

INVESTIGATING THE USE OF CHOKING INTERVENTION STRATEGIES WITH  
CHOKING-SUSCEPTIBLE ATHLETES

By

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## STUDENT DECLARATION

“I, Christopher Mesagno, declare that the PhD thesis entitled ‘Investigating the Use of Choking Intervention Strategies with Choking-Susceptible Athletes’ is no more than 100,000 words in length, exclusive of tables, figures, appendices, references, and footnotes. This thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma. Except where otherwise indicated, this thesis is my own work.”

Signature\_\_\_\_\_ Date\_\_\_\_\_

## ABSTRACT

Based on recently proposed definitions (e.g., Hall, 2004; Wang 2002), choking is defined as a critical deterioration in the execution of habitual processes as a result of an elevation in anxiety levels under perceived pressure. The self-focus model of choking (Baumeister, 1984; Beilock & Carr, 2001; Masters, 1992), distraction model of choking (Nideffer, 1992), and recently an integrated model of choking (Wang, 2002) have been proposed to explain choking. Predictors of choking are also relevant in terms of identifying choking-susceptible athletes. Thus, applied sport psychology techniques are important for assisting athletes in countering choking effects. The three interconnected studies in this dissertation were designed to further develop applied sport psychology techniques to predict and alleviate choking.

The primary purpose of Study 1 was to investigate whether choking and non-choking behaviour can be predicted using a battery of psychological inventories. Forty-six experienced netball players completed three psychological inventories and categorised as either choking-susceptible (CS) or choking-resistant (CR). Eight purposively sampled participants then completed a total of 180 netball shots each in a series of single-case A<sub>1</sub>-B-A<sub>2</sub> designs, with the B phase as “high-pressure” and the A phases as “low-pressure”. Participants were interviewed upon completion of the netball shooting to investigate cognitions related to choking and non-choking behaviour.

Results from Study 1 indicated that established psychological inventories, measuring trait anxiety (A-trait), self-consciousness (S-C), and coping styles, were accurate predictors of non-choking behaviour with the 4 CR athletes. The psychological inventories, however, were less accurate predictors of choking behaviour with the 4 CS athletes (predicting two out of four instances of choking). The 50% success rate is perhaps

understandable given that even highly CS athletes are likely to experience choking infrequently.

Using inductive content analysis, each participant's interview was analysed individually and a cross-case analysis was also included for the CS participants. The interview results indicated that the 2 CS participants who performed poorly under pressure used approach coping strategies, such as information seeking, to manage the pressure situation. Conversely, CR participants typically used avoidance coping strategies, such as blocking out the audience/camera, to cope with the pressure. Overall, the interview results corroborated the findings that the manipulated "high-pressure" in the B phase resulted in increases in state anxiety (A-state). Furthermore, the interview added valuable detail about how participants responded in the A<sub>1</sub>-B-A<sub>2</sub> phases that generally fitted with the responses from the initial battery of questionnaires. A key finding in Study 1 was that all participants differed substantially in their capacity to absorb competitive pressure and similarly their coping repertoire ranged greatly.

Drawing on principles of Nideffer's (1992) distraction model and the qualitative results of Study 1, as foundations, Study 2 was designed to investigate whether a pre-shot routine (PSR) reduced choking effects. Five CS participants were purposively sampled (using the same inventories and selection criteria as Study 1), from 87 participants, to complete ten-pin bowling deliveries in a single-case A<sub>1</sub>-B<sub>1</sub>-A<sub>2</sub>-B<sub>2</sub> design with the A phases as "low-pressure," and the B phases as "high-pressure." Five experienced tenpin bowlers completed at least 180 ten-pin bowling deliveries in a single-case A<sub>1</sub>-B<sub>1</sub>-A<sub>2</sub>-B<sub>2</sub> design with the A phases as "low-pressure," and the B phases as "high-pressure." Three of these participants completed an additional 60 deliveries (totalling 240 deliveries) because they experienced a decrease in performance (i.e., experienced choking) in the B<sub>1</sub> phase

and were instructed to use the planned intervention (i.e., the PSR) prior to the B<sub>2</sub> phase. The 3 participants that utilised the PSR improved accuracy in the B<sub>2</sub> phase. The interviews, conducted after the 240 deliveries, indicated that choking effects were partially due to an increase in S-A and, in this regard, were similar to the results of Study 1. An increase in S-A coincided with increases in distraction or conscious processing of execution, and thus, provided qualitative support for both the self-focus model and the distraction model of choking. Participants also explained that performance improvements were a result of the PSR minimising S-A during the B<sub>2</sub> phase. The reduction in S-A permitted other positive psychological outcomes to occur, including a decrease in the perception of pressure, decreased negative self-talk, increased concentration, and increased confidence. Thus, the PSR produced adaptive and relevant, task-focused attention.

In Study 3, music was used as a dual-task intervention under pressure. Similar to Studies 1 and 2, I also re-examined cognitive processes and perceptions of pressure using in-depth interviews. Five purposively sampled CS participants (with selection criteria similar to those used in Studies 1 and 2), from 41 screened basketball players, performed basketball free throws in a single-case A<sub>1</sub>-B<sub>1</sub>-A<sub>2</sub>-B<sub>2</sub> design similar to Study 2. Three participants showed evidence of choking by decreasing performance during the B<sub>1</sub> phase. These participants were then instructed to listen to the lyrics of a song as an intervention prior to and during the B<sub>2</sub> phase. These 3 participants either maintained or improved performance in the B<sub>2</sub> phase. Similar to the qualitative results of Studies 1 and 2, participants explained that choking resulted from attention to the audience. Using the music intervention, in the B<sub>2</sub> phase, resulted in decreased S-A, enabling participants to decrease explicit monitoring of execution and reducing general distractibility. The results

of Study 3 extended the findings of Study 2 by identifying that specific interventions could facilitate performance or ameliorate choking. Based on the results of the three interconnected studies, and previous choking research, choking processes are relatively complex, and differ based on personality characteristics and coping strategies employed. Implications for theory, practitioners and future research on choking are also discussed.

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## CHAPTER 1

### INTRODUCTION

With lucrative contracts, sponsorship arrangements, and high expectations from the public and media, many athletes experience pressure to perform in sport. From sinking a tournament winning two-foot putt in golf to making the game winning shot in basketball, sporting competitions are replete with pressure, sometimes causing athletes to experience detrimental performance effects. Researchers (e.g., Baumeister, 1984; Masters, 1992) have shown that heightened pressure can negatively affect performance. Pressure may also result in behavioural and attentional changes whereby athletes can sometimes experience the embarrassing and uncomfortable phenomenon often referred to as “choking under pressure.”

In dissecting the phrase “choking under pressure,” Wallace, Baumeister, and Vohs (2005) explained,

The choking part of the term “choking under pressure” simply refers to underachievement. Individuals can be said to have choked when their performance under high pressure is inferior to their performance under low pressure. In other words, choking implies a negative change in performance (under high pressure). (p. 430-431)

In sport, choking is limited to high-pressure situations, therefore, using the full phrase “choking under pressure” is superfluous. To this end, throughout this dissertation, I have referred to “choking under pressure” simply as choking.

The popular press often classifies athletes as “chokers” based on observable performance decrements under pressure. Examples of professional athletes who, according to the popular press, have succumbed to choking and been labelled “chokers” include,

professional golfers Greg Norman (1996 U.S. Masters) and Jean Van de Velde (1999 British Open) and tennis player Jana Novotna (1993 Wimbledon final). In each event, a commanding lead diminished rapidly and the athlete lost the tournament unexpectedly. In fact, according to Clarkson (1999), a journalist, “Australian professional golfer Greg Norman has lost so many leads in major tournaments that to ‘choke’ in golf has been labelled as ‘pulling a Norman’” (p. 203-204).

Literally hundreds of newspaper headlines have used the term choking (or “choke”) to report instances where well-known athletes are perceived to have performed poorly under pressure. “Rafter goes for broke after last year’s final choke” (Pearce, 2001), “Final no choke for Russian” (Pearce, 1999), “Indians hit choker tag” (Indians hit choker tag, 2002), and “Choker to free-throw hero” (Howell, 2001) are only a few examples of the “media hype” related to the choking label. Victoria Titans’ (Australian National Basketball League team) coach Brian Goorjian illustrated the apprehension athletes experience when being labelled a “choker”, “To be branded a ‘choker’ in professional sport cuts deep, and, as far as I am concerned, it is as bad as being labelled a quitter. Neither are descriptions a sportsman wants” (Goorjian, 2002, p. 28). Goorjian’s quote indicated that public perception may be important to athletes and being perceived with a negative public image, such as “choker” or “quitter”, is detrimental to an athlete’s psychological state. Nevertheless, the media directs considerable attention to choking, and has substantial influence over public perceptions and athletes’ experiences of choking.

In Australia particularly, journalists frequently speculate that athletes have experienced choking based on inference, rather than a clear understanding of the phenomenon. The media’s misunderstanding of choking could possibly stem from the difficulty in clearly defining choking. Even researchers have not yet universally agreed on

an operational definition of choking. For example, Daniel (1981), Baumeister (1984), Nideffer (1992), Wang (2002) and Hall (2004) have all proposed definitions of choking, with each appearing to be limited in scope. I have formulated my own definition based on aspects of Hall's and Wang's definition, which states that choking is a critical deterioration in the execution of habitual processes as a result of an elevation in anxiety levels under perceived pressure. In seeking to better understand choking, researchers have developed a number of explanatory models (see Chapter 2) to help us more fully comprehend the mechanisms involved in choking.

There is much to be learned and various problems that still need to be resolved in choking research. For example, limited attention has been devoted to testing interventions to alleviate choking. The results of the present research should assist applied sport psychologists in consulting with athletes who experience choking. If athletes can be trained to be more resistant to choking, they may likely perform in accordance with their ability in pressure situations.

### Aims of the Dissertation

#### *General Aims*

The present dissertation was designed to further extend choking research by examining the extent to which psychological inventories predict non-choking and choking behaviour. Furthermore, on the basis of qualitative experiences of choking and extant theory, two interventions were tested as a means of alleviating choking.

#### *Specific Aims*

1. To examine whether psychological inventories can successfully predict non-choking and choking behaviour (Study 1)

2. To test a pre-shot routine as an intervention designed to alleviate choking in CS athletes (Study 2).

3. To test attentiveness to the words of background music as an intervention alleviate choking in CS athletes (Study 3).

4. In all three studies (Studies 1, 2, and 3), an additional aim was to investigate cognitive strategies and perceptions related to “choking-resistant” (CR) and “choking-susceptible” (CS) athletes, using qualitative methods.

### Chapter Organisation

Each chapter commences with an identified objective and a brief synopsis. In Chapter 1, I introduce choking, media attention is summarised, and general and specific aims are discussed. In Chapter 2, I provide a review of literature including a detailed summary of choking definitions. Also in Chapter 2, fundamental constructs, models, predictors, and potential interventions are reviewed. Chapters 3 – 5 are presented as independent, but interconnected studies with a focus on testing specific research hypotheses. Chapter 3 is focused on predicting choking and non-choking behaviour with CS and CR athletes, respectively. Qualitative research is also used to supplement the empirical and quantifiable data. In Chapter 4, I test whether a pre-shot routine is a potential choking intervention for CS athletes. In Chapter 5, I test whether music can be a potentially viable choking intervention for CS athletes. Chapter 6 is used to summarise and link the interrelated studies, whereby implications for theory, implications for practitioners, and future research directions are discussed.

## CHAPTER 2

### REVIEW OF LITERATURE

The experience of choking can be humiliating to elite athletes who may be labelled as “chronic chokers” (athletes that “choke” repeatedly). Athletes who are unable to perform under pressure may subsequently experience increased social anxiety and diminished enjoyment. Although choking is widely recognised by sport psychologists, the prevalence rates are unknown. Only over the past two decades has an increasing number of sport psychologists and social psychologists investigated issues related to choking in sport (e.g., Baumeister, 1984; Beilock, Bertenthal, McCoy, & Carr, 2004; Beilock & Carr, 2001; Beilock, Carr, MacMahon, & Starkes, 2002; Butler & Baumeister, 1998; Drinan, Williams, Marchant, & Wang, 2000; Hall, 2004; Hardy, Mullen, & Jones, 1996; Heaton & Sigall, 1989, 1991; Leith, 1988; Lewis & Linder, 1997; Masters, 1992; Wang, Marchant, & Morris, 2004; Wang, Marchant, Morris, & Gibbs, 2004). Although these studies have advanced the understanding of choking, unresolved issues still remain. Some researchers have investigated the underlying mechanisms of and personality traits associated with choking, however, interventions designed to alleviate choking have not been widely tested. Hall found a broad array of interventions being used by renowned researchers, and surprisingly, few of the interviewees related their suggested interventions to evidence-based research support.

Research developments on the antecedents of choking have progressed considerably in recent years. A number of hypotheses relating to the mechanisms of choking have been researched, however, different perspectives limit the generalisability of the findings. For example, researchers (e.g., Baumeister 1984; Nideffer, 1992) argue that choking is essentially an attention-related problem. Baumeister and Nideffer, however, have provided

different attention-related pathways in explaining the process of choking. Baumeister suggested that choking is a cognitive, information-processing problem, mediated by self-consciousness, whereas Nideffer suggested that choking is a cognitive distraction problem exacerbated by task-irrelevant information, such as internal (e.g., self-talk) or external (e.g., environmental) factors. Masters (1992) postulated that choking occurs because of heightened pressure, whereas some researchers would contend a recent qualitative investigation by Drinan et al. (2000) posited that choking results from combined of both attention and anxiety. The relative paucity of choking research has prolonged the debate regarding the causes of choking for more than 20 years. As early as 1986, Baumeister and Showers explained, “The development of therapeutic techniques for ameliorating choking must wait until this debate [what causes choking] is resolved” (p. 377). As will be discussed in detail, Baumeister’s automatic execution hypothesis has gained greater support than Nideffer’s distraction hypothesis in terms of explaining the causes of choking. Wang (2002), however, has discussed how integrating Baumeister’s automatic execution hypothesis and Nideffer’s distraction hypothesis into a combined model of choking is viable.

This chapter will first provide a general background regarding choking definitions along with a discussion of perceptions of choking. A number of definitions have been proposed (e.g., Baumeister, 1984; Daniel, 1981; Hall, 2004; Nideffer, 1992; Wang, 2002), however, debate continues about each definition’s acceptability. Next, a general background regarding attention and anxiety will be presented to explain their role in choking. A discussion will then follow, examining predictors of choking, underlying mechanisms of choking, and potential choking interventions. These factors are central to choking and will provide an explanation of how dispositional and situational factors, as



well as choking models, may help researchers and sport psychologists develop efficacious choking interventions.

### Conceptualisations of Choking

Current conceptions of choking can be categorised into explicit definitions and perspectives on choking. Although contemporary perspectives are important, operational and universal definitions are necessary to advance choking research. Researchers are not unanimous in defining choking.

#### *Existing Definitions*

Over the past 20 years, researchers have made serious attempts to understand choking, in part, by proposing three definitions, but no definition is universally accepted. Daniel (1981) perceived choking as “the inability to perform up to previously exhibited standards” (p. 70). Although a respectable initial definition, given the minimal choking research conducted at that time, there are many reasons why athletes may not perform to previous standards apart from choking (e.g., poor concentration, lack of interest, or injury). Weinberg and Gould (2003) stated that, although choking is usually linked with suboptimal performance, poor performance does not necessarily indicate choking. Another limitation of Daniel’s definition is that anxiety is not included as a contributing factor. Daniel’s definition is most notable for being the first proposed definition of choking, but has not been widely adopted in subsequent research.

The most widely used definition, proposed by Baumeister (1984), is simply “performance decrements under pressure circumstances” (p. 610), with pressure being “any factor or combination of factors that increases the importance of performing well on a particular occasion” (p. 610). Unlike Daniel (1981), Baumeister’s definition includes pressure, however, two potential limitations are a) the quantity of performance decrement

is not stated and b) no differentiation in skill level is proposed, thus all athletes whether elite or recreational are treated the same. Operationally defining the amount of decrement required for choking to have occurred may be important for researchers. For example, using a phrase such as a considerable decrease in performance in comparison to previous self-standards may suffice. Thus, Baumeister's definition, although an improvement on Daniel's definition, is still somewhat limited.

A third definition posited, by Nideffer (1992), is that "choking is an altered state of consciousness" (p. 16). According to Nideffer, perceived pressure leads to an alteration in normal state of consciousness, represented when an athlete maintains a performance focus. Choking occurs when a normal state of consciousness is interrupted and "attention becomes so focused on internal cues (thoughts and feelings) that you cannot attend to external task-relevant cues" (Nideffer, p.128). Nideffer suggested that choking constitutes a process whereby a task-irrelevant focus is the basis of performance decrements. A shift of attention from task-relevant cues (i.e., hitting a target) to task-irrelevant cues (e.g., worry, feelings about anxiety) may result in performance decrements. Two main deficiencies in Nideffer's definition, however, are that an increase in anxiety and a performance decrement are not explicitly included in the definition.

#### *Recently Proposed Definitions*

Two definitions have been proposed to help resolve inadequacies of previous choking definitions. Wang (2002) identified choking as "deterioration in the execution of habitual processes of performance under pressure" (p. 141). Wang's definition incorporates three potential elements that relate to choking (e.g., importance of the situation or pressure, performance decrement, and automatic skill execution). As will be described in detail later, Wang's definition is somewhat at odds with Baumeister and

Showers (1986) position that choking occurs at any skill level. Wang's definition implies that choking only occurs in athletes who have achieved a level of "execution of habitual processes", whereas Baumeister and Showers suggested novices might also experience choking. Wang's definition is the first to incorporate the three potential factors represented when choking occurs.

In a recent investigation, Hall (2004) critically examined the existing definitions of choking by interviewing researchers who had investigated choking with a view to establishing a more adequate operational definition. Hall conducted 13 interviews with choking researchers, all of whom had published in peer review journals, to critically examine the three existing definitions (i.e., Baumeister, 1984; Daniel, 1981; Nideffer, 1992) and to ascertain researchers' perspectives about an adequate definition of choking. Hall suggested current definitions were unpopular among researchers and constructed an alternative explaining choking as an elevation in anxiety and arousal levels under perceived pressure, leading to a critical deterioration in skilled performance. Two main problems with this definition are that anxiety is presented first and attention is not included. First, if anxiety causes choking, and choking is an increase in anxiety, then this suggests anxiety is anxiety, which then becomes circular and tautological (R. F. Baumeister, personal communication, June 2006). Second, the definition by Hall does not include a reference about attention being disrupted. Therefore, I have formulated a definition, based on aspects of Hall's and Wang's separate definitions, in which choking is a critical deterioration in the execution of habitual processes as a result of an elevation in anxiety levels under perceived pressure. This definition incorporates the essential elements of choking (i.e., perceived pressure, decline in performance, and diversion of attention) and identifies possible reasons (i.e., increased anxiety) for the decline in performance.

*Perspectives on Choking*

Despite progress toward a better understanding of choking, uncertainty still exists about what exactly constitutes a “choke” (Nideffer & Sagal, 2001; Weinberg & Gould, 2003). Baumeister and Showers (1986) explained that a number of conditions must be present before the choking “label” is justified. First, there must be reasonable evidence that the person could have performed better. For example, it is difficult to interpret when novices experience choking because performance decrements may be due to insufficient skill level. Second, the performer must be motivated to perform well under the circumstances. If performance is not important to the athlete, choking cannot be attributed clearly. If an athlete lacks motivation to succeed, the likelihood of experiencing pressure is reduced, thus reducing the likelihood of choking. Baumeister and Showers suggested that, as long as maximum performance is the goal, choking might occur. This statement may imply that choking can not occur during practice because skill acquisition and learning is usually the central purpose. Choking may, however, be evident if, for example, impressing the coach generates feelings of anxiety and importance. Motivation to impress the coach may produce feelings of pressure or may be exacerbated by self-consciousness. Third, choking may occur among performers at any level of skill. Some investigators (e.g., Baumeister & Showers; Beilock et al., 2002) have proposed that choking occurs at any skill level, but other researchers (e.g., Masters, 1992; Wang, 2002) have maintained that choking can only occur among skilled performers. Although the debate over what skill level is required for athletes to experience choking has not been discussed in published research articles, differences of opinion were expressed in Hall’s (2004) interview study. The general consensus of researchers was that choking might occur for novices, but only

when performance is relatively consistent so that unpredictable execution is not the reason of poor performance.

Excessive use of the term “choker”, when labelling athletes, may become a self-fulfilling prophecy. Leith (1988) conducted a study involving the effects of coaching behaviours on choking. Leith randomly assigned 80 undergraduate students equally into four groups to identify whether a brief talk about “choking” would elicit a choking effect. Using a Solomon-Four design, the experimental conditions were arranged as follows: Group 1 performed 25 pre-test basketball free throws, listened to a brief talk about choking and then performed 25 post-test free throws, Group 2 received the pre-test and post-test only, Group 3 received no pre-test, listened to the brief talk and then received the post-test, and Group 4 received only the post-test (Leith). Results indicated that negative performance occurred when the brief talk about choking was used. The Solomon four-group design is underused in research (Walton-Braver & Braver, 1988), however, it allows for examination of treatment effects, both with and without a pre-test. In this way, the potential reactivity of the pre-test could be determined, as would be evident if analysis with and without the pre-test differed. It also allows for any sensitising effect because of the pre-treatment measure to be detected.

Some perspectives of choking extend beyond mere psychological explanations and include physiological aspects of human movement. For example, the ‘yips’ is similar to choking in that poor performance under pressure occurs. The ‘yips’ is defined as a jerk, tremor, or freezing in the distal upper extremity that interrupts the putting stroke (Smith et al., 2000) and, although usually associated with golf, may be evident in cricket and darts (Bawden & Maynard, 2001). Smith et al. (2003) described the ‘yips’ as “a motor phenomenon of involuntary movements affecting golfers, with multiple possible

aetiologies, spanning a continuum from the neurological disorder of dystonia to the psychologic disorder of choking” (p. 14). Apparently, ‘yips’ behaviour is experienced when anxiety and arousal surpass a threshold, thus, as anxiety increases, the probability of ‘yips’ symptoms occurring intensifies. To date, however, causes of the involuntary movements are not fully understood. Based on the existing research related to the ‘yips’, Smith et al. (2000, 2003) concluded that the ‘yips’ generally affects experienced, middle-aged (aged 45 to 55) golfers on short putts (i.e., usually 1 to 5 ft from the cup) during tournaments.

Although psychological factors (e.g., increased anxiety and arousal) have been linked to the incidence of ‘yips’ behaviour, physiological factors have also been identified. For example, dystonia is a neurological disorder characterised by involuntary movements resulting in spasms, twisting, and posturing of a body part (Smith et al., 2003) and is strongly implicated in the ‘yips.’ Smith et al. (2000, 2003) deduced that performance anxiety is a common factor that affects the likelihood of choking or dystonia, increasing the probability of ‘yips’ behaviour. After extensive discussion about the ‘yips’, Smith et al. (2003) explained that the ‘yips’ could be differentiated into two categories: Type I (dystonia; a neurological disorder) and Type II (choking; a psychological phenomenon). To date, no research has examined whether causes of choking (e.g., anxiety and attention) are related to performance decrements in ‘yips’-affected individuals. Further investigations are necessary to fully understand the mechanism of ‘yips’ behaviour and to test Smith et al.’s proposed Type I, Type II differentiation.

#### Constructs Related to Choking

Research to date has been focused on either the attention component of choking or the anxiety component of choking, however, recently Drinan et al. (2000) asserted that

choking is a combined attention and anxiety problem, involving both a debilitating effect of anxiety and improper allocation of attention. Further research is necessary to investigate the sequence in which attention and anxiety occur, because ambiguity exists regarding whether anxiety and attention act concomitantly or whether one precedes and affects the other. An evaluation of both attention and anxiety is necessary to completely understand the antecedents of choking.

### *Attention and Choking*

A range of features contributes to the composition of attention. One characteristic is that attention is a limited capacity or resource (Kahneman, 1973). Attention limitations are the result of restricted resources available to complete information-processing demands. Attending to multiple tasks at one time decreases attention capacity, which limits the number of skills that can be performed together. Thus, when demands of information exceed attentional capacity, performance on one or multiple tasks may suffer. Features that may occupy attentional space may be emotional (e.g., arousal, anxiety, or worry), environmental (e.g., crowd noise or watching an opponent) or skill-specific (e.g., body mechanics or selective visual attention toward a target). If the majority of attentional resources are dedicated to processing one particular set of information, fewer resources are available to process other data (Kahneman). Similarly, when attention is allocated to irrelevant information (e.g., negative thoughts or worry) less attentional space is available to process relevant information (e.g., a defender's moves or whether a ball hits a target).

The proportion of available attentional capacity may be dependent on how well the skill is learned. Generally, newly acquired tasks are simultaneously performed less accurately with other tasks than well-learned tasks, because novel skills require greater attention to complete correctly. Conscious thought toward skill mechanics is important

when acquiring a new skill, yet limits attentional capacity to perform other tasks simultaneously. As the new skill is continually practiced, a progression to automatic processes occurs that require less attentional capacity or resources (Shiffrin & Schneider, 1977). Increases in skill level release attentional space due to movement automaticity and permit an increase in attention to other information. For example, when learning how to drive a car, beginners attend to the micro processes of driving (e.g., hand-over-hand turning, executing pedal actions, steering) that consume available attentional space. As learning and automaticity is achieved, less attention is needed for driving operations and attentional resources for processing other information (e.g., other traffic, changing the radio station, talking to a passenger) are liberated.

In addition to being a limited resource, another feature of attention is selectivity. As Abernethy (2001) pointed out, “selective attention is the general term used to describe this process by which certain information is preferentially selected for detailed processing while other information is ignored” (p. 67). Athletes are required to select where mental effort (i.e., amount of mental resources allocated to task demands [Paas, van Meeriënboer, & Adams, 1994]) is focused in order to process relevant information. Selective attention involves two major factors: the ability to focus attention without being overloaded or distracted and the ability to direct that focus to the most important stimuli for successfully performing the task (Summers & Ford, 1995). Overloading and distracting information are constantly present in sport and pertain to environmental, emotional, or information-processing sources. An example of a combination of these factors is when an athlete is anxious and also processing skill-execution information. The two information sources compete for attentional space and may overload attentional capacity. Selecting relevant



information, especially in open-skilled sports, such as football codes or racquet sports, where the environment is constantly changing, is a key performance determinant.

Although various attention theories have been proposed, Kahneman's (1973) central resource theory is relevant to choking, in part, because of the inclusion of arousal. Duffy (1962) defined arousal as "the extent of release of potential energy, stored in the tissues of the organism, as this is shown in activity or response" (p. 179). Arousal is the natural activity of one's physiology ranging from deep sleep to extreme excitement (Malmö, 1959), and reflects fluctuating degrees of physical and emotional readiness. Increases or decreases in arousal may be activated by internal, cognitive thoughts or external, environment factors and may differentially affect performance (Zaichkowsky & Baltzell, 2001).

