding may be an effect of the sample, not being previously experienced in collegiate competition at the time of completion of the trait anxiety measure. This finding coupled with the correlational results shows that additional validity research is needed before the SAS can be fully accepted.

Retrospective anxiety was not significantly related to state anxiety. Again, this was contrary to expectations, but may be an effect of the different anxiety questionnaires used to assess retrospective and state anxiety. However, the low correlations between these measures and the high intercorrelations between cognitive and somatic anxiety lead one to question the validity of retrospective anxiety as measured by the Mental Readiness Form.

Strengths and Limitations of the Present Study

The greatest strength of this study lies in the investigation of anxiety and athletic performance in a methodologically sound and ecologically valid environment. Even though the results did not provide strong evidence for the catastrophe theory, a methodological and statistical model for examining this theory by future researchers has been presented. Additionally, partial support was generated for the multidimensional anxiety theory.

The present study incorporated many suggestions for improving anxiety research based on critiques of previous inverted-U studies (e.g., Burton, 1988; Neiss, 1988; Weinberg, in press). At least three distinct levels of anxiety were obtained, which is prerequisite to investigation of any non-linear anxiety-performance model. Multiple assessments of anxiety and performance were obtained over the course of an entire athletic season. Anxiety and performance relationships were examined across twelve soccer competitions which permitted investigation of trends across two to three times as many performances as in previous studies (e.g., Burton, 1988; Gould et al., 1987). Intra-individual anxiety scores were utilized to take into consideration individual differences in optimal levels of anxiety. Standardized performance scores allowed for performance to be examined relative to each athlete's typical level of performance and negated between subject comparisons.

Still, there are several issues that future researchers may want to address and/or improve upon in subsequent investigations of the anxiety-athletic performance relationship. The biggest limitation of the present study is the small number of subjects. The choice of athletic team for the sample was weighed against the likelihood of obtaining reliable and complete data, resulting in the choice of a relatively small, yet very helpful and cooperative team. Although, only nineteen subjects were included in the study, 146 data points were entered into the catastrophe analyses since the athletes were followed across the whole soccer season. The minimum number of data points for use in the catastrophe analyses was 100, as suggested by T. Oliva (personal communication, May, 1989), allowing for an exploratory investigation of the catastrophe model.

Further, as suggested by Flay (1978), one of the preconditions for testing catastrophe theory was that a powerful test of the model be implemented. According to Cohen (1969), power can be estimated by using his standardized effect size to estimate the number of subjects needed for a prespecified level of power.[3] Using the estimate for a moderate effect size (.30), a test with 100 data points, as in the multidimensional anxiety theory analyses, the power of the test would be .86. It has been suggested that power of .80 be used as a convention for significance (Christensen & Christensen, 1977). When using an estimated moderate effect size and 140 data points, as in the tests of the catastrophe model, power rose to .95. This procedure for determining power, being an estimate, may not accurately assess power. However, this procedure does not

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[3] Power was not assessed in the present study since one of the variables taken into account when determining power is effect size. Effect size is determined by comparing the experimental group to a control group and this being a field study, did not have a control group. Hence an estimated effect size was utilized to estimate power.

control for extraneous influences to reduce error variance or enhance the power of an investigation (e.g., obtaining measures in real competitive environments, use of standardized anxiety and performance measures) (Dotson, 1980).

Investigation of a team sport may have posed some difficulties in the present study. It is possible that few of the athletes in this study experienced catastrophes. Based on the visual inspection of individual athlete cognitive anxiety, somatic anxiety and performance data plots, many good performances were found under conditions of high cognitive anxiety, counter to the multidimensional anxiety and catastrophe theories. Possibly these subjects rarely achieved levels of cognitive and somatic anxiety which would have led to them choking or experiencing a catastrophe on the soccer field. In a sport such as soccer where there are many players on the field at one time, it is possible for a player beginning to experience a potential catastrophe to "pull herself together" and avoid a catastrophe. There is a lot of time when a player does not have the ball in soccer and will be able to avoid displaying anxiety-invoked poor performances. Contrary, in individual sports, once an athlete begins to experience difficulty, he or she must continue to fully participate and either cope with his or her high anxiety or experience a catastrophe. Future researchers may want to investigate individual sport athletes for a more specific test of catastrophe theory predictions.

The objective performance measure in the present study also has some limitations. First, as previously mentioned, it only accounted for offensive, "on ball" skills, possibly allowing for underrepresentation of performance by primarily defensive players. Further, objective performance, as measured in the present study, may have been influenced by the skill of the opponents. For example, when playing against a team such as the University of North Carolina at Chapel Hill (the number one ranked Division I team in the country at the time), the number of successful passes was much less than when playing against less skilled teams. The more highly skilled opponents did not allow for as many successful passes, for example, to be completed as the less skilled Division III teams. Finally, interrater reliability was relatively low, suggesting that this measure may not have been completely accurate in assessing the recorded soccer behaviors. Future researchers may chose to utilize sports with more easily obtained performance measures. For example, sports like swimming, indoor track and field, or shooting would allow for a more reliable and readily attainable performance measure to be obtained.

Another limitation of the present study that should be noted was the timing of pre-competitive anxiety measurement. Athletes completed the CSAI-2 20-30 minutes prior to each competition. It is possible that at this time, anxiety levels did not accurately reflect how the athletes actually felt immediately prior to performance. Research indicates that somatic anxiety and, to a lesser extent cognitive anxiety, tend to increase up until the commencement of performance (Gould, Petlichkoff, & Weinberg, 1984; Jones, Cale, & Kerwin, 1988; Krane & Williams, 1987; Martens et al, 1990). The anxiety measure in the present study was also used in an attempt to predict performance over 45 minutes of a soccer match. Perhaps an anxiety measure immediately preceding performance of an athletic event of shorter duration, such as diving, may provide a more accurate indicant of athlete affect.

The Inverted-U Hypothesis, Multidimensional Anxiety Theory, and Catastrophe Theory - Conclusions

Much evidence exists which perpetuates the need to move beyond the inverted-U hypothesis and examine more complex theories about the relationship between anxiety and performance (e.g., Burton, 1988; Gould, Petlichkoff, & Weinberg, 1984; Gould et al., 1987; Krane & Williams, 1987a; Jones & Cale, 1989; Jones, Cale, & Swain, 1989; Martens et al., 1990). As Jones (in press) noted, "the development of research into, and the understanding of, the relationship between stress and performance has been hindered by sport psychologists' continued acceptance of unidimensional descriptions of the relationship between stress and performance, and the inverted-U hypothesis in particular" (p.26). The differential patterns between cognitive anxiety and somatic anxiety and performance exhibited in the present study as well as in previous studies, reinforces the need to move beyond the inverted-U hypothesis. At this point it is important to realize that regardless of the wrath of criticism levied at the inverted-U hypothesis, it should not be completely disregarded. While there may have been some complacency in its overwhelming acceptance, the inverted-U hypothesis was extremely heuristic. Moreover, little direct research support has been generated for catastrophe theory in this investigation and the lack of a psychic energy measure renders reversal theory untestable at the present time. Finally, previous investigations of the inverted-U allowed for the current advances in the anxiety literature. It is because of these studies that researchers are now able to forward various criticisms and move into more sophisticated methodologies and theories.

As the inverted-U hypothesis was receiving increased criticism, the multidimensional anxiety theory received much attention by anxiety researchers. Investigation of multidimensional anxiety has progressed in three waves. The first wave investigated the relative independence of cognitive and somatic anxiety and temporal changes in cognitive and somatic anxiety prior to competition (e.g., Gould, Petlichkoff, & Weinberg, 1984; Jones, Cale, & Kerwin, 1988; Krane & Williams, 1987a). This wave also included research comparing cognitive and somatic anxiety levels in subgroups of athletes such as male and female athletes and more and less experienced athletes (e.g., Krane & Williams, 1986, 1987, 1988; Martens et al., 1990).

In the second wave, researchers began to implement more sensitive measures of intra-individual anxiety and standardized performance. Burton (1988) and Gould and his colleagues (1987) utilized these methods and examined the independent relationships between cognitive anxiety and performance and somatic anxiety and performance. The results of previous studies along with the present study do not provide evidence for a consistent relationship between the anxiety subcomponents and athletic performance. The present study supported the multidimensional anxiety theory prediction that cognitive anxiety would be related to performance in a negative linear manner while the predicted curvilinear relationship between somatic anxiety and performance was not found. Concurring with Hardy (in press), it is suggested that the inconsistent findings in studies of multidimensional anxiety theory result from the investigation of two independent subcomponents of anxiety. These inconsistent results can be interpreted through the catastrophe theory. The consistent finding that cognitive anxiety negatively influences performance is consistent with catastrophe theory. The inconsistent somatic anxiety-performance results can also be explained by catastrophe theory. Depending upon the level of cognitive anxiety, somatic anxiety will differentially influence performance. Therefore, inconsistent results would be expected as long as somatic anxiety is examined independent of cognitive anxiety. Results of the present study and Hardy, Parfitt & Pates' (in press) work provide empirical support for the need to investigate the joint effects of cognitive and somatic anxiety on athletic performance.

The third wave in the multidimensional anxiety literature is the recent focus on new theories which may be applied to the anxiety-performance relationship and has been examined mostly on a conceptual level (e.g., Hardy, in press; Hardy & Fazey, 1987; Kerr, 1985; Martens, 1987). One of the primary contentions of the present paper is that empirical tests of this third wave, more specifically the catastrophe theory, are needed. There is also a special need to compare the newly proposed theories (e.g., multidimensional anxiety theory, psychic energy theory, reversal theory, catastrophe theory).

Conclusive support for either the multidimensional anxiety or the catastrophe theory was not obtained. Partial support was found for multidimensional anxiety theory predictions and limited indirect support was provided for some catastrophe theory predictions. The strongest finding, that cognitive anxiety had a negative linear relationship with performance, was consistent with both theories. However, the multidimensional anxiety theory received the most trenchant support in the present study. Specifically, it was found that cognitive and somatic anxiety differentially relate to athletic performance.

To date, only one research article focusing on catastrophe theory predictions is available. Hardy, Parfitt, & Pates (in press) supported the hysteresis hypothesis (performance will be differentially affected by somatic anxiety depending upon whether somatic anxiety is increasing or decreasing) in an experimental setting. The present study examined a model fitting test of catastrophe theory in a field setting. The catastrophe theory was not supported by the model fitting analysis, however, indirect support was gained for some catastrophe theory predictions. Further research is necessary before a more definitive conclusion concerning catastrophe theory can be made.

Future Research Directions

The present study, by virtue of being the first to examine the complete catastrophe model, must be viewed as exploratory. Any further replication and extension of the present study would be a necessary addition to the anxiety literature. Methodologically, the present study can be improved upon by the inclusion of a greater number of subjects and a more reliable performance measure. These methodological issues have been discussed in depth previously, so the present section will provide conceptual directions for future research.

One of the most controversial issues involving catastrophe theory, and the anxiety literature in general, concerns the use of the somatic anxiety construct versus the physiological arousal construct. Most anxiety researchers are biased either towards utilizing measures of somatic anxiety or physiological arousal. Unfortunately, the ease of administration of somatic anxiety questionnaires compared to the use of physiological indices often leads researchers to utilize the somatic anxiety construct regardless of the theoretical implications. An important area of study involves inclusion of both somatic anxiety and physiological measures in studies to examine the relationship between the two constructs, as well as to performance. We may find that physiological arousal is strongly related to somatic anxiety or that the addition of physiological arousal will contribute to the prediction of athletic performance. Care must be taken when choosing a physiological measure since different athletes will have different physiological anxiety reactions. For example one athlete will react to an evaluative situation with increased heart rate while another may react with changes in muscular tension. Researchers must pilot test a physiological measure to ensure that the subjects included in the study will react in that particular system.

The application of reversal theory to the anxiety-athletic performance relationship offers another important area for future research. The reversal theory may be related to catastrophe theory predictions, especially concerning the effect of the telic metamotivational state on athletic performance. Gould and Krane (in press) suggested that the telic state may be considered equivalent to cognitive anxiety. Thus negative interpretations of physiological arousal (somatic anxiety) is predicted to negatively influence performance in reversal theory and Martens' psychic energy theory, as well as in catastrophe theory. Further investigation of the reversal theory also involves the development of a valid measure of the paratelic metamotivational state or positive psychic energy.

Another direction for future researchers involves the use of qualitative methods in sport psychology to further enhance knowledge gained from field studies. Interviews of athletes can provide great insight into the specific relationships between anxiety and athletic performance. Scanlan, Ravizza, and Stein (1989) have established an exemplary protocol for application of this methodology in a scientifically rigorous manner.

In real life competition, it is difficult to measure anxiety and performance under conditions of decreasing anxiety (e.g., an athlete recovering from a catastrophic or choke performance). Pre-competition measures of anxiety will not allow researchers to examine the hysteresis hypothesis which suggests that performance will follow a different path when somatic anxiety is increasing than when it is decreasing. Qualitative investigations with athletes will allow for athletes to retrospectively describe their feelings and performance when playing well and when in "choke" situations. Use of this methodology is a logical next step in furthering our understanding of the anxiety-athletic performance relationship.

In conclusion, although the present study did not support the catastrophe theory predictions, it offers a new perspective for examining the relationship between anxiety and athletic performance. The recent introduction of this theory in sport psychology offers the potential of extending our understanding and knowledge in the anxiety area. The indirect and partial support of the present study and the work of Hardy, Parfitt, and Pates (in press) suggest that further research is warranted. Replication and extension of the present study may provide further support for catastrophe theory predictions, enhancing our understanding of the effects of cognitive and somatic anxiety on athletic performance. Overall, the catastrophe theory provides an explanation for previous inconsistent results within the multidimensional anxiety theory literature. While the nature of the relationship between anxiety and athletic performance may still be described as elusive, application of catastrophe theory may bring sport psychologists one step closer to a comprehensive understanding of the anxiety-performance relationship.

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Appendix A

Competitive State Anxiety Inventory - 2

(complete questionnaire)

Appendix B

Shortened Competitive State Anxiety Inventory - 2

Appendix C

Anti-Social Desirability Instructions

"The effects of high competitive sports can be powerful and very different among athletes. The inventory you are about to complete measures how you feel about this competition at the moment you are responding. Please complete the inventory as honestly as you can. Sometimes athletes feel they should not admit to any nervousness, anxiety, or worry before competition because this is undesirable. Actually these feelings are quite common and to help us understand them, we want you to share you feelings with us candidly. If you are worried about the competition or have butterflies or other feelings which you know are signs of anxiety, please indicate these feelings accurately on the inventory. And equally, if you feel calm and relaxed, indicate these feelings as accurately as you can. Your answers will not be shared with anyone" (Martens et al., 1990, p. 181).

Appendix D

Instructions Read to Athletes

You are being asked to participate in a research project examining mental states of soccer players prior to competition. Specifically, I am examining the effect of anxiety on soccer performance. If you chose to participate in this study, you will be asked to complete a short questionnaire approximately 20 minutes prior to each game of the 1989 season. I have talked to your coach about this study and he has offered his full cooperation.

In order to make this study beneficial for you as well as for me, I will offer individualized mental skills training based on my findings. That is, I will obtain a "road map" of your anxiety level prior to each game as well as a detailed performance measure (which tallies your successful passes, loss of possession, gain of possession, shots, headers, assists, and goals). For any one who chooses, I will share this information on an individual basis and help you develop necessary relaxation or psyching up strategies to enhance your soccer performance.

Let me stress that this information will not be shared with your coaches. They may receive group averages at the end of the season, but individual anxiety scores will not be seen by anyone but you and me. Your participation is completely voluntary and you may withdraw participation at any time during the study.

Before you complete any questionnaires, it is important that you understand that there are no right or wrong answers. That is, one soccer player may play best with more anxiety while another player's best performance may come with low levels of anxiety. Participation in this study may help you determine your individual optimal level of arousal.

Appendix E

Sport Anxiety Test

Appendix F

Mental Readiness Form

Mark the spot on this continuum that best indicates how you felt during your last competition.

My thoughts were

calm ____ worried

My body felt

tense ____ relaxed

Appendix G

Demographic Questionnaire

Name________________________________

Age_________________________________

Position____________________________

Including this year, how many years have you played soccer for UNCG? ______________

Including this year, how many total years have you played competitive soccer? ____________________

List any special recognition you have received because of your soccer performance (e.g. All area teams, All-American)

High School	College
_________________________	_________________________
_________________________	_________________________
_________________________	_________________________
_________________________	_________________________
_________________________	_________________________
_________________________	_________________________
_________________________	_________________________
_________________________	_________________________

Appendix H

SOCCER PERFORMANCE SCORE SHEET

Name	Successful Pass	Loss of Possession		Gain of Possession	Shots		Headers		Assists		Goals	Time Entered	Time Left
			Fouls		On	Off	Attempt	Success	1st	2nd			

Appendix H (con't)

GOALKEEPER PERFORMANCE SCORE SHEET

Name	Crosses			Shots			Grounders			1 v 1				Goals		
	Caught	Punch	Drop & Recover	Caught	Punch	Drop & Recover	Caught	Punch	Drop & Recover	Caught	Punch	Drop & Recover	Perfect Shot	Tactical Error	Technical Error	Defender Error

Appendix I

Athlete Soccer Performance Ratings

Rate how well you played in this game compared to your current ability. Circle the number that best represents your rating.

Did not play at all near my potential										Played to the best of my potential
1	2	3	4	5	6	7	8	9	10	11
(e.g., worst game I ever played)					average game					(e.g., best game I ever played)

Appendix J

Coach Soccer Performance Ratings

Rate how well this player competed in this game compared to her current ability. Circle the number that best represents your rating.

Did not play at all near her potential		Played to the best of her potential

/ 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 / 11/

(e.g., worst game I ever played)	average game	(e.g., best game I ever played)

Appendix K

Informed Consent Form

You are being asked to participate in a research project examining mental states of soccer players prior to competition. Your involvement will include completing a short questionnaire approximately 20 minutes prior to each soccer game of the 1989 season. Additionally, there will be a few occasions when you will be asked to complete the questionnaire prior to a scrimmage during a practice session. All information obtained will be confidential. Your responses **will not** be shared with your coaches. However, upon request, all information gained concerning your individual anxiety levels and performance will be shared on an individual basis to assist you in your mental skills training and preparation.

