VICTORIA UNIVERSITY OF TECHNOLOGY

INVESTIGATING A CAUSAL MODEL OF ANXIETY IN SPORT

By

Daryl Brian Marchant

A thesis submitted to the faculty of Human Development in

fulfilment of the requirement for the degree of

DOCTOR OF PHILOSOPHY

DEPARTMENT OF PHYSICAL EDUCATION AND RECREATION

MELBOURNE, VICTORIA

AUGUST, 1996

ABSTRACT

Three experiments tested the Martens, Vealey, and Burton (1990) model of competitive anxiety. In experiment one, perceived uncertainty of outcome, one of three hypothesised causes of state anxiety (A-state), was manipulated by assigning 72 golfers to either a low uncertainty group (LU), composed of unequal ability pairs, or a high uncertainty group (HU), consisting of equal ability pairs. Participants completed the Competitive State Anxiety Inventory - 2 (CSAI-2) and the Match Orientation Questionnaire (MOQ; a measure of perceived uncertainty and perceived importance) during breaks in a chipping competition. A series of t-tests did not support the original manipulation of uncertainty. A re-analysis using a different grouping format produced distinct LU and HU groups, but no significant differences in A-state were found between groups. This first analysis followed the Martens et al. (1990) model by measuring A-state as a global reaction. A re-analysis of A-state, separating cognitive and somatic anxiety, produced significant group differences for cognitive anxiety only; this suggests the model needs refinement. The model suggests likely winners and losers both experience low uncertainty, and hence low A-state. A further analysis revealed that the likely losers experienced significantly higher cognitive A-state than the likely winners, and thus, may not psychologically dissociate themselves from losing as Martens et al. (1990) propose. Follow up multiple regression analyses demonstrated that confidence was a superior predictor of A-state than perceived uncertainty.

In Experiment two perceived importance, another hypothesised cause of

A-state was manipulated by assigning 52 club golfers to either a low importance (LI) group that competed for three golf balls, or a high importance (HI) group that competed for a new pair of golf shoes. As with experiment one, participants completed the CSAI-2 and the MOQ prior to and during breaks in a chipping competition. After a manipulation check demonstrated significant differences in perceived importance, Analyses of Covariance and multiple regression analyses demonstrated that perceived importance was a key contributor to competitive A-state in this study.

Experiment three tested the hypothesised interaction between perceived uncertainty and importance by manipulating both perceived uncertainty and importance with 100 golfers. The same experimental protocol as Experiment 2 was again used. Multivariate Analyses of Covariance indicated that perceived uncertainty and importance did not interact as the Martens et al. model suggests. Perceived importance was again shown to be a significant predictor of competitive A-state.

All three studies verified trait anxiety (A-trait) as a strong predictor of competitive state anxiety. The Martens et al. (1990) model, as presently formulated, does not appear to adequately explain the relationship between perceived uncertainty, perceived importance, A-trait, and A-state. A new model, based on the results of these studies is presented.

DEDICATION

My wife, Tina

Like many children I dreamt unrealistically about marrying the perfect partner, unlike others my dream came true

My children, Courtney, Rebecca, Jeremy, and Lachlan
Four children made on earth but designed in heaven

ACKNOWLEDGMENTS

To my two supervisors, Dr. Tony Morris and Dr. Mark Andersen, you have both provided me with exceptional support throughout the course of this research program. Your professionalism has been invaluable in helping shape and fine tune this thesis. More importantly, you represent high quality role models on which I can base my own supervision in future. Tony, thankyou especially for your enthusiasm, support, and prompt feedback on drafts. Mark, I had lofty expectations given that you have published extensively on supervision skills, you actually surpassed these expectations. I have learned that good supervisors are ~~sometimes~~ always "a real pain in the bum".

The Latrobe Golf Club and their members who generously allowed me to use their practice facilities over an extended period of time. The many club golfers from Metropolitan Melbourne who participated in this study, thankyou for your time and patience.

My Parents, Brian and Merle Marchant who taught me the value of persistence, a necessary quality for any doctoral candidate.

Victoria University have supported my study with a generous research budget, and access to technical support (e.g., computers, photocopying). The Australian Government in allocating Australian Postgraduate Research Scholarships (APRA), receiving one of these scholarships enabled my to study full time.

Finally, other postgraduate students at Victoria University including, David Buttifant, Con Hrysomallis, Steve Fraser, and Rob Hess who helped make 9 David Street a great place to be during 1992, 1993, and 1994.

TABLE OF CONTENTS

-

-

TABLE OF TABLES

-

TABLE OF FIGURES

LIST OF APPENDICES

CHAPTER 1

INTRODUCTION

Sport psychologists recognise anxiety as a critical factor affecting optimal sport performance and enjoyment. Advances in knowledge and understanding have gradually led to a greater appreciation of the conceptual complexity of anxiety. Establishing consistent relationships between anxiety and performance is extremely difficult due to the multidimensional nature of anxiety in sport. For example, anxiety is triggered by a number of causes; similarly the effects of anxiety are diverse. Person and sport specific differences further compound the problem of deciphering the anxiety-performance relationship.

Although a number of studies have investigated the specific causes of anxiety, the approaches have been usually univariate rather than an integrated multidimensional approach. An attempt to synthesise findings into a plausible causal model has recently emerged. Martens, Vealey, and Burton (1990) suggest a three factor model, perceived uncertainty of outcome, and perceived importance of outcome, in conjunction with trait anxiety (A-trait), to explain state anxiety (A-state) in sport. The authors themselves have highlighted the absence of experimental verification of their theory and invite researchers to test the model empirically in sporting contexts. Being the first attempt to provide a systematic causal model of anxiety in sport, it warrants further investigation. This thesis tests the Martens et al. (1990) causal model of anxiety in the sporting context of competitive golf.

Aims

General Aims

Aim 1) To examine whether the Martens et al. (1990) theory of competitive anxiety provides a framework to predict A-state in sport.

Specific Aims

Aim 1.1) To establish empirically whether perceived uncertainty of outcome and perceived importance of outcome are predictors of A-state in golf.

Aim 1.2) To establish the relative contributions of uncertainty and importance to state anxiety in golf.

Aim 1.3) To establish if uncertainty and importance interact in explaining A-state in golf.

-

Organisation

Chapter 1

Introduces the topic, general aims, specific aims and the organisation of the study.

Chapter 2

The review of literature provides a review of the key developments in the field of competitive anxiety in sport. Specific research investigating possible causes of anxiety is then discussed before introducing the rationale and components of the Martens et al. (1990) model of competitive anxiety.

Given the relative breadth and depth of sport related anxiety research, detailed discussion is reserved mainly for those sub-aspects that relate specifically to this dissertation (i.e., causes of anxiety and the Martens et al. (1990) model).

Chapter 3, 4, and 5

Each of these chapters is devoted to a self-contained experiment investigating either specific components of the model (Chapters 3 & 4) or the model as a whole (Chapter 5). Each of these chapters contains the conventional research manuscript components including: purpose, hypothesis, method, results, discussion, and conclusion sections.

Chapter 6

This general discussion chapter integrates the findings of the three experiments, especially as they reflect on the overall structure of the Martens et al. model. Relevant methodological issues and limitations are also discussed.

-

Chapter 7

This chapter provides conclusions and recommendations for possible changes to the Martens et al. model and directions for future research.

CHAPTER 2

REVIEW OF LITERATURE

Anxiety in sport is prevalent with most athletes able to describe a number of anxiety affected experiences. Some athletes will readily go one step further and provide naive ascriptions as to the cause of their anxiety. Kroll (1979) has suggested, "No one needs to be told that anxiety (in sport) exists, not because of the amount of research attesting to its presence, but simply because it is self-evident to even the most casual observer" (p. 211).

Explaining the causal antecedents and behavioural consequences of performance anxiety has challenged researchers for many years. Hembree (1988) suggests the construct may seem remarkable less for its age than for its enduring fascination. Many students, public speakers, and performing artists (musicians, dancers, actors) are also affected by the anxiety associated with performance situations. Performance anxiety is defined as the experience of persisting, distressful apprehension about or actual impairment of, performance skills in a public context (Salmon, 1990). Performance anxiety in sport, is usually referred to as competitive anxiety because of the integral role of competition in most sports.

Anxiety, Stress, and Arousal

Sport anxiety researchers do not agree on the precise definitions of three related terms: anxiety, stress, and arousal. Stress according to Selye (1975), is a non-specific physiological response of an organism (person) to an internal or external demand. Selye differentiated between positive stress, which he labelled eustress, and negative stress, which he called distress. According to Cox (1990), anxiety and distress are virtually identical. Recently, Jones and Hardy (1990) edited a text entitled "*Stress and Performance in Sport*", where the term stress is substituted for anxiety. Obviously a number of researchers are content to use anxiety and stress interchangeably. Sport psychology researchers, however, as with other scientific disciplines, should seek to develop definitions of key terms that underscore their unique elements, rather than use them interchangeably simply because they overlap to some extent.

Spielberger (1989) recognises the common elements of anxiety and stress while managing to highlight the essential difference between the two. He defines stress as a psychobiological process consisting of three elements: Stressors, perceptions or appraisals of danger (threat), and emotional reactions. Anxiety, as he defines it, fits neatly with the third element, emotional reactions. Anxiety is an emotional state (S-Anxiety) consisting of subjective, consciously experienced feelings of tension, apprehension, nervousness, worry, and often is accompanied by heightened arousal of the autonomic nervous system (Spielberger, 1989). According to Spielberger (1989) people who are anxiety-prone, that is they perceive a wide range of situations as anxiety evoking, are high in T-Anxiety otherwise known as trait anxiety (A-trait). Anxiety is perhaps best viewed as a potential but not necessary outcome of a variety of stressful conditions.

Bridges (1971) states that arousal constitutes a continuum that includes relaxed drowsiness, wakefulness, curiosity and attentiveness. Increased levels of arousal may result in stronger emotions such as joy, exhilaration, anxiety, panic, anger, or rage depending on the situation. This is not to say that high levels of arousal necessarily constitute a state of anxiety as individuals may react, to and interpret similar levels of arousal quite differently. For instance, a better than expected performance may induce excitement, and trigger high levels of arousal and joy in the same manner that a poor performance may produce an equally high level of arousal and shame.

Only since the inception of academic sport psychology have the effects of competitive anxiety in sport been subjected to rigorous research. Sport anxiety research involves four, related areas: 1) determining arousal-performance relationships, 2) clarifying the multidimensional nature of competitive anxiety in sport, 3) identifying the underlying causes and effects of anxiety, 4) identifying, developing, and implementing sports anxiety interventions.

Bridges (1971) states that arousal constitutes a continuum that includes relaxed drowsiness, wakefulness, curiosity and attentiveness.

Arousal-Performance Relationships

Drive Theory

Although not accepted by contemporary researchers as an adequate explanation of the arousal-performance relationship, Taylor's (1953) and Spence's (1958) use of Hull's (1943) drive theory is helpful in explaining the relationship between drive (arousal level), which is a state of tension that motivates a person to satisfy a need, and habit strength, which is the degree of previous learning that has taken place (Hull, 1943). This relationship is a multiplicative function and takes the following form:

-

$$\text{Performance} = f[\text{habit (strength)} \times \text{drive}]$$

According to this equation, the f indicates that performance is equal to some "function" of the interaction of habit and drive. Drive-level facilitates performance if the appropriate habits are already dominant, or if there are no, or few competing habits. This certainly applies to easy tasks, but for difficult tasks the opposite occurs (Heckhausen, 1989). Athletes, particularly those engaged in complex, fine motor activities, experience a decrement in performance at high levels of arousal rather than continued improvements as drive theory suggests.

Drive theory has proven to be a difficult theory to test; as a consequence the results of studies in this area have been equivocal. Drive theory was tested extensively in the 1960s and 1970s mainly in laboratory experiments, where high and low trait anxious participants were subjected to various stressors. In a review article of 28 studies testing the drive theory framework, Martens (1971) found that support for, and rejection of, drive theory was about equal. Martens (1971) also suggested that testing drive theory is a difficult if not impossible task, because determining the habit hierarchies (i.e., dominance of correct or incorrect responses) is a difficult task itself.

Quiescence theory

Quiescence theory may be a useful explanation of the arousal-performance relationship in some sports. Quiescence, according to Morgan and Ellickson (1989) represents the antithesis of drive theory, it specifies that performance will increase as arousal decreases. Rather than "psyching up" athletes, this approach uses relaxation procedures to reduce the arousal level of athletes during competition. Little evidence has supported quiescence theory and some studies refute it outright (Morgan & Ellickson, 1989). Quiescence theory may however, fit with tasks that require reduced sympathetic nervous system activity such as rifle shooting, golf putting and chipping, archery, and the free throw in basketball.

Inverted-U hypothesis

Until recently, it has generally been accepted that the inverted-U hypothesis, originally formulated by Yerkes and Dodson (1908), best explains the relationship between arousal and performance (Landers, 1980; Martens, 1977). The inverted-U hypothesis predicts that performance is optimal at a moderate level of arousal, and that performance progressively declines as arousal increases or decreases from a moderate level. Although the inverted-U hypothesis was originally formulated some eighty-five years ago, it is only recently that researchers have applied it to arousal-performance relationships in sport (Martens & Landers, 1970; Sonstroem & Bernardo, 1982; Gould, Petlichkoff, Simons, & Vevera, 1987). Gould et al. also express surprise that few studies have sought to empirically test the inverted-U hypothesis. The number of studies testing the inverted-U hypothesis is relatively small, given that the majority of competitive anxiety review articles, and both academic and applied sport psychology texts discuss it, often in considerable detail.

Perhaps, due to this extensive coverage in sport psychology texts, the inverted-U hypothesis has invariably come under close scrutiny. Krane (1992), in an extensive review article, brings together many critical reviews of the inverted-U hypothesis. An extensive section is devoted to identifying an array of conceptual and methodological problems of the inverted-U hypothesis. A final section specifies the conditions that need to be met before the inverted-U hypothesis is being adequately tested (see, Krane, pp. 73-76). In light of these criticisms, Krane recommends that researchers move beyond the inverted-U hypothesis to examine the anxiety-performance relationship using more complete theories.

Optimal arousal hypothesis

The optimal arousal hypothesis, which in some respects is similar to the inverted-U hypothesis, has received considerable attention recently in the sport psychology literature (Gould, Tuffey, Hardy, & Lockbaum, 1993; Hanin & Syrja, 1995; Morgan, O'Conner, Ellickson, & Bradley, 1988; Raglin, Morgan, & Wise, 1990). Hanin (1980) suggests that each individual has an arousal zone of optimal functioning (ZOF) and that performance efficiency is best when the individual's level of arousal falls within this zone. This optimal zone is calculated from pre-start and retrospective measures of anxiety in previous performances. The optimal arousal hypothesis has an advantage over other prominent theories by accounting for individual differences in arousal susceptibility. Unlike the inverted-U hypothesis, which predicts that performance is best at a moderate arousal level, the optimal arousal hypothesis predicts that some individuals will perform best when highly aroused, whereas others will perform at their peak when relaxed (Morgan & Ellickson, 1989). The optimal arousal hypothesis has obvious applications. Indeed, Zaichkowsky and Takenaka (1993) report that groups of elite tennis and hockey players have had their heart rate monitored in an effort to identify their optimal zone of functioning. Zaichkowsky & Takenaka (1993) also suggest that as with other arousal-performance theories, the optimal arousal hypothesis is, however, somewhat limited, because arousal is often conceptualised in terms of anxiety.

The Catastrophe Model

A relatively recent development has been the application of catastrophe model to the arousal-performance relationship (Fazey & Hardy, 1988). This constitutes a refinement of the inverted-U hypothesis. When athletes experience anxiety, the drop in performance is sometimes dramatic (i.e., catastrophic) rather than gradual as the inverted-U infers. Furthermore, once an athlete experiences high levels of performance anxiety in these circumstances it is often very difficult to get back to a moderate level of arousal. Finally, the inverted-U is a unidimensional arousal based hypothesis with no means of accounting for the significant role that cognitions play. In comparison, the catastrophe model assumes that anxiety has at least two components, cognitive anxiety and a somatic arousal response.

According to the catastrophe model, the quality of performance will vary depending on the interplay between cognitive anxiety and somatic arousal before, and during performance. For example, high levels of physiological arousal without accompanying cognitive anxiety can lead to changes in performance that follow the inverted-U curve. The effect of high levels of both physiological arousal and cognitive anxiety, however, is a sharp decline in performance (i.e., catastrophe). The model proposes a range of outcomes based on combinations of low and high levels of cognitive anxiety and physiological arousal (Hardy, 1989).

Research testing the catastrophe model in sport settings has produced equivocal results. In one study, Hardy and Parfitt (1991) claim strong support for the Fazey & Hardy application of the catastrophe model to sport. In a later study using a similar experimental design Hardy, Parfitt, and Pates (1994) claim equivocal support for the model. Both of these designs are weakened by the decision to test the catastrophe model in non competitive situations. As has been noted earlier it is important for researchers advocating theories designed to explain competitive anxiety to test the theory in ecologically valid settings, in this case real competition. Failure to do so, does not invalidate the theory or model, but does beg the question of whether anxiety commensurate with real competition is produced. A further problem with the two studies by Hardy and associates is the choice to use a questionnaire designed to measure physiological anxiety to assess physiological arousal. In both studies the CSAI-2 was used to measure both cognitive and somatic anxiety. Given that physiological arousal was manipulated with an aerobic exercise procedure the use of the somatic anxiety scale may be inappropriate. As Hardy and Partitt themselves suggest physiological arousal and physiological anxiety do not necessarily parallel each other.

Krane's (1990) thesis dissertation tested the full catastrophe model in a sport setting. Using nonlinear regression analysis little support was found for the model as an explanation of performance data. Because the application of catastrophe model to arousal and performance is relatively new, and the results to date have been equivocal, it awaits experimental verification.

The preoccupation with explaining anxiety by way of theories of arousal is in some respects regrettable. Virtually every major sport psychology text has devoted considerable space to expounding arousal theories in considerable detail. Yet, arousal theories have delivered little in terms of understanding the antecedents of anxiety, its specific effects, and the development of appropriate interventions. Furthermore, the change in allegiance to different arousal theories over the years may reflect a lack of confidence in the predictive validity of any one theory. The recent development of the more sophisticated catastrophe theory is perhaps a reflection of dissatisfaction with traditional arousal theories.

Anxiety as a Multidimensional Construct

The differentiation between trait anxiety (A-trait) and state anxiety (A-state) proposed by Cattell and Scheier (1961) and later by Spielberger (1966) was a major break-through in anxiety research. This differentiation views anxiety as a transitory emotional state (A-state) and anxiety proneness as a personality disposition or trait (A-trait). Thus, A-trait refers essentially to chronic anxiety, whereas A-state refers essentially to acute anxiety. The concept of A-trait reflects relatively stable individual differences in the susceptibility to assess a range of situations as anxiety provoking. This will be reflected in the frequency and intensity with which an individual experiences anxiety (Hackfort & Schwenkmezger, 1993).

When attempting to predict how people will respond in different situations, additional information apart from a measure of a person's general proneness to experience anxiety is necessary. For instance, as Martens, Vealey, and Burton (1990) point out, a person may become quite anxious when taking a maths test, sitting in a dentist's chair, or delivering a speech, but not when competing in hockey, during a piano recital, or taking a driver's test. It is therefore, not surprising, that a number of situation specific trait tests have shown superior predictive capacity over general trait measures (Mellstrom, Cicala, & Zuckerman, 1976; Watson & Friend, 1969).

Researchers have found A-trait to be a consistent predictor of A-state in sport. A series of studies conducted by Martens and colleagues to examine the relationship between A-trait and A-state using the Sport Competition Anxiety Test (SCAT) and the Competitive State Anxiety Inventory-2 (CSAI-2) respectively, lends strong support for the predictive validity of A-trait (Cooley, 1987; Gould, Horn, & Spreeman, 1983; Martens et al., 1990; Poteet & Weinberg, 1980; Scanlan & Lewthwaite, 1984; Scanlan & Passer, 1978, 1979; Weinberg & Genuchi, 1980; Williams & Krane, 1992). These studies demonstrated that A-trait predicts A-state in a number of sports and at different periods throughout the competition. The strongest relationship between A-trait and A-state was found at the pre-competition stage and in stressful competitive situations (Martens et al., 1990). Martens and Simon (1976) have reported a correlation of $r = .73$ between pre-competitive A-trait and A-state, accounting for 53 % of the total variance with a group of collegiate basketball players. Other researchers have since affirmed the ability of A-trait to predict pre-competition A-state (Brustad & Weiss, 1987; Weinberg & Genuchi, 1980).

A number of A-trait tests have been developed both in mainstream psychology and sport psychology. One of the most popular instruments has been the trait sub-scale of the State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch & Lushene, 1970). The popularity of the STAI is evident by its widespread international use, having been translated and adapted into 39 languages and dialects. Martens, who was the first to recognise the need for a sport specific trait scale, developed the SCAT (Martens, 1977), a sport specific measure of a person's proneness to become anxious in sport competitions. The SCAT has been extensively used in both research and applied aspects of sport psychology (Maynard & Howe, 1987; Scanlan & Lewthwaite, 1984; Weinberg & Genuchi, 1980).

Another important breakthrough in anxiety research apart from the trait-state distinction was the division of A-state into cognitive and somatic elements. Liebert and Morris (1967) were the first to draw a distinction between worry and emotionality, more recently labelled cognitive anxiety and somatic anxiety (Davidson & Schwartz, 1976). Cognitive anxiety is defined as "negative expectations, and concerns about oneself, the situation at hand, and the potential consequences". Cognitive anxiety is manifested in persistent worries, ruminations, inability to concentrate, and disturbing visual images. Somatic anxiety is defined as the "physiological and affective elements of the anxiety experience that develop directly from autonomic arousal" (Martens et al., 1990, p. 120). Indicators of somatic anxiety include: increased heart rate, shallow breathing, clammy hands, and tense muscles (Martens et al., 1990).

Research suggests that cognitive and somatic anxiety are likely to co-vary. Martens et al. (1990) argue that many situations contain elements that elicit both cognitive and somatic elements of anxiety. Borkovec (1976) suggests that each component may serve as a conditioning function for the other. For example, an athlete may acquire conditioned somatic responses to a particular environment or event such as a locker room, a pre-contest warm-up routine, or even a particular opponent. The conditioned somatic response may then trigger the athlete to start worrying because he or she feels certain somatic symptoms of anxiety (Martens et al. 1990).

Each athlete has his or her own idiosyncratic patterns of response in stressful circumstances, and may experience different levels of cognitive and somatic anxiety. In addition, a person may respond in a situation specific manner, demonstrating mainly cognitive symptoms in one situation and somatic symptoms in another (Borkovec, 1976). In contrast Hatfield and Landers (1983) believe that many individuals are either primarily cognitive 'responders' or somatic 'responders'. This ties in with the research of Davidson and Schwartz (1976) who developed the matching hypothesis, a diagnostic approach that assesses the anxiety sufferer as either cognitive or somatic anxiety dominant, and left hemisphere or right hemisphere dominant. Thus, people fit into one of four categories generated from this 2 x 2 assessment approach. The appropriate intervention strategy is then matched to the specific type of anxiety being experienced. For example, techniques such as EMG biofeedback, hypnosis, exercise, and physical relaxation are prescribed as the treatment-of-choice for people assessed as somatic-left hemisphere dominant. The matching hypothesis was developed largely in response to the finding that stress management techniques were not always successful in alleviating anxiety. Davidson and Schwartz believe that finding a better match between the person and the array of available treatments would improve the success rate (Burton, 1990). To date, sport psychologists have not tested the matching hypothesis in sporting contexts. Nevertheless, such an approach makes intuitive sense, and may yet prove valuable in providing a better service to the anxiety ridden athlete.

Martens et al. (1983) argue that somatic anxiety should influence performance less than cognitive anxiety because it reaches its peak prior to, and during the early stages of competition and then declines (Jones & Cale, 1989; Martens et al. 1990). In contrast, cognitive anxiety is hypothesised to be a better predictor of performance because it is likely to persist for a greater part of the competition. Gould et al. (1987) suggest that somatic anxiety influences performance primarily when the performer becomes preoccupied with the internal functions of his or her body, as often occurs with fine motor activities such as rifle shooting, golf putting, and chipping. This focus of attention on bodily functions distracts the performer. In these fine motor activities, physical effects such as hand tremor are detrimental to performance.

-

Measures of Anxiety

A number of inventories have been constructed to measure the trait and state elements of anxiety, and the cognitive and somatic components of A-state including, the Test Anxiety Inventory (Spielberger, Gonzalez, Taylor, Algaze, & Anton, 1981), the Worry-Emotionality Inventory (Liebert & Morris, 1967), and the Cognitive-Somatic Anxiety Questionnaire (Schwartz, Davidson, & Goleman, 1978).

In sport settings the SCAT has proven to be a very popular research instrument. A possible limitation of the SCAT is it's global design with cognitive and somatic A-trait not having separate sub-scales. Smith, Smoll, and Schutz (1990) recognised this limitation and produced the Sport Anxiety Scale, a multidimensional measure of A-trait in sport. The Sport Anxiety Scale has strong psychometric properties and is useful where it is important to differentiate between cognitive and somatic A-trait.

Further to developing the SCAT, Martens also recognised the need to produce a sport specific scale to measure A-state in athletic settings. The Competitive State Anxiety Inventory-2 (CSAI-2) (Martens, Burton, Vealey, Bump, & Smith, 1983) was developed to meet this need. The CSAI-2 includes nine items related to each of three sub-scales: cognitive anxiety, somatic anxiety, and self confidence. The CSAI-2 replaced an earlier version of the Competitive State Anxiety Inventory (CSAI) (Martens, Burton, Rivkin, & Simon, 1980) that was found to be lacking in reliability and validity. The CSAI-2 has been used extensively to measure pre-competitive anxiety, especially in field settings, where the brevity of the CSAI-2 enables anxiety response to be gathered relatively quickly (e.g., Burton, 1988; Crocker, Alderman & Smith, 1988; Gould et al., 1987; Gould & Weinberg, 1985; Krane & Williams, 1987). As with many pencil and paper tests, a potential limitation of the CSAI-2, which needs to be minimised, is the possibility of obtaining socially desirable response biases (Gould & Krane, 1992). Hackfort and Schwenkmezger (1989) also point to the problems associated with social desirability, and reason that anxiety repression is a particular threat for questionnaires, where the intensions can be easily discerned by the respondent. Producing items with a high degree of face validity makes the task of producing items where the intensions are not readily apparent particularly difficult. The CSAI-2, which unlike SCAT does not have any non-anxiety related filler items, appears to be especially transparent. Despite these limitations and others (see, Hackfort & Schwenkmezger, 1989) pencil and paper tests are used extensively in anxiety related research. Paper and pencil tests apart from the relatively non-invasive are also a relatively inexpensive and time efficient means of obtaining information.

Physiological and Behavioural Measures

Physiological and behavioural assessment of anxiety are sometimes used in preference to questionnaires, but as with questionnaires these methods present their own advantages and disadvantages. Psychophysiology is an area where the collection of accurate and reliable A-state information through the use of sophisticated measuring devices is possible. Psychophysiology is defined by Sternbach (1966) as a body of knowledge concerned with the inference of psychological processes and emotional states from an examination of physiological measurements. Some studies have demonstrated evidence in favour of the predictive validity of psychophysiological measures over self report measures (Light & Obrist, 1983; Webb, Cambell, Schwartz, & Sechrest, 1966). With ongoing improvements in technology and instrumentation, psychophysiological instruments can provide objective and accurate measurement not always possible with the more reactive psychological measures (e.g., pencil and paper tests). In a review of problems associated with psychophysiological measures of anxiety, Hackfort and Schwenkmezger (1989) suggest there are a substantial number of disadvantages of such measures, and these outweigh the advantages.

Often overlooked as indicators of the effects of anxiety are behavioural indices. Observational assessments of anxiety can be less intrusive than either pencil and paper or psychophysiological techniques, but they suffer from the difficulty of making universal associations between particular behaviours and anxiety. That is, anxiety responses, being relatively individualised, are difficult to observe objectively. Even though behavioural measures have seldom been employed in sport psychology anxiety research, they do hold potential as a source of corroborating other measures, particularly when individual response patterns have been studied extensively in a range of anxiety intensive situations.

Effects of Anxiety

Sport psychologists have identified an array of specific somatic, cognitive, and behavioural effects relating to performance anxiety. When suffering from anxiety, athletes experience an array of physiological changes. Common physiological effects include the following: nausea, pounding heart beat, trembling, increased respiration rate, bio-chemical changes, electrophysiological indicators (e.g., skin conductance, electromyogram, electrocardiogram, electroencephalogram and muscle potentials), clammy hands, flushed face, cotton mouth, butterflies in the stomach, visual distortion, yawning, diarrhoea, nausea, vomiting and hyperventilation (Hackfort & Schwenkmezger, 1989; Harris & Harris, 1984; Kroll, 1979).

The specific effects of cognitive anxiety are numerous and the results are often maladaptive mind sets culminating in negative thinking, worry, and rumination over the consequences of performance outcome. Other effects of cognitive anxiety include: a sense of confusion, forgetting details, and inability to concentrate (Harris & Harris, 1984). Yet, anxiety in not necessarily detrimental and can have facilitative effect on performance. The famous musician Pablo Casals is reported to have experienced strong anxiety with every performance until his death at the age of 97 (Plaut, 1988). Similarly, anecdotal reports indicate that the legendary Boston Celtics centre, Bill Russell was physically ill before taking the court throughout his career.

Interpretation of behavioural indices is somewhat subjective; often it is difficult to determine whether anxiety or another cause is behind a behaviour. For example, one does not know whether a skier trembling at the peak of a steep downhill slope is afraid or merely cold (Hackfort & Schwenkmezger, 1989). Despite this ambiguity, assessment of behavioural indicators is especially important because coaches and trainers tend to rely heavily on their observation of anxiety symptoms rather than more sophisticated psychological and physiological measurement (Hackfort & Schwenkmezger, 1989).

The intensity and manifestation of anxiety symptoms differ from person to person, and situation to situation. In addition, each sub-system (i.e., somatic, cognitive, and behavioural) is probably connected with each other, allowing for a multitude of feedback loops. For example, thinking about a particularly difficult opponent may first induce worrying thoughts, followed by an increase in heart rate and breathing, and finally, a change in facial expression.

As previously mentioned, anxiety is thought to lead to a decrease in an athlete's concentration and attentional abilities. Theorists supporting the link between anxiety and attentional processes emphasise that negative cognitions influence a person's ability to focus on the task at hand. For example, Wine (1971), in studying test anxiety, suggests that high anxious people spend considerable time worrying about performing poorly and the consequences of failing rather than focusing on the task at hand. Because these cognitions contribute nothing to the solution of the task, they distract attention from it, and thus, negatively affect performance. One of Wine's respondents, when answering an open ended item, stated, "I thought about it so much I couldn't concentrate" (p. 95). Anxious athletes may divert attention inwardly to their thought processes, and therefore, less attention is given to the external stimuli critical for successful performance.

This attentional interpretation of the effects of anxiety on task performance is consistent with Easterbrook's (1959) theory of cue utilisation. In sport tasks, many cues are available to the performer, some of these are relevant for quality performance; others are irrelevant, and attention to them can damage performance (Cox, 1990). Cue utilisation theory suggests that, at a low level of arousal too many cues, relevant and irrelevant, are processed, and as a result performance is not optimal. As an athlete's level of arousal increases attentional narrows to only process task relevant cues, as a result performance is optimal. Finally, when an athlete overly narrows many of the relevant cues are not detected or used, therefore, performance is again not optimal.

Anxiety in competitive situations has clearly proven to be far more complex than originally thought. Over the past forty years researchers have demonstrated the multidimensional nature of anxiety by identifying a number of important distinctions. The initial recognition of the difference between A-trait and A-state was followed by a further sub-division of A-state into cognitive and somatic elements. Anxiety is equally diverse in how it is likely to affect a performer. Disruptions in cognitive functioning such as rumination, memory, and attentional disruption occur during a range of tasks. In addition, a number of somatic and behavioural manifestations of anxiety are discernible to the performer and others. It is vital to establish what causes these effects, especially for those athletes who perform best when these effects are alleviated.

Underlying Causes of Anxiety in Sport

Despite there being many possible causes of anxiety, it is commonplace for theorists to emphasise one, two, or occasionally three causes of anxiety without reference to other salient factors. Some authors (Jones, Swain, & Cale, 1990;

Parfitt, Jones, & Hardy, 1990) suggest that, considering the large amount of research devoted to investigating anxiety in sport, detailed identification of factors that elicit anxiety during competition has received relatively little attention. They suggest this is particularly surprising, because such information could prove valuable in the prevention and control of debilitating levels of anxiety.

An examination of relevant literature did, however, uncover an extensive body of material relating to the causes of competitive anxiety. Apart from the findings of many quantitative studies into competitive anxiety, a number of qualitative studies have investigated the more general domain of sources of stress in sport (Cohn, 1990; Gould, Jackson, & Finch, 1993; Scanlan, Stein, & Ravizza, 1991). The findings of these qualitative studies are included here because they either define stress as incorporating anxiety (Scanlan et al.) or use stress and anxiety interchangeably (Cohn, 1990). For example, Scanlan et al. defined stress in their study as:

> When we discuss stress or pressure now, I am referring to the negative emotions, feelings, and thoughts that you might have had with respect to your skating experience. These would include feelings of apprehension, anxiety, muscle tension, nervousness, physical reactions (such as butterflies in the stomach, shaking, or nervous sweating), thought centered on worry and self-doubt, and negative statements to yourself (p. 105).

In reviewing the related literature, these qualitative studies do not typically discriminate between studies that seek to investigate sources of stress in sport and sources of competitive anxiety in sport. The extended list of causes identified in this dissertation are, therefore, a compilation of identified causes of stress and anxiety. This approach is taken to provide a more complete list of causes.

-

An Interactional Approach

To better understand these proposed antecedents of competitive anxiety in sport, Magnusson and Endler's (1977) interactionist model is adopted. They proposed that the anxiety response is dependent on the reciprocal interaction between athletes and their specific sport environments. To capture the essence of the interactional paradigm, salient information is necessary about persons and the situations in which they find themselves (Fisher & Zwart, 1982). In reviewing both intrapersonal, situational, and episodic factors, a much larger than expected list of causes was uncovered. Other competitive anxiety researchers may contend that there is some duplication here, or possibly that other salient causes have gone unnoticed. Each of the following 17 proposed causes of anxiety is reviewed briefly beginning with intrapersonal factors.

Proposed Intrapersonal Causes

Fear of failure

Sport psychology researchers have consistently linked fear of failure with competitive anxiety (Gould, Horn, & Spreeman, 1983; Kroll, 1979; Passer, 1983; Rainey & Cunningham, 1988; Scanlan & Lewthwaite, 1984). Fear of failure is perhaps best understood as part of Atkinson's (1964) theory of achievement motivation. According to Atkinson, if the motive to avoid failure exceeds the motive to achieve success a person is unlikely to approach an achievement situation. It is not difficult to see how participation in competitive sport, where failure is common, can potentially lead to a high level of fear of failure in some individuals. After all, the result of competition in sport is invariably either a zero sum situation (i.e., one loser for every winner), or a negative sum situation (i.e., multiple losers for every winner). Even though fear of failure is hypothesised as a cause of anxiety, it probably has its own antecedents that may differ from person-to-person. As part of the development of a proposed athletic stress scale, Kroll (1979) produced a fear of failure sub-scale that incorporated the following concerns: letting teammates down, losing, pressure to win, choking, and falling for a 'sucker' play. Similarly, Scanlan, et al. (1991) identified performing poorly and subjective feelings of failure and as part of a theme they called worries of competition.