According to Kahneman (1973), there is a central (within the nervous system), flexible pool of resources for which all activities compete and problems in attention occur because of the limited amount of processing capacity that can be allocated. Attention capacity is, therefore, subdivided to various tasks and several conditions affect the individual's allocation policy (i.e., where attention is assigned). The first condition is that the available attention capacity is flexible, depending on the individual's arousal level. That is, the amount of attentional resources available may increase or decrease depending on arousal levels. According to Kahneman's attention model, additional attentional capacity is typically available with moderate levels of arousal. The second factor determining adequate attentional capacity is attention requirements of the task. Evaluation of task demands and estimation of task difficulty are necessary to determine appropriate attention allocation. Notably, variations of attention demands cause corresponding variations of arousal, but variations of arousal also affect the policy by which attention is

allocated to different activities (Kahneman). For example, if high task difficulty is perceived, arousal may increase due to cognitive appraisal of the difficult task. Increases in level of arousal lead to a reduction in attention capacity, which may affect the likelihood of successful performance. Moderate arousal levels increase the range of attentional cues available, whereas low and high levels of arousal restrict the range of cues a person uses in the guidance of action (Easterbrook, 1959). Finally, three features influence the distribution of attention: allocation of attention according to enduring predispositions, allocation of attention to ensure completion of the activity, and allocation of attention to a person's momentary intentions. Among these allocation factors, the aspect closely associated with choking is the allocation of attention to enduring predispositions. Attentional predispositions are personality characteristics that naturally attract our attention and may be involuntary and potentially attention demanding. Athletes under pressure may unconsciously allocate attention toward general predispositions (e.g., self-consciousness and anxiety) that researchers suggest can negatively affect performance (Baumeister, 1984; Masters, 1992). Thus, Kahneman's model of attention is relevant to choking because attentional predispositions and arousal both influence the allocation of attention.

### *Anxiety and Choking*

Baumeister (1984; Masters, 1992; Nideffer, 1992) generally agree that anxiety contributes to choking. Spielberger (1975) defined anxiety as "an emotional state or reaction characterised by the presence of recognisable unpleasant feelings of intensity, preoccupation, disturbance, and apprehension and a simultaneous pronounced activation of the autonomic nervous system" (p. 137). Some early researchers (e.g. Scanlan & Passer, 1978; Simon & Martens, 1977) investigated anxiety from a unidimensional

perspective; however, other researchers in mainstream psychology (e.g., Davidson & Schwartz, 1976; Liebert & Morris, 1967) generally agree that anxiety is a multidimensional construct.

*Multidimensional anxiety theory.* Multidimensional Anxiety Theory (MAT; Burton, 1988; Martens, Burton, Vealey, Bump, & Smith, 1990) has been supported recently within sport anxiety research. Advocates of MAT posit that anxiety is represented in both a mental (cognitive anxiety) and a physiological component (somatic anxiety). Davidson and Schwartz (1976) proposed a differentiation between cognitive and somatic anxiety, however, original operational definitions of cognitive and somatic anxiety were proposed by Morris, Davis, and Hutchings (1981). Morris et al. defined cognitive anxiety as “negative expectations and cognitive concerns about oneself, the situation at hand, and potential consequences” (p. 541). Cognitive anxiety is characterised by a state of worry, the awareness of unpleasant feelings and concerns about ability to perform and concentrate in an environment. Choking may be linked to cognitive anxiety because, as probability of success negatively changes, worry increases. As additional attentional space is allocated to worry, a point is reached where insufficient attentional resources remain to process task-relevant information, thereby decreasing performance (Wine, 1971).

Whereas cognitive anxiety represents the mental component preoccupied with unpleasant cognitions, somatic anxiety is the physiological component of MAT. Morris et al. (1981) defined somatic anxiety as “one’s perception of the physiological-affective elements of the anxiety experience, that is, indications of autonomic arousal and unpleasant feeling states such as nervousness and tension” (p. 541). Somatic anxiety is represented in perceptions of physiological processes such as shakiness, sweating, increased heart rate, rapid respiration, and “butterflies” in the stomach (Rotella & Lerner,

1993). In sport, researchers (Gould, Petlichkoff, & Weinberg 1984; Martens et al., 1990) have suggested somatic anxiety is based on a conditioned response to competitive situations elevated immediately prior to the start of an event, and often dissipates once performance commences. Wang, Marchant, Morris, and Gibbs (2004) found, however, individuals high in somatic anxiety are likely to direct attention to physiological changes under pressure, which may disrupt performance. Specifically investigating choking research, Wang et al. may demonstrate the potential link between choking and somatic anxiety.

*Catastrophe model.* Of the existing anxiety-performance models, perhaps the most relevant to choking is the Cusp Catastrophe Model (CCM; Hardy, 1990; Hardy & Fazey, 1987) because of the similarities between catastrophic performance, arousal surpassing a threshold, and choking. Hardy and Fazey proposed that different combinations of cognitive and somatic anxiety are associated with separate performance outcomes. Researchers advocating the CCM have contended that a three-dimensional description of the anxiety-performance relationship explains how cognitive anxiety and physiological arousal influence performance. That is, a combined influence on performance is produced when cognitive anxiety and arousal are both involved. According to Hardy (1990, 1996), high cognitive anxiety positively effects performance when arousal levels remain low. When cognitive anxiety and arousal exceed an optimal level, however, detrimental performances may occur. Hardy and Parfitt (1991; Parfitt & Hardy, 1993) have provided evidence that under high cognitive anxiety and elevated arousal, a “catastrophic” drop in performance occurs. Once the decline occurs, substantial reductions in arousal levels are necessary to restore previous performance level. Thus, the CCM is related to choking because when cognitive anxiety and arousal levels exceed an optimal level, a catastrophic

decrement in performance may occur. As Hall (2004) explained, choking is a critical deterioration in skilled performance as a result of an elevation in anxiety and arousal levels under perceived pressure. Behaviourally, a substantial performance decrement is noticeable when choking occurs, which is likely due to increased anxiety and arousal. Unlike the CCM, however, superior performance may not be regained even if moderate or low levels of anxiety and arousal are attained.

Attention and anxiety are two constructs central to choking and may influence sport performance in various ways. A common hypothesis is that situations in which athletes become aware of the importance of performing well may induce choking (Baumeister, 1984; Baumeister & Showers, 1986). Other variables, however, may also affect an athlete's ability to perform well. By recognising variables that affect performance, sport psychologist may increase their ability to predict choking. Incidences of choking are difficult to predict (Hanrahan, 1996), but researchers, including Baumeister and Showers, have hypothesised variables that may assist in the prediction process.

#### Predictors of Choking

Although choking is difficult to predict, researchers have identified both dispositional and situational factors associated with choking.

##### *Dispositional Causes of Choking*

Some predictors of choking are personality characteristics that are essentially stable. Researchers have demonstrated that self-consciousness, trait anxiety, and coping style are dispositional characteristics that may identify a person as potentially susceptible to choking.

*Self-consciousness.* One mediator that has received considerable attention in choking literature is self-consciousness (S-C). Fenigstein, Scheier, and Buss (1975) explained that,

“the consistent tendency of persons to direct attention either inward or outward is the trait of S-C” (p. 522). S-C is the realisation that others may be aware of oneself, resulting in a sense of uneasiness when the individual suspects critical evaluation by others. S-C is predicted to mediate choking because of close associations with self-awareness (Baumeister, 1984; Heaton & Sigall, 1991). Self-awareness (S-A) is the existence of self-directed attention, as a result of transient situational variables, chronic dispositions, or both (Fenigstein et al.). Generally, S-A is the state of being attentive of oneself in a relatively objective, but open and accepting manner. S-A is elevated when environmental factors lead performers to direct attention to self. S-C and S-A are similar, because either S-C or S-A can be manifested in self-attention. A fundamental difference is that S-C is a predisposition to direct attention either inwardly or outwardly, whereas S-A is a state of attentional focus reflected inwardly during a specific event. A predisposition to being self-conscious, however, does promote the likelihood of being self-aware during pressure situations (Masters, Polman, & Hammond, 1993).

Fenigstein et al. (1975) described two dimensions of S-C: private S-C and public S-C. Private S-C is the tendency to focus on inner thoughts, feelings, moods, and attitudes. Individuals high in private S-C may focus on the suppressed, personal aspects of the self. For example, an individual high in private S-C may characteristically analyse inner thoughts and feelings to understand emotions during particular situations. Public S-C is the tendency to focus on outwardly observable aspects of the self (e.g., physical appearance). Individuals high in public S-C consider the self as a social object and often seek approval to maintain a sense of identity.

Differences between individuals high and low in S-C may be represented in dissimilar responses to pressure. When performing under pressure, individuals high in

private S-C are predisposed to focus on emotions and feelings. Individuals low in private S-C are likely to ignore emotions and feelings during pressure circumstances. Highly public self-conscious individuals, alternatively, are likely to become aware of being observed when under pressure because social appearance and acceptability are important to them. The highly public self-conscious person is concerned with what people think or say about them, whereas low publicly self-conscious individuals are sometimes oblivious of others' perceptions. Private S-C and public S-C are moderately correlated (Wang, 2002) and scores in both private and public S-C are often to be comparable.

Researchers in general psychology (e.g., Carver, Antoni, & Scheier, 1985; Cheek & Briggs, 1982; Kurosawa & Harackiewicz, 1995) have found people high in both private and public S-C are more adversely affected by situations where pressure promotes S-A. In these studies, pressure was induced by a number of methods, including presence of a mirror, video camera, or audience. Carver and Scheier (1987) argued that experimental manipulations of S-A also have conceptually distinct private (self-directed attention) and public (external evaluation) components. Presence of a mirror, for example, may emphasise more personal, covert attention associated with private S-C, whereas presence of a video camera or audience may encourage a more external, overt degree of evaluation related to public S-C. In an effort to clarify this concept, Kurosawa and Harackiewicz found that the presence of a video camera or mirror during a paper-and-pencil word game produced social concerns (i.e., public S-C) and also created the highest overall level of concern (i.e., combined public and private S-C) compared to other groups. The strongest detrimental performance effects were evident when public and private S-C concerns were combined. That is, the video camera and mirror increased combined private-public S-C evaluation, and had a detrimental effect on performance.

High self-conscious individuals are more susceptible to becoming inwardly focused due, in part, to their constant thoughts about private and public evaluation. Continuous attention to evaluation may result in concern over others' perceptions. Hull, Reilly, and Ennis (1991) suggested that people high in S-C are often worried about others' expectations, which may consume resources needed by other cognitive processes and cause performance disruptions. Furthermore, high S-C elicits over-sensitivity to others' opinions, leading to further self-focused behaviour (Fenigstein, 1979; Woody, 1996). High self-conscious individuals, then, could be more negatively affected by increased S-A because self-evaluation increases attention to self-assessment and others' impressions.

Researchers investigating the effects of S-C on performance have produced equivocal findings. For example, using a non-sport task, Baumeister (1984) found that participants low in S-C performed poorly under pressure compared to high self-conscious individuals. Baumeister asserted that individuals high in S-C cope more easily with situations that promote S-A, because they are more familiar with performing while self-focused. Baumeister asserted that individuals low in S-C might be more susceptible to choking because inward attentional focus is less common and they are less experienced in being self-aware. The uncharacteristic self-reflection at a time when conscious monitoring is unnecessary may disrupt execution and decrease performance. From this perspective, pressure induces individuals low in S-C to become more self-aware and they may be unable to cope with the change (Berglas & Baumeister, 1993).

In sport, Masters et al. (1993) and Wang, Marchant, Morris, and Gibbs (2004) have provided support for the opposing argument that high S-C is a predictor of choking. Recently, Wang et al. conducted a study in which 58 participants completed two questionnaires to ascertain if dispositional S-C and trait anxiety were predictors of



choking. Participants completed basketball free throws under both low- and high-pressure conditions. Pressure was manipulated by the presence of a video camera, audience, and performance contingent rewards (i.e., offering money based on performance outcomes). Correlational analysis and hierarchical multiple regression analysis confirmed the expectation that individuals high in S-C perform poorly under high-pressure. Wang et al. found that high self-conscious, rather than low self-conscious, individuals are more affected because their susceptibility to reflect inwardly disrupts automatic execution.

Heaton and Sigall (1991) provided a plausible explanation for the equivocal evidence between S-C and performance. Seventy-eight participants were randomly assigned to one of six conditions (i.e., supportive audience, non-supportive audience, or no audience conditions, with each receiving either success or failure feedback) and performed three rounds of a game of “perfection” against another team. Heaton and Sigall hypothesised that choking would occur in individuals high in S-C following failure feedback because of their predominantly inward focus and inherent self-presentational concerns, whereas individuals low in S-C would “choke” when an audience was present due to direct attention to public appraisal (i.e., pleasing the audience). When positive self-presentation (i.e., characterised by individuals high in S-C) was important, greater effort was given to self-preservation than pleasing the audience. Individuals low in S-C “choked” when disappointing the audience was likely because pleasing the audience added pressure. According to Heaton and Sigall, individuals low in S-C are more likely to focus on pleasing the audience than aspects of self-presentation. High self-conscious individuals are more concerned with self-standards than audience standards and performed poorly when negative performance was inevitable. Apparently, individuals high in S-C required success feedback to protect a positive self-presentation and improve performance.

Carver et al. (1985) found that participants high in S-C were more likely than participants low in S-C to obtain performance norms after success feedback and to avoid such information after failure feedback.

S-C seems to be important in predicting choking, however, it is still unclear whether choking can be predicted from measures of S-C. Intuitively, one would expect that people high in S-C would be likely to “choke” because of the tendency to turn inward when anxious. Wang (2002), however, suggested that the equivocal results of S-C studies might be due to limitations in methodology, such as inadequate control and monitoring of task difficulty and participants’ skill level. Although limitations in methodology exist, other characteristics, such as trait anxiety, may also be a possible predictor of choking.

*Trait anxiety.* Trait anxiety (A-trait) is the disposition to perceive a wide range of situations as threatening, and to respond to such situations with state anxiety (Spielberger, 1966). The situations may be influenced by emotional and cognitive components in which the person is preoccupied with irrelevant thoughts and eventual perception of excitement when the ego is threatened (Janelle, 1997). A person high in A-trait perceives minimally threatening situations as being anxiety-inducing. Test anxiety researchers have confirmed that individuals high in A-trait react to pressure situations with greater levels of A-state than individuals low in A-trait (Spielberger, Anton, & Bedell, 1976). Furthermore, Calvo, Alamo, and Ramos (1990; Kurosawa & Harackiewicz, 1995) have found that high A-trait individuals perform more poorly under pressure than low A-trait individuals, which may be due to focus on self-evaluative thinking in pressure situations (Wine, 1971).

Test anxiety researchers have suggested a relationship may exist between high A-trait and poorer performance. Accordingly, Baumeister and Showers (1986) have posited that A-trait may be a possible predictor of choking. For example, individuals high in A-

trait would be more susceptible to performance pressure than individuals low in A-trait and may perform poorly under pressure. Sport anxiety literature has confirmed that A-trait is a strong predictor of A-state (e.g., Marchant, Morris, & Andersen, 1998; Williams & Krane, 1992). Halvari and Gjesme (1995) found that A-trait was related to both A-state and performance errors. High A-trait was accompanied by associated increases in A-state, which was depicted by a strong U-shaped relationship to performance errors. Moderate A-state was associated with fewer errors than low or high A-state. Until recently, however, researchers have not examined whether A-trait is a predictor of choking in motor skills. Wang, Marchant, Morris, and Gibbs (2004) examined A-trait as a likely predictor of choking and found that A-trait was a significant predictor of choking with somatic A-trait being highly correlated with poor performance under pressure. Further research is necessary to understand the underlying mechanisms regarding A-trait as a predictor, as well as other factors that may predict choking. Coping styles, for example, have been investigated to identify their affect on predicting choking.

*Coping styles.* Coping is defined as “a response to environmental and psychological demands in particularly stressful situations” (Endler & Parker, 1990, p. 845). When athletes are confronted with pressure, the effectiveness of their coping skills may determine success or failure. According to Folkman and Lazarus (1985), the coping process may involve either regulating emotion or attempting to solve the problem. Individuals who attempt to cope with pressure by regulating emotions may do so by simply avoiding or focusing specifically on the problem. Whether coping reduces perceived pressure, however, seems dependent on the individual’s coping style. A coping style is a psychological disposition that reflects an athlete’s tendency to respond in a predictable manner when confronted with a particular situation (Anshel, Jamieson, &

Raviv, 2001) and is reflected in an athlete's preference and selection for using certain types of coping strategies under pressure (Holahan & Moos, 1987). A coping strategy, then, is a situation-specific method of coping and reflects an athlete's coping response following a pressure situation (Anshel et al.). When pressure is perceived, coping strategies are activated to deal with the situation. Coping styles and coping strategies are often interchangeably used within coping research, however, in the current dissertation, coping styles are operationalised as the participant's dispositional coping mechanisms, whereas coping strategies are the coping methods actually used (or not used) during the pressure situation.

Athletes use coping strategies to alter cognitions of a pressure situation or increase resources to deal with the situation. Generally, an athlete's coping style is a predictor of the coping strategies used in competition. Choking may be partially caused by the use of inappropriate coping strategies to deal with pressure. Two coping styles, approach coping and avoidance coping, have recently been examined to determine whether approach or avoidance coping can predict choking. Approach coping involves focusing on problem solving by using direct effort (Crocker & Graham, 1995). Krohne (1993) suggested approach coping is the process of actively dealing with a perceived problem. Continuing to contemplate the emotions related to the pressure would be an example of approach coping in sport. Avoidance coping, also referred to as desensitisation or repressive coping, is typically used to direct activity away from the threat-related stimulus (Anshel & Weinberg, 1999). An example of avoidance coping is when an athlete mentally distracts himself from the pressure by focusing on the next task. Approach coping involves directing cognitive and behavioural efforts toward solving the problem causing stress, whereas avoidance coping is aimed to reduce stress by directing activities away from the

stressful stimulus (Anshel & Weinberg). According to Anshel (1996), the athlete actively attempts to understand the perceived pressure when using approach coping, whereas the athlete does not attempt to solve the problem when using avoidance coping, thus, allowing them an opportunity to maintain attentional focus. Researchers (e.g., Miller, 1990; Mullen & Suls, 1982; Roth & Cohen, 1986) have shown that avoidance coping reduces anxiety in uncontrollable situations more effectively than approach coping. In most sports, perceived pressure may be uncontrollable and with avoidance coping, an anxiety reduction may be obtained while maintaining focus on the task.

To examine the affects of coping styles on the likelihood of choking, Wang, Marchant, and Morris (2004) asked 66 basketball players to complete a coping questionnaire (Coping Style Inventory for Athletes; Anshel & Kaissidis, 1997) one-week prior to participation in a basketball task. Participants then performed 20 free throws under both low-pressure and high-pressure conditions. Based on a multiple regression analysis, Wang et al. found that approach coping accounted for 7% of the explained performance variance under pressure. Athletes that predominantly used approach coping performed less accurately under high-pressure than those that predominantly used avoidance coping strategies. Thus, approach coping was established as a predictor of choking. According to Wang et al., approach coping may increase perceived threat, leading those who actively seek a reduction in anxiety to divert attention to irrelevant cues. Avoidance “copers,” as the name implies, tend to avoid reflecting on anxiety and persistently use relevant information to maintain performance. Conversely, approach “copers” may become immersed in searching for an explanation, increasing perceived anxiety, and potentially decreasing performance.

### *Situational Causes of Choking*

An understanding of situational causes of choking is imperative to help athletes overcome choking. Situational causes of choking may be either internal (e.g., cognitive style) or external (e.g., environmental factors). Internal factors may include the athlete's awareness of others' perceived expectations, self-expectations, and effort, whereas external factors may involve the presence of an audience, video cameras, possible rewards, and variations in skill characteristics. External characteristics may increase the athlete's awareness of the situations perceived importance, and may negatively affect performance (Baumeister, 1984). Situational factors can affect performance negatively, yet, athletes' perceptions may be modified to manage them.

*Expectations.* Expectations, whether from self or family and friends, can increase perceived pressure. Expecting favourable performance under pressure may help in producing desired outcomes, and may be associated with previous performance expectations. Bond (1982; Geen, 1980) found that participants who recently experienced success performed more successfully, whereas participants that recently experienced failure were less successful with the presence of an audience. Successful performance under pressure may promote feelings of confidence and stability and lead to resilience during subsequent performance under pressure. In addition, previous poor performance under pressure may lead to self-doubt and success may be inhibited (Singer, 1986). Fear of recurrence of past inferior performance may introduce anxiety, resulting in further suboptimal performances.

The expectations of significant others may also lead to suboptimal performance. Baumeister and Steinhilber (1984) suggested that an increase in expectations from others may increase pressure and can lead to inferior performance. Baumeister, Cooper, and Skib

(1979) also explained expectations (desirable or undesirable), if known to others, might influence the performer, whereas if self-expectations are the only expectancy source, performance is not affected. Baumeister et al. asked participants to complete a “bogus” personality test that identified them as a desirable or undesirable personality type and were informed that individuals with the “bogus” (i.e., desirable or undesirable) personality trait usually performed poorly on an anagram-solving task. As predicted, when the expectancy was desirable (i.e., positive personality trait) and publicly known, participants performed poorly on the anagram-solving task in relation to previous performance, thus indicating the importance of self-presentational concerns about whether the expectancy will influence behaviour. Apparently, if the performer believes other people expect a certain performance under pressure, then performance outcome may actually conform to that expectancy in a self-fulfilling manner. Although expectations can affect performance, Baumeister, Hamilton, and Tice (1985) have suggested that audience expectations do not always facilitate performance. In fact, when the performer perceives the audience expects successful performance, additional pressure may be added, which may be detrimental to performance.

*Audience.* The presence of an audience is an environmental factor that may add pressure to competitive situations. The characteristics of the audience, such as size, support (or opposition), and performing before an informed audience, may also affect the perceived importance of the situation. Many researchers have used audiences to manipulate perceived pressure (Baumeister, 1984; Butler & Baumeister, 1998; Hardy et al., 1996; Heaton & Sigall, 1991; Masters, 1992; Tice, Buder, & Baumeister, 1985). Pressure was manipulated in most of these studies as an independent variable with an expectation that the dependent variable (e.g., performance) would be affected. Participants

in the study by Hardy et al. performed a golf-putting task with an audience that comprised a professional golfer and without an audience. Performance decrements occurred when the professional golfer evaluated participants' performance. Based on these studies, it seems that unsupportive audiences are likely to increase pressure and impede performance.

Public speaking or performing in front of an audience can be intimidating, especially with unsupportive audiences. People performing before an audience may even persuade a network of friends and acquaintances to attend the public engagement to engender encouragement and support. But does a supportive audience have a positive influence on performance like many people believe? Butler and Baumeister (1998) conducted a series of experiments designed to examine the effects of supportive audiences on performance. Experiment 1 included 21 participants randomly assigned into two audience conditions (friend or stranger). Participants performed a mental arithmetic task, while a friend or stranger watched behind a one-way mirror. Poorer accuracy and speed were evident in the supportive audience condition. In Experiment 2, the researchers again found that participants' performance was negatively influenced when performing an Atari video game in front of a supportive audience. In Experiment 3, the researchers randomly assigned 93 participants into four conditions (i.e., supportive, adversarial, neutral, and control). In the supportive condition, the participant and audience member would each receive money, if the participant were successful, compared to previous performance. If the participant succeeded in the adversarial audience, the participant would receive money, whereas, if the participant were unsuccessful, the audience member would receive the money. In the neutral condition, only the participant received money for success; no audience or monetary incentive was used for the control group. Butler and Baumeister again confirmed that a supportive audience had a detrimental performance effect.



Negative perceptions about anxiety may be debilitating to performance, however, Butler and Baumeister demonstrated that positive assessment of a supportive audience was also negatively related to performance. Although a supportive audience may promote pressure and positive perceptions are associated with a supportive audience, debilitating performance may occur. Butler and Baumeister concluded that a supportive audience creates “friendly faces” to performers, but still may hinder performance.

Apparently, age may be a determining factor of whether presence of an audience affects performance. Tice et al. (1985) found that children under 12 years of age improved performance on a video arcade game, whereas adolescents and adults showed moderate to significant performance decreases when an audience was present. Tice et al. explained that the tendency to become self-conscious is less likely in children, permitting a functional task focus, whereas S-C peaks in adolescence (Simmons, Rosenberg, & Rosenberg, 1973) and may affect performance negatively.

Many reviews of audience effects have been published within the last three decades (e.g., Bond & Titus, 1983; Geen & Gange, 1977; Strauss, 2002; Zajonc, 1965). Bond and Titus integrated 241 studies into a meta-analysis of audience effects, using primarily human participant studies. The main finding was that the influence of an audience on performance was minimal. Bond and Titus clarified that the presence of an audience only explains 0.3 – 3% of the performance variance. What appears to be a small variance in performance may be substantial at elite levels of sport where gold medals are won and lost by milliseconds in sports, such as swimming and athletics. Other important findings included: the presence of an audience heightens physiological arousal, experts rather than non-experts in the audience facilitated performance for participants on simple tasks, but not for complex tasks, knowledgeable audience members were facilitative to participants

performing simple tasks, but debilitating to participants performing complex tasks, and an unfamiliar audience was debilitating to participants performing complex tasks.

Strauss (2002) recently reviewed research on audience effects for people performing motor tasks. Similar to Bond and Titus (1983), Strauss ascertained that “if any effects of the mere presence of others are to be found at all, they tend to be very weak” (p. 253). Although Strauss suggested weak results for audience effects, three main points from the review were noteworthy. First, the fundamental social facilitation theories and research supporting or contradicting the theories was critically analysed and reviewed. Second, a differentiation among motor tasks and audience effects was acknowledged. A review was offered for separate skills that place demands on conditioning (i.e., tasks that require high levels of energy or physical effort, such as weight lifting), skills that place demands on coordination (i.e., tasks in which various body systems have to be synchronised, such as golf or dart-throwing), or a mixed form of simultaneous conditioning-coordination skills (e.g., basketball or soccer). Strauss noted, “All tasks make demands of conditioning and coordination... the crucial aspect is how strongly these parts relate to each other” (p. 247). Strauss delineated that presence of an audience increased performance in tasks where conditioning skills were pre-eminent. Contradictory evidence, however, was found for coordination skills and skills combining the coordination-conditioning components. Performance can be either facilitative or debilitating when an audience is present for coordination or mixed forms of skills. Finally, coordination and conditioning skills research was matched to the social facilitation models and Strauss found that “the most recent models... tend to be supported only by their authors’ own empirical work... In his review, Zajonc (1980) tends to favour his own model from 1965” (p. 251).

*Influence of video camera.* Although the intention is essentially the same as presence of an audience, other external factors, such as a video camera, may be used to increase perceived pressure (Beilock & Carr, 2001; Kurosawa & Harackiewicz, 1995; Lewis & Linder, 1997; Linder, Lutz, Crews, & Lochbaum, 1999; Wang, Marchant, & Morris, 2004; Wang, Marchant, Morris, & Gibbs, 2004). Carver et al. (1985) maintained that presence of a video camera might increase S-A, which interferes with processing of task-relevant information. Baumeister (1984; Beilock & Carr; Masters, 1992) have suggested that when S-A increases, performance decrements may occur. Linder et al. demonstrated that a video camera increased A-state in a golf-putting task with 10 experienced golfers. Increased A-state was evident, however, performance differences were equivocal. The presence of a video camera has been shown to increase A-state, which is likely to decrease performance in motor skills (Wang, Marchant, & Morris, 2004; Wang, Marchant, Morris, & Gibbs, 2004).