I understand that my participation is entirely voluntary. No coercion of any kind has been used to obtain my cooperation.

I understand that I may withdraw my consent and terminate my participation at any time during the project.

I have been informed of the procedures that will be used in the project and understand what will be required of me as a subject.

I understand that all my responses will remain completely anonymous.

I wish to give my voluntary cooperation as a participant.

____
Signature

____
Date

Appendix L

DATA DICTIONARY

LINE	NAME	COLUMN	RANGE	VARIABLE NAME
1	SUBJ	1-2	1-25	SUBJECT NUMBER
	AGE	3-4	1-22	AGE
	YRSUNCG	5	1-4	YEARS PLAYING FOR UNCG
	TOTEX	6-7	1-18	TOTAL YEARS SOCCER EXPERIENCE
	SAS1	8	1-4	SAS ITEM 1
	SAS2	9	1-4	SAS ITEM 2
	SAS3	10	1-4	SAS ITEM 3
	SAS4	11	1-4	SAS ITEM 4
	SAS5	12	1-4	SAS ITEM 5
	SAS6	13	1-4	SAS ITEM 6
	SAS7	14	1-4	SAS ITEM 7
	SAS8	15	1-4	SAS ITEM 8
	SAS9	16	1-4	SAS ITEM 9
	SAS10	17	1-4	SAS ITEM 10
	SAS11	18	1-4	SAS ITEM 11
	SAS12	19	1-4	SAS ITEM 12
	SAS13	20	1-4	SAS ITEM 13
	SAS14	21	1-4	SAS ITEM 14
	SAS15	22	1-4	SAS ITEM 15
	SAS16	23	1-4	SAS ITEM 16
	SAS17	24	1-4	SAS ITEM 17
	SAS18	25	1-4	SAS ITEM 18
	SAS19	26	1-4	SAS ITEM 19
	SAS20	27	1-4	SAS ITEM 20
	SAS21	28	1-4	SAS ITEM 21
	BLANK	29		
	BUFANX1	30	1-4	BUFFALO CSAI-2 ITEM 1
	BUFANX2	31	1-4	BUFFALO CSAI-2 ITEM 2
	BUFANX3	32	1-4	BUFFALO CSAI-2 ITEM 3
	BUFANX4	33	1-4	BUFFALO CSAI-2 ITEM 4
	BUFANX5	34	1-4	BUFFALO CSAI-2 ITEM 5
	BUFANX6	35	1-4	BUFFALO CSAI-2 ITEM 6
	BUFANX7	36	1-4	BUFFALO CSAI-2 ITEM 7
	BUFANX8	37	1-4	BUFFALO CSAI-2 ITEM 8
	BUFANX9	38	1-4	BUFFALO CSAI-2 ITEM 9
	BUFANX10	39	1-4	BUFFALO CSAI-2 ITEM 10
	BUFANX11	40	1-4	BUFFALO CSAI-2 ITEM 11
	BUFANX12	41	1-4	BUFFALO CSAI-2 ITEM 12
	BUFANX13	42	1-4	BUFFALO CSAI-2 ITEM 13
	BUFANX14	43	1-4	BUFFALO CSAI-2 ITEM 14
	BUFANX15	44	1-4	BUFFALO CSAI-2 ITEM 15

	BUFANX16	45	1-4	BUFFALO CSAI-2 ITEM 16
	BUFANX17	46	1-4	BUFFALO CSAI-2 ITEM 17
	BUFANX18	47	1-4	BUFFALO CSAI-2 ITEM 18
	BLANK	48		
	ATPERF1	49-50	1-11	ATHLETE PERFORMANCE RATING 1ST GAME
	MRFCOG1	51-53	0-100	1ST HALF POST COG 1ST GAME
	MRFSOM1	54-56	0-100	1ST HALF POST SOM 1ST GAME
	MRF2COG1	57-59	0-100	2ND HALF POST COG 1ST GAME
	MRF2SOM1	60-62	0-100	2ND HALF POST SOM 1ST GAME
	COPERF1	63-64	1 - 11	COACH PERFORMANCE RATING 1ST GAME
	BLANK	65		
	UNCANX1	66	1-4	CHAPEL HILL CSAI-2 ITEM 1
	UNCANX2	67	1-4	CHAPEL HILL CSAI-2 ITEM 2
	UNCANX3	68	1-4	CHAPEL HILL CSAI-2 ITEM 3
	UNCANX4	69	1-4	CHAPEL HILL CSAI-2 ITEM 4
	UNCANX5	70	1-4	CHAPEL HILL CSAI-2 ITEM 5
	UNCANX6	71	1-4	CHAPEL HILL CSAI-2 ITEM 6
	UNCANX7	72	1-4	CHAPEL HILL CSAI-2 ITEM 7
	UNCANX8	73	1-4	CHAPEL HILL CSAI-2 ITEM 8
	UNCANX9	74	1-4	CHAPEL HILL CSAI-2 ITEM 9
	UNCANX10	75	1-4	CHAPEL HILL CSAI-2 ITEM 10
	UNCANX11	76	1-4	CHAPEL HILL CSAI-2 ITEM 11
	UNCANX12	77	1-4	CHAPEL HILL CSAI-2 ITEM 12
	UNCANX13	78	1-4	CHAPEL HILL CSAI-2 ITEM 13
	UNCANX14	79	1-4	CHAPEL HILL CSAI-2 ITEM 14
	UNCANX15	80	1-4	CHAPEL HILL CSAI-2 ITEM 15
2	UNCANX16	1	1-4	CHAPEL HILL CSAI-2 ITEM 16
	UNCANX17	2	1-4	CHAPEL HILL CSAI-2 ITEM 17
	UNCANX18	3	1-4	CHAPEL HILL CSAI-2 ITEM 18
	BLANK	4		
	ATPERF2	5-6	1-11	ATHLETE PERFORMANCE RATING 2ND GAME
	MRFCOG2	7-9	0-100	1ST HALF POST COG 2ND GAME
	MRFSOM2	10-12	0-100	1ST HALF POST SOM 2ND GAME
	MRF2COG2	13-15	0-100	2ND HALF POST COG 2ND GAME
	MRF2COG2	16-18	0-100	2ND HALF POST SOM 2ND GAME
	COPERF2	19-20	1-11	COACH PERFORMANCE RATING 2ND GAME
	BLANK	21	1-4	
	UVAANX1	22	1-4	UVA CSAI-2 ITEM 1
	UVAANX2	23	1-4	UVA CSAI-2 ITEM 2
	UVAANX3	24	1-4	UVA CSAI-2 ITEM 3
	UVAANX4	25	1-4	UVA CSAI-2 ITEM 4
	UVAANX5	26	1-4	UVA CSAI-2 ITEM 5
	UVAANX6	27	1-4	UVA CSAI-2 ITEM 6
	UVAANX7	28	1-4	UVA CSAI-2 ITEM 7
	UVAANX8	29	1-4	UVA CSAI-2 ITEM 8

	UVAANX9	30	1-4	UVA CSAI-2 ITEM 9
	UVAANX10	31	1-4	UVA CSAI-2 ITEM 10
	UVAANX11	32	1-4	UVA CSAI-2 ITEM 11
	UVAANX12	33	1-4	UVA CSAI-2 ITEM 12
	UVAANX13	34	1-4	UVA CSAI-2 ITEM 13
	UVAANX14	35	1-4	UVA CSAI-2 ITEM 14
	UVAANX15	36	1-4	UVA CSAI-2 ITEM 15
	UVAANX16	37	1-4	UVA CSAI-2 ITEM 16
	UVAANX17	38	1-4	UVA CSAI-2 ITEM 17
	UVAANX18	39	1-4	UVA CSAI-2 ITEM 18
	BLANK	40		
	ATPERF3	41-42	1-11	ATHLETE PERFORMANCE RATING 3RD GAME
	MRFCOG3	43-45	0-100	1ST HALF POST COG 3RD GAME
	MRFSOM3	46-48	0-100	1ST HALF POST SOM 3RD GAME
	MRF2COG3	49-51	0-100	2ND HALF POST COG 3RD GAME
	MRF2SOM3	52-54	0-100	2ND HALF POST SOM 3RD GAME
	COPERF3	55-56	1-11	COACH PERFORMANCE RATING 3RD GAME
	BLANK	57		
	DAVANX1	58	1-4	DAVIDSON CSAI-2 ITEM 1
	DAVANX2	59	1-4	DAVIDSON CSAI-2 ITEM 2
	DAVANX3	60	1-4	DAVIDSON CSAI-2 ITEM 3
	DAVANX4	61	1-4	DAVIDSON CSAI-2 ITEM 4
	DAVANX5	62	1-4	DAVIDSON CSAI-2 ITEM 5
	DAVANX6	63	1-4	DAVIDSON CSAI-2 ITEM 6
	DAVANX7	64	1-4	DAVIDSON CSAI-2 ITEM 7
	DAVANX8	65	1-4	DAVIDSON CSAI-2 ITEM 8
	DAVANX9	66	1-4	DAVIDSON CSAI-2 ITEM 9
	DAVANX10	67	1-4	DAVIDSON CSAI-2 ITEM 10
	DAVANX11	68	1-4	DAVIDSON CSAI-2 ITEM 11
	DAVANX12	69	1-4	DAVIDSON CSAI-2 ITEM 12
	DAVANX13	70	1-4	DAVIDSON CSAI-2 ITEM 13
	DAVANX14	71	1-4	DAVIDSON CSAI-2 ITEM 14
	DAVANX15	72	1-4	DAVIDSON CSAI-2 ITEM 15
	DAVANX16	73	1-4	DAVIDSON CSAI-2 ITEM 16
	DAVANX17	74	1-4	DAVIDSON CSAI-2 ITEM 17
	DAVANX18	75	1-4	DAVIDSON CSAI-2 ITEM 18
	BLANK	76		
	ATPERF4	77-78	1-11	ATHLETE PERFORMANCE RATING 4TH GAME
3	MRFCOG4	1-3	0-100	1ST HALF POST COG 4TH GAME
	MRFSOM4	4-6	0-100	1ST HALF POST SOM 4TH GAME
	MRF2COG4	7-9	0-100	2ND HALF POST COG 4TH GAME
	MRF2SOM4	10-12	0-100	2ND HALF POST SOM 4TH GAME
	COPERF4	13-14	1-11	COACH PERFORMANCE RATING 4TH GAME
	BLANK	15		
	UMSANX1	16	1-4	UMSL CSAI-2 ITEM 1

UMSANX2	17	1-4	UMSL CSAI-2 ITEM 2
UMSANX3	18	1-4	UMSL CSAI-2 ITEM 3
UMSANX4	19	1-4	UMSL CSAI-2 ITEM 4
UMSANX5	20	1-4	UMSL CSAI-2 ITEM 5
UMSANX6	21	1-4	UMSL CSAI-2 ITEM 6
UMSANX7	22	1-4	UMSL CSAI-2 ITEM 7
UMSANX8	23	1-4	UMSL CSAI-2 ITEM 8
UMSANX9	24	1-4	UMSL CSAI-2 ITEM 9
UMSANX10	25	1-4	UMSL CSAI-2 ITEM 10
UMSANX11	26	1-4	UMSL CSAI-2 ITEM 11
UMSANX12	27	1-4	UMSL CSAI-2 ITEM 12
UMSANX13	28	1-4	UMSL CSAI-2 ITEM 13
UMSANX14	29	1-4	UMSL CSAI-2 ITEM 14
UMSANX15	30	1-4	UMSL CSAI-2 ITEM 15
UMSANX16	31	1-4	UMSL CSAI-2 ITEM 16
UMSANX17	32	1-4	UMSL CSAI-2 ITEM 17
UMSANX18	33	1-4	UMSL CSAI-2 ITEM 18
BLANK	34		
ATPERF5	35-36	1-11	ATHLETE PERFORMANCE RATING 5TH GAME
MRFCOG5	37-39	0-100	1ST HALF POST COG 5TH GAME
MRFSOM5	40-42	0-100	1ST HALF POST SOM 5TH GAME
MRF2COG5	43-45	0-100	2ND HALF POST COG 5TH GAME
MRF2SOM5	46-48	0-100	2ND HALF POST SOM 5TH GAME
COPERF5	49-50	1-11	COACH PERFORMANCE RATING 5TH GAME
BLANK	51	1-4	
BARANX1	52	1-4	BARRY CSAI-2 ITEM 1
BARANX2	53	1-4	BARRY CSAI-2 ITEM 2
BARANX3	54	1-4	BARRY CSAI-2 ITEM 3
BARANX4	55	1-4	BARRY CSAI-2 ITEM 4
BARANX5	56	1-4	BARRY CSAI-2 ITEM 5
BARANX6	57	1-4	BARRY CSAI-2 ITEM 6
BARANX7	58	1-4	BARRY CSAI-2 ITEM 7
BARANX8	59	1-4	BARRY CSAI-2 ITEM 8
BARANX9	60	1-4	BARRY CSAI-2 ITEM 9
BARANX10	61	1-4	BARRY CSAI-2 ITEM 10
BARANX11	62	1-4	BARRY CSAI-2 ITEM 11
BARANX12	63	1-4	BARRY CSAI-2 ITEM 12
BARANX13	64	1-4	BARRY CSAI-2 ITEM 13
BARANX14	65	1-4	BARRY CSAI-2 ITEM 14
BARANX15	66	1-4	BARRY CSAI-2 ITEM 15
BARANX16	67	1-4	BARRY CSAI-2 ITEM 16
BARANX17	68	1-4	BARRY CSAI-2 ITEM 17
BARANX18	69	1-4	BARRY CSAI-2 ITEM 18
BLANK	70		
ATPERF6	71-72	1-11	ATHLETE PERFORMANCE RATING 6TH GAME
MRFCOG6	73-75	0-100	1ST HALF POST COG 6TH GAME
MRFSOM6	76-78	0-100	1ST HALF POST SOM 6TH GAME

3	MRF2COG6	1-3	0-100	2ND HALF POST COG 6TH GAME
	MRF2SOM6	4-6	0-100	2ND HALF POST SOM 6TH GAME
	COPERF6	7-8	1-11	COACH PERFORMANCE RATING 6TH GAME
	BLANK	9		
	UCANX1	10	1-4	U CHARLESTON CSAI-2 ITEM 1
	UCANX2	11	1-4	U CHARLESTON CSAI-2 ITEM 2
	UCANX3	12	1-4	U CHARLESTON CSAI-2 ITEM 3
	UCANX4	13	1-4	U CHARLESTON CSAI-2 ITEM 4
	UCANX5	14	1-4	U CHARLESTON CSAI-2 ITEM 5
	UCANX6	15	1-4	U CHARLESTON CSAI-2 ITEM 6
	UCANX7	16	1-4	U CHARLESTON CSAI-2 ITEM 7
	UCANX8	17	1-4	U CHARLESTON CSAI-2 ITEM 8
	UCANX9	18	1-4	U CHARLESTON CSAI-2 ITEM 9
	UCANX10	19	1-4	U CHARLESTON CSAI-2 ITEM 10
	UCANX11	20	1-4	U CHARLESTON CSAI-2 ITEM 11
	UCANX12	21	1-4	U CHARLESTON CSAI-2 ITEM 12
	UCANX13	22	1-4	U CHARLESTON CSAI-2 ITEM 13
	UCANX14	23	1-4	U CHARLESTON CSAI-2 ITEM 14
	UCANX15	24	1-4	U CHARLESTON CSAI-2 ITEM 15
	UCANX16	25	1-4	U CHARLESTON CSAI-2 ITEM 16
	UCANX17	26	1-4	U CHARLESTON CSAI-2 ITEM 17
	UCANX18	27	1-4	U CHARLESTON CSAI-2 ITEM 18
	BLANK	28		
	ATPERF7	29-30	1-11	ATHLETE PERFORMANCE RATING 7TH GAME
	MRFCOG7	31-33	0-100	1ST HALF POST COG 7TH GAME
	MRFSOM7	34-36	0-100	1ST HALF POST SOM 7TH GAME
	MRF2COG7	37-39	0-100	2ND HALF POST COG 7TH GAME
	MRF2SOM7	40-42	0-100	2ND HALF POST SOM 7TH GAME
	COPERF7	43-44	1-11	COACH PERFORMANCE RATING 7TH GAME
	BLANK	45		
	NCSANX1	46	1-4	NCSU CSAI-2 ITEM 1
	NCSANX2	47	1-4	NCSU CSAI-2 ITEM 2
	NCSANX3	48	1-4	NCSU CSAI-2 ITEM 3
	NCSANX4	49	1-4	NCSU CSAI-2 ITEM 4
	NCSANX5	50	1-4	NCSU CSAI-2 ITEM 5
	NCSANX6	51	1-4	NCSU CSAI-2 ITEM 6
	NCSANX7	52	1-4	NCSU CSAI-2 ITEM 7
	NCSANX8	53	1-4	NCSU CSAI-2 ITEM 8
	NCSANX9	54	1-4	NCSU CSAI-2 ITEM 9
	NCSANX10	55	1-4	NCSU CSAI-2 ITEM 10
	NCSANX11	56	1-4	NCSU CSAI-2 ITEM 11
	NCSANX12	57	1-4	NCSU CSAI-2 ITEM 12
	NCSANX13	58	1-4	NCSU CSAI-2 ITEM 13
	NCSANX14	59	1-4	NCSU CSAI-2 ITEM 14
	NCSANX15	60	1-4	NCSU CSAI-2 ITEM 15
	NCSANX16	61	1-4	NCSU CSAI-2 ITEM 16
	NCSANX17	62	1-4	NCSU CSAI-2 ITEM 17