Ego threat/Fear of Evaluation

Another similar but more specific proposed cause of anxiety is ego threat (Fisher & Zwart, 1982; Pierce & Stratton, 1981). Ego threat comprises situations where there is an apparent negative spotlight on the athlete such as after making a foolish mistake (Fisher & Zwart, 1982). Dunn and Nielson (1993) in a study of soccer and ice hockey players found that situations which focused attention on players negatively were consistent perceived as sources of threat. These types of situations included: being benched, receiving criticism from the coach and making a bad pass that leads to an opposition goal. Athletes may also react to internal threats to their ego, such as losing, or not performing up to their expectations, and not improving on their last performance (Gould & Weinberg, 1985). According to Scanlan and Passer (1979), "participation in evaluation-laden settings can be perceived as threatening to self-esteem if a child feels personal inadequacy in

-

successfully meeting the demands of the competition and, as a consequence, risks failure and/or negative social appraisal" (p. 151). Ego threat may also result from the perceived expectations of parents, coaches, and teammates (Gould & Weinberg, 1985; Passer, 1982). Scanlan, et al. (1991) found that figures skaters experienced a number of perceived ego threats including: not wanting to let others down, what others would think and say if they performed poorly, losing one's sense of self-worth/identify. Fisher & Zwart (1983) found ego threat to be the most pervasive facet of anxiety response among male college basketballers. They found that criticism by the coach and crowd rate as two of the three highest anxiety-inducing situations in a list of eighteen anxiety eliciting basketball related scenarios. Rainey and Cunningham (1988) found similar results, but only for male athletes in their study of participants from a range of sports. They contend this could be because women's sport receives less public attention, and hence less negative affect from team mates and parents. Ego threat seems to be more prevalent among elite athletes, who invest large amounts of time, energy, and money in their sport often to such an extent they become identified by others by their sporting affiliation. This threat is summed up by one elite figures skaters comment, "losing one's sense of self-worth or identify due to the loss of self-esteem, feeling inadequate because ... and being referred to by the family when talking to friends as "the skater" versus by name. (p. 115; Scanlan, et al. 1991)

The performer's skill level

An obvious cause of anxiety often overlooked by researchers is the actual skill level of the athlete. This view suggests that anxiety derives from a realistic negative self evaluation, and expectations of failure result from an inability to match the task requirements (Heckhausen, 1990). This explanation, known as the "incompetence hypothesis", has received some support. Culler and Holahan (1980) found that compared to low anxious students, students with high test anxiety had poorer study techniques. Anxious students also have greater difficulty encoding and processing information than their less anxious counterparts (Benjamin, McKeachie, Lin, & Holinger, 1981). According to this view, test anxious students are handicapped in their ability to perform. Right from the start, they know, expect, and feel this, which in turn elicits anxiety responses. These findings would be more convincing if the researchers demonstrated that ability, as reflected in test scores, was not confounded by A-state. Clearly, it is difficult to determine whether a lack of skill leads to anxiety, or whether anxiety contributes to poor performances.

The incompetence theory has received little support in sport specific studies. Fisher and Zwart (1982) found perceived ability to be a minor contributor to the overall anxiety experienced by male basketball players. Similarly, Passer (1983) found little difference in perceived ability between high and low anxious soccer players. Perhaps the lack of support for the "incompetence hypothesis" relates to how the independent variable (i.e., skill level) was operationalised. Both studies used self perceptions of ability rather than more objective means of determining player skill levels. This problem should not be too difficult to amend because, nowadays, game statistics are used extensively, to objectively measure many aspects of performance, especially in elite sport. Further research is needed to directly measuring the amount of variance in anxiety accounted for by ability.

Poor preparation or lack of perceived physical readiness

Another variable that has been positively correlated to competitive anxiety is a lack of perceived readiness (Cohn, 1990; Heyman, 1982; Jones, Swain, & Cale, 1990; Martens & Gill, 1976; Scanlan, 1978). Perceived readiness takes in such factors as recent training form, recent competitive form, level of fatigue, physical readiness, and mental readiness (Jones, Swain, & Cale, 1990). In a recent study Jones et al. found that a factor that they labelled as perceived readiness accounted for 26.2% of the total explained variance in state cognitive anxiety among elite middle distance runners. This represented the highest degree of explained state cognitive anxiety among five factors extracted from a pre-race questionnaire (PRQ) developed for the Jones et al. study. In a qualitative study into the sources of stress for collegiate golfers Cohn (1990), found that a lack of practice and poor practice form were reported as stressors for 90% and 60% of golfers respectively. Ironically, a number of golfers in the Cohn study reported that they felt burnout due to a number of reasons including practicing too much which was the most frequently cited reason given for burnout. Perceived readiness, therefore, is probably best seen as an optimum balance between practicing too little and practicing too much.

Performance Expectancies

Another prevalent source of anxiety relates to the internal pressure associated with performing up to personal expectations. This proposed cause, rates highly when athletes are asked to describe their most frequent sources of worry and stress. In an exploratory study with intercollegiate wrestlers Gould and Weinberg (1985) identified 33 separate sources of worry. Of these, two of the top four perceived worries related directly to performance expectations, over 40% of participants rated "about improving on my last performance" and "about performing up to my level of ability" as a major source of worry. In a similar study of competitive stress in 10 intercollegiate golfers by Cohn (1990), 29 separate sources of stress were identified. Of these, the most frequently cited source of stress was "playing up to personal standards", all 10 golfers identified this as a perceived stressor. Where a discrepancy occurs between expectancy and performance significant levels of stress are often reported (Scanlan & Lewthwaite, 1984). The relationship between performance expectations and competitive anxiety is mediated by contextual factors. For instance, the relationship between performance expectancies and anxiety is more firmly supported in individual sports compared to team sports. Moreover, performance expectations are more likely to lead to anxiety where their is a discrepancy between performance outcome and team expectations, rather than performance outcome and individual expectations (Scanlan & Lewthwaite, 1984).

Pre-disposition (A-Trait)

Of all the hypothesised causes of competitive anxiety, pre-disposition commonly referred to as trait anxiety (A-trait), has received the most support (Cooley, 1987; Gould, Horn, & Spreeman, 1983; Martens et al. 1990; Poteet & Weinberg, 1980; Scanlan & Lewthwaite, 1984; Scanlan & Passer, 1978, 1979;

Weinberg & Genuchi, 1980; Williams & Krane, 1992). This is not surprising since the correlation between A-trait and A-state is reported to be in the r =.50 to r = .60 range, thereby confirming that they share a considerable amount of the total variance (Weinberg & Genuchi, 1980; Scanlan & Passer, 1977). The overwhelming support of A-trait as a cause of A-state is important, because it demonstrates that A-trait is a logical starting point for predicting those athletes that are likely to experience high levels of A-state.

Perceived uncertainty

Perceived uncertainty being an integral part of the Martens et al. (1990) model is reviewed in detail in the next section of this Chapter (see The Martens, Vealey, and Burton (1990) Model section).

Perceived importance

Perceived importance is also an integral part of the Martens et al. (1990) model (see The Martens, Vealey, and Burton (1990) Model section for a detailed review).

Proposed Situational Causes

Research suggests that other causes other than intraindividual factors can also causes A-state reactions. A number of situational causes of competitive A-state have been identified, these include:

Position goal (i.e., task difficulty)

The perceived difficulty of the task has also been shown to be related to A-state (Dowthwaite & Armstong, 1984; Faulkner, 1980; Gruber & Beauchamp, 1979; Jones, Swain, & Cale, 1990). In a study with University of Kentucky basketball players, Gruber and Beauchamp found game difficulty to be closely related to A-state, as measured with the Competitive State Anxiety Inventory (CSAI). Mean scores were significantly different for two practice situations (M = 19.5, S.D = 3.9), compared to three easy games (M = 22.0, S.D = 6.7), and three crucial games (M = 25.4, S.D = 6.5). Gruber and Beauchamp also highlight the probable interrelationship between game difficulty and perceived importance when they discuss the importance of the crucial games to the team's future ranking and in particular the importance of a game against a local rival. The crucial games were categorised as such, because in each case the opponents were ranked in the top 10 teams in the U.S.A, and a win would have placed the Kentucky team in the top ten themselves. Conversely, if they lost these games they would drop in the ranking from their present position. Crucial games are anxiety inducing because they challenge an athletes belief in their ability to meet the task demands, especially in reference to their opponents ability.

Social facilitation effects

The effects of social facilitation on anxiety have not been systematically studied in sport psychology research. Despite this, a number of studies have indirectly lend support for the hypothesis that the presence of others can lead to anxiety. Zajonc (1965) is credited with demonstrating that the presence of an audience can have a profound effect on arousal level. Whether this arousal in interpreted negatively, positively, or in a neutral manner is probably dependent on a number of factors including: the task, the experience and competence of the athlete, the evaluative potential of the audience, the proximity and size of the audience (Cox, 1985). In a qualitative study involving in-depth interviews, Cohn (1990), reported that the first tee shot was a significant stressor for 9 out of the 10 collegiate golfers that were interviewed. The stress of teeing up is exemplified by the following quote. "The biggest is the first tee, whether I am in a match or just playing with friends; you just have a lot of pressure to start well, and usually if I do well it will cut down the stress" (p. 101). In another qualitative study by Scanlan, et al. (1991) skating in front of people and falling in front of the crowd were mentioned as sources of stress for some skaters.

Loss of control

Some athletes are likely to feel anxious in situations where they feel they lack control over elements of the situation. In the development stages of a scale to measure the causes of anxiety in sport, Kroll (1979) found a cluster of responses made by athletes to perceived stressors that they termed loss of control. This cluster included: the conduct of their opponents, equipment failure, weather, behaviour of spectators, being injured, and bad luck. Kroll suggested that this loss of control list is very similar to Rotter's (1966) concept of external locus of control. A person's tendency ascribe anxiety to uncontrollable events may be related to their dispositional locus of control style.

Playing in poor conditions

Playing in poor conditions seems to be a particularly stressful event for some athletes. Marchant (1992), in a case study of an elite rifle shooter found that persistent fog during a National Championship that made the target barely visible, resulted in a significantly higher heart rate and competitive A-state. Poor playing

-

conditions may be especially anxiety evoking in sports where participants compete on a time interval basis rather than simultaneously. In these sports athletes may feel anxious because they feel that poor intermittent weather may place them at a relative disadvantage. In golf, for example, late afternoon winds, a brief thunderstorm, or general wear-and-tear on putting surfaces may lead to elevated levels of anxiety for some participants.

Type of sport

Research suggests that the context of sports participation affects the likelihood of anxiety response. For example differences have been noted based on whether the sport involves individual performance v team performance (Griffen, 1972; Martens et al. 1990; Scanlan, 1977; Simon & Martens, 1979), contact v non-contact (Martens 1979; Martens et al. 1990), and objective scoring v subjective scoring (Krane & Williams, 1987; Martens et al., 1990). Martens et al. suggest that individual athletes are more likely to feel more anxious, because evaluation threat is maximised compared to team sports, where the responsibility for performance errors is more likely to be diffused across the team. Sports that use a subjective scoring system, such as judge evaluations, are also thought to be more anxiety inducing, because athlete perceive a greater sense of uncertainty and reduced control over their performance scores. The reason for the difference between contact and non-contact sports is hypothesised to be caused by the increased threat of personal confrontation in contact sports (Martens et al., 1990). Taken together, these three reasons may significantly heighten the level of A-state in contact sports such as boxing where athletes compete individually, and the scoring system is subjective.

Parental/Coach pressure

A less consistent, yet nevertheless significant source of stress for some athletes, is associated with significant others such as parents or coaches. In all likelihood, some parents exacerbate the stress their children feel prior to, and during athletic competition, while other may obviate it. Scanlan and Lewthwaite, (1984), suggest that these significant others, are intricately involved in the structure, dynamics, and social milieu of children's sport. As such, parents and coaches are influential in shaping athletes perceptions, including the perception of threat. A descriptive study by Pierce and Stratton (1981) supports the proposition that expectations and pressure from parent, either direct or indirect, weighs heavily on some junior athletes. They found that among the most prominent worries for youth sports participants were 'what their parents would think', 'what their coach would say', and 'what their teammates would say'. Gould and Weinberg (1984) found that parental, coach, and teammate concerns are not confined to adolescents. These concerns ranked 3, 7, and 11 among a list of 33 sources of worry for a sample of NCAA Division one wrestlers. Perhaps more concerning, is the finding of Purdy, Haufler, and Eitzen (1981), who found there is a tendency for parents to underestimate the stress being experienced by their children. It seems that parents, at least in some settings, are not always sensitive to the emotional well being of their children. These findings support the notion of further educating significant others to the concomitant pressures associated with their involvement in sport, and how this affects their charges.

Real life stressors

The unique demands of pursuing sporting excellence are well documented. These demands range from sport-to-sport but include: financial burden involved in travelling, buying equipment and uniforms, excessive time needed to train and compete, relationship issues, dealing with sporting politics, missed social opportunities, expectations of others, media demands and effects, interruption of school and study schedules (Gould et al., 1993). Undoubted, there are many other stressors that affect athletes depending on their particular life circumstances. Apart from the constancy of these stressors, other unexpected stressful events may produce an anxiety response, albeit for a lesser time. Although many of these real life stressors are not directly linked to competition, they can negatively affect an athletes preparation, and hence represent a potential source of competition anxiety. Gould, et al. (1993) have suggested that researchers interested in studying stress in elite athletes would do well to keep these stressors in mind when conducting future research. Equally, sport psychologists working in applied settings should not underestimate the potency of these stressors to increase the anxiety experienced prior to, and during competition.

Episodic Variables

Athletes can quickly move from a relaxed to anxious state, or vise-versa, depending on their perceptions of how well they are playing, and the context of the game or match. Research suggests that these factors may be equally, or more critical, than intrapersonal or situational variables.

Critical situations within the game

The opportunity to hit the game winning run, holing the tournament winning putt, or defying the opposition with a buzzer beating jump shot, represent critical moments within sports contests. Labels such as 'choker' or 'ice' are sometimes given to athletes who respond repeatedly to these critical situations, either maladaptively ('Choker'), or adaptively ('Iceman'). Recently, Krane, Joyce, and Rafeld (1994) investigated the effects of how critical the situation was in followed up on earlier work by Lowe (1973), who found that little league baseballers experienced higher heart rates during critical moments. Krane et al. using collegiate softball players, found a significant difference in cognitive A-state when the score differential was close and when a players was on third base, compared to when there was a two run or more score differential, and when third base was not occupied. Krane et al. conclude that the situational demand and accompanying anxiety fluctuate during competition, particularly when athletes face critical situations, because they perceived these situations as more threatening or important.

Ongoing performance

Fluctuations in the level of A-state can occur, depending on how well the athlete is performing. For example, A-state may increase or decrease quickly in response to an unexpected poor performance, or when an opponent is performing exceptionally well. McAuley (1985), found that post-performance A-state was more closely related to performance than pre-competitive A-state to performance. As a result, McAuley concluded that A-state is more likely a result of performance than an antecedent. In his study, golf performance had a significant influence on cognitive A-state, accounting for 25.6% of the variance. In an earlier study, Scanlan (1977) using an elaborate experimental design involving bogus win-loss information to youths on a motor maze task, found that those who received feedback that they had won reported significantly lower A-state at the completion of the task than those who were told they lost. Sport psychologists must, therefore, be mindful, whether working in applied or research settings, that A-state can change dramatically over a short space of time, especially in sports such as golf, where actual competition time is protracted. In addition, it appears that the practice of attempting to predict performance based on pre-competition A-state is confounded by the effects of both ongoing performance result and situation criticality. Taken together, these two variables emphasise the tendency for A-state to be reactive, and thus fluctuate throughout within the competition period.

Other Group Differences

Apart from the many hypothesised causes of A-state, a number of differences in A-state responses have been identified based on demographic differences, such as age, gender, and years of experience in a sport. In assessing the likelihood that an athlete will experience high levels of A-state sport psychologists need to consider these demographic differences as well as intrapersonal, environmental, and episodic factors.

-

Age

Younger athletes are often cited anecdotally as being more susceptible to competitive anxiety due to their relative inexperience, and because older athletes tend to have a less ego-oriented motivational orientation (Maehr & Braskamp, 1986). Hammermeister and Burton (1995), using the CSAI-2, found older endurance athletes to be significantly less anxious than their younger counterparts. As no attempt was made to control for extraneous factors this result should not be viewed as necessarily conclusive. Age related differences may, for example, have been partly due to differences in level of competition. Although the athletes involved in the Hammermeister and Burton study were competing in the same events, the majority of higher placed finishes, or elite competitors, may have been young, and thus weight the data. This is not to decry the finding that age differences in competitive A-state occur, but they must be viewed in context, with other intervening variables accounted for. Similarly, the assumption that younger athletes will be more anxious due to a relative lack of experience may also be invalid. In some situations younger athletes have been involved in their chosen sport for many years, and are sometimes more experienced than older athletes who are later starters.

Years of experience in the sport

Research carried out by Fenz and colleagues with parachutists has been frequently cited in the sport anxiety literature. In these studies, experienced parachutists were reported to have lower pre-jump A-state levels than inexperienced jumpers, temporal differences based on jumping experience were also reported (Epstein & Fenz, 1962; Fenz, 1988; Fenz & Jones, 1972). Since then, a number of studies have sought to further investigate differences in A-state as a result of experience in sporting contexts. While, is has not always been agreed that different temporal patterns exist, a number of studies have shown that experienced athletes are generally less anxious prior to competing than inexperienced athletes (Gould, Petlichkoff, & Weinberg, 1984; Martens, 1977). In a study with intercollegiate wrestlers, Gould, Petlichoff, & Weinberg (1984) found years of experience to be a key predictor of pre-competitive A-state, as measured 10 minutes before each of two competitive matches. A regression equation showed that along with A-trait, years of experience accounted for the most variance among the predictor variables.

The complexity of the competitive anxiety phenomena that includes multiple intrapersonal, situational, and espisodic predictors of A-state has been a major stumbling block for researchers. According to Martens et al. (1990) a good theory of competition anxiety should predict the levels of A-state in varying competitive situations taking into consideration characteristics of the competitors and situational demands. Not surprisingly, few researchers have attempted to posit a comprehensive theory capable of accounting for the multidimensional nature of anxiety.

The Martens, Vealey, and Burton (1990) Model

An attempt to synthesise findings into a theoretical model has recently emerged. Based on a fifteen year research program on competitive anxiety, Martens et al. (1990) have suggested a three factor causal model, incorporating perceived uncertainty of outcome, perceived importance of outcome, and competitive A-trait as affecting perception of threat, which in turn produces an A-state reaction. Martens et al. define threat as "the perception of danger arising from the objective competitive situation" (p. 218). They hypothesised that the first two precursors, perceived uncertainty and importance are interactive, with both needing to be present for threat (T) to exist. This relationship is symbolically expressed as $T = f(U \times I)$. As shown in Figure 2.1, perceived threat is a function of the interaction of uncertainty and importance. The third factor, A-trait, is predicted to affect perception of threat independently. Threat is included as a precursor to A-state to emphasise the importance of perception in determining responses made to the environment.

The Martens et al. (1990) model is based on a conceptual model of the stress process developed by McGrath (1970). Martens et al. quote McGrath who states that stress "has to do with a (perceived) substantial imbalance between demand and response capability, under conditions where failure to meet demands has important (perceived) consequences" (p. 20); that is, there is uncertainty that the demand can be met, and failure to do so is important.

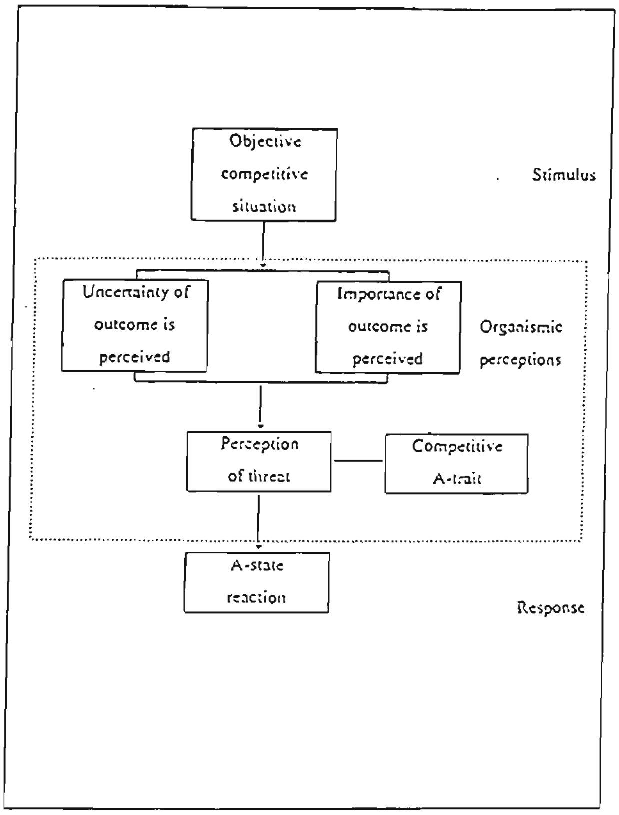


Figure 2.1. A theory of competitive anxiety (from Martens et al., 1990, p. 219).

Whether perception of threat is a necessary part of the model is debatable. Reber's (1985) dictionary of psychology defines threat as "most generally, any action gesture or response that indicates an intension to attack, harm or intimidate another" (p. 773). Threat being synonymous with physical action seems somewhat misplaced when used in the context of the Martens et al. (1990) model. The inclusion of threat in the model is appropriate for situations, including some contact sports, where a genuine physical threat is present, such as boxing, martial arts, and some football codes. As previously stated, the reason for including perception of threat relates closely to the important role perception plays in determining responses made in any given situation (Martens, et al.). Although perception is undoubtedly important, the three hypothesised precursors of threat already involve perceptions in making an appraisal, thus a further measure such as perception of threat seems redundant.

Perceived Uncertainty

Although Martens et al. (1990) do not provide a direct definition of uncertainty of outcome, they refer to Kagan (1972) who, in discussing sources of uncertainty, states that it is the "inability to predict the future, especially if the doubt centers on the experience of potentially unpleasant events like punishment, physical harm, failure, or rejection" (p. 52). In establishing what constitutes outcome uncertainty, Martens et al. elect to operationalise perceived uncertainty as being mainly dependent on uncertainty based on ability factors. Other situational sources of uncertainty, such as weather, equipment, and playing conditions, are of secondary importance. Presumably, Martens et al. rate ability uncertainties as more enduring and hence more salient than situational uncertainties.

In operationalising uncertainty, Martens et al. (1990) predict the likely relationship between uncertainty and probability of success by using an inverted-V, as shown in Figure 2.2. As the uncertainty increases from zero, the probability of success (P_s) increases to a point where there is an equal chance of winning and losing. Beyond this point, uncertainty decreases, as the probability of success increased towards 1.0.

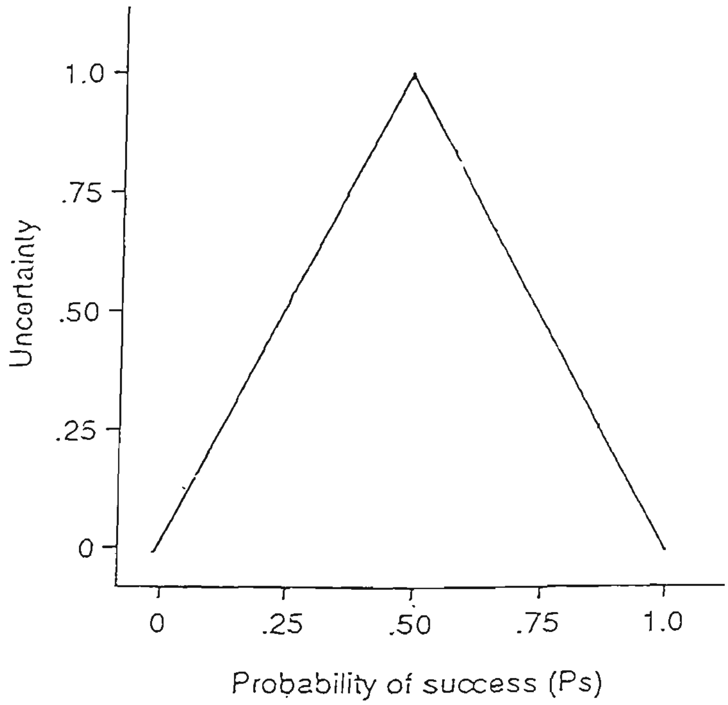


Figure 2.2. Relationship between uncertainty and probability of success.

The influence of the nonmonotonic relationship outlined in Figure 2.2 in predicting a performer's likelihood of becoming anxious is unclear. Martens et al. (1990) propose that anxiety is high when uncertainty is high, as with two equally matched opponents, so anxiety is highest when $P_s = 0.5$. The resolution of uncertainty, the anticipation of which is extremely threatening is, according to Kagan (1972), a basic motive in humans. An inability to reduce uncertainty can result in distress, fear, shame, and guilt, especially if the doubt centres on potentially unpleasant outcomes like punishment, physical harm, failure, and rejection (Martens et al., 1990).

Martens et al. (1990) argue that people attempt to resolve the uncertainty, and simultaneously calculate their chances of success by seeking information from four sources. First, information about the standard is sought, this can be predictable, such as a golfer who wishes to beat par, or less predictable, such as the same golfer wishing to win a competition by producing the lowest score. In situations such as this the comparison standard is never known with complete certainty in advance. Second, the performer's response capacity must be determined by referring to informational sources, such as past experiences or current form. Response capacity refers to the self's perceived ability for producing a particular response or behaviour. Martens et al. argue that sometimes athletes have little information about their own ability to meet a demand. Third, athletes require information about their likelihood of competing to their ability. Martens et al. point out that performance is ephemeral and athletes are seldom sure they will play to their ability. This type of uncertainty is reflected in the statement often pronounced prior to competition, "just as long as I play to my ability". The fourth source of uncertainty is the discrepancy between performance and performance outcome. In competition, performance outcome is determined, not only by the player's form and skill, but also by external factors such as luck, weather, officials, opponents, and physical conditions such as the surface or equipment. For example, a well hit ball in baseball (i.e., good performance) does not necessarily result in a good performance outcome, because a fielder may execute an exceptional catch or stop. Conversely, a poorly struck shot may result in a 'base hit' if it is misfielded or is unplayable (Martens et al., 1990).

Martens et al. (1990) made a distinction between what they label uncertain-uncertainty and certain-uncertainty. Although they do not explore in full what constitutes each of these two states, essentially a two factor (2 x 2) model is being described (see Martens et al., p. 230). The first factor relates to the four previously described sources of information that athletes seek in order to reduce uncertainty, hereafter labelled information factor (IF). The second factor relates to the actual perceived probability of success based again on information from the aforementioned four factors, hereafter labelled probability of success factor (P_s). Table 2.1 describes the four possible situations as a result of this two factor model.

Table 2.1

Dimensions of uncertainty: Relevant Information and Perceived Probability of Success

	Probability of Success	
Information	Moderate P_s (.50)	High or Low P_s
Complete information on the four uncertainty sources	Certain-uncertainty Information high & moderate P_s	Certain-certainty Information high & either high or low P_s
[b] Incomplete information on the four uncertainty sources	[b] Uncertain-uncertainty Information low & moderate P_s	[b] Uncertain-certainty Information low & high or low P_s

[b] In most cases, when information is lacking, a realistic assessment of P_s is difficult, and hence uncertain-uncertainty, and uncertain-certainty are best simply labelled, uncertainty.

According to Martens et al. (1990) a situation where there is a lack of information yet the athlete anticipates a close match, is more likely to induce high A-state. Martens et al. emphasise that high uncertainty is not sufficient in itself to lead to high levels of A-state, the situation must also be perceived as important by the athlete.

Perceived Importance

Situations perceived as important have been shown by a number of researchers to be anxiety inducing (Dorthwaite & Armstrong, 1984; Gould et al., 1983; Lewthwaite, 1990; Lox, 1992; Rainey & Cunningham, 1988; Scanlan et al., 1991). Strangely, Martens et al. (1990), do not cite any previous sports specific studies to support the inclusion of perceived importance (or perceived uncertainty) in their competitive anxiety model. Perhaps, they were unaware of those studies that had investigated perceived importance prior to 1990 when the Martens et al. text was published.

Perceived importance of outcome relates to the perceived value of attaining a favourable result. According to Martens et al. (1990), the perceived value is a combination of the intrinsic and extrinsic consequences of the result. Extrinsic consequences include tangible rewards, such as money or positive reinforcement, whereas intrinsic consequences include a sense of mastery, feelings of competence, and increased self-esteem. The present model uses perceived importance of outcome as an umbrella term covering both extrinsic and intrinsic factors. It is likely that individual differences exist in the levels of intrinsic and extrinsic importance. A further question of interest is whether intrinsic and extrinsic elements of importance act interdependently or independently.

Another concept that Martens et al. (1990) draw heavily on when discussing their model is Atkinson's (1957) probability of success (P_s). The relationship between P_s and importance is difficult to predict. Using Atkinson's (1957) risk-taking theory, Martens et al. (1990) suggest that when P_s is low, the incentive value of success (I_s) is increased. This makes intuitive sense, because beating a more highly rated player is a particularly satisfying result for most athletes, but one that is not highly probable. Martens et al. suggest that when P_s is low, importance may be diminished as a defence mechanism to cope with the likely failure. They quote Mechanic (1970) who found that "persons who gave the impression of "having given up" were less tense that those who were struggling actively against extremely difficult problems" (p. 113). This line of reasoning opposes the McClelland, Atkinson, Clark, and Lowell (1953) achievement motivation (n Ach) theory. According to McClelland et al. the incentive value of success increases as the chance of success decreases, stated theoretically as I (incentive) = 1 - P_s. Martens et al. acknowledge this high incentive situation that likely losers may face in competitive situations, but favour the likelihood of psychological dissociation as a defence mechanism.

Nevertheless, when an athlete faces a situation of indisputable importance, ego defence strategies may not be as easily activated. Choosing to perceive a situation as unimportant becomes increasingly difficult when this perception is at odds with the available intrinsic and extrinsic rewards. For example, a professional tennis player battling to make a living and facing a highly ranked player in the first round of a tournament (low P_s) would be unlikely to enter into defensive, protective thinking. Having invested considerable time, effort, and money into developing a tennis career, it would be extremely difficult for this player to reduce perceived importance to a low level.

For some athletes using other strategies besides ego protective mechanisms may not feasible in some situations. For instance, when an unexpected result becomes possible, both players may actually increase perceived importance. The 'inferior' player, sensing a possible victory over a more highly credentialed opponent, is likely to increase or maintain high importance. The situation for the 'superior' player, who expects to win, and, therefore, has more to lose is somewhat more complex. The ramifications of a loss for this player may include lower status, confidence, and self esteem. Therefore, when faced with a possible loss to an 'inferior' player, they may foresee the negative consequences of a loss and respond by increasing perceived importance. Or they may use an ego defence mechanism by saying to themselves "Well, if I lose it was not that important a tournament anyway". Due to the relatively untested nature of the Martens et al. (1990) model, predictions about the tendency for people to either decrease or increase importance over time are not clearly established.

A-State as a Global Reaction

Martens et al. (1990) include A-state as a global term in their model rather than making the distinction between cognitive and somatic anxiety. This decision appears rather odd in view of the extensive work the same group of authors have committed to differentiating between cognitive and somatic A-state. For example, the development of the Competitive State Anxiety Inventory - 2 (CSAI-2) was due, at least in part, to a perceived need to provide distinct sport specific measures that recognise the differences between cognitive and somatic A-state. Based on the numerous studies that have investigated differences between cognitive and somatic reactions, it is surprising that Martens et al. have not discussed possible differences between how perceived uncertainty and perceived importance influence each of cognitive and somatic A-state. As previously discussed, the effect on the performer is different depending on the type of anxiety they are experiencing (i.e., cognitive, somatic, or both). The model relies heavily on cognitive perceptions of uncertainty, importance, and A-trait, and these may be better predictors of cognitive rather than somatic A-state. Clearly, the model needs further development, based on empirical research, before possible links between causes of anxiety and specific responses are predictable.

Martens et al. (1990) have highlighted the absence of experimental verification to validate their theory and have invited researchers to test the model in the sporting contexts. To date, only one published study has sought to test the Martens et al. model. Lox (1992), using female volleyball players measured perceived uncertainty, perceived importance, state anxiety, and self-efficacy prior to a regular season intercollegiate match. Based on a correlational analysis, the Lox study suggests that uncertainty of outcome is closely associated with cognitive anxiety, whereas importance of outcome relates more to somatic anxiety. Because there was no effort to actively manipulate the variables (perceived uncertainty and importance), or measure player perceptions on more than one occasion, the results are only suggestive of an underlying relationship and support the need for further study.

The Value Of Delineating The Causes Of Anxiety:

Treatment of Anxiety in Sport

A clearer understanding of what antecedents trigger anxiety in sport should facilitate the choice of anxiety management procedures. Based on the premise that uncertainty and importance of outcome are key causal dimensions, Martens et al. (1990) argue that cognitive methods should be especially effective in reducing high A-states because they are suitable in altering perceptions. This is not to say that relaxation methods, hypnosis, and transcendental meditation will not be effective; rather their success is dependent on how they alter perceptions of uncertainty and importance (Martens et al., 1990).

Applied sport psychology has not always been able to deliver consistent and effective treatments to athletes. Dishman (1983) suggests, "it is not clear to what extent contemporary sport psychology possesses a clearly defined and reliable technology for intervention in applied settings" (p. 127). At present the prescription of anxiety treatments and techniques is mainly dependent on the skills, knowledge, and biases of the individual sport psychologist. The success of any treatment is therefore dependent on factors that are highly variable. Mahoney and Meyers (1989) suggest that there is considerable room for improvement in the delivery of services to athletes in the treatment of sport related anxiety. Evidence suggests that even respected and highly credentialed practitioners are not always able to reduce anxiety in some athletes. A notable sport anxiety researcher and practitioner, Damon Burton, has candidly admitted that at times his efforts in reducing competitive anxiety have been unsuccessful (Burton, 1990).

Furthermore, Burton points out that stress management is a topic that is much easier to theorise about than to apply effectively (Burton, 1990). This situation is of concern, especially because anxiety reduction treatments are extremely popular in applied settings (Greenspan & Felz, 1989; Nideffer & Deckner 1970; Prapavessis, Grove, McNair & Cable 1992; Weinberg, Seabourne & Jackson, 1981).

There is no shortage of possible treatments and interventions available to the practitioner attempting to combat performance anxiety. A reflection of the recent trend in psychology toward cognitive approaches is the burgeoning of cognitive based therapies. For example, rational emotive therapy (RET), (Ellis, 1970), cognitive behaviour therapy (CBT), (Beck, 1976), stress inoculation therapy (SIT), (Meichenbaum, 1985), and stress management training (SMT), (Smith, 1980) have been used in the treatment of anxiety in sport (Crocker, Alderman & Smith, 1988; Elko & Ostrow, 1991; Mace & Carroll, 1985; Ziegler, Klinzing & Williamson, 1982). In addition, other treatments frequently used include: progressive muscle relaxation (PMR; Jacobsen, 1938); the relaxation response (Benson, 1975), a derivative of transcendental meditation; hypnosis; autogenic training (Schultz & Luthe, 1959); and biofeedback.

Differences in the rationale underlying each type of therapy are in some cases very minor, and represent only subtle changes in approach. In contrast, some treatments differ markedly, and have very little in common with other treatments. The success of any one treatment will largely depend on two factors. First, how effective is the treatment in combating anxieties common to all or many athletes?

Second, how effective is the treatment in combating idiosyncratic anxieties? The diversity of possible treatments available to the practitioner has both positive and negative aspects. The number of treatments available should ensure that a "treatment of choice" is made with some assurance of success. Conversely, the smorgasbord of choice could possibly lead to confusion as to which treatment is most effective or appropriate.

Unfortunately, there has been very little research directed toward matching treatments with underlying causes or effects of anxiety. A systematic model for diagnosing the underlying causes and prescribing appropriate treatments to combat performance anxiety is lacking. Burton (1990) suggests that without a proven diagnostic model, Davidson and Schwartz's (1976) multimodal stress management model may prove to be beneficial in assessing anxiety in sport. This model proposes that the "treatment of choice" is dependent on whether an individual predominantly experiences cognitive or somatic anxiety and is predominantly left or right hemisphere dominant. At the present time no research has clearly demonstrated the viability of diagnosing sport anxiety according to the multimodal stress management model. Two studies by Maynard and Cotton (1993), and Maynard, Hemmings and Warwick-Evans (1995), found some support for matching treatments to anxiety type, however, these studies are methodologically flawed, or at least limited, by a lack of adequate controls and very small participant numbers. The possible advantages of a diagnostic model include greater consistency in the diagnosis of anxiety and more successful treatment outcomes. However, there is a clear need for sport psychologists to take further steps in identifying links between the causes, effects, and treatments of anxiety in sport. It may be some time before sport psychologists are ready, or indeed willing, to use a diagnostic model. Such a model has undeniable advantages, however. Carson, Coleman, and Butcher (1989) state:

> "Classification is important in any science - whether we are studying planets, plants, or people. . . . It (classification) is a first step toward introducing some order into our discussion of the nature, causes, and treatments of behaviour and in communicating about particular clusters of behaviour in agreed-upon and meaningful ways . . . . There are more mundane reasons for "diagnostic" classifications, such as enabling adequate statistical counts of disorders" (p. 10).

Therefore the problem is, how do sport psychologists correctly diagnose and treat something triggered by a number of causes and that manifests itself differently from person-to-person and situation-to-situation? An example of a diagnostic approach is the Diagnostic and Statistical Manual (Amercian Psychiatric Association, 1994) which psychiatrists and clinical psychologists use. The current version, DSM-IV (1994), classifies mental illnesses according to an agreed upon system. While not necessarily advocating that a model similar to DSM-1V be developed in sport psychology, more consistency in the choice of anxiety treatments is desirable. Burton (1990) points out that stress management is an extremely complex area that requires increasingly sophisticated stress models to understand this complexity. Before developing such a model, a clearer understanding of the underlying causes and subsequent effects of anxiety is needed.