*Performance contingent rewards.* Offering monetary incentives has been shown to affect performance (Baumeister, 1984; Beilock & Carr, 2001; Hardy et al., 1996; Lewis & Linder, 1997; Linder et al., 1999; Masters, 1992). The possibility of earning a reward for performance may intensify the perceived importance of a situation and consequently perceived pressure. Attending to the possibility of a reward may distract the performer or interfere with intrinsic motivation (Baumeister & Showers, 1986). Baumeister illustrated that when offering a monetary reward for successful performance, participants performed significantly worse compared to a control group not offered a reward. Similarly, Masters participants' practiced a golf-putting task and then were offered an increase or decrease in monetary payment in a "stress" session. Participants who were hypothesised to perform poorly in the "stress" session demonstrated a decline in performance, while an increase in

heart rate and A-state were evident. Thus, the possibility of earning more or less money appears to elevate anxiety. It should be noted that a “golf professional” was used to evaluate participant performance, therefore, it is unknown whether the monetary incentive or the evaluation was the cause of the significant pressure manipulation.

*Skill characteristics.* A number of researchers have suggested that variations in skill characteristics may differentially affect performance under pressure (Baumeister, Hutton, & Cairns, 1990; Baumeister & Showers, 1986; Beilock & Carr, 2001; Beilock et al., 2002; Mesagno & Janelle, 2002; Wang, Marchant, & Morris, 2004; Wang, Marchant, Morris, & Gibbs, 2004). Two aspects of skill characteristics should be considered under pressure: skill complexity and skill difficulty. According to Naylor and Briggs (1963), skill complexity refers to the number of parts or components in a skill, as well as information-processing demands, whereas skill difficulty refers to the likelihood of executing the correct performance. Researchers have not always made a clear distinction between what constitutes complex and simple tasks. Complex tasks are closely related to skill-based tasks because of their reliance on smooth execution of multiple processes that can be interrupted by pressure. Simple tasks, however, may only require one step to execute and are less susceptible to pressure interference (Beilock & Carr). Baumeister et al. suggested that task complexity has often been confused with task difficulty. For example, short-distance golf putting has been used in choking research. Such putting is arguably a relatively simple, fine-motor task, when constructed and performed under typical laboratory controlled conditions. Beilock and Carr and Masters (1992), however, have suggested that golf putting, even under experimentally controlled conditions, is a complex skill. Thus, an understanding of performance under pressure regarding both complex and simple tasks may be helpful to choking research.

Another task characteristic recently investigated that seems important to choking susceptibility, and similar to Strauss's (2002) social facilitation finding regarding the differentiation among motor tasks and audience effects, is whether the task is predominantly skill-based or effort-based. Baumeister et al. (1990) suggested that skill tasks demand "a gradual learning curve of improvement over successive trials, combined with an inability to improve by simply trying harder" (p. 134) and effort tasks are "those on which performance is a function of consciously monitored exertion" (p. 133). Skill-based tasks generally become automated with learning, and require less attention to perform. As the mechanics of skill-based tasks become well developed, increases in effort and motivation are unlikely to directly affect performance, except in interfering with automaticity of execution (Baumeister et al.). Skill-based tasks may be more susceptible to pressure by means of an inhibition of well-learned sequences of movement (Kimble & Perlmutter, 1970). Conversely, effort-based tasks benefit from exertion, based on conscious control. An increase in effort to facilitate performance should increase stamina and motivation. Although largely dependent on the task, in effort-based tasks, individuals under pressure may endeavour to assist performance by controlling execution and increasing effort. Baumeister et al. demonstrated that the effects of verbal praise on performance differ depending on the task. Participants performing an effort-based task responded well to praise, whereas participants completing a skill-based task responded poorly to praise. Baumeister et al. suggested that praise disrupts skilled performance through an elevation in S-C, and may also burden the performer with audience expectations for repeated success. Wang (2002) also confirmed the effort-based vs. skill-based task hypothesis under pressure. Wang found participants that completed a running (effort-based) task improved performance in a high-pressure condition, whereas

decrements in performance occurred for participants completing a free-throw shooting (skill-based) task under pressure.

The review of research in attention, anxiety, and predictors of choking has lead investigators to a general understanding of the effects attention, anxiety, and dispositional and situational factors have on choking. As suggested, choking has been an illusive construct to define and comprehend, causing difficulty in developing theoretical explanations. Thus, questions still remain regarding underlying mechanisms of choking.

#### Underlying Mechanisms of Choking

Several studies have verified that researchers can induce choking behaviour within controlled, experimental conditions (e.g., Baumeister, 1984; Beilock & Carr, 2001; Masters, 1992). Researchers, however, have not yet demonstrated more ecologically valid (e.g., field setting) evidence. Although choking may be an ideographic phenomenon, Clark (2002a, 2002b) suggested choking should also be tested outside the research laboratory. Clark (2002a) recently investigated the susceptibility of choking of professional golfers. Statistical analyses on 41 archival golf championships were completed to identify the occurrence of choking. Clark found that choking was not evident. Limitations with the study, nevertheless, made it difficult to generalise the findings. First, choking is individualistic and situation specific and may not be globalised to statistics and archival data. To strengthen the study, a comparison of each golfer's initial round with their final round (i.e., pressure) score could have resulted in a more accurate understanding of whether choking occurred. Second, Clark referenced Baumeister's definition of choking, however, no direct method of pressure confirmation (e.g., arousal or anxiety testing) was used to confirm Clark's hypothesis that players one shot from the lead experienced the most pressure during the final round. Without a direct

measure of anxiety and arousal levels, the pressure hypotheses are merely speculative. Perhaps controlled field studies should be conducted, as they may be more robust in understanding choking than archival data with no direct evidence of pressure.

Despite researchers' suggestions (e.g., Baumeister & Showers, 1986; Beilock & Carr, 2001; Masters, 1992; Nideffer, 1992) about what represents choking, sport psychology theory and practice has not developed to the point where researchers are in total agreement about what constitutes choking. Nonetheless, the causes and mechanisms of choking continue to be investigated. Most research has focused on the role of attention under pressure, although, to a lesser extent, the role of anxiety has also been examined.

#### *Attentional Models of Choking*

Attentional theories in sport are based on the principle that optimal performance is contingent on the ability to focus attention on task-relevant information, processes, and behaviours, while concomitantly ignoring task-irrelevant cues (Nideffer, 1992). Although some stimuli cause involuntary attentional shifts (e.g., hearing a loud noise from spectators), most attentional shifts are voluntary; consequently, voluntary attention will be the focus of this discussion.

An athlete's ability to shift attention may be examined as a position on a continuum ranging from complete control to the inability to modify attentional focus. When athletes are predisposed to one attentional style and are incapable of modifying attentional focus, detriments in performance may occur. Attentional flexibility (i.e., ability to direct and alter attention) is an essential component in sport, especially in open skilled sports, because adopting other appropriate attentional styles allows athletes to adapt to constantly changing environments. Nideffer (1992) theorised two main dimensions appropriate in modifying attention: width (scope) and direction (focus). The width dimension refers to

the number of concurrent stimuli receiving attention at one time and ranges on a scale from broad to narrow, whereas the direction of attention refers to the origin of the stimuli to which the person attends and is denoted as either external (i.e., stimuli originates in the environment) or internal (i.e., stimuli originates from within the individual) focus of attention. When an athlete applies width and direction dimensions to sport performance, only relevant information should actually be processed through selective attention. Selective attention (i.e., the process by which certain information is preferentially chosen while other information is ignored) is not simply the ability to choose between direction and width, rather the ability to choose among four possible, specific combinations of attention: broad-external, narrow-external, broad-internal, and narrow-internal. Within these four dimensions, athletes (depending on the sport) differentiate important cues by shifting attention. According to Nideffer, a voluntary shift in attention to task-relevant cues assists the athlete in remaining focused on maximising performance. For example, in basketball, an external-broad focus (scanning the court) may be used first, followed by a shift to an external-narrow focus (looking at the basketball rim) when shooting. Voluntary shifts in attention assist the athlete in correct decision-making and increase performance capabilities by attending to relevant cues and disregarding irrelevant cues. Shifts in attention to task-irrelevant cues yield detrimental effects by disrupting task concentration.

Choking may be caused by increases in anxiety levels under perceived pressure (Masters, 1992), which diverts attention to either internal (movement) or external (environmental) irrelevant cues, disrupting task concentration. For example, increased attention to internal, irrelevant cues may negatively influence execution because the preoccupation with internal mechanisms redirects concentration to thoughts not associated with performance. Thus, researchers have formulated two models that predominantly



apply to choking: *distraction* and *self-focus* (e.g., Baumeister's [1984] automatic execution hypothesis, Masters' conscious processing hypothesis, and Beilock and Carr's [2001] explicit monitoring of execution hypothesis) models. The distraction model and the self-focus model, in addition to an alternative model recently developed but not empirically tested, hypothesise causes of choking.

*Distraction model.* Nideffer (1992) may have adapted the distraction model from original explanations of poor performance in test anxiety (Wine, 1971). Researchers involved in test anxiety suggest that poor test-taking performance may be due to task-irrelevant (e.g., worry about outcome), rather than task-relevant (e.g., the question being answered) information. Nideffer proposed an athlete's attention is directed toward a combination of task-relevant and task-irrelevant performance cues and particular stimuli divert attention from task-relevant information. According to Nideffer, athletes that are distracted, experience choking because attention shifts from task-relevant to irrelevant cues. Important emotional modifications (e.g., increases in anxiety and arousal) during competition prompt attentional changes, resulting in reduced attentional flexibility (i.e., ability to modify and direct the dimensions of attention). Nideffer posited that as arousal increases, athletes become too internally immersed in task-irrelevant thoughts (e.g., worry) because of increasing physiological sensations (e.g., heart rate, butterflies, sweating) and are unable to escape inappropriate cognitions, resulting in failure to attend to important cues. An example of choking based on the distraction model is at the start of a basketball game, successful free throw attempts are due to a player using an external, task-relevant mode of attention. When perceived importance of success increases, perhaps near the conclusion of a close game, physiological changes occur and the athlete modifies attention internally (e.g., negative self-talk) when attempting free throws. The voluntary

shift to critical self-talk about internal feelings may lead the athlete to miss shot attempts. Nideffer and Sagal (2001) suggested that “over-attention” to task-irrelevant factors, such as internal distractions (e.g., self-doubt, anxiety), leads to physiological (e.g., increases in muscle tension, heart rate) and attentional (e.g., attentional narrowing, internal focus) changes, which in turn results in performance decrements.

Although Nideffer’s (1992) distraction model proposes that as an elevation in arousal occurs, physiological changes increase and the tendency to direct attention to internal distractions (e.g., negative thoughts, worry) also intensifies, Beilock and Carr (2001; Lewis & Linder, 1997) have also interpreted that choking may occur when external distractions (e.g., watching an opponent, crowd awareness) interfere with the athlete’s attention. External distractions rather than internal cognitions cause attentional shifting, leading to choking. For example, shifts of attention to external cues may occur in individual-based sports like golf or tennis, when an athlete repeatedly watches the scoreboard to determine personal ranking, rather than focusing on personal performance.

Recently, working memory and cognitive control mechanisms, developed in part from Kahneman’s (1973) work, have been investigated to further advance the distraction model of choking. Working memory is a short-term memory system that maintains, in an active state, a limited amount of information with immediate relevance to the task at hand while preventing distractions from the environment and irrelevant thoughts (Kane & Engle, 2000). The functions of the central executive of working memory are not fully understood but seem to be attention-related (e.g., Baddeley, 1993, 1996; Engle, Tuholski, Laughlin, & Conway, 1999). Engle (1996) argued that individual differences of “working-memory capacity” reflect the capability to use controlled attention to prevent distraction from the environment and interference from events stored in long-term memory. If the

ability of working memory to maintain task focus is disrupted by internal or external factors, then performance may suffer. Beilock, Kulp, Holt, and Carr (2004) conducted a study to investigate the influence of pressure in a task in which performers would be susceptible to choking via distraction. The researchers asked individuals to perform easy (low demand on working memory) and difficult (high demand on working memory) math problems in both low- and high-pressure situations. Similar to Nideffer's (1992) distraction model of choking and Wine (1971) test anxiety research, Beilock et al. found that pressure causes individuals to worry. Moreover, participants that performed difficult math problems (strongly reliant on working memory resources) showed signs of failure under pressure, which indirectly indicated worrisome thoughts. Beilock et al. concluded that pressure could compromise working memory resources, causing failure via distraction in tasks that rely heavily working memory.

*Self-focus model.* The genesis of the self-focus model was perhaps established in skill acquisition and motor learning research. Hence, a brief discussion of skill learning is essential to understand the self-focus model. Theorists (e.g., Anderson, 1982; Fitts & Posner, 1967) have hypothesised that skill acquisition progresses through stages, transitioning from explicit, retrievable processes to more implicit, automatic processes in which constant attention is not required for task performance. Fitts and Posner explained that in the first stage, the cognitive stage, learners acquire skill by activation of cognitive processes. Skill execution usually depends on a set of control structures held in working memory and attended to in a step-by-step manner (Anderson). Conscious monitoring of skill execution assists the learner in understanding the movement sequence. During Stage 2, the associative stage, performance is usually more consistent and the skill is performed with comparatively less cognitive effort. Due to increases in skill with adherence to

practice, accurate methods of performing are ascertained and emphasis is on the role of practice conditions for the development of more proficient skill. As expertise develops, the role of attention during performance also changes. As procedural knowledge is developed, regular conscious control is superfluous. The last stage, the autonomous stage, is characterised by efficient, effortless, automatic performance. Skill development is represented by decreases in required attentional resources and assistance from working memory. Fitts and Posner anticipated that the expert performer should execute the skill without conscious thought. Even at elite levels, however, athletes become self-aware due to increased anxiety levels (Singer, 2002). When S-A is elevated, the athlete reverts to prior stages of learning and conscious attention to execution may ensure proper movement is maintained. Paradoxically, though, conscious control of mechanics may reduce attention to perform automatically and performance decrements result.

There are many examples, however, where the cognitive stage of learning is seemingly bypassed. For example, children acquire dance routines, sport skills, and other complex movements with what seems to be minimal cognitive effort. Consequently, the amount of cognition required or desirable during skill learning is debatable. Fitts and Posner's (1967) cognitive stage has been challenged by researchers in awareness vs. non-awareness conditions (e.g., Lidor, Tennant, & Singer, 1996; Singer, Lidor, & Cauraugh, 1993, 1994) and internal vs. external focus of attention (FOA) studies (e.g., Perkins-Ceccato, Passmore, & Lee, 2003; Radlo, Steinberg, Singer, Barba, & Melnikov, 2002; Wülf, Hüb, & Prinz, 1998; Wülf, Lauterbach, & Toole, 1999; Wülf, McNevin, Fuchs, Ritter, & Toole, 2000) in an effort to understand whether FOA influences performance. Typically, S-A and internal FOA strategies are suggested for beginners learning sports. Researchers, however, are currently investigating whether novices should adopt a more

autonomous, implicit learning approach to skill acquisition. To illustrate, Singer et al. (1993) asked participants to perform a nondominant overhand throw at a target. Participants were randomly assigned to a nonawareness group (asked to preplan the movement, focus on one cue [i.e., centre of target], and ignore all movement information), and an awareness group (instructed to be aware of ball-throwing execution). Singer et al. found the nonawareness group performed more accurately than the awareness group, suggesting self-focused attention may inhibit performance for unskilled performers. Wülf et al. (1998) studied the effects of external focus (related to performers' actions on the environment) compared to internal focus (self-directed attention) on performance with a ski-simulator and then with a stabilometer (balance board). Similar to findings by Singer et al., external focus led to best performance in comparison to internal focus. Apparently, learners need not always experience increased cognition at early stages of learning, and it may be beneficial to adopt implicit learning strategies.

In the self-focus model, arousal and anxiety levels may increase under perceived pressure that leads to an elevation in S-A during performance (Baumeister, 1984; Masters, 1992; Masters et al., 1993). Wegner and Giuliano (1980) demonstrated that increased arousal eventually leads to focusing attention toward body awareness. Participants were exposed to manipulations designed to vary levels of general arousal. Three tasks were used: running in place, waiting in a chair, and reclining in a lounge chair. All participants were given a measure of focused attention identifying the number of first person pronouns used to complete a sentence, while heart rate was monitored, providing an indication of arousal level. Participants who ran in place displayed greater self-focus than participants in a comparison group whom merely waited for an equivalent time period. Wegner and Giuliano concluded that increased arousal levels lead to an elevation in self-focused

attention. Supporters of the self-focus model of choking (e.g., Baumeister; Beilock & Carr, 2001; Masters) have suggested that inhibition of performance is a result of increased S-A, either through reduction in response speed (Bond, 1982) or interference of response automaticity (Kimble & Perlmutter, 1970). Although two causes are hypothesised for performance decrements, interference of response automaticity has been the fundamental rationale in choking studies.

Advocates of the self-focus model (Baumeister, 1984; Beilock & Carr, 2001; Masters, 1992) have provided a perspective that follows the work of Carver and Scheier (1978) on S-C, which suggested anxiety increases S-A. To explain choking, Baumeister conducted a series of studies proposing three hypotheses: increased S-A causes decrements in performance, pressure causes decrements in performance, and performance decrements occur in field settings. Participants in Studies 1, 2, and 3 performed a “roll up” game in which two rods were attached to a vertical board at one end and the participant held rods from the other end. The object was to earn as many points as possible by moving the metal ball up the slight incline of the rods and dropping the ball close to participants’ hands. The three studies illustrated that increased S-A was detrimental to performance. In Studies 4 and 5, the hypothesis that pressure may hinder performance, while executing a slightly different task, was confirmed, whereas in Study 6, choking was demonstrated within a field setting. Baumeister emphasised “these experiments do not provide direct evidence that pressure causes increased attention to one’s internal performance processes, although there was ample indirect evidence of relationships between pressure and S-C” (p. 619). Baumeister mentioned a limitation in the study was that a pressure manipulation was not provided. Baumeister initially introduced the automatic execution hypothesis noting that participants having a high motivation to do well may consciously monitor behaviour,

whereas Masters explained that pressure produces increased attention to internal performance processes through conscious processing.

To expand Baumeister's (1984) hypothesis, Masters (1992) conducted a classic explicit and implicit motor learning study in which participants learned golf-putting through explicit motor learning (providing instructions about how to perform the skill) or implicit motor learning (no instructions given regarding execution of the skill). Forty novice golfers were randomly assigned to one of five groups, including: explicit learning (EL), implicit learning (IL), implicit learning control (ILC), non-stress control (NSC), and stress control (SC) groups. The EL group was provided with instructions on how to perform a golf-putt. The two implicit groups (i.e., IL and ILC) performed a random letter generation task that interferes with explicit knowledge acquisition; thus ensuring implicit learning (Baddeley, 1992). "Stress" was provided for the IL group in the final session, but not the ILC group. Control groups did not perform the random letter-generating task and were not given explicit information. Participants performed a total of 400 golf putts over 4 sessions during a skill acquisition phase and 100 putts under a "stress" condition. The stress condition involved a monetary incentive and an audience that comprised a professional golfer. The EL, IL, and SC groups were subjected to the stress condition, whereas the other groups performed with no stress. Participants in Masters' study exhibited an increase in somatic anxiety, cognitive anxiety, and heart rate under pressure. The resulting evidence indicated a slight decrease in mean number of putts holed for the EL group under stress in comparison to the IL groups, who increased number of putts holed. Masters concluded that implicit motor learners are relatively more stress-resistant compared to explicit motor learners because of less dependence on task rules. Apparently, implicit motor learners performed automatically under stress, due to their lack of

“reinvestment” in explicit rules. More specifically, explicit rules were not formed because participants learned implicitly and were not accessible under stress. The phenomenon of detrimental, conscious processing under pressure, shown by explicit learners, has been called “reinvestment” (Masters et al., 1993) or “deautomatization” (Deikman, 1969).

Masters et al. (1993) conducted a follow-up study to Masters (1992) study to explain the performance decrement for explicit motor learners under “stress.” In this investigation, reinvestment scores of participants in the SC and IL groups from Masters study were combined to establish whether high reinvesters (i.e., individuals likely to use instructions for movement execution) or low reinvesters (i.e., individuals not likely to be conscious of movement execution) experienced greater performance decrements under pressure. A reinvestment scale, consisting of 75 questions from various questionnaires (Cognitive Failures Questionnaire [Broadbent, Cooper, FitzGerald, & Parkes, 1982]; Emotional Control Questionnaire [Roger & Neshoever, 1987]; Self-Consciousness Scale [Fenigstein et al., 1975]), was formulated to identify high and low reinvesters. High reinvesters were chosen from a group of participants that scored more than one standard deviation (SD) above the overall mean score, whereas low reinvesters were selected from a group of participants that scored more than one SD below the overall mean score. A Pearson product moment correlation coefficient was then computed between the reinvestment scores and putting performance differences from pre- to post-stress. The resulting evidence indicated that high reinvesters performed poorly compared to low reinvesters. Evidently, high reinvesters directed conscious awareness to the movement during stressful situations, thereby disrupting automaticity. In contrast, much like implicit motor learners, low reinvesters allowed automaticity to occur leading to an increase in putts made. In summary, Masters has proposed that when stress increases, performance decreases



because increases in reinvestment disrupt automaticity. Caution should be used when interpreting these results because the reinvestment scale was not psychometrically validated prior to this study and may have provided inconsistent results. This extension of the self-focus model has been recently identified as Masters' conscious processing hypothesis and is an appropriate inclusion into self-focus models of choking.

A consistent methodological limitation of "reinvestment" research to date (e.g., Hardy et al., 1996; Masters, 1992), however, has been the assumption that explicit motor learners increasingly reinvest knowledge under stress by evaluating explicit knowledge during post-experiment assessment only. Mesagno and Janelle (2002) acknowledged this limitation and provided evidence for Masters reinvestment prediction by directly assessing explicit knowledge within the low and high stress phases of their experiment, rather than post-experiment. Specifically, Mesagno and Janelle found that explicit motor learners indeed relied more upon explicit knowledge under stress in comparison to implicit motor learners. Explicit motor learners increased explicit knowledge in a post-stress in-task assessment in comparison to pre-stress, thus, directly confirming that reinvestment occurs. Results of this study should be viewed with caution because no significant performance differences were obtained between explicit and implicit motor learning groups.

To investigate further the processes behind self-focused attention and expert performance, Beilock and Carr (2001) sought to document the accessibility of declarative (i.e., formal, rule-based [Anderson, 1987]) knowledge about golf putting with changes in skill level. Beilock and Carr hypothesised that generic knowledge increases as level of skill progresses, whereas episodic knowledge decreases with further expertise. Generic knowledge relates to how the skill is typically executed, incorporating general facts and rules about performance. Episodic knowledge captures an autobiographical record of a

previous performance in a specific situation or context (Beilock & Carr). The difference in generic and episodic knowledge was theorised because highly practiced skills involve more episodic knowledge than generic knowledge and, thus, require less attention to perform. Beilock and Carr found that episodic recollection of specific putts was poor for experts, denoting that skilled putting is encoded in a procedural form that supports performance without the need for constant attentional control and substantiates the contention that self-focusing is not necessary during skilled performance. Thus, execution of movement should remain at an automatic level to facilitate skilled functioning.

Beilock and Carr (2001) also provided support for the self-focus model when participants performed either a golf-putting or alphabetic arithmetic task. In the alphabetic arithmetic task, participants' were asked to solve equations such as " $A + 2 = C$  by counting two units down the alphabet to C" and answer, as quickly as possible, whether the equation was true or false. Participants in each task practiced until reaching a consistent level, then, subsequently performed in a low-pressure and high-pressure condition. The main finding was that choking occurred within the predominantly sensorimotor skill (i.e., golf putting), but was not evident in the cognitive alphabetic arithmetic task. Beilock and Carr suggested, "Choking arises in a task whose underlying knowledge base is thought to be procedural, but not one in which the underlying knowledge base is assumed to be more explicitly accessible" (p. 719). For sensorimotor skills, pressure apparently leads to impractical efforts to consciously control use of more complex, procedural knowledge that already operate automatically. Another conclusion was that three task properties may be involved in choking: task complexity, degree to which task components become proceduralised with practice, and differences in susceptibility to breakdowns under pressure between cognitive and motor tasks.

In a recent study, Wang (2002) tested the self-focus model and expanded choking research by conducting a series of studies regarding gender differences, predictors of choking, coping styles, and perceptions of choking. Wang attempted to identify choking through direct anxiety manipulations, employing a low-pressure (LP) and high-pressure (HP) design to investigate potential gender differences in choking. Forty-six male and 18 female participants filled out a series of psychological questionnaires before participating in a basketball free throw task. No gender differences were evident between the LP and HP condition. Wang also identified that S-C was more likely to negatively affect females' performance and A-trait was more likely to negatively affect males' performance.

Choking is an idiosyncratic and personal experience that may be explored more readily through other scientific genres such as philosophy. Accordingly, in a summary article, James (1998) discussed a philosophical perspective explaining choking as irrational and self-defeating behaviour (i.e., behaviours that result in failure to achieve one's apparent goals and ambitions). James proposed that irrationality typically involves making inferences, holding beliefs, or performing activities counterproductive to the individual's goals or aims. James suggested that self-defeating behaviours involve misdirected beliefs. He agreed with advocates of the self-focus model, that anxiety might direct a person to become self-aware. James proposed that when a person becomes self-aware, increases in self-reactive attitudes promote inward self-focus and are associated with demands on oneself because of others' opinions (James); excessive demands may promote irrationality. For example, a skilled performer, if believing and behaving rationally, would rely on acquired skills for performance execution. Instead, according to James, the irrational performer becomes self-conscious and the irrational belief develops when the person deduces that to perform well, attention to performance execution is

necessary, which is counterproductive to the individual's goals as explained by advocates of the self-focus model of choking. Thus, James argued that when S-A increases, self-reactive attitudes are intensified that cause previously learned skills to be ignored and the person "chokes." The person creates harsh self-reactive attitudes that lead to self-doubt and increases attention to detail, which is typically counterproductive to performance, instead of maintaining confidence in ability level. Thus, instead of executing automatically under pressure, attention is shifted to an unnecessarily controlled execution because thoughts centre around others opinions and irrational self-beliefs.

*Distraction model vs. self-focus model debate.* Recently, investigators have compared and tested these two predominant models of choking (Beilock et al., 2002; Beilock, Bertenthal, et al., 2004; Gray, 2004; Lewis & Linder, 1997). Lewis and Linder evaluated participants executing golf-putts in a low-pressure and a high-pressure condition under a distraction or a self-focus criterion. To induce S-A in the self-focus condition, participants were informed that performance would be filmed and the videotape analysed by a sport psychologist, golf team, and coaches (Lewis & Linder). The distraction group performed golf-putts, while counting backwards from 100 by 2's. Lewis and Linder hypothesised if choking was due to self-focused attention, the addition of a distraction would prevent participants from self-focusing and hence, be less likely to "choke." If choking were due to distraction, however, addition of the distraction would result in choking effects. Lewis and Linder provided support for the self-focus model and explained that choking is more likely to occur when S-A is heightened as illustrated with the self-focused group. Based on choking research, the self-focus model provided a plausible explanation for the decreased performance exhibited in choking, whereas the distraction model was not supported during Lewis and Linder's study.