	NCSANX18	63	1-4	NCSU CSAI-2 ITEM 18
	BLANK	64		
	ATPERF8	65-66	1-11	ATHLETE PERFORMANCE RATING 8TH GAME
	MRFCOG8	67-69	0-100	1ST HALF POST COG 8TH GAME
	MRFSOM8	70-72	0-100	1ST HALF POST SOM 8TH GAME
	MRF2COG8	73-75	0-100	2ND HALF POST COG 8TH GAME
	MRF2COG8	76-78	0-100	2ND HALF POST SOM 8TH GAME
	COPERF8	79-80	1-11	COACH PERFORMANCE RATING 8TH GAME
4	ELOANX1	1	1-4	ELON CSAI-2 ITEM 1
	ELOANX2	2	1-4	ELON CSAI-2 ITEM 2
	ELOANX3	3	1-4	ELON CSAI-2 ITEM 3
	ELOANX4	4	1-4	ELON CSAI-2 ITEM 4
	ELOANX5	5	1-4	ELON CSAI-2 ITEM 5
	ELOANX6	6	1-4	ELON CSAI-2 ITEM 6
	ELOANX7	7	1-4	ELON CSAI-2 ITEM 7
	ELOANX8	8	1-4	ELON CSAI-2 ITEM 8
	ELOANX9	9	1-4	ELON CSAI-2 ITEM 9
	ELOANC10	10	1-4	ELON CSAI-2 ITEM 10
	ELOANX11	11	1-4	ELON CSAI-2 ITEM 11
	ELOANX12	12	1-4	ELON CSAI-2 ITEM 12
	ELOANX13	13	1-4	ELON CSAI-2 ITEM 13
	ELOANX14	14	1-4	ELON CSAI-2 ITEM 14
	ELOANX15	15	1-4	ELON CSAI-2 ITEM 15
	ELOANX16	16	1-4	ELON CSAI-2 ITEM 16
	ELOANX17	17	1-4	ELON CSAI-2 ITEM 17
	ELOANX18	18	1-4	ELON CSAI-2 ITEM 18
	BLANK	19		
	ATPERF9	20-21	1-11	ATHLETE PERFORMANCE RATING 9TH GAME
	MRFCOG9	22-24	0-100	1ST HALF POST COG 9TH GAME
	MRFSOM9	25-27	0-100	1ST HALF POST SOM 9TH GAME
	MRF2COG9	28-30	0-100	2ND HALF POST COG 9TH GAME
	MRF2COG9	31-33	0-100	2ND HALF POST SOM 9TH GAME
	COPERF9	34-35	1-11	COACH PERFORMANCE RATING 9TH GAME
	BLANK	36		
	MCANX1	37	1-4	METHODIST CSAI-2 ITEM 1
	MCOANX2	38	1-4	METHODIST CSAI-2 ITEM 2
	MCOANX3	39	1-4	METHODIST CSAI-2 ITEM 3
	MCANX4	40	1-4	METHODIST CSAI-2 ITEM 4
	MCANX5	41	1-4	METHODIST CSAI-2 ITEM 5
	MCANX6	42	1-4	METHODIST CSAI-2 ITEM 6
	MCANX7	43	1-4	METHODIST CSAI-2 ITEM 7
	MCANX8	44	1-4	METHODIST CSAI-2 ITEM 8
	MCANX9	45	1-4	METHODIST CSAI-2 ITEM 9
	MCANC10	46	1-4	METHODIST CSAI-2 ITEM 10
	MCANX11	47	1-4	METHODIST CSAI-2 ITEM 11

	MCANX12	48	1-4	METHODIST CSAI-2 ITEM 12
	MCANX13	49	1-4	METHODIST CSAI-2 ITEM 13
	MCANX14	50	1-4	METHODIST CSAI-2 ITEM 14
	MCANX15	51	1-4	METHODIST CSAI-2 ITEM 15
	MCANX16	52	1-4	METHODIST CSAI-2 ITEM 16
	MCANX17	53	1-4	METHODIST CSAI-2 ITEM 17
	MCANX18	54	1-4	METHODIST CSAI-2 ITEM 18
	BLANK	55		
	ATPERF10	56-57	1-11	ATHLETE PERFORMANCE RATING 10TH GAME
	MRFCOG10	58-60	0-100	1ST HALF POST COG 10TH GAME
	MRFSOM10	61-63	0-100	1ST HALF POST SOM 10TH GAME
	MRF2CG10	64-66	0-100	2ND HALF POST COG 10TH GAME
	MRF2SM10	67-69	0-100	2ND HALF POST SOM 10TH GAME
	COPERF10	70-71	1-11	COACH PERFORMANCE RATING 10TH GAME
	BLANK	72		
	DUKANX1	73	1-4	DUKE CSAI-2 ITEM 1
	DUKANX2	74	1-4	DUKE CSAI-2 ITEM 2
	DUKANX3	75	1-4	DUKE CSAI-2 ITEM 3
	DUKANX4	76	1-4	DUKE CSAI-2 ITEM 4
	DUKANX5	77	1-4	DUKE CSAI-2 ITEM 5
	DUKANX6	78	1-4	DUKE CSAI-2 ITEM 6
	DUKANX7	79	1-4	DUKE CSAI-2 ITEM 7
	DUKANX8	80	1-4	DUKE CSAI-2 ITEM 8
5	DUKANX9	1	1-4	DUKE CSAI-2 ITEM 9
	DUKANC10	2	1-4	DUKE CSAI-2 ITEM 10
	DUKANX11	3	1-4	DUKE CSAI-2 ITEM 11
	DUKANX12	4	1-4	DUKE CSAI-2 ITEM 12
	DUKANX13	5	1-4	DUKE CSAI-2 ITEM 13
	DUKANX14	6	1-4	DUKE CSAI-2 ITEM 14
	DUKANX15	7	1-4	DUKE CSAI-2 ITEM 15
	DUKANX16	8	1-4	DUKE CSAI-2 ITEM 16
	DUKANX17	9	1-4	DUKE CSAI-2 ITEM 17
	DUKANX18	10	1-4	DUKE CSAI-2 ITEM 18
	BLANK	11		
	ATPERF11	12-13	1-11	ATHLETE PERFORMANCE RATING 11TH GAME
	MRFCOG11	14-16	0-100	1ST HALF POST COG 11TH GAME
	MRFSOM11	17-19	0-100	1ST HALF POST SOM 11TH GAME
	MRF2CG11	20-22	0-100	2ND HALF POST COG 11TH GAME
	MRF2SM11	23-25	0-100	2ND HALF POST SOM 11TH GAME
	BLANK	26-28		
	ERSANX1	29	1-4	ERSKINE CSAI-2 ITEM 1
	ERSANX2	30	1-4	ERSKINE CSAI-2 ITEM 2
	ERSANX3	31	1-4	ERSKINE CSAI-2 ITEM 3
	ERSANX4	32	1-4	ERSKINE CSAI-2 ITEM 4
	ERSANX5	33	1-4	ERSKINE CSAI-2 ITEM 5
	ERSANX6	34	1-4	ERSKINE CSAI-2 ITEM 6

	ERSANX7	35	1-4	ERSKINE CSAI-2 ITEM 7
	ERSANX8	36	1-4	ERSKINE CSAI-2 ITEM 8
	ERSANX9	37	1-4	ERSKINE CSAI-2 ITEM 9
	ERSANC10	38	1-4	ERSKINE CSAI-2 ITEM 10
	ERSANX11	39	1-4	ERSKINE CSAI-2 ITEM 11
	ERSANX12	40	1-4	ERSKINE CSAI-2 ITEM 12
	ERSANX13	41	1-4	ERSKINE CSAI-2 ITEM 13
	ERSANX14	42	1-4	ERSKINE CSAI-2 ITEM 14
	ERSANX15	43	1-4	ERSKINE CSAI-2 ITEM 15
	ERSANX16	44	1-4	ERSKINE CSAI-2 ITEM 16
	ERSANX17	45	1-4	ERSKINE CSAI-2 ITEM 17
	ERSANX18	46	1-4	ERSKINE CSAI-2 ITEM 18
	BLANK	47		
	ATPERF12	48-49	1-11	ATHLETE PERFORMANCE RATING 12TH GAME
	MRFCOG12	50-52	0-100	1ST HALF POST COG 12TH GAME
	MRFSOM12	53-55	0-100	1ST HALF POST SOM 12TH GAME
	MRF2CG12	56-58	0-100	2ND HALF POST COG 12TH GAME
	MRF2SM12	59-61	0-100	2ND HALF POST SOM 12TH GAME
	COPERF12	62-63	1-11	COACH PERFORMANCE RATING 12TH GAME
6	SP11	1		SUCCESS. PASSES 1ST 10 MIN 1ST HALF VS BUFFALO
	SP21	2		SUCCESS. PASSES 2ND 10 MIN 1ST HALF VS BUFFALO
	SP31	3		SUCCESS. PASSES 3RD 10 MIN 1ST HALF VS BUFFALO
	SP41	4		SUCCESS. PASSES LAST 15 MIN 1ST HALF VS BUFFALO
	LOP11	5		LOSS OF POSSESS. 1ST 10 MIN 1ST HALF VS BUFFALO
	LOP21	6		LOSS OF POSSESS. 2ND 10 MIN 1ST HALF VS BUFFALO
	LOP31	7		LOSS OF POSSESS. 3RD 10 MIN 1ST HALF VS BUFFALO
	LOP41	8		LOSS OF POSSES. LAST 15 MIN 1ST HALF VS BUFFALO
	FOUL11	9		FOULS 1ST TEN MIN 1ST HALF VS BUFFALO
	FOUL21	10		FOULS 2ND TEN MIN 1ST HALf VS BUFFALO
	FOUL31	11		FOULS 3RD TEN MIN 1ST HALF VS BUFFALO
	FOUL41	12		FOULS LAST 15 MIN MIN 1ST HALF VS BUFFALO
	GOP11	13		GAIN OF POSSES. 1ST TEN MIN 1ST HALF VS BUFFALO
	GOP21	14		GAIN OF POSSES. 2ND TEN MIN 1ST HALF VS BUFFALO

GOP31	15	GAIN OF POSSES. 3RD TEN MIN 1ST HALF VS BUFFALO
GOP41	16	GAIN OF POSSES. LAST 15 MIN 1ST HALF VS BUFFALO
SHON11	17	SHOTS ON GOAL 1ST 10 MIN 1ST HALF VS BUFFALO
SHON21	18	SHOTS ON GOAL 2ND 10 MIN 1ST HALF VS BUFFALO
SHON31	19	SHOTS ON GOAL 3RD 10 MIN 1ST HALF VS BUFFALO
SHON41	20	SHOTS ON GOAL LAST 15 MIN 1ST HALF VS BUFFALO
SHOF11	21	SHOTS OFF GOAL 1ST 10 MIN 1ST HALF VS BUFFALO
SHOF21	22	SHOTS OFF GOAL 2ND 10 MIN 1ST HALF VS BUFFALO
SHOF31	23	SHOTS OFF GOAL 3RD 10 MIN 1ST HALF VS BUFFALO
SHOF41	24	SHOTS OFF GOAL LAST 15 MIN 1ST HALF VS BUFFALO
AHEAD11	25	ATTEMPTED HEADS 1ST 10 MIN 1ST HALF VS BUFFALO
AHEAD21	26	ATTEMPTED HEADS 2ND 10 MIN 1ST HALF VS BUFFALO
AHEAD31	27	ATTEMPTED HEADS 3RD 10 MIN 1ST HALF VS BUFFALO
AHEAD41	28	ATTEMPTED HEADS LAST 15 MIN 1ST HALF VS BUFFALO
SHEAD11	29	SUCCESS. HEADS 1ST 10 MIN 1ST HALF VS BUFFALO
SHEAD21	30	SUCCESS. HEADS 2ND 10 MIN 1ST HALF VS BUFFALO
SHEAD31	31	SUCCESS. HEADS 3RD 10 MIN 1ST HALF VS BUFFALO
SHEAD41	32	SUCCESS. HEADS LAST 15 MIN 1ST HALF VS BUFFALO
BLANK	33	
SP51	34	SUCCESS. PASSES 1ST 10 MIN 2ND HALF VS BUFFALO
SP61	35	SUCCESS. PASSES 2ND 10 MIN 2ND HALF VS BUFFALO
SP71	36	SUCCESS. PASSES 3RD 10 MIN 2ND HALF VS BUFFALO
SP81	37	SUCCESS. PASSES LAST 15 MIN 2ND HALF VS BUFFALO
LOP51	38	LOSS OF POSSES. 1ST 10 MIN 2ND HALF VS BUFFALO
LOP61	39	LOSS OF POSSES. 2ND 10 MIN 2ND HALF VS BUFFALO
LOP71	40	LOSS OF POSSES. 3RD 10 MIN 2ND HALF VS BUFFALO

LOP81	41	LOSS OF POSSES. LAST 15 MIN 2ND HALF VS BUFFALO
FOUL51	42	FOULS 1ST TEN MIN 2ND HALF VS BUFFALO
FOUL61	43	FOULS 2ND TEN MIN 2ND HALF VS BUFFALO
FOUL71	44	FOULS 3RD TEN MIN 2ND HALF VS BUFFALO
FOUL81	45	FOULS LAST 15 MIN MIN 2ND HALF VS BUFFALO
GOP51	46	GAIN OF POSSES. 1ST TEN MIN 2ND HALF VS BUFFALO
GOP61	47	GAIN OF POSSES. 2ND TEN MIN 2ND HALF VS BUFFALO
GOP71	48	GAIN OF POSSES. 3RD TEN MIN 2ND HALF VS BUFFALO
GOP81	49	GAIN OF POSSES. LAST 15 MIN 2ND HALF VS BUFFALO
SHON51	50	SHOTS ON GOAL 1ST 10 MIN 2ND HALF VS BUFFALO
SHON61	51	SHOTS ON GOAL 2ND 10 MIN 2ND HALF VS BUFFALO
SHON71	52	SHOTS ON GOAL 3RD 10 MIN 2ND HALF VS BUFFALO
SHON81	53	SHOTS ON GOAL LAST 15 MIN 2ND HALF VS BUFFALO
SHOF51	54	SHOTS OFF GOAL 1ST 10 MIN 2ND HALF VS BUFFALO
SHOF61	55	SHOTS OFF GOAL 2ND 10 MIN 2ND HALF VS BUFFALO
SHOF71	56	SHOTS OFF GOAL 3RD 10 MIN 2ND HALF VS BUFFALO
SHOF81	57	SHOTS OFF GOAL LAST 15 MIN 2ND HALF VS BUFFALO
AHEAD51	58	ATTEMPTED HEADS 1ST 10 MIN 2ND HALF VS BUFFALO
AHEAD61	59	ATTEMPTED HEADS 2ND 10 MIN 2ND HALF VS BUFFALO
AHEAD71	60	ATTEMPTED HEADS 3RD 10 MIN 2ND HALF VS BUFFALO
AHEAD81	61	ATTEMPTED HEADS LAST 15 MIN 2ND HALF VS BUFFALO
SHEAD51	62	SUCCESS. HEADS 1ST 10 MIN 2ND HALF VS BUFFALO
SHEAD61	63	SUCCESS. HEADS 2ND 10 MIN 2ND HALF VS BUFFALO
SHEAD71	64	SUCCESS. HEADS 3RD 10 MIN 2ND HALF VS BUFFALO
SHEAD81	65	SUCCESS. HEADS LAST 15 MIN

7	SP12	1	SUCCESS. PASSES 1ST 10 MIN 1ST HALF VS CHAPEL HILL
	SP22	2	SUCCESS. PASSES 2ND 10 MIN 1ST HALF VS CHAPEL HILL
	SP32	3	SUCCESS. PASSES 3RD 10 MIN 1ST HALF VS CHAPEL HILL
	SP42	4	SUCCESS. PASSES LAST 15 MIN 1ST HALF VS CHAPEL HILL
	LOP12	5	LOSS OF POSSES. 1ST 10 MIN 1ST HALF VS CHAPEL HILL
	LOP22	6	LOSS OF POSSES. 2ND 10 MIN 1ST HALF VS CHAPEL HILL
	LOP32	7	LOSS OF POSSES. 3RD 10 MIN 1ST HALF VS CHAPEL HILL
	LOP42	8	LOSS OF POSSES. LAST 15 MIN 1ST HALF VS CHAPEL HILL
	FOUL12	9	FOULS 1ST TEN MIN 1ST HALF VS CHAPEL HILL
	FOUL22	10	FOULS 2ND TEN MIN 1ST HALF VS CHAPEL HILL
	FOUL32	11	FOULS 3RD TEN MIN 1ST HALF VS CHAPEL HILL
	FOUL42	12	FOULS LAST 15 MIN MIN 1ST HALF VS CHAPEL HILL
	GOP12	13	GAIN OF POSSES. 1ST TEN MIN 1ST HALF VS CHAPEL HILL
	GOP22	14	GAIN OF POSSES. 2ND TEN MIN 1ST HALF VS CHAPEL HILL
	GOP32	15	GAIN OF POSSES. 3RD TEN MIN 1ST HALF VS CHAPEL HILL
	GOP42	16	GAIN OF POSSES. LAST 15 MIN 1ST HALF VS CHAPEL HILL
	SHON12	17	SHOTS ON GOAL 1ST 10 MIN 1ST HALF VS CHAPEL HILL
	SHON22	18	SHOTS ON GOAL 2ND 10 MIN 1ST HALF VS CHAPEL HILL
	SHON32	19	SHOTS ON GOAL 3RD 10 MIN 1ST HALF VS CHAPEL HILL
	SHON42	20	SHOTS ON GOAL LAST 15 MIN 1ST HALF VS CHAPEL HILL
	SHOF12	21	SHOTS OFF GOAL 1ST 10 MIN 1ST HALF VS CHAPEL HILL
	SHOF22	22	SHOTS OFF GOAL 2ND 10 MIN 1ST HALF VS CHAPEL HILL
	SHOF32	23	SHOTS OFF GOAL 3RD 10 MIN 1ST HALF VS CHAPEL HILL
	SHOF42	24	SHOTS OFF GOAL LAST 15 MIN 1ST HALF VS CHAPEL HILL
	AHEAD12	25	ATTEMPTED HEADS 1ST 10 MIN 1ST HALF VS CHAPEL HILL
	AHEAD22	26	ATTEMPTED HEADS 2ND 10 MIN