Sport psychologists need a better understanding of the fundamental elements of performance anxiety in sport, and in particular the underlying causes of anxiety. Further research into better delineating the range of anxiety triggers in sport has important implications both theoretically and practically. Empirical testing should enable researchers to establish well defined theoretical models of what causes anxiety. Given that Martens et al. (1990) have provided an initial model to describe what causes anxiety it is important this model is tested, and if necessary altered. From a practical perspective, a more thorough understanding of what triggers anxiety, should greatly assist applied sport psychologists in accurately diagnosing those athletes who are suffering from problems relating to competitive anxiety. In addition practitioners are should be in a better position to offer athletes the treatment of choice for these anxious athletes.

This thesis is possibly a first step toward addressing the paucity of research testing causes of anxiety and contributing to the aim of enabling applied sport psychologists to administer more efficacious treatments to athletes. More specifically, this thesis will test predictions about perceived uncertainty and importance as crucial factors in the production of cognitive and somatic state anxiety. Perceived uncertainty and importance are independently manipulated and the consequent effects on state anxiety are monitored.

CHAPTER 3

EXPERIMENT ONE: TEST OF PERCEIVED UNCERTAINTY

Purpose

This experiment tested the perceived uncertainty factor of the Martens et al. (1990) model of competitive anxiety. Perceived uncertainty of outcome, one of three hypothesised causes of A-state, was manipulated in the sporting context of golf. The relative contribution of A-trait, a second hypothesised cause of A-state, was also examined.

Hypothesis

Based on the Martens et al. (1990) model, perceived uncertainty of outcome, and as a consequence A-state, should differ between evenly and unevenly contested matches.

Formal Statement of the Experimental Hypothesis

$\underline{H}_1$. As measured by the Competitive State Anxiety Inventory - 2 (CSAI-2), participants' A-state will be significantly greater in high uncertainty situations compared to low uncertainty situations. In testing this hypothesis, the standard .05 significance level was used in a directional analysis.

Method

Participants

In recruiting participants, I approached private golf clubs in metropolitan Melbourne ($\underline{n} = 15$), university golf clubs ($\underline{n} = 4$), and a private boys' school. Typically, I approached the club manager who first read the written request before forwarding the letter to the club's committee for possible approval (see Appendix A). Two of the private clubs refused the request to recruit their members. After gaining approval, I approached club members at the completion of their regular weekly round of competition.

Of the 553 golfers who took a questionnaire package, 289 (51.9 %) completed and returned them. A total of 198 (35.8%) indicated their willingness to participate. Twelve (2.2%) subsequently withdrew due to injury, time constraints, loss of interest, or change in place of residence. The remaining 186 (33.6 %) took part in either an initial pilot study (n = 14) or one of the experiments (see also chapters 4 and 5). The final total for the formal experiments was 172 participants consisting of 148 males (M = 35.5 years old), and 24 females (M = 47.4 years old). The gender imbalance reflects the greater number of males playing golf at the majority of private golf clubs. The majority of participants (n = 123) belonged to private golf clubs. The remainder came from university golf clubs (n = 30), a private boys' school (n = 13) or were recruited through a personal acquaintance (n = 6).

A sample of 72 participants consisting of 64 males (M = 38.3 years old) and 8 females (M = 51.4 years old) drawn from the larger pool described above, took part in Experiment 1. Participants represented a wide range of handicaps (M = 16.3, SD = 7.85).

-

Measures

Golf Ability Rating Form (GARF).

Golfers provided their official club handicap and their self-rated handicap for all major golf sub-components (e.g., driving, putting, chipping), by filling out a Golf Ability Rating Form (GARF) (see Appendix B). Unlike many other sports, a relatively objective measure of ability is available in golf through the universal golf handicap system. In Australia, the Australian Golf Union (AGU) regulates the attainment of handicaps for all club golfers. To account for underlying differences in the difficulty of particular golf courses, the AGU assigns each course with an accredited course rating that is entered into the formula used to assign player handicaps.

The GARF which requires players to rate different aspects of their game (i.e., driving, chipping, long irons etc) was used because a club handicap is an indicator of overall ability, and, therefore, does not necessarily represent a player's relative skill at particular aspects of golf. For example, a player may drive the ball poorly but compensates by above average chipping or putting. A rating of each golfer's chipping ability was of particular importance because chipping was the performance task in this study. Self-rated chipping ability was used to match players into one of four experimental conditions, see Formation of experimental groups section. Participants reported a wide range of chipping abilities ($M = 15.3$, $SD = 8.45$). Although golf handicap and predicted chipping handicap correlated strongly ($r = .78$, $p < .0001$), a few players rated their chipping as much as 20 handicap points above or below their official handicap. To test whether self-rated chipping ability predicted actual chipping performance, a Pearson product moment correlation was calculated for the 72 participants in this experiment. Self-rated chipping ability was a strong predictor of follow up performance on the experimental task ($r = .61$, $p < .0001$).

Sport Competition Anxiety Test (SCAT)

The Sport Competition Anxiety Test, Form A (SCAT; Martens, 1977) was used to measure each participant's competitive A-trait. The SCAT measures an individual's tendency to perceive competitive situations as anxiety provoking. The SCAT takes less than five minutes to complete and consists of 15 items with 10 anxiety related statements and five filler items. Respondents rate how they usually feel when playing sports and games by choosing hardly ever, sometimes, or often for each item (e.g., Before I compete I worry about not performing well). The SCAT is used extensively in sport psychology research, and has satisfactory test-retest reliability ($r = .57$ to $.93$) for one month and one day respectively, and internal consistency (Cronbach's alpha = .95 to .97). Martens et al. (1990) also refer to a wide range of studies that provide support for the content, concurrent and, in particular, construct validity of the SCAT. See Martens et al. (1990) for a review of the test's reliability and validity. According to the recommended administration procedure, the SCAT was presented under the neutral name of the Victoria Competition Questionnaire (see Appendix C). In this experiment, SCAT was used to measure A-trait, one of the three hypothesised causes of state anxiety according to Martens et al.

The Marlowe-Crowne Social Desirability Scale (M-C SDS)

To test for response distortion all participants completed the M-C SDS (Crowne & Marlowe, 1960) (see Appendix D). The M-C SDS assesses a person's need to obtain approval by responding in a socially appropriate and acceptable manner. Crowne and Marlowe have described social desirability as an "association of defensiveness and protection of self-esteem with dependence on the approval of others" (p. 206). The M-C SDS, was administered under the name of the Personal Reaction Inventory. It consists of 33 true/false items designed to detect a tendency to 'fake good' (e.g., My table manners at home are as good as when I eat out in a restaurant). Crowne and Marlowe have reported acceptable internal consistency using the Kuder-Richardson-20 technique ($r = .88$) and satisfactory test-retest reliability ($r = .89$) for the M-C SDS. Previous research has demonstrated moderate but significant correlations between the M-C SDS and A-trait, $r = -.24$, as measured by SCAT, cognitive A-state, $r = -.24$, and state self confidence, $r = .45$, as measured by the CSAI-2 (Williams & Krane, 1989). In view of these findings, the M-C SDS was administered pre-experimentally for possible later use as a covariate to control for response bias.

Demographic Questionnaire

A demographic questionnaire established each participant's age, gender, address, contact phone number, and willingness to take part in the formal experimental phase (see Appendix E).

Competitive State Anxiety Inventory - 2 (CSAI-2)

The Competitive State Anxiety Inventory-2 (CSAI-2; Martens, Burton, Vealey, Bump & Smith, 1982) was used to measure multidimensional state anxiety, measured respondents' feelings and thoughts about competition at a given time or moment. The CSAI-2 takes approximately five minutes to complete and consists of 27 items, each rated on a Likert scale from 1 not at all to 4 very much so. The 27 items represent three nine-item sub-scales: cognitive anxiety (e.g., I have self doubts), somatic anxiety (e.g., My body feels tense), and self confidence (e.g., I feel secure), each yielding separate scores between 9 and 36. Alpha coefficients ranging between .79 and .90 have demonstrated a sufficiently high degree of internal consistency for the CSAI-2 sub-scales (see Martens et al., 1990 for a review). Studies investigating the construct validation of the CSAI-2 have supported the three sub-scales as sport specific measures of A-state. In addition, the three sub-scales while sharing some variance generally follow a different temporal path and are affected differently by situational factors (Martens et al., 1990). In accordance with the recommended administration procedure, the CSAI-2 was presented as the Victoria Self Evaluation Questionnaire (see Appendix F).

The Match Orientation Questionnaire (MOQ)

The Match Orientation Questionnaire (MOQ), an instrument developed for this dissertation, provided a measure of each participant's perceived uncertainty of outcome (e.g., How likely do you think it is that you will win this match ?), and perceived importance of outcome (e.g., How important is performing well in this match to you ?), using a 9 point Likert scale. The MOQ consists of three perceived uncertainty items and three perceived importance items (see Appendix G). The perceived uncertainty items are scored in a bi-directional manner. The mid-point of the scale, a score of five, represents the highest level of uncertainty. Scores of four and six convert to an uncertainty score of four. Similarly, scores of three and seven convert to a score of three, two and eight to a score of two, and finally one and nine equal the lowest level of uncertainty, a score of one. Participants who feel sure they will win get the same score as those who feel sure they will lose, because it is assumed that both reflect a low level of uncertainty.

Development of the MOQ began with the Martens et al. (1990) model. According to Martens et al. athletes seek to reduce perceived uncertainty by seeking information. First, athletes seek information regarding the quality of the standard to which their performance will be compared. This usually equates to task demands such as an objective performance standard or their opponent's ability. Second, information is sought about the self's performance capability or response capability, such as ability level. Third, an estimate is sought of the probability that actual performance will approximate performance capacity. This relates to the likelihood of their best form being produced. Finally, an estimate of the probability that actual performance will determine outcome is assessed, meaning the extent to which a good performance will be rewarded with a good score.

Martens et al. (1990) do not specifically address which information sources are most valuable for athletes seeking to reduce uncertainty. The relative weight assigned to each source is likely to be a function of the accuracy and variability of the information. The accuracy of information obtained about an opponent's ability is variable from sport to sport and situation to situation. In golf, the universally adopted handicap system provides a reasonably accurate indicator of ability. Therefore, in this experiment assessments of the first two sources of uncertainty information as proposed by Martens et al. were easily obtained by referring to a player's handicap in golf. In comparison, attaining accurate information before competition about the third and fourth information sources is likely to be extremely difficult. In regard to the third source of information, Martens et al. state "they [athletes] cannot be certain they will be able to produce the response they are capable of making. Performance is ephemeral; it varies widely because it is determined by many factors" (p. 228). In addition, determining if the quality of performance will accurately translate into performance outcome is also extremely difficult, because uncontrollable external factors can affect results. Martens et al. list a number of these external factors, including weather, condition of playing equipment, playing surfaces, chance occurrences, judgement by officials, and performance of opponent.

These considerations resulted in the development of the perceived uncertainty items. The first two questions were designed to measure perceived uncertainty relating to the first two sources that Martens et al. (1990) suggest athletes seek. How likely do you think it is that you will win this match and How would you rate your skill compared with that of your opponent. The third item, How well are you performing in today's competition[1] was designed to measure the extent to which athletes believe they are playing to their potential. To account for the highly variable fourth source of information, the task was standardised to hold external factors at a constant level.

Perceived importance according to Martens et al. (1990) is based on a combination of intrinsic and extrinsic sources of reinforcement. The item designed to measure extrinsic importance was, 'How important is winning the twelve golf balls', and the item designed to measure intrinsic importance was, 'How important is performing well to you'. An additional item 'How important is the next round of shots' designed to measure overall importance, was also included.

An exploratory factor analysis on the data collected in the pilot study determined if the items for perceived uncertainty and perceived importance represented distinct factors. All items were subjected to a principal components factor analysis with varimax rotation. A criterion loading of .50 was set for item inclusion on a factor. Results indicated a two factor solution with all the perceived uncertainty items loading on Factor 1, and all the perceived importance items loading on Factor 2 (see Table 3.1). The internal consistency values (Cronbach's alpha) for perceived uncertainty and perceived importance were .70 and .82 respectively.

---

[1] When administering the MOQ prior to competition "how do you expect to perform" is substituted for "how are you performing" in this item.

Based on these results, the MOQ was deemed suitable for administration in the main experimental phase. For futher confirmation of the factor structure of the MOQ refer to Appendix H, for the factor loadings of all experimental data. The MOQ was administered on five occasions, twice before competition began, and three times during breaks between each round of competition.

Table 3.1

Match Orientation Questionnaire (MOQ): Factor Loadings (Varimax Rotation)

	Factors	
Item	1	2
Perceived Uncertainty		
Likelihood of Winning	-.09	.90
Skill Comparison	-.01	.69
Predicted Performance	.34	.73
Perceived Importance		
Importance of competition	.97	.007
Performing well	.91	-.18
Importance of next round	.77	-.20
Reward for winning	.80	-.11
Percent of variance explained	50.1	22.1
Eigenvalue	3.5	1.55

Golf Chipping Task

The experimental site was a practice green situated in a secluded section of a golf course in Melbourne, Victoria. This practice green is typical of the playing characteristics and general appearance of a regular competition green (see the schematic diagram in Figure 3.1). All participants used their own set of golf clubs.

To standardise the task, the following procedures were adopted. Participants chipped standard medium compression golf balls throughout the competition. Each player in a pair played with a different coloured ball throughout. One player used white balls, the other used yellow balls. Participants played their shots from anywhere they chose within a marked 2 x 2 metre zone. This zone measured 30 metres directly behind a greenside bunker so that a relatively difficult lofted shot was required. The task difficulty was further increased by placing the pin fairly close to the bunker, thereby, requiring participants to stop the ball abruptly. These steps to increase the task difficulty were in response to criticism by Gould, Petlichkoff, Simons, and Vevera (1987) that previous researchers had not induced levels of A-state commensurate with real competition. Previous research has shown that increasing the shot difficulty is likely to increase the A-state reaction. Cohn (1990) found that the single highest source of stress (anxiety) among collegiate golfers was "playing a difficult shot (over water, around a tree, near out-of-bounds, etc)" (p.100).

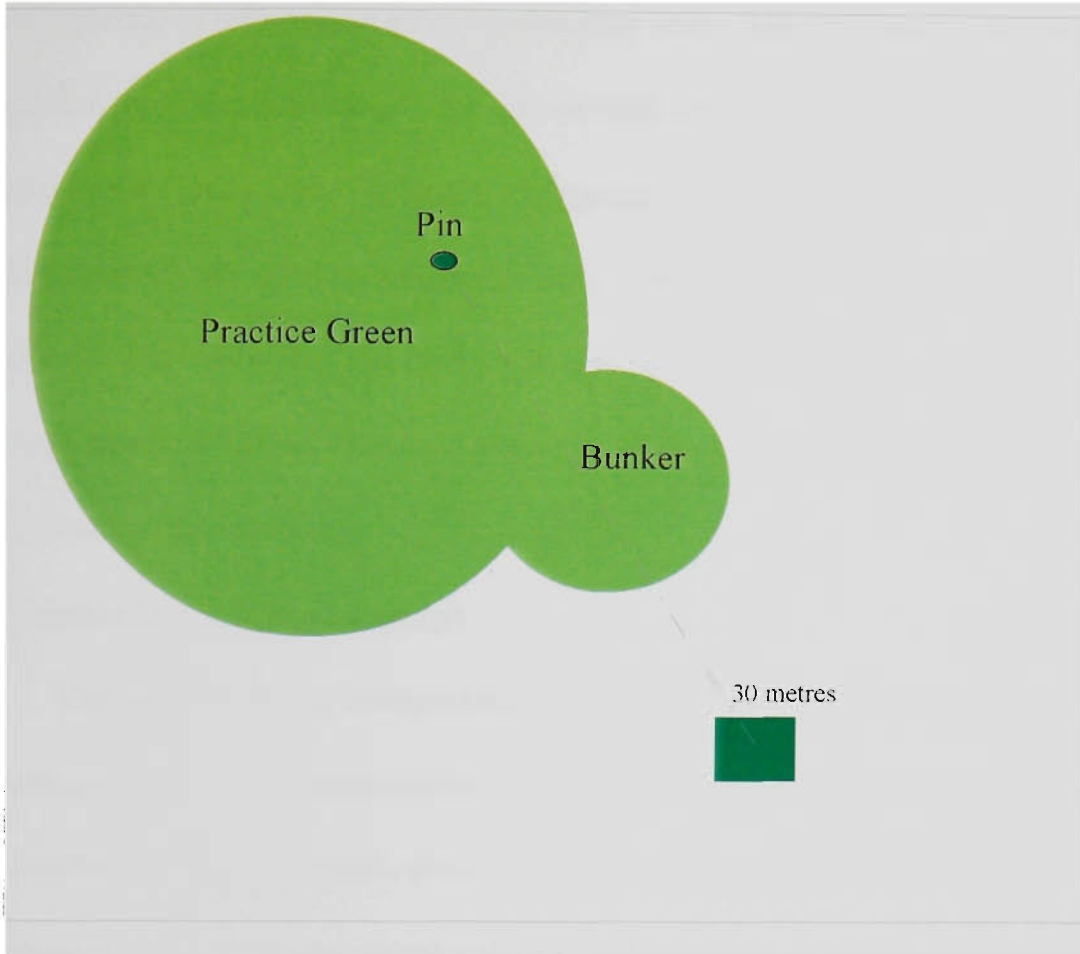


Figure 3.1. Schematic diagram of the experimental site.

The distance between the nearest edge of the hole and the resting position of each ball was measured to the nearest centimetre with a standard coil measuring tape. Each player's final score was the combined distance in metres of the 32 shots taken.

Pilot study

A sample of 14 participants (M = 43.1 years old) took part in a pilot study, reported previously in the Match Orientation Questionnaire section. The pilot study was especially useful in fine tuning the testing procedures and in the administration of the MOQ and CSAI-2 questionnaires. A number of relatively minor, yet important, adjustments were made to the testing procedure as a consequence of information gained in the pilot study. The 14 participants were matched into pairs according to the criteria used for assignment to the different experimental groups, see Formation of experimental groups section. By doing so, the pilot study provided an insight into how participants reacted to the experimental conditions. The pilot study also provided confirmation data of the appropriateness and psychometric properties of the items used in the Match Orientation Questionnaire.

Formation of experimental groups

The research design incorporated a direct participant to participant matching. Each pair was matched and randomly assigned to an experimental group according to chipping ability, availability, and sex. Players were paired against opponents of the same sex to control for possible cross sex effects. Each participant was assigned to one of four experimental conditions: Superior ability (Sup.A), inferior ability (Inf.A), similar ability (Sim.A), and unknown ability (Unk.A).

The Sup.A and Inf.A groups were both needed to provide the two usually occurring elements of a low uncertainty condition (LU), namely a likely winner and a likely loser. Interestingly, the Martens et al. (1990) model does not discriminate between likely winners and likely losers in terms of any potential differences in A-state responses. Splitting the LU group in this manner provides the additional possibility of a more finely grained analysis, by comparing the Sup.A and Inf.A groups separately. The Sim.A group which is equivalent to certain-uncertainty was formed to increase the chances of close matches occurring and thus, provide a high uncertainty (HU) condition. An Unk.A group which is equivalent to uncertain-uncertainty was added as a means of testing a special HU situation when athletes are provided with no pre-competition information about their opponents' ability.

Self-rated chipping ability was the key independent variable used to form these four groups, each containing eighteen participants. Each Sup.A player was matched with a corresponding Inf.A player. The criterion for each Sup.A versus Inf.A match was a net difference in chipping ability of no more than ten strokes and no less than five strokes. A resident club professional offered suggestions for the most appropriate criteria for placement of participants into groups. He suggested that to be confident one player is superior to another in golfing ability, a minimum five shot handicap difference be set. For instance 10 handicap players were designated as the superior player if their opponents had handicaps in the 15 to 20 range. Also, the same 10 handicap players could have been the inferior ability players if their opponent had a handicaps in the 0 to 5 range. In setting the handicap difference criteria, I wanted to maintain a consistent but clear difference in perceived ability of a magnitude commonly encountered in regular competition. Eighteen Sup.A versus Inf.A pairs were matched according to this criterion.

The criterion for placement in the Sim.A group was a net difference in chipping ability of between 0 and 4 strokes. For instance a 10 handicap player was matched with a player in the 6 to 14 range. No specific handicap difference criterion was set for placement in the Unk.A group. This group later proved problematic in the first analysis of the Martens et al. (1990) model because it contained a broad mix of players who were randomly assigned, rather than assigned by matching. This is reflected in the relatively large mean handicap difference between players in this group (M = 8.78, S.D = 5.3). Nine matched pairs formed both the Sim.A, and Unk.A groups, thereby eighteen players constituted each group. The mean ability differences (absolute value) between pairs in the four groups is presented in Table 3.2.

Table 3.2
Descriptive Results: Mean Differences in Chipping For Matched Players in Each Group (N = 72, n = 18)

Scale	M	SD	Min	Max
Superior ability	7.50	2.3	4.0	12.0
Inferior ability	7.50	2.3	4.0	12.0
Similar ability	1.67	1.3	0.0	3.0
Unknown ability	8.78	5.3	1.0	17.0

The actual assignment of participants into the four experimental groups followed a rotation system. First, two Sup.A versus Inf.A matches were scheduled by leafing through the player availability checklists of 90 potential participants to locate the first two pairs of players who fitted the matching criterion. Second, the first two participants to fit the criterion for inclusion in the Sim.A condition, were matched according to availability, and chipping handicap. Finally, an Unk.A pair was formed with the first two available participants. This system was repeated nine times thereby forming four groups of 18 participants (N = 72), the remaining 18 unmatched players participated later in Experiment Two. After assignment to groups, participants were contacted by telephone to arrange a mutually acceptable time for their participation. Participants were matched with someone from a different club to avoid biased assessments of ability based on prior knowledge.

Pre-testing organisation

Approximately one week before their scheduled match, I mailed a reminder letter (see Appendix I) and an internal map of the experimental venue (see Appendix J) to each participant. As an additional reminder, I phoned participants the night before testing.

Testing took place over three two-week periods beginning in October 1993 and ending in February 1994. Seven one and a half hour time slots (8.30, 10.00, and 11.30 am, 1.00, 2.30, 4.00, and 5.30 pm) were available to players on any given day of testing. One and a half hours was sufficient time to conclude testing of one pair before the following pair arrived. Due to difficulties in scheduling, an average of only two pairs played on each test date. Uncontrollable factors such as illness, inclement weather, injury, work commitments, and players forgetting their appointment time resulted in postponement of a number of matches.

Procedures

Pre-experimental procedures

After approaching players for the first time, I briefly told them the purpose of the study and asked them to participate by filling out four brief questionnaires. Each interested player then received an A4 size envelope containing a Golf Ability Rating Form (GARF), SCAT, the M-C SDS, and a demographic questionnaire. Standard informed consent procedures were followed. Golfers completed these measures privately in the order listed and returned them in a sealed envelope to their clubs' resident professional. I allowed a two to three week period before returning to collect the questionnaires from the clubs. I adopted a similar protocol for university, school, and private administrations of the questionnaires. Table 3.3 contains the means, standard deviations, and ranges for the SCAT, and the M-C SDS.

Table 3.3
Descriptive Results: Pre-Experimental Questionnaires (N = 72)

Scale	M	SD	Min	Max
SCAT	17.7	5.1	11	30
M-C SDS	18.1	5.3	5	27

The mean score on the M-C SDS was substantially higher than those reported by Crowne and Marlowe (1960) when they developed this instrument. Using a group of 120 undergraduate psychology students, they reported scores of (M = 13.72, SD = 5.78). Mean scores for participants in this study are therefore, approaching one standard deviation above those reported by Crowne and Marlowe (1960). Williams and Krane (1990) have shown response distortion to be correlated with the cognitive and self confidence sub-scales of the CSAI-2. The larger than average M-C SDS scores obtained in the present study suggest A-state may have been under reported.

Following the return of questionnaires, participants were mailed a letter containing further information and instructions (see Appendix K). In addition, participants completed a preferred time of participation checklist (see Appendix L) and returned this in a pre-addressed, stamped envelope. The preferred time checklist helped facilitate the task of matching and assigning participants' partners.

Experimental procedure and description

I met participants at a car park adjacent to the practice fairway, and instructed them to prepare themselves to take a series of chip shots. I then introduced participants, and gave them a general explanation of the task while walking to the experiment site some 300 metres from the car park. I also told participants not to discuss their handicaps until further notice. Upon arriving at the experiment site, participants sat on deck chairs and filled out an informed consent form (see Appendix M), the Match Orientation Questionnaire (MOQ), and the Competitive State Anxiety Inventory - 2 (CSAI-2). I then read the following information to the players:

> You will take four rounds of eight chip shots from a position about 30 metres from the flag. After I have finished explaining the procedure, you will hit 16 practice balls to help you warm up and get a feel for the green. One player will hit yellow balls throughout the competition and the other player white balls. As you can see, eight numbered white and yellow balls are positioned ready for the first round of shots. Whoever plays first (decided by toss of a coin) will take the ball marked one and chip it as close to the pin as possible from the marked drop zone. The other player will then repeat this procedure in taking their first shot following which you will alternate until all your eight balls have been played. The distance each ball finishes from the hole is then measured and added in a cumulative manner. In between each round I will inform you of both your own and your opponent's progressive score. The winner will be the player who has the smallest total distance over the four rounds. The winner will receive a box of 12 new Dunlop DDH masters golf

-

> balls. You will also fill out two of the questionnaires you have already filled out once on four more occasions. It is important you answer these honestly based on how you feel at that time; your answers are confidential. Are there any questions?

Both players were then informed of each other's chipping ability, (as reported in the Golf Ability Rating Form), and allowed to commence practising. The exception to this procedure was the Unk.A group who were deliberately not informed of their opponent's ability. Players then filled out the MOQ and CSAI-2 for the second time. Meanwhile, I collected the practice balls and laid out the competition balls in the chipping zone. Players then completed the first round of eight shots, and the distance each ball finished from the pin was measured and recorded. In the event of a ball pitching and rolling into another ball, I replaced them as if the collision had not taken place. This happened infrequently, and the impact was minimal so ball replacement was easily accomplished. Before they filled out the MOQ and CSAI-2 for the third time, I informed participants of both their own and their opponents' progressive scores. This procedure of filling out the two questionnaires, playing, and scoring each round of eight shots was repeated until the players had completed four rounds. Players were then informed of their four round total. The winning player received the promised reward, and the losing player was given an unexpected consolation prize of 3 golf balls. Finally, I debriefed the players while we walked back to their cars and provided them with information on a sequence of golf seminars conducted at Victoria University, for all interested participants, free of charge.

Results

Pre-experimental Findings

To ensure the four experimental groups were equivalent prior to formal testing, the two key pre-experimental measures age and chipping ability were subjected to a one way Analysis of Variance (ANOVA). No significant differences were found between groups for age and chipping ability. A significant difference $F(3, 68) = 2.07$, $p < .05$ (Cohen's $f = .33$, between a medium and large effect size), was found between the Sup.A and Inf.A groups for chipping ability. This was expected as these two groups were deliberately manipulated to produce a difference in ability.

Previous research has shown that A-state is influenced by social desirability (Williams & Krane, 1989), and A-trait (Martens et al., 1990). In the present study the M-C SDS and the SCAT were included in the pre-experimental questionnaire package for possible later use as covariates if they proved to be significantly related to A-state. By doing so the predictable error variance can be removed from the error term and thus act as a noise-reduction device (Tabachnick & Fidell, 1983). In this first experiment A-trait was consistently linked with A-state at all stages of testing: pre-briefing, $r = .35$, $p < .002$; post-briefing, $r = .35$, $p < .002$; after round 1, $r = .32$, $p < .006$; after round 2, $r = .28$, $p < .02$; and after round 3, $r = .29$, $p < .01$. Based on this relationship, the SCAT was used to partial out the effects of A-trait on the dependent variable A-state in later analyses. At no stage of testing was the M-C SDS significantly linked with A-state, and thus, was not subsequently used as a covariate in this experiment.

Testing the Martens et al. Model

I analysed data at each of the five administrations of the MOQ and CSAI-2. The first administration of the questionnaires, labelled pre-briefing, provided base-line scores. Participants completed the questionnaires for a second time, labelled post-briefing after an explanation of the competition task and hitting their 16 practice shots. The third, fourth, and fifth questionnaire administrations provided participant responses between consecutive rounds of eight shots.

Manipulation Check

The Martens et al. (1990) model predicts that any differences in A-state are dependent on differences in perceived uncertainty across different levels of the independent variable (experimental groupings). A manipulation check, involving a between groups comparison was carried out to assess whether the high uncertainty group actually did report significantly higher levels of perceived uncertainty than the low uncertainty group.

The initial test of the Martens et al. (1990) model and the uncertainty manipulation, involved collapsing the four experimental groups into a low uncertainty (LU), and a high uncertainty (HU) condition. I combined the participants in the Sup.A and Inf.A groups to form a LU condition because they should perceive themselves to be either likely winners or likely losers and thus score low on uncertainty. Participants in the Sim.A and Unk.A groups should, at least initially, foresee a close match. These two groups combined to form a high uncertainty (HU) group. Figure 3.2 provides an error bar chart of the changing trend in perceived uncertainty for the LU and HU conditions. Error bar charts provide a relatively simple graphical representation of the mean (i.e., the cental box), and the 95% confidence interval (i.e., the extending vertical lines bounded by horizontal lines). The perceived uncertainty score is the combined total of three perceived uncertainty items. Clearly, perceived uncertainty diminished for both groups as the competition progressed. This makes sense because as competition progresses the likely winner is more easily predicted.

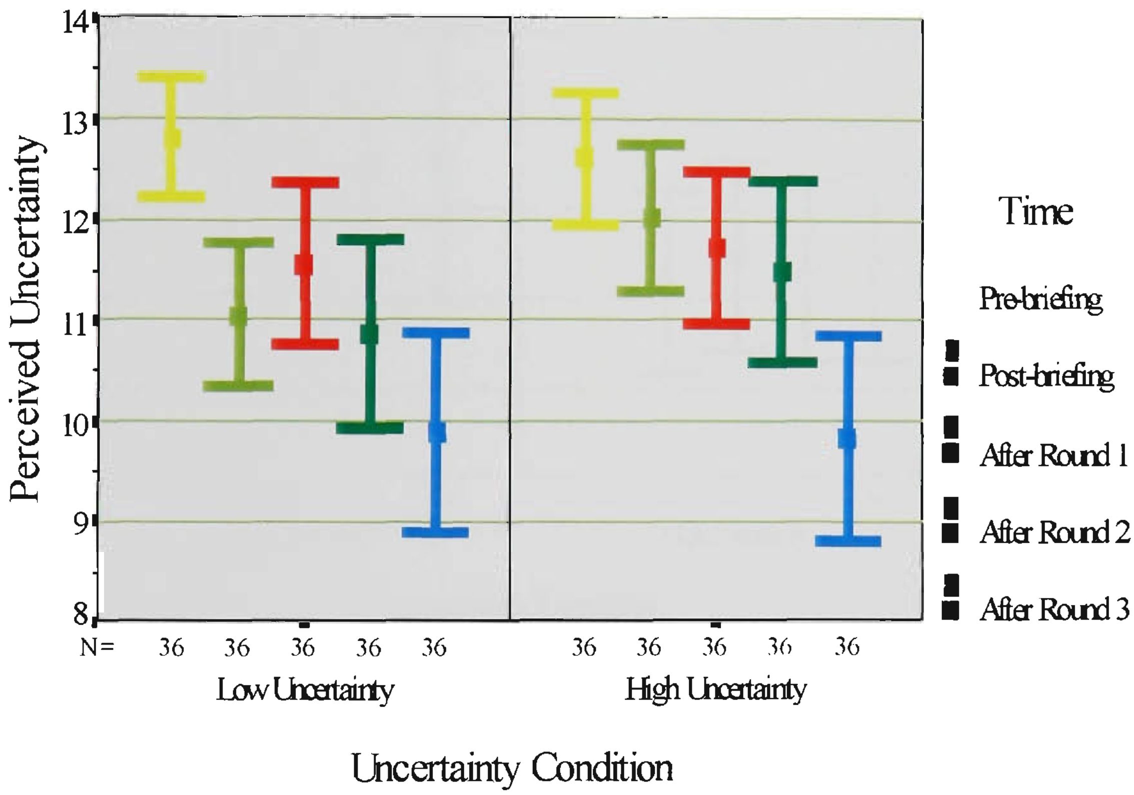


Figure 3.2. Error bar chart comparison of PU for the LU and the HU conditions across the five occasions of testing. The central box represents the mean score and the horizontal bars represent the 95% confidence interval.

Figure 3.3 provides a corresponding error bar chart of the changing trend in A-state for the LU and HU conditions. In line with the Martens et al. (1990) model, A-state is represented as a global score by combining the cognitive and the somatic A-state sub-scale scores, giving a range of 18 to 72. The mean CSAI-2 scores reported here are consistent with published norms for golfers (Martens et al., 1990). Of particular interest, is the general trend for the LU group to become more anxious than the HU group, this issue is further discussed later.

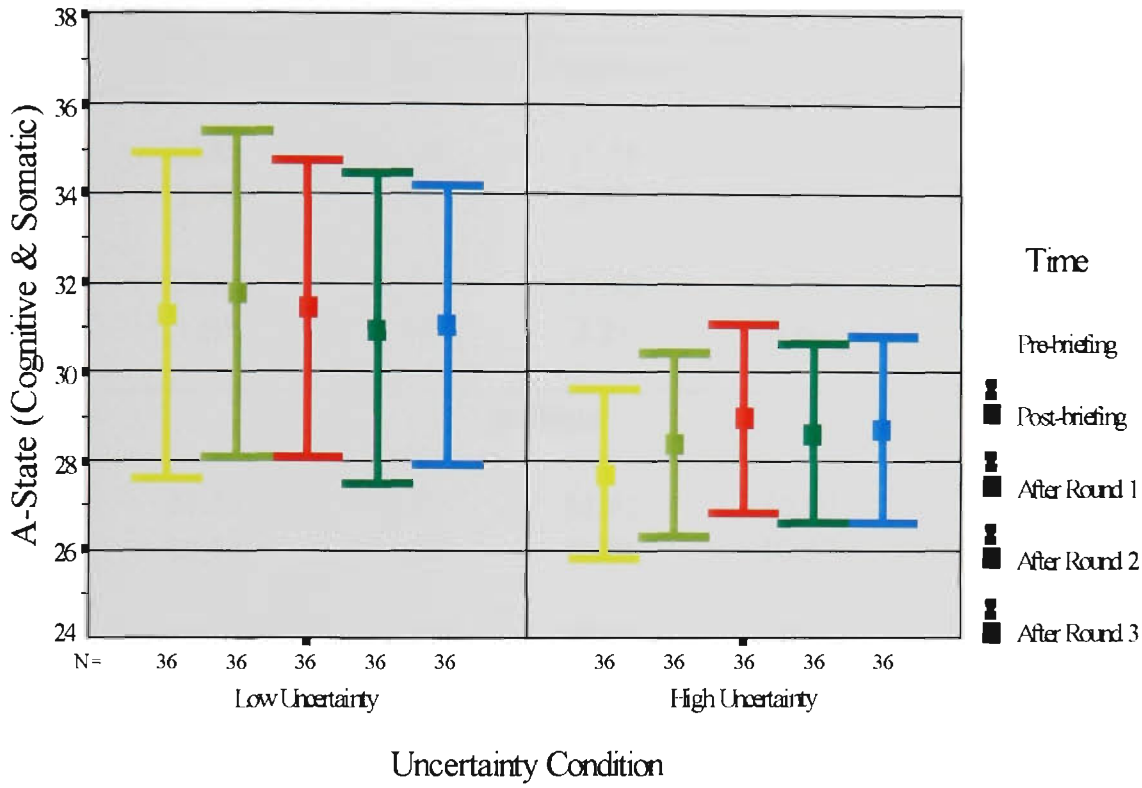


Figure 3.3. Error bar chart comparison of A-state reaction for the LU and the HU conditions across the five occasions of testing.

Table 3.4 displays the raw scores for perceived uncertainty and A-state for the HU (Sup.A & Inf.A), and LU (Sim.A & Unk.A) conditions across the five administrations of the MOQ and CSAI-2.