Although Lewis and Linder (1997) provided preliminary evidence in support of the self-focus model, additional research is necessary in sport to link the self-focus model with choking. In a study to examine the affect of self-focused attention on sensorimotor skills, Beilock et al. (2002) asked experienced golfers to perform golf putting under conditions of dual-task (DT) and skill-focused (SF) attention. In the DT condition, participants attempted golf putting while listening for a “target tone.” After hearing the tone, participants spoke the word “tone” aloud. Participants in the SF condition were asked to “monitor the swing of the golf club” and at the time the club head came to a stop, say “stop” audibly. The DT condition was designed to distract attention and the SF condition was designed to promote explicit monitoring of performance. Beilock et al. found that participants in the DT condition were more accurate, thus indicating that constant attention control may not be necessary (and possibly detrimental) for experts. In Experiment 2, right-footed novice and experienced soccer players dribbled through a slalom course of cones with the dominant foot under DT and SF conditions. Novice players performed quicker when involved in SF conditions, whereas experienced players performed in less time during the DT condition. Beilock et al. indirectly provided support for the proposition that novice players “choked” while being distracted, whereas experienced players “choked” when self-focusing. That is, self-focused attention enhances performance in novices, whereas self-focused attention is not necessary for experienced players. Finally, inexperienced and experienced soccer players performed the same soccer-dribbling task with their non-dominant foot under SF and DT conditions. Beilock et al. determined that both novice and experienced players performed faster under the SF condition. Evidently, for experienced players, the task was not automated with their non-dominant foot compared to their dominant foot. These results again confirmed the effect

that SF attention has on inexperienced performers. When experienced players apply SF attention on skilled movements, detrimental effects may occur.

Similar to Beilock et al. (2002), Beilock, Bertenthal, et al. (2004; Experiment 1) replicated Beilock et al. (2002; Experiment 1), but included novices within the study. Eighteen novice and 18 expert golfers performed 20 golf putts within a single-task condition (i.e., performed the golf putts only), a SF condition (i.e., performed the putts, while “monitoring” their swing), and a DT condition (i.e., performed the putts while listening to tones). Beilock, Bertenthal, et al. confirmed that experienced golfers “choked” when in the SF condition, whereas novice golfers “choked” when in the DT condition. Experiment 2 was designed to reduce the time available to monitor explicit rule-based knowledge in novice and expert golfers. Beilock, Bertenthal, et al. hypothesised that experts under time constraints would perform more accurately because less time was available to attend to skill execution. Participants were randomly assigned into either an accuracy (i.e., performed putts as precisely as possible) or speed (i.e., performed putts within three seconds of set up) condition. Novice golfers performed more accurately with no time constraints, whereas experts performed better with time constraints. Novices, apparently, needed more time to attend to components of the skill, whereas experts’ procedural knowledge allowed performance to occur without monitoring execution.

To extend the results of Beilock et al. (2002) and Beilock, Bertenthal, et al. (2004) into open skill sports, Gray (2004) conducted three studies to determine attentional mechanisms during an open skill (i.e., baseball batting). Experiment 1 and 3 were relevant to the current discussion. In Experiment 1, 10 expert and 10 novice baseball batters performed in a batting simulation, while attending to random tones. Participants completed 100 trials in each of three experimental conditions: extraneous dual-task

(articulate the tone as high or low in sound frequency), skill-focused dual-task (identify position of bat as moving up or down at time of tone), and single-task (ignore the auditory tone). Participants in each DT condition (i.e., skill-focused and extraneous) verbalised their answers immediately after completion of each trial. Novices in the skill-focused and experts in the extraneous task condition similarly decreased temporal swing errors. Experiment 1 provided additional support for Beilock and colleagues contention that experts attending to movement execution decrease performance. In Experiment 3, 12 expert baseball players were randomly assigned into a pressure or control group. The experts completed 2 blocks of 200 trials in a low-pressure and a high-pressure condition under SF and DT conditions. Significantly higher judgment error percentage for the SF group than the DT group and lower error percentage during high-pressure than low-pressure phase were evident. Apparently, the addition of pressure reduced error percentage for the SF group, but had no effect on errors in the DT condition. Gray suggested that the SF group in Experiment 3 provided direct support that the amount of SF attention is greater in expert performers under pressure, which compliments Beilock and colleagues' findings from their golf putting and soccer-dribbling studies. Some caution should be used when interpreting the findings, however, because no direct assessment of the pressure manipulation was provided during Experiment 3.

Researchers have provided strong evidence for the contention that the self-focus model is the main explanation for choking, however, a predicament in investigations of choking models is whether the distraction model and self-focus model are independent of one another. For example, Baumeister and Showers (1986) argued that the distraction and self-focus models are distinct (but could be overlapping). That is, athletes may experience choking due to internal distraction (e.g., negative self-talk), but, at another time, internal

cognitions may cause them to become more self-aware and increase the likelihood of choking. Thus, processes leading a person toward choking are different. If choking occurs due to internal processes, how do researchers know whether choking was due to self-focus or distraction? As will be described in detail, Wang (2002) introduced a model that encompasses the independent parts of the self-focus and distraction model amalgamated into a larger choking model.

*Integrated model of choking.* As part of his doctoral dissertation, using fundamentals of the self-focus and distraction models, Wang (2002) formulated an innovative model that integrates choking within novice and elite athletes. Not widely known within choking literature, the central tenets of Wang's integrated model (Figure 2.1) are experientially, and empirically, based. Wang argued that the self-focus and distraction models do not explain choking sufficiently when individually presented and the integrated model of choking combines aspects of the self-focus and the distraction models. The model proceeds along a number of pathways to the possibilities of choking through the self-focus model, the distraction model, or where choking is not likely to occur. Wang suggested that, initially, stable (i.e., dispositional characteristics) and unstable (i.e., situational emotional states) "causal factors" combine to affect an athlete's perception of pressure. Stable factors (denoted as dispositional causes of choking previously in this chapter), such as S-C and A-trait, are essentially aspects of the individual's personality. Unstable factors (referred to as situational causes of choking earlier in this chapter), such as presence of a video camera and others expectations, are situation dependent. Although cognitive appraisal is ongoing, in pressure situations, stable and unstable factors combine to generate cognitive appraisal of the situation. If the situation is threatening and/or important, increases in perceived pressure occur. Once an elevation of perceived pressure



occurs, the athlete becomes more self-aware, A-state increases, and the significance of performing well increases. To date, researchers are uncertain of the sequence in which these cognitive mechanisms develop and could interact to elicit the importance of performing well. The incipient nature of Wang's integrated model permits refutation and additional research to understand the sequence of these cognitive processes.

The next step, after initial cognitive appraisal and increases in S-A and A-state, is the activation of coping mechanisms to deal with heightened pressure. Wang (2002) suggested that two possible coping strategies (i.e., approach or avoidance coping) might be used to deal with the pressure situation. Approach coping refers to directing cognitive and behavioural efforts toward reducing anxiety intensity and increasing attention on attending to situation-relevant characteristics. Athletes who use approach coping take direct action (e.g., increase effort, obtain information to solve the dilemma, or attempt to explain the source of anxiety). Approach coping strategies may be ineffective for pressure situations because direct information regarding the pressure is irrelevant to performance and directly contradicts Nideffer's (1992) view of maximising performance. Conversely, avoidance coping refers to directing activity away from the threat-related stimulus. Athletes who use avoidance coping may ignore pressure-inducing information, such as potential distracters, and maintain a task-relevant focus. Thus, Wang suggested avoidance coping should be used to decrease the likelihood of choking. Approach coping when applied to effort-dominant tasks, however, has the same performance effect as avoidance coping strategies. Effort-dominant tasks are supported by a conscious organising of exertion, often possessing a strong reliance on elements of physical fitness (e.g., strength, speed), and aided by motivation and trying hard (Wang). Thus, avoidance coping in effort-dominant tasks diverts attention to increased effort and reduces the likelihood of choking.

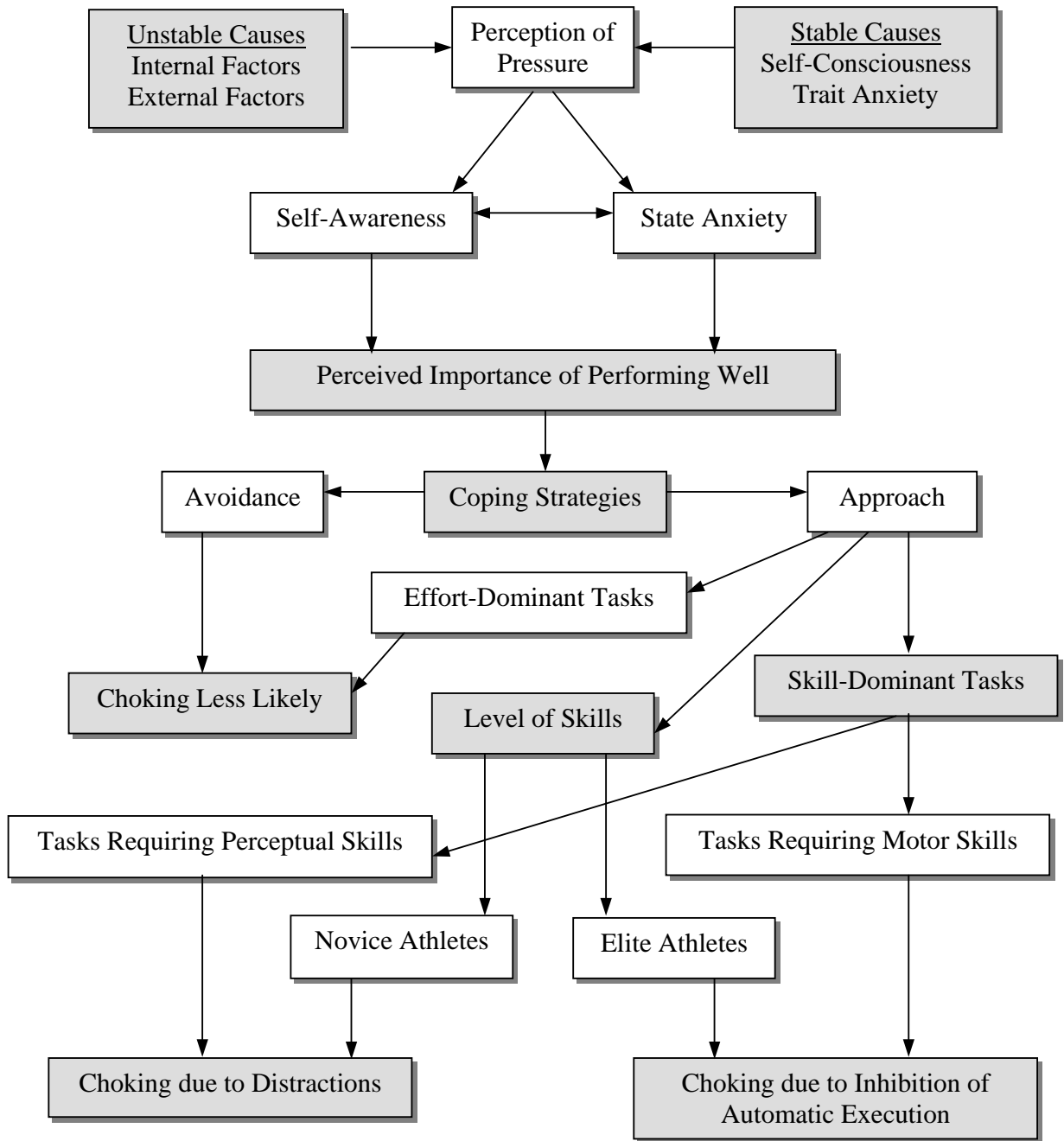


Figure 2.1. Integrated model of choking in sport. Reproduced from Wang (2002) with permission.

As Wang’s (2002) model indicates, approach coping usually leads to choking in pressure situations. Nonetheless, the occurrence of choking may depend on task characteristics, mainly type of skill (i.e., skill-dominant or effort-dominant) and skill level

(i.e., novice or elite). Skill-dominant, unlike effort-dominant, tasks require sophisticated perceptual and attention control, as well as sufficient motor skills that become automated with learning. If a skill-dominant task that requires refined perceptual skills is performed (e.g., clay shooting or volleying in tennis), choking may be due to distraction. Perceptual skills are cognitive processes used to understand information from the senses. For tasks predominantly requiring a response to information cues (i.e., perceptual processes), performance would largely involve perceptual skills. If performers have inadequate perceptual cues or do not obtain enough perceptual information, decision-making may not match task demands. For example, volleying in tennis requires both the motor ability to perform volleys and advanced perceptual skills to anticipate and react to the ball movement. Arguably, well-developed perceptual skills may be the predominant skill needed, as volleying requires quick attentional shifts to perform well.

If a skill-dominant task that requires well-developed motor skills is performed (e.g., golf-putting), choking may occur because of inhibition of automatic execution. When motor skills are well learned, performance on these tasks is normally of a high standard. The ability to perform these tasks automatically, without conscious control, is important for successful execution. As Nideffer (1992) explained, golf putting requires a narrow-external attentional focus on the golf ball until the stroke is completed. Attention is primarily on performing the motor skill, rather than shifting attention to perceptual information. According to advocates of the self-focus model (Baumeister, 1984; Beilock & Carr, 2001; Masters, 1992) of choking, performing motor skills may permit more time athletes to actually shift attention internally and contemplate the correct movement, increasing the probability of choking. Thus, choking may be due to inhibition of automatic execution because the task is based on motor ability allowing for additional conscious

processing of information. The other task variable that may contribute to the likelihood of choking is the athletes' skill level. Wang (2002) did not clearly define novice and elite athletes, therefore, due to recent research involving skill level and choking (e.g., Baumeister; Beilock & Carr; Beilock, Bertenthal, et al., 2004; Beilock et al., 2002; Hall, 2004; Masters), I have interpreted novice athletes as those in the cognitive stage of learning and elite athletes as those in the autonomous stage of learning (i.e., expert). Wang hypothesised that, for novices, choking might be due to distraction because of inexperience with attentional selectivity, whereas, for experts, choking may be due to inhibition of automatic execution because attention is diverted to S-A when anxious, increasing the likelihood of choking. Wang's integrated model of choking was developed from quantitative research (e.g., Baumeister; Beilock & Carr; Beilock et al., 2002; Lewis & Linder, 1997; Masters), although additional research is necessary to verify and support the model.

#### *Developing Trust in Skill Execution*

As previously stated, skill development progresses from consciously controlled processing to automatic, effortless performance (Schneider & Shiffrin, 1977). With dedicated practice, the ability to trust execution should develop. Moore and Stevenson (1991, 1994) defined trust, in this context, as letting go of tendencies to conscious control, allowing automatic processes to develop through training. Advocates of the self-focus model (e.g., Baumeister, 1984; Beilock & Carr, 2001; Masters, 1992) have suggested that skill execution with cognitive interference may be counterproductive, especially when anxiety is increased, because trusting may be overruled by dispositional characteristics, such as S-C. Athletes who lack trust in their skill (or development) revert to controlled

processes in order to assist execution and thus use “reinvestment” (Masters et al., 1993) or “deautomatization” (Deikman, 1969), and do not allow the skill to advance automatically.

Moore and Stevenson (1991) suggested that breakdowns in trust could occur at two main levels: during selection of movement sequences or during program execution. At times, with closed skills, a number of factors should be considered for optimal skill execution. In golf, for example, wind direction, distance to the green, and club selection are important in determining the amount of swinging power for the selected club. A breakdown in trust during selection of movement sequence occurs when excessive cognitive activity occurs during the selection and execution process. Similarly, breakdowns in trust occur during program execution, when conscious control interferes with proper movement execution. Moore and Stevenson identified three examples of breakdowns in program execution: aiming, pressing, and controlling. Aiming is excessive concern with the target; once aiming occurs, likelihood of fear of missing the target increases. Pressing is unwarranted tension in an attempt to generate more force. Trying too hard may be a form of pressing. Controlling is an attempt to exert excessive control over execution. Controlling during program execution is relevant to the self-focus model and prevents the athlete from fully trusting execution of the skill. Breakdowns in trust may be viewed similarly to reinvestment, although differences exist. In the absence of trust, automaticity is not reliable during either pressure or non-pressure situations. Reinvestment, however, is excessive attention to self and constant processing of movement execution during pressure situations only. Trust (or lack of trust) may occur at any skill level providing that skill proficiency is dominant, whereas reinvestment is associated with high-level performance with needless S-A under pressure. With reinvestment, explicit processes may be elicited to aid performance, whereas with

breakdowns in trust, conscious control may result in excessive concern with the target or excessive tension. Reinvestment and trust will not occur concurrently under pressure because reinvestment occurs when there is an absence of trust. Simply put, in any situation, one either trusts or does not trust (Moore & Stevenson); under pressure, one either trusts or “reinvests.”

Realising excessive rule-based information about skill execution may lead to self-doubt, nervousness, and momentary failures in concentration, Gallwey (1974, 1979) developed a fundamentally different approach to coaching in tennis and golf. Gallwey recognised that standard coaching methods, emphasising rule-based skill acquisition, frequently place unnecessary anxiety on performers and allow insufficient time to process information. Using basic tenets of motor learning and psychology, such as modelling, imagery, practice conditions, and brain hemisphere functioning, Gallwey encouraged the development of relaxed, effortless concentration through an “inner game” technique. Trust is an underlying technique incorporated in Gallwey’s system.

To introduce trust, Gallwey (1974, 1979) dichotomised the mind into two modes of consciousness: Self 1 and Self 2. Based on scientific explanations of brain functioning, Gallwey (1974) explained that Self 1 is mental interference that inhibits both right- and left-brain functioning. Self 1 calculates and computes all aspects of skill execution in order to control movement and ensure proper execution. Self 1 is usually most helpful at beginning stages of learning because conscious attention helps improve the basic development of the sequence of movements. As skill develops, the role of Self 1 should diminish considerably. Self 2 is the total human organism, the body itself. Self 2 coordinates skill execution without conscious effort and produces complex movements with effortless fluidity. Traditional coaching techniques emphasise Self 1, whereas Self 2

development may be encouraged by sport psychology techniques, such as imagery and modelling. Within Gallwey's inner game approach, therefore, modelling and imagery are provided instead of explicit coaching techniques for skill development. By using the inner game approach, the athlete develops skill with less self-doubt and cognitive involvement, which allows the athlete to trust more effectively. Hardy and Ringland (1984) provided the only study conducted on the inner game approach. Adult beginning badminton players were randomly assigned to a traditional instruction group and an inner game instruction group. The traditional instruction group received eight weeks of instruction "by the book" whereas the inner game instruction group received eight weeks of demonstrations followed by practice routines. Participants in the inner game group were asked to observe the demonstration, concentrate on the body position and arc of the shuttle, and then clearly image the shot. Hardy and Ringland found that Gallwey's inner game approach was effective under empirical testing. This suggests that more implicit coaching styles should be used to increase trust and decrease self-focus under pressure. This study should be viewed with caution, however, as a number of limitations were involved. For example, the total number of participants was not explicitly stated in the study and the dependent variable was the number of wins recorded by each player, which may be dependent on other external factors such as opponent's ability level.

Although research dedicated to understanding choking has been minimal in comparison to other sport psychology constructs, such as self-efficacy and A-state, research on choking has increased in the past 25 years. Within the past 15 years in particular, researchers have presented considerable evidence primarily focusing on choking models. In an early review of choking research, Baumeister and Showers (1986) suggested that the debate on whether the self-focus or distraction model best explains

choking must be resolved before choking intervention research could be commenced. As support favouring the self-focus model has accumulated, interventions to ameliorate choking can now be empirically tested.

#### Suggested Choking Interventions

Understanding choking models and factors related to choking does not necessarily translate into prevention of choking at the applied level. Although many suggestions have been proposed regarding choking interventions (e.g., Anshel, 1995; Hall, 2004; Nideffer & Sagal, 2001), to date, applied sport psychology techniques have not been widely discussed or empirically tested to facilitate performance under pressure. Anshel, for example, proposed psychological and behavioural methods to inoculate athletes against choking. Cognitive restructuring, thought stopping, and encouraging athletes to maintain realistic expectations have been discussed, but from a somewhat generic perspective. Anshel also proposed behavioural methods, such as developing performance routines and focusing externally, to deal with pressure. Researchers (e.g., Beilock & Carr, 2001; Lewis & Linder, 1997) have also included interventions as secondary components in published studies. For example, Lewis and Linder used a video camera to simulate and familiarise participants with pressure. Lewis and Linder hypothesised that, if adaptation to performing under pressure is trained, the performer have adapted to the increased S-A under pressure. The hypothesis was confirmed with the S-A adapted group performing more accurately in golf putts than a non-adapted S-A group. Adapting athletes to increased S-A, as suggested by Lewis and Linder, however, may be counterproductive, creating a conditioned response for athletes to increase S-A under pressure. The aforementioned inoculation studies were not the main focus of their investigations, thus, empirical examinations are still needed to identify potential choking interventions.



### *Potential Choking Interventions*

Researchers have investigated various applied sport psychology techniques in an attempt to enhance performance, however, interventions have not yet been empirically tested and applied to pressure situations. Hall (2004) conducted a recent investigation, in part, to determine potential choking interventions. Thirteen sport psychologists and sport psychology researchers, who had published in peer-reviewed journals on choking, agreed to participate in in-depth interviews regarding choking interventions. A variety of interventions, based on the distraction and self-focus models, were identified and discussed. Preventative techniques were suggested to stop choking from occurring, whereas recovery techniques proposed the use of recovery techniques after the onset of choking behaviour. Hall based her recommended interventions on the underlying reasons for choking (e.g., attention- or anxiety-based), and included pre-performance routines, self-talk regulation, simulation training, relaxation techniques, and thought stoppage as potential interventions. Although a literature review of potential interventions is warranted, due to word limit constraints, I have decided to only discuss the two interventions germane to the studies in this dissertation.

*Pre-performance routines.* A pre-performance routine may help to maintain task-relevant attention and performance consistency. Crews and Boutcher (1986a) defined a pre-performance routine, or synonymously a pre-shot routine (PSR), as “a set pattern of cue thoughts, actions and images consistently carried out before performance of the skill” (p. 291). A decade later, Moran (1996) substantiated the definition by explaining that a PSR is a sequence of task-relevant thoughts and actions an athlete systematically engages in prior to performance of a sport skill. Cognitive and behavioural components assist in producing correct mental and physical organisation prior to performance execution. Pre-

performance routines can be applied to closed-skill sports (i.e., sports performed in a stable, unchanging environment during skill execution) or open-skill sports (i.e., sports performed in an unstable, changing environment during skill execution), but are generally used to prepare for self-paced skills. Using a PSR is commonplace in self-paced tasks, such as putting in golf, free throw shooting in basketball, serving in tennis, and execution of a ten-pin bowling delivery.

Anecdotal support for the efficacy of using PSR's in self-paced tasks originates from both self-report and observational studies. Crews and Boutcher (1986a) provided initial empirical evidence by monitoring the PSR of female professional golfers in tournament play. The players' pre-putt and pre-shot behaviours were consistent over several hours of play. Dividing the players into two groups based on professional rank provided further evidence for the positive influence of the PSR. Crews and Boutcher found significant differences between the two groups with lower ranked (more successful) players taking more time on full swings and putts than higher ranked (less successful) players. Crews and Boutcher proposed that successful players applied consistent routines and took more time on swings than less successful players and this may be indicative of better mental preparation techniques, such as imagery and concentration.

Researchers have provided equivocal results on the effectiveness of a PSR for different skill levels. For example, researchers have provided empirical support that a PSR assists novices with sport performance (Beauchamp, Halliwell, Fournier, & Koestner, 1996; Crews & Boutcher, 1986b; McCann, Lavalley, & Lavalley, 2001); however, the effectiveness of a PSR for experienced athletes has been mixed (e.g., Boutcher & Crews, 1987; Cohn, Rotella, & Lloyd, 1990; Kingston & Hardy, 2001; Lobmeyer & Wasserman, 1986; Marlow, Bull, Heath, & Shambrook, 1998). Cohn et al. examined the effects of a

cognitive-behavioural intervention on three male collegiate golfers during competition. The intervention was designed to increase adherence to a mental and behavioural PSR. The first step of the intervention was a behavioural treatment in which proper alignment to the target was assessed. The second step was to teach the golfer cognitive components to a routine that would facilitate proper execution of shots. A multiple-baseline design was used with an interview following the completion of the multiple-baseline phase. Cohn et al. reported the intervention increased PSR adherence, but there was no immediate performance increase. Participants expressed immediate subjective improvements in unobservable, mental skills, such as concentration and confidence, during the study. Although not directly observable in the number of strokes per round, participants emphasised a perception of improvement in reference to preliminary performance. A four-month follow-up verified an improvement in all three players' performances. Marlow et al., also using a multiple-baseline design, provided immediate support that employing a PSR prior to a water polo penalty shot improved performance. Three experienced water polo players completed three trial blocks of five penalty shots each over an 8-week period. Participants' accuracy was measured on an 11-point scoring scale, ranging from 0 for a complete miss to 10 for a perfect goal. During the trial blocks, the intervention was introduced with a staggered multiple-baseline. Participants were instructed regarding the personalised PSR, comprising of a concentration cue, relaxation, imagery technique, and a cue word to facilitate performance. After the PSR was implemented, the 3 participants accuracy increased by between 21% and 28% (Marlow et al.). Performance improvements, however, may not be the only positive outcome to PSR development. Researchers have also established a number of additional positive outcomes when using a PSR, including lower arousal levels (Boutcher & Crews), increased intrinsic motivation

and reduced negative introspection (Beauchamp et al.), and increased attention to task (Cohn et al.).

A number of researchers (e.g., Anshel, 1995; Bartholomew, 2003; Dale, 2004) have posited that a PSR is a suitable intervention for pressure situations. Dale proposed that, by using a PSR, athletes might experience and perceive more control over the pressure situation, and may manage the pressure more effectively. The individual's belief of control over what is happening may have anxiety-reducing benefits (Bandura, Cioffi, Barr-Taylor, & Brouillard, 1988). The perception of control may reduce anxiety even though actual control of the situation is not possible (Averill & Rosenn, 1972). In addition, Dale posited that regular PSR modification might be important to reduce the likelihood of automaticity of the PSR. When the PSR remains accessible to attention, less attentional resources are available to process irrelevant information, indirectly increasing the likelihood of task-relevant focus and continued proficient performance.

Researchers (e.g., Baumeister, 1984; Masters, 1992) have found that an increase in S-A is a factor that contributes to choking effects, therefore, examining applied sport psychology techniques that may assist athletes in decreasing S-A under pressure would be helpful. Researchers (e.g., Beilock et al., 2002; Lewis & Linder, 1997; Masters, 1992) have found that having experienced athletes use a dual-task (DT) reduces the likelihood of self-focusing and improves performance under pressure. The DT paradigm is a research method wherein participants perform two tasks concurrently. In the DT approach, researchers note the degree of interference caused by one task, while simultaneously performing another. An example of a DT is an experienced basketball player monitoring other players' movements, while dribbling a basketball. The basketball player is capable of performing two tasks concurrently because one task, dribbling the basketball, is

essentially automatic, so available attentional resources can be directed to other information. The DT paradigm may be beneficial within choking intervention studies because DT's could decrease the likelihood of self-focusing under pressure. The DT's used in choking research (e.g., counting backwards from 100 by 2's), however, may not be practical for diverting attention under pressure because, in actual competition, athlete's should not be expected to verbalise tones (Beilock et al.) or numbers (Lewis & Linder) during performance, similar to DT's in research. For example, a tennis player should not be expected to articulate numbers while serving in a competition to simulate a DT. Thus, sport psychologists should create practical, empirically-tested methods of overcoming self-focusing under pressure.