		1ST HALF VS CHAPEL HILL
AHEAD32	27	ATTEMPTED HEADS 3RD 10 MIN 1ST HALF VS CHAPEL HILL
AHEAD42	28	ATTEMPTED HEADS LAST 15 MIN 1ST HALF VS CHAPEL HILL
SHEAD12	29	SUCCESS. HEADS 1ST 10 MIN 1ST HALF VS CHAPEL HILL
SHEAD22	30	SUCCESS. HEADS 2ND 10 MIN 1ST HALF VS CHAPEL HILL
SHEAD32	31	SUCCESS. HEADS 3RD 10 MIN 1ST HALF VS CHAPEL HILL
SHEAD42	32	SUCCESS. HEADS LAST 15 MIN 1ST HALF VS CHAPEL HILL
BLANK	33	
SP52	34	SUCCESS. PASSES 1ST 10 MIN 2ND HALF VS CHAPEL HILL
SP62	35	SUCCESS. PASSES 2ND 10 MIN 2ND HALF VS CHAPEL HILL
SP72	36	SUCCESS. PASSES 3RD 10 MIN 2ND HALF VS CHAPEL HILL
SP82	37	SUCCESS. PASSES LAST 15 MIN 2ND HALF VS CHAPEL HILL
LOP52	38	LOSS OF POSSES. 1ST 10 MIN 2ND HALF VS CHAPEL HILL
LOP62	39	LOSS OF POSSES. 2ND 10 MIN 2ND HALF VS CHAPEL HILL
LOP72	40	LOSS OF POSSES. 3RD 10 MIN 2ND HALF VS CHAPEL HILL
LOP82	41	LOSS OF POSSES. LAST 15 MIN 2ND HALF VS CHAPEL HILL
FOUL52	42	FOULS 1ST TEN MIN 2ND HALF VS CHAPEL HILL
FOUL62	43	FOULS 2ND TEN MIN 2ND HALF VS CHAPEL HILL
FOUL72	44	FOULS 3RD TEN MIN 2ND HALF VS CHAPEL HILL
FOUL82	45	FOULS LAST 15 MIN MIN 2ND HALF VS CHAPEL HILL
GOP52	46	GAIN OF POSSES. 1ST TEN MIN 2ND HALF VS CHAPEL HILL
GOP62	47	GAIN OF POSSES. 2ND TEN MIN 2ND HALF VS CHAPEL HILL
GOP72	48	GAIN OF POSSES. 3RD TEN MIN 2ND HALF VS CHAPEL HILL
GOP82	49	GAIN OF POSSES. LAST 15 MIN 2ND HALF VS CHAPEL HILL
SHON52	50	SHOTS ON GOAL 1ST 10 MIN 2ND HALF VS CHAPEL HILL
SHON62	51	SHOTS ON GOAL 2ND 10 MIN 2ND HALF VS CHAPEL HILL
SHON72	52	SHOTS ON GOAL 3RD 10 MIN

			2ND HALF VS CHAPEL HILL
	SHON82	53	SHOTS ON GOAL LAST 15 MIN 2ND HALF VS CHAPEL HILL
	SHOF52	54	SHOTS OFF GOAL 1ST 10 MIN 2ND HALF VS CHAPEL HILL
	SHOF62	55	SHOTS OFF GOAL 2ND 10 MIN 2ND HALF VS CHAPEL HILL
	SHOF72	56	SHOTS OFF GOAL 3RD 10 MIN 2ND HALF VS CHAPEL HILL
	SHOF82	57	SHOTS OFF GOAL LAST 15 MIN 2ND HALF VS CHAPEL HILL
	AHEAD52	58	ATTEMPTED HEADS 1ST 10 MIN 2ND HALF VS CHAPEL HILL
	AHEAD62	59	ATTEMPTED HEADS 2ND 10 MIN 2ND HALF VS CHAPEL HILL
	AHEAD72	60	ATTEMPTED HEADS 3RD 10 MIN 2ND HALF VS CHAPEL HILL
	AHEAD82	61	ATTEMPTED HEADS LAST 15 MIN 2ND HALF VS CHAPEL HILL
	SHEAD52	62	SUCCESS. HEADS 1ST 10 MIN 2ND HALF VS CHAPEL HILL
	SHEAD62	63	SUCCESS. HEADS 2ND 10 MIN 2ND HALF VS CHAPEL HILL
	SHEAD72	64	SUCCESS. HEADS 3RD 10 MIN 2ND HALF VS CHAPEL HILL
	SHEAD82	65	SUCCESS. HEADS LAST 15 MIN
8	SP13	1	SUCCESS. PASSES 1ST 10 MIN 1ST HALF VS VIRGINIA
	SP23	2	SUCCESS. PASSES 2ND 10 MIN 1ST HALF VS VIRGINIA
	SP33	3	SUCCESS. PASSES 3RD 10 MIN 1ST HALF VS VIRGINIA
	SP43	4	SUCCESS. PASSES LAST 15 MIN 1ST HALF VS VIRGINIA
	LOP13	5	LOSS OF POSSES. 1ST 10 MIN 1ST HALF VS VIRGINIA
	LOP23	6	LOSS OF POSSES. 2ND 10 MIN 1ST HALF VS VIRGINIA
	LOP33	7	LOSS OF POSSES. 3RD 10 MIN 1ST HALF VS VIRGINIA
	LOP43	8	LOSS OF POSSES. LAST 15 MIN 1ST HALF VS VIRGINIA
	FOUL13	9	FOULS 1ST TEN MIN 1ST HALF VS VIRGINIA
	FOUL23	10	FOULS 2ND TEN MIN 1ST HALF VS VIRGINIA
	FOUL33	11	FOULS 3RD TEN MIN 1ST HALF VS VIRGINIA
	FOUL43	12	FOULS LAST 15 MIN MIN

		1ST HALF VS VIRGINIA
GOP13	13	GAIN OF POSSES. 1ST TEN MIN 1ST HALF VS VIRGINIA
GOP23	14	GAIN OF POSSES. 2ND TEN MIN 1ST HALF VS VIRGINIA
GOP33	15	GAIN OF POSSES. 3RD TEN MIN 1ST HALF VS VIRGINIA
GOP43	16	GAIN OF POSSES. LAST 15 MIN 1ST HALF VS VIRGINIA
SHON13	17	SHOTS ON GOAL 1ST 10 MIN 1ST HALF VS VIRGINIA
SHON23	18	SHOTS ON GOAL 2ND 10 MIN 1ST HALF VS VIRGINIA
SHON33	19	SHOTS ON GOAL 3RD 10 MIN 1ST HALF VS VIRGINIA
SHON43	20	SHOTS ON GOAL LAST 15 MIN 1ST HALF VS VIRGINIA
SHOF13	21	SHOTS OFF GOAL 1ST 10 MIN 1ST HALF VS VIRGINIA
SHOF23	22	SHOTS OFF GOAL 2ND 10 MIN 1ST HALF VS VIRGINIA
		1ST HALF VS VIRGINIA
SHOF43	24	SHOTS OFF GOAL LAST 15 MIN 1ST HALF VS VIRGINIA
AHEAD13	25	ATTEMPTED HEADS 1ST 10 MIN 1ST HALF VS VIRGINIA
AHEAD23	26	ATTEMPTED HEADS 2ND 10 MIN 1ST HALF VS VIRGINIA
AHEAD33	27	ATTEMPTED HEADS 3RD 10 MIN 1ST HALF VS VIRGINIA
AHEAD43	28	ATTEMPTED HEADS LAST 15 MIN 1ST HALF VS VIRGINIA
SHEAD13	29	SUCCESS. HEADS 1ST 10 MIN 1ST HALF VS VIRGINIA
SHEAD23	30	SUCCESS. HEADS 2ND 10 MIN 1ST HALF VS VIRGINIA
SHEAD33	31	SUCCESS. HEADS 3RD 10 MIN 1ST HALF VS VIRGINIA
SHEAD43	32	SUCCESS. HEADS LAST 15 MIN 1ST HALF VS VIRGINIA
BLANK	33	
SP53	34	SUCCESS. PASSES 1ST 10 MIN 2ND HALF VS VIRGINIA
SP63	35	SUCCESS. PASSES 2ND 10 MIN 2ND HALF VS VIRGINIA
SP73	36	SUCCESS. PASSES 3RD 10 MIN 2ND HALF VS VIRGINIA
SP83	37	SUCCESS. PASSES LAST 15 MIN 2ND HALF VS VIRGINIA
LOP53	38	LOSS OF POSSES. 1ST 10 MIN 2ND HALF VS VIRGINIA

LOP63	39	LOSS OF POSSES. 2ND 10 MIN 2ND HALF VS VIRGINIA
LOP73	40	LOSS OF POSSES. 3RD 10 MIN 2ND HALF VS VIRGINIA
LOP83	41	LOSS OF POSSES. LAST 15 MIN 2ND HALF VS VIRGINIA
FOUL53	42	FOULS 1ST TEN MIN 2ND HALF VS VIRGINIA
FOUL63	43	FOULS 2ND TEN MIN 2ND HALF VS VIRGINIA
FOUL73	44	FOULS 3RD TEN MIN 2ND HALF VS VIRGINIA
FOUL83	45	FOULS LAST 15 MIN MIN 2ND HALF VS VIRGINIA
GOP53	46	GAIN OF POSSES. 1ST TEN MIN 2ND HALF VS VIRGINIA
GOP63	47	GAIN OF POSSES. 2ND TEN MIN 2ND HALF VS VIRGINIA
GOP73	48	GAIN OF POSSES. 3RD TEN MIN 2ND HALF VS VIRGINIA
GOP83	49	GAIN OF POSSES. LAST 15 MIN 2ND HALF VS VIRGINIA
SHON53	50	SHOTS ON GOAL 1ST 10 MIN 2ND HALF VS VIRGINIA
SHON63	51	SHOTS ON GOAL 2ND 10 MIN 2ND HALF VS VIRGINIA
SHON73	52	SHOTS ON GOAL 3RD 10 MIN 2ND HALF VS VIRGINIA
SHON83	53	SHOTS ON GOAL LAST 15 MIN 2ND HALF VS VIRGINIA
SHOF53	54	SHOTS OFF GOAL 1ST 10 MIN 2ND HALF VS VIRGINIA
SHOF63	55	SHOTS OFF GOAL 2ND 10 MIN 2ND HALF VS VIRGINIA
SHOF73	56	SHOTS OFF GOAL 3RD 10 MIN 2ND HALF VS VIRGINIA
SHOF83	57	SHOTS OFF GOAL LAST 15 MIN 2ND HALF VS VIRGINIA
AHEAD53	58	ATTEMPTED HEADS 1ST 10 MIN 2ND HALF VS VIRGINIA
AHEAD63	59	ATTEMPTED HEADS 2ND 10 MIN 2ND HALF VS VIRGINIA
AHEAD73	60	ATTEMPTED HEADS 3RD 10 MIN 2ND HALF VS VIRGINIA
AHEAD83	61	ATTEMPTED HEADS LAST 15 MIN 2ND HALF VS VIRGINIA
SHEAD53	62	SUCCESS. HEADS 1ST 10 MIN 2ND HALF VS VIRGINIA
SHEAD63	63	SUCCESS. HEADS 2ND 10 MIN 2ND HALF VS VIRGINIA
SHEAD73	64	SUCCESS. HEADS 3RD 10 MIN

			2ND HALF VS VIRGINIA
	SHEAD83	65	SUCCESS. HEADS LAST 15 MIN
9	SP14	1	SUCCESS. PASSES 1ST 10 MIN 1ST HALF VS DAVIDSON
	SP24	2	SUCCESS. PASSES 2ND 10 MIN 1ST HALF VS DAVIDSON
	SP34	3	SUCCESS. PASSES 3RD 10 MIN 1ST HALF VS DAVIDSON
	SP44	4	SUCCESS. PASSES LAST 15 MIN 1ST HALF VS DAVIDSON
	LOP14	5	LOSS OF POSSES. 1ST 10 MIN 1ST HALF VS DAVIDSON
	LOP24	6	LOSS OF POSSES. 2ND 10 MIN 1ST HALF VS DAVIDSON
	LOP34	7	LOSS OF POSSES. 3RD 10 MIN 1ST HALF VS DAVIDSON
	LOP44	8	LOSS OF POSSES. LAST 15 MIN 1ST HALF VS DAVIDSON
	FOUL14	9	FOULS 1ST TEN MIN 1ST HALF VS DAVIDSON
	FOUL24	10	FOULS 2ND TEN MIN 1ST HALF VS DAVIDSON
	FOUL34	11	FOULS 3RD TEN MIN 1ST HALF VS DAVIDSON
	FOUL44	12	FOULS LAST 15 MIN MIN 1ST HALF VS DAVIDSON
	GOP14	13	GAIN OF POSSES. 1ST TEN MIN 1ST HALF VS DAVIDSON
	GOP24	14	GAIN OF POSSES. 2ND TEN MIN 1ST HALF VS DAVIDSON
	GOP34	15	GAIN OF POSSES. 3RD TEN MIN 1ST HALF VS DAVIDSON
	GOP44	16	GAIN OF POSSES. LAST 15 MIN 1ST HALF VS DAVIDSON
	SHON14	17	SHOTS ON GOAL 1ST 10 MIN 1ST HALF VS DAVIDSON
	SHON24	18	SHOTS ON GOAL 2ND 10 MIN 1ST HALF VS DAVIDSON
	SHON34	19	SHOTS ON GOAL 3RD 10 MIN 1ST HALF VS DAVIDSON
	SHON44	20	SHOTS ON GOAL LAST 15 MIN 1ST HALF VS DAVIDSON
	SHOF14	21	SHOTS OFF GOAL 1ST 10 MIN 1ST HALF VS DAVIDSON
	SHOF24	22	SHOTS OFF GOAL 2ND 10 MIN 1ST HALF VS DAVIDSON
	SHOF34	23	SHOTS OFF GOAL 3RD 10 MIN 1ST HALF VS DAVIDSON
	SHOF44	24	SHOTS OFF GOAL LAST 15 MIN

		1ST HALF VS DAVIDSON
AHEAD14	25	ATTEMPTED HEADS 1ST 10 MIN 1ST HALF VS DAVIDSON
AHEAD24	26	ATTEMPTED HEADS 2ND 10 MIN 1ST HALF VS DAVIDSON
AHEAD34	27	ATTEMPTED HEADS 3RD 10 MIN 1ST HALF VS DAVIDSON
AHEAD44	28	ATTEMPTED HEADS LAST 15 MIN 1ST HALF VS DAVIDSON
SHEAD14	29	SUCCESS. HEADS 1ST 10 MIN 1ST HALF VS DAVIDSON
SHEAD24	30	SUCCESS. HEADS 2ND 10 MIN 1ST HALF VS DAVIDSON
SHEAD34	31	SUCCESS. HEADS 3RD 10 MIN 1ST HALF VS DAVIDSON
SHEAD44	32	SUCCESS. HEADS LAST 15 MIN 1ST HALF VS DAVIDSON
BLANK	33	
SP54	34	SUCCESS. PASSES 1ST 10 MIN 2ND HALF VS DAVIDSON
SP64	35	SUCCESS. PASSES 2ND 10 MIN 2ND HALF VS DAVIDSON
SP74	36	SUCCESS. PASSES 3RD 10 MIN 2ND HALF VS DAVIDSON
SP84	37	SUCCESS. PASSES LAST 15 MIN 2ND HALF VS DAVIDSON
LOP54	38	LOSS OF POSSES. 1ST 10 MIN 2ND HALF VS DAVIDSON
LOP64	39	LOSS OF POSSES. 2ND 10 MIN 2ND HALF VS DAVIDSON
LOP74	40	LOSS OF POSSES. 3RD 10 MIN 2ND HALF VS DAVIDSON
LOP84	41	LOSS OF POSSES. LAST 15 MIN 2ND HALF VS DAVIDSON
FOUL54	42	FOULS 1ST TEN MIN 2ND HALF VS DAVIDSON
FOUL64	43	FOULS 2ND TEN MIN 2ND HALF VS DAVIDSON
FOUL74	44	FOULS 3RD TEN MIN 2ND HALF VS DAVIDSON
FOUL84	45	FOULS LAST 15 MIN MIN 2ND HALF VS DAVIDSON
GOP54	46	GAIN OF POSSES. 1ST TEN MIN 2ND HALF VS DAVIDSON
GOP64	47	GAIN OF POSSES. 2ND TEN MIN 2ND HALF VS DAVIDSON
GOP74	48	GAIN OF POSSES. 3RD TEN MIN 2ND HALF VS DAVIDSON
GOP84	49	GAIN OF POSSES. LAST 15 MIN 2ND HALF VS DAVIDSON
SHON54	50	SHOTS ON GOAL 1ST 10 MIN

			2ND HALF VS DAVIDSON
	SHON64	51	SHOTS ON GOAL 2ND 10 MIN 2ND HALF VS DAVIDSON
	SHON74	52	SHOTS ON GOAL 3RD 10 MIN 2ND HALF VS DAVIDSON
	SHON84	53	SHOTS ON GOAL LAST 15 MIN 2ND HALF VS DAVIDSON
	SHOF54	54	SHOTS OFF GOAL 1ST 10 MIN 2ND HALF VS DAVIDSON
	SHOF64	55	SHOTS OFF GOAL 2ND 10 MIN 2ND HALF VS DAVIDSON
	SHOF74	56	SHOTS OFF GOAL 3RD 10 MIN 2ND HALF VS DAVIDSON
	SHOF84	57	SHOTS OFF GOAL LAST 15 MIN 2ND HALF VS DAVIDSON
	AHEAD54	58	ATTEMPTED HEADS 1ST 10 MIN 2ND HALF VS DAVIDSON
	AHEAD64	59	ATTEMPTED HEADS 2ND 10 MIN 2ND HALF VS DAVIDSON
	AHEAD74	60	ATTEMPTED HEADS 3RD 10 MIN 2ND HALF VS DAVIDSON
	AHEAD84	61	ATTEMPTED HEADS LAST 15 MIN 2ND HALF VS DAVIDSON
	SHEAD54	62	SUCCESS. HEADS 1ST 10 MIN 2ND HALF VS DAVIDSON
	SHEAD64	63	SUCCESS. HEADS 2ND 10 MIN 2ND HALF VS DAVIDSON
	SHEAD74	64	SUCCESS. HEADS 3RD 10 MIN 2ND HALF VS DAVIDSON
	SHEAD84	65	SUCCESS. HEADS LAST 15 MIN 2ND HALF VS DAVIDSON
10	SP15	1	SUCCESS. PASSES 1ST 10 MIN 1ST HALF VS UMSL
	SP25	2	SUCCESS. PASSES 2ND 10 MIN 1ST HALF VS UMSL
	SP35	3	SUCCESS. PASSES 3RD 10 MIN 1ST HALF VS UMSL
	SP45	4	SUCCESS. PASSES LAST 15 MIN 1ST HALF VS UMSL
	LOP15	5	LOSS OF POSSES. 1ST 10 MIN 1ST HALF VS UMSL
	LOP25	6	LOSS OF POSSES. 2ND 10 MIN 1ST HALF VS UMSL
	LOP35	7	LOSS OF POSSES. 3RD 10 MIN 1ST HALF VS UMSL
	LOP45	8	LOSS OF POSSES. LAST 15 MIN 1ST HALF VS UMSL
	FOUL15	9	FOULS 1ST TEN MIN 1ST HALF VS UMSL