Table 3.4

Low and High Uncertainty Conditions: Descriptive Scores for Perceived Uncertainty and A-State Across the Five Occasions of Testing

	Stage of competition				
Condition	1[a]	2[b]	3[c]	4[d]	5[e]
			Perceived Uncertainty		
LU					
M	12.81	11.06	11.56	10.86	9.89
SD	1.74	2.14	2.37	2.75	2.92
HU					
M	12.61	12.03	11.72	11.50	9.83
SD	1.93	2.16	2.21	2.67	3.02
			A-State		
LU					
M	31.25	31.75	31.42	30.97	31.06
SD	10.77	10.78	9.80	10.37	9.22
HU					
M	27.69	28.36	28.97	28.61	28.72
SD	5.63	6.11	6.28	5.95	6.16

[a]Pre-briefing
[b]Post-briefing
[c]After Round 1
[d]After Round 2
[e]After Round 3

A series of five (occasion of testing) t-tests examined the predicted hypotheses that HU and LU conditions would produce significant differences in perceived uncertainty. Each t-test included one independent variable, uncertainty condition with two levels (HU & LU), and one dependent variable, perceived uncertainty. No statistically significant differences were found between the LU and HU conditions at any stage of testing. Because of the ineffective manipulation of uncertainty, no analyses were conducted on the A-state scores.

This lack of significant differences for the uncertainty groups may have resulted from the criteria used to form the HU condition. Placing Unk.A participants into a HU condition may have been inappropriate because six of the nine Unk.A pairs actually fitted the criteria for placement in the LU condition, that is, there was a greater than five shot difference in ability between opponents. Conceivably, these Unk.A participants, despite not being informed of their opponent's ability, may have used non-verbal information sources such as their opponent's golf attire, playing style, or equipment to estimate skill levels. Furthermore, Unk.A players who initially believed they were equally matched may have quickly changed this perception after one player gained an early lead, as was often the case in this group. The Unk.A group contained a mix of both well matched and unevenly matched participants. This meant that categorising many of the Unk.A participants in the HU group was probably a misclassification.

Another possible confounding influence was the unpredictable nature of sports competition. Results often run counter to expectations based on an ability assessment. For example, in the present study a few of Inf.A players defeated their supposedly Sup.A opponents who were at least 5 handicap points lower on the rating scale. Likewise, a number of matches involving Sim.A participants did not produce the close result expected. Once competition began, unpredictable results provided an additional source of information that effectively threatened the structural integrity of the LU and HU groupings. In comparing playing ability and predicting the likelihood of success, information derived from ongoing results may have superseded information obtained before the competition began.

To account for unpredictable results, I devised an alternative method of forming the HU and LU conditions for analysis. This method used progressive scores at the end of each round to determine the condition to which participants were assigned for the next round (i.e., low or high uncertainty). First, the 72 participants were rank ordered after each round of shots from greatest winning margin to greatest losing margin. The first and fourth quartiles of ranked scores formed a LU condition, and the second and third quartiles formed a HU condition. It was presumed that, participants in the first and fourth quartiles belonged together because they are likely to perceive themselves to be either likely winners or losers. Participants in the second and third quartiles belonged together because they are likely to anticipate a close result. Refer to Table 3.5 for a summary of the cutting point scores in metres for inclusion in each quartile. It is important to note that using this revised method of forming the groups, some participants oscillated between groups depending on how well they were performing. Generally, most participants reported relatively stable performance levels and either stayed within the same quartile throughout or fluctuated between two quartiles. Only rarely did a participant change their perceptions to the extent where they moved two quartile groupings from one occasion to another.

Table 3.5

Cutting Points Margin Scores in Metres For Each Quartile After Round 1 of the Competition (N = 72)

	Minimum	Maximum	Median
First Quartile (LU)	-64.84	-14.59	-28.54
Second Quartile (HU)	-14.48	-1.58	-9.20
Third Quartile (HU)	1.58	14.48	9.20
Fourth Quartile (LU)	14.59	64.84	28.54

Table 3.6 provides mean and standard deviation scores for perceived uncertainty, and A-state after each round using this revised method of forming the LU and HU groupings[2].

A series of three t-tests revealed a significant main effect for group on perceived uncertainty after round one, $t(71) = 12.77$, $p < .001$; round two, $t(71) = 9.52$, $p < .003$; and round three, $t(71) = 30.44$, $p < .0001$. The HU group were more uncertain than the LU group after each competitive round. Using this revised method of forming uncertainty conditions, the manipulation of participants into LU and HU groups appears to be validated. A series of three Analyses of Covariance with two levels of the independent variable (LU, HU), one dependent variable (global A-state), and SCAT as a covariate to partial out any pre-existing differences in trait anxiety, produced no main effect for group on A-state at any stage of testing. Thus, while groups demonstrated differences in uncertainty, there

[2] Error bar charts are not provided in revisions of the model because the method used to form the LU and HU conditions results in the need to produce different plots for each stage of the testing.

were no differences in anxiety; thereby, lending no support to the Martens et al. (1990) model or the experimental hypothesis.

Table 3.6

First Revision of HU and LU Conditions: Descriptive Scores for Perceived Uncertainty and A-State After Rounds 1, 2, and 3

	Stage of competition		
Condition	After round 1	After round 2	After round 3
	Perceived Uncertainty		
LU			
M	10.75	10.25	8.25
SD	1.98	3.04	2.77
HU			
M	12.53	12.11	11.47
SD	2.24	1.97	2.14
	A-State (Combined Cognitive & Somatic)		
LU			
M	30.08	30.83	30.86
SD	8.66	9.77	8.10
HU			
M	30.31	28.75	28.92
SD	7.97	6.94	7.63

Additional Testing Beyond the Model

A number of possible explanations may be proposed as to why there was no differences between uncertainty groups and A-state. Participants may not have perceived the competition as being anxiety inducing and uniformly responded to the CSAI-2 with low A-state. Similarly, participants may not have perceived the competition as being sufficiently important to produce an A-state reaction. In addition, the Martens et al. (1990) model treats A-state as a global reaction rather than separating the cognitive and somatic elements. Finally, even though both the Sup. A and Inf.A groups should be highly certain of the result, their A-state responses may be quite different. Those in the losing group may experience more anxiety than the winners because they are likely to perceive that their capabilities (their own ability) are unlikely to match demand (their opponent's ability).

When studying A-state reactions in experimental situations, the level of anxiety induced should be commensurate with real competition (Gould, Petlichkoff, Simons & Verera, 1987). The mean scores from participants in this experiment ranged between 16.4 and 16.90 (SD range 5.2 to 6.0) for cognitive anxiety, and 13.1 and 13.7 (SD range 3.4 to 4.5) for somatic anxiety across the five administrations of the CSAI-2. I compared experimental CSAI-2 results to a current study using Australian trainee professionals as a means of ensuring that the experimental competition produced an A-state reaction similar to norms for regular competition (McKay, 1995). In this study, the competition condition was one of a number of qualifying rounds trainees play, where only the very best results are rewarded with entry into upcoming professional tournaments. Given the importance of playing well in these qualifying rounds, in terms of their future career prospects, trainees are playing in an anxiety inducing environment. A group of 15 trainees filled out the CSAI-2 prior to playing an 18 hole round, and after the 6th, 12th and 18th holes in practice and competitive rounds. The resultant mean score for cognitive anxiety was 13.6 in practice (SD = 4.4) and 18.8 in competition (SD = 4.1). The corresponding somatic scores were 10.7 (SD = 2.8) in practice and 14.3 (SD = 4.7) in competition. These scores indicate that the A-state scores for the present study were somewhere between the scores obtained for the practice round and the competition round in the McKay study. In comparing A-state scores between the two studies, age differences should be taken into account. Research suggests that younger athletes report higher levels of A-state than older athletes (Hammermeister & Burton, 1995). All the trainee professionals were 23 years of age or younger, whereas the average age of participants in the present study was 39.7 years. In order to make a more direct comparison between the studies, I partitioned out all players in the present study under the age of 23 and again calculated average A-state scores. The average cognitive score for the 16 players who fitted this criterion was 17.88 (SD = 6.3) and the average somatic score was 12.7 (SD = 4.3). These results suggest participants in the present study experienced a level of cognitive anxiety approaching that reported by trainee professionals in a qualifying round of competition. Somatic A-state scores were above those of a practice round, but they were somewhat short of those experienced in competition by the trainees.

The moderate A-state scores obtained in the present study and the McKay (1995) study where participants were in highly anxiety-evoking competition, raises some concerns about the validity of the CSAI-2. This point can be appreciated by considering that the scores in these two studies barely reached the mid-point of the possible cognitive and somatic sub-scale ranges. This may be related to the sensitivity of the CSAI-2 which uses a four point range. Perhaps the inclusion of a six or seven point scale might rectify this problem. Alternatively, it may be the result of participants repressing their feelings during competition.

Future research might investigate the possible presence of a 'floor' effect using the CSAI-2.

Although the present experiment primarily examined perceived uncertainty, I attempted to hold perceived importance at a constant level. Martens et al. (1990) state "For threat (leading to A-state) to exist there must be substantial uncertainty about an outcome, and the outcome must be important to the person" (p. 218). To ensure participants considered the competition to be important, each pair vied for a reward of 12 new golf balls. Perceived importance scores as measured by the MOQ were generally at a moderate level for both HU and LU groups in this experiment.

A-state is multidimensional and comprises cognitive and somatic elements (Liebert & Morris, 1967). Previous studies suggest that these two sub-components affect athletes quite differently depending on such factors as the type of sport and the duration of competition (Gould et al., 1987; Burton, 1988). Rather than predicting different cognitive and somatic responses, the Martens et al. (1990) model treats A-state as a global reaction. This is puzzling because the same group of researchers developed the CSAI-2, an instrument predicated on the assumption of differences between cognitive and somatic A-state. As an extension of the present model, I analysed cognitive and somatic sub-components of A-state separately. To test the relative contributions of cognitive and somatic A-state, I ran a series of MANCOVAs with two levels of the independent variable (LU, HU), two dependent variables (cognitive A-state, somatic A-state), and SCAT as the covariate. The revised criteria for forming the LU and HU groups were used again. No main effect of condition on somatic A-state occurred across the occasions of testing. A main effect of condition resulted for cognitive anxiety after round three, $F(1,69) = 4.75$, $p < .03$ (Cohen's $f = .36$) . The direction of difference, however, was in the opposite direction to what was expected. That is, the LU participants experienced greater cognitive A-state than the HU participants. Considering this result, I decided to again review the rationale underpinning the formation of the LU and HU conditions.

The Martens et al. (1990) model pre-supposes that likely winners and losers will both experience low uncertainty, and consequently low A-state. This runs counter to the assumptions underlying demand-response theory as proposed by McGrath (1970) and summarised by Martens (1977). "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). While likely winners and losers in the present study may have reported similar scores for perceived uncertainty, this may not necessarily have translated into similar A-state scores. Based on this possibility the next analysis grouped likely winners and likely losers as separate groups. As with the previous analysis, participants were ranked after each round according to the margin in metres between the two participants. The fourth quartile of participants, that is, those with the greatest leading margin, formed a positive low uncertainty (PLU) group. The second, and third quartiles remained as the HU group. The first quartile, those who trailed their opponents by the greatest margins, formed a negative low uncertainty (NLU) group. Table 3.7 provides descriptive scores after each round using this revision of LU and HU groupings.

Table 3.7

Revised HU and LU Conditions: Descriptive Scores for Perceived Uncertainty, Cognitive A-State and Somatic A-State After Rounds 1, 2, and 3

Condition	Stage of competition		
	After round 1	After round 2	After round 3
	Perceived Uncertainty		
PLU			
M	10.3	10.7	9.2
SD	1.9	3.2	2.7
HU			
M	12.5	12.1	11.3
SD	2.2	2.0	2.4
NLU			
M	11.2	9.8	7.7
SD	1.95	2.8	2.8
	Cognitive A-State		
PLU			
M	15.2	15.7	16.4
SD	4.9	6.1	4.9
HU			
M	16.6	15.4	15.3
SD	5.6	4.5	4.7
NLU			
M	18.7	20.3	20.6
SD	6.5	7.3	7.2
	Somatic A-State		
PLU			
M	13.2	13.3	12.8
SD	3.7	4.0	3.3
HU			
M	13.7	13.2	13.5
SD	3.8	3.8	3.9
NLU			
M	13.1	12.6	12.1
SD	4.1	3.7	2.2

-

I again ran a series of ANCOVAs, this time with three levels of the independent variable (PLU, HU, NLU) and perceived uncertainty as the dependent variable. The SCAT was again used as a covariate to partial out pre-existing differences in trait anxiety between the groups. A main effect of condition occurred for uncertainty at all occasions of testing; after round one, $F(2,68) = 15.47$, $p < .0001$ (Cohen's $f = .80$); round two, $F(2, 68) = 4.1$, $p < .008$ ($f = .81$); and round three, $F(1,68) = 15.9$, $p < .0001$ ($f = .81$). All the effect sizes are in the large to very larg range. A series of follow up one-way ANOVAs including post hoc analysis (Newman-Keuls) revealed there was a significant difference between the HU group and both the LU groups after round one and round three. For round two there was only a significant difference between the HU group and NLU group. Thus, the manipulation was successful.

I then ran a series of three MANCOVAs, with three levels of the independent variable (PLU, HU, NLU) and two dependent variables (cognitive A-state and somatic A-state) on each occasion. A main effect of condition occurred on each occasion $F(2, 68) = 4.02$, $p < .003$ ($f = .41$), after round 1; $F(2, 68) = 3.22$, $p < .015$ ($f = .36$), after round 2; $F(2, 68) = 7.88$, $p < .0001$ ($f = .57$), after round 3. Follow up univariate analyses indicated their were significant differences for cognitive A-state at round two $F(1, 68) = 7.38$, $p < .03$ ($f = .55$), and round three $F(1, 68) = 7.5$, $p < .001$ ($f = .56$). A series of follow up one way ANOVAs including post hoc analysis revealed there was a significant difference between the NLU and both the HU and PLU groups after round two and three with the NLU group reporting the most cognitive state anxiety. For somatic anxiety, there were significant differences between groups only after round three $F(1, 68) = 3.77$, $p < .03$ ($f = .40$), with the HU group having more somatic anxiety than the other two groups.

Alternative Test of the Model

Clearly, the Martens et al. (1990) model is not easily tested with an independent groups design such as used in this experiment. It was only after a series of revisions that a reasonable test of the Martens et al. (1990) model emerged. These revisions helped manipulate uncertainty and form truly different groups but this uncertainty did not translate into different A-state reactions in the manner suggested by the Martens et al. (1990) model. More specifically, NLU participants felt significantly more anxious than PLU or HU participants.

The revisions and associated re-analyses, even though successful in highlighting inherent weaknesses in the Martens et al. (1990) model, are probably not the most practical and straightforward test of the model. In attempting to better test the Martens et al. (1990) model, yet still retain an independent groups design, a number of design limitations emerged. First, dichotomising a continuous variable such as distance (i.e., margin between opponents) into quartiles, is according to Cohen (1990), a perversion of simple is better, because this practice wilfully discards information, and is akin to reducing all cell sizes to the size of the smallest group by dropping cases. Second, because players were divided according to ongoing performance (i.e., margin after each round) the actual constituency of each uncertainty group changed from round to round. This grouping method is reactive, and thus lacks the predictive capacity that is vital for models that purport to identify causal variables. Third, it is likely the variability of perceived uncertainty and perceived importance within the groups may be fairly large and result in a large overlap on uncertainty and importance. With the aim of producing a less complicated but methodologically sound test of the Martens et al. (1990) model, a series of multiple regression analyses were computed.

Initially, MOQ scores, which reflect the level of perceived uncertainty of outcome, and SCAT scores, which reflect each participant's A-trait, were entered as predictor variables. The contribution of a third hypothesised predictor variable, perceived importance of outcome, is analysed in Experiments 2 and 3. The criterion variable was global A-state as measured by the CSAI-2. As can be seen in Table 3.8, the results confirmed the earlier MANOVA analysis with perceived uncertainty not predicting A-state at any stage of the competition. In contrast pre-competition A-trait was a significant predictor of A-state throughout the competition, pre-briefing, $R^2 = .13$, $p < .002$; post-briefing, $R^2 = .08$, $p < .017$; after round one, $R^2 = .07$, $p < .024$; after round two, $R^2 = .08$, $p < .015$; and after round three, $R^2 = .07$, $p < .026$.

-

Table 3.8

Multiple Regression Analysis: A-trait and Perceived Uncertainty as Predictors of Global A-State

Condition	R^2	Beta	Sig T	Sig F
Dependent Variable: A-State (cognitive & somatic combined)				
1) Pre-briefing				
A-trait	.13	.36	.002	
Perceived uncertainty	.01	.01	ns	
Total	.14			.008
2) Post-briefing				
A-trait	.08	.28	.017	
Perceived uncertainty	.01	.09	ns	
Total	.09			.008
3) After Round 1				
A-trait	.07	.27	.024	
Perceived uncertainty	.00	.02	ns	
Total	.07			.02
4) After Round 2				
A-trait	.08	.28	.015	
Perceived uncertainty	.00	-.10	ns	
Total	.08			.05
5) After Round 3				
A-trait	.07	.26	.027	
Perceived uncertainty	.01	-.10	ns	
Total	.08			.04

Similar results were found when a separate multiple regression equations were computed for cognitive A-state and somatic A-state. Tables 3.9 and 3.10 show that A-trait is the main contributor to the explained variance for both cognitive A-state and somatic A-state, with its influence being slightly more pronounced for the cognitive component. Although the amount of variance explained by perceived uncertainty increased as the competition progressed, it did not reach significance for either cognitive or somatic A-state.

Table 3.9

Multiple Regression Analysis: A-Trait and Perceived Uncertainty as Predictors of Cognitive A-State

Condition	R^2	Beta	Sig T	Sig F
Dependent Variable: Cognitive A-State				
1) Pre-briefing				
A-trait	.13	.36	.02	
Perceived uncertainty	.01	.07	ns	
Total	.14			.007
2) Post-briefing				
A-trait	.08	.28	.02	
Perceived uncertainty	.01	.08	ns	
Total	.09			.05
3) After Round 1				
A-trait	.07	.27	.02	
Perceived uncertainty	.01	.08	ns	
Total	.08			.06
4) After Round 2				
A-trait	.08	.28	.02	
Perceived uncertainty	.00	.02	ns	
Total	.08			.05
5) After Round 3				
A-trait	.07	.26	.05	
Perceived uncertainty	.03	-.18	ns	
Total	.10			.03

Table 3.10

Multiple Regression Analysis: A-trait and Perceived Uncertainty as Predictors of Somatic A-State

Condition	R^2	Beta	Sig T	Sig F
Dependent Variable: Somatic A-State				
1) Pre-briefing				
A-trait	.08	.27	.02	
Perceived uncertainty	.00	-.02	ns	
Total	.08			.07
2) Post-briefing				
A-trait	.12	.35	.02	
Perceived uncertainty	.01	.05	ns	
Total	.13			.009
3) After Round 1				
A-trait	.09	.30	.01	
Perceived uncertainty	.00	-.04	ns	
Total	.09			.04
4) After Round 2				
A-trait	.03	.17	ns	
Perceived uncertainty	.01	.10	ns	
Total	.04			ns
5) After Round 3				
A-trait	.05	.23	.03	
Perceived uncertainty	.04	.20	ns	
Total	.09			.04

A decision to also use perceived confidence of outcome as a possible predictor variable was prompted by the general trend for NLU participants to be the most anxious. The measures of perceived confidence of outcome were the scores obtained from the same three MOQ items previously used to measure perceived uncertainty of outcome. For perceived uncertainty, a bi-directional scoring system was used with the mid-point of the scale representing the highest level of uncertainty. To provide a measure of perceived confidence the same items were scored (certain I will win) in a uni-directional manner, with nine representing the highest level of confidence or perceived certainty of winning, and one the lowest level of confidence or perceived certainty of losing.

As with perceived uncertainty and perceived importance, an exploratory factor analysis on the data collected in the pilot study determined if the items for perceived confidence represented a distinct factor. All items were subjected to a principal components factor analysis with varimax rotation. A criterion loading of .50 was set for item inclusion on a factor. Results indicated that all the perceived confidence items loading on a common factor (see Table 3.11). The internal consistency (Cronbach's alpha) for the perceived confidence scale was .80.

Table 3.11

Match Orientation Questionnaire (MOQ): Factor Loadings Generated From Exploratory Factor Analysis with Varimax Rotation

Item	Factor 1	Factor 2
Perceived Confidence		
Likelihood of Winning	.86	.24
Skill Comparison	.83	.32
Predicted Performance	.76	.04
Perceived Importance		
Performing well	.17	.92
Importance of next round	.18	.85
Reward for winning	.21	.83
Percent of variance explained	54.30	21.20
Eigenvalue	3.25	1.27

Earlier MANCOVA designs indicated that A-state and particularly cognitive anxiety is generally highest among likely losers, (i.e., the NLU group). The A-state responses to competition among these NLU individuals was quite different to either the positive low uncertainty (PLU) or high uncertainty (HU) groups. To investigate this finding further, a series of multiple regression analyses was computed with global A-state being the criterion variable and A-trait and perceived confidence of outcome as the predictor variables. As with the previous multiple regression analysis for perceived uncertainty, A-trait was again the main predictor of global A-state in this equation. Perceived confidence was a significant predictor of global A-state after round one, $\underline{R}^2 = .06$, $\underline{p} < .04$; and round three, $\underline{R}^2 = .09$, $\underline{p} < .008$. Table 3.12 demonstrates that perceived confidence of outcome and A-trait together account for a moderate amount of the A-state variance.

Perceived confidence of outcome is a considerably stronger predictor of global A-state than perceived uncertainty. As the competition progressed perceived confidence accounts for an increasing amount of the explained variance. By the fifth stage of testing, perceived confidence had overtaken A-trait as the key predictor of global A-state. By this stage the competition was three quarters completed and participants were well placed to assess whether they were likely to win the match. When perceived confidence and A-trait were combined, the explained variance ranged from 14% at the start of the competition to 17% by the end of the third round of competition.

-

Table 3.12

Multiple Regression Analysis: A-Trait and Perceived Confidence as Predictors of Global A-State

Condition	R^2	Beta	Sig T	Sig F
Dependent Variable: A-State (cognitive & somatic combined)				
1) Pre-briefing				
A-trait	.13	.36	.002	
Perceived confidence	.01	-.09	ns	
Total	.14			.006
2) Post-briefing				
A-trait	.13	.35	.002	
Perceived confidence	.01	-.13	ns	
Total	.14			.005
3) After Round 1				
A-trait	.10	.32	.006	
Perceived confidence	.06	-.22	.04	
Total	.16			.003
4) After Round 2				
A-trait	.08	.28	.02	
Perceived confidence	.04	-.20	ns	
Total	.12			.01
5) After Round 3				
A-trait	.08	.29	.01	
Perceived confidence	.09	-.29	.008	
Total	.17			.001

In line with previous analyses, the effect of A-trait and perceived confidence was again analysed separating global A-state into cognitive and somatic components (see Tables 3.13 and 3.14).

Table 3.13

Multiple Regression Analysis: A-Trait and Perceived Confidence as Predictors of Cognitive A-State

Condition	R^2	Beta	Sig T	Sig F
Dependent Variable: Cognitive A-state				
1) Pre-briefing				
A-trait	.13	.36	.002	
Perceived confidence	.02	-.14	ns	
Total	.15			.003
2) Post-briefing				
A-trait	.08	.28	.017	
Perceived confidence	.04	-.21	ns	
Total	.12			.02
3) After Round 1				
A-trait	.07	.27	.024	
Perceived confidence	.05	-.23	.04	
Total	.12			.009
4) After Round 2				
A-trait	.08	.28	.015	
Perceived confidence	.11	-.32	.006	
Total	.19			.001
5) After Round 3				
A-trait	.07	.26	.027	
Perceived confidence	.16	-.40	.0003	
Total	.23			.0001

As Table 3.13 shows perceived confidence accounted for more of the total variance as the competition progressed, reaching 16% of the total variance in the cognitive A-state by the last stage of testing. As a result the combined variance for A-trait and perceived confidence ranged from 15% at the start of the competition to 23% at the three quarter point of the competition. This findings is not surprising because previous research has shown that self-confidence is inversely correlated to cognitive A-state (Martens et al., 1990).

Table 3.14

Multiple Regression Analysis: A-Trait and Perceived Confidence as Predictors of Somatic A-State

Condition	R^2	Beta	Sig T	Sig F
Dependent Variable: Somatic A-state				
1) Pre-briefing				
A-trait	.08	.27	.02	
Perceived confidence	.00	.004	ns	
Total	.08			.07
2) Post-briefing				
A-trait	.12	.35	.002	
Perceived confidence	.01	-.06	ns	
Total	.13			.009
3) After Round 1				
A-trait	.09	.30	.01	
Perceived confidence	.02	-.13	ns	
Total	.11			.02
4) After Round 2				
A-trait	.03	.17	ns	
Perceived confidence	.00	.04	ns	
Total	.03			ns
5) After Round 3				
A-trait	.05	.22	.06	
Perceived confidence	.00	.01	ns	
Total	.05			ns

The contribution of perceived confidence in the somatic equation peaked at a non-significant 2% of the explained variance, thereby showing a weak relationship between perceived confidence and somatic A-state. The above separate analysis demonstrated that perceived confidence is more closely associated with cognitive A-state than somatic A-state.

The emergence of perceived confidence as a strong predictor of cognitive A-state suggests that the self confidence sub-scale of the CSAI-2 might also be a strong predictor. Logically, perceived confidence and self-confidence should covary. A series of Pearson product moment correlations was used to measure the degree of relationship between perceived confidence and self-confidence. The relationship was moderate to strong: pre-briefing $r = .31$, $p < .008$; post-briefing, $r = .57$, $p < .0001$; after round one, $r = .43$, $p < .0001$; after round two, $r = .61$, $p < .0001$; and after round three, $r = .72$, $p < .0001$. Whether perceived confidence of outcome (MOQ) or self confidence (CSAI-2) is used to measure confidence is not important. The fact that Martens et al. (1990) did not include confidence as a hypothesised predictor of A-state in their model is surprising, especially, since the same group of researchers produced the CSAI-2, an instrument that includes self confidence because of the relationship between confidence and A-state.

Discussion

The initial test of the Martens et al. (1990) model proved inconclusive, due in part, to the uncertainty manipulation being unstable over time. Once competition started, ongoing performance-related information probably changed individual uncertainty perceptions, at least for some participants. As a result, the structural integrity of the experimental groupings weakened, particularly when competition results ran counter to pre-match expectations.

The use of ongoing margin between opponents at various stages of the competition to group participants proved to be an effective measure to divide participants into uncertainty groups. Not surprisingly, those players involved in close matches (high uncertainty) reported significantly higher levels of uncertainty than players involved in uneven matches (low uncertainty). Yet, contrary to the Martens et al. (1990) model there was no difference in A-state reactions between the high and low uncertainty groups. The result led to a rejection of the hypothesis that there would be differences in A-state reactions between high uncertainty and low uncertainty participants.

A re-analysis examined the distinction between likely winners, who were labelled the positive low uncertainty group, and likely losers, who were labelled the negative low uncertainty group. Negative low uncertainty participants experienced significantly higher levels of cognitive A-state than either positive low uncertainty or high uncertainty participants. No difference was found between the positive low uncertainty and high uncertainty golfers. The main conclusion is that those participants who are clearly losing are more anxious than other participants. The Martens et al. (1990) model suggests that likely losers psychologically dissociate themselves as a means of coping with the inevitable failure, and as a result, do not experience elevated A-state. The results of this experiment indicate that this may not be the case.

Although performance margin proved to be helpful in forming perceived uncertainty groups, this procedure lacked predictive power. Because performance margin, and hence, perceived uncertainty is not known until the competition is under way, those athletes who are likely to experience high A-state as a result of negative low uncertainty cannot be determined in an a priori manner.

The Martens et al. (1990) model proposes a preference for global A-state over a differentiation between cognitive and somatic A-state reactions which does not seem defensible. The present study found perceived uncertainty to be predictive of cognitive, but not somatic, A-state. In presenting their theory of competitive anxiety Martens et al. do not specifically discuss why A-state is conceptualised as a general reaction. Earlier in their text Martens et al. draw on the findings of Gould et al. (1984) to discuss the relationship between competitive A-trait, perceived ability, experience, and previous match outcome as possible predictors of either cognitive A-state or somatic A-state. Martens et al. conclude, "that no antecedent strongly predicted all three CSAI-2 components, again supporting the independence of the components" (p. 203). In view of this statement the decision to present A-state as a global construct is surprising. Perhaps due to the absence of empirical testing of their model, they may have felt it premature to make predictions about relationships between specific causes of anxiety and specific A-state reactions. See Chapter 6 for a more detailed discussion that synthesises the findings of Experiments 1, 2, and 3.

Conclusions

This experimental manipulation of perceived uncertainty of outcome, a hypothesised cause of A-state, was unsuccessful. The initial test of the model was unsuccessful in differentiating between LU and HU participants on either perceived uncertainty or A-state. A manipulation check revealed that the model was not adequately tested due to unexpected fluctuations in perceived uncertainty across the LU and HU conditions. A revised method of grouping players was more successful in categorising participants into LU and HU conditions. Using this revised method, the manipulation check revealed significant differences in perceived uncertainty between LU and HU participants. This difference in uncertainty, however, did not translate into different A-state reactions between LU and HU players. This first analysis followed the Martens et al. (1990) model by treating A-state as a global reaction. A further re-analysis of A-state, separating cognitive and somatic anxiety, found LU participants to have higher cognitive anxiety than HU participants.

A potential flaw in the model is that it predicts that likely winners and losers will both experience low uncertainty, and hence low A-state. Using the second re-analysis, separating winners and losers into positive and negative low uncertainty groups respectively, significant main effects were found for cognitive A-state after rounds two and three. The likely losers (NLU) had significantly higher cognitive A-state than likely winners (PLU). Low uncertainty, thus, only translates to low cognitive A-state for likely winners. This challenges the assumption by Martens et al. (1990) that likely losers psychologically dissociate themselves as a means of coping with the failure, and thereby do not experience elevated A-state.

The results of the multiple regression analyses suggest that perceived confidence is a better predictor of A-state than perceived uncertainty. The strength of the relationship increased as the match progressed, possibly confirming for some that they were likely to lose. This finding fits well with the tendency of likely losers to become more anxious than likely winners or those engaged in a close match. This finding indicates that the subtitution of perceived confidence in place of perceived uncertainty in the Martens et al. (1990) may be justified. A further finding of the multiple regression analyses, was that the relationship between perceived confidence and cognitive A-state proved to be much stronger than the relationship between perceived confidence and somatic A-state. It may, therefore, also be necessary to redefine the Martens et al. (1990) model into separate cognitive and somatic models. A-trait was shown to be a key contributor to the combined explained variance when entered with either perceived uncertainty or perceived confidence. This demonstrates that A-trait should be retained in the model or in a possible re-definement of the model.

CHAPTER 4

EXPERIMENT TWO: TEST OF PERCEIVED IMPORTANCE

Purpose

Experiment two tested the perceived importance factor of the Martens et al. (1990) model of competitive anxiety. Perceived importance of outcome, one of three hypothesised causes of A-state was manipulated in the sporting context of golf. The relative contribution of A-trait, a second hypothesised cause of A-state, was also examined.

Hypothesis

Based on the Martens et al. (1990) model, perceived importance of outcome, and, as a consequence, A-state should differ between high and low importance situations.

Formal Statement of the Experimental Hypothesis

$\underline{H}_1$. As measured by the CSAI-2, participants' A-state will be significantly higher in the high importance (HI) situation compared to the low importance (HI) situation. In testing this hypothesis, the standard .05 significance level was used in a directional analysis.

Method

Participants

A sample of 52 participants, consisting of 48 males ($\underline{M}$ = 31.9 years old), and 4 females (M = 50.2 years old) took part in this experiment. All participants were recruited from the original participant pool ($\underline{N}$ = 172) described in the Method section of Experiment 1. A wide range of golfing handicaps were represented ($\underline{M}$ = 15.5, $\underline{SD}$ = 7.32).

Measures

Golf Ability Rating Form (GARF)

Golfers provided their official club handicaps and self-rated handicaps for all major golf sub-components (e.g., driving, putting, chipping), by filling out a Golf Ability Rating Form (GARF). A rating of each golfer's chipping ability was of particular importance because chipping was the performance task in this study. Self-rated chipping ability was used to match players into one of two experimental conditions, see Formation of experimental groups section of this Chapter. Participants reported a wide range of chipping abilities ($\underline{M}$ = 16.1, $\underline{SD}$ = 6.63). Golf handicap and self-rated chipping ability were strongly related ($\underline{r}$ = .75, $\underline{p}$ < .0001). Self-rated chipping ability was a highly significant predictor of follow up performance on the experimental task ($\underline{r}$ = .78, $\underline{p}$ < .0001).

As in Experiment 1, participants filled out the GARF, SCAT, M-C SDS, CSAI-2, and MOQ and demographic questionnaires. See the Measures section of Experiment 1, for a detailed description of these measures and their psychometric properties.

Golf Chipping Task

The same experimental site as described in the first experiment was used in this experiment. Participants played four rounds of eight shots with medium compression golf balls. The distance between the nearest edge of the hole and the resting position of each ball was measured to the nearest centimetre with a standard measuring tape. Each player's final score comprised the combined distance of the 32 shots taken. Participants played eight shots from each of four 2 x 2 metre zones measuring 20, 25, 30, and 35 metres from the centre of the zone to the hole (see Figure 4.1). In varying the shot length, wear and tear on the shot zone was spread over a larger area. This helped to maintain 'good lies' throughout the competition. With shots being played from four different zones, participants needed to adjust their shot making, and sometimes club selection, thereby better simulating regular competition. The zone order was counterbalanced throughout the experiment to ensure that differences in perceptions were due to the experimental variables rather than shot difficulty.

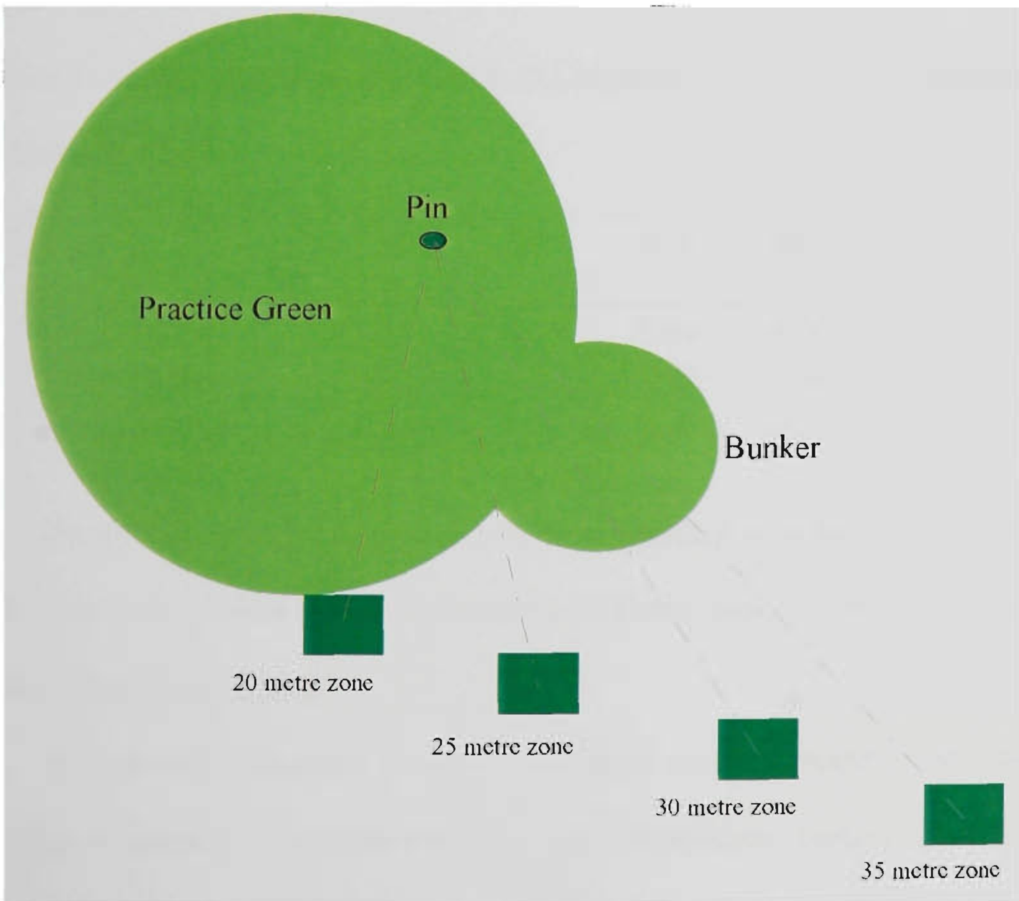


Figure 4.1. Schematic diagram of the experimental site.