*Music.* Accounts of music in athletic performance are mainly associated with music as an aspect of pre-competition routines. Depending on the content and style, listening to music may “psyche-up”, motivate, or relax athletes prior to competition. Listening to music before competition may, thus, help to regulate arousal or mood. Researchers investigating the effects of music have focused mainly on physical activity and exercise (e.g., Anshel & Marisi, 1978; Copeland & Franks, 1991; Ferguson, Carbonneau, & Chambliss, 1994) and have principally overlooked the potential benefits of music on sport performance. For instance, a perusal of music research between 1990 and 2004 indicated only one article dedicated to directly examining the effects of music during sport performance. Pates, Karageorghis, Fryer, and Maynard (2003) examined the effects of a music intervention on the perception of “flow” states and shooting performance in netball. Three experienced netball players performed 12 blocks of netball shooting, each comprising 12 shots within a single-case multiple-baseline design. Immediately before, as well as during, the intervention phase, participants listened to music to promote feelings of

flow and to possibly enhance performance. Participants selected their own music “to overcome the numerous problems associated with externally imposed selections within experimental work” (Pates et al., p. 420). Pates et al. found that the music intervention enhanced netball performance and also triggered emotions and cognitions related to flow.

The potential benefits of music on physical activity may be physiological, affective, or psychophysical. Although the physiological and mood-enhancing advantages of using music are fundamental, the psychophysical rewards of music may be central to sport anxiety research and the current dissertation. To illustrate the psychophysical benefits, Karageorghis and Terry (1997) expressed three main hypotheses (i.e., music narrows the performer’s attention, music alters arousal, and music provides a rhythmical element in which individuals may be predisposed to respond) regarding the effects of music in sport and exercise, of which the first two may be directly related to this dissertation. First, music narrows and diverts the performer’s attention away from sensations of fatigue during exercise. Anshel and Marisi (1978) argued that when physical activity is commenced, attention might be allocated to a number of resources (e.g., environmental distractions, internal movements). As individuals persist with the physical activity, eventually less attentional resources are available to process other information because individuals become fatigued and attention is allocated to the primary attention-demanding resource (i.e., feelings of fatigue). If a second attention-demanding resource is added, such as music, perception of fatigue is decreased because attention is allocated to enjoyment of music and less attentional space is available for processing information about fatigue.

To illustrate Anshel and Marisi’s (1978) diversion of attention hypothesis in a sport context, Greg Louganis, one of the most decorated Olympic divers in U.S. history,

provided examples of using music before and during dives to focus attention on the rhythm of the dive and performing well. Louganis (1995) explained,

As I waited at the bottom of the ladder for my turn, I went through my dive in my head, visualising each step and playing music in my head to the beat of the dive. Most of the time I dove to “If You Believe” from *The Wiz*... My dive was announced, and I walked to my starting point on the springboard, got into place, took a deep breath, and told myself to relax. I took the first step, the second step, the third step, and the fourth step, all to the beat of the music from *The Wiz* that only I could hear. (p. 3-4)

Using music was a means of focusing attention on the rhythm of the dive. Concentrating on the music allowed Louganis to focus attention on the dive and diverted attention away from distracting thoughts.

As expressed in the quote by Greg Louganis, music may assist in focusing attention on the rhythm of the task. Although not directly related to choking per se, Greg Louganis' example provides a generic point associated with using the rhythm of the dive as a means of performing successfully under pressure. According to the self-focus model, as anxiety and arousal increase, athletes allocate attention to the primary attention-demanding resource (e.g., anxiety and self-focused attention), which may be detrimental to performance (Baumeister, 1984; Masters, 1992). If, however, a second attention-demanding resource is added, such as music, and attention is allocated toward listening to the words of the music, then less attentional space is available to process other information. With less attentional space, the athlete may decrease attention to anxiety and tendencies to self-focus, enhancing performance.

Karageorghis and Terry's (1997) second hypothesis was that music could alter psychomotor arousal during physical activity. Apparently, the auditory stimulation of music functions as a stimulant or sedative prior to or during physical activity (Smith & Morris, 1976, 1977). Sport psychologists may recommend the use of stimulating music to increase vigour preceding competition, whereas sedative music may be recommended to overanxious athletes in preparation for competition. As athletes respond to music in different ways, sport psychologists should continue to investigate the effects of music on arousal. Terry (2004) provided a robust justification for the enhancing effects of music in a sport context by illustrating the positive performance effects music had on athletes during the 2000 Sydney Olympics. In the review article, Terry gave examples of many athletes that used music within a pre-competition routine to regulate mood and arousal; music was particularly helpful in maintaining pre-competition focus, positive mood, and appropriate arousal level. Researchers have also found that well-chosen asynchronous (background) music has the potential to generate significant mood improvements (Boutcher & Trenske, 1990). With researchers suggesting music positively affects mood, music may be a therapeutic means of arousal control. As arousal levels may be a fundamental component of choking, providing music as an intervention to control arousal levels may assist athletes' during performance under pressure. Finally, Karageorghis and Terry also explained that individuals might have a predisposition to respond to rhythmical elements of music during continual submaximal activity, which may benefit sport and exercise activity.

#### The Present Dissertation

Based on the review of literature, the purpose of the present dissertation was to examine the extent to which psychological inventories predict non-choking and choking



behaviour. To investigate this, there were three aims: to examine whether psychological inventories predict CS and CR behaviour, to understand psychological characteristics of CS and CR athletes, and to investigate whether two interventions may alleviate choking. To investigate the aims, I conducted three interconnected studies with similar procedures for data collection. In the last decade, single-case design (SCD) research has become more common and is being used in sport psychology research. To illustrate the advantages that SCD research may have for sport psychology research, two types of SCD methods (i.e., A-B-A and A-B-A-B design) were used in conjunction with qualitative research to provide a robust and rich empirical investigation of choking. Specifically, I used a single-case A-B-A design in Study 1 to test whether choking and non-choking behaviour (e.g., performance improvements) could be predicted, using established personality inventories for CS and CR athletes. In addition, a secondary purpose was to identify characteristics of CS and CR athletes using qualitative research. Studies 2 and 3 were designed to propose and evaluate strategies to alleviate choking, using task-relevant information to focus attention appropriately and to decrease the likelihood of self-focusing, based on the distraction and self-focus model of choking. In Studies 2 and 3, I used single-case A-B-A-B designs to determine whether selected interventions can ameliorate choking effects. In Study 2, I examined whether a PSR could decrease the likelihood of choking. A PSR was selected so participants could use task-relevant information in the PSR while disregarding task-irrelevant thoughts. In Study 3, I investigated whether listening to the words of music assiduously would facilitate performance under pressure. As advocates of the self-focus model (e.g., Baumeister, 1984; Beilock & Carr, 2001; Masters, 1992) delineate, heightened anxiety may increase the probability that athletes increase S-A and control movement mechanics, subsequently decreasing performance. Thus, listening to the words

of music could potentially decrease attentional space and the propensity to become self-aware, allowing automaticity to develop and increasing performance.

## CHAPTER 3

### STUDY 1: PREDICTING CHOKING AND NON-CHOKING BEHAVIOUR

#### Introduction

Athletes react distinctively to pressure and consequently exhibit diverse coping strategies. Some athletes perform well under pressure and in colloquial terms “step up to the challenge,” whereas others experience debilitating anxiety and perform poorly. The poor performance can result in the media speculating that the athlete has succumbed to choking. Based on Hall and Wang independent definitions, choking is defined as a critical deterioration in the execution of habitual processes as a result of an elevation in anxiety levels under perceived pressure. Researchers (e.g., Baumeister, 1984; Nideffer & Sagal, 2001; Weinberg & Gould, 1999) have agreed that, if an athlete perceives a situation as important, choking is likely to occur because of changes in anxiety (Masters, 1992), attention (e.g., Baumeister; Nideffer, 1992), or a combination of anxiety and attention (Drinan et al., 2000). The causes and characteristics that may predispose athletes to choking help sport psychologists prevent and possibly predict when choking may occur. Dispositional characteristics that have been researched and identified as possible predictors of choking include self-consciousness (S-C), trait anxiety (A-trait), and coping styles (see Chapter 2 for relevant references). Confirmation regarding how these characteristics predict choking should assist sport psychologists to determine the likelihood of some athletes to experience choking. Thus, potential predictors may help in identifying athletes as either choking-susceptible (i.e., more likely to experience choking) or choking-resistant (i.e., less likely to experience choking). The focus of Chapter 3 is to report on a study designed to examine whether choking and non-choking behaviour could

be predicted, using a battery of psychological inventories measuring S-C, A-trait, and coping style.

### *Self-Consciousness and Choking*

One mediator that has received considerable attention in choking literature is S-C. A number of researchers have examined the relationship between S-C and performance (e.g., Baumeister, 1984; Heaton & Sigall, 1991; Kurosawa & Harackiewicz, 1995), however, results to date, have been somewhat equivocal. In social psychology research, for example, Baumeister found that participants low in S-C performed worse under pressure than individuals high in S-C. Baumeister asserted that individuals low in S-C might be more susceptible to choking because an inward attentional focus, precipitated by performance pressure, was uncharacteristic. This inexperience with self-reflection, at a time when conscious monitoring should be superfluous, disrupts movement execution and decreases performance (Baumeister). Sport psychology researchers (e.g., Masters et al., 1993; Wang, Marchant, Morris, & Gibbs, 2004), conversely, have found that individuals high in S-C performed poorly under high pressure. The propensity to focus inwardly may affect highly self-conscious individuals more negatively under pressure because they are chronically conscious of potential distracters. It seems that sport psychology researchers have provided more evidence in favour of high S-C, rather than low S-C, leading to choking. The reader is referred to Chapter 2 for a more detailed discussion of S-C and choking.

### *Trait Anxiety and Choking*

Although, at present, a minimal amount of research has been conducted, another hypothesised predictor of choking is trait anxiety (i.e., A-trait). Of the three proposed predictors of choking (i.e., S-C, A-trait, and coping styles), perhaps A-trait is the most

obvious predictor because anxiety has been consistently linked with poor attention selection and performance. Test anxiety researchers have confirmed that individuals high in A-trait react to pressure situations with greater levels of A-state than individuals low in A-trait (Spielberger et al., 1976). In mainstream psychology research, Byrne and Eysenck (1995) reported that high A-trait individuals performed poorly under pressure because they respond to pressure with elevated A-state more frequently or more intensely than low A-trait individuals. In sport psychology research, Wang, Marchant, Morris, and Gibbs (2004) found that A-trait was a significant predictor of choking, with somatic A-trait being highly correlated with poor performance under pressure. Evidently, individuals high in A-trait are more likely to experience elevations in A-state and may also respond with increased S-A. Thus, it seems that high A-trait may lead to choking. The reader is referred to Chapter 2 for a more detailed discussion of A-trait and choking.

#### *Coping Styles and Choking*

Another potential predictor of choking that has received even less attention than the previous two predictors is coping style. Generally, approach and avoidance coping have been examined to determine whether coping styles potentially predict choking. Approach coping involves focusing on problem solving by using direct effort, whereas avoidance coping is typically used to direct activity away from the threat-related stimulus (Anshel & Weinberg, 1999). In a sport context, athletes who employ approach coping, actively attempt to understand the pressure, whereas athletes who use avoidance coping maintain attentional focus and address the next task (Anshel, 1996). In a recent study, Wang, Marchant, and Morris (2004) found approach coping to be associated with choking. Wang et al. explained that approach coping might increase perceived threat. Those who actively seek to reduce anxiety divert attention to irrelevant cues, decreasing task focus. Thus, low

S-C, low A-trait, and avoidance coping are predicted to be associated with choking-resistant (CR) athletes, whereas high S-C, high A-trait, and approach coping are likely to be related to choking-susceptible (CS) athletes.

Although Hanrahan (1996) suggested choking is not easily predicted, the primary purpose of the current study was to investigate whether choking and non-choking behaviour can be predicted using established psychological inventories. It was expected that participants categorised as CR would display non-choking behaviour, whereas participants categorised as CS would exhibit choking behaviour. A subsidiary purpose was to examine process issues in choking and non-choking behaviour, including coping strategies, cognitions, emotions, and behaviours. Identifying cognitions used in pressure situations by CR and CS athletes would assist in recognising and developing suitable choking interventions, for planned later studies.

## Method

### *Participants*

Forty-six experienced female netball players, between the ages of 17 and 26 ( $M = 19.53$ ,  $SD = 1.90$ ), completed three psychological inventories (see *Procedure* and *Design* section for more information) in order to purposively sample a small number of CS and CR participants (i.e., four in each group) for more intensive study (see *Procedure* section for more information about selected participants). Potential participants had a minimum of 5 years experience and had played as either a goal shooter or goal attack (the two shooting positions) for at least 3 years in the last 5 years. A demographic questionnaire was completed prior to testing to ensure participants met these requirements (see Appendix A).

### *Task*

Participants attempted netball shots from a distance of 2.44 m (8 ft) from the inside edge of the goal post to shooting line. The distance was determined based on pilot data and consultation with an elite netball coach, and was deemed to be a reasonable shooting distance within the 4.90 m (16 ft) radius of the goal circle (Netball Victoria, 2003).

### *Equipment and Specifications*

Standard netballs and goals were used according to Netball Australia specifications. Readers who are unfamiliar with netball are referred to Appendix B for further information. According to Netball Australia (n.d.), the recommended regulation full size netball has a circumference of approximately 0.69 to 0.71 m (27 to 28 in) and weighs approximately 400 to 450 g (14 to 16 oz). Full-size netballs are approximately three-quarters the size and slightly lighter than full-size basketballs. A goal post with a suspended steel ring measuring 0.38 m (14.96 in) in internal diameter from a height of 3.05 m (10 ft) from the floor to the bottom of the ring was used (Netball Victoria, 2003). During the pressure phase, a Sony video camera was used to record participants' shot attempts (see Appendix C for a diagram).

### *Measures*

Four psychological inventories were used to measure self-consciousness (i.e., S-C), trait anxiety (i.e., A-trait), coping styles, and state anxiety (i.e., A-state). All of these measures have been used in choking research (e.g., Baumeister, 1984; Masters, 1992; Wang, 2002).

*Self-consciousness.* The Self-Consciousness Scale (SCS; Fenigstein et al., 1975; Appendix D) is a 23-item questionnaire used to measure three distinct subscales of S-C on a 4-point Likert scale, ranging from 1 (*extremely uncharacteristic*) to 4 (*extremely*

*characteristic*). Ten items measure private S-C, “*I’m generally attentive to my inner feelings*”, seven items measure public S-C, “*I usually worry about making a good impression*”, and six items measure social anxiety, “*I get embarrassed very easily.*” Total scores range from 23 to 92, with higher scores indicating higher S-C. Fenigstein et al. reported high reliability coefficients for the subscales,  $r = .84$  for public S-C,  $r = .79$  for private S-C, and  $r = .73$  for social anxiety. A substantial body of evidence has supported the reliability and validity of the SCS (Buss, 1980; Carver & Glass, 1976; Carver & Scheier, 1981). Masters et al. (1993) suggested and Wang, Marchant, Morris, and Gibbs (2004) verified that S-C is a predictor of choking, thus, the private and public S-C components of the SCS were used and the social anxiety questions were excluded. Masters et al. also omitted the social anxiety questions to evaluate the effects of S-C on performance.

*Trait anxiety.* Trait anxiety was assessed with the Sport Anxiety Scale (SAS; Smith, Smoll, & Schutz, 1990). The SAS (Appendix E) was used to measure two cognitive factors, worry and concentration disruption, and one physiological factor, somatic anxiety. The SAS consists of 21 statements in which individuals describe how they usually feel prior to or during competition. Statements are based on a 4-point Likert scale, ranging from 1 (*not at all*) to 4 (*very much so*). Examples of statements from the questionnaire that correspond to the respective factors include: “*I have self-doubts*” (cognitive anxiety/worry), “*My mind wanders during sport competition*” (concentration disruption), and “*My body feels tense*” (somatic anxiety). Total scores range from 21 to 84 with lower scores indicating low susceptibility to experiencing anxiety. The SAS has undergone rigorous validation procedures (e.g., Dunn, Causgrove-Dunn, Wilson, & Syrotuik, 2000; Smith et al., 1988, 1990), with Dunn et al. reporting internal consistency results with Cronbach’s



alphas being  $\alpha = .87$  (cognitive anxiety),  $\alpha = .88$  (somatic anxiety), and  $\alpha = .69$  (concentration disruption). The SAS has also been extensively used in sport anxiety research. Dunn et al.'s exploratory and confirmatory factor analyses illustrated that two SAS questions, Question 14 - "*I have lapses in concentration because of nerves*" and Question 20 - "*I'm concerned I won't be able to concentrate*", did not load on the concentration disruption factor. Dunn et al. proposed that the "two items make particular reference to aspects of anxiety... Items 14 and 20 measure an athlete's susceptibility to lose concentration as a function of trait anxiety" (p. 191). Thus, during the current dissertation, Questions 14 and 20 were included within the cognitive anxiety subscale, rather than the concentration disruption subscale.

*Coping style.* The Coping Style Inventory for Athletes (CSIA; Anshel & Kaissidis, 1997) is a 16-item questionnaire used to measure participants' individual coping strategies on a 5-point Likert scale, ranging from 1 (*very untrue*) to 5 (*very true*). The CSIA (Appendix F) was used to measure participants' tendency to use approach or avoidance coping styles in pressure situations. Total scores range from 8 to 40 on each of the two subscales (i.e., approach and avoidance coping) with higher scores indicating a greater propensity to use that particular coping style. The two dimensions, comprised of eight questions each, were adapted from a previously-validated scale of approach and avoidance coping (Roth & Cohen, 1986). An example of an approach coping statement is "*I tried to analyse the reasons for the unpleasant experience*" and an example of avoidance coping is "*I immediately turned my attention to the next physical task at hand.*" Kaissidis-Rodafinos, Anshel, and Porter (1997) reported that the CSIA has acceptable internal consistency, with Cronbach's alphas of  $\alpha = .79$  and  $\alpha = .84$  for the approach and avoidance scales, respectively.

*State anxiety.* The Directional Modification of the Competitive State Anxiety Inventory-2 (DM-CSAI-2; Jones & Swain, 1992) was also used in this study. The CSAI-2 (Martens et al., 1990) measures how anxious an individual feels at a given moment in time (i.e., intensity levels). The CSAI-2 (Appendix G) consists of 27 self-report statements designed to measure three components of A-state: cognitive anxiety, “*I am concerned about losing*”, somatic anxiety, “*I feel jittery*”, and self-confidence, “*I feel secure.*” The focus of the current study is related to anxiety responses, thus, cognitive and somatic anxiety components were used and the self-confidence questions were excluded. Other researchers (e.g., Hanton & Jones, 1999; Krane, 1993; Woodman, Albinson, & Hardy, 1997) have also omitted the self-confidence questions in order to evaluate cognitive and somatic anxiety only. Each participant was instructed to respond to the 18 items in accordance with how they felt “at the present moment.” Intensity level responses for each item were scored on a 4-point Likert scale, ranging from 1 (*not at all*) to 4 (*very much so*). The CSAI-2 has undergone rigorous validation procedures (Martens et al.) and has been extensively used in sport anxiety research. Martens et al. reported that Cronbach’s alpha reliability coefficients ranged from  $\alpha = .79$  to  $\alpha = .83$  for cognitive A-state, and from  $\alpha = .82$  to  $\alpha = .83$  for somatic A-state.

Jones and Swain (1992) modified the CSAI-2 to add a directional component, that is, whether athletes perceived their anxiety level would assist (facilitative) or hinder (debilitative) their performance. The resultant DM-CSAI-2 includes a directional scale in addition to the traditional intensity scale. The DM-CSAI-2 allows psychologists to assess athletes’ perceived anxiety as helpful (facilitative) or unhelpful (debilitative). The directional interpretation scale ranges from + 3 (*very helpful*) to – 3 (*very unhelpful*) for each question; thus, the possible directional scores on each subscale range from + 18 to –

18. Cronbach's alpha coefficients have demonstrated internal consistency for the direction scale yielding values from .80 to .89 for cognitive anxiety and .72 to .84 for somatic anxiety (Hanton, Jones, & Mullen, 2000; Jones & Hanton, 1996). In recent years, the DM-CSAI-2 has become the standard measure for state anxiety in sport research (Fletcher & Hanton, 2001; Jones & Hanton, 2001; Jones & Uphill, 2004).

*Performance.* The total number of successful shots (i.e., attempts in which the netball passed through the netball ring) out of 10 attempts represented the dependent variable for each trial block.

### *Design*

Researchers (e.g., Baumeister, 1984; Beilock & Carr, 2001; Lewis & Linder, 1997; Masters, 1992; Wang, Marchant, & Morris, 2004; Wang, Marchant, Morris, & Gibbs, 2004) have primarily applied quantitative methodology to examine choking in sport. Quantitative designs, however, may not explain choking completely because the experience involves underlying cognitive processes that are not easily quantified. Researchers integrating alternative methodologies, such as qualitative inquiry, may explore, confirm, or explain the consistencies and contradictions related to choking research. Large-sample designs, although statistically powerful, pose special problems in applied research. Brustad (2002) has called for the use of multiple methods and acceptance of other paradigms in the research process. Combining quantitative methodology with qualitative inquiry in a "mixed-methods design" seems particularly apt in further exploring choking because choking appears to contain both objective and subjective elements.

With a "mixed-methods design," researchers apply a combination of quantitative and qualitative techniques during data collection and data analysis to answer a variety of

research questions. For instance, by triangulating data, researchers employ a selection of methodological combinations to expose the research question to multiple data testing and collection strategies and thus enhance validity (Greene, Caracelli, & Graham, 1989).

Triangulated studies involve combining methods, such as pencil and paper questionnaires, interviews, and behavioural observations, to study the same factor (Merriam, 1998).

Triangulation is based on the assumption that any bias inherent in various data resources can be neutralised when those data sources are used in combination with other confirmatory data sources. The aim of triangulation is to test for consistency in the findings from different data sources (Patton, 2002). According to Denzin (1978), there are four types of triangulation including data triangulation, investigator triangulation, theory triangulation, and methodological triangulation. In the current study, data triangulation (i.e., use of multiple data sources) consisting of psychological inventories, observable performance measures (i.e., successful shot attempts), and in-depth interviews were used. Methodological triangulation (i.e., use of multiple methods to study a problem) was also used, combining a single-case design (SCD) with qualitative research. The “mixed-methods design” used in this study included a SCD with a reversal component ( $A_1$ - $B$ - $A_2$  design;  $A_1$  = pre-pressure baseline,  $B$  = pressure,  $A_2$  = post-pressure baseline) as the quantitative component and in-depth semi-structured interviews as the qualitative component. In the context of the present study, the rationale for using a SCD with interviews in a “mixed-methods design” was to monitor closely individual experiences and trends in A-state in differing levels of pressure to determine whether a manipulation of pressure affected performance and then describe intra-individual accounts of participants’ cognitions to more fully understand CR and CS athletes.

*Single-case design.* A SCD is a research design in which individual participants are exposed to specific and definable experimental conditions (Smith, 1988). Researchers using SCD's (e.g., A-B, A-B-A, A-B-A-B) apply direct control over the independent variable and, thus, precision in ruling out alternative hypotheses and arriving at causal interpretations of the data (Kazdin, 1982). Researchers in applied psychology and applied sport psychology often use SCD's, especially in the early stages of testing the efficacy of treatments and interventions (Pates, Cummings, & Maynard, 2002). SCD's allow participants to serve as their own control (Barlow & Hersen, 1984; Hrycaiko & Martin, 1996). Therefore, conclusions are usually made regarding the treatment effects by comparing the treatment and control conditions of each participant over time.

*Qualitative component.* Choking may not necessarily be fully understood by relying solely on quantitative methodology. Thus, after completion of the SCD phases, participants were interviewed about their experience in the study. Qualitative research is an inquiry process based on distinct methodological traditions that explore a social or human problem (Creswell, 1998). Researchers using qualitative methods may focus on the lives of athletes and gather information to understand meaning from the participants' perspective. Qualitative inquiry permits a more holistic understanding of an athlete's experience and may help to identify new variables and relationships by obtaining in-depth assessment of athletes' emotions and cognitions (Gould, Greenleaf, & Krane, 2002). Thus, supplementing the numerical data with a qualitative component enabled participants to provide a descriptive account of their cognitive processes, emotions, coping strategies, and behaviours, while participating in the testing phases.

A number of inherent benefits have led to a greater acceptance of qualitative methods. Peshkin (1993) suggested that the beneficial results of qualitative inquiry might

be categorised as description, interpretation, verification, and evaluation. First, qualitative researchers seek “thick descriptions” to provide rich characterisations of the current phenomenon (Streaan, 1998). A thick description may be necessary in order to understand the phenomenon completely. Second, interpretation involves the reader understanding the data and making generalisations about the phenomenon. In exploratory investigations of choking, descriptive information may be helpful in expanding and developing further research in the area. Third, qualitative investigations may verify assumptions within the construct being examined. For example, qualitative inquiry may help confirm, verify, or dispute current models of choking. Finally, qualitative research may help to evaluate treatment or intervention effects. That is, researchers may improve the evaluation of, and provide detailed feedback about, treatment effects by using qualitative designs. To more fully explain the strengths of integrating qualitative research, Jackson (1995) suggested:

Some of the main strengths of qualitative research include: depth and richness of findings, potential to understand individual experience, holistic nature of findings, power in identifying new directions, and ability to identify individual differences as well as examine between-case consistencies. ... Qualitative research may be the method of choice when the interest is in understanding subjective experience, when the individual matters, when depth and richness of data is a priority, and when understanding the total picture counts. (p. 590)

These strengths are essential to the current research because choking can be individualistic and a somewhat subjective experience. Thus, qualitative research seems well suited to the description and understanding of choking. To justify the decision to use a “mixed-methods design,” in this study, I refer to Culver, Gilbert, and Trudel (2003) who suggested, “When other sources of data relating to human behaviour are combined with interviews to study

human activity, it is possible to capture a more complete picture of the processes involved” (p. 7). By combining quantitative research and exploratory qualitative inquiry, the current study may lead to investigations of other areas of choking research, as well as confirming or challenging current models of choking.

### *Procedure*

Coaches were first contacted through a national level organisation to facilitate a briefing session with potential participants. After coordinating a meeting time, I addressed the athletes and explained that the purpose of the study was to examine feelings and reactions to competitive situations in netball. It was emphasised that participation was strictly voluntary and those that did volunteer would be free to withdraw at any time without penalty. To minimise coaches’ pressure to participate, the coach was absent when I was addressing the athletes. Envelopes, containing an informed consent form (Appendix H), a demographic information sheet, and a series of paper-and-pencil tests (i.e., SCS, SAS, and CSIA) were then distributed to volunteer athletes. Participants were asked to read, complete, and then return all questionnaires in an envelope addressed to the researcher. The three paper-and-pencil questionnaires were used to identify a small number of CS and CR athletes to further participate in the study. Thus, 8 participants (i.e., 4 CS and 4 CR) who met the selection criterion (explained below) then took part in the A<sub>1</sub>-B-A<sub>2</sub> phases of the study and the subsequent interview. Participants not selected were thanked, were given \$20 for their efforts, but not invited to participate further.