FOUL25	10	FOULS 2ND TEN MIN 1ST HALF VS UMSL
FOUL35	11	FOULS 3RD TEN MIN 1ST HALF VS UMSL
FOUL45	12	FOULS LAST 15 MIN MIN 1ST HALF VS UMSL
GOP15	13	GAIN OF POSSES. 1ST TEN MIN 1ST HALF VS UMSL
GOP25	14	GAIN OF POSSES. 2ND TEN MIN 1ST HALF VS UMSL
GOP35	15	GAIN OF POSSES. 3RD TEN MIN 1ST HALF VS UMSL
GOP45	16	GAIN OF POSSES. LAST 15 MIN 1ST HALF VS UMSL
SHON15	17	SHOTS ON GOAL 1ST 10 MIN 1ST HALF VS UMSL
SHON25	18	SHOTS ON GOAL 2ND 10 MIN 1ST HALF VS UMSL
SHON35	19	SHOTS ON GOAL 3RD 10 MIN 1ST HALF VS UMSL
SHON45	20	SHOTS ON GOAL LAST 15 MIN 1ST HALF VS UMSL
SHOF15	21	SHOTS OFF GOAL 1ST 10 MIN 1ST HALF VS UMSL
SHOF25	22	SHOTS OFF GOAL 2ND 10 MIN 1ST HALF VS UMSL
SHOF35	23	SHOTS OFF GOAL 3RD 10 MIN 1ST HALF VS UMSL
SHOF45	24	SHOTS OFF GOAL LAST 15 MIN 1ST HALF VS UMSL
AHEAD15	25	ATTEMPTED HEADS 1ST 10 MIN 1ST HALF VS UMSL
AHEAD25	26	ATTEMPTED HEADS 2ND 10 MIN 1ST HALF VS UMSL
AHEAD35	27	ATTEMPTED HEADS 3RD 10 MIN 1ST HALF VS UMSL
AHEAD45	28	ATTEMPTED HEADS LAST 15 MIN 1ST HALF VS UMSL
SHEAD15	29	SUCCESS. HEADS 1ST 10 MIN 1ST HALF VS UMSL
SHEAD25	30	SUCCESS. HEADS 2ND 10 MIN 1ST HALF VS UMSL
SHEAD35	31	SUCCESS. HEADS 3RD 10 MIN 1ST HALF VS UMSL
SHEAD45	32	SUCCESS. HEADS LAST 15 MIN 1ST HALF VS UMSL
BLANK	33	
SP55	34	SUCCESS. PASSES 1ST 10 MIN 2ND HALF VS UMSL
SP65	35	SUCCESS. PASSES 2ND 10 MIN 2ND HALF VS UMSL

SP75	36	SUCCESS. PASSES 3RD 10 MIN 2ND HALF VS UMSL
SP85	37	SUCCESS. PASSES LAST 15 MIN 2ND HALF VS UMSL
LOP55	38	LOSS OF POSSES. 1ST 10 MIN 2ND HALF VS UMSL
LOP65	39	LOSS OF POSSES. 2ND 10 MIN 2ND HALF VS UMSL
LOP75	40	LOSS OF POSSES. 3RD 10 MIN 2ND HALF VS UMSL
LOP85	41	LOSS OF POSSES. LAST 15 MIN 2ND HALF VS UMSL
FOUL55	42	FOULS 1ST TEN MIN 2ND HALF VS UMSL
FOUL65	43	FOULS 2ND TEN MIN 2ND HALF VS UMSL
FOUL75	44	FOULS 3RD TEN MIN 2ND HALF VS UMSL
FOUL85	45	FOULS LAST 15 MIN MIN 2ND HALF VS UMSL
GOP55	46	GAIN OF POSSES. 1ST TEN MIN 2ND HALF VS UMSL
GOP65	47	GAIN OF POSSES. 2ND TEN MIN 2ND HALF VS UMSL
GOP75	48	GAIN OF POSSES. 3RD TEN MIN 2ND HALF VS UMSL
GOP85	49	GAIN OF POSSES. LAST 15 MIN 2ND HALF VS UMSL
SHON55	50	SHOTS ON GOAL 1ST 10 MIN 2ND HALF VS UMSL
SHON65	51	SHOTS ON GOAL 2ND 10 MIN 2ND HALF VS UMSL
SHON75	52	SHOTS ON GOAL 3RD 10 MIN 2ND HALF VS UMSL
SHON85	53	SHOTS ON GOAL LAST 15 MIN 2ND HALF VS UMSL
SHOF55	54	SHOTS OFF GOAL 1ST 10 MIN 2ND HALF VS UMSL
SHOF65	55	SHOTS OFF GOAL 2ND 10 MIN 2ND HALF VS UMSL
SHOF75	56	SHOTS OFF GOAL 3RD 10 MIN 2ND HALF VS UMSL
SHOF85	57	SHOTS OFF GOAL LAST 15 MIN 2ND HALF VS UMSL
AHEAD55	58	ATTEMPTED HEADS 1ST 10 MIN 2ND HALF VS UMSL
AHEAD65	59	ATTEMPTED HEADS 2ND 10 MIN 2ND HALF VS UMSL
AHEAD75	60	ATTEMPTED HEADS 3RD 10 MIN 2ND HALF VS UMSL
AHEAD85	61	ATTEMPTED HEADS LAST 15 MIN

			2ND HALF VS UMSL
	SHEAD55	62	SUCCESS. HEADS 1ST 10 MIN 2ND HALF VS UMSL
	SHEAD65	63	SUCCESS. HEADS 2ND 10 MIN 2ND HALF VS UMSL
	SHEAD75	64	SUCCESS. HEADS 3RD 10 MIN 2ND HALF VS UMSL
	SHEAD85	65	SUCCESS. HEADS LAST 15 MIN 2ND HALF VS UMSL
11	SP16	1	SUCCESS. PASSES 1ST 10 MIN 1ST HALF VS BARRY
	SP26	2	SUCCESS. PASSES 2ND 10 MIN 1ST HALF VS BARRY
	SP36	3	SUCCESS. PASSES 3RD 10 MIN 1ST HALF VS BARRY
	SP46	4	SUCCESS. PASSES LAST 15 MIN 1ST HALF VS BARRY
	LOP16	5	LOSS OF POSSES. 1ST 10 MIN 1ST HALF VS BARRY
	LOP26	6	LOSS OF POSSES. 2ND 10 MIN 1ST HALF VS BARRY
	LOP36	7	LOSS OF POSSES. 3RD 10 MIN 1ST HALF VS BARRY
	LOP46	8	LOSS OF POSSES. LAST 15 MIN 1ST HALF VS BARRY
	FOUL16	9	FOULS 1ST TEN MIN 1ST HALF VS BARRY
	FOUL26	10	FOULS 2ND TEN MIN 1ST HALF VS BARRY
	FOUL36	11	FOULS 3RD TEN MIN 1ST HALF VS BARRY
	FOUL46	12	FOULS LAST 15 MIN MIN 1ST HALF VS BARRY
	GOP16	13	GAIN OF POSSES. 1ST TEN MIN 1ST HALF VS BARRY
	GOP26	14	GAIN OF POSSES. 2ND TEN MIN 1ST HALF VS BARRY
	GOP36	15	GAIN OF POSSES. 3RD TEN MIN 1ST HALF VS BARRY
	GOP46	16	GAIN OF POSSES. LAST 15 MIN 1ST HALF VS BARRY
	SHON16	17	SHOTS ON GOAL 1ST 10 MIN 1ST HALF VS BARRY
	SHON26	18	SHOTS ON GOAL 2ND 10 MIN 1ST HALF VS BARRY
	SHON36	19	SHOTS ON GOAL 3RD 10 MIN 1ST HALF VS BARRY
	SHON46	20	SHOTS ON GOAL LAST 15 MIN 1ST HALF VS BARRY

SHOF16	21	SHOTS OFF GOAL 1ST 10 MIN 1ST HALF VS BARRY
SHOF26	22	SHOTS OFF GOAL 2ND 10 MIN 1ST HALF VS BARRY
SHOF36	23	SHOTS OFF GOAL 3RD 10 MIN 1ST HALF VS BARRY
SHOF46	24	SHOTS OFF GOAL LAST 15 MIN 1ST HALF VS BARRY
AHEAD16	25	ATTEMPTED HEADS 1ST 10 MIN 1ST HALF VS BARRY
AHEAD26	26	ATTEMPTED HEADS 2ND 10 MIN 1ST HALF VS BARRY
AHEAD36	27	ATTEMPTED HEADS 3RD 10 MIN 1ST HALF VS BARRY
AHEAD46	28	ATTEMPTED HEADS LAST 15 MIN 1ST HALF VS BARRY
SHEAD16	29	SUCCESS. HEADS 1ST 10 MIN 1ST HALF VS BARRY
SHEAD26	30	SUCCESS. HEADS 2ND 10 MIN 1ST HALF VS BARRY
SHEAD36	31	SUCCESS. HEADS 3RD 10 MIN 1ST HALF VS BARRY
SHEAD46	32	SUCCESS. HEADS LAST 15 MIN 1ST HALF VS BARRY
BLANK	33	
SP56	34	SUCCESS. PASSES 1ST 10 MIN 2ND HALF VS BARRY
SP66	35	SUCCESS. PASSES 2ND 10 MIN 2ND HALF VS BARRY
SP76	36	SUCCESS. PASSES 3RD 10 MIN 2ND HALF VS BARRY
SP86	37	SUCCESS. PASSES LAST 15 MIN 2ND HALF VS BARRY
LOP56	38	LOSS OF POSSES. 1ST 10 MIN 2ND HALF VS BARRY
LOP66	39	LOSS OF POSSES. 2ND 10 MIN 2ND HALF VS BARRY
LOP76	40	LOSS OF POSSES. 3RD 10 MIN 2ND HALF VS BARRY
LOP86	41	LOSS OF POSSES. LAST 15 MIN 2ND HALF VS BARRY
FOUL56	42	FOULS 1ST TEN MIN 2ND HALF VS BARRY
FOUL66	43	FOULS 2ND TEN MIN 2ND HALF VS BARRY
FOUL76	44	FOULS 3RD TEN MIN 2ND HALF VS BARRY
FOUL86	45	FOULS LAST 15 MIN MIN 2ND HALF VS BARRY
GOP56	46	GAIN OF POSSES. 1ST TEN MIN 2ND HALF VS BARRY

	GOP66	47	GAIN OF POSSES. 2ND TEN MIN 2ND HALF VS BARRY
	GOP76	48	GAIN OF POSSES. 3RD TEN MIN 2ND HALF VS BARRY
	GOP86	49	GAIN OF POSSES. LAST 15 MIN 2ND HALF VS BARRY
	SHON56	50	SHOTS ON GOAL 1ST 10 MIN 2ND HALF VS BARRY
	SHON66	51	SHOTS ON GOAL 2ND 10 MIN 2ND HALF VS BARRY
	SHON76	52	SHOTS ON GOAL 3RD 10 MIN 2ND HALF VS BARRY
	SHON86	53	SHOTS ON GOAL LAST 15 MIN 2ND HALF VS BARRY
	SHOF56	54	SHOTS OFF GOAL 1ST 10 MIN 2ND HALF VS BARRY
	SHOF66	55	SHOTS OFF GOAL 2ND 10 MIN 2ND HALF VS BARRY
	SHOF76	56	SHOTS OFF GOAL 3RD 10 MIN 2ND HALF VS BARRY
	SHOF86	57	SHOTS OFF GOAL LAST 15 MIN 2ND HALF VS BARRY
	AHEAD56	58	ATTEMPTED HEADS 1ST 10 MIN 2ND HALF VS BARRY
	AHEAD66	59	ATTEMPTED HEADS 2ND 10 MIN 2ND HALF VS BARRY
	AHEAD76	60	ATTEMPTED HEADS 3RD 10 MIN 2ND HALF VS BARRY
	AHEAD86	61	ATTEMPTED HEADS LAST 15 MIN 2ND HALF VS BARRY
	SHEAD56	62	SUCCESS. HEADS 1ST 10 MIN 2ND HALF VS BARRY
	SHEAD66	63	SUCCESS. HEADS 2ND 10 MIN 2ND HALF VS BARRY
	SHEAD76	64	SUCCESS. HEADS 3RD 10 MIN 2ND HALF VS BARRY
	SHEAD86	65	SUCCESS. HEADS LAST 15 MIN 2ND HALF VS BARRY
12	SP17	1	SUCCESS. PASSES 1ST 10 MIN 1ST HALF VS CHARLESTON
	SP27	2	SUCCESS. PASSES 2ND 10 MIN 1ST HALF VS CHARLESTON
	SP37	3	SUCCESS. PASSES 3RD 10 MIN 1ST HALF VS CHARLESTON
	SP47	4	SUCCESS. PASSES LAST 15 MIN 1ST HALF VS CHARLESTON
	LOP17	5	LOSS OF POSSES. 1ST 10 MIN 1ST HALF VS CHARLESTON
	LOP27	6	LOSS OF POSSES. 2ND 10 MIN

		1ST HALF VS CHARLESTON
LOP37	7	LOSS OF POSSES. 3RD 10 MIN 1ST HALF VS CHARLESTON
LOP47	8	LOSS OF POSSES. LAST 15 MIN 1ST HALF VS CHARLESTON
FOUL17	9	FOULS 1ST TEN MIN 1ST HALF VS CHARLESTON
FOUL27	10	FOULS 2ND TEN MIN 1ST HALF VS CHARLESTON
FOUL37	11	FOULS 3RD TEN MIN 1ST HALF VS CHARLESTON
FOUL47	12	FOULS LAST 15 MIN MIN 1ST HALF VS CHARLESTON
GOP17	13	GAIN OF POSSES. 1ST TEN MIN 1ST HALF VS CHARLESTON
GOP27	14	GAIN OF POSSES. 2ND TEN MIN 1ST HALF VS CHARLESTON
GOP37	15	GAIN OF POSSES. 3RD TEN MIN 1ST HALF VS CHARLESTON
GOP47	16	GAIN OF POSSES. LAST 15 MIN 1ST HALF VS CHARLESTON
SHON17	17	SHOTS ON GOAL 1ST 10 MIN 1ST HALF VS CHARLESTON
SHON27	18	SHOTS ON GOAL 2ND 10 MIN 1ST HALF VS CHARLESTON
SHON37	19	SHOTS ON GOAL 3RD 10 MIN 1ST HALF VS CHARLESTON
SHON47	20	SHOTS ON GOAL LAST 15 MIN 1ST HALF VS CHARLESTON
SHOF17	21	SHOTS OFF GOAL 1ST 10 MIN 1ST HALF VS CHARLESTON
SHOF27	22	SHOTS OFF GOAL 2ND 10 MIN 1ST HALF VS CHARLESTON
SHOF37	23	SHOTS OFF GOAL 3RD 10 MIN 1ST HALF VS CHARLESTON
SHOF47	24	SHOTS OFF GOAL LAST 15 MIN 1ST HALF VS CHARLESTON
AHEAD17	25	ATTEMPTED HEADS 1ST 10 MIN 1ST HALF VS CHARLESTON
AHEAD27	26	ATTEMPTED HEADS 2ND 10 MIN 1ST HALF VS CHARLESTON
AHEAD37	27	ATTEMPTED HEADS 3RD 10 MIN 1ST HALF VS CHARLESTON
AHEAD47	28	ATTEMPTED HEADS LAST 15 MIN 1ST HALF VS CHARLESTON
SHEAD17	29	SUCCESS. HEADS 1ST 10 MIN 1ST HALF VS CHARLESTON
SHEAD27	30	SUCCESS. HEADS 2ND 10 MIN 1ST HALF VS CHARLESTON
SHEAD37	31	SUCCESS. HEADS 3RD 10 MIN 1ST HALF VS CHARLESTON