-

Formation of Experimental Groups

As in Experiment 1, each pair was matched and assigned to an experimental group according to their chipping ability, availability and sex. Each participant was assigned to one of two experimental conditions: Low importance (LI) and High importance (HI). To attempt to maintain a constant level of uncertainty, all pairs were matched using the same criterion as that used to form the Sim.A group in Experiment 1 (0 - 4 shot handicap difference). The mean chipping ability differences (absolute value) between pairs in the two groups are presented in Table 4.1. The average difference of nearly one handicap point between the two groups needs to be viewed in the context of the comparatively large 36 point range possible in competitive golf.

Table 4.1

Descriptive Results: Mean Difference in Chipping Ability Across Experimental Groups (N = 52)

Scale	M	SD	Min	Max
Low Importance	2.15	1.20	0.00	4.00
High Importance	1.23	1.14	0.00	3.00

As with Experiment 1, participants were matched with someone from a different club to avoid biased assessments of ability based on prior knowledge.

Pre-testing Organisation

After assignment to the groups, participants were contacted by telephone to arrange a mutually acceptable time for their participation. Testing commencing in March 1994, and concluded in July 1994. Again, seven one and a half hour time slots were available to players on any given day of testing. Again a number of uncontrollable factors such as illness, inclement weather, injury, work commitments, and players forgetting their appointment time resulted in the postponement of a number of matches.

Procedures

See the Procedures section of the first experiment for a description of the participant recruitment protocol. Table 4.2 contains the means, standard deviations, and ranges for the SCAT, and the M-C SDS for participants in this experiment. The scores for SCAT are similar to those obtained in Experiment 1 and published norms for athletes, whereas the M-C SDS scores are lower than Experiment 1 (18.1 compared to 16.7), but substantially higher than published norms (16.7 compared to 13.7). Because participants in this study are on average six years younger than those in Experiment 1, but are still approximately 12 years older than the undergraduate students used to derive the original M-C SDS norms, social desirability scores may have been, at least partially, a function of age. For a more detailed discussion of this issue, see Chapter 6, General Discussion.

Table 4.2

Descriptive Results: Pre-Experimental Questionnaires (N = 52)

Scale	M	SD	Min	Max
SCAT	17.6	4.8	10	30
M-C SDS	16.7	5.7	0	29

Following the return of questionnaires, participants were mailed a letter containing further information and instructions. In addition, participants completed a preferred time of participation checklist and returned this in a pre-addressed, stamped envelope. The preferred time checklist helped facilitate the task of matching and assigning participants' partners.

Experimental Procedure and Description

Participants had similar instructions as in Experiment 1, except they were told the winner would receive either three golf balls (LI) or a new pair of golf shoes (HI).

Both players were then informed of each other's chipping ability, and asked to fill out the MOQ and CSAI-2 for the second time. Players then completed the first round of eight shots, and the distance each ball finished from the pin was measured and recorded. In the event of a ball pitching and rolling into another ball, I placed them as if the collision had not taken place. This happened infrequently, and the impact was minimal so ball replacement was easily accomplished. Before they filled out the MOQ and CSAI-2 for the third time, I informed participants of both their own and their opponent's progressive score. This procedure of filling out the two questionnaires, playing, and scoring each round of eight shots was repeated until the players had completed four rounds. Players were then informed of their four round total. The winning player received the promised reward, and the losing player was given an unexpected consolation prize of three golf balls. Finally, I debriefed the players while we walked back to their cars and provided them with information on a sequence of golf seminars conducted at Victoria University of Technology for all interested participants free of charge.

-

Results

Pre-experimental Findings

To ensure the two experimental groups were equivalent prior to formal testing, each of the key pre-experimental measures was subjected to a one way ANOVA. No significant differences between groups were found for age, and chipping handicap.

As with the Experiment 1, the M-C SDS and the SCAT were administered for possible later use as covariates. Again, A-trait was consistently linked with A-state at all stages of testing: pre-briefing, $r = .42$, $p < .002$; post-briefing, $r = .32$, $p < .02$; after round 1, $r = .40$, $p < .004$; after round 2, $r = .41$, $p < .003$; and after round 3, $r = .40$, $p < .003$. Based on this relationship, the SCAT was used to partial out the effects of A-trait on the dependent variable A-state in later analyses. In contrast to Experiment 1, the M-C SDS was significantly linked with A-state, after round 1, $r = -.29$, $p < .04$; after round 2, $r = -.32$, $p < .02$; and after round 3, $r = -.28$, $p < .04$. The M-C SDS scores were, therefore, also used as a covariate in subsequent testing in this experiment.

Testing the Martens et al. (1990) Model

As with Experiment 1, the data was analysed at each of the five administrations of the MOQ and CSAI-2. The first administration of the questionnaires, labelled pre-briefing, provided base-line scores. Participants completed the questionnaires for a second time, labelled post-briefing after receiving an explanation of the competition task and hitting their 16 practice

-

shots. The third, fourth, and fifth questionnaire administrations provided participant responses between consecutive rounds of eight shots.

Manipulation Check

Differences in A-state should occur with differences in perceived importance across different levels of the independent variable (experimental groupings). A manipulation check, involving a between groups comparison between the high importance condition (HI) and the low importance condition (LI) was carried out to ensure the manipulation successfully altered perceived importance. Error bar chart is provided to show the changing trend in perceived importance for the LI and HI groups across the five administrations of the MOQ, see Figure 4.2. Error bar charts provide a relatively simple graphical representation of the mean (i.e., the cental box), and the 95% confidence interval (i.e., the extending vertical lines bounded by horizontal lines). The perceived importance score is the combined total of three perceived importance items. An exception was the first administration of the MOQ, where only two importance items were included. At this stage, participants had not been informed of the reward for winning; the question relating to the promised reward was included from the second MOQ administration onward [How important is winning the three golf balls (or golf shoes)?]

Figure 4.2 indicates perceived importance was, as expected, substantially higher beyond the briefing session for the HI group compared to the LI group. The reason for the dramatic increase in perceived importance from the pre-briefing to the post-briefing is due mainly to the addition of a third perceived importance question in the MOQ, the one relating to the perceived importance of the reward. A series of four t-tests, was used to test whether the experimental manipulation was effective. Significant differences between groups were observed for perceived importance at each stage of testing beyond the pre-briefing stage, after round one, $t(51) = 4.25$, $p < .04$; after round two, $t(51) = 5.29$, $p < .03$; and after round three, $t(51) = 8.68$, $p < .005$. Because the HI group consistently perceived the competition to be more important, the results indicated the reward manipulation was successful.

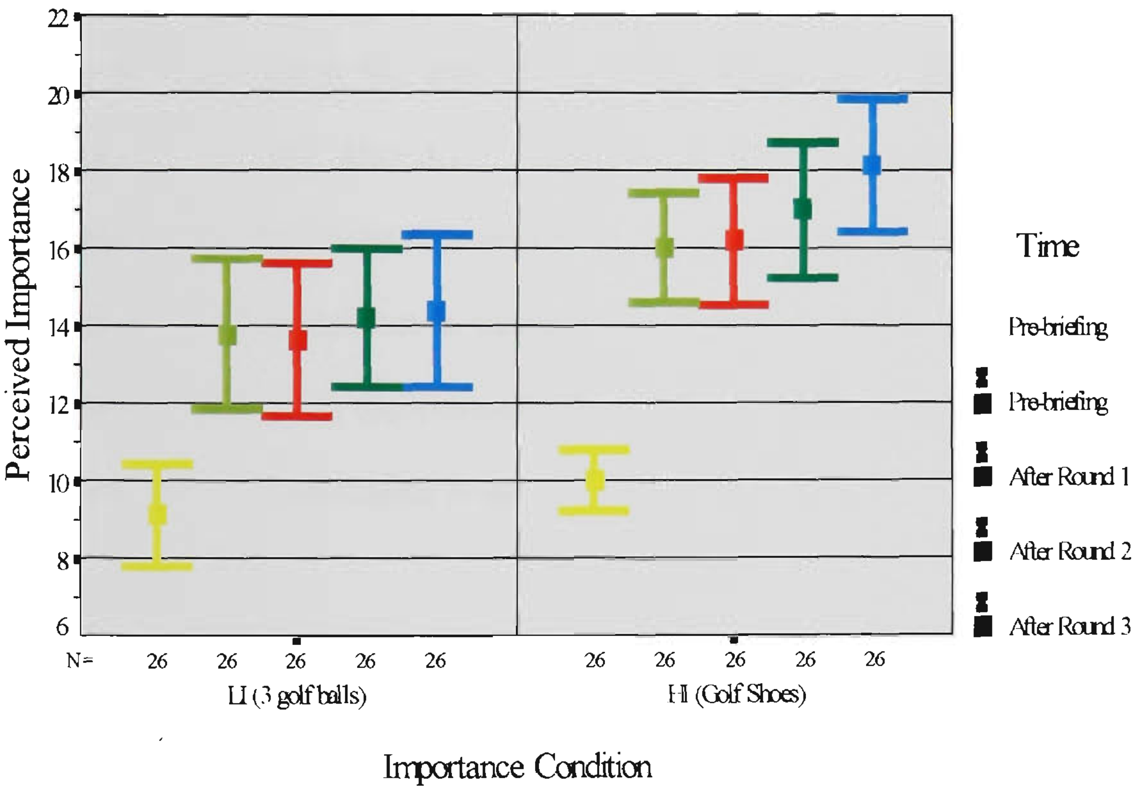


Figure 4.2. Error bar chart comparison of perceived importance for the LI and HI groups across the five occasions of testing.

Because the manipulation of perceived importance was successful, possible A-state differences between the LI and HI groups were investigated. In line with the Martens et al. (1990) model the A-state score was the combined total of the cognitive and somatic sub-scales. Figure 4.3 shows that apart from the pre-briefing stage A-state, was as expected, higher for the HI group than the LI group.

A series of four Analyses of Covariance ANCOVAs was conducted, with two levels of the independent variable (LI, HI), one dependent variable (global A-state), and two covariates (the M-C SDS and the SCAT) to partial out any pre-existing differences in A-trait and social desirability. The HI group experienced significantly higher levels of A-state. High Importance (HI) participants consistently reported higher A-state scores than the LI group: after the briefing $\underline{F}(1, 48) = 4.3$, $\underline{p} < .04$, ($\underline{f} = .41$); after round one, $\underline{F}(1, 48) = 3.9$, $\underline{p} < .05$, ($\underline{f} = .38$); and after round three, $\underline{F}(1, 48) = 5.1$, $\underline{p} < .03$, ($\underline{f} = .44$). Thus, the initial test of the relationship between perceived importance and A-state generally supported the Martens et al. (1990) model, that is, significant group differences occurred directly after the introduction of the experimental manipulation and toward the end of the competition, but not in the middle stages.

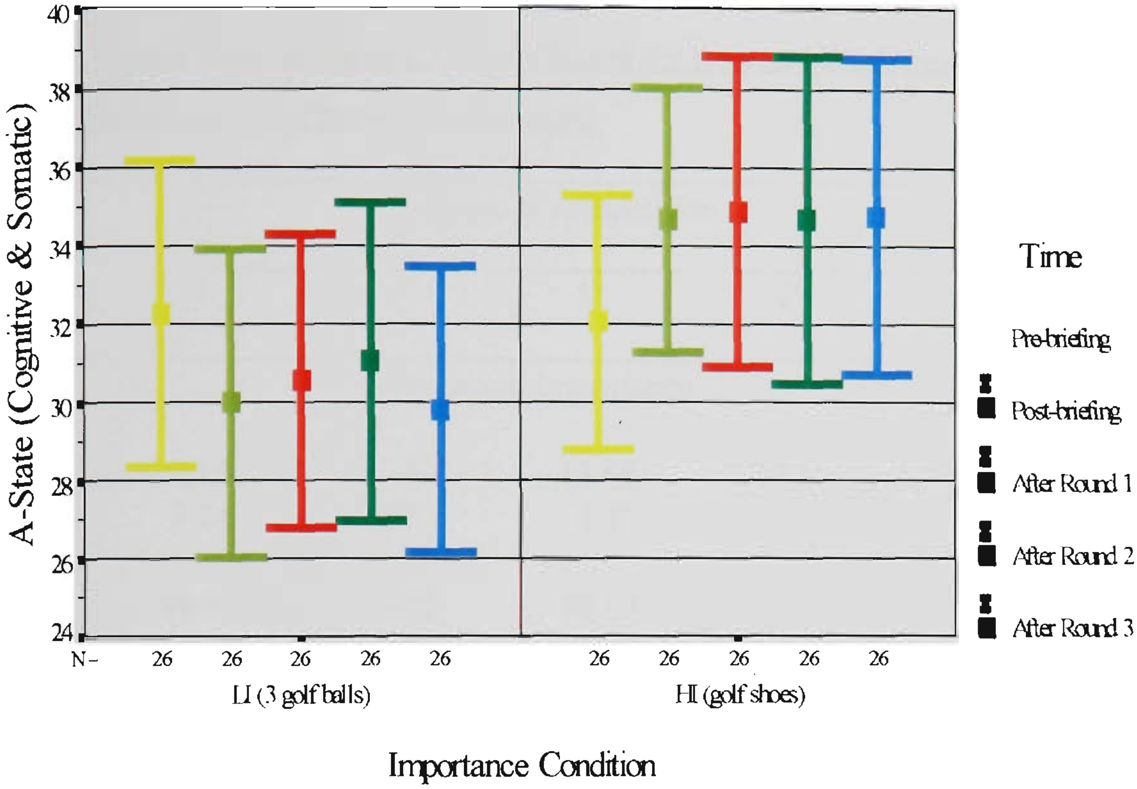


Figure 4.3. Error bar chart comparison of A-state for the LI and HI groups across the five occasions of testing.

Table 4.3 displays perceived importance and A-state means for the LI and HI conditions across the five administrations of the MOQ and CSAI-2. As with Experiment 1, to be consistent with the Martens et al. (1990) model, A-state is represented as a global score by combining the cognitive and the somatic A-state sub-scale scores. The mean CSAI-2 scores reported here are consistent with those reported in the first experiment and with published norms for golfers (Martens et al. 1990).

-

Table 4.3

Mean Perceived Importance and A-State Scores for Low and High Importance Conditions Across Five Occasions of Testing

		Stage of competition				
Condition		1[a]	2[b]	3[c]	4[d]	5[e]
			Perceived Importance			
LI						
	M	9.15	13.80	13.65	14.19	14.42
	SD	3.24	4.77	2.37	2.75	2.92
HI						
	M	10.03	16.03	16.19	17.00	18.15
	SD	1.98	3.84	4.02	4.39	4.23
			A-State			
LI						
	M	32.26	30.00	30.53	31.03	29.80
	SD	9.62	9.72	9.31	10.02	9.03
HI						
	M	32.04	34.65	34.84	34.65	34.73
	SD	8.06	8.31	9.81	10.31	9.89

[a]Pre-briefing
[b]Post-briefing
[c]After Round 1
[d]After Round 2
[e]After Round 3

Additional Testing Beyond The Model

In Experiment 1, cognitive A-state was associated with perceived uncertainty but somatic A-state was not. To test whether this finding also held true for perceived importance, cognitive and somatic A-state were again analysed separately. Two Multivariate Analysis of Covariance (MANCOVA) were conducted with two levels of one independent variable (HI, LI), and four levels of the dependent variables (either cognitive A-state or somatic A-state). The SCAT scores were again used as a covariate. A main effect resulted for somatic A-state $F(1, 48) = 2.62$, $p < .05$ ($f = .31$), but not for cognitive A-state. Subsequent univariate analyses indicated significant differences after round one, $F(1, 48) = 4.6$, $p < .03$, ($f = .41$); round two, $F(1, 48) = 4.3$, $p < .04$, ($f = .40$); and round three, $F(1, 48) = 4.9$, $p < .03$, ($f = .43$). Based on these results it appears that perceived importance has a more sustained effect on somatic A-state than cognitive A-state. See Table 4.4 for a summary of the descriptive statistics.

Table 4.4

Mean Cognitive and Somatic A-State Scores for Low and High Importance Conditions Across Five Occasions of Testing

	Stage of competition				
Condition	1[a]	2[b]	3[c]	4[d]	5[e]
	Cognitive A-state				
LI					
M	18.0	16.2	17.0	17.9	16.9
SD	6.0	5.7	6.1	6.5	5.8
HI					
M	17.7	19.1	18.8	19.0	19.2
SD	5.1	5.5	5.5	5.5	5.5
	Somatic A-state				
LI					
M	14.3	13.8	13.5	13.1	12.9
SD	4.3	5.2	4.5	4.7	4.4
HI					
M	14.4	15.5	16.0	15.6	15.5
SD	4.1	4.8	5.5	5.8	5.5

[a]Pre-briefing
[b]Post-briefing
[c]After Round 1

[d]After Round 2
[e]After Round 3

These findings are in accordance with the Lox (1992) study which found that perceived importance was more closely associated with somatic than cognitive anxiety. This is interesting, because variables that rely on perceptions would normally be expected to be more closely associated with cognitive A-state.

In the present experiment, somatic A-state dimished once competition commenced for the LI condition (see Table 4.4). In comparison, somatic A-state for the HI condition rose once the experimental manipulation was introduced, thereafter it was maintained at approximately the same level. It seems that the introduction of a reward has an influence on both cognitive and somatic A-state.

Alternative Test of the Model

In testing the effect of perceived uncertainty of outcome in the first experiment, the methodological limitations of a between groups design became apparent. More specifically, efforts to produce different perceived uncertainty groups were only successful after a series of grouping revisions. These revisions, although successful in producing distinct perceived uncertainty groups, resulted in a more complicated test of the Martens et al. (1990) model than originally intended. An alternative multiple regression test of the model proved more direct, and also demonstrated the superiority of "perceived confidence of outcome" over "perceived uncertainty of outcome" in predicting A-state. In deference to the apparent suitability of a multiple regression analysis in testing the Martens (1990) model, and to align this second experiment with the first, an equivalent alternative test of the model is presented.

MOQ scores, which reflect the level of perceived importance of outcome, and SCAT scores, which reflect each participant's A-trait, were used as predictors of A-state. The criterion variable was A-state at each stage of the competition, as measured by the CSAI-2. As can be seen in Table 4.5, the results confirmed that pre-competition A-trait was a significant predictor of A-state throughout the competition. Perceived importance of outcome was a significant predictor at three of the four stages of testing beyond the baseline period, see Table 4.5.

The results indicate that the combined effects of A-trait and perceived importance of outcome produced a strong effect in predicting competitive A-state. When perceived importance and A-trait are combined, the explained variance ranges from 20% at the start of the competition to a substantial 31% by the end of the third round of competition. The saliency of the reward for winning on perceived importance that was introduced in the briefing stage is clearly evident at the post-briefing stage. The amount of variance explained by perceived importance rose from 2% to 15% after the reward was introduced, thereafter it dropped slightly before increasing toward the end of the competition. This makes sense, because participants probably focussed more on the reward immediately after it was introduced and near the end, where they may have felt the reward was nearly attainable.

-

Table 4.5

Multiple Regression Analysis: A-trait and Perceived Importance as Predictors of Global A-State

Condition	R^2	Beta	Sig T	Sig F
Dependent Variable: A-State (cognitive & somatic combined)				
1) Pre-briefing				
A-trait	.19	.44	.001	
Perceived importance	.02	.14	ns	
Total	.21			.004
2) Post-briefing				
A-trait	.07	.27	.04	
Perceived importance	.15	.32	.02	
Total	.22			.002
3) After Round 1				
A-trait	.20	.44	.001	
Perceived importance	.04	.24	ns	
Total	.24			.001
4) After Round 2				
A-trait	.21	.40	.002	
Perceived importance	.07	.27	.03	
Total	.28			.0003
5) After Round 3				
A-trait	.20	.39	.002	
Perceived importance	.11	.33	.009	
Total	.31			.0001

As with previous testing beyond the model, a series of multiple regression analyses was calculated for the effect of perceived importance and A-trait on cognitive and somatic anxiety separately. Both A-trait and perceived importance were significant predictors of cognitive A-state at all stages beyond the pre-briefing (see Table 4.6). The pattern for perceived importance in affecting cognitive A-state was similar to the pattern for global A-state with a large increase

-

in explained variance after the introduction of the reward. Thereafter, once again there is a slight drop, before a gradual increase in explained variance as the competition progresses.

Table 4.6

Multiple Regression Analysis: A-trait and Perceived Importance as Predictors of Cognitive A-State

Condition	R^2	Beta	Sig T	Sig F
Dependent Variable: Cognitive A-State				
1) Pre-briefing				
A-trait	.15	.39	.004	
Perceived importance	.02	.14	ns	
Total	.17			.004
2) Post-briefing				
A-trait	.07	.26	.05	
Perceived importance	.17	.41	.002	
Total	.24			.002
3) After Round 1				
A-trait	.12	.35	.01	
Perceived importance	.13	.37	.007	
Total	.25			.001
4) After Round 2				
A-trait	.14	.38	.005	
Perceived importance	.13	.37	.006	
Total	.27			.0003
5) After Round 3				
A-trait	.17	.41	.002	
Perceived importance	.17	.42	.002	
Total	.34			.0001

Perceived importance did not predict somatic A-state until after the third round of competition. A-trait, was a significant predictor of somatic A-state at all stages of the competition (see Table 4.7). Here, the contribution of perceived importance to the total explained variance is only significant at the final stage of testing when the competition was nearing completion.

Table 4.7

Multiple Regression Analysis: A-trait and Perceived Importance as Predictors of Somatic A-State

Condition	R^2	Beta	Sig T	Sig F
Dependent Variable: Somatic A-State				
1) Pre-briefing				
A-trait	.17	.41	.003	
Perceived importance	.001	.01	ns	
Total	.17			.004
2) Post-briefing				
A-trait	.11	.34	.01	
Perceived importance	.06	.24	ns	
Total	.17			.002
3) After Round 1				
A-trait	.18	.42	.002	
Perceived importance	.06	.24	ns	
Total	.24			.001
4) After Round 2				
A-trait	.19	.43	.001	
Perceived importance	.05	.24	ns	
Total	.24			.0003
5) After Round 3				
A-trait	.16	.40	.003	
Perceived importance	.08	.28	.04	
Total	.24			.0001

Thus, perceived importance was strongly related to cognitive but only weakly with somatic A-state. A-trait was a consistent predictor of both cognitive and somatic A-state.

-

Discussion

The reward of golf balls (LI) versus golf shoes (HI) proved to be a successful manipulation of the independent variable, perceived importance. That is, the HI group consistently perceived the competition as being more important than the LI group, once the reward was introduced.

The use of an extrinsic reward was preferred because club golfers frequently play in competitions where success is rewarded extrinsically. In reviewing the success of these extrinsic rewards in affecting perceived importance, and thus A-state in this experiment, it is worth considering the possible effect of larger extrinsic rewards that are often available, particularly at the elite level of competition. It should be remembered that success in 'real' competition generally offers other forms of inducement that may affect perceived importance (e.g., peer acknowledgment, praise, and status). Further studies should investigate the effect of different levels of reward in increasing perceived importance and A-state in 'real' competition.

The inter-group difference in perceived importance translated into a significant difference in A-state as the Martens et al. (1990) model suggests. This result supported the experimental hypothesis that there would be differences in A-state reactions between the HI and LI groups. Similarly, an alternative series of analyses using multiple regression found that perceived importance and A-trait were both strong predictors of A-state throughout the competition. A-trait was the stronger predictor accounting for the majority of the variance on four of the five occasions of testing. The 31% of explained variance by the fifth occasion of testing is substantial, particularly given that only perceived importance and A-trait were used as predictor variables. Presumably the inclusion of other predictor variables may result in the explanation of a larger amount of variance. A logical place to commence would be the addition of perceived uncertainty, the third hypothesised cause of A-state, according to the Martens et al. model.

The Martens et al. (1990) model does not divide A-state into cognitive and somatic. Perhaps due to the untested nature of their theory, Martens et al. may have felt it premature to speculate on possible differences for cognitive and somatic elements of A-state. The present study found that the HI group reported significantly higher A-state for both cognitive and somatic anxiety than their LI counterparts. Given the experimental hypothesis that related primarily to perceptions of importance, the finding of cognitive A-state being higher for the HI group was expected. The tendency for somatic A-state to remain elevated, again fits with the experimental hypothesis, but runs counter to previous research that suggests it usually diffuses once competition commences. This finding suggests that high levels of perceived importance tend to neutralise the usual temporal pattern of somatic activation followed by reduction.

The study by Lox (1992), is the only direct test of the Martens et al. (1990) model published at this time. That study, measured PU and PI then correlated these scores to measures of somatic A-state and cognitive A-state, finding PI to be more closely related to somatic than cognitive A-state. Lox used a different measure of PI to that used here. He tested components of the Martens et al. model prior to a competitive match, and did not manipulate PI. The present study manipulated PI and measured it on five occasions, but created an artificial competitive situation. Lox found that PI was more closely related to somatic A-state than to cognitive A-state, whereas the present study found that PI was strongly associated with both cognitive and somatic A-state. The manipulation of PI and repeated testing of both PI and A-state in the present study provide the basis for confidence in the current findings. Further testing of the model in a range of different sports is needed to determine what variables mediate the relationship between PI and state anxiety components.

Martens et al. (1990) predict that A-trait is an independent predictor of perceived threat and global A-state. This proposition was supported by the multiple regression analysis and is consistent with previous research that has demonstrated a relationship between trait anxiety and cognitive and somatic A-state (e.g., Gould, Petlichoff, & Weinberg, 1984; Man, Stuchlikova, & Kindlmann, 1995; Martens, et al. 1990; Sanderson, 1989).

An examination of Table 4.6 indicates that the variance in cognitive A-state accounted for by A-trait and PI varied across occasions of testing. At pre-briefing, A-trait accounted for most of the explained variance, whereas at post-briefing, PI has the much larger $\underline{R}^2$ value. After the first round of shots, $\underline{R}^2$ values reverse again, returning to levels similar to pre-briefing. From there, the contribution of A-trait remains stable, whereas PI increases its contribution, leading to a greater amount of the total variance being explained. These patterns seem to be consistent with the context. At pre-briefing, when no reward/prize had been offered. Immediately after being told about the prize, the participants' perceptions of importance were highly salient and strongly influenced A-state. As the chipping match progressed, it seems that awareness of the prize brought the importance of winning into greater consideration. An important implication of this pattern is that models that assume variables play consistent roles throughout the course of long duration sporting contests fail to account for possible changes to perceptions and situations as a result of ongoing competitive processes. Future models need to take account of these fluctuations. An excellent context to examine this aspect further would be tournaments that involve several matches in one day, as often happens in sports like badminton, squash, or table tennis.

See Chapter 6 for a more detailed discussion that synthesises the findings of Experiments 1, 2, and 3.

Conclusions

This experiment tested the Martens et al. (1990) model of competitive anxiety by manipulating perceived importance of outcome, a hypothesised cause of A-state. Analyses revealed significant differences for A-state between the LI and HI groups at all stages of the competition. Thus, the inclusion in the Martens et al. model of perceived importance as a cause of competitive anxiety appears to be justified. A further analysis confirmed these findings, and in addition found that A-trait was a strong predictor of competitive A-state, and should also be retained in the model.

CHAPTER 5

EXPERIMENT THREE: TEST OF THE INTERACTION BETWEEN PERCEIVED UNCERTAINTY AND PERCEIVED IMPORTANCE

Purpose

Experiment three tested the influence of the interaction of perceived uncertainty and perceived importance on A-state hypothesised in the Martens et al. (1990) model of competitive anxiety. Perceived uncertainty and perceived importance were tested using both factorial and multiple regression analyses. The relative contribution of A-trait, a third hypothesised cause of A-state, was also examined.

Hypotheses

Based on the Martens et al. (1990) model, perceived uncertainty of outcome and perceived importance influence A-state in a multiplicative (e.g., interactive) manner.

Formal Statement of the Experimental Hypotheses:

H_1. As measured by the Competitive State Anxiety Inventory - 2 (CSAI-2), participants' A-state will be significantly greater in high uncertainty situations compared to low uncertainty situations.

H_1. As measured by the CSAI-2, participants' A-state will be significantly higher in the high importance (HI) situation compared to the low importance (HI) situation.

$\bar{H}_1$ As measured by the Competitive State Anxiety Inventory - 2 (CSAI-2), there will be a significant interaction between perceived uncertainty (PU) and perceived importance (PI).

Method

Participants

A sample of 100 participants consisting of 86 males (M = 33.4 years), and 14 females (M = 44.9 years) took part in this experiment. All participants were recruited from the original participant pool (N = 172), described in the Method section of Experiment 1. A wide range of golfing handicaps was represented (M = 15.3, SD = 7.16).

Measures

Golfers provided their official club handicap and self-rated handicap for all major golf sub-components (e.g., driving, putting, chipping), by filling out a Golf Ability Rating Form (GARF). As with previous experiments, a rating of each golfer's chipping ability was of particular importance because chipping was the performance task in this study. Self-rated chipping ability was later used to match players into one of four experimental conditions, see the Formation of experimental groups section of this Chapter. Participants reported a wide range of chipping abilities (M = 15.1, SD = 6.82). Golf handicap and self-rated chipping ability were strongly related (r = .80, p < .0001). Self-rated chipping ability was a significant predictor of follow up performance on the experimental task (r = .68, p < .0001). As with the first two experiments, participants also filled out the SCAT

(Martens et al., 1983), the M-C SDS (Crowne & Marlowe, 1960), and a demographic questionnaire prior to competing in the experimental phase.

Golf Chipping Task

The golf chipping task was identical to that outlined previously for Experiment 2.

Formation of Experimental Groups

As in Experiments 1 and 2, each pair was matched and assigned to an experimental group according to chipping ability, availability, and sex. In this experiment each participant was assigned to one of four experimental conditions. For this third experiment, the 52 participants of Experiment 2, formed the two HU groups. As noted previously, these participants were all matched with a similar ability opponent, with either LI or HI. Forty eight new participants formed the LU groups with either LI or HI. Thus a two by two factorial design was used. From a methodological perspective this is justified because the experimental design and testing procedures were identical for Experiments 2 and 3. To ensure equivalence of testing, Experiments 1 and 2 were both conducted in the March - July period of the same year. Apart from this reason, I was seeking to maximise the use of participants because considerable resources were needed to recruit and test participants. Moreover, the reality of financial and time constraints would have precluded the recruitment and testing of additional participants. This decision to opt for the most efficient use of human resources was made after due consideration, that is before testing commenced in any of the three studies.

-

The criteria for group selection was derived from the uncertainty and importance manipulations used in the previous two experiments. As with Experiments 1 and 2, a four shot difference in chipping ability was used as the cutting point for assigning participants into either a high or low uncertainty condition. Thus, the new groups in this study consisted of players with chipping handicaps differing by more than 4 shots. The previously successful 'reward for winning' manipulation of perceived importance was again used; that is, 3 golf balls constituted the LI condition and a pair of golf shoes constituted the HI condition. The mean chipping ability differences (absolute values) between pairs in the four groups are presented in Table 5.1.

Table 5.1
Descriptive Results: Mean Differences in Chipping For Matched Players in Each Group (N = 100)

	n	M	SD	Min	Max
High uncertainty-low importance	26	2.15	1.20	0.00	4.00
High uncertainty-high importance	26	1.23	1.14	0.00	3.00
Low uncertainty-low importance	24	7.42	2.22	5.00	11.00
Low uncertainty-high importance	24	5.58	2.75	6.00	8.00

After being assigned to groups, participants were contacted by telephone to arrange a mutually acceptable time for their participation. As with Experiment 1 participants were matched with someone from a different club to avoid biased assessments of ability based on prior knowledge.

Pre-testing Organisation

Approximately one week before their scheduled match, participants were mailed a reminder letter, and an internal map of the experimental venue. As an additional reminder, I phoned the participants the night before testing. Testing took place over four two week blocks commencing in March 1994, and it concluded in July 1994. As with Experiments 1 and 2, seven one and a half hour time slots were available to players on any given day of testing. A number of uncontrollable factors such as illness, inclement weather, injury, work commitments, and players forgetting their appointment time resulted in the postponement of a number of matches.

Procedures

See the procedures section of Experiment 1 for a description of the participant recruitment protocol. Table 5.2 contains the mean, standard deviation, and range for the SCAT, and the M-C SDS for participants in this experiment. The SCAT scores are very similar to those obtained in the first two experiments. The M-C SDS scores are similar to those reported in Experiment 2.

Table 5.2

Descriptive Results: Pre-Experimental Questionnaires (N = 100)

Scale	M	SD	Min	Max
SCAT	17.4	4.6	10	30
M-C SDS	16.7	5.5	0	29

Following the return of questionnaires, participants were mailed a letter containing further information and instructions. As with previously described experiments, participants completed a preferred time of participation checklist and returned this in a pre-addressed, stamped envelope.

Event Procedure and Description

The procedures and description was identical to that outlined previously for Experiment 2.

Results

Pre-experimental Findings

To ensure the four experimental groups were equivalent prior to formal testing, each of the key pre-experimental measures was subjected to a one-way Analysis of Variance (ANOVA). No significant differences were found between groups for age and chipping ability.

As with previous experiments, the M-C SDS and the SCAT were measured for possible later use as covariates. Again, A-trait was significantly related to A-state at all stages of testing: pre-briefing, $r = .38$, $p < .0001$; post-briefing, $r = .34$, $p < .001$; after round 1, $r = .33$, $p < .001$; after round 2, $r = .37$, $p < .001$; and after round 3, $r = .38$, $p < .001$. Based on this relationship, the SCAT was used to partial out the effects of A-trait on the dependent variable A-state in later analyses. As with Experiment 1, but unlike Experiment 2, the M-C SDS was not significantly linked with A-state, and thus, was not used as a covariate in subsequent testing.

Testing the Martens et al. (1990) Model

As with the previous experiments, I analysed data at each of the five administrations of the MOQ and CSAI-2. The first administration of the questionnaires, labelled pre-briefing, provided base-line scores. Participants completed the questionnaires for a second time, labelled post-briefing after an explanation of the competition task and hitting their 16 practice shots. The third, fourth, and fifth questionnaire administrations provided participant responses between consecutive rounds of eight shots.

Manipulation Check

The Martens et al. (1990) model predicts that any differences in A-state are dependent on the combined effects of perceived uncertainty and perceived importance. Before proceeding to formally test the Martens et al. (1990) model, a similar manipulation check of perceived uncertainty and perceived importance to that used in previous experiments was conducted. That is, a between groups comparison was carried out to assess whether the HU and HI groups did in fact report significantly higher levels of PU and PI than their counterpart LU/LI groups.

The manipulation of uncertainty involved a comparison between the high uncertainty participants (HU) ($n = 52$), and the low uncertainty (LU) participants ($n = 48$). Figure 5.1 provides an error bar chart of the changes in perceived uncertainty for the LU (LU-LI and LU-HI combined), and HU (HU-LI and HU-HI combined) conditions. The perceived uncertainty score is the combined total of the three perceived uncertainty items as measured by the Match Orientation Questionnaire (MOQ). As Figure 5.1 and Table 5.3 demonstrate, once the briefing was completed participants in the low uncertainty condition reported substantially lower levels of perceived uncertainty than those in the high uncertain condition.

As the match progressed the perceived uncertainty level of the low uncertainty condition continued in a downward direction, because the likely match outcome was often apparent at an early stage of the competition. In contrast, the perceived uncertainty level of the high uncertainty condition stayed relatively high, thus reflecting the closeness of many of these matches.