*Participant selection criteria.* The purpose of the study was to determine whether choking and non-choking behaviour can be predicted. Thus, a criterion was necessary to purposively recruit the sample of CS and CR participants based on responses from paper-and-pencil questionnaires (i.e., SCS, SAS, and CSIA). The major dilemma, however, was

finding a rigorous criterion that would produce a powerful and efficient sample, recruiting CR participants likely to exhibit non-choking behaviour and CS participants likely to display choking behaviour.

One possible solution for a stringent selection criterion was to purposively sample participants on opposite extremes of the proposed “choking continuum”, deliberately excluding participants in the middle. It was difficult to unequivocally determine a reasonable criterion for selection based on responses from questionnaires, but I wanted to establish a strict enough selection prerequisite to recruit highly CR and highly CS participants (i.e., power principle). I realise that researchers could debate my selection criteria, but the stringent criteria used to select participants seemed appropriate considering previous research and data (see Masters et al., [1993], Wang, Marchant, Morris, & Gibbs, [2004], and Wang, Marchant, & Morris, [2004] for further information regarding S-C, A-trait, and coping styles indicating choking-susceptibility, respectively). Criteria for selection of CS athletes were as follows:

1. Score on at least two out of the three psychological inventories needed to be located in the 75th to 100th percentile of scores surveyed, that is,
  - a. High self-consciousness (SCS),
  - b. High trait anxiety (SAS)
  - c. Positive differential CSIA score (e.g., approach coping of 38 minus avoidance coping score of 21 = differential score + 17)
2. The remaining score was required to be in the 50th to 100th percentile of scores surveyed.

Conversely, the criteria for selection of CR athletes were as follows:



1. Score on at least two out of the three psychological inventories needed to be located in the 0 to 25th percentile of scores surveyed, that is,
  - a. Low self-consciousness (SCS),
  - b. Low trait anxiety (SAS)
  - c. Negative differential CSIA score (e.g., approach 19 – avoidance 28 = differential score – 9)
2. The remaining score was required to be in the 0 to 50th percentile of scores surveyed.

Although the sampling criterion selected is potentially controversial, I propose that it improves on some methods used previously for sample selection in sport psychology. For example, Jones and Swain (1992; Jones, Swain, & Hardy, 1993) have used the median split technique to divide participants into high and low competitive (or elite and non-elite) categories after data collection. The median split technique, however, was not appropriate in the present research because participants were selected after administration of questionnaire and prior to quantitative, data collection. Also, a dichotomous split can result in misclassification of individuals as well as the loss of reliable information about individual differences within the groups (MacCallum, Zhang, Preacher, & Rucker, 2002). Because choking is a relatively extreme experience, it was important to select a sample that is relatively extreme to maximise sample efficiency. Using a median split and selecting participants in the middle of a choking susceptibility “continuum” may not result in a sample powerful enough to predict choking or non-choking behaviour.

All purposively sampled participants took part in the three phases (A<sub>1</sub>-B- A<sub>2</sub>) within the Victoria University indoor sports arena with the subsequent interview conducted in a reserved consultation room adjacent to the sports arena. Participants completed 18 trial

blocks with each trial block consisting of 10 shots. The 18 trial blocks were divided into three phases with six (10 shot) trial blocks in each phase (see Figure 3.1). The three phases included a pre-pressure baseline phase, a pressure phase, and a post-pressure baseline phase, and were scheduled weekly over three consecutive weeks.

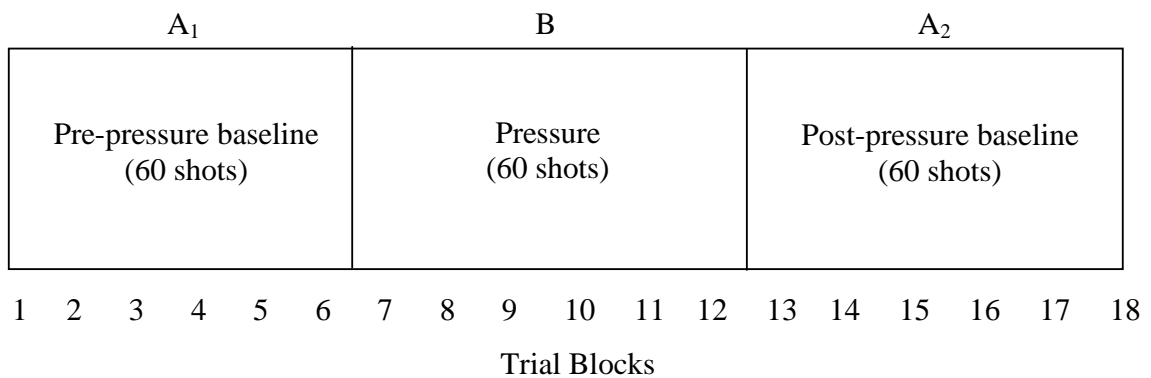


Figure 3.1. A<sub>1</sub>-B-A<sub>2</sub> phases within the single-case design.

*Pre-pressure baseline (A<sub>1</sub>) phase.* Prior to the A<sub>1</sub> phase, participants were briefed about the study, completed the DM-CSAI-2, and performed a 10-shot warm-up. The DM-CSAI-2 was used as a manipulation check of cognitive anxiety and somatic anxiety before each phase. To minimise variability, experimental procedures were narrated directly from prepared instructions (Appendix I). Participants were then given the opportunity to ask questions. Testing commenced as soon as the warm-up was completed. The A<sub>1</sub> phase consisted of six trial blocks (60 shots) with a 30-second rest period following each trial block. After completion of the initial A<sub>1</sub> testing, participants were informed when to return for the next phase.

*Pressure (B) phase.* Prior to the B phase, to reduce potential misunderstanding, the instructions for the B phase were again read verbatim (Appendix J). Participants then completed the DM-CSAI-2, and the 10-shot warm-up. The same procedures as pre-pressure baseline testing were used, with the addition of the pressure manipulation. The

pressure manipulation consisted of a) videotaping all shot attempts, b) presence of an audience, and c) performance-contingent financial incentive. These pressure manipulations have been used previously (e.g., Baumeister, 1984; Butler & Baumeister, 1998; Lewis & Linder, 1997; Masters, 1992; Wang, 2002).

A video camera was placed adjacent to the end line of the court facing the participant, and was used throughout the B phase. Videotaping has been shown to heighten S-A (Lewis & Linder, 1997). The second manipulation consisted of a small audience, consisting of first-year (i.e., freshman) human movement students. Participants were informed that eight human movement students would watch them complete the B phase. The audience members were told not to interact, encourage, or discourage participants and simply observed, with interest, participants' performance. The audience members were positioned to both sides of the participant just outside the goal circle. Two audience members were asked to take notes of participants' reactions and were positioned behind the participant just outside the goal circle. The third manipulation was a performance-contingent financial incentive. Participants were paid for their participation, depending on the number of successful shots relative to their performance in the A<sub>1</sub> phase. Participants were advised that a \$20 bonus would be earned for improving on their score from the A<sub>1</sub> phase with an additional \$5 for each successful shot above the A<sub>1</sub> phase score to a maximum of \$100. If the participant failed to reach the earlier baseline performance, the participant was told that no money would be earned. At the beginning of the B phase, participants were told the number of successful shots they had made in the earlier A<sub>1</sub> phase. After the B phase concluded, participants were informed of the exact amount of money they would receive.

*Post-pressure baseline (A<sub>2</sub>) phase.* The A<sub>2</sub> phase was a return to the earlier baseline testing condition. During the A<sub>2</sub> phase, the same procedures as the A<sub>1</sub> testing were used (Appendix K), that is, six trial blocks (60 shots) were completed. Upon completion of the final A<sub>2</sub> phase, athletes were asked to participate in an individual interview about their experience.

*Interview.* In-depth, semi-structured interviews were conducted. In-depth interviewing is essentially a conversation with a specific purpose – a conversation between researcher and informant, focusing on the participant's perceptions of self, life, and experience, expressed in their own words (Minichiello, Aroni, Timewell, & Alexander, 1995). They consisted of open-ended questions based on a purpose-designed interview guide (see Appendix L). The interview guide was developed after familiarising myself with the relevant literature. Based on feedback from pilot testing and a sport psychology academic, modifications to the interview guide were finalised. During the interview, specific clarification and elaboration probes stimulated participant responses and provided the interviewer with a more in-depth understanding of the research question (Patton, 2002). The interview began with general information about participants' netball experience and then focused more on the emotions, coping strategies, and cognitions experienced during the SCD component of the study. Interviews ranged in duration from 35 to 75 minutes.

The quantitative data collection and in-depth qualitative interview were scheduled as close together as possible to capitalise on participants' recall and, thus, improve data reliability. After the interview, participants' were debriefed and informed about the specific rationale and purposes of the study (Appendix M). During debriefing, participants were thanked for their participation and paid the amount promised.

### *Analyses*

*Pressure analysis.* Visual inspection (also known as visual analysis) of the DM-CSAI-2 data was used to identify the effects of the pressure manipulation. Visual inspection “refers to reaching a judgment about the reliability or consistency of intervention effects by visually examining graphed data” (Kazdin, 1982, p. 232).

*Performance analysis.* Bloom and Fischer (1982) contended, “Visual inspection of data should be considered a very useful beginning point. But, unless the patterns are clear, with sufficient numbers of observations and stable baseline data, other methods of analysis should also be employed” (p. 439). To further explore this contention, Ottenbacher (1990) conducted a study to challenge the reliability of visual inspection and found that depending on visual inspection exclusively can be unreliable and may lead to inconsistent interpretations. Thus, in the present study, the split-middle technique (White, 1971, 1972, 1974) was employed to detect changes in the number of successful shots within phases and resultant trend lines (Barlow & Hersen, 1984). Although the split-middle procedure remains primarily descriptive, performance analyses may be supported beyond mere description of the mean by providing additional methods of observing the data. By using the split-middle procedure, celeration lines (or trend lines) are constructed to characterise performance over time and predict direction and rate of change (Barlow & Hersen).

The calculation of White’s (1971, 1972, 1974) split-middle technique involved five steps for analysing each testing phase (the reader is referred to Figure 3.2 throughout this description). First, the number of data points in the phase being analysed were counted, then divided into two equal halves by inserting a vertical line midway. In the present study there was an even number of data points, therefore, the vertical line was inserted between the two middle data points, one to each side of the median (if there is an odd number of

data points, the vertical line should be inserted directly on the median point). This is shown as the bold vertical line in Figure 3.2 and divides the points into two equal groups (i.e., Section 1 and Section 2). Second, each section was then divided into two equal halves again with a vertical line at the middle data point (see unbolded dashed vertical lines in Figure 3.2). In the present study there were an odd number of points, thus, I inserted the vertical line directly on the middle point (conversely, insert the vertical line between the two middle data points, one to each side of the median, for an even number of data points). Third, the median score of the three data points on the ordinate (i.e., y-axis) of Section 1 and Section 2 is determined and a horizontal line inserted at the median point for each section (displayed as the two horizontal dashed lines in Figure 3.2). There should now be one “intersection”, consisting of a vertical and a horizontal line, in each section. Fourth, a line connecting these two “intersections” is inserted. At this point, the “quarter-intersect” line is identified (displayed as the dotted line connecting the intersections in Figure 3.2) and normally splits all data points in half (i.e., 50% of the points above and 50% of the points below). In Figure 3.2, the data points are not evenly distributed around the quarter-intersect line (i.e., two data points were below and four data points were above the line). Consequently, the final step was to move the quarter-intersect line slightly up or down, while maintaining the same slope, until the data points were evenly distributed above and below the line. The final line is labelled the celeration (or trend) line (shown as the bolded dotted line connecting the intersections in Figure 3.2). Any subsequent analysis is then completed following similar procedures. With the split-middle technique, data can be analysed both within and between phases by extending the celeration line into the subsequent phase. Refer to White and Liberty (1976) for a more complete discussion of the split-middle technique.

After identifying the celeration line, White (1974) proposed that two descriptive analyses be calculated to contribute to conclusions using the split-middle technique, the slope and the level of the celeration line. First, constructing a celeration line enables the change in slope across phases to be calculated. Typically, to calculate the slope, a point on the celeration line is identified arbitrarily along with the point on the ordinate through which it passes (Kazdin, 1982). The ordinate value on the celeration line of another trial block is then identified. To compute the slope, the numerically larger value is divided by the smaller value. The computation is then expressed in a ratio with a multiplication sign ( $\times$ ) to signify an increasing trend (a positive slope) or a division sign ( $\div$ ) to signify a decreasing trend (a negative slope). For example, using the scores from Figure 3.2, if Trial Block 2 yields a score of 7.75 and Trial Block 5 yields a score of 2.75, the slope of the celeration line equals  $\div 2.82$  (i.e.,  $7.75 / 2.75 = 2.82$ ). When separate phases are assessed (e.g., A<sub>1</sub> and B phases), calculation of the change in slope depends on whether the slope is the same or in opposite directions. For example, if the slope in the phases being analysed are in the same direction (e.g., a positive slope), the change in slope is calculated by dividing the larger trend by the smaller trend; the resultant trend is then presented. Applying these computations, if the slope of the celeration line in the A<sub>1</sub> phase is  $\times 2.00$  and the slope of the celeration line in the B phase is  $\times 1.33$ , the resultant change in slope is  $\div 1.50$  (i.e.,  $\times 2.00$  divided by  $\times 1.33 = \div 1.50$ ). Alternatively, if there is a positive celeration line slope in the A<sub>1</sub> phase and a negative slope of the celeration line in the B phase, the two are multiplied together for the resultant change in slope. The direction of the change in slope is determined by identifying the direction in which the change occurred. For example, the change from a negative slope in the A<sub>1</sub> phase (e.g.,  $\div 1.33$ ) to a positive slope during the B phase (e.g.,  $\times 1.33$ ) would equal an increasing trend in

performance (e.g.,  $\div 1.33$  multiplied by  $\times 1.33 = \times 1.77$ ). With the split-middle technique, there is an assumption that no ceiling effect exists to limit the slope of the performance trend. Thus, projected performance slopes may be potentially misleading when ceiling effects are evident.

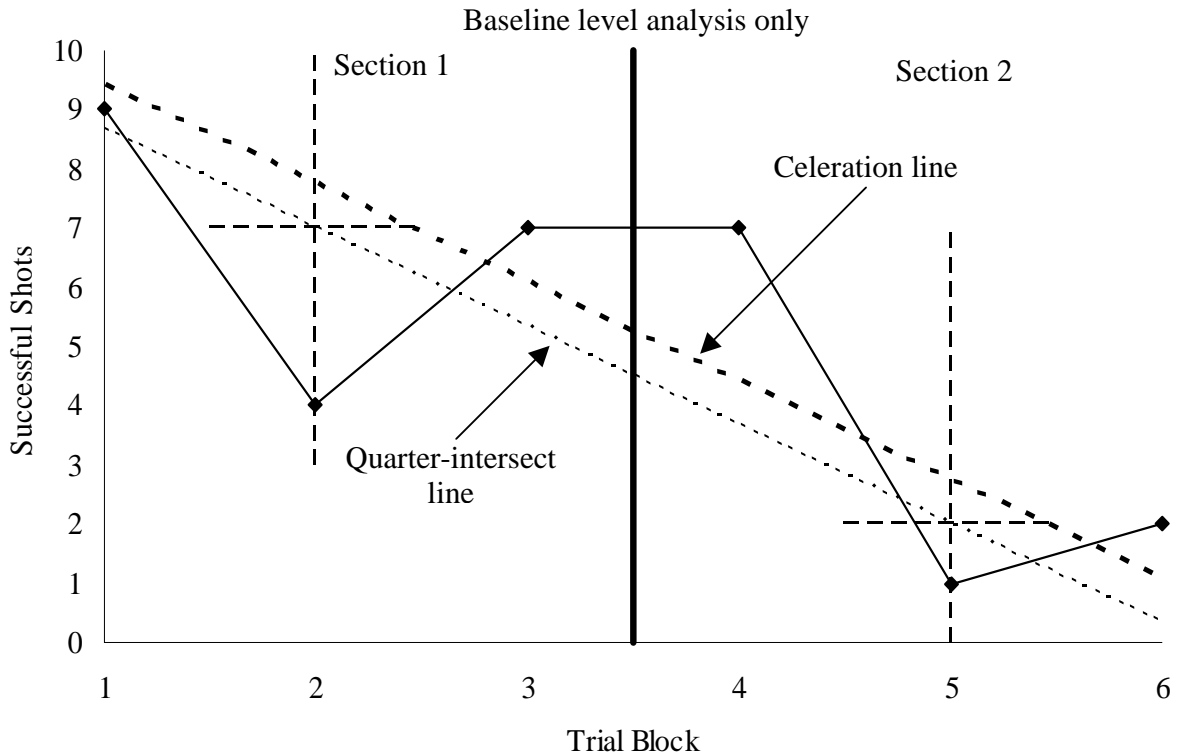


Figure 3.2. Example of performance analysis using the split-middle technique.

The second descriptive analysis computed with the split-middle technique is the level of the trend line. The level can be expressed by noting the value of the dependent variable where the trend line passes through the last data point in each phase. In the split-middle analysis example (Figure 3.2), the final level on the trend line in the A<sub>1</sub> phase is approximately 1.00. In a succeeding phase analysis, the level is expressed by noting the value of the dependent variable where the trend line passes through the first data point of the trend line in the B phase. The calculation of the level enables assessment of the change



in performance from the last trial block of one phase to the first data point of another phase. To calculate the change in level, the larger value is divided by the smaller value. Hypothetically, if the level of the last data point on the trend line in the A<sub>1</sub> phase is 2.00 and the first data point on the trend line in the B phase is 4.00, then the change in level is  $4.00 / 2.00 = \times 2.00$ . The increasing (i.e.,  $\times 2.00$ ) trend is the result of the level increasing from the A<sub>1</sub> phase to the B phase. This calculation provides a description of how quickly the subsequent phase (e.g., B phase) effects performance and is presented as a ratio. This ratio indicates the difference in the trend line intersection between the phases.

Changes in level of the celeration line between the A<sub>1</sub> and B phases and the B and A<sub>2</sub> phases, in relation to performance trend, are considered to determine how quickly the pressure affected performance. That is, the last point on the celeration line in the A<sub>1</sub> phase and the first point on the celeration line in the B phase are compared. Similarly, the last point in the B phase and the first point in the A<sub>2</sub> phase, on the respective celeration lines, are assessed. In SCD research, it is uncommon to analyse the first data point in the initial phase (e.g., A<sub>1</sub> phase) and the last data point in the final phase (e.g., A<sub>2</sub> phase). These two points alone do not enhance the analysis because the celeration line is based on all data points from a phase, so it would be erroneous to say that any of the comparisons are based on a single data point (O. R. White, personal communication, February 4, 2006).

Celeration lines are used as simple descriptors of patterns to predict values beyond the immediate data set. There is no theoretical justification, however, for extrapolating beyond the data set. Experience and empirically demonstrated success is necessary in deciding whether the data are orderly enough to warrant predictions (White, 2005). Given that a point on the celeration line does not actually explain the performance level in these studies, it does not seem critical to the calculation for these studies. Thus, I have not

included level calculations in participant's results, but I have presented these results for all participants separately in Appendix N for the readers' perusal.

Results of the split-middle analysis are discussed in relation to several features of each participant's performance. First, mean performance and comparisons of performance among the three phases are explicated. One benefit of using a SCD is that a comparison can be (and in this study may be) assessed between any two phases to determine participants' resultant performance change. Second, changes in slope of the celeration line across the three phases are considered. That is, a comparison of the change in slope of the celeration line from the A<sub>1</sub> phase to the B phase and a difference of change in slope of the celeration line from the B phase to A<sub>2</sub> phase are calculated. Finally, a summary of the participant's performance is offered. In all case studies, all data points are evaluated in all phases, allowing the assessment of not only overall effects, but also the processes through which the effects materialize (O. R. White, personal communication, January 17, 2006).

*Interview analysis.* Content analysis refers to the investigator searching text for recurring words and themes or analysing text, rather than observation-based field notes (Patton, 2002). This procedure allows the researcher to organise raw data (i.e., direct quotations from participants) into interpretable and meaningful themes and categories as the inquirer comes to understand patterns that exist (Hanton & Jones, 1999). Inductive content analysis is a fundamental part of grounded theory (Glaser & Strauss, 1967) and was used to analyse interviews in this study. In grounded theory, the emphasis is on becoming immersed in the data (i.e., being grounded) so that principal meanings can emerge. Grounded theory analysis often begins with specific observations and builds toward general patterns. Inductive content analysis involves discovering patterns, themes, and categories in one's data. This is often referred to as "open coding" (Patton). The open-

coding technique allows for identification of themes from the raw data with the central purpose of opening inquiry widely (Strauss, 1987). In its entirety, grounded theory involves three aspects of inquiry (i.e., induction, deduction, and verification) to assess, develop, and verify a theory. Only inductive content analysis was used during this study because the secondary purpose was merely exploratory, rather than to develop a choking theory. Inductive content analysis has been widely used by sport psychology researchers (e.g., Gould, Eklund, & Jackson, 1992a, 1992b; Hanton & Jones; Scanlan, Stein, & Ravizza, 1989, 1991) and has also been used for sport psychology case study research (e.g., Jackson & Baker, 2001).

Interviews were conducted and audiotaped with participant consent and transcribed verbatim. After transcribing the interviews, for data checking purposes, I read the text while listening to the recorded interviews. The interview text was then returned to the respective participant for verification of accuracy (member checking) and then my principal supervisor and I read the transcripts numerous times to ensure familiarity with the content. Each interview was analysed separately to provide an understanding of each participant's experiences. In reading the interview, I wrote comments in the margin to create a participant profile and to assist in understanding cognitive processes and emotions involved in the SCD. In reading the transcript, I developed a preliminary list of issues (i.e., emotions and cognitions related to the experimental phases) into which I grouped personal notes and relevant text. It would be unrealistic to expect researchers to conduct studies without knowledge about the phenomena under investigation (Krane, Andersen, & Streat, 1997), thus, decisions regarding the classification of text were guided by the primary and secondary purposes of the study, my knowledge about choking, and the meanings made explicit by the participants (Merriam, 1998).

Using inductive content analysis outlined by Patton (2002), raw data (i.e., significant quotes and paraphrased quotes) were first organised into related groups by comparing tags (i.e., important pieces of information) with similar meanings and labels that best captured the substance of the topic (Côté, Salmela, Baria, & Russell, 1993). For the purposes of the content analysis, basic units were operationally defined as any comment by the participant about emotions, cognitive processes, coping strategies, or behaviours related to her experience. Assigning raw data to groups was not a linear process and I frequently reassigned raw data to different groups. After I was satisfied with the raw data compiled in each group, a list of theme names was created that reflected “the recurring regularities or patterns in the study” (Merriam, 1998, p. 181). Theme names were not solely derived from inductive analyses, but emerged from each participant’s interview and the relevant literature. Themes emerged through either manifest content or latent content. Manifest content is information that is directly observable in the transcripts or “those elements that are physically present and countable” (Berg, 1995, p. 176). Latent content is “extended to an interpretive reading of the symbolism underlying the physically presented data... (and) is the deep structural meaning conveyed by the message” (Berg, p. 176). Latent content typically represents my interpretation of the interview material. In addition, I intended the selected themes to reflect all content and original wording of each participant to ensure all material, rather than only text related to my preferences, was analysed (Berg). Once I was satisfied with theme names, they were assigned to the list of related groups of raw data.

*Trustworthiness.* Member checking is the process by which the participant verifies the researcher’s summary and conclusions of the interview to ensure the information gathered from the interview is authentic (Lincoln & Guba, 1985). Member checking allows participants to correct any misconceptions or perceived mistakes the researcher

may have made (Flick, 1998). In the present study, two methods of member checking were used that served as a reliability check of the interview. First, each participant was sent a copy of the interview text and asked to comment on the accuracy (or inaccuracy) of the transcript. Second, after analysing each participant's interview data, my interview interpretation was offered to each participant for subsequent verification. In most cases, my analysis was discussed with the participant and minor adjustments made and included in the analysis. To enhance trustworthiness and reduce potential analyst bias, a consensus validation procedure was used whereby an independent investigator trained in inductive content analysis completed each stage of the analysis. The trained researcher randomly chose four interviews and verified that the themes were congruent with my interpretation and, thus, represented a second content analysis. After both content analyses were conducted, results of the separate analysis were then compared, investigators came to agreement on the specific themes, and differences were resolved through discussion.

### Results

The purpose of Study 1 was to determine whether self-consciousness (S-C), trait anxiety (A-trait), and coping styles, as measured with psychological inventories, would predict non-choking and choking behaviour. Not only was the effectiveness of predicting choking investigated, but an attempt was also made to better understand the cognitive processes associated with choking-resistant (CR) and choking-susceptible (CS) athletes to help develop relevant choking interventions. In presenting the results, brief descriptive information related to participants' scores on the psychological inventories is presented first. Responses to these questionnaires were important because they were used to classify participants into CR and CS categories. The descriptive statistics included results from the

46 participants who completed the psychological inventories in this study and a comparison sample (Wang, 2002).

Eight case studies are then presented with quantitative and qualitative data for 4 CR and 4 CS participants. Each case study is introduced separately and commences with a participant profile consisting of background information about the participant's netball playing history. Next, visual analysis of the state anxiety (A-state) results and qualitative data related to the pressure manipulation are presented. Results from the DM-CSAI-2 and interview are presented collectively to reinforce the interpretation of anxiety experienced during the phases. Then, quantitative results related to the single-case design (SCD) are presented and a summary of the performance analysis included. Next, the corresponding interview data is presented. In reporting the findings, direct quotes are used throughout the results in order to preserve the voice of the participant. For efficiency purposes, results and discussion related to each participant's interview are presented simultaneously to circumvent backtracking. Finally, each case study is summarised, combining the quantitative and qualitative data analyses. Although not included for all participants, where appropriate, I have integrated a discussion of key field notes related to the relevant participant to enhance the case study.

### *Psychological Inventories*

This section provides descriptive statistics of scores on the three psychological inventories (i.e., SCS, SAS, and CSIA) and the representative scores of the 46 participants collectively (Table 3.1).

Table 3.1

*Descriptive Statistics for the Self-Consciousness Scale (SCS), Sport Anxiety Scale (SAS), and Coping Styles Inventory for Athletes (CSIA)*

Inventory	Range	Mean	SD	25th percentile	50th percentile	75th percentile
SCS	30 to 59	43.74	6.72	39	44	49
SAS	21 to 49	32.74	7.15	27	32	39
CSIA	- 14 to + 17	- 0.46	6.48	- 6	0	+ 5

Participant scores from the SCS ranged from 30 to 59 with higher scores indicating high S-C. Scores on the SAS ranged from 21 to 49 with higher scores indicating high A-trait. Scores on the CSIA ranged from - 14 to + 17 with positive differential scores indicating a tendency toward approach coping. These results are similar to Wang's (2002) comparison sample (see Table 3.2).

Table 3.2

*Wang's (2002) Descriptive Statistics for the SCS, SAS, and CSIA (N = 80)*

Inventory	Range	Mean	SD	25th percentile	50th percentile	75th percentile
SCS	28 to 57	42.73	6.37	38	42	47
SAS	17 to 61	33.95	9.87	26	33	39
CSIA	- 22 to + 14	+ 0.63	6.93	- 5	+ 1	+ 5

### *Choking-Resistant (CR) Participants*

Four CR athletes' case studies are presented. I assured participant's anonymity would be maintained in any reports and publications. Thus, I used pseudonyms to identify CR participants. To decrease confusion, participants were organised in alphabetical order and named Amy, Beth, Carol, and Debbie.