SHEAD47	32	SUCCESS. HEADS LAST 15 MIN 1ST HALF VS CHARLESTON
BLANK	33	
SP57	34	SUCCESS. PASSES 1ST 10 MIN 2ND HALF VS CHARLESTON
SP67	35	SUCCESS. PASSES 2ND 10 MIN 2ND HALF VS CHARLESTON
SP77	36	SUCCESS. PASSES 3RD 10 MIN 2ND HALF VS CHARLESTON
SP87	37	SUCCESS. PASSES LAST 15 MIN 2ND HALF VS CHARLESTON
LOP57	38	LOSS OF POSSES. 1ST 10 MIN 2ND HALF VS CHARLESTON
LOP67	39	LOSS OF POSSES. 2ND 10 MIN 2ND HALF VS CHARLESTON
LOP77	40	LOSS OF POSSES. 3RD 10 MIN 2ND HALF VS CHARLESTON
LOP87	41	LOSS OF POSSES. LAST 15 MIN 2ND HALF VS CHARLESTON
FOUL57	42	FOULS 1ST TEN MIN 2ND HALF VS CHARLESTON
FOUL67	43	FOULS 2ND TEN MIN 2ND HALF VS CHARLESTON
FOUL77	44	FOULS 3RD TEN MIN 2ND HALF VS CHARLESTON
FOUL87	45	FOULS LAST 15 MIN MIN 2ND HALF VS CHARLESTON
GOP57	46	GAIN OF POSSES. 1ST TEN MIN 2ND HALF VS CHARLESTON
GOP67	47	GAIN OF POSSES. 2ND TEN MIN 2ND HALF VS CHARLESTON
GOP77	48	GAIN OF POSSES. 3RD TEN MIN 2ND HALF VS CHARLESTON
GOP87	49	GAIN OF POSSES. LAST 15 MIN 2ND HALF VS CHARLESTON
SHON57	50	SHOTS ON GOAL 1ST 10 MIN 2ND HALF VS CHARLESTON
SHON67	51	SHOTS ON GOAL 2ND 10 MIN 2ND HALF VS CHARLESTON
SHON77	52	SHOTS ON GOAL 3RD 10 MIN 2ND HALF VS CHARLESTON
SHON87	53	SHOTS ON GOAL LAST 15 MIN 2ND HALF VS CHARLESTON
SHOF57	54	SHOTS OFF GOAL 1ST 10 MIN 2ND HALF VS CHARLESTON
SHOF67	55	SHOTS OFF GOAL 2ND 10 MIN 2ND HALF VS CHARLESTON
SHOF77	56	SHOTS OFF GOAL 3RD 10 MIN 2ND HALF VS CHARLESTON
SHOF87	57	SHOTS OFF GOAL LAST 15 MIN 2ND HALF VS CHARLESTON

	AHEAD57	58	ATTEMPTED HEADS 1ST 10 MIN 2ND HALF VS CHARLESTON
	AHEAD67	59	ATTEMPTED HEADS 2ND 10 MIN 2ND HALF VS CHARLESTON
	AHEAD77	60	ATTEMPTED HEADS 3RD 10 MIN 2ND HALF VS CHARLESTON
	AHEAD87	61	ATTEMPTED HEADS LAST 15 MIN 2ND HALF VS CHARLESTON
	SHEAD57	62	SUCCESS. HEADS 1ST 10 MIN 2ND HALF VS CHARLESTON
	SHEAD67	63	SUCCESS. HEADS 2ND 10 MIN 2ND HALF VS CHARLESTON
	SHEAD77	64	SUCCESS. HEADS 3RD 10 MIN 2ND HALF VS CHARLESTON
	SHEAD87	65	SUCCESS. HEADS LAST 15 MIN 2ND HALF VS CHARLESTON
13	SP18	1	SUCCESS. PASSES 1ST 10 MIN 1ST HALF VS NC STATE
	SP28	2	SUCCESS. PASSES 2ND 10 MIN 1ST HALF VS NC STATE
	SP38	3	SUCCESS. PASSES 3RD 10 MIN 1ST HALF VS NC STATE
	SP48	4	SUCCESS. PASSES LAST 15 MIN 1ST HALF VS NC STATE
	LOP18	5	LOSS OF POSSES. 1ST 10 MIN 1ST HALF VS NC STATE
	LOP28	6	LOSS OF POSSES. 2ND 10 MIN 1ST HALF VS NC STATE
	LOP38	7	LOSS OF POSSES. 3RD 10 MIN 1ST HALF VS NC STATE
	LOP48	8	LOSS OF POSSES. LAST 15 MIN 1ST HALF VS NC STATE
	FOUL18	9	FOULS 1ST TEN MIN 1ST HALF VS NC STATE
	FOUL28	10	FOULS 2ND TEN MIN 1ST HALF VS NC STATE
	FOUL38	11	FOULS 3RD TEN MIN 1ST HALF VS NC STATE
	FOUL48	12	FOULS LAST 15 MIN MIN 1ST HALF VS NC STATE
	GOP18	13	GAIN OF POSSES. 1ST TEN MIN 1ST HALF VS NC STATE
	GOP28	14	GAIN OF POSSES. 2ND TEN MIN 1ST HALF VS NC STATE
	GOP38	15	GAIN OF POSSES. 3RD TEN MIN 1ST HALF VS NC STATE
	GOP48	16	GAIN OF POSSES. LAST 15 MIN 1ST HALF VS NC STATE
	SHON18	17	SHOTS ON GOAL 1ST 10 MIN

		1ST HALF VS NC STATE
SHON28	18	SHOTS ON GOAL 2ND 10 MIN 1ST HALF VS NC STATE
SHON38	19	SHOTS ON GOAL 3RD 10 MIN 1ST HALF VS NC STATE
SHON48	20	SHOTS ON GOAL LAST 15 MIN 1ST HALF VS NC STATE
SHOF18	21	SHOTS OFF GOAL 1ST 10 MIN 1ST HALF VS NC STATE
SHOF28	22	SHOTS OFF GOAL 2ND 10 MIN 1ST HALF VS NC STATE
SHOF38	23	SHOTS OFF GOAL 3RD 10 MIN 1ST HALF VS NC STATE
SHOF48	24	SHOTS OFF GOAL LAST 15 MIN 1ST HALF VS NC STATE
AHEAD18	25	ATTEMPTED HEADS 1ST 10 MIN 1ST HALF VS NC STATE
AHEAD28	26	ATTEMPTED HEADS 2ND 10 MIN 1ST HALF VS NC STATE
AHEAD38	27	ATTEMPTED HEADS 3RD 10 MIN 1ST HALF VS NC STATE
AHEAD48	28	ATTEMPTED HEADS LAST 15 MIN 1ST HALF VS NC STATE
SHEAD18	29	SUCCESS. HEADS 1ST 10 MIN 1ST HALF VS NC STATE
SHEAD28	30	SUCCESS. HEADS 2ND 10 MIN 1ST HALF VS NC STATE
SHEAD38	31	SUCCESS. HEADS 3RD 10 MIN 1ST HALF VS NC STATE
SHEAD48	32	SUCCESS. HEADS LAST 15 MIN 1ST HALF VS NC STATE
BLANK	33	
SP58	34	SUCCESS. PASSES 1ST 10 MIN 2ND HALF VS NC STATE
SP68	35	SUCCESS. PASSES 2ND 10 MIN 2ND HALF VS NC STATE
SP78	36	SUCCESS. PASSES 3RD 10 MIN 2ND HALF VS NC STATE
SP88	37	SUCCESS. PASSES LAST 15 MIN 2ND HALF VS NC STATE
LOP58	38	LOSS OF POSSES. 1ST 10 MIN 2ND HALF VS NC STATE
LOP68	39	LOSS OF POSSES. 2ND 10 MIN 2ND HALF VS NC STATE
LOP78	40	LOSS OF POSSES. 3RD 10 MIN 2ND HALF VS NC STATE
LOP88	41	LOSS OF POSSES. LAST 15 MIN 2ND HALF VS NC STATE
FOUL58	42	FOULS 1ST TEN MIN 2ND HALF VS NC STATE
FOUL68	43	FOULS 2ND TEN MIN 2ND HALF VS

			NC STATE
	FOUL78	44	FOULS 3RD TEN MIN 2ND HALF VS NC STATE
	FOUL88	45	FOULS LAST 15 MIN MIN 2ND HALF VS NC STATE
	GOP58	46	GAIN OF POSSES. 1ST TEN MIN 2ND HALF VS NC STATE
	GOP68	47	GAIN OF POSSES. 2ND TEN MIN 2ND HALF VS NC STATE
	GOP78	48	GAIN OF POSSES. 3RD TEN MIN 2ND HALF VS NC STATE
	GOP88	49	GAIN OF POSSES. LAST 15 MIN 2ND HALF VS NC STATE
	SHON58	50	SHOTS ON GOAL 1ST 10 MIN 2ND HALF VS NC STATE
	SHON68	51	SHOTS ON GOAL 2ND 10 MIN 2ND HALF VS NC STATE
	SHON78	52	SHOTS ON GOAL 3RD 10 MIN 2ND HALF VS NC STATE
	SHON88	53	SHOTS ON GOAL LAST 15 MIN 2ND HALF VS NC STATE
	SHOF58	54	SHOTS OFF GOAL 1ST 10 MIN 2ND HALF VS NC STATE
	SHOF68	55	SHOTS OFF GOAL 2ND 10 MIN 2ND HALF VS NC STATE
	SHOF78	56	SHOTS OFF GOAL 3RD 10 MIN 2ND HALF VS NC STATE
	SHOF88	57	SHOTS OFF GOAL LAST 15 MIN 2ND HALF VS NC STATE
	AHEAD58	58	ATTEMPTED HEADS 1ST 10 MIN 2ND HALF VS NC STATE
	AHEAD68	59	ATTEMPTED HEADS 2ND 10 MIN 2ND HALF VS NC STATE
	AHEAD78	60	ATTEMPTED HEADS 3RD 10 MIN 2ND HALF VS NC STATE
	AHEAD88	61	ATTEMPTED HEADS LAST 15 MIN 2ND HALF VS NC STATE
	SHEAD58	62	SUCCESS. HEADS 1ST 10 MIN 2ND HALF VS NC STATE
	SHEAD68	63	SUCCESS. HEADS 2ND 10 MIN 2ND HALF VS NC STATE
	SHEAD78	64	SUCCESS. HEADS 3RD 10 MIN 2ND HALF VS NC STATE
	SHEAD88	65	SUCCESS. HEADS LAST 15 MIN 2ND HALF VS NC STATE
14	SP19	1	SUCCESS. PASSES 1ST 10 MIN 1ST HALF VS ELON
	SP29	2	SUCCESS. PASSES 2ND 10 MIN 1ST HALF VS ELON

SP39	3	SUCCESS. PASSES 3RD 10 MIN 1ST HALF VS ELON
SP49	4	SUCCESS. PASSES LAST 15 MIN 1ST HALF VS ELON
LOP19	5	LOSS OF POSSES. 1ST 10 MIN 1ST HALF VS ELON
LOP29	6	LOSS OF POSSES. 2ND 10 MIN 1ST HALF VS ELON
LOP39	7	LOSS OF POSSES. 3RD 10 MIN 1ST HALF VS ELON
LOP49	8	LOSS OF POSSES. LAST 15 MIN 1ST HALF VS ELON
FOUL19	9	FOULS 1ST TEN MIN 1ST HALF VS ELON
FOUL29	10	FOULS 2ND TEN MIN 1ST HALF VS ELON
FOUL39	11	FOULS 3RD TEN MIN 1ST HALF VS ELON
FOUL49	12	FOULS LAST 15 MIN MIN 1ST HALF VS ELON
GOP19	13	GAIN OF POSSES. 1ST TEN MIN 1ST HALF VS ELON
GOP29	14	GAIN OF POSSES. 2ND TEN MIN 1ST HALF VS ELON
GOP39	15	GAIN OF POSSES. 3RD TEN MIN 1ST HALF VS ELON
GOP49	16	GAIN OF POSSES. LAST 15 MIN 1ST HALF VS ELON
SHON19	17	SHOTS ON GOAL 1ST 10 MIN 1ST HALF VS ELON
SHON29	18	SHOTS ON GOAL 2ND 10 MIN 1ST HALF VS ELON
SHON39	19	SHOTS ON GOAL 3RD 10 MIN 1ST HALF VS ELON
SHON49	20	SHOTS ON GOAL LAST 15 MIN 1ST HALF VS ELON
SHOF19	21	SHOTS OFF GOAL 1ST 10 MIN 1ST HALF VS ELON
SHOF29	22	SHOTS OFF GOAL 2ND 10 MIN 1ST HALF VS ELON
SHOF39	23	SHOTS OFF GOAL 3RD 10 MIN 1ST HALF VS ELON
SHOF49	24	SHOTS OFF GOAL LAST 15 MIN 1ST HALF VS ELON
AHEAD19	25	ATTEMPTED HEADS 1ST 10 MIN 1ST HALF VS ELON
AHEAD29	26	ATTEMPTED HEADS 2ND 10 MIN 1ST HALF VS ELON
AHEAD39	27	ATTEMPTED HEADS 3RD 10 MIN 1ST HALF VS ELON
AHEAD49	28	ATTEMPTED HEADS LAST 15 MIN

		1ST HALF VS ELON
SHEAD19	29	SUCCESS. HEADS 1ST 10 MIN 1ST HALF VS ELON
SHEAD29	30	SUCCESS. HEADS 2ND 10 MIN 1ST HALF VS ELON
SHEAD39	31	SUCCESS. HEADS 3RD 10 MIN 1ST HALF VS ELON
SHEAD49	32	SUCCESS. HEADS LAST 15 MIN 1ST HALF VS ELON
BLANK	33	
SP59	34	SUCCESS. PASSES 1ST 10 MIN 2ND HALF VS ELON
SP69	35	SUCCESS. PASSES 2ND 10 MIN 2ND HALF VS ELON
SP79	36	SUCCESS. PASSES 3RD 10 MIN 2ND HALF VS ELON
SP89	37	SUCCESS. PASSES LAST 15 MIN 2ND HALF VS ELON
LOP59	38	LOSS OF POSSES. 1ST 10 MIN 2ND HALF VS ELON
LOP69	39	LOSS OF POSSES. 2ND 10 MIN 2ND HALF VS ELON
LOP79	40	LOSS OF POSSES. 3RD 10 MIN 2ND HALF VS ELON
LOP89	41	LOSS OF POSSES. LAST 15 MIN 2ND HALF VS ELON
FOUL59	42	FOULS 1ST TEN MIN 2ND HALF VS ELON
FOUL69	43	FOULS 2ND TEN MIN 2ND HALF VS ELON
FOUL79	44	FOULS 3RD TEN MIN 2ND HALF VS ELON
FOUL89	45	FOULS LAST 15 MIN MIN 2ND HALF VS ELON
GOP59	46	GAIN OF POSSES. 1ST TEN MIN 2ND HALF VS ELON
GOP69	47	GAIN OF POSSES. 2ND TEN MIN 2ND HALF VS ELON
GOP79	48	GAIN OF POSSES. 3RD TEN MIN 2ND HALF VS ELON
GOP89	49	GAIN OF POSSES. LAST 15 MIN 2ND HALF VS ELON
SHON59	50	SHOTS ON GOAL 1ST 10 MIN 2ND HALF VS ELON
SHON69	51	SHOTS ON GOAL 2ND 10 MIN 2ND HALF VS ELON
SHON79	52	SHOTS ON GOAL 3RD 10 MIN 2ND HALF VS ELON
SHON89	53	SHOTS ON GOAL LAST 15 MIN 2ND HALF VS ELON
SHOF59	54	SHOTS OFF GOAL 1ST 10 MIN

			2ND HALF VS ELON
	SHOF69	55	SHOTS OFF GOAL 2ND 10 MIN 2ND HALF VS ELON
	SHOF79	56	SHOTS OFF GOAL 3RD 10 MIN 2ND HALF VS ELON
	SHOF89	57	SHOTS OFF GOAL LAST 15 MIN 2ND HALF VS ELON
	AHEAD59	58	ATTEMPTED HEADS 1ST 10 MIN 2ND HALF VS ELON
	AHEAD69	59	ATTEMPTED HEADS 2ND 10 MIN 2ND HALF VS ELON
	AHEAD79	60	ATTEMPTED HEADS 3RD 10 MIN 2ND HALF VS ELON
	AHEAD89	61	ATTEMPTED HEADS LAST 15 MIN 2ND HALF VS ELON
	SHEAD59	62	SUCCESS. HEADS 1ST 10 MIN 2ND HALF VS ELON
	SHEAD69	63	SUCCESS. HEADS 2ND 10 MIN 2ND HALF VS ELON
	SHEAD79	64	SUCCESS. HEADS 3RD 10 MIN 2ND HALF VS ELON
	SHEAD89	65	SUCCESS. HEADS LAST 15 MIN 2ND HALF VS ELON
15	SP110	1	SUCCESS. PASSES 1ST 10 MIN 1ST HALF VS METHODIST
	SP210	2	SUCCESS. PASSES 2ND 10 MIN 1ST HALF VS METHODIST
	SP310	3	SUCCESS. PASSES 3RD 10 MIN 1ST HALF VS METHODIST
	SP410	4	SUCCESS. PASSES LAST 15 MIN 1ST HALF VS METHODIST
	LOP110	5	LOSS OF POSSES. 1ST 10 MIN 1ST HALF VS METHODIST
	LOP210	6	LOSS OF POSSES. 2ND 10 MIN 1ST HALF VS METHODIST
	LOP310	7	LOSS OF POSSES. 3RD 10 MIN 1ST HALF VS METHODIST
	LOP410	8	LOSS OF POSSES. LAST 15 MIN 1ST HALF VS METHODIST
	FOUL110	9	FOULS 1ST TEN MIN 1ST HALF VS METHODIST
	FOUL210	10	FOULS 2ND TEN MIN 1ST HALF VS METHODIST
	FOUL310	11	FOULS 3RD TEN MIN 1ST HALF VS METHODIST
	FOUL410	12	FOULS LAST 15 MIN MIN 1ST HALF VS METHODIST
	GOP110	13	GAIN OF POSSES. 1ST TEN MIN 1ST HALF VS METHODIST