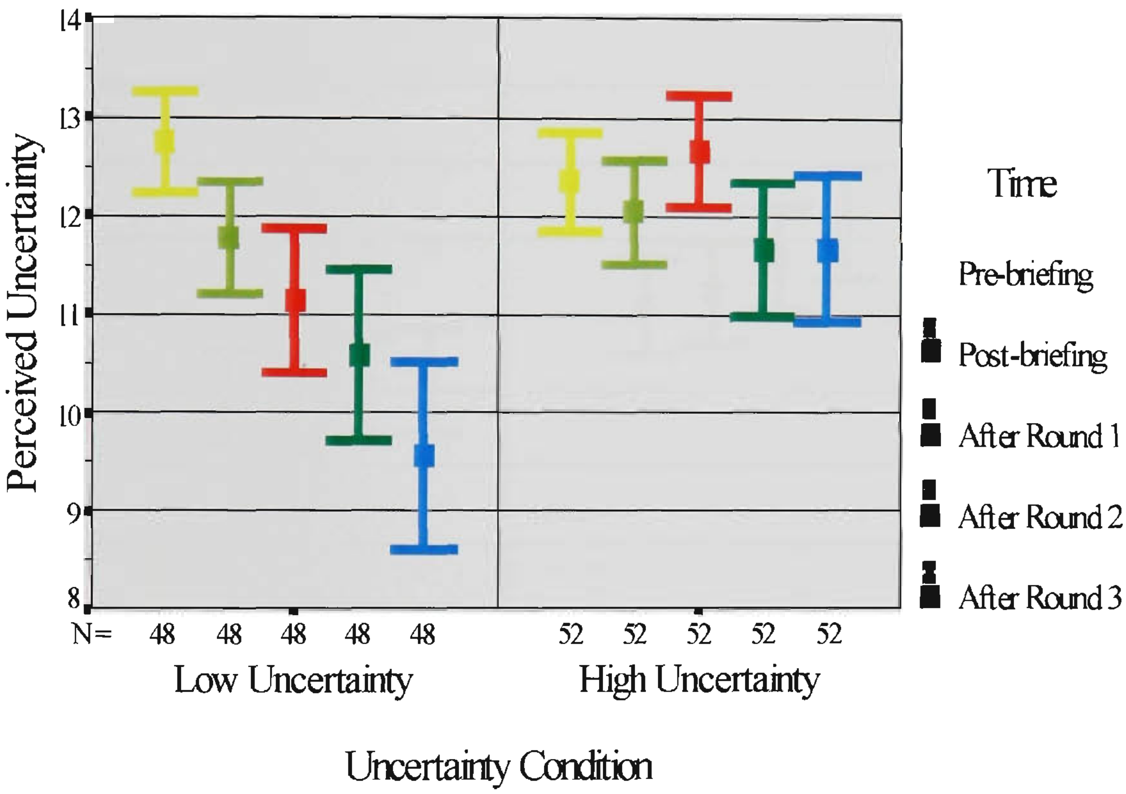


Figure 5.1. Error bar chart comparison of perceived uncertainty for the low LU and the HU conditions across the five occasions of testing.

The manipulation of importance involved a comparison between the high importance participants (HI) (n = 50), and the low importance participants (LI) (n = 50). Figure 5.2 provides an error bar chart of the changes in perceived importance for the LI (LU-LI and HU-LI combined), and HI (LU-HI and HU-HI combined) conditions. The perceived importance score is the combined total of three perceived uncertainty items. An exception was the first administration of the MOQ, where only two importance items were included. At this stage, participants had not been informed of the reward for winning. As Figure 5.2 and Table 5.3 demonstrate, once participants were exposed to the experimental manipulation (reward for winning) substantial inter-group differences in perceived importance were reported.

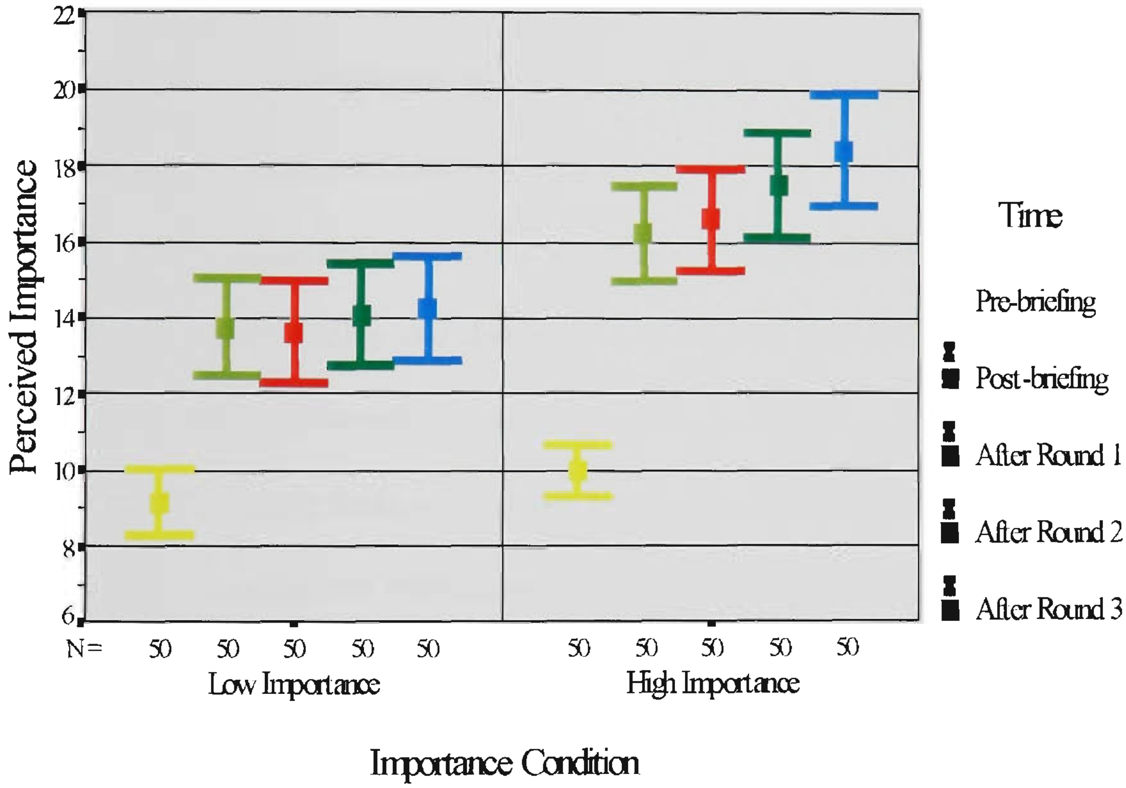


Figure 5.2. Error bar chart comparison of perceived uncertainty for the LI and the HI conditions across the five occasions of testing.

Two Multivariate Analysis of Variance (MANOVAs) were calculated as a manipulation check of whether the uncertainty and importance manipulations were successful in producing significant differences in perceived uncertainty and perceived importance. Each MANOVA included two independent variables,

-

uncertainty condition with two levels (HU & LU) and importance condition with two levels (HI, LI), and two dependent variables, either perceived uncertainty or perceived importance measured five times. A significant main effect was found for perceived uncertainty, $\underline{F}(1, 95) = 2.32$, $\underline{p} < .02$, ($\underline{f} = .21$). Follow up univeriate tests showed significant differences for MOQ uncertainty scores after round one, $\underline{F}(1, 95) = 11.7$, $\underline{p} < .001$, ($\underline{f} = .48$); round two, $\underline{F}(1, 95) = 4.0$, $\underline{p} < .05$, ($\underline{f} = .28$); and round three, $\underline{F}(1, 95) = 13.1$, $\underline{p} < .0001$, ($\underline{f} = .51$). Thus, the manipulation of uncertainty produced differences in perceived uncertainty, but only once the competition had commenced. It seems that despite being deliberately told of their opponent's ability before the competition started, participants were open minded about their comparative ability and chances of success until they received objective performance information (i.e., after the competition commenced). This is logical, because simply being told you are better or worse than an opponent does not always translate into winning or losing as might be expected. Simply put, the axiom 'seeing is believing' sums up the general tendency for participants in this study to wait until the result was beyond reasonable doubt before predicting a likely win or loss.

A significant main effects was found for perceived importance $\underline{F}(1, 95) = 3.06$, $\underline{p} < .002$, ($\underline{f} = .25$). Follow up univiariate analyses indicated there were significant differences for perceived importanc after the post-briefing, $\underline{F}(1, 95) = 7.8$, $\underline{p} < .006$ ($\underline{f} = .39$); round one, $\underline{F}(1, 95) = 9.9$, $\underline{p} < .002$, ($\underline{f} = .44$); round two, $\underline{F}(1, 95) = 12.9$, $\underline{p} < .001$, ($\underline{f} = .51$); and round three, $\underline{F}(1, 95) = 17.1$, $\underline{p} < .0001$,

(f = .58). Thus, the manipulation of importance produced clear differences in perceived importance once participants were exposed to the reward for winning.

Table 5.3

Mean Perceived Uncertainty for Low and High Uncertainty Conditions Across the Five Occasions of Testing

		Stage of competition				
Condition		1[a]	2[b]	3[c]	4[d]	5[e]
		Perceived Uncertainty				
LU						
	M	12.75	11.77	11.14	10.58	9.56
	SD	1.77	1.91	2.51	2.98	3.24
HU						
	M	12.34	12.03	12.68	11.67	11.67
	SD	1.79	1.89	2.02	2.43	2.65
		Perceived Importance				
LI						
	M	9.15	13.80	13.65	14.19	14.42
	SD	3.24	4.77	2.37	2.75	2.92
HI						
	M	10.03	16.03	16.19	17.00	18.15
	SD	1.98	3.84	4.02	4.39	4.23

[a]Pre-briefing
[b]Post-briefing
[c]After Round 1
[d]After Round 2
[e]After Round 3

The two previous experiments tested specific aspects of the Martens et al. (1990) model. The first experiment focused on uncertainty of outcome, and the second experiment on importance of outcome. Manipulation of these two factors individually led to a significant difference in global A-state across experimental groups for importance but not uncertainty. The notion of perceived uncertainty was particularly problematic in the first experiment due to an inherent difference between likely winners (positive low uncertain) and likely losers (negative low uncertain). Despite these findings it was important to test the Martens et al. (1990) model in accordance with how it was originally presented. Particular attention was placed on the need to test uncertainty and importance as interactive (see p. 218 of Martens et al.). According to Martens et al. threat, and hence A-state, is a function of perceived uncertainty of outcome x perceived importance of outcome, or, symbolically expressed, $T = f(U \times I)$. A-trait is hypothesised to also contribute to threat and A-state, but independently of uncertainty and importance.

To test the hypothesised interaction between perceived uncertainty and perceived importance in producing an A-state reaction, a MANCOVA was calculated. The MANCOVA included two independent variables, uncertainty condition with two levels (HU & LU) and importance condition with two levels (HI, LI), and one dependent variable A-state on four occasions. As with previous experiments the SCAT was used as a covariate to partial out any pre-existing differences in trait anxiety. As with Experiments 1 and 2, A-state is represented as a global score by combining the cognitive and the somatic A-state sub-scale scores. As Figure 5.3 shows apart from the base line pre-briefing measure, the HI group reported a greater elevation in A-state throughout the competition than the LI group.

No significant main effects were found for the perceived uncertainty groups at any stage of the competition. This is hardly surprising, given the earlier finding in Experiment 1 that low uncertainty leads to high levels of A-state mainly for likely losers, those labelled as negative low uncertain (NLU). Again it seems that combining NLU and PLU participants into one group negatives differences between these participants and the HU group. A clear trend is evident for the importance condition, with A-state clearly differing between the two conditions after the introduction of the extrinsic reward for winning. A significant main effect was found for perceived importance $\underline{F}(1, 95) = 2.42$, $\underline{p} < .05$ ($\underline{f} = .22$). Follow up univariate analyses revealed significant differences after the post-briefing, $\underline{F}(1, 95) = 7.7$, $\underline{p} < .007$, ($\underline{f} = .39$); round one, $\underline{F}(1, 95) = 5.9$, $\underline{p} < .01$, ($\underline{f} = .34$); round two, $\underline{F}(1, 95) = 4.1$, $\underline{p} < .04$, ($\underline{f} = .28$); and round three, $\underline{F}(1, 95) = 6.9$, $\underline{p} < .03$, ($\underline{f} = .37$), (see Figure 5.3)[3].

[3] A within subjects analysis produced similar findings.

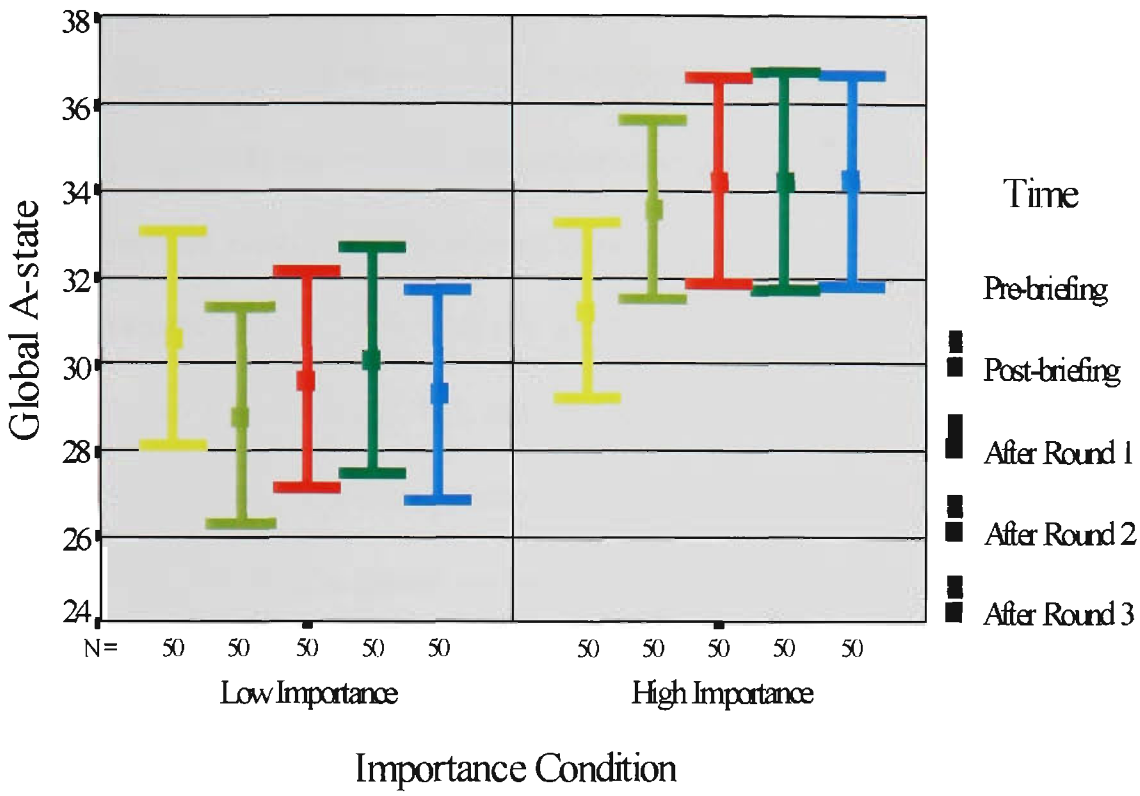


Figure 5.3. Error bar chart comparison of global A-state for the LI and the HI conditions across the five occasions of testing.

Hypothesis one, that there will be significant differences between low uncertainty (LU) and high uncertainty (HU) situations was not supported. Hypothesis two, that there will be significant differences between low importance (LI) and a high importance (HI) situations was supported. That is, support was found for differences in A-state as a result of perceived importance but not perceived uncertainty. This is consistent with the findings of the two previous experiments. In addition no significant interaction was found between perceived uncertainty and perceived importance, and thus the third hypothesis was not supported.

-

Additional Testing Beyond The Model

To be consistent with the previous two experiments global A-state was re-analysed separately for specific differences in cognitive and somatic A-state. Two Multivariate Analysis of Covariance were conducted with two independent variables, perceived uncertainty with two levels (LU, HU), and perceived importance with two levels (LI, HI), and two dependent variables (either cognitive A-state, somatic A-state) at four questionnaire administrations. The SCAT was again used as a covariate to partial out any pre-existing differences in trait anxiety. See Tables 5.4 and 5.5 for a summary of the descriptive statistics and Table 5.6 for a summary of the MANCOVA analysis.

Table 5.4

Mean Cognitive and Somatic A-State Scores for the LU and HU Conditions Across Five Occasions of Testing

	Stage of competition				
Condition	1[a]	2[b]	3[c]	4[d]	5[e]
	Cognitive A-state				
LU					
M	17.1	17.5	17.8	18.2	18.4
SD	4.4	4.9	5.5	5.7	5.4
HU					
M	17.8	17.7	17.9	18.5	18.1
SD	5.5	5.7	5.8	6.0	5.7
	Somatic A-state				
LU					
M	12.4	12.5	13.2	13.2	12.9
SD	3.6	3.5	3.9	3.9	4.2
HU					
M	14.3	14.7	14.8	14.3	14.2
SD	4.2	5.0	4.5	5.3	5.1

-

[a]Pre-briefing
[b]Post-briefing
[c]After Round 1
[d]After Round 2
[e]After Round 3

As Table 5.4 shows there was no dramatic differences between the LU and HU conditions for cognitive A-state across the five occasions of testing. In comparison there was a difference between the two conditions for somatic difference with the LU condition less somatically anxious. This difference was evident from the beginning, where a two point difference was evident, there after the A-state levels of both conditions continued at much the same level.

Table 5.5

Mean Cognitive and Somatic A-State Scores for LI and HI Conditions Across Five Occasions of Testing

		Stage of competition				
Condition		1[a]	2[b]	3[c]	4[d]	5[e]
		Cognitive A-state				
LI						
	M	17.2	15.9	16.6	17.2	16.6
	SD	5.2	5.3	5.6	5.9	5.3
HI						
	M	17.8	19.2	19.2	19.5	19.8
	SD	4.7	4.8	5.4	5.6	5.4
		Somatic A-state				
LI						
	M	13.4	12.9	13.0	12.8	12.7
	SD	4.5	4.6	4.4	4.5	4.5
HI						
	M	13.4	14.4	15.0	14.8	14.4
	SD	3.5	4.2	4.7	4.8	4.8

-

Table 5.5 shows the increase in both somatic and cognitive A-state after the introduction of the reward for winning at the second stage of testing.

Table 5.6

Multivariate Analysis of Covariance for Cognitive and Somatic A-State Across the Four Occasions of Testing

	Perceived Uncertainty			Perceived Importance		
Occasion	F	p	f	F	p	f
			Main Effect			
		ns		3.18	.004	.25
			Cognitive A-state			
Post-briefing	.01	ns		8.8	.04	.42
After Round 1	.01	ns		4.7	.03	.31
After Round 2	.01	ns		3.0	ns	
After Round 3	.20	ns		7.6	.007	.39
			Main Effect			
		ns			ns	
			Somatic A-state			
Post-briefing	5.7	.02	.33	2.2	ns	
After Round 1	2.4	ns		3.6	ns	
After Round 2	1.2	ns		3.0	ns	
After Round 3	1.7	ns		2.4	ns	

As Table 5.6 shows there were significant differences between the LI and HI conditions for cognitive A-state on three of the four occasions beyond the pre-briefing. There were no differences between the LU and HU condition for cognitive A-state, probably because as explained earlier, the likely losers in the LU condition tend to be quite anxious. For somatic A-state there were no significant differences except at the post-briefing stage, where the HU group were significantly more anxious than the LU group. This may have been in anticipation of a close match. As with global A-state there was no significant interaction between perceived uncertainty and perceived importance for either cognitive A-state or somatic A-state.

Alternative Test of the Model

Conclusions drawn from the first two experiments led to a preference for testing the Martens et al. (1990) model with a multiple regression analysis rather than a between groups analysis. The advantages of a multiple regression analysis include not having to dichotomise a continuous variable and not having to place participants into groups formed on a predicted link between ability rating, and likely performance level in a competitive setting. The other clear advantage of a regression analysis is the possibility of including A-trait as a predictor variable, and hence to test the Martens et al. model in accordance with how it is proposed.

In addition, multiple regression is useful in testing the independent variables, uncertainty and importance as a multiplicative function. This was achieved by creating a combined score that multiplied the sub-total score for the three MOQ perceived uncertainty questions by the sub-total score for the three MOQ perceived importance questions. Table 5.7 presents the results of this analysis with the multiplicative score and A-trait being the predictor variables and A-state as the criterion variable. Consistent with the results of the previous experiments, A-trait as measured by SCAT was a significant predictor variable on all five occasions of testing. The multiplicative function was a significant predictor at the post-briefing, after round 1, and after round 3. As Table 5.7 demonstrates these two predictors

-

account for a substantial amount of variance, ranging from 16% prior to the competition, rising to 24% early in the competition before dropping back slightly to 21% at the three quarter point of the competition (i.e., the final testing point).

Table 5.7

Multiple Regression Analysis: A-Trait and the Multiplicative Function as Predictors of A-State

Condition	R^2	Beta	Sig T	Sig F
Dependent Variable: Global A-state(cognitive & somatic combined)				
1) Pre-briefing				
A-trait	.16	.40	.00001	
Multiplicative function	-	.10	ns	
Total	.16			00001
2) Post-briefing				
A-trait	.06	.25	.007	
Multiplicative function	.14	.36	.0002	
Total	.20			.00001
3) After Round 1				
A-trait	.07	.27	.034	
Multiplicative function	.17	.34	.0004	
Total	.24			.00001
4) After Round 2				
A-trait	.16	.40	.00001	
Multiplicative function	-	.16	ns	
Total	.16			.00001
5) After Round 3				
A-trait	.17	.36	.0001	
Multiplicative function	.04	.20	.03	
Total	.21			.00001

Although the multiplicative function proved to be a significant predictor of A-state it is not clear if either perceived uncertainty or perceived importance accounts for the majority of the variance. Based on the previously presented

MANCOVA, it appears that in this experiment perceived importance was more closely linked to A-state than perceived uncertainty. In addition, because uncertainty and importance were independent factors they should be entered into a regression analysis as separate predictors rather than as a multiplicative function. Table 5.8 presents the results of this analysis with perceived uncertainty, perceived importance and A-trait being the predictor variables and A-state as the criterion variable. A-trait and perceived importance were strong predictors of A-state, but perceived uncertainty was a significant predictor after round 2 only. This regression equation accounts for a considerable amount of the variance, ranging from 16% to 35%. Based on these results, A-state is better predicted by entering perceived uncertainty and perceived importance as separate predictors, rather than in the multiplicative manner that Martens et al. (1990) suggest.

-

Table 5.8

Multiple Regression Analysis: A-Trait, Perceived Uncertainty, and Perceived Importance as Predictors of A-State

Condition	R^2	Beta	Sig T	Sig F
Dependent Variable: A-state (cognitive & somatic combined)				
1) Pre-briefing				
A-trait	.16	.40	.00001	
Perceived uncertainty	-	.06	ns	
Perceived importance	-	.15	ns	
Total	.16			.00001
2) Post-briefing				
A-trait	.06	.25	.008	
Perceived uncertainty	-	.16	ns	
Perceived importance	.16	.33	.0006	
Total	.22			.00001
3) After Round 1				
A-trait	.07	.26	.005	
Perceived uncertainty	-	.12	ns	
Perceived importance	.17	.41	.004	
Total	.24			.00001
4) After Round 2				
A-trait	.09	.30	.0007	
Perceived uncertainty	.06	-.24	.005	
Perceived importance	.20	.37	.00001	
Total	.35			.00001
5) After Round 3				
A-trait	.09	.31	.0005	
Perceived uncertainty	-	-.16	ns	
Perceived importance	.23	.39	.00001	
Total	.32			.00001

The results of this experiment suggest that, while the Martens et al. (1990) model may have merit, more research is needed to refine the model. The following multiple regression analysis presented here is one such attempt that further probes an earlier finding. Exchanging perceived uncertainty for perceived confidence better predicted A-state in the first study. Here, PU is replaced by perceived confidence by scoring PU items from 1 (certain loss) to 9 (certain win). In this analysis A-state was again the criterion variable, with A-trait, perceived importance, and perceived confidence serving as the predictor variables. This form of analysis proved to be the most successful yet in predicting A-state, with perceived confidence being a significant contributor to the overall explained variance at all five stages of testing (see Table 5.9).

As Table 5.9 demonstrates, these three predictors accounted for 28.8 % of the variance in the pre-briefing stage. This percentage rose to 38.4% at the mid-point of the competition and remained close to this level. The substantial amount of variance explained prior to the competition through A-trait, perceived confidence, and perceived importance is a notable finding, because anxiety management strategies could successfully be used to address these perceived concerns before the competition actually commences, but as demonstrated earlier, only for factors known to participants before the competition.

Table 5.9

Multiple Regression Analysis: A-Trait, Perceived Confidence, and Perceived Importance as Predictors of Global A-State

Condition	R^2	Beta	Sig T	Sig F
Dependent Variable: Global A-State (cognitive & somatic combined)				
1) Pre-briefing				
A-trait	.16	.40	.00001	
Perceived confidence	.07	-.35	.0003	
Perceived importance	.06	.29	.003	
Total	.29			.00001
2) Post-briefing				
A-trait	.06	.25	.005	
Perceived confidence	.12	-.34	.0001	
Perceived importance	.16	.38	.00001	
Total	.34			.00001
3) After Round 1				
A-trait	.10	.35	.0001	
Perceived confidence	.10	-.37	.00001	
Perceived importance	.17	.31	.0004	
Total	.37			.00001
4) After Round 2				
A-trait	.09	.34	.0001	
Perceived confidence	.09	-.30	.0003	
Perceived importance	.20	.30	.00001	
Total	.38			.00001
5) After Round 3				
A-trait	.09	.31	.0004	
Perceived confidence	.05	-.22	.006	
Perceived importance	.23	.40	.00001	
Total	.37			.00001

As with the previous experiment, the effect of A-trait, perceived importance and perceived confidence on A-state was further investigated by dividing global A-state into its cognitive and somatic components. A series of multiple regression analyses with cognitive A-state being the criterion variable and A-trait, perceived importance, and perceived confidence as the predictor variables was conducted (see Table 5.10 and Table 5.11).

Table 5.10

Multiple Regression Analysis: A-Trait, Perceived Confidence, and Perceived Importance as Predictors of Cognitive A-State

Condition	R^2	Beta	Sig T	Sig F
Dependent Variable: Cognitive A-State				
1) Pre-briefing				
A-trait	.14	.38	.0001	
Perceived confidence	.03	-.16	.ns	
Perceived importance	.08	.32	.005	
Total	.25			.00001
2) Post-briefing				
A-trait	.07	.27	.006	
Perceived confidence	.05	-.21	.03	
Perceived importance	.20	.45	.00001	
Total	.32			.00001
3) After Round 1				
A-trait	.08	.29	.004	
Perceived confidence	.08	-.28	.03	
Perceived importance	.25	.49	.00001	
Total	.41			.00001
4) After Round 2				
A-trait	.10	.32	.001	
Perceived confidence	.05	-.30	.03	
Perceived importance	.25	.50	.0001	
Total	.40			.00001
5) After Round 3				
A-trait	.13	.37	.0002	
Perceived confidence	.02	-.14	.ns	
Perceived importance	.25	.50	.00001	
Total	.40			.00001

Table 5.10 indicates that A-trait and particularly perceived importance were consistently significant predictors of cognitive A-state. In addition, perceived confidence was a significant predictor in the early and middle stages of the competition. The total explained variance was consistently large, ranging between 25% and 41%.

A series of multiple regression analyses with somatic A-state being the criterion variable and A-trait, perceived importance, and perceived confidence as the predictor variables was also conducted. As Table 5.11 indicates, A-trait and perceived confidence were consistently significant predictors of somatic A-state. Perceived importance was weaker, but still predicted somatic A-state at some points during the competition. The total explained variance was reasonable large, ranging between 20% and 27%.

-

Table 5.11

Multiple Regression Analysis: A-Trait, Perceived Confidence, and Perceived Importance as Predictors of Somatic A-State

Condition	R^2	Beta	Sig T	Sig F
Dependent Variable: Somatic A-State				
1) Pre-briefing				
A-trait	.10	.31	.002	
Perceived confidence	.10	-.32	.001	
Perceived importance	.001	.04	.ns	
Total	.20			.00001
2) Post-briefing				
A-trait	.10	.32	.001	
Perceived confidence	.07	-.25	.01	
Perceived importance	.05	.22	.02	
Total	.22			.00001
3) After Round 1				
A-trait	.11	.33	.0007	
Perceived confidence	.06	-.24	.02	
Perceived importance	.04	.19	.ns	
Total	.21			.00001
4) After Round 2				
A-trait	.14	.38	.0001	
Perceived confidence	.04	-.21	.03	
Perceived importance	.06	.25	.01	
Total	.24			.00001
5) After Round 3				
A-trait	.12	.35	.0004	
Perceived confidence	.06	-.25	.02	
Perceived importance	.09	.30	.002	
Total	.27			.00001

To summarise, the hypothesised multiplicative function was not supported due mainly to the inability of perceived uncertainty to reliably predict A-state in this experiment. These results verify that A-trait, perceived importance, and perceived confidence are meaningful predictors of global A-state. These three variables, and in particular perceived importance, were also strong predictors of cognitive A-state. The relationship between these three predictors and somatic A-state was also significant. Finally, perceived confidence was tested and supported as an alternative predictor of A-state to perceived uncertainty.

Discussion

In general, the results of this experiment confirm the findings of the two previous experiments. In particular, little support was found for the perceived uncertainty factor as a predictor of A-state. No clear differences in A-state emerged between LU and HU participants with the original conception of low uncertainty, that is, likely winners and likely losers classified together as low uncertainty.

This may be related to a fundamental flaw in the Martens et al. (1990) model. That is, participants in this study who are likely losers may not have accepted their fate as Martens et al. suggest. Martens et al. refer to previous research by Mechanic (1970) and Seligman (1976) in supporting the likelihood that probable losers will lay down and accept their fate. This seems to be a misuse of Seligman's learned helplessness theory. This experiment used a group of typical club golfers, and there is no logical reason to suspect that the majority of likely losers will use a pessimistic attributional style in the face of adversity. In drawing from Mechanic's finding that people tended to give up in an educational setting when a situation appeared hopeless, Martens et al. may be underestimating the fighting qualities of the average sports participant. Perhaps support for this type of pattern of pessimistic behaviour may result when extreme miss-matches occur, for example, a club golfer being opposed to an established professional golfer. Mismatches of that type, however, are rare, and certainly far less common than a moderate mismatch (e.g., the type deliberately engineered in this series of experiments). Further research should investigate whether the size of the relative gap in ability between opponents is a key factor in producing the so called 'adaptive behaviour', that Martens et al. propose is used by likely losers.

Conclusions

This experiment tested the Martens et al. (1990) model of competitive anxiety by manipulating both uncertainty and importance and measuring their effects on A-state in a multiplicative manner. The manipulation was successful in that significant inter-group differences were found for both perceived uncertainty and perceived importance of outcome as measured by the MOQ.

A series of MANOVAs and multiple regression analyses supported a link between the multiplicative function and A-state. Perceived importance remained a reliable predictor of A-state throughout each analysis and proved to be the key contributor to the combination of uncertainty and importance (i.e., multiplicative function). Further analysis revealed that no interaction existed between perceived uncertainty and perceived importance, calling into question the use of the multiplicative term as a predictor of A-state.

A-trait was a useful predictor of A-state throughout the competition, and when combined with perceived importance accounted for a substantial portion of the variance. The amount of explained variance was further improved when perceived confidence replaced perceived uncertainty as a third predictor. Based on these findings, it is proposed that perceived confidence replace perceived uncertainty in the model and the use of a multiplicative term be abandoned. See Chapter 6 for a more detailed discussion that synthesises the findings of Experiments 1, 2, and 3.

CHAPTER 6

GENERAL DISCUSSION

This discussion will integrate the findings of the three experiments that constitute this thesis, especially in regard to common themes and overall findings. Methodological issues, including limitations of the present studies and suggestions for future research, are also discussed. In addition, issues that pertain specifically to the Martens et al. (1990) model of competitive anxiety are discussed before moving to the more peripheral, but equally informative findings.

Testing The Model

The results of these three experiments provide partial support for the Martens et al. (1990) model of competitive anxiety. Two of the three hypothesised causes of anxiety, A-trait and perceived importance of outcome, proved to be strong predictors of A-state, accounting for a substantial amount of the variance. The results were less favourable toward the third hypothesised predictor, perceived uncertainty of outcome. Each of the hypothesised predictors of A-state is discussed separately beginning with the most problematic, perceived uncertainty.

Perceived Uncertainty

The original grouping method employed to manipulate perceived uncertainty in Experiment 1 failed to produce distinct low uncertain (LU) and high uncertain (HU) groups. Distinct groupings of LU and HU participants were only produced after a re-analysis and regrouping of how participants were performing on an ongoing basis (using a quartile split). There were no differences between the LU and HU groups on level of A-state even though the manipulation appeared valid.

The lack of difference in A-state for LU and HU groups was due, in part, to a number of members of the LU group who were losing becoming rather anxious. I labelled these participants as the negative low uncertainty (NLU) group. This tendency for the losing LU participants to become anxious contradicts the argument put forward by Martens et al. (1990) that likely losers will accept their fate (as a form of adaptive behaviour), and thus lessen their A-state. At present, it is not clear if the behaviour of likely losers in these experiments prevails in other contexts, such as real competition, or in other sports. The practice of likely losers accepting their fate in the face of an impending defeat, and not becoming overly anxious, as Martens et al. suggest, may possibly occur in situations where the relative ability difference between opponents is very large, or the competition is not perceived as important. Arguably, anxiety may be more prevalent the more difficult the challenge or task facing a player. Similarly, there may be a relationship between anxiety and personal differences in tendencies such as learned helplessness.

The discrepancy in the findings of this thesis and the suggestion of Martens et al. that likely losers will accept their fate may also be related to the original research source that Martens et al. drew on. In developing this line of reasoning, they cited the non sport specific research of Mechanic (1970), who states, "those persons who gave the impression of 'having given up' were less tense and anxious than those who were struggling against extremely difficult problems" (Martens et al., p. 226). Forming part of a theory based on research that is non sport specific and summarised with a statement that includes 'giving an impression' seems rather non-scientific. Future research may seek to replicate the tendency of likely losers to respond with increased A-state.

The emergence of a distinct high anxious NLU group provided a clue that A-state increases, not as Martens et al. (1990) imply (see p. 223), that is following an inverted-V where greatest anxiety occurs at maximum uncertainty, but in a linear fashion inversely related to a player's confidence and likelihood of success. Based on this finding, a further series of analyses was conducted that indicated perceived confidence seems to influence A-state more strongly than perceived uncertainty. Perceived confidence appears to be a good predictor of A-state even before competition begins. This is useful from a sport psychology practitioner's perspective, because it suggests that attempts to boost a player's confidence prior to competition might help to modulate A-state.

The finding that perceived confidence predicts A-state has been known for some time. Indeed, Martens et al. (1982) included the self-confidence scale in the CSAI-2 because it was found to be closely related to A-state. The correlation between perceived confidence as measured by the MOQ, and confidence as measured by the CSAI-2 self-confidence sub-scale, indicates that either of these measures could be used to help predict A-state.

In addition, it is unclear whether perceived uncertainty, as described by Martens et al. (1990), is different than conventional descriptions of self-confidence, or more specifically, self-efficacy. There appear to be a number of points where the constructs of perceived confidence and self-efficacy converge. According to Feltz (1988), self-efficacy describes the "conviction one has to execute successfully the behaviour (e.g., a sports performance) required to produce a certain outcome (e.g., a trophy or self-satisfaction)" (p. 423). This definition might also be related to the perceived probability of success (P_s), which according to Martens et al. is needed before determining uncertainty. Feltz also notes that, apart from self-confidence and self-efficacy, terms such as "perceived ability" and "perceived competence" have been used to describe one's perceived capability to accomplish a certain level of performance. These two latter terms are also central to the Martens et al. notion of perceived uncertainty. The process of determining one's P_s and thus uncertainty, requires information related to athletes' perceptions of both their ability and their opponents' ability (Martens et al., p. 227).

Perceived Importance

In Experiments 2 and 3, the use of different extrinsic rewards for winning proved to be a successful manipulation of importance and produced distinct HI and LI groups. A closer examination of the results suggested that the manipulation was mainly successful in altering perceptions of extrinsic importance and not intrinsic importance. This is not surprising because the manipulation (i.e., golf balls/golf shoes) was clearly extrinsic. The implication here is that in seeking to alter perceptions of importance, sport psychologists need to pay attention to all sources that impinge on perceived importance. For example, to alter perceived intrinsic importance successfully, other forms of manipulation may need to be considered. This is difficult because factors that determine intrinsic importance such as feelings of competence, mastery, and personal satisfaction are less manipulable than extrinsic factors such as trophies, rewards, or verbal praise.

The suggestion that perceived importance plays a central role in determining A-state seems justified based on the findings of Experiments 2 and 3. Those participants in the HI condition responded with higher levels of A-state than their LI counterparts. This finding was supported in the MANCOVA and multiple regression analyses. Whether this tendency carries over to real sports competition has not been demonstrated to date, at least scientifically. Given the relatively small rewards offered to winners in these experiments compared to the rewards in elite sport, there is reason to suggest this tendency may even be amplified in real situations. Arguably, the increasing importance of sport from a socio-political perspective, coupled with the increasing rewards available to successful athletes tend to amplify the importance of sport, especially at the elite level. Apart from the differences in perceived importance as a result of the magnitude of the reward, other variables such as age, type of sport, extrinsic motivation, or financial state could also influence perceived importance, and consequently, A-state.

The findings of these experiments on the relationship between A-state and perceived importance fit well with previous research and anecdotal evidence. A number of studies have shown perceived importance to be a significant predictor of A-state (e.g., Dorwthwaite & Armstrong, 1984; Hammermeister & Burton, 1995; Lewthwaite, 1990). For example, how many times do athletes perform well before faltering right at the point of ultimate success? A nervous player may 'dump' their volley into the net at the brink of victory in a Wimbledon final or inexplicably miss a three foot putt on the 18th green of a major golf tournament.