#### *CR Participant- Amy*

*Participant profile.* Amy was 18 years old and had been playing competitive netball for 9 years. At the time of the study, Amy had been playing in a division (association) level team for the past 3 years and had been playing in a shooting position for 5 years. Amy attempted to make a state under age netball team once, but was unsuccessful. Amy was purposively sampled as a CR participant because she was moderately low in S-C, low in A-trait, and primarily used avoidance coping. Specifically, Amy's scores were 44 on the SCS (25th to 50th percentile), 27 on the SAS (1st to 25th percentile), and - 6 on the CSIA differential score (1st to 25th percentile).

*Pressure analysis.* The B phase was critically important for the purpose of the present study. Without a manipulation of pressure and an associated increase in A-state during the B phase, it would be difficult to conclude that participants' actually perceived a difference in pressure between the low-pressure (i.e., A<sub>1</sub> and A<sub>2</sub>) and high-pressure (B) phases. In order to assess the effects of the pressure manipulation, A-state was measured prior to commencement of each phase, using the Directional Modification of the Competitive State Anxiety Inventory-2 (DM-CSAI-2). Scores on the DM-CSAI-2 were used to determine if a change in perceived A-state occurred during the B phase. The DM-CSAI-2 results will be discussed in terms of relative scores and absolute scores. Relative scores were those that increased or decreased in reference to other phases, whereas



absolute scores are scores that are categorised as low (between 9 and 17), moderate (between 18 and 26), or high (between 27 and 36). The direction scores were not an essential component to the current research, and thus were not a focus of discussion for the case studies. The interested reader may refer to Appendix O for directional scores of the DM-CSAI-2.

Visual inspection of Figure 3.3 shows that Amy's intensity scores for cognitive anxiety prior to the pre-pressure baseline (A<sub>1</sub>), pressure (B), and post-pressure baseline (A<sub>2</sub>) phases were 18, 23, and 17, respectively. Intensity scores for somatic anxiety leading into the three phases were 13, 25, and 12. Clearly, Amy experienced a substantial and similar increase in cognitive and somatic anxiety intensity prior to the B phase. Amy's absolute anxiety increased from low levels prior to the A<sub>1</sub> and A<sub>2</sub> phases to moderate levels prior to the B phase.

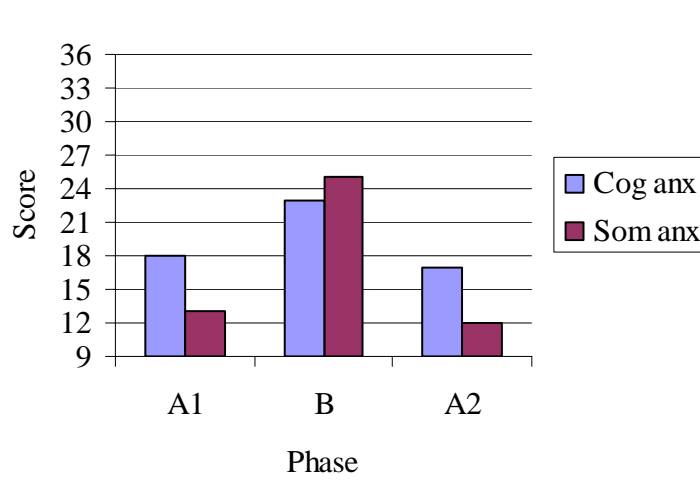


Figure 3.3. Cognitive and somatic anxiety intensity scores for Amy.

*Interview analysis: Pressure manipulation.* During the interview, as a further manipulation check, I asked participants to explain their perceived anxiety during the three phases to reinforce or contradict the reported DM-CSAI-2 results. During the interview,

Amy explained that she experienced nervousness primarily through symptoms of somatic, rather than cognitive, anxiety. To further explicate her A-state, Amy stated,

Session 1 (A<sub>1</sub> phase), I walked in and it was very professional and very formalised... that kind of made me a little nervous, not nerves as in shaking and that, I didn't really have butterflies, I wasn't *that* (Amy emphasises) nervous, but just a little nervous. Compare that to Session 2 (B phase), when we had the audience, had the camera, and that made me a lot more nervous than what Session 1 did. ... I had butterflies. I was very nervous, I was very surprised. Session 3 (A<sub>2</sub> phase), I was just a lot more relaxed.

This excerpt confirms the reported results of the DM-CSAI-2, where Amy perceived an increase in intensity of somatic anxiety prior to the B phase, however, does not explain the drastic change in reported direction scores prior to the A<sub>2</sub> phase. To elaborate further on her anxiety level, Amy also explained that she experienced cognitive anxiety, albeit different types, during the three phases.

I was worried (during the A<sub>1</sub> phase), I just wanted to do the best I could... I felt like I had a little bit of pressure on me because I was a goaler, I thought I've got to do well because otherwise you'll (the researcher) be like, what is this girl doing? ... Session 2, I had a bit more pressure not only to do well, but to improve on what I got last time, and also having people around me, I was like what are they (the audience) going to think of me. ... I wasn't really that worried (during the A<sub>2</sub> phase), because I was thinking, what else can he try?

This quote indicates that Amy's cognitive anxiety during the A<sub>1</sub> phase was primarily because of the expectations of another, possibly important, person (i.e., researcher), whereas pressure increased during the B phase because of the accumulated effect of the

pressure manipulation, social expectations, and self-expectations. The previous quotes also reinforce the impression that the A<sub>2</sub> phase was the least anxiety-evoking phase. Collectively, Amy clearly increased A-state during the B phase, as indicated by the increase in intensity of anxiety on the DM-CSAI-2 and detailed explanations of nervousness during the interview.

Two themes that were apparent for Amy, related to the perceived pressure, were uncertainty and formality. Kagan (1972) defined uncertainty as the “inability to predict the future, especially if the doubt centres on the experience of potentially unpleasant events like punishment, physical harm, failure, or rejection” (p. 55). According to Martens et al. (1990) competitive anxiety theory, uncertainty may increase the perception of A-state. Amy expressed uncertainty during the A<sub>1</sub> phase as she stated, “The first one (phase), I was unfamiliar with what was going on. ... I didn’t know what it (the study) was going to be about. I knew I was going to shoot goals, but I didn’t know what to think.” The A<sub>1</sub> and A<sub>2</sub> phases were allegedly both low-pressure phases, yet, Amy’s uncertainty and subsequent A-state decreased during the A<sub>2</sub> phase, “I was pretty relaxed. I figured it would be like the first session (phase). After having done a couple sessions, I kind of got into it... I got relaxed and wasn’t worried about it.” It appears that a decrease in uncertainty reduced A-state, thus supporting the contention of Martens et al. that uncertainty influences A-state.

Another theme that was evident, particularly during the A<sub>1</sub> phase, was formality. The professionalism of the A<sub>1</sub> phase possibly influenced Amy’s A-state,

It was pretty formalised, there wasn’t you rock up and shoot some goals. You (the researcher) got the survey out and you went through it step by step, so it was a bit more structured than I thought it would be. ... It felt like I had pressure on me. I

wanted to get over this feeling and try to do the best that I could, but I was a bit intimidated by the guidelines. I didn't really realise how professional it would be. Though the study was formal and professional, Amy explained that the structure of the A<sub>1</sub> phase was helpful, "It was good. I'd rather have it like that than just muck around and do whatever." It appears that Amy was slightly affected by the professionalism during the A<sub>1</sub> phase, but ultimately preferred the formal situation because she is, in her words, "an organised person" and was more comfortable in that situation.

*Performance analysis.* Mean performance for Amy, when expressed in number of successful shots out of 10 attempts, was  $5.50 \pm 1.05$  during the A<sub>1</sub> phase and was  $9.17 \pm 0.75$  during the B phase. This represented a large 67% improvement between the A<sub>1</sub> and B phase. Mean performance during the A<sub>2</sub> phase was  $6.83 \pm 1.17$ . This represented a 34% decline between the B and A<sub>2</sub> phase (see Figure 3.4). The change in mean performance between the low-pressure (i.e., A<sub>1</sub> and A<sub>2</sub>) phases was also assessed to determine if A<sub>2</sub> phase performance level was similar to the earlier A<sub>1</sub> phase. Researchers (e.g., Barlow & Hersen, 1984; Kazdin, 1982) who frequently use SCD research suggest that if, in the context of this study, a similar mean performance occurs during both low-pressure (i.e., A<sub>1</sub> and A<sub>2</sub>) phases with a decrease in performance during the high-pressure phase (i.e., B<sub>1</sub> phase), the pressure manipulation was effective in disrupting typical performance rates. For Amy, mean performance increased by 24% from the A<sub>1</sub> to the A<sub>2</sub> phase whereas the B<sub>1</sub> phase performance changed considerably, indicating the pressure manipulation was successful during the B<sub>1</sub> phase. As explained earlier, the reader is referred to Appendix N for a description of participants' celeration line level calculations.

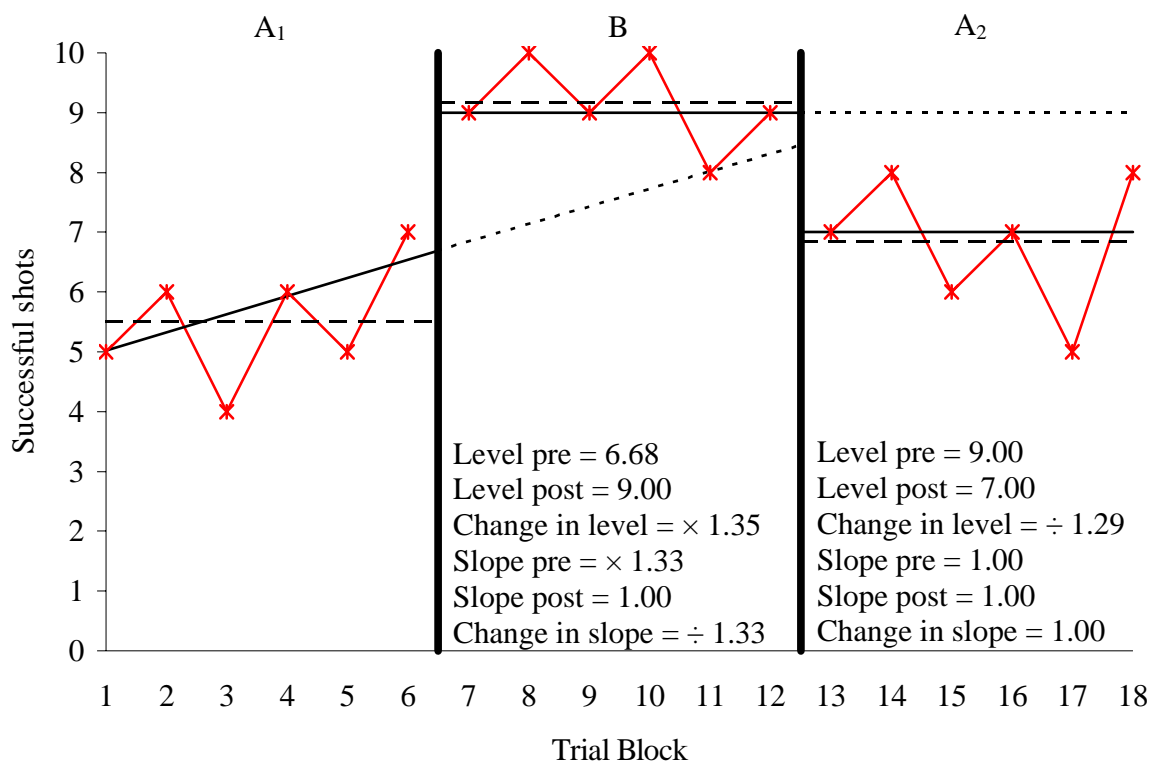


Figure 3.4. Split-middle analysis for Amy.

*Note.* In all performance figures, solid vertical lines represent the point of phase change, solid black lines for each phase indicate celeration lines, dotted lines signify projected celeration lines, and horizontal dashed lines in each phase indicate mean performance.

The slope represented the rate of performance change between consecutive trial blocks within the phases. In all slope analyses, a slope of 1.00 indicates an even, horizontal slope of the celeration line with no increasing or decreasing trends. The slope of the celeration line for Amy in the A<sub>1</sub> phase was  $\times 1.33$  and the slope for the B phase was 1.00. The resultant change in slope was  $\div 1.33$ , representing a decrease in rate of change between the A<sub>1</sub> and B phase. During the A<sub>2</sub> phase, the slope of the celeration line remained steady (i.e., slope of 1.00), reflecting no change in slope between B and A<sub>2</sub> phase. As a point of explanation, the decrease in rate of change for the B phase shows how the statistical analyses do not make sense alone and should be contextualised. That is, the

decrease in rate of change occurred possibly because performance in the B phase was consistently excellent. Thus, decreasing rate of change may not necessarily provide a negative result.

Researchers who have conducted numerous SCD investigations recommend achieving a stable baseline before proceeding with subsequent interventions (Barlow & Hersen, 1984; Hrycaiko & Martin, 1996). A stable baseline, where the slope of the performance change is minimal, allows researchers to clearly identify robust performance trends regarding the effects of subsequent interventions. Pre-pressure baseline phase stability increases the capability to make a reasonable judgment on whether the pressure manipulation was successful in affecting performance during the B phase. Data points in the A<sub>1</sub> phase (Figure 3.4) show that Amy achieved a reasonably stable baseline in a positive direction. For experienced netball players, a relatively stable baseline would be expected. Experienced players, such as those used in the current study, will have literally honed their shooting technique with thousands of shot attempts.

From the DM-CSAI-2 and interview data, the pressure manipulation also seemed to increase perceived pressure prior to, and during, the B phase. Clearly, a noticeable performance increase between the A<sub>1</sub> and B phase was exhibited under pressure. A classic performance trend expected of a CR participant occurred. That is, Amy exhibited non-choking behaviour and performed with less variability during the B phase. Three performance variables may substantiate the evidence that Amy performed more successfully under pressure. First, Amy's performance indicated that there was a considerable difference, increasing performance by 67%, from the A<sub>1</sub> to the B phase. Second, all data points during the B phase are on or above the projected celeration line of the A<sub>1</sub> phase, indicating that performance improved by a sizeable amount during the B

phase. Finally, the timing of the effect was immediate and sustained. That is, performance during the B phase changed without delay, indicating the pressure manipulation was effective in changing success rates. The interview analysis helped to explain Amy's experience during the three phases.

*Interview analysis: Cognitive themes.* During the interview, two themes that were evident were positive self-talk and avoidance coping. Positive self-talk was apparent when Amy explained her thoughts relating to the shot distance. During the A<sub>1</sub> phase, Amy was surprised about the shot distance, "I didn't think I would be shooting from that far... that surprised me, but after I put a few practice shots in, I was fine." Earlier pilot data had indicated that the shot distance of 2.44 m (8 ft) was a reasonable distance in comparison to the 4.90 m (16 ft) radius of the goal circle (Netball Victoria, 2003). In addition, Amy would have practiced shots from this distance regularly in training. Amy used positive self-talk to deal with the shot distance by saying, "I was telling myself I couldn't do anything about it, so I adjusted to it quickly." Generally speaking, Amy exhibited a high degree of adaptability during the A<sub>1</sub> phase by recovering from the initial surprise of the situation.

Positive self-talk was also evident in the B phase, however, Amy now used positive self-talk to cope with the pressure. For example, Amy stated, "I was very focused, I was just like 'c' mon, I can do this' and when I missed one, I was like, 'ok, let's get the next one in.'" Amy used positive and enthusiastic self-statements (e.g., "c' mon, I can do this") to explain her experience during the B phase. Amy also elaborated that, at least, two benefits of using positive self-talk were recovery from errors and task-focus. First, Amy recovered from errors quickly in order to prepare for the next attempt. When I asked Amy how she coped with missing shots, she stated, "I felt really positive about myself. Even if I

missed one, I thought, 'that's alright, I'll just get the next one or I'll get the next one after that,' very positive thinking toward myself." Second, Amy used positive self-talk to maintain an intense level of task-focused attention. For example, Amy was explicit when explaining her cognitions during the B phase, "I concentrated more and I became more focused and I was getting them (the shots) in more... I was just saying 'c'mon, I can do this' and they kept going in." Amy's results relate with research on self-talk (e.g., Hardy, Gammage, & Hall, 2001; Landin & Hebert, 1999). In a descriptive qualitative investigation, for example, Hardy et al. found that one reason that athletes used self-talk was to maintain concentration on the task. As Amy discussed concentration, she also mentioned peak performance idioms, such as "in the zone" and "got into a rhythm." When asked how she dealt with the pressure, Amy stated, "I was in the zone, I was in the zone. I don't know what you call it. ... Just getting in the zone, being able to concentrate, shooting well, doing well, and thinking positively." It appears that positive self-talk facilitated Amy's mental preparation and focus for each attempt. In addition, Amy elaborated on the meaning of "got into a rhythm" during the B phase,

I just got into a rhythm and mode and I found it hard to miss. ... I find it really hard, when I shoot, they (the attempts) just go in. I don't worry about them not going in. I say "ok it'll go in, it'll go in," and it goes in and then when I don't get it in, I just say "ok, let's get the next one." I try to stay positive.

The idiom "got into a rhythm" perhaps meant that Amy experienced less cognitive interference related to performance because she prepared equally for each attempt. Using positive self-talk may have ensured that Amy established the proper mental readiness and focus before each attempt.



Another theme that emerged from the interview was avoidance coping. Avoidance coping is typically used to direct activity away from the threat-related stimulus (Anshel & Weinberg, 1999). When athletes use avoidance coping, they do not attempt to solve the problem, but try to maintain attentional focus and address the next task (Anshel, 1996). Three possible issues related to avoidance coping for Amy were blocking out distractions, imagining team support, and bouncing the ball. Amy coped with the pressure by ignoring the camera and audience,

I was blocking out all the distractions. Half the time I didn't even know the video camera was there. I forgot about it and then, when we had to stop for 30 seconds, I thought, "oh, the video camera is there." That's how focused I was. I didn't even know they (the audience members) were sitting around me half the time. I didn't even know they were writing notes until I finished and then I saw they had paper and I said, "what are you doing?" (Amy chuckles)

Blocking out the camera and audience, whether consciously or unconsciously, represent a classic avoidance coping strategy enabling attention to remain on shooting.

Amy used other avoidance coping strategies during the B phase possibly as a habit in keeping with the team environment and support she normally experiences when playing. Team support was an essential part of dealing with the pressure as Amy imagined teammates during the B phase,

In my team I have this girl that plays wing attack and she's always, "c'mon get it in," she's always so positive. There was a couple times when I went to put it (the shot) up, because I am so used to her (the teammate) saying "c'mon, lets get it in," I was waiting for her to say "c'mon you can get it in" and I imagined that she said it and that helped.

This quote could be interpreted in numerous ways. First, team support could work in the same way as avoidance coping strategies by helping Amy dissociate from the pressure and maintain focus on shooting. That is, Amy imagined team support to cope with the pressure and remain task-focused. Second, team support and encouragement may have evoked a type of positive, conditioned response of successful shooting. Finally, team support perhaps normalised the experimental situation into a more familiar environment, allowing Amy to effectively deal with the pressure. I suggest that, in all three interpretations, Amy attempted to decrease A-state by imagining team support.

Another coping strategy Amy used during the B phase was bouncing the netball. Apparently, bouncing the ball was also a strategy to help Amy relax, “I didn’t really bounce the ball a lot (in the A<sub>1</sub> phase). Compare that to Session 2, I did bounce it a lot... it was like a deep breath and relaxing thing before I took the shot.” Amy seemed to bounce the ball as an arousal regulation technique to control breathing and focus her attention on the task. After reviewing the videotape of performance during the B phase, I observed that Amy bounced the ball once before each shot. In a regulation netball game, however, bouncing the ball is prohibited, which makes this strategy very intriguing. Unfortunately, during the interview, I did not probe Amy about her rationale for bouncing the ball in relation to the legality of the action during a regulation game because, although Amy mentioned it during the interview, I only noticed the consistency of the action on the videotape after the interview was conducted.

*General summary of Amy.* As indicated by the DM-CSAI-2 and interview, Amy experienced a perceived elevation in pressure leading into the B phase. By triangulating data, a more robust validation of the pressure manipulation was obtained. During the B phase, Amy only missed 5 out of 60 attempts, an exceptional performance. Amy’s success

under pressure was expected (although perhaps not to this large extent) because she was classified as a CR participant. Amy was able to perform at a very high level despite feeling relatively anxious prior to the B phase. Kazdin (1982) explained, “Latency of change refers to the period between onset or termination of one condition and changes in performance. The more closely in time the change occurs after the experimental conditions have been altered, the clearer the intervention effect” (p. 237). In Amy’s case, the latency of change was brief and performance changes coincided with the onset of the B phase, thus reinforcing the positive effect of pressure on performance. It appears that Amy’s answers to the psychological inventories were helpful in successfully predicting Amy’s likely resilience from choking effects.

During the interview, Amy expressed two main themes regarding her cognitions during the study, namely positive self-talk and avoidance coping. It appears that positive self-talk and avoidance coping strategies were employed in order to deal with the uncertainty and pressure manipulation experienced during the study. A number of avoidance coping strategies were utilised during the B phase, possibly to maintain focus on the task. Amy consistently mentioned strategies to avoid the pressure, such as “blocking out the audience” and “imagining my teammate” that helped her maintain attention on shooting. Amy’s use of avoidance coping strategies during the B phase supports her reported CSIA results indicating that she is typically an “avoidance coper.” Attending to task-relevant cognitions, rather than focusing on the pressure, as explained by Amy, helped her “get into a rhythm” and remain task-focused. Similar to Amy’s peak performance expressions, Jackson (1992; Jackson & Csikszentmihayli, 1999) have examined the “flow” experience often reported by athletes when performing extraordinarily well. Two variables that may indicate Amy was experiencing peak

performance were the level of successful performance and phrases during the interview. First, a substantial increase in performance during the B phase occurred in comparison to the A<sub>1</sub> and A<sub>2</sub> phases. Second, it appeared that at least two (i.e., concentration on the task at hand and loss of self-consciousness) of the identified constituents of a “flow” experience (see Jackson & Csikszentmihayli) were in the forefront of Amy’s performance explanation. Concentration on the task at hand and loss of self-consciousness (S-C) were both discussed during the interview and are important elements of the flow experience. An absence of statements related to S-C may indicate that Amy was completely immersed in the task and not easily distracted by the pressure manipulation. Amy also explained performance in flow-like expressions, using terms such as “get into a rhythm” and “in the zone,” to describe her experience.

A drawback to this interview was that it was one of the initial interviews conducted. In retrospect, the initial interviews were probably less proficient in comparison to the later interviews because with each interview my knowledge about CR athletes expanded, helping me to focus on specific and meaningful questions and issues. For instance, during the interview, I missed the opportunity to investigate why Amy bounced the ball during the B phase, but not other phases. This may have provided more insight into the psychological mechanisms during the B phase. Regardless, Amy provided meaningful information regarding the cognitive processes of a CR participant.

#### *CR Participant- Beth*

*Participant profile.* Beth was 19 years old and had been playing netball in a division (association) level team for 7 years. During that time, she played in a shooting position for 4 years. Beth was purposively sampled as a CR participant because she was low in S-C, moderately low in A-trait, and predominantly used avoidance coping. Beth’s scores were

39 on the SCS (1st to 25th percentile), 32 on the SAS (25th to 50th percentile), and – 9 on the CSIA differential score (1st to 25th percentile).

*Pressure analysis.* Visual inspection of Figure 3.5 shows that Beth's intensity scores for cognitive anxiety were 12, 27, and 15 immediately before the A<sub>1</sub>, B, and A<sub>2</sub> phases, respectively. Clearly, Beth experienced a substantial increase in intensity of cognitive anxiety prior to the B phase. Intensity scores for somatic anxiety were 11, 17, and 19 prior to the three phases, respectively. Beth, thus, exhibited a successive elevation of somatic anxiety prior to each of the three phases. For Beth, absolute cognitive anxiety increased from low levels prior to the A<sub>1</sub> and A<sub>2</sub> phases to moderate levels prior to the B phase. Absolute levels of somatic anxiety remained low prior to the A<sub>1</sub> and B phases, but increased to moderate levels prior to the A<sub>2</sub> phase.

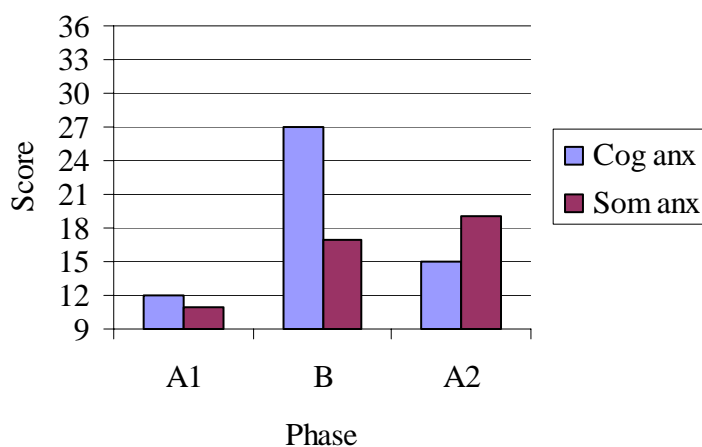


Figure 3.5. Cognitive and somatic anxiety intensity scores for Beth.

*Interview analysis: Pressure manipulation.* Before discussing the interview results, a statement should be made in relation to Beth's reported somatic anxiety scores. Beth's intensity scores showed a successive increase in somatic anxiety for the three phases. My field notes indicate that Beth arrived late for the A<sub>2</sub> phase and exhibited typical reactions to being rushed, such as rapid breathing and heart racing. Upon her arrival, Beth rested for

approximately five minutes before completing the DM-CSAI-2. She may have misinterpreted her increase in arousal as an increase in somatic anxiety during the A<sub>2</sub> phase, or perhaps she was anxious due to her tardiness. In any case, reported DM-CSAI-2 results should be viewed with caution.

During the interview, Beth explained her nervousness through expressions of somatic anxiety. During the A<sub>1</sub> phase, she used idioms such as “heart racing a bit” and “muscles tense a bit,” to explain her experiences of A-state, which was possibly related to Beth experiencing uncertainty. For example, when asked to compare her A-state during the A<sub>1</sub> and A<sub>2</sub> phases, Beth suggested,

During Session 1 (A<sub>1</sub> phase) I was a bit nervous, I didn't really know what to expect, but then when I started shooting, I became more relaxed. ... During Session 3 (A<sub>2</sub> phase) I wasn't feeling much, I now knew what to expect and knew what to do and I just felt really relaxed. There wasn't any real pressure and I wanted to do well.

The quote above supports the contention of Martens et al. (1990) that uncertainty increases A-state. It appears that uncertainty and A-state quickly dissipated as the A<sub>1</sub> phase became more familiar and Beth commenced her shot attempts. During the A<sub>2</sub> phase, Beth was more familiar with and certain about the procedures enabling her to remain relaxed and attempt shots in a state of relative calm.

As Beth explained her experience during the B phase, it quickly became clear that her experience was different to the other phases. For example, Beth explained, “My first reaction was that I was a bit excited, my heart was racing a bit, so that probably helped a lot. I was also pretty relaxed, which helped my shots go in.” Superficially, Beth's use of “excited” and “relaxed” to describe A-state seems contradictory because one cannot be excited and relaxed simultaneously. In the context of Kerr's (1990) Reversal Theory (RT)

of arousal, however, it is logical that Beth experienced both excitement and relaxation during the B phase. Advocates of RT posit that individuals are capable of interpreting their arousal on a continuum of hedonic tones ranging from high (i.e., pleasant) to low (i.e., unpleasant). Four possible pairs of meta-motivational states are also postulated, where a meta-motivational state is a “phenomenological state, which is characterised by a certain way of interpreting some aspect(s) of one’s own motivation” (Kerr, 1990, p. 129). The telic-paratelic pair (see Apter 1982 for a discussion of other states) has received the most research attention in sport. In this pair, individuals in a telic state (e.g., goal-oriented and express purpose) are typically serious, preferring low arousal levels, whereas individuals in a paratelic state (e.g., oriented toward the sensations related to the behaviour) are naturally spontaneous, preferring high arousal levels. Depending on the hedonic tone, high arousal levels may be perceived as excitement (pleasant) or anxiety (unpleasant) and low arousal interpreted as relaxation (pleasant) or boredom (unpleasant). Within RT, performers can rapidly change (reverse) meta-motivational states (i.e., telic-paratelic) or interpretations of arousal (i.e., pleasant or unpleasant), however these changes are involuntary. The RT appears to provide a plausible explanation of Beth’s qualitative results because a shift in arousal or meta-motivational state occurred during the B phase. These shifts were possible because each phase continued for approximately 30 minutes, which included administering the DM-CSAI-2 and shot attempts with breaks, allowing sufficient time for Beth to switch from telic to paratelic states or decrease arousal. According to RT, excitement is a paratelic state characterised by high arousal and high hedonic tone (i.e., pleasure) and relaxation is a telic state characterised by low arousal and high hedonic tone. Considering excitement and relaxation are both characterised by pleasure, Beth possibly experienced a “reversal” of meta-motivational states during the B

phase because she experienced excitement (a paratelic state) during the initial shots and then involuntarily shifted to relaxation (a telic state) as arousal decreased during the B phase. In a qualitative investigation related to RT, Males, Kerr, and Gerkovich (1998) conducted 50 post-event interviews with nine elite male slalom canoeists regarding meta-motivational states during competition and found support that athlete's experience "reversals" during competitions. Males et al. explained that the athletes involuntarily changed meta-motivational states at different stages of the competition (i.e., pre-race, during race, and post-race) in response to errors or other events. Beth's qualitative results may support Kerr's RT interpretation of arousal.

*Performance analysis.* Mean performance for Beth during the A<sub>1</sub> phase was  $5.50 \pm 1.05$  and was  $7.00 \pm 1.41$  during the B phase. This represented a 27% improvement from the A<sub>1</sub> to the B phase. During the A<sub>2</sub> phase, mean performance was  $5.67 \pm 1.03$ . This was a 24% performance decrease between the B and A<sub>2</sub> phase. For Beth, mean performance increased by only 3% from the A<sub>1</sub> to the A<sub>2</sub> phase whereas performance during the B<sub>1</sub> phase changed considerably, indicating the pressure manipulation was successful (see Figure 3.6).

The slope of the trend line for the A<sub>1</sub> phase was  $\div 1.33$  and the slope of the trend line for the B phase was  $\times 1.33$ . This represented a reverse change in slope of  $\times 1.77$  from the A<sub>1</sub> to the B phase. The slope of the trend line for the A<sub>2</sub> phase was 1.00, which was a change in slope of  $\div 1.33$  across the B and A<sub>2</sub> phase.



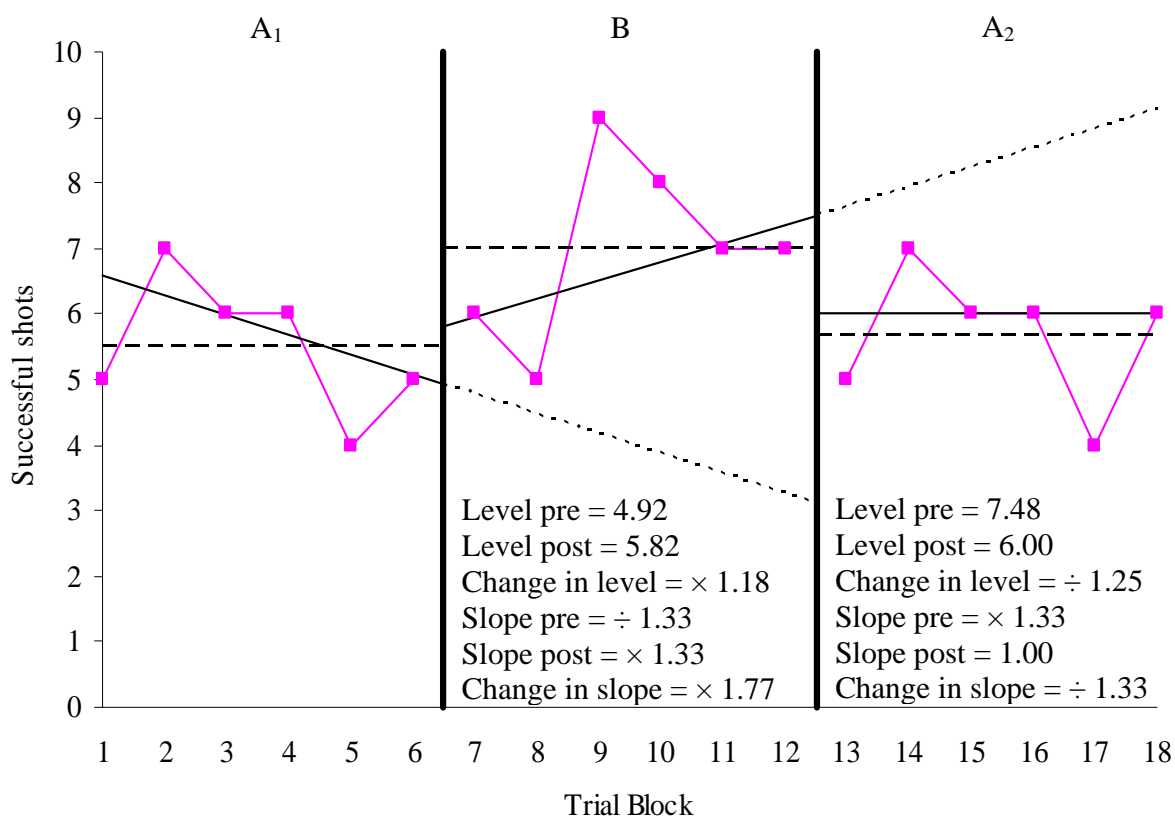


Figure 3.6. Split-middle analysis for Beth.

In summary, mean performance for Beth increased by 1.5 successful shots per trial block between the A<sub>1</sub> and B phase. Over the 60 shot attempts, this translates to an increase of nine successful shots during the B phase compared to the A<sub>1</sub> phase. A 27% increase in successful shots between these phases is a considerable improvement. Two concerns, however, should be discussed regarding the B phase. First, data variability increased in the B phase compared to the other phases. That is, Beth's performance consistency decreased, perhaps an indication that the pressure manipulation affected performance. Second, it appears the pressure negatively affected performance during the initial 20 shots (i.e., Trial Blocks 7 and 8). Barlow and Hersen (1984) explained, in reference to behaviour research, the immediacy of the performance effects is important in determining the interventions effectiveness. In Beth's case, delayed performance increase after the introduction of the

pressure manipulation may limit interpretations of pressure effects. Perhaps Beth needed time to select coping strategies to deal with the pressure. Data variability and immediacy of the effects were perhaps a derivative of the pressure in the first two trial blocks (i.e., Trial Block 7 and 8), but less so thereafter. Performance data shows that Beth increased performance during the B phase, however, caution should be used when interpreting the performance changes. Perhaps the interview data may help explain the increased variability and delayed effects of the manipulation during the B phase.

*Interview analysis: Cognitive themes.* During the interview, two themes that were evident for Beth were positive interpretation and avoidance coping. Beth spoke about the audience and reward as the most distracting pressure manipulations. Thus, in the subsequent analysis, I explain how these pressure manipulations relate to each of the themes separately. For example, Beth used positive interpretation as a cognitive restructuring technique to cope with the audience's presence. When asked about the audience's affect performance, Beth stated, "By having them there... and by them watching me, there is this silent thing that they were encouraging me to do well." The audience was instructed not to interact with the participants. Yet, Beth perceived a positive impression from the audience that, for her, equated to motivation to perform in front of the audience. Beth could not completely explain why she felt the audience was helpful, but she commented, "I don't know, having people there watching, I was confident, it made me feel better when I got my shots in." This quote supports Zajonc's (1965) classic theory of social facilitation. According to Zajonc, the presence of others leads to performance increments in well-learned tasks because the enhanced arousal (or drive) increases the probability of a dominant, successful response. Perhaps as a result of being an experienced netball player and increase in confidence, the probability of the dominant outcome

occurred with the audience presence. The positive interpretation of the audience was possibly a result of Beth's cognitive restructuring and positive self-talk, "(I) didn't really care about the expectations that they (the audience) had, I sort of said that I would try to do my best, said to myself I can do it, so I could keep my confidence up." This statement emphasised that Beth can cope well with external pressure, using positive self-talk to increase confidence. Beth also insinuated that others expectations may negatively affect her performance by stating, "(I) didn't really care about the expectation." Beth possibly understands that perceiving high expectations of others may hinder performance and dismissing the expectation helps her manage the pressure. It appears that Beth downplayed the significance of the audience, which had a positive effect on performance, "It made me relax a bit more, which would then help me concentrate... the fact that I didn't really need to meet anyone's expectations helped me relax and increase confidence." Thus, Beth countered high expectations from others by using cognitive restructuring to successfully decrease A-state.

Aspects of positive interpretation was also expressed when Beth discussed the financial reward. Offering a monetary incentive for successful performance may affect participants in one of two ways, depending on participants' interpretation. First, when the person interprets the situation as negative, possible rewards may hinder performance because the possibility of receiving the prize intensifies perceived importance and can consequently elevate perceived A-state (Baumeister, 1984; Masters, 1992). Second, when person interprets the situation as positive, possible monetary incentives may increase motivation and subsequent performance. Beth positively interpreted the reward as an incentive, "I was thinking I wanted to do better because the money was a motivator. I came into the experiment not expecting much, and if I get the chance to make money, then

I think that's good." Beth's interpretation linked with performance results provides support for the argument made by Jones and colleagues that an athlete's interpretation of anxiety may influence performance under pressure (Hanton & Cannoughton, 2002; Hanton & Jones, 1999; Hanton, Mellalieu, & Hall, 2004; Jones & Swain, 1992; Jones et al., 1993; Swain & Jones, 1996). In an initial investigation, Jones and Swain divided participants into high and low competitive groups from a number of sports (e.g., rugby union, basketball, soccer, and field hockey) to examine differences in anxiety intensity and anxiety direction. The high competitive group interpreted cognitive anxiety as significantly more facilitative than the low competitive group, who reported cognitive anxiety as more debilitating. When asked how the motivation of receiving the monetary reward helped, Beth stated, "It helped me think that I could do it, that I could get the shots in." It appears that the positive interpretation affected Beth's confidence, ultimately using additional positive self-talk to facilitate performance.

The second theme that was evident for Beth was avoidance coping. Avoidance coping may have helped Beth maintain focus on shooting during the B phase. Although Beth stated that the audience was helpful, perhaps in a psychologically encouraging way, she also explained that she blocked them out as well, "I pretended that they weren't there and really talked to myself. I knew they were there, I just didn't notice them." I interpreted this quote to mean that Beth was aware of the audience in between shot attempts perhaps for psychological support, but essentially disconnected from the pressure by blocking the audience out in order to maintain attention on the task. When asked how she increased concentration, she explained,

I just went into my own little world, my own zone, I wasn't thinking about the audience... I was using self-talk, I was sort of just in my brain, like shooting well, and no real distracters were there and didn't really notice the audience after that.

From this quote, it appears that Beth can consciously buffer potential distractions when necessary. Beth seemed to use self-talk to stay in the present moment as a cocooning technique from other possible distractions. Self-talk may isolate Beth from the pressure in order to block out external factors.

During the interview, Beth suggested that the monetary incentive was a motivating factor, however, the impetus of the reward may have also distracted Beth during the B phase. For example, when asked about the reward, Beth stated, "The money helped a little but (pause)... the first 20 shots I was thinking about it too much and wasn't concentrating on my shots. After that, I didn't really think about it. I was concentrating on my shot and technique." This quote supports Baumeister and Showers (1986) contention that attending to possible rewards may distract the performer or may interfere with intrinsic motivation. I also asked Beth probing questions about how she recovered from her lapse of concentration, "I just went into my own little world, my own zone; I just wasn't thinking about the money, I didn't notice any real distractions." Due to the vagueness of the idiom "own zone", I probed further, "I wasn't thinking really about anything around me, happy with my thoughts and my performance... nothing really phased me, no interruptions or anything." Thus, Beth was initially distracted by the financial incentive, but later was able to psychologically distance herself (an avoidance coping strategy) from the pressure. These results support the finding of Wang, Marchant, and Morris (2004) that athletes who typically use an avoidance coping style perform better under pressure than athletes who typically use an approach coping style. Avoidance coping was a method of recovering

from errors and performing in “my own zone,” which was interpreted as attention being task-focused and blocking out distractions. It seems that Beth was resilient under pressure and skilful in switching attention to task-relevant cues when necessary.

*General summary of Beth.* Scores on the DM-CSAI-2 indicated that cognitive anxiety increased during the B phase, however, consecutive increases in somatic anxiety occurred during the three phases. The cognitive anxiety results support the contention that the pressure manipulation succeeded in increasing pressure, however, the successive increases in somatic anxiety was unexpected. This trend possibly occurred because Beth arrived late and exhibited reactions to being rushed, potentially affecting her somatic anxiety results. The interview results related to the pressure also indicated, as discussed in relation to Kerr’s (1990) RT interpretation of arousal, that Beth experienced pressure initially and then adjusted during the B phase. Beth’s performance increased considerably during the B phase compared to the other phases. From the collective pressure and performance analyses, Beth experienced elevated pressure and increased performance during the B phase. Thus, it appears that the psychological inventories were helpful in predicting Beth’s likely resistance to choking effects, however, she needed some time to adjust and possibly select appropriate coping strategies to deal with the pressure.

During the interview, two themes that were evident were positive interpretation and avoidance coping. Throughout the entire interview, Beth explained she managed the pressure manipulations by using positive interpretations and positive self-talk. The positive self-statements helped Beth to adjust to the pressure manipulations more easily. Perhaps Beth’s performance can be explained by combining the themes from the interview with information related to Kerr’s (1990) RT interpretation of arousal. From the qualitative results, Beth implied that A-state was highest at the commencement and

possibly decreased in later trial blocks of the B phase. The excitement (characterised by high arousal and high hedonic tone) experienced possibly diverted attention to the money as Beth explained she was “thinking about it (the money) too much and wasn’t concentrating on my shots.” As a result, performance was likely affected negatively during the first 20 shots. Beth then used common avoidance coping strategies, such as blocking out the audience and positive self-talk, to psychologically distance herself from the pressure and perform more successfully during the later trial blocks.

*CR Participant- Carol*

*Participant profile.* Carol was 19 years old and had been playing netball for 9 years. She first played at division (association) level and then on a state league team for 2 years as goal shooter, before moving to another state. At the time of the study, Carol was playing on a division team and in a goal shooting position for 5 years. Carol was purposively sampled as a CR participant because she was low in S-C, low in A-trait, and typically used avoidance coping. Specifically, Carol’s scores were 39 on the SCS (1st to 25th percentile), 21 on the SAS (1st to 25th percentile), and – 11 on the CSIA differential score (1st to 25th percentile).

*Pressure analysis.* Visual inspection of Figure 3.7 demonstrates that Carol’s intensity scores for cognitive anxiety were 21, 11, and 10 before the A<sub>1</sub>, B, and A<sub>2</sub> phases, respectively. Cognitive anxiety was highest prior to the A<sub>1</sub> phase and was relatively low in all phases. Intensity scores for somatic anxiety were 13, 13, and 12 for the three phases. Somatic anxiety was consistently low prior to all experimental phases. For Carol, absolute levels of cognitive anxiety decreased from moderate prior to the A<sub>1</sub> phase to low levels prior to the B and A<sub>2</sub> phases, whereas absolute levels of somatic anxiety remained low prior to all phases.

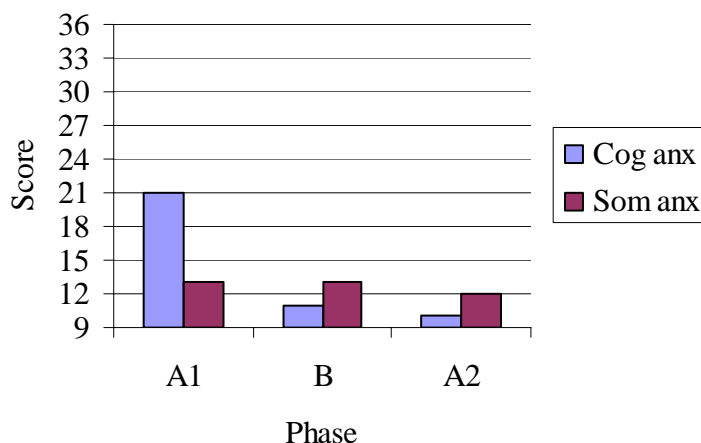


Figure 3.7. Cognitive and somatic anxiety intensity scores for Carol.

*Interview analysis: Pressure manipulation.* During the interview, Carol expressed her nervousness primarily through phrases relating to cognitive anxiety. For example, Carol explained her A-state after completing the DM-CSAI-2 and prior to commencement of the three phases by saying,

I was starting to get worried about my shooting after completing the survey before the first one (A<sub>1</sub> phase) because I wasn't feeling confident. ... (During the B phase) I was feeling the same as the first one until you (the researcher) mentioned the video camera. (Carol chuckled) I don't like video cameras. ... I think that made me nervous... (I was thinking) I'm not going to improve... after I finished the survey, I was waiting and it started to worry me that I would not improve. ... I wasn't nervous, I was fine during Session 3 (A<sub>2</sub> phase).

Two issues should be discussed in relation to the previous excerpt. First, it seems that Carol experienced similar nervousness prior to the A<sub>1</sub> and B phases compared to the A<sub>2</sub> phase. She acknowledged her nervousness prior to the A<sub>1</sub> and B phase, whereas she was relaxed during the A<sub>2</sub> phase. Second, Carol suggested that her A-state increased after completing the DM-CSAI-2 and prior to commencement of the A<sub>1</sub> and B phases.



Specifically, her cognitive anxiety increased due to a lack of confidence during the A<sub>1</sub> phase, and concern about the camera during the B phase. Perhaps Carol increased A-state after completing the DM-CSAI-2 because of uncertainty prior to commencing the A<sub>1</sub> and B phases. In fact, a theme evident for Carol, relating to the perceived pressure, was uncertainty. A number of environmental factors contributed to Carol experiencing uncertainty, including unfamiliar environment, unfamiliar procedure, and shot distance. The most prevalent, during the A<sub>1</sub> phase, was unfamiliarity with the environment.

In netball, you know your corner is going to pass the ball to you, but in this situation (the study), there is nothing like that. I just had to shoot, so there was no defender to put on the pressure but there was pressure to get as many shots in as possible.

In a regulation netball game, players shift positions, pass the ball, and a defender attempts to prevent successful goal shooting. During the A<sub>1</sub> phase, however, Carol was without the usual game-related build-up to receiving the ball. Carol then spoke about familiarity with the procedures and shot distance during the A<sub>2</sub> phase, “By Session 3 (A<sub>2</sub> phase), I got used to the distance, it wasn’t going to move and I knew that. I felt a lot better. I was fine because I had the last two weeks to settle in and get comfortable.” This quote supports the contention of Martens et al. (1990) that uncertainty increases A-state because, unlike the A<sub>1</sub> and B phases, the procedures and shot distance were overt, resulting in slight pressure.

*Performance analysis.* Mean performance for Carol during the A<sub>1</sub> phase was  $4.33 \pm 1.03$ , whereas performance during the B phase was  $6.00 \pm 1.67$ . This represented a 39% improvement in performance. During the A<sub>2</sub> phase, mean performance was  $5.00 \pm 1.27$ , representing a 20% decrease between the B and A<sub>2</sub> phase. Mean performance from the A<sub>1</sub> to the A<sub>2</sub> phase increased by 16% whereas the B<sub>1</sub> phase performance changed substantially, indicating the pressure manipulation was effective (see Figure 3.8).

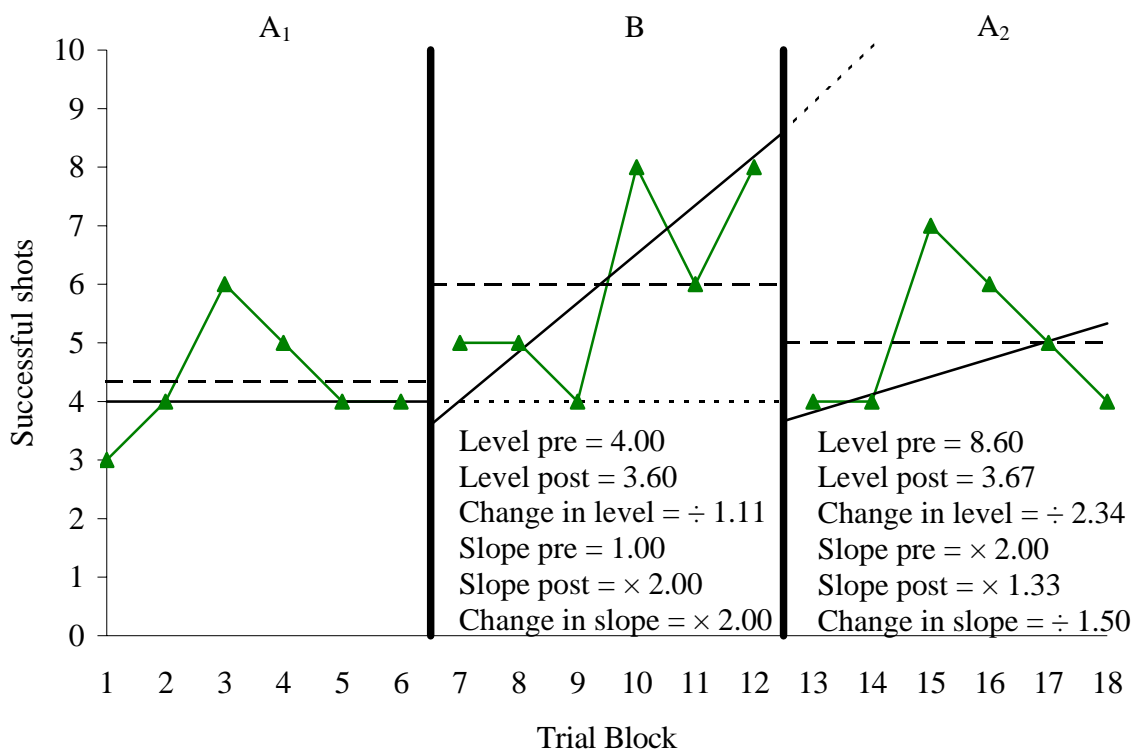


Figure 3.8. Split-middle analysis for Carol.

The slope of the celeration line for the A<sub>1</sub> phase was 1.00, whereas the slope of the celeration line for the B phase was  $\times 2.00$ . This represented a change in slope of  $\times 2.00$  from the A<sub>1</sub> to the B phase. During the A<sub>2</sub> phase, the slope of the celeration line was  $\times 1.33$ . This indicated a change in slope of  $\div 1.50$  between the B and A<sub>2</sub> phase.

In summary, Carol's performance during the A<sub>1</sub> phase was the lowest of all participants. This seems incongruent in the context of her high skill level and previous state level representation, but perhaps related to the uncertainty experienced prior to and during the A<sub>1</sub> phase. As expected for a CR participant, Carol increased performance by 39% during the B phase, a considerable improvement. Two concerns, however, should be discussed regarding the B phase. First, the expected performance improvement was delayed, and thus caution should be used when interpreting the pressure effects (Barlow & Hersen, 1984). Second, inspection of the variability in data points indicates that Carol was

more inconsistent during the B phase than the other phases. Carol's inaccuracy during the first 30 shots was perhaps due to an increase in nervousness during the B phase. These two performance indicators provide indirect support that the pressure manipulation was effective during the B phase. In the interview analysis, Carol provides an explanation of her focus of attention during the B phase.

*Interview analysis: Cognitive themes.* During the interview, three themes were evident for Carol including performance fluctuations, avoidance coping, and positive interpretation. Performance fluctuations were evident when Carol discussed her attention and shooting discrepancies during the B phase. It was obvious that she was uncomfortable with the video camera being nearby, as she explained several times, "I don't like video cameras." As a result, the video camera initially affected Carol's shooting.

During the first 30 shots, my focus was more on the video camera than on shooting, but then I started focusing on the ring, and getting them in. ... In between shots I saw the camera but during my shots, I just didn't think about it.

Researchers (e.g., Carver et al., 1985; Kurosawa & Harackiewicz, 1995; Wang, Marchant, Morris, & Gibbs, 2004) have found that a video camera might increase self-awareness (S-A) and interfere with processing of task-relevant information. The previous quotes support this finding as Carol explained her inattentiveness to shooting. When probed about the effects of the video camera on performance, Carol explained,

In the second (phase), I started with my technique in my practice shots and the first 30 shots. I wasn't getting anywhere near the ring so I decided to just feel comfortable when I was shooting, whereas in the first 30 shots, I did a lot of technique. I was more focused on technique and I kept missing the goal. In the last part of the second one (phase), I was more relaxed and just shot the ball.

I asked Carol to clarify what she meant by “focused on technique.”

I was focusing, you know, hands up high, bend knees, flick it with one of my hands and not both. It didn't seem to be working... I thought it's not working and I don't feel comfortable, so I just changed to where I did feel comfortable.

This quote indicates that ‘technique’, for Carol, implied focusing on execution of the shooting task, whereas feeling ‘comfortable’ indicated an external focus of attention, and, in Carol’s words, “focusing on the ring.” Advocates of the self-focus model (e.g., Baumeister, 1984; Beilock & Carr, 2001; Masters, 1992) of choking propose that performance pressure increases anxiety and S-A about performing correctly, and, in turn, enhances attention to skill processes and conscious control. Attention to automated performance is thought to disrupt proceduralised processes of high-level skills that normally run outside the scope of working memory during performance (Beilock & Carr, 2001). Carol’s quotes provide support for the self-focus model because the video camera may have increased S-A during the first 30 shot attempts, increasing Carol’s attention to explicit monitoring of skill execution, with a subsequent decrease in performance. Performance fluctuations occurred when Carol modified attentional focus to being more ‘comfortable’, rather than using ‘technique’ when shooting.

Performance fluctuations were possibly a direct result of a shift to avoidance coping strategies during the final 30 shots of the B phase. The theme avoidance coping was evident when Carol explained she was remaining in the present moment during the final 30 shots. Carol used descriptions, such as “forgot about the last shot”, to maintain concentration and minimise distractions. When asked whether the monetary incentive affected performance, Carol stated,