GOP210	14	GAIN OF POSSES. 2ND TEN MIN 1ST HALF VS METHODIST
GOP310	15	GAIN OF POSSES. 3RD TEN MIN 1ST HALF VS METHODIST
GOP410	16	GAIN OF POSSES. LAST 15 MIN 1ST HALF VS METHODIST
SHON110	17	SHOTS ON GOAL 1ST 10 MIN 1ST HALF VS METHODIST
SHON210	18	SHOTS ON GOAL 2ND 10 MIN 1ST HALF VS METHODIST
SHON310	19	SHOTS ON GOAL 3RD 10 MIN 1ST HALF VS METHODIST
SHON410	20	SHOTS ON GOAL LAST 15 MIN 1ST HALF VS METHODIST
SHOF110	21	SHOTS OFF GOAL 1ST 10 MIN 1ST HALF VS METHODIST
SHOF210	22	SHOTS OFF GOAL 2ND 10 MIN 1ST HALF VS METHODIST
SHOF310	23	SHOTS OFF GOAL 3RD 10 MIN 1ST HALF VS METHODIST
SHOF410	24	SHOTS OFF GOAL LAST 15 MIN 1ST HALF VS METHODIST
AHEAD110	25	ATTEMPTED HEADS 1ST 10 MIN 1ST HALF VS METHODIST
AHEAD210	26	ATTEMPTED HEADS 2ND 10 MIN 1ST HALF VS METHODIST
AHEAD310	27	ATTEMPTED HEADS 3RD 10 MIN 1ST HALF VS METHODIST
AHEAD410	28	ATTEMPTED HEADS LAST 15 MIN 1ST HALF VS METHODIST
SHEAD110	29	SUCCESS. HEADS 1ST 10 MIN 1ST HALF VS METHODIST
SHEAD210	30	SUCCESS. HEADS 2ND 10 MIN 1ST HALF VS METHODIST
SHEAD310	31	SUCCESS. HEADS 3RD 10 MIN 1ST HALF VS METHODIST
SHEAD410	32	SUCCESS. HEADS LAST 15 MIN 1ST HALF VS METHODIST
BLANK	33	
SP510	34	SUCCESS. PASSES 1ST 10 MIN 2ND HALF VS METHODIST
SP610	35	SUCCESS. PASSES 2ND 10 MIN 2ND HALF VS METHODIST
SP710	36	SUCCESS. PASSES 3RD 10 MIN 2ND HALF VS METHODIST
SP810	37	SUCCESS. PASSES LAST 15 MIN 2ND HALF VS METHODIST
LOP510	38	LOSS OF POSSES. 1ST 10 MIN 2ND HALF VS METHODIST
LOP610	39	LOSS OF POSSES. 2ND 10 MIN 2ND HALF VS METHODIST

LOP710	40	LOSS OF POSSES 3RD TEN MIN 2ND HALF VS METHODIST
LOP810	41	LOSS OF POSSES. LAST 15 MIN 2ND HALF VS METHODIST
FOUL510	42	FOULS 1ST TEN MIN 2ND HALF VS METHODIST
FOUL610	43	FOULS 2ND TEN MIN 2ND HALF VS METHODIST
FOUL710	44	FOULS 3RD TEN MIN 2ND HALF VS METHODIST
FOUL810	45	FOULS LAST 15 MIN MIN 2ND HALF VS METHODIST
GOP510	46	GAIN OF POSSES. 1ST TEN MIN 2ND HALF VS METHODIST
GOP610	47	GAIN OF POSSES. 2ND TEN MIN 2ND HALF VS METHODIST
GOP710	48	GAIN OF POSSES. 3RD TEN MIN 2ND HALF VS METHODIST
GOP810	49	GAIN OF POSSES. LAST 15 MIN 2ND HALF VS METHODIST
SHON510	50	SHOTS ON GOAL 1ST 10 MIN 2ND HALF VS METHODIST
SHON610	51	SHOTS ON GOAL 2ND 10 MIN 2ND HALF VS METHODIST
SHON710	52	SHOTS ON GOAL 3RD 10 MIN 2ND HALF VS METHODIST
SHON810	53	SHOTS ON GOAL LAST 15 MIN 2ND HALF VS METHODIST
SHOF510	54	SHOTS OFF GOAL 1ST 10 MIN 2ND HALF VS METHODIST
SHOF610	55	SHOTS OFF GOAL 2ND 10 MIN 2ND HALF VS METHODIST
SHOF710	56	SHOTS OFF GOAL 3RD 10 MIN 2ND HALF VS METHODIST
SHOF810	57	SHOTS OFF GOAL LAST 15 MIN 2ND HALF VS METHODIST
AHEAD510	58	ATTEMPTED HEADS 1ST 10 MIN 2ND HALF VS METHODIST
AHEAD610	59	ATTEMPTED HEADS 2ND 10 MIN 2ND HALF VS METHODIST
AHEAD710	60	ATTEMPTED HEADS 3RD 10 MIN 2ND HALF VS METHODIST
AHEAD810	61	ATTEMPTED HEADS LAST 15 MIN 2ND HALF VS METHODIST
SHEAD510	62	SUCCESS. HEADS 1ST 10 MIN 2ND HALF VS METHODIST
SHEAD610	63	SUCCESS. HEADS 2ND 10 MIN 2ND HALF VS METHODIST
SHEAD710	64	SUCCESS. HEADS 3RD 10 MIN 2ND HALF VS METHODIST
SHEAD810	65	SUCCESS. HEADS LAST 15 MIN

2ND HALF VS METHODIST

16	SP111	1	SUCCESS. PASSES 1ST 10 MIN 1ST HALF VS DUKE
	SP211	2	SUCCESS. PASSES 2ND 10 MIN 1ST HALF VS DUKE
	SP311	3	SUCCESS. PASSES 3RD 10 MIN 1ST HALF VS DUKE
	SP411	4	SUCCESS. PASSES LAST 15 MIN 1ST HALF VS DUKE
	LOP111	5	LOSS OF POSSES. 1ST 10 MIN 1ST HALF VS DUKE
	LOP211	6	LOSS OF POSSES. 2ND 10 MIN 1ST HALF VS DUKE
	LOP311	7	LOSS OF POSSES. 3RD 10 MIN 1ST HALF VS DUKE
	LOP411	8	LOSS OF POSSES. LAST 15 MIN 1ST HALF VS DUKE
	FOUL111	9	FOULS 1ST TEN MIN 1ST HALF VS DUKE
	FOUL211	10	FOULS 2ND TEN MIN 1ST HALF VS DUKE
	FOUL311	11	FOULS 3RD TEN MIN 1ST HALF VS DUKE
	FOUL411	12	FOULS LAST 15 MIN MIN 1ST HALF VS DUKE
	GOP111	13	GAIN OF POSSES. 1ST TEN MIN 1ST HALF VS DUKE
	GOP211	14	GAIN OF POSSES. 2ND TEN MIN 1ST HALF VS DUKE
	GOP311	15	GAIN OF POSSES. 3RD TEN MIN 1ST HALF VS DUKE
	GOP411	16	GAIN OF POSSES. LAST 15 MIN 1ST HALF VS DUKE
	SHON111	17	SHOTS ON GOAL 1ST 10 MIN 1ST HALF VS DUKE
	SHON211	18	SHOTS ON GOAL 2ND 10 MIN 1ST HALF VS DUKE
	SHON311	19	SHOTS ON GOAL 3RD 10 MIN 1ST HALF VS DUKE
	SHON411	20	SHOTS ON GOAL LAST 15 MIN 1ST HALF VS DUKE
	SHOF111	21	SHOTS OFF GOAL 1ST 10 MIN 1ST HALF VS DUKE
	SHOF211	22	SHOTS OFF GOAL 2ND 10 MIN 1ST HALF VS DUKE
	SHOF311	23	SHOTS OFF GOAL 3RD 10 MIN 1ST HALF VS DUKE
	SHOF411	24	SHOTS OFF GOAL LAST 15 MIN 1ST HALF VS DUKE

AHEAD111	25	ATTEMPTED HEADS 1ST 10 MIN 1ST HALF VS DUKE
AHEAD211	26	ATTEMPTED HEADS 2ND 10 MIN 1ST HALF VS DUKE
AHEAD311	27	ATTEMPTED HEADS 3RD 10 MIN 1ST HALF VS DUKE
AHEAD411	28	ATTEMPTED HEADS LAST 15 MIN 1ST HALF VS DUKE
SHEAD111	29	SUCCESS. HEADS 1ST 10 MIN 1ST HALF VS DUKE
SHEAD211	30	SUCCESS. HEADS 2ND 10 MIN 1ST HALF VS DUKE
SHEAD311	31	SUCCESS. HEADS 3RD 10 MIN 1ST HALF VS DUKE
SHEAD411	32	SUCCESS. HEADS LAST 15 MIN 1ST HALF VS DUKE
BLANK	33	
SP511	34	SUCCESS. PASSES 1ST 10 MIN 2ND HALF VS DUKE
SP611	35	SUCCESS. PASSES 2ND 10 MIN 2ND HALF VS DUKE
SP711	36	SUCCESS. PASSES 3RD 10 MIN 2ND HALF VS DUKE
SP811	37	SUCCESS. PASSES LAST 15 MIN 2ND HALF VS DUKE
LOP511	38	LOSS OF POSSES. 1ST 10 MIN 2ND HALF VS DUKE
LOP611	39	LOSS OF POSSES. 2ND 10 MIN 2ND HALF VS DUKE
LOP711	40	LOSS OF POSSES. 3RD 10 MIN 2ND HALF VS DUKE
LOP811	41	LOSS OF POSSES. LAST 15 MIN 2ND HALF VS DUKE
FOUL511	42	FOULS 1ST TEN MIN 2ND HALF VS DUKE
FOUL611	43	FOULS 2ND TEN MIN 2ND HALF VS DUKE
FOUL711	44	FOULS 3RD TEN MIN 2ND HALF VS DUKE
FOUL811	45	FOULS LAST 15 MIN MIN 2ND HALF VS DUKE
GOP511	46	GAIN OF POSSES. 1ST TEN MIN 2ND HALF VS DUKE
GOP611	47	GAIN OF POSSES. 2ND TEN MIN 2ND HALF VS DUKE
GOP711	48	GAIN OF POSSES. 3RD TEN MIN 2ND HALF VS DUKE
GOP811	49	GAIN OF POSSES. LAST 15 MIN 2ND HALF VS DUKE
SHON511	50	SHOTS ON GOAL 1ST 10 MIN 2ND HALF VS DUKE

	SHON611	51	SHOTS ON GOAL 2ND 10 MIN 2ND HALF VS DUKE
	SHON711	52	SHOTS ON GOAL 3RD 10 MIN 2ND HALF VS DUKE
	SHON811	53	SHOTS ON GOAL LAST 15 MIN 2ND HALF VS DUKE
	SHOF511	54	SHOTS OFF GOAL 1ST 10 MIN 2ND HALF VS DUKE
	SHOF611	55	SHOTS OFF GOAL 2ND 10 MIN 2ND HALF VS DUKE
	SHOF711	56	SHOTS OFF GOAL 3RD 10 MIN 2ND HALF VS DUKE
	SHOF811	57	SHOTS OFF GOAL LAST 15 MIN 2ND HALF VS DUKE
	AHEAD511	58	ATTEMPTED HEADS 1ST 10 MIN 2ND HALF VS DUKE
	AHEAD611	59	ATTEMPTED HEADS 2ND 10 MIN 2ND HALF VS DUKE
	AHEAD711	60	ATTEMPTED HEADS 3RD 10 MIN 2ND HALF VS DUKE
	AHEAD811	61	ATTEMPTED HEADS LAST 15 MIN 2ND HALF VS DUKE
	SHEAD511	62	SUCCESS. HEADS 1ST 10 MIN 2ND HALF VS DUKE
	SHEAD611	63	SUCCESS. HEADS 2ND 10 MIN 2ND HALF VS DUKE
	SHEAD711	64	SUCCESS. HEADS 3RD 10 MIN 2ND HALF VS DUKE
	SHEAD811	65	SUCCESS. HEADS LAST 15 MIN 2ND HALF VS DUKE
17	SP112	1	SUCCESS. PASSES 1ST 10 MIN 1ST HALF VS ERSKINE
	SP212	2	SUCCESS. PASSES 2ND 10 MIN 1ST HALF VS ERSKINE
	SP312	3	SUCCESS. PASSES 3RD 10 MIN 1ST HALF VS ERSKINE
	SP412	4	SUCCESS. PASSES LAST 15 MIN 1ST HALF VS ERSKINE
	LOP112	5	LOSS OF POSSES. 1ST 10 MIN 1ST HALF VS ERSKINE
	LOP212	6	LOSS OF POSSES. 2ND 10 MIN 1ST HALF VS ERSKINE
	LOP312	7	LOSS OF POSSES. 3RD 10 MIN 1ST HALF VS ERSKINE
	LOP412	8	LOSS OF POSSES. LAST 15 MIN 1ST HALF VS ERSKINE
	FOUL112	9	FOULS 1ST TEN MIN 1ST HALF VS ERSKINE
	FOUL212	10	FOULS 2ND TEN MIN 1ST HALF VS

		ERSKINE
FOUL312	11	FOULS 3RD TEN MIN 1ST HALF VS ERSKINE
FOUL412	12	FOULS LAST 15 MIN MIN 1ST HALF VS ERSKINE
GOP112	13	GAIN OF POSSES. 1ST TEN MIN 1ST HALF VS ERSKINE
GOP212	14	GAIN OF POSSES. 2ND TEN MIN 1ST HALF VS ERSKINE
GOP312	15	GAIN OF POSSES. 3RD TEN MIN 1ST HALF VS ERSKINE
GOP412	16	GAIN OF POSSES. LAST 15 MIN 1ST HALF VS ERSKINE
SHON110	17	SHOTS ON GOAL 1ST 10 MIN 1ST HALF VS ERSKINE
SHON212	18	SHOTS ON GOAL 2ND 10 MIN 1ST HALF VS ERSKINE
SHON312	19	SHOTS ON GOAL 3RD 10 MIN 1ST HALF VS ERSKINE
SHON412	20	SHOTS ON GOAL LAST 15 MIN 1ST HALF VS ERSKINE
SHOF110	21	SHOTS OFF GOAL 1ST 10 MIN 1ST HALF VS ERSKINE
SHOF212	22	SHOTS OFF GOAL 2ND 10 MIN 1ST HALF VS ERSKINE
SHOF312	23	SHOTS OFF GOAL 3RD 10 MIN 1ST HALF VS ERSKINE
SHOF412	24	SHOTS OFF GOAL LAST 15 MIN 1ST HALF VS ERSKINE
AHEAD110	25	ATTEMPTED HEADS 1ST 10 MIN 1ST HALF VS ERSKINE
AHEAD212	26	ATTEMPTED HEADS 2ND 10 MIN 1ST HALF VS ERSKINE
AHEAD312	27	ATTEMPTED HEADS 3RD 10 MIN 1ST HALF VS ERSKINE
AHEAD410	28	ATTEMPTED HEADS LAST 15 MIN 1ST HALF VS ERSKINE
SHEAD110	29	SUCCESS. HEADS 1ST 10 MIN 1ST HALF VS ERSKINE
SHEAD212	30	SUCCESS. HEADS 2ND 10 MIN 1ST HALF VS ERSKINE
SHEAD312	31	SUCCESS. HEADS 3RD 10 MIN 1ST HALF VS ERSKINE
SHEAD410	32	SUCCESS. HEADS LAST 15 MIN 1ST HALF VS ERSKINE
BLANK	33	
SP512	34	SUCCESS. PASSES 1ST 10 MIN 2ND HALF VS ERSKINE
SP612	35	SUCCESS. PASSES 2ND 10 MIN 2ND HALF VS ERSKINE
SP712	36	SUCCESS. PASSES 3RD 10 MIN

		2ND HALF VS ERSKINE
SP812	37	SUCCESS. PASSES LAST 15 MIN 2ND HALF VS ERSKINE
LOP512	38	LOSS OF POSSES. 1ST 10 MIN 2ND HALF VS ERSKINE
LOP612	39	LOSS OF POSSES. 2ND 10 MIN 2ND HALF VS ERSKINE
LOP712	40	LOSS OF POSSES. 3RD 10 MIN 2ND HALF VS ERSKINE
LOP812	41	LOSS OF POSSES. LAST 15 MIN 2ND HALF VS ERSKINE
FOUL512	42	FOULS 1ST TEN MIN 2ND HALF VS ERSKINE
FOUL612	43	FOULS 2ND TEN MIN 2ND HALF VS ERSKINE
FOUL712	44	FOULS 3RD TEN MIN 2ND HALF VS ERSKINE
FOUL812	45	FOULS LAST 15 MIN MIN 2ND HALF VS ERSKINE
GOP512	46	GAIN OF POSSES. 1ST TEN MIN 2ND HALF VS ERSKINE
GOP612	47	GAIN OF POSSES. 2ND TEN MIN 2ND HALF VS ERSKINE
GOP712	48	GAIN OF POSSES. 3RD TEN MIN 2ND HALF VS ERSKINE
GOP812	49	GAIN OF POSSES. LAST 15 MIN 2ND HALF VS ERSKINE
SHON512	50	SHOTS ON GOAL 1ST 10 MIN 2ND HALF VS ERSKINE
SHON612	51	SHOTS ON GOAL 2ND 10 MIN 2ND HALF VS ERSKINE
SHON712	52	SHOTS ON GOAL 3RD 10 MIN 2ND HALF VS ERSKINE
SHON812	53	SHOTS ON GOAL LAST 15 MIN 2ND HALF VS ERSKINE
SHOF512	54	SHOTS OFF GOAL 1ST 10 MIN 2ND HALF VS ERSKINE
SHOF612	55	SHOTS OFF GOAL 2ND 10 MIN 2ND HALF VS ERSKINE
SHOF712	56	SHOTS OFF GOAL 3RD 10 MIN 2ND HALF VS ERSKINE
SHOF812	57	SHOTS OFF GOAL LAST 15 MIN 2ND HALF VS ERSKINE
AHEAD512	58	ATTEMPTED HEADS 1ST 10 MIN 2ND HALF VS ERSKINE
AHEAD612	59	ATTEMPTED HEADS 2ND 10 MIN 2ND HALF VS ERSKINE
AHEAD712	60	ATTEMPTED HEADS 3RD 10 MIN 2ND HALF VS ERSKINE
AHEAD812	61	ATTEMPTED HEADS LAST 15 MIN 2ND HALF VS ERSKINE

	SHEAD512	62	SUCCESS. HEADS 1ST 10 MIN 2ND HALF VS ERSKINE
	SHEAD612	63	SUCCESS. HEADS 2ND 10 MIN 2ND HALF VS ERSKINE
	SHEAD712	64	SUCCESS. HEADS 3RD 10 MIN 2ND HALF VS ERSKINE
	SHEAD812	65	SUCCESS. HEADS LAST 15 MIN 2ND HALF VS ERSKINE
19	TIMEF1	1-4	TIME PLAYED 1ST HALF BUFFALO
	TIMES1	5-8	TIME PLAYED 2ND HALF BUFFALO
	TIMEF2	9-12	TIME PLAYED 1ST HALF CHAP HILL
	TIMES2	13-16	TIME PLAYED 2ND HALF CHAP HILL
	TIMEF3	17-20	TIME PLAYED 1ST HALF UVA
	TIMES3	21-24	TIME PLAYED 2ND HALF UVA
	TIMEF4	25-28	TIME PLAYED 1ST HALF DAVIDSON
	TIMES4	29-32	TIME PLAYED 2ND HALF DAVIDSON
	TIMEF5	33-36	TIME PLAYED 1ST HALF UMSL
	TIMES5	37-40	TIME PLAYED 2ND HALF UMSL
	TIMEF6	41-44	TIME PLAYED 1ST HALF BARRY
	TIMES6	45-48	TIME PLAYED 2ND HALF BARRY
	TIMEF7	49-52	TIME PLAYED 1ST HALF CHARLES.
	TIMES7	53-56	TIME PLAYED 2ND HALF CHARLES.
	TIMEF8	57-60	TIME PLAYED 1ST HALF NCSU
	TIMES8	61-64	TIME PLAYED 2ND HALF NCSU
	TIMEF9	65-68	TIME PLAYED 1ST HALF ELON
	TIMES9	69-72	TIME PLAYED 2ND HALF ELON
	TIMEF10	73-76	TIME PLAYED 1ST HALF METHODIST
	TIMES10	77-80	TIME PLAYED 2ND HALF METHODIST
20	TIMEF11	1-4	TIME PLAYED 1ST HALF DUKE
	TIMES11	5-8	TIME PLAYED 2ND HALF DUKE
	TIMEF12	9-12	TIME PLAYED 1ST HALF ERSKINE
	TIMES12	13-16	TIME PLAYED 2ND HALF ERSKINE
	GOALSF1	18	GOALS 1ST HALF BUFFALO
	GOALSS1	19	GOALS 2ND HALF BUFFALO
	GOALSF2	20	GOALS 1ST HALF CHAPEL HILL
	GOALSS2	21	GOALS 2ND HALF CHAPEL HILL
	GOALSF3	22	GOALS 1ST HALF UVA
	GOALSS3	23	GOALS 2ND HALF UVA
	GOALSF4	24	GOALS 1ST HALF DAVIDSON
	GOALSS4	25	GOALS 2ND HALF DAVIDSON
	GOALSF5	26	GOALS 1ST HALF UMSL
	GOALSS5	27	GOALS 2ND HALF UMSL
	GOALSF6	28	GOALS 1ST HALF BARRY
	GOALSS6	29	GOALS 2ND HALF BARRY
	GOALSF7	30	GOALS 1ST HALF CHARLESTON
	GOALSS7	31	GOALS 2ND HALF CHARLESTON
	GOALSF8	32	GOALS 1ST HALF NCSU

	GOALSS8	33	GOALS 2ND HALF NCSU
	GOALSF9	34	GOALS 1ST HALF ELON
	GOALSS9	35	GOALS 2ND HALF ELON
	GOALSF10	36	GOALS 1ST HALF METHODIST
	GOALSS10	37	GOALS 2ND HALF METHODIST
	GOALSF11	38	GOALS 1ST HALF DUKE
	GOALSS11	38	GOALS 2ND HALF DUKE
	GOALSF11	40	GOALS 1ST HALF ERSKINE
	GOALSS12	41	GOALS 2ND HALF ERSKINE
	ASSTSF1	43	ASSISTS 1ST HALF BUFFALO
	ASSTSS1	44	ASSISTS 2ND HALF BUFFALO
	ASSTSF2	45	ASSISTS 1ST HALF CHAPEL HILL
	ASSTSS2	46	ASSISTS 2ND HALF CHAPEL HILL
	ASSTSF3	47	ASSISTS 1ST HALF UVA
	ASSTSS3	48	ASSISTS 2ND HALF UVA
	ASSTSF4	49	ASSISTS 1ST HALF DAVIDSON
	ASSTSS4	50	ASSISTS 2ND HALF DAVIDSON
	ASSTSF5	51	ASSISTS 1ST HALF UMSL
	ASSTSS5	52	ASSISTS 2ND HALF UMSL
	ASSTSF6	53	ASSISTS 1ST HALF BARRY
	ASSTSS6	54	ASSISTS 2ND HALF BARRY
	ASSTSF7	55	ASSISTS 1ST HALF CHARLESTON
	ASSTSS7	56	ASSISTS 2ND HALF CHARLESTON
	ASSTSF8	57	ASSISTS 1ST HALF NCSU
	ASSTSS8	58	ASSISTS 2ND HALF NCSU
	ASSTSF9	59	ASSISTS 1ST HALF ELON
	ASSTSS9	60	ASSISTS 2ND HALF ELON
	ASSTSF10	61	ASSISTS 1ST HALF METHODIST
	ASSTSS10	62	ASSISTS 2ND HALF METHODIST
	ASSTSF11	63	ASSISTS 1ST HALF DUKE
	ASSTSS11	64	ASSISTS 2ND HALF DUKE
	ASSTSF12	65	ASSISTS 1ST HALF ERSKINE
	ASSTSS12	66	ASSISTS 2ND HALF ERSKINE
	COPERF11	68	COACH RATING OF PERFORMANCE DUKE
21	AVECOG	1-4	AVERAGE COGNITIVE ANXIETY
	SCCOG	5-7	STAND. DEV. COGNITIVE ANXIETY
	AVESOM	8-11	AVERAGE SOMATIC ANXIETY
	SDSOM	12-14	STAND. DEV. SOMATIC ANXIETY
	AVATPERF	15-17	AVERAGE ATHLETE RATINGS OF PERFORMANCE
	SDATPERF	18-20	STAND. DEV ATHLETE RATINGS OF PERFORMANCE
	AVECOPERF	21-23	AVERAGE COACH RATINGS OF PERFORMANCE
	SDCOPERF	24-26	STAND. DEV COACH RATINGS OF PERFORMANCE
	AVOPERF	28-31	AVERAGE OBJECTIVE RATINGS OF PERFORMANCE

SDOPERF	32-35	STAND. DEV OBJECTIVE RATINGS OF PERFORMANCE
AVTENMIN	36-39	AVERAGE TEN MINUTE OBJECTIVE RATINGS OF PERFORMANCE
SDTENMIN	40-43	STAND. DEV TEN MINUTE RATINGS OBJECTIVE PERFORMANCE
AVMRFCOG	44-47	AVERAGE MRF COGNITIVE ANXIETY
SDMRFCOG	48-51	STAND DEV. MRF COGNITIVE ANXIETY
AVMRFSOM	52-55	AVERAGE MRF SOMATIC ANXIETY
SDMRFSOM	56-59	STAND DEV. MRF SOMATIC ANXIETY

Appendix M

Raw Data

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Appendix N

Vitae

Victoria Ivy Krane

3100-J Lawndale Drive
Greensboro, North Carolina 27408
(919)282-5725

EDUCATION

Graduate

Doctor of Philosophy: Exercise and Sport Science
Concentration: Sport Psychology
University of North Carolina at Greensboro, 1988-1990
Advisor: Daniel Gould, Ph.D.

Doctoral Candidate: Kinesiology
Concentration: Sport Psychology
University of Illinois at Urbana-Champaign, 1987-1988
Advisor: Daniel Gould, Ph.D.

Master of Science: Exercise and Sport Sciences
Concentration: Sport Psychology
University of Arizona, Tucson, Arizona, 1983-1985
Advisor: Jean Williams, Ph.D.

Undergraduate

Bachelor of Arts: Psychology
Minor: Physical Education
Denison University, Granville, Ohio, 1979-1983
Graduated with honors.

PROFESSIONAL EXPERIENCE

Editorial Assistant, The Sport Psychologist 1988-1989

Research Assistant, University of North Carolina at Greensboro 1988-1990

ACEP Developmental Assistant, American Coaching Effectiveness Program, Human Kinetics Publishers, Champaign, Illinois 1988

TEACHING EXPERIENCE

Graduate Teaching Assistant 1988-1990
University of North Carolina at Greensboro
Fencing, Weight Training

Graduate Teaching Assistant 1987-1988
University of Illinois at Urbana-Champaign
Weight Training, Fencing

Graduate Teaching Assistant 1983-1985
University of Arizona, Tucson, Arizona
Weight Training, Jogging, Swimming, Fencing

Teaching Assistant 1983
Denison University, Granville, Ohio
Psychology, Physical Education

CERTIFICATION

American Coaching Effectiveness Program
Level 1 Instructor

COACHING EXPERIENCE

Head Coach Girls' Varsity Soccer 1987
Brewster High School, Brewster, New York

Assistant Soccer Coach, Sport Psychologist 1985-1986
College of William and Mary,
Williamsburg, Virginia

Head Coach Girls' Varsity Soccer 1984-1985
Rincon High School, Tucson, Arizona

RESEARCH AND PUBLICATIONS

Research Publications

Gould, D, Giannini, J., Krane, V. & Hodge, K. (1990). Educational needs of elite US National team, Pan American, and Olympic coaches. Journal of Teaching Physical Education.

Williams, J.M. & Krane, V. (1989). Response distortion on self-report questionnaires with female collegiate golfers. The Sport Psychologist, 3(3), 212-218.

Krane, V. & Williams, J. (1987). Cognitive anxiety, somatic anxiety, and confidence: Changes prior to competition and relationship to performance. Journal of Sport Behavior, 10(1), 47-56.

Scholarly Book Chapter

Gould, D. & Krane, V. (in press). The arousal-athletic performance relationship: Current status and future directions. In T. Horn (Ed.), Advances in sport psychology. Champaign, IL: Human Kinetics Publishers.

Service Publications

Krane, V. (1989). Talk yourself into better running: The thinking runner's approach to thought control. Manuscript submitted for publication.

Krane, V. (January, 1989). Follow through with your fitness resolutions. Network: UNCG's women's services newsletter, 5, 3.

Grants

Krane, V. (1989). Anxiety and athletic performance: A test of the multidimensional anxiety theory and catastrophe theory. Stout fellowship, University of North Carolina at Greensboro (Funded $800).

Gould, D. & Krane, V. (1989). Factors influencing tennis coaches' abilities to predict anxiety levels in their athletes. United States Tennis Association Research Grant Proposal (Funded $750.00).

Research Papers in Review

Krane, V., Eklund, R., & McDermott, M. Collaborative action research and a behavioral coaching intervention: A case study. Journal of Applied Research in Coaching and Athletics.

Williams, J.M. & Krane, V. Low anxious, repressive, high anxious, and defensive high-anxious coping styles: Differential pre-competitive state anxiety and confidence responses. Journal of Applied Sport Psychology.

Research Papers in Preparation

Krane, V. & Finch, L. Structural changes in women's athletics leading to the decline in women coaches and administrators.

Gould, D., Krane, V., Finch, L. Factors influencing coaches' ability to predict anxiety levels in their athletes.

Krane, V., Williams, J., & Feltz, D. Path analysis examining the relationships among cognitive anxiety, somatic anxiety, self-confidence and golf performance.

Research Presentations

Krane, V., Finch, L., Gould, D., Eklund, R., & Kelley, B. (September, 1990). Factors influencing coaches' ability to predict anxiety levels in their athletes: Part I - State anxiety. Paper to be presented at the meeting of the Association for the Advancement of Applied Sport Psychology, San Antonio, Texas.

Finch, L., Krane, V., Gould, D., Eklund, R., & Kelley, B. (September, 1990). Factors influencing coaches' ability to predict anxiety levels in their athletes: Part II - Trait anxiety. Paper to be presented at the meeting of the Association for the Advancement of Applied Sport Psychology, San Antonio, Texas.

Krane, V. (April, 1990). Mental preparation and performance optimization - From research to applied sport psychology practice. Paper presented at the AAHPERD National conference, New Orleans, LA.

Krane, V., Eklund, R., & McDermott, M. (April, 1989). Collaborative action research and behavioral coaching intervention: A case study. Manuscript presented at the AAHPERD National conference, New Orleans, LA.

Krane, V. & Williams, J. (June, 1989). The influence of social desirability bias on state anxiety and confidence: Different responses of low anxious, high anxious, repressive, and defensive golfers. Paper presented at the meeting of the North American Society for Sport and Physical Activity, Kent, Ohio.

Krane, V. & Williams, J. (October, 1988). Cognitive anxiety, somatic anxiety, and self-confidence in track and field athletes: A comparison between gender and performance. Paper presented at the meeting of the Association for the Advancement of Applied Sport Psychology, Nashua, New Hampshire.

Gould, D., Giannini, J., Krane, V. & Hodge, K. (1988). Educational needs of elite US National team, Pan American, and Olympic coaches. Paper presented to the US Olympic Committee Special Committee on Coaches Education.

Krane, V. & Williams, J. (April, 1988). The relationship between the Competitive State Anxiety Inventory - 2 and social desirability. Paper presented at the AAHPERD National conference, Kansas City, Missouri.

Krane, V. & Williams, J. (April, 1987). The relationship of cognitive anxiety, somatic anxiety, and confidence to performance in male and female track and field athletes. Paper presented at the AAHPERD National Conference, Las Vegas, Nevada.

Krane, V. & Williams, J. (April, 1986). The relationship among CSAI-2 subcomponents and performance during golf competition. Paper presented at the AAHPERD National Conference, Cincinnati, Ohio.

Krane, V., Williams, J., & Feltz, D. (October, 1986). Path analysis examining the relationships among cognitive anxiety, somatic anxiety, self-confidence and golf performance. Paper presented at the meeting of the Association for the Advancement of Applied Sport Psychology, Jekyll Island, Georgia.

Krane, V. & Williams, J. (1985). Changes in CSAI-2 subcomponents prior to athletic competition. Paper presented at the Exercise Science and Sports Medicine Symposium, Tucson, Arizona.

Service Presentations

Krane, V. (January, 1990). Relaxation and imagery training for soccer players. Presentation to the North Carolina Youth Soccer Association, Greensboro, North Carolina.

Krane, V. (January, 1990). Motivating your athletes: Coaches guide to positive communication. Presentation to the North Carolina Youth Soccer Association, Greensboro, North Carolina.

Krane, V. (July, 1988). Enhancing volleyball performance through goal setting. Presentation to Mahomet High School Volleyball Camp, Mahomet, Illinois.

Gould, D. & Krane, V. (January, 1988). Sport physiology - strength and conditioning. Presentation at the Illinois Inter-Agency Athletic Association Conference, Champaign, Illinois.

Professional Symposiums

Krane, V., Hunt, E., McAuley, E., Scanlan, T., Dobson, D., & Hanson, T. (September, 1989). Grant writing in sport psychology. Symposium conducted at the annual meeting of the Association for the Advancement of Applied Sport Psychology, Seattle, Washington.

Greenspan, M. & Krane, V. (September, 1989). The effect of AAASP certification on students. Intervention/performance enhancement symposium conducted at the annual meeting of the Association for the Advancement of Applied Sport Psychology, Seattle, Washington.

Taylor, J., Gould, D., Kirschenbaum, D., Rotella, B., Ravizza, K., Waite, B., & Krane, V. (October, 1988). Career development in sport psychology. Intervention/performance enhancement symposium at the annual meeting of the Association for the Advancement of Applied Sport Psychology, Nashua, New Hampshire.

Theses

Krane, V. (1990). Anxiety and athletic performance: A test of the multidimensional theory of anxiety and catastrophe theory. Unpublished doctoral dissertation, University of North Carolina at Greensboro.

Krane, V. (1985). The relationship between CSAI-2 subcomponents and performance during collegiate golf competition. Unpublished Master's thesis, University of Arizona.

Krane, V. (1983). Motivation and sex roles in sport. Unpublished Honor's paper, Denison University.

SERVICE TO THE PROFESSION

Membership and Involvements in Professional Associations

American Alliance for Health, Physical Education, Recreation, and Dance, 1984-present.

Association for the Advancement of Applied Sport Psychology, 1986-present.

Elected National Student Representative to the Executive Board, 1988-1989
Student Regional Representative, 1987-1988

North American Society for Psychology of Sport and Physical Activity, 1988-present.

University Committee Membership

President, Graduate Exercise and Sport Science Society, University of North Carolina at Greensboro, 1989-1990

Student Representative to the Graduate Faculty Board, University of North Carolina at Greensboro, 1988-1989

Executive Board Member, Physical Education Graduate Society, University of North Carolina at Greensboro, 1988-1989

Psychological Skills Consultant

1988-1990 Women's Varsity Soccer Team
University of North Carolina at Greensboro
Psychological skills development

1987-1988 Women's Varsity Golf Team
University of Illinois at Urbana-Champaign
Psychological skills development, imagery, relaxation

1988 High School Golfer
Champaign, Illinois
Goal setting, relaxation, imagery, positive self-talk

1985-1986 Women's Varsity Golf
College of William and Mary, Williamsburg, Virginia
Concentration, imagery, positive self-talk

1985	Women's Varsity Volleyball Team College of William and Mary, Williamsburg, Virginia Imagery

HONORS AND SPECIAL RECOGNITION

Graduate Tuition Scholarship, University of Arizona, 1985
Who's Who in American Colleges, 1983
National Dean's List, 1983
Women's Achievement Award, Denison University, 1982, 1983
Mortar Board, Denison University, 1982
Psi Chi, Denison University, 1982
Phi Society, Denison University, 1980

TEACHING COMPETENCIES AND EXPERIENCES

Teaching Competencies

Academic Courses	Social Psychology of Sport Applied Sport Psychology Stress Management Psychosocial Aspects of Teaching and Coaching Women in Sport Research Methods Sociology of Sport
Activity Courses	Fencing Fitness and Conditioning Soccer Weight Training

Teaching Experience

Denison University

Physical Education	Water Safety Instructor (2 hours) (Assisted instructor)
Psychology	Learning and Motivation (4 hours) (Conducted individualized testing and lead help sessions)

University of Arizona

Jogging (1hour)
Weight Training for Women (1 hour)
Beginning Fencing (1 hour)
Beginning Swimming (1 hour)
Intermediate Swimming (1 hour)

University of Illinois

Weight Training (1 hour)
Beginning Fencing (1 hour)
Conditioning and Weight Control (1 hour)

University of North Carolina at Greensboro

Beginning Fencing (1 hour)
Intermediate Fencing (1 hour)