Experiments 1 and 2 were designed to isolate the key elements of the Martens et al. (1990) model. In Experiment 1, perceived uncertainty was manipulated while attempting to holding the reward for winning at a constant level. In Experiment 2, the reward for winning was manipulated while attempting to match players evenly. These attempts to hold constant perceived importance and perceived uncertainty were successful, to the extent that the mean scores for these variables were not significantly different between the experimental conditions. It was not, however, until Experiment 3, that perceived uncertainty and perceived importance were manipulated simultaneously. That is, Experiment 3 tested the full Martens et al. (1990) model by allowing perceived uncertainty and perceived importance to be tested in a multiplicative manner. The results of this test of the model indicated that perceived uncertainty and perceived importance did not act interactively as Martens et al. suggest. This result alone suggests that the Martens et al. model requires some modification. The results of Experiment 3, confirmed the earlier findings of Experiment 1, that perceived uncertainty did not reliably predict A-state. As with Experiment 1, substituting perceived confidence for perceived uncertainty again resulted in a more reliable prediction of A-state. Furthermore, the results of Experiment 3 confirmed the finding of Experiment 2 that perceived importance was a particularly salient factor in influencing A-state.

Trait Anxiety

The results of these three experiments also provide consistent support for

A-trait, the third hypothesised cause of A-state according to the Martens et al. (1990) model. This is not surprising because the ability of A-trait to predict A-state is well established (Gould, Horn, & Spreeman, 1983; Martens, 1977; Scanlan, 1976; Scanlan & Passer, 1979). A-trait scores are useful in providing a preliminary indication of athletes' susceptibility to competition anxiety in general. The further examination of other factors that combine with A-trait to produce an A-state reaction, such as perceived confidence and importance, is clearly of benefit to sport psychology practitioners and researchers alike. Based on these findings, elements of the Martens et al. competitive anxiety model should be retained, whereas other elements need to be omitted or alterated.

A More Comprehensive Model

Martens et al. (1990) present their model as the culmination of fifteen years of research. In view of the many studies they undertook during that time, coupled with the published findings of other researchers, it is somewhat surprising that the final model is limited to only three hypothesised causes of A-state. Before outlining their model in full, the authors themselves state that "A-trait, as a personality disposition, is hypothesised to interact with potentially many different variables in the objective competitive situation to produce an A-state reaction" (p. 217). As previously outlined (see Underlying Causes of Anxiety in Review of Literature Chapter), a list of hypothesised causes of anxiety has been proposed that draws on a wide range of anxiety related studies in sport. Even though Martens et al. might have considered some of these variables for possible inclusion in their model, they were not formally discussed.

A further change to the model could be effected by splitting global A-state into cognitive and somatic A-state. The results of this thesis show that A-trait and perceived confidence predict both cognitive and somatic A-state. Perceived importance was shown to be closely linked to cognitive A-state; its relationship to somatic A-state was not as strong.

Methodological Issues and Limitations

This section discusses particular methodological issues that are worthy of further discussion. To maintain consistency, these issues are addressed in order of their presentation in the method section of the three experimental chapters.

Participants

Of the 553 golfers asked to fill in the initial questionnaire package, a respectable return rate of 52% was obtained. Of those who returned questionnaires, approximately 64% took part in either a pilot study or one of the three experiments. It is, however, difficult to determine the extent to which the sample is representative of club golfers in Australia. A brief review of the gender, handicap and age characteristics provides information on the demographic profile of the final participant pool.

The final sample was comprised mainly of men with only 14 females (7.5%) taking part. Females were, therefore, underepresented not only numerically but in relation to their membership numbers at private golf clubs. According to club professionals at three clubs, females make up between 10 - 20% of the total number of members. Based on these estimates, between 17 and 35 female participants would have been needed for them to be proportionally represented.

Ideally, an even gender ratio of participants would have been recruited, but it soon became obvious that this would be unrealistic in light of the smaller number of female golfers in clubs, and that they were generally less interested in taking part than their male counterparts. The females who took part in the study were distributed fairly evenly across experiments and experimental conditions. In addition, to eliminate possible cross-gender effects, all participants were matched with a same gender opponent.

The majority of participants were recruited from private golf clubs, and all had an official Australian Golf Union handicap. I felt that having an official handicap would make the task of matching opponents more consistent. As indicated in Chapter 3, some participants were recruited from sources other than private golf clubs. This was done mainly because of the difficulty in reaching the target number of 186 needed for the pilot study and experiments, and also to increase the number of younger players, who were underepresented in the early stages of recruitment. Despite this, 86% of participants had an official golf handicap. The remaining 14% were asked to estimate their likely handicap if they were to join a golf club.

The handicap scores for the 186 participants were 'normally' distributed ($\underline{M}$ = 15.3, range 1 - 35). This is probably fairly representative of the type of handicaps that exist at member only golf clubs in Australia. Arguably, higher handicap players could have been underrepresented due to the competitive nature of the task. High handicap players may have perceived that they lacked the skill to take part or compete well in such a study. To avert this possibility, potential participants were informed in the recruitment stage, that a wide range of handicaps was needed in this study.

The age distribution was bi-modal with a high number of participants in the 16 - 25 and 45 - 60 ranges. Players in the 26 - 44 age range were underepresented, perhaps due to greater family or work commitments at this stage of life. There was a general trend for the younger players to have lower handicaps (r = .22) with a larger cluster of the lower handicap players falling in the 17 - 30 age range. There were also a large number of lesser experienced players in this 17 - 30 age range who had relatively high handicaps. As with gender it would have been ideal to have an even age cross section of participants but this was not possible.

Measures

Golf Ability Rating Form (GARF).

The GARF was developed to provide a rating of overall golf handicap for each participant. More specifically, the GARF also required players to rate specific aspects of their game (including chipping), to make the task of matching players more objective. The extent of error when using the GARF is difficult to estimate, but clearly some players would have either underestimated or overestimated their abilities. Nevertheless, the GARF was a strong predictor of performance on the experimental task (r = .79), thereby indicating it had good predictive validity. In addition, the GARF was a time effective measure taking the majority of players about a minute to complete.

-

Sport Competition Anxiety Test (SCAT)

The SCAT, a psychometrically validated questionnaire, was filled out pre-experimentally to provide a measure of each participant's trait anxiety in sport. A measure of A-trait was needed because A-trait is one of the three predictor variables included in the Martens et al. (1990) model. Because of the known relationship between A-trait and A-state, the SCAT scores were also used as a covariate when comparing A-state between groups to partial out differences between groups.

Marlowe-Crowne Social Desirability Scale (M-C SDS)

Participants were required to complete the psychometrically validated M-C SDS prior taking part in the study. The M-C SDS a measure of the tendency for participants to respond in a socially desirable manner, was included because previous research has shown a link between social desirability tendencies and the repression of A-state when completing the CSAI-2 (Williams & Krane, 1989). The relationship between social desirability and A-state when combining participants in the three experiments comprising this thesis, was significant for the first two administrations of the CSAI-2 pre-briefing, $r = -.14$, $p < .05$; post-briefing,

$r = -.14$, $p < .05$ but not thereafter. This lends partial support for the suggestion of Williams and Krane (1989), that sport anxiety researchers should be mindful of the role social desirability plays in repressing A-state scores for some athletes.

Of further interest in the present study, was the substantially higher average M-C SDS scores than was expected. When combining the participants from the three studies, the average M-C SDS score ($\underline{M}$ = 17.3, $\underline{S.D}$ = 5.4) represents an increase over those published by Crowne and Marlowe (1960) of almost one standard deviation. This could be due to the difference in samples with the published norms being based on North American undergraduate psychology students. It is more likely related to the substantially higher average age of participants in the present study, compared to the norming group. When combining participants in the three experiments of this thesis, the tendency for older participants to respond in a socially desirable manner was clearly evident ($\underline{r}$ = .43). This finding is directly opposite to the finding of Nickel, (as cited in Hackfort & Schwenkmezger, 1993), that social desirability, in regard to anxiety, is particularly acute in younger athletes. Studies using a cross section of age categories and sports should investigate this discrepancy further. If the tendency for people to respond differently in a socially desirable manner due to age is confirmed, it would be necessary for age related norms to be produced.

Competitive State Anxiety Inventory - 2 (CSAI-2)

Some of the problems in using the CSAI-2 in the present study were discussed previously and are addressed in the next section on the arousal - performance relationship. These concerns are mainly in relation to the possible inability of the CSAI-2 to detect changes in A-state adequately over time, and the effects of social desirability tendencies. Another point worthy of discussion is the validity of administering the CSAI-2 on repeated occasions. In the present study participants filled out the CSAI-2 on five occasions within a one and a half hour time period. Although no participants openly expressed dissatisfaction with

-

having to fill out the same questionnaires on five occasions, some may have become bored and developed a response set.

Match Orientation Questionnaire (MOQ)

Although the perceived uncertainty items were modelled on the four uncertainty sources that Martens et al. (1990) discuss, they may not have reflected these as well as was intended. As discussed earlier, the Martens et al. (1990) notion of uncertainty is based on: information about the standard (opponent or opponent's ability), individual response capability (the accuracy with which an athlete can predict their own task specific response capacity), the likelihood of actual performance meeting performance capacity (current form), and performance outcome (the extent to which the score reflects the actual quality of performance; factors such as weather, officials and luck can affect the outcome irrespective of performance quality). The first two MOQ questions were designed to reflect the type of uncertainty engendered by information about the standard and individual response capability. In hindsight, these questions should probably contain the word certainty, and relate to perceived ability, rather than the perceived likelihood of winning, as with the first question. The third source of uncertainty, performance capacity, was covered by the third MOQ uncertainty item relating to performance expectations. An additional item designed to directly measure performance outcome would have also been a useful inclusion. Further research may lead to an improvement in the psychometric qualities of the MOQ, especially for the perceived uncertainty sub-scale, the internal consistency of which was borderline. This was probably due, at least in part, to the bi-directional scoring procedure that was based on Martens et al. (1990). The same questions fared much better when they were scored uni-directionally, as perceived confidence questions. Based on these possible shortcomings of the present MOQ, a revised MOQ that includes four perceived uncertainty items is proposed (see Appendix N). The present three perceived uncertainty items have been reworded to include the word 'certainty', and an item on perceived performance outcome has been added. The present three perceived importance items have been retained and an additional item measuring overall importance has been included. As a result this revised version consists of a total of eight items compared to the original six item version. The first perceived importance item should be reworded if necessary depending on the context (i.e., to reflect perceived extrinsic importance using a relevant tangible reward for that context). Other researchers investigating the role of perceived uncertainty as a cause of A-state may wish to pilot test this revised MOQ.

Golf Chipping Task

Participants were required to play a difficult chip shot. In Experiment 1, they played a 30 metre shot directly over a greenside bunker, with the added difficulty of having to stop the ball abruptly. The high degree of difficulty was chosen because Cohn (1990) reported that difficult shots are very stressful for golfers. In Experiments 2 and 3 the task was modified slightly, with participants being required to play their four rounds of shots from different positions. This was done to reduce wear-and-tear, thereby helping to maintain 'good' lies. Because the experiments used a contrived competition, it was important to create a situation where high levels of A-state commensurate with real competition were possible. Many participants reported that they felt the task was very difficult, especially because the green used was a practice green that was not maintained to the standard of a regular green. As a result, some players complained that the bounce of the green was not always even and the green did not hold the ball as well as regular greens. Ideally, a regular green should have been used, but due to the extended number of hours needed for testing this would have been impossible. I am satisfied that the type of shot required was well chosen and presented the participants with a difficult challenge capable of eliciting very high levels of A-state for some players.

Formation of Experimental Groups

As previously discussed, the groupings of participants into experimental conditions did not always produce the type of results that were expected. For example, on some occasions two relatively equal players played a lop-sided match contrary to expectations. To an extent, this is unavoidable because competition, as Martens et al. (1990) point out, is by nature ephemeral, and fluctuations in form and performance help to provide the uncertainty that makes the result unpredictable. It could be argued, that rather than using the GARF to match players, a baseline performance score on the experimental task may have provided a more accurate ability indicator. In the present study, this would have been extremely time intensive and may have affected the perceived uncertainty ratings, because players would have gained prior knowledge of the experimental task. In any case, the temporal effects of factors such as anxiety, which can lead to fluctuations in performance, threaten the validity of such an approach.

Procedures

Pre-experimental procedures.

The main task in this part of the study, was to make personal contact with potential participants, explain the general nature of the study, and get them interested in taking part. Beyond that, participants were required to fill in a package of questionnaires that indicated their willingness to take part in the experimental stage, measured their A-trait, social desirability susceptibility, golfing ability, and gleaned demographic information. The final step in the pre-experimental stage was to match participants and arrange a mutually suitable time for them to participate in one of the three experiments. Apart from the usual time consuming nature of liaising with administrative bodies, recruiting participants, and organising matches, this stage progressed fairly smoothly.

Experimental procedure and description

Running an initial pilot study was very helpful in streamlining the experimental procedures. Fortunately, there was no need to make any alternations to the intended experimental procedure once the first study commenced. One factor that did, however, prove troublesome throughout the three experiments, was the variable weather conditions. Inevitably, being a large scale field study some matches had to be postponed because of rain. Often this was achieved before participants had left their homes and was nothing more than an inconvenience. The matches that were interrupted by rain proved to be more inconvenient because shelter had to be provided, participants sometimes got wet, and the match schedule was affected. Eight matches were interrupted by rain, none of which had to be cancelled. Generally, participants were very understanding, realising golf is, to an extent, a wet weather sport, as they played through the rain or waited till it subsided. It is difficult to estimate if these occurrences affected the results, but conceivably the weather may have altered the performance of participants, caused them to become distracted or changed their level of A-state. Because these rain affected matches occurred at random and did not seem to affect participants' response or performance in an obvious manner, they were retained in the final analysis.

The Anxiety-Performance Relationship

The general interest in anxiety-performance relationships by sport psychologists is reflected in a steady flow of studies on this subject (Burton, 1988; Gould et al., 1987; Krane, 1993; Krane, Joyce & Rafeld, 1994). The present study was not designed to investigate specifically the anxiety-performance relationship. Yet, because the experimental design incorporated a performance measurement as well as measurements of A-state, some comments regarding this relationship seem appropriate. Rather than present a formal account of performance related data, I will make some general comments about interesting trends only.

The collection of performance and A-state data in these experiments was quite extensive. The one hundred and seventy six participants took a total of 5,632 competitive chip shots and approximately 2,100 practice shots. They also completed a total of 880 CSAI-2 and 176 SCAT questionnaires. A number of performance catastrophes occurred, with some participants responding to the competitive situation by hitting a disproportionately high percentage of what are generally described in golf parlance as, 'topped', 'duffed', 'fat', and 'skinny' shots. These terms reflect the full gamut of unintended outcomes, and participants responded with a range of emotions, including outward signs of anger, frustration, bemusement, and embarrassment. There were also a number of participants who responded exceptionally well to the competitive situation and were obviously proud of their performance.

Informed of the handicap ratings of all participants, watching them practise, and then observing their responses to how they were playing, I felt that I was able to form a fairly complete picture of how participants were performing relative to their capabilities. I was especially struck by the tendency of participants experiencing a 'catastrophe' to report only incremental increases in A-state. On many occasions after an exceptionally poor round of shots where the performance of players was apparently adversely affected by nervous tension, players then reported steady, or only a marginal increase, in A-state. This is somewhat perplexing because my behavioural observations indicated that a large increase in A-state seemed to have occurred. Perhaps some athletes in the midst of competition, who are experiencing anxiety, are unlikely to openly attend to, label, and report these feelings, for fear of exacerbating them, and thus further affecting their performance. It would be interesting to investigate whether there are differences in CSAI-2 responses, based on whether athletes are self reporting in the midst of competition, or immediately after its conclusion.

-

These observations lead to a number of questions that are rhetorical at present. These questions are mentioned to draw attention to some discrepancies between my observations and CSAI-2 responses. Was I ascribing poor performance in these catastrophes to increased A-state incorrectly? Did some participants not report increased A-state because they did not want to admit to anxiety in the midst of a competition? Is the CSAI-2 really sensitive to ongoing changes in A-state? Do participants enter into response sets when filling out a questionnaire such as the CSAI-2 on repeated occasions in the same competition? Was the strength of results or the differences between experimental groups in these studies being undermined by these possibilities? Future research designed to answer these questions is needed, because, if the CSAI-2 is unable to accurately detect changes in A-state, some of the conclusions that are being reported may be faulty. These concerns may prove unwarranted, but given the widespread use of the CSAI-2 in both research and applied settings they need to be investigated further.

Whether competitive anxiety hinders or helps performance outcome is of central importance to athletes and coaches. In the present study no obvious anxiety - performance trend was evident. There did not appear to be any clear relationship between A-state and performance such as those that the inverted-U hypothesis or drive theory predict. Anxiety is only one of a number of variables that potentially affect performance outcome. As Sonstroem and Bernardo (1982) suggest, individual responses to anxiety are idiosyncratic. The evidence from the studies in this thesis, supports the view that anxiety is potentially helpful or detrimental depending on the interplay of a number of factors. To be more specific at this stage regarding prevailing anxiety-performance trends based on these experiments is premature and secondary to the major aim of testing the Martens et al. (1990) model.

CHAPTER 7

CONCLUSIONS AND RECOMMENDATIONS

This chapter summarises the main findings of this series of experiments designed to test the Martens et al. (1990) model of competitive anxiety. Particular attention is given to possible limitations of the Martens et al. model that these experiments have revealed. In addition, recommendations are made concerning potential revisions to the model and directions for future research.

Limitations of The Model

Because I have already discussed probable weaknesses of the Martens et al. (1990) model in some detail in earlier chapters, the key limitations are summarised here in point form. The first four limitations, based on experimental findings suggest the model needs to be altered. The fifth point is of significance because it calls into question the limited scope of the Martens et al. model. The limitations are:

1. The inability of perceived uncertainty to predict A-state in this series of experiments.
2. The tendency for likely losers to react with increased, rather than decreased, A-state.
3. The choice of global A-state over the more widely accepted differentiation between cognitive and somatic elements. This weakens the predictive ability and potential application of the model.
4. A lack of evidence to support the hypothesis that perceived uncertainty and perceived importance act multiplicatively.
5. Restricting the model to only three hypothesised causes of A-state. This limits its predictive power.

The first limitation of the Martens et al. (1990) model relating to the lack of support for perceived uncertainty as a predictor of A-state, should be regarded as a preliminary finding. It should be noted that Martens et al. do not explicitly define either perceived uncertainty or perceived importance in their text. In the present series of experiments perceived uncertainty was defined, and subsequently operationalised, based on the extended discussion in Chapter 8 of the Martens et al. (1990) text. Other researchers, before testing components of the Martens et al. model, should re-examine the manner in which perceived uncertainty is operationalised in the present study. I believe that it faithfully reflects the intention expressed in the Martens et al. text.

A further caveat regarding this first limitation relates to the measurement of perceived uncertainty. In the present thesis perceived uncertainty is rejected as a predictor of A-state, this is based on the responses of the participants to the perceived uncertainty items on the MOQ. Perhaps the development of a stronger (psychometrically) set of perceived uncertainty questions, may lead to a recommendation to retain perceived uncertainty in the model. To this end, a priority for researchers seeking to further test the Martens et al. (1990) model should be to further examine the potential role of perceived uncertainty as a predictor of A-state.

The findings of the present study indicate that a possible flaw in the Martens et al. (1990) model is the tendency for likely losers or those who are labelled as negative low uncertain (NLU) to react with high A-state. These NLU participants responded to the experimental situation with significantly higher A-state than either likely winners that were labelled as positive low uncertainty (PLU), or those who were high uncertain (HU) because they were engaged in a close match. This finding challenges the assumption of Martens et al. that likely winners and likely losers will both respond to the competitive situation with low A-state because their is little uncertainty. Giving up in adverse circumstances (i.e., losing) in an attempt to reduce A-state was not a common practice among the participants of this study, most of whom were concerned about the prospect of losing. Based on this finding, researchers should avoid placing likely winners and likely losers into a composite low uncertainty condition, because they are unlikely to respond in a similar manner to anxiety inducing situations. Furthermore, applied sport psychologists and coaches should be sensitive to the likelehood of elevated levels of A-state in their athletes who are losing, especially those who are losing on a consistent basis.

A third weakness in the Martens et al. (1990) model, is the preference for global A-state, rather than adopting the usual differentiation of A-state into its cognitive and somatic components. The present series of experiments found that A-trait was related to both cognitive and somatic A-state, but not equally, with a slightly stronger relationship evident between A-trait and cognitive A-state. Perceived importance followed a similar pattern with a stronger relationship evident with cognitive A-state. Perceived uncertainty was not related to either cognitive or somatic A-state. When the perceived uncertainty items were scored to reflect confidence then a weak but significant relationship was found with both cognitive and somatic A-state. Based on these findings, the relationship between

A-state and its hypothesised predictors is similar for components of A-state, but not identical. It would seem that splitting A-state into cognitive and somatic components, is mainly justified in the interests of making more precise predictions of how hypothesised causes affect A-state.

The lack of support for perceived uncertainty and perceived importance as being multiplicative is a fourth criticism of the Martens et al. (1990) model. Both the MANCOVA and multiple regression analyses used in Experiment 3, did not support the contention that perceived uncertainty and perceived importance interact. Martens et al. suggest that for threat, and hence A-state to occur, there must be substantial uncertainty about the outcome, and the outcome must be important to the person. As discussed previously, this is not always the case, because some individuals become anxious when they are certain they will lose, and hence have low uncertainty. Perhaps, the multiplicative function generated by multiplying perceived uncertainty and perceived importance was less successful than entering the variables separately in the regression equations, because of the instability of perceived uncertainty. This instability, was mainly evident in the emergence of two uncertainty sub-groups, those that were labelled negative low uncertain and those labelled as positive low uncertain.

Surprisingly, Martens et al. (1990) do not justify the restriction of their model to only three hypothesised causes of A-state. In an earlier section of their text they discuss a limited range of other possible antecedents including perceived ability, experience, and previous match outcome. Martens et al. chose not to include these, or any of the many other variables reported in the related literature to be antecedents in their model. At present, it is not clear whether Martens et al. are not aware of the full scope of other hypothesised predictors of A-state, or whether they feel that other predictors feed into either perceived uncertainty, perceived importance, or A-trait. Thus, the fifth criticism of the Martens et al. model relates to the rationale for including and excluding potential A-state predictors.

Based on the present study, it appears that the components of the Martens et al. (1990) model account for a portion of the total A-state variance. The most successful regression equation in the present series of experiments managed to explain 40% of the total variance. This was for cognitive A-state using, A-trait, perceived importance, and perceived confidence as the predictors. It appears that the majority of the total A-state variance is explained by other factors not accounted for in the Martens et al. (1990) model. Further research looking at a greater number of hypothesised A-state predictors is needed. For example, a studies looking at the intercorrelation and factor structure of predicted causes may eventually lead to a model capable of explaining a larger proportion of the total A-state variance.

The Revised Model

The present thesis has shown that the Martens et al. (1990) model needs modification. An alternative model is, therefore, presented that reflects the key limitations listed above. Perceived uncertainty has been removed because it failed to reliably predict A-state. Perceived confidence is included as a replacement for perceived uncertainty because it proved to be a strong predictor of A-state. The removal of perceived uncertainty is made in a tentative sense. Future researchers should not necessarily assume perceived uncertainty as being incapable of predicting A-state, and further testing of this variable is recommended.

In accordance with multidimensional anxiety theory, the A-state reaction is partitioned into cognitive and somatic elements. This separation is justified based on previous research, and the findings of the present thesis. For example, the regression analysis in Experiment 3, showed that a stronger relationship exists between perceived importance and cognitive A-state, compared to the relationship between perceived importance and somatic A-state. This separation should allow researchers to test the model more easily, and draw more specific conclusions.

Researchers are reminded of the contention of Martens et al. (1990) that if either perceived uncertainty or perceived importance is not present A-state may be very low or negligible. The present thesis sought to control (rather than remove) the influence of perceived uncertainty and perceived importance. Because, no interaction was found using the methodology employed here, each of the three demonstrated predictors of A-state, perceived confidence, perceived importance, and A-trait contributes to A-state independently not interactively.

The alternative model is presented using a similar design to the original Martens et al. (1990) model. For ease of identification each of the three predictors of A-state is depicted in a different colour. Three line thicknesses are used to indicate a strong, moderate, or weak relationships. Arrows are also used to help identify the intended directions of influence from one variable to another. Finally, the intention of this thesis was to test the Martens et al. model, the possible inclusion of other A-state predictor variables has not been investigated beyond the theoretical stage.

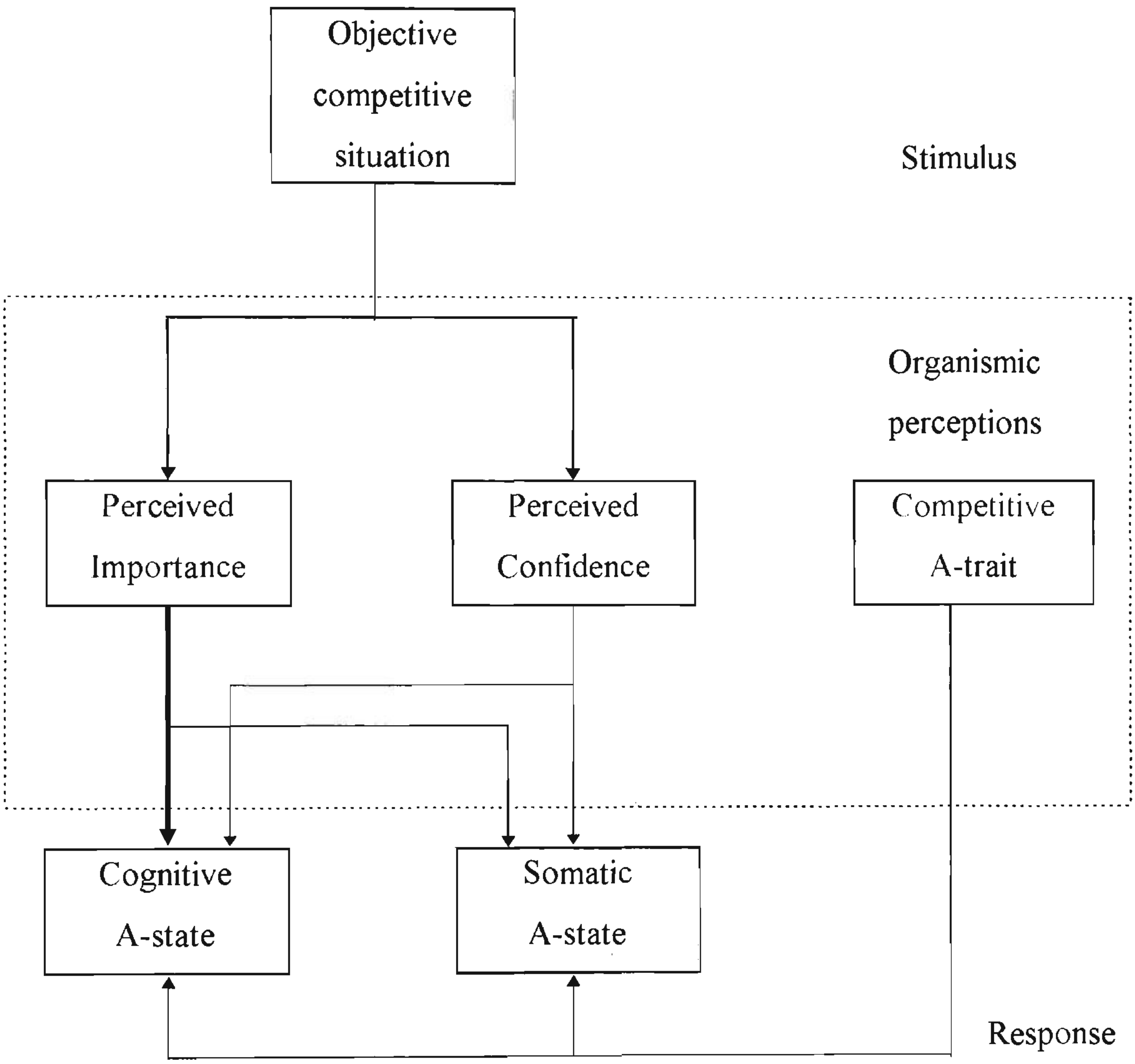


Figure 7.1. Revised version of the Martens et al. (1990) model of competitive anxiety.

Despite the limitations of the Martens et al. (1990) model, I applaud them for its development, and inviting other researchers to test its validity in competitive settings. Similarly, the revised model presented above will require further testing and alteration if necessary. Testing the possible inclusion of other hypothesised causes of A-state is also worthy of consideration.

REFERENCES

Atkinson, J. W. (1964). An introduction to motivation. New Jersey: Van Nostrand.

Beck, A. T. (1976). Cognitive therapy and the emotional disorders. New York: International Universities Press.

Benjamin, M., McKeachie, W. J., Lin, Y. G., & Holinger, D. C. (1981). Test Anxiety: Deficits in information processing. Journal of Educational Psychology, 73, 816-824.

Benson, H. (1975). The relaxation response. New York: Avon books.

Borkovec, T. D. (1976). Physiological and cognitive processes in the regulation of anxiety. In G. Schwartz, & D. Shapiro (Eds.), Consciousness and self regulation: Advances in research (Vol. 1.). New York: Plenum Press.

Bridges, P. K. (1971). Attention and arousal: Some factors influencing physiological responses to arousal. Proceedings of the Fifth Conference of the British Society of Sport Psychology, Leeds: England, (pp. 212-223).

Brustad, R., & Weiss, M. R. (1987). Competence perceptions and sources of worry in high, medium, and low competitive trait-anxious young athletes. Journal of Sport Psychology, 9, 97-105.

Burton, D. (1988). Do anxious swimmers swim slower? Reexamining the elusive anxiety-performance relationship. Journal of Sport and Exercise Psychology, 10, 45-61.

Burton, D. (1990). Multimodal stress management in sport: Current status and future directions. In J. G. Jones, & L. Hardy (Eds.), Stress and performance in sport (pp. 171-201). Chichester, West Sussex: Wiley & Sons.

Carson, R. C., Butcher, J. N., & Coleman, J. C. (1988). Abnormal psychology and modern life. Illinois: Scott, Foresman, & Company.

Cattell, R. B., & Scheier, I. H. (1961). The meaning and measurement of neuroticism and anxiety. New York: Ronald Press.

Cohn, P. J. (1990). An exploratory study on sources of stress and athlete burnout in youth golf. The Sport Psychologist, 4. 95-106.

Coleman, J. S. (1961). The adolescent society: The social life of the teenager and its impact on education. New York: Free Press.

Cooley, E. J. (1987). Situational and trait determinants of competitive state anxiety, Perceptual and Motor Skills, 64, 767-773.

Cox, R. H. (1990). Sport psychology: Concepts and applications. Dubuque, Iowa: Wm. C. Brown.

Crocker, P. R. E., Alderman. R. B., & Smith, F. M. R. (1988). Cognitive-affective stress management training with high performance youth volleyball players: Effects on affect, cognition, and performance. Journal of Sport and Exercise Psychology, 10, 448-460.

Crowne, D. P., & Marlowe, D. (1960). A new scale of social desirability independent of pathology. Journal of Consulting Psychology, 24, 349-354.

Culler, R. E., & Holahan, C. J. (1980). Test Anxiety and academic performance: The effects of study-related behaviours. Journal of Educational Psychology, 72, 16-20.

Davidson, R. J., & Schwartz, G. E. (1976). The psychobiology of relaxation and related states: A multiprocess theory. In D. I. Mostofsky (Eds.), Behavior control modification of physiological activity. Englewood Cliffs, NJ: Prentice Hall.

Dishman, R. (1983). Identity crisis in North American sport psychology: Academics in professional issues. Journal of Sport Psychology, 5, 123-134.

Dowthwaite, M. R., & Armstrong, M. R. (1984). An investigation into the anxiety levels of soccer players. International Journal of Sport Psychology, 15, 149-159.

Dunn, G. H., & Nielsen, A. B. (1993). A between-sport comparison of situational threat perceptions in ice hockey and soccer. Journal of Sport & Exercise Psychology, 15, 449-465.

Easterbrook, J. A. (1959). The effects of emotion on cue utilisation and the organisation of behavior. Psychological Review, 66, 183-201.

-

Elko, P. K., & Ostrow, A. C. (1991). Effects of a rational-emotive education program on heightened anxiety levels of female collegiate gymnasts. The Sport Psychologist, 5, 235-255.

Ellis, A. (1970). The essence of rational psychotherapy: A comprehensive approach to treatment. New York: Institute for Rational Living.

Epstein, S., & Fenz, W. D (1962). Theory and experiment on the measurement of approach-avoidance conflict. Journal of Abnormal and Social Psychology , 64, 97-112.

Faulkner, M. K. (1980). A study of pre-match state anxiety in northamptonshire country hockey teams. British Society of Sports Psychology, 68.

Fazey, J., & Hardy, L. (1988). The inverted-U: A catastrophe for sport psychology ? Bass Monograph no. 1. British Association of Sports Sciences and the National Coaching Federation. Leeds: England.

Feltz, D. L. (1988). Self-confidence and sports performance, Exercise and Sport Science Reviews, 16, 423-258.

Fenz, W. D. (1988). Learning to Anticipate Stressful Event, Journal of Sport & Exercise Psychology, 10, 223-228.

Fenz, W. D., & Jones, G. B. (1972). Individual differences in physiological arousal and performance in sport parachutists. Psychosomatic Medicine, 34, 1-8.

Fisher, C. A., & Zwart, E. F. (1982). Psychological analysis of athlete's anxiety responses. Journal of Sport Psychology, 4, 139-158.

Flood, M., & Endler, N. S. (1980). The interaction model of anxiety: An empirical test in an athletic competition situation. Journal of Research in Personality, 14, 229-339.

Greenspan, M. J., & Feltz, D. L. (1990). Psychological interventions with athletes in competitive situations: A review. The Sport Psychologist, 3, 219-236.

Gould, D., Horn, T., & Spreeman, J. (1983a). Competitive anxiety in junior elite wrestlers. Journal of Sport Psychology, 5, 58-71.

Gould, D., Horn, T., & Spreeman, J. (1983b). Sources of stress in junior elite wrestlers. Journal of Sport Psychology, 5, 159-171.

Gould, D., & Krane, V. (1992). The arousal-athletic performance relationship: Current status and future directions. In T. Horn (Ed.), Advances in Sport Psychology (pp. 119-142), Champaign, Illinois: Human Kinetics.

Gould, D., Jackson, S., & Finch, L. (1993). Sources of stress in national champion figure skaters. Journal of Sport and Exercise Psychology, 15, 134-159.

Gould, D., Petlichkoff, L., & Weinberg, R. S. (1984). Antecedents of, temporal changes in, and relationships between CSAI-2 subcomponents. Journal of Sport Psychology, 6, 289-384.

Gould, D., Petlichkoff, L., Simons, J., & Verera, M. (1987). Relationship between competitive state anxiety inventory-2 subscale scores and pistol shooting performance. Journal of Sport Psychology, 9, 33-42.

Gould, D., & Weinberg, R. S. (1985). Sources of worry in successful and less successful intercollegiate wrestlers. Journal of Sport Behavior, 8, 115-127.

Gould, D., Tuffey, S., Hardy, L., & Lochbaum, M. (1993). Mutlidimensional state anxiety and middle distance running performance: An exploratory examination of Hanin's (1980) Zones of optimal functioning hypothesis. Journal of Applied Sport Psychology, 5, 85-89.

Griffin, M. R. (1972). An analysis of state and trait anxiety experienced in sports competition at different age levels, Foil, Spring, 58-64.

Gruber, J. J., & Beauchamp, D. B. (1979). Relevancy of the competitive state anxiety inventory in a sport environment. Research Quarterly, 50, 207-214.

Hackfort, D., & Schwenkmezger, P. (1989). Measuring anxiety in sports: Perspectives and problems. In D. Hackfort & C. D. Spielberger (Eds.), Anxiety in sports: An international perspective (pp. 261-266). New York: Hemisphere Publishing.

Hackfort, D., & Schwenkmezger, P. (1993). Anxiety. In R. N. Singer., M. Murphey., & L. K. Tennant (Eds.), Handbook of Research on Sport Psychology (pp. 328-364). New York: Macmillan.

Hammermeister, J., & Burton, D. (1995). Anxiety and the ironman: Investigating the antecedents and consequences of endurance athletes' state anxiety. The Sport Psychologist, 9, 29-40.

-

Hanin, Y. L. (1980). A study of anxiety in sports. In W. F. Straub (Ed.) Sport psychology: An analysis of athlete behavior, (pp. 236-249). Ithaca, New York: Mouvement Publications.

Hanin, Y. L., & Syrja, P. (1995). Performance affect in junior ice hockey players: An application of the individual zones of optimal functioning model. The Sport Psychologist, 9, 167-187.

Harris, D. V., & Harris, B. L. (1984). The athlete's guide to sports psychology: Mental skills for physical people. New York: Leisure Press.

Hardy, L. A catastrophe model of performance in sport. In J. G. Jones, & L. Hardy (Eds.), Stress and performance in sport (pp 43-80). Chichester, West Sussex: Wiley & Sons.

Hatfield, B. D., & Landers, D. M. (1983). Psychophysiology-A new direction for sport psychology. Journal of Sport Psychology, 5, 243-259.

Heckhausen, H. (1990). Motivation and action. Berlin: Germany, Springer-Verlag.

Hembree, R. (1988). Correlates, causes, effects, and treatments of test anxiety. Review of Educational Research, 58, 47-77.

Heyman, S. R. (1982). Comparisons of successful and unsuccessful competitors: A reconsideration of methodological questions and data. Journal of Sport Psychology, 4, 295-300.

Highlen, P. S., & Bennett, B. B. (1979). Psychological characteristics of successful and nonsuccessful elite wrestlers: An exploratory study. Journal of Sport Psychology, 1, 123-137.

Hull, C. L. (1943). Principles of behavior, New York: Appleton-Century Co.

Jacobsen, E. (1938). Progressive relaxation (2nd ed.). Chicago: University of Chicago Press.

Jones, J. G., & Cale, A. (1989). Relationships between multidimensional competitive state anxiety and cognitive and motor subcomponents of performance. Journal of Sport Sciences, 7, 129-140.

J. G. Jones, & L. Hardy (Eds.), Stress and performance in sport. Chichester, West Sussex: Wiley & Sons.

Jones, J. G., Swain, A., & Cale, A. (1990). Antecedents of multidimensional competitive state anxiety and self-confidence in elite middle-distance runners. The Sport Psychologist, 4, 107-118.

Kagan, J. (1972). Motives and development. Journal of Personality and Social Psychology, 22, 51-66.

Krane, V. (1992). Conceptual and methodological considerations in sport anxiety research: From the inverted-U hypothesis to catastrophe theory. Quest, 44, 72-87.

Krane, V. (1993). A practical application of the anxiety-athletic performance relationship: The zone of optimal functioning hypothesis. The Sport Psychologist, 7, 113-126.

Krane, V., & Williams, J. M. (1987). Performance and somatic anxiety, cognitive anxiety, and confidence changes prior to competition. Journal of Sport Behavior, 10, 47-56.

Krane, V., Joyce, D., & Rafeld, J. (1994). Competitive anxiety, situation criticality, and softball performance. The Sport Psychologist, 8, 58-72.

Kroll, W. (1979). The stress of high performance athletics. In P. Klavora & V. L. D. Daniel (Eds.), Coach, athlete and the sport psychologist (2nd ed., pp. 211-219). Illinois: Human Kinetics.

Landers, D. M. (1980). The arousal-performance relationship revisited. Research Quarterly for Exercise and Sport, 51, 77-90.

Lewthwaite, R. (1990). Threat perception in competitive trait anxiety: The endangerment of important goals. Journal of Sport and Exercise Psychology, 12, 280-300.

Liebert, R. M., & Morris, L. W. (1967). Cognitive and emotional components of test anxiety: A distinction and some initial data. Psychological Reports, 30, 975-978.

Light, K., & Obrist, P. A. (1983). Task difficulty, heart rate reactivity and cardiovascular response to an appetitive reaction time task. Psychophysiology, 20, 301-312.

Lowe, R. Stress, arousal, and task performance of little league baseball players. Unpublished doctoral dissertation, University of Illinois at Urbana-Champaign, 1973.

Lox, C. L. (1992). Perceived threat as a cognitive component of state anxiety and confidence. Perceptual and Motor Skills, 75, 1092-1094.

McAuley, E. (1985). State anxiety: antecedent or result of sport performance. Journal of Sport Behavior, 8, 71-77.

McGrath, J. E. (1970). A conceptual formulation for research on stress. In J. E. McGrath (Ed.), Social and psychological factors in stress (pp. 1-13). New York: Holt, Rinehart, & Winston.

McClelland, D. C., Atkinson, J. W., Clark, R.W., & Lowell, E. L. (1953). The achievement motive. New York: Appleton-Century-Crofts.

Mace & Carroll (1985), The control of anxiety in sport: Stress inoculation training prior to abseiling. International Journal of Sport Psychology, 16, 165-175.

Maehr, M. L., & Braskamp, L. A. (1986). The motivational factor: A theory of personal investment, Lexington, MA: Lexington Press.

Mahoney, M. J., & Meyers, A. W. (1989). Anxiety and athletic performance: Traditional and cognitive-developmental perspectives. In D. Hackfort & C. D., Spielberger (Eds.), Anxiety in sports: An international perspective (pp. 261-266). New York: Hemisphere Publishing.

Man, F., Stuchlikova, I., & Kindlmann, P. (1995). Trait-state anxiety, worry, emotionality, and self-confidence in top-level soccer players. The Sport Psychologist, 9, 212-224.

Magnusson, D., & Endler, N. S. (1977). Interactional psychology: Present status and future prospects. In D. Magnusson & N. S. Endler (Eds.), Personality at the crossroads: Current issues in interactional psychology. Hillsdale, NJ: Eribaum.

Marchant, D. B. (1992). Investigating the arousal-performance relationship in rifle shooting, Unpublished master's thesis, University of Alberta, Edmonton, Alberta, Canada.

Martens, R. (1971). Anxiety and motor behavior: A review. Journal of Motor Behavior, 3, 151-179.

-

Martens, R. (1977). Sport Competition Anxiety Test. Champaign, IL: Human Kinetics.

Martens, R., & Gill, D. (1976). State anxiety among successful and unsuccessful competitors who differ in competitive trait anxiety. Research Quarterly, 47, 698-708.

Martens, R., & Landers, D. M. (1970). Motor performance under stress: A test of the inverted-U hypothesis. Journal of Personality and Social Psychology, 16, 29-37.

Martens, R., & Simon, J. (1976). Comparison of three predictors of state anxiety in competitive situations. The Research Quarterly, 47, 381-387.

Martens, R., Burton, D., Rivkin, F., & Simon, J. (1980). Reliability and validity of the Competitive State Anxiety Inventory (CSAI). In C. H. Nadeau, W. C. Halliwell, K. M. Newell, & G. D. Roberts (Eds.), Psychology of motor behaviour and sport-1979 (pp. 91-99). Champaign, IL: Human Kinetics.

Martens, R., Burton, D., Vealey, R. S., Bump, L. A., & Smith, D. E. (1982). Competitive State Anxiety Inventory-2. Symposium conducted at the meeting of the North American Society for the Psychology of Sport and Physical Activity, College Park, MD.

Martens, R., Vealey, R. S., & Burton, D. (1990) Competitive anxiety in sport. Illinois: Human Kinetics.

Maynard, I. W., Cotton, P. C. J. (1993). An investigation of two stress-management techniques in a field setting. The Sport Psychologist, 7, 375-387.

Maynard, I. W., Hemmings, B., & Warwick-Evans (1995). The effects of a somatic intervention strategy on competitive state anxiety and performance in semiprofessional soccer players. The Sport Psychologist, 9, 51-64.

Maynard, I. W., & Howe, B. L. (1987). Interrelations of trait and state anxiety with game performance of rugby players. Perceptual and Motor Skills, 64, 599-602.

Meichenbaum, D. (1985). Stress inoculation training. New York: Pergamon.

Mellstrom, M. Jr., Cicala, G. A., & Zuckerman, M. (1976). General versus specific trait anxiety measures in the prediction of fear of snakes, heights, and darkness. Journal of Consulting and Clinical Psychology, 44, 83-91.

Morgan, W. P., & Ellickson, K. A. (1989). Health, anxiety, and physical exercise. In D. Hackfort & C. D. Spielberger (Eds.), Anxiety in sports: An international perspective. New York: Hemisphere Publishing.

Morgan, W., O'Conner, P., Ellickson, K., & Bradley, P. (1988). Personality structure, mood states, and performance in elite male distance runners. Journal of Sport Psychology, 10, 247-263.

Nideffer, R., & Deckner, C. (1970). A case study of improved athletic performance following use of relaxation procedures. Perceptual and Motor Skills, 30, 821-822.

Parfitt, C. G., Jones. J. G., & Hardy. L. (1990). Mutidimensional anxiety and performance. In J. G. Jones & L. Hardy (Eds.),. Stress and performance in sport (pp 43-80). West Sussex: Wiley & Sons.

Passer, M. W. (1982). Children in sport: Participation motives and psychological stress. Quest, 33, 231-244.

Passer, M. W. (1983). Fear of failure, fear of evaluation, perceived competence, and self-esteem in competitive-trait anxious children. Journal of Sport Psychology, 5, 172-188.

Pierce, W. J., & Stratton, R. K. (1981). Perceived sources of stress in youth sports participants. In G. C. Roberts & D. M. Landers (Eds.), Psychology of motor behavior and sport - 1980. Illinois: Human Kinetics.

Plaut, E. A. (1990). Psychotherapy of performance anxiety. Medical Problems of Performing Artists, 5, 58-63.

Poteet, D., & Weinberg, R. (1980). Competition trait anxiety, state anxiety, and performance. Perceptual and Motor Skills, 50, 651-654.

Prapavessis, H., Grove, J. R., NcNair, P. J., & Cable, N. T. (1992). Self-regulation training, state anxiety, and sport performance: A psychophysiological case study. The Sport Psychologist, 6, 213-229.

Purdy, D. A., Haufler, S. E., & Eitzen, D. S. (1981). Stress among child athletes: Perceptions by parents, coaches and athletes. Journal of Sport Behavior, 4, 32-44.

Raglin, J., Morgan, W., & Wise, K. (1990). Pre-competition anxiety and performance in female high school swimmers: A test of optimal function theory. International Journal of Sports Medicine, 11, 171-175.

Rainey, D. W., & Cunningham, H. (1988). Competitive trait anxiety in male and female college athletes. Research Quarterly for Exercise and Sport, 59, 244-247.

A. S. Reber, (1985). The Penguin Dictionary of Psychology. London: Penguin.

Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. Psychological Monographs, 80 (1, Whole No. 609).

Salmon, P. G. (1990). A psychological perspective on musical performance anxiety: A review of the literature. Medical Problems of Performing Artists, 5, 2-11.

Scanlan, T. K. (1977). The effects of success-failure on the perception of threat in a competitive situation. Research Quarterly, 48, 144-153.

Scanlan, T. K., & Lewthwaite, R. (1984). Social psychological aspects of competition for male youth sport participants: Predictors of competitive stress. Journal of Sport Psychology, 6, 208-226.

Scanlan, T. K., & Passer, M. W. (1977). The effects of competition trait anxiety and game win-loss on perceived threat in a natural competitive setting. In D. M. Landers & R.W. Christina (Eds.), Psychology of motor behavior and sport-1976 (pp. 157-160). Champaign, IL: Human Kinetics

Scanlan, T. K., & Passer, M. W. (1978). Factors related to competitive stress among male youth sport participants, Medicine and Science in Sports, 10, 103-108.

Scanlan, T. K., & Passer, M. W. (1979). Sources of competitive stress in young female athletes. Journal of Sport Psychology, 1, 151-159.

Scanlan, T. K., Stein, G., & Ravizza, K. (1991). An in-depth study of former elite figure skaters: 111 Sources of Stress. Journal of Sport & Exercise Psychology, 13, 103-120.

Schultz, J. H., & Luthe, W. (1959). Autogenic training: A psychophysiological approach to psychotherapy. New York: Grune and Stratton.

Schwartz, G. E., Davidson, R. J., & Goleman, D. J. (1978). Patterns of cognitive and somatic processes in the self-regulation of anxiety: Effects of meditation versus exercise. Psychosomatic Medicine, 40, 321-328.

Simon, J. A., & Martens, R. (1979). Children's anxiety in sport and nonsport evaluative activities. Journal of Sport Psychology, 1, 160-169.

Smith, R. E. (1980). A cognitive-affective approach to stress management training for athletes. In C. Nadeau, W. Halliwell. K, Newell & C. C. Roberts (Eds.), Psychology of motor behavior and sport-1979. Champaign, IL: Human Kinetics.

Selye. H. (1975). Stress without distress. New York: New American Library.

Sonstoem, R. J., & Bernardo, P. (1982). Intraindividual pregame state anxiety and basketball performance: A re-examination of the inverted-U curve. Journal of Sport Psychology, 4, 235-245.

Spence, K. W. (1958). A theory of emotionally based drive (D) and its relation to performance in simple learning situations. American Psychologist, 13, 131-141.

Spielberger, C. D. (1966). Theory and research on anxiety. In C. D. Spielberger (Ed.), Anxiety and behavior (pp. 3-20). New York: Academic Press..

Spielberger, C. D. (1989). Stress and anxiety in sports. In D. Hackfort & C. D. Spielberger (Eds.), Anxiety in sports (pp. 3-17). New York: Hemisphere Publishing.

Spielberger, C. D., Gorsuch, R. L., & Lushene, R. L. (1970). Manual for the State-Trait Anxiety Inventory. Palo Alto, CA: Consulting Psychologists.

Spielberger, C. D., Gonzalez, H. P., Taylor, C., Algaze, B., & Anton, W. D. (1978). Examination stress and test anxiety. In C. D. Spielberger & I. D. Sarason (Eds.), Stress and anxiety (Vol 5, pp. 167-191). New York: Hemisphere/Wiley.

Spielberger, C. D., & Sarason, I. G, (Eds.), (1978), Stress and anxiety. New York: Hemisphere/Wiley.

Sternbach, R. A. Principles of psychophysiology. (1986). New York: Academic Press.

Tabachnick, B. G., & Fidell, L. S. (1983). Using Multivariate Statistics. New York: Harper & Row.

Taylor, J. A. (1953). A personality scale of manifest anxiety. Journal of Abnormal and Social Psychology, 48, 285-290

Taylor, J. A. (1956). Drive theory and manifest anxiety. Psychological Bulletin, 53, 303-320.

Veroff, J. (1969). Social comparison and the development of achievement motivation. In C. P. Smith (Ed.), Achievement related motives in children (pp. 46-101). New York: Sage Foundation.

Watson, D., & Friend, R. (1969). Measurement of social-evaluative anxiety. Journal of Consulting and Clinical Psychology, 33, 448-457.

Webb, E. J., Cambell, D. T., Schwartz, R. D., & Sechrest, L. (1966). Unobtrusive measures. Nonreactive research in the social sciences. Chicago: Rand McNally.

Weinberg, R. (1989). Anxiety, arousal, and motor performance: Theory, research, and applications. In D. Hackfort & C. D. Spielberger (Eds.), Anxiety in sports: An international perspective (pp. 95-115). New York: Hemisphere Publishing.

Weinberg, R. S., & Genuchi, M. (1980). Relationship between competitive trait anxiety, state anxiety, and golf performance: A field study. Journal of Sport Psychology, 2, 148-154.

Weinberg, R. S., Seabourne, T., & Jackson, A. (1981). Effects of visuo-motor behavior rehearsal, relaxation, and imagery on karate performance. Journal of Sport Psychology, 3, 228-238.

Williams, J. M., & Krane, V. (1990). Response distortion on self-report questionnaires with female collegiate golfers. The Sport Psychologist, 3, 212-218.

-

Williams, J. M., & Krane, V. (1992). Coping styles and self-reported measures of state anxiety and self confidence. Journal of Applied Sport Psychology, 4, 134-143.

Wine, J. (1971). Test anxiety and direction of attention. Psychological Bulletin, 78, 92-104.

Yerkes, R. M., & Dodson, J. D. (1908). The relation of strength of stimulus to rapidity of habit formation. Journal of Comparative Neurology and Psychology, 18, 459-482.

Zaichkowsky, L., & Takenaka, K. (1993). Optimizing arousal level. In R. N., Singer, M. M., Murphey & L. Tennant (Eds.), Handbook of research on sport psychology (pp. 511-527). New York: Macmillan.

Zajonc, R. B. (1965). Social Facilitation. Science, 149, 269-274.

Ziegler, S. F., Klinzing, J. & Williamson, K. (1992). The effects of two stress management training programs on cardiorespiratory efficiency. Journal of Sport Psychology, 4, 280-289.

APPENDICES

Appendix A: Letter to the Manager

Dear (insert managers name),

I am writing to request your assistance with a research project I am conducting investigating psychological aspects of competitive golf. The investigation will form part of my doctoral dissertation currently being undertaken in sport psychology under the supervision of Dr. Tony Morris at Victoria University of Technology. I would like permission to recruit club members for possible participation in the study. Feedback from the golfers who have participated in the study to date has been extremely positive. Participation is on a volunteer basis and would require involvement at one or both of the following two stages.

1) Pre-screening phase - golfers will fill out four brief questionnaires which take approximately 15 minutes in total to complete. It is envisaged that potential participants would be recruited through face-to-face contact at a mutually convenient time.
2) Modified competition phase - At Latrobe Golf Club, and will take approximately one and a half hours.

Golfers will be clearly informed that participation is voluntary, and they would be free to withdraw at any stage. At the completion of the study, information relating to the results and purpose of the study will be provided to all participants. Thank you for considering this request.

Yours sincerely,

Daryl Marchant

B. App. Sci (Phys Ed), Dip. Ed, M.A.

-

Appendix B: Golf Ability - Rating Form

The following items will help determine your current playing level in specific parts of your golf game. Please answer all questions as accurately as possible.

1) My current handicap is _____

All players have their relative strengths and weaknesses. For example a player with a handicap of 15 may putt more like a 12 handicap player and drive like a 18 handicap player. We would like you to assess each part of your game in this manner.

2) I typically drive like a _____ handicap player

I typically hit my fairway woods like a _____ handicap player

I typically hit my long irons like a _____ handicap player

I typically hit my medium irons like a _____ handicap player

I typically hit my short irons like a _____ handicap player

I typically chip/pitch like a _____ handicap player

I typically play bunker shots like a _____ handicap player

I typically putt like a _____ handicap player

Appendix C: Victoria Competition Questionnaire

Directions: A number of statements that athletes have used to describe their feeling before competition are given below. Read each statement and then place a tick in the appropriate circle to the right of each number to indicate *how you usually feel* when playing sports and games. There are no right or wrong answers. Do not spend too much time on any one statement.

	Hardly Ever	Sometimes	Often
1. Competing against others is socially enjoyable.	⬭	⬭	⬭
2. Before I compete I feel uneasy.	⬭	⬭	⬭
3. Before I compete I worry about not performing well.	⬭	⬭	⬭
4. I am a good sport when I compete.	⬭	⬭	⬭
5. When I compete I worry about making mistakes.	⬭	⬭	⬭
6. Before I compete I am calm.	⬭	⬭	⬭
7. Setting a goal is important when competing.	⬭	⬭	⬭
8. Before I compete I get a queasy feeling in my stomach.	⬭	⬭	⬭
9. Just before competing I notice my heart beats faster than usual.	⬭	⬭	⬭
10. I like to compete in games that demand considerable physical energy.	⬭	⬭	⬭
11. Before I compete I feel relaxed.	⬭	⬭	⬭
12. Before I compete I am nervous.	⬭	⬭	⬭
13. Team sports are more exciting than individual sports.	⬭	⬭	⬭
14. I get nervous wanting to start the game.	⬭	⬭	⬭
15. Before I compete I usually get uptight.	⬭	⬭	⬭

Appendix D: Personal Reaction Inventory

Listed below are a number of statements concerning personal attitudes and traits. Read each item and decide whether the statement is *true* or *false* as it pertains to you personally. Circle either true or false beside each question.

1.	Before voting I thoroughly investigate the qualifications of all the candidates.	T	F
2.	I never hesitate to go out of my way to help someone in trouble.	T	F
3.	It is sometimes hard for me to go on with my work if I am not encouraged.	T	F
4.	I have never intensely disliked anyone.	T	F
5.	On occasion I have had doubts about my ability to succeed in life.	T	F
6.	I sometime feel resentful when I don't get my way.	T	F
7.	I am always careful about my manner of dress.	T	F
8.	My table manners at home are as good as when I eat out in a restaurant.	T	F
9.	If I could get into a movie without paying and be sure I was not seen I would probably do it.	T	F
10.	On a few occasions, I have given up doing something because I thought too little of my ability.	T	F
11.	I like to gossip at times.	T	F
12.	There have been times when I felt like rebelling against people in authority even thought I knew they were right.	T	F
13.	No matter who I'm talking to, I'm always a good listener.	T	F
14.	I can remember "playing sick" to get out of something.	T	F
15.	There have been occasions when I took advantage of someone.	T	F
16.	I'm always willing to admit it when I make a mistake.	T	F
17.	I always try to practice what I preach.	T	F
18.	I don't find it particularly difficult to get along with loud mouthed, obnoxious people.	T	F
19.	I sometimes try to get even rather than forgive and forget.	T	F
20.	When I don't know something I don't at all mind admitting it.	T	F
21.	I am always courteous, even to people who are disagreeable	T	F
22.	At time I have really insisted on having things my own way	T	F

-

23.	There have been occasions when I felt like smashing things.	T	F
24.	I would never think of someone else getting punished for my wrongdoings.	T	F
25.	I never resent being asked to return a favour.	T	F
26.	I have never been irked when people expressed ideas very different from my own.	T	F
27.	I never make a long trip without checking the safety of my car.	T	F
28.	There have been times when I was quite jealous of the good fortune of others	T	F
29.	I have almost never felt the urge to tell someone off.	T	F
30.	I am sometimes irritated by people who ask favours of me.	T	F
31.	I have never felt that I was punished without cause.	T	F
32.	I sometimes think when people have a misfortune they only got what they deserved.	T	F
33.	I have never deliberately said something that hurt someone's feelings.	T	F

Appendix E: Demographic Questionnaire

(please print, all information is strictly confidential)

Name: ______________________________

Age: ________

Gender: (circle) M/F

Address: ______________________________________

____

Phone No: __________________

Club (if applicable) _________________

Playing time:

On average, how many hours do you practice per week ? ______

On average, how many rounds of golf do you play per week ? ______

Agree to take further part in this study ? (circle either option 1 or 2)

Option 1)	* Participating in a modified golf competition ?	yes
Option 2)	No further part in this study	yes

* Option 1 - Requires a commitment of 60 minutes of actual golf play at Latrobe G.C. An optional follow up session explaining the purpose of the study and the application of mental skills to golf will also be offered to those choosing Option 1.

Appendix F: Victoria Self Evaluation Questionnaire

Directions: A number of statements that athletes have used to describe their feeling before competition are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate *how you feel right now* - at this moment. There are no right or wrong answers. Do not spend too much time on any one statement, but choose the answer which describes your feeling *right now*.

	Not At All	Moderately So	Somewhat	Very Much So
1. I am concerned about this competition.	1	2	3	4
2. I feel nervous.	1	2	3	4
3. I feel at ease.	1	2	3	4
4. I have self-doubts	1	2	3	4
5. I feel jittery.	1	2	3	4
6. I feel comfortable.	1	2	3	4
7. I am concerned that I may not do as well in this competition as I could.	1	2	3	4
8. My body feels tense.	1	2	3	4
9. I feel self confident.	1	2	3	4
10. I am concerned about losing.	1	2	3	4
11. I feel tense in my stomach.	1	2	3	4
12. I feel secure.	1	2	3	4
13. I am concerned about choking under pressure.	1	2	3	4
14. My body feels relaxed.	1	2	3	4
15. I'm confident I can meet the challenge	1	2	3	4
16. I'm concerned about performing poorly	1	2	3	4
17. My heart is racing.	1	2	3	4
18. I'm confident about performing well.	1	2	3	4
19. I'm concerned about reaching my goal	1	2	3	4
20. I feel my stomach sinking.	1	2	3	4
21. I feel mentally relaxed.	1	2	3	4
22. I'm concerned that others will be disappointed with my performance.	1	2	3	4
23. My hands are clammy.	1	2	3	4
24. I'm confident because I mentally picture myself reaching my goal.	1	2	3	4
25. I'm concerned I won't be able to concentrate.	1	2	3	4
26. My body feels tight.	1	2	3	4
27. I'm confident of coming through under pressure.	1	2	3	4

-

Appendix G: Match Orientation Questionnaire

Please circle the number which most accurately reflects your feelings about each of the following questions.

1. How likely do you think it is that you will win this match ?

1	2	3	4	5	6	7	8	9
Certain Loss		Likely Loss		Highly Uncertain		Likely Win		Certain Win

2. How would you rate your skill compared with that of your opponent ?

1	2	3	4	5	6	7	8	9
Highly Inferior		Somewhat Inferior		Skill Level Equal		Somewhat Superior		Highly Superior

3. How well are you performing in this match ?

1	2	3	4	5	6	7	8	9
Very Poorly		Poorly		Moderately		Well		Very Well

4. How important is winning the golf shoes ?

1	2	3	4	5	6	7	8	9
Not Important		Somewhat Important		Important		Very Important		Extremely Important

5. How important is the next round of eight shots ?

1	2	3	4	5	6	7	8	9
Not Important		Somewhat Important		Important		Very Important		Extremely Important

6. How important is performing well in this match to you ?

1	2	3	4	5	6	7	8	9
Not Important		Somewhat Important		Important		Very Important		Extremely Important

-

Appendix H: MOQ Factor Loadings for Experimental Data

Match Orientation Questionnaire (MOQ): Rotated Factor Loadings For All Experimental Data

	Factors	
Item	1	2
Perceived Uncertainty		
Likelihood of Winning	-.07	.84
Skill Comparison	.006	.68
Predicted Performance	-.27	.67
Perceived Importance		
Importance of Competition	.84	-.06
Performing well	.89	-.14
Importance of next round	.81	-.16
Reward for winning	.78	-.06
Percent of variance explained	44.00	20.30
Eigenvalue	3.07	1.42

Appendix I: Letter to the Player

Dear (Insert player name),

Thank you for expressing your interest in my research relating to psychological preparation in competitive golf. The modified competition phase of the study will take place in the over the next three to four months at Latrobe Golf Club. Please fill in the attached form indicating which times of the week you are normally available during this period and return it as soon as possible using the provided self addressed and stamped envelope. You will then be contacted by phone to set up a suitable time and day for participation. Obviously, the more time slots you indicate the easier it is for me to schedule your participation.

On the day of competition you will be playing for a small golf merchandise prize in a match play format by taking 32 shots in total. You will need to bring your golf clubs and wear suitable golf attire (i.e., no jeans). The competition will take approximately one hour. The results of your participation will be provided by mail at the completion of the study.

A number of seminars will be arranged which you are welcome to attend (free of charge), where sport psychology theories and techniques will be discussed in relation to golf. You will be notified of these seminar dates and given further information at Latrobe Golf Club on the day of your participation regarding these seminars.

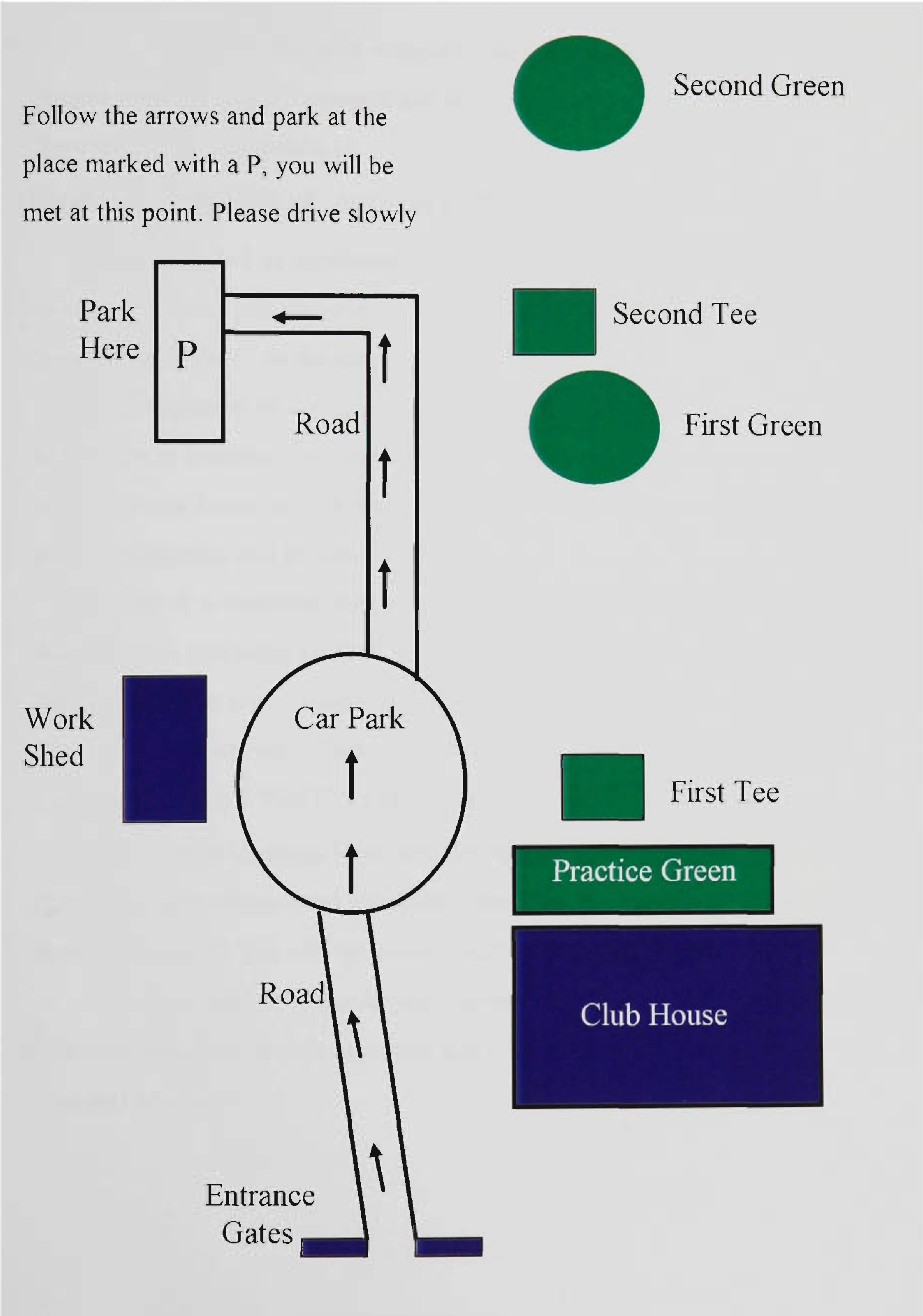
Further inquiries can be directed to me by phone on 018-996795 or 761-0357 (H). Thank you for your cooperation, it is greatly appreciated

Yours sincerely

Daryl Marchant
B. App. Sci (Phys Ed), Dip. Ed, M.A.

Appendix J: Latrobe Golf Club

Farm Street, Alphington (Melways Map 31, Reference D12)



Appendix K: Reminder letter to the player

Dear (Insert name),

Just a brief reminder note confirming your participation in the second stage of my PhD research and some additional information.
Your time for participation is:

Sunday the 9th of January at 2.00 pm

I have included an additional copy of the internal map of Latrobe Golf Club to assist you once you arrive at the club. You will be met at the designated place (marked "park here" on the map).

If it happens to be a very poor day from a weather perspective, I will ring you in advance to postpone your participation. If by chance it starts raining just prior to you leaving home or work and you have not been contacted, ring me to ensure your participation will proceed as planned.

Finally, it is important that you are punctual as others golfers participation is dependent on you being on time. If you are unable to participate on the designated day it is vital that you contact me as early as possible so that I can arrange an alternative time and alert other participants of the change in plans. I can be contacted on, 018 - 996795 (M) or 761-0357 (H).

A number of seminars have been arranged which you are welcome to attend (free of charge), where sport psychology theories and techniques will be discussed in relation to golf. You will be given specific information regarding.

Those who have participated in the study to date have found it to be relatively straight forward, enjoyable and rewarding, thank you again for your time and interest.

Yours sincerely,

Daryl Marchant

B. App. Sci (Phy Ed), Dip. Ed, M.A.

Appendix L: Preferred Times Checklist

Name: ______________________________

Club: ______________________________

Place a tick next to the times which you are expect to be available in the month of July (Please note as yet there are no specific dates, you will be contacted by phone to arrange a mutually convenient time and date for your participation). Please tick as many times as possible (this makes it easier to find a suitable time). Place completed form in the pre-stamped/addressed envelope and post.

Mon 8.00 - 9.00 am	____	Tue 8.00 - 9.00 am	____	Wed 8.00 - 9.00 am	____
Mon 9.30 - 10.30 am	____	Tue 9.30 - 10.30 am	____	Wed 9.30 - 10.30 am	____
Mon 11.00 - 12.00 am	____	Tue 11.00 - 12.00 am	____	Wed 11.00 - 12.00 am	____
Mon 12.30 - 1.30 pm	____	Tue 12.30 - 1.30 pm	____	Wed 12.30 - 1.30 pm	____
Mon 2.00 - 3.00 pm	____	Tue 2.00 - 3.00 pm	____	Wed 2.00 - 3.00 pm	____
Mon 3.30 - 4.30 pm	____	Tue 3.30 - 4.30 pm	____	Wed 3.30 - 4.30 pm	____
Mon 5.00 - 6.00 pm	____	Tue 5.00 - 6.00 pm	____	Wed 5.00 - 6.00 pm	____

Thur 8.00 - 9.00 am	____	Fri 8.00 - 9.00 am	____		
Thur 9.30 - 10.30 am	____	Fri 9.30 - 10.30 am	____		
Thur 11.00 - 12.00 am	____	Fri 11.00 - 12.00 am	____		
Thur 12.30 - 1.30 pm	____	Fri 12.30 - 1.30 pm	____	Sat 12.30 - 1.30 pm	____
Thur 2.00 - 3.00 pm	____	Fri 2.00 - 3.00 pm	____	Sat 2.00 - 3.00 pm	____
Thur 3.30 - 4.30 pm	____	Fri 3.30 - 4.30 pm	____	Sat 3.30 - 4.30 pm	____
Thur 5.00 - 6.00 pm	____	Fri 5.00 - 6.00 pm	____	Sat 5.00 - 6.00 pm	____

Sun 12.30 - 1.30 pm	____
Sun 2.00 - 3.00 pm	____
Sun 3.30 - 4.30 pm	____
Sun 5.00 - 6.00 pm	____

Appendix M: Consent Form

Nature of the Study

We are interested in your feelings and reactions to a number of competitive situations in golf. To study these feelings in detail we would like you to take part in a modified golf chipping competition. You will be required to compete against another golfer in a match play format. You will only be required to take part on one day of competition which will take an average of sixty minutes. Prior to and during the competition you will be asked to fill in a number of short straightforward questionnaires, about your thoughts and feelings. Your responses to these questionnaires will be kept totally confidential. You are free to withdraw from the study at any time. You are also encouraged to ask questions at any time if you have any queries.

Informed Consent

I acknowledge that the research procedures have been explained to me

I acknowledge that I have been given the chance to ask questions.

I acknowledge that I may ask further questions at any time

I understand that my results will be confidential

I understand that I am free to withdraw at any time

Signed .... Date ....

-

Appendix N: Revised Match Orientation Questionnaire

Please circle the number which most accurately reflects your feelings about each of the following questions.

1. How certain are you that you can match your opponents performance in this competition ?

1	2	3	4	5	6	7	8	9
Certain Loss		Likely Loss		Highly Uncertain		Likely Win		Certain Win

2. How would you rate your skill compared with that of your opponent ?

1	2	3	4	5	6	7	8	9
Highly Inferior		Somewhat Inferior		Skill Level Equal		Somewhat Superior		Highly Superior

3. How certain are you that you will perform to the best of your ability in this match ?

1	2	3	4	5	6	7	8	9
Very Poorly		Poorly		Moderately		Well		Very Well

4. How certain are you that a good performance in this competition will not be affected by external factors (e.g., weather conditions, playing surface, officials, equipment or chance occurrences) ?

1	2	3	4	5	6	7	8	9
Very Poorly		Poorly		Moderately		Well		Very Well

5. How important is winning the golf shoes ?

1	2	3	4	5	6	7	8	9
Not Important		Somewhat Important		Important		Very Important		Extremely Important

6. How important is the next round of eight shots ?

1	2	3	4	5	6	7	8	9
Not Important		Somewhat Important		Important		Very Important		Extremely Important

7. How important is performing well in this match to you ?

1	2	3	4	5	6	7	8	9
Not Important		Somewhat Important		Important		Very Important		Extremely Important

8. How important is winning this match to you ?

1	2	3	4	5	6	7	8	9
Not Important		Somewhat Important		Important		Very Important		Extremely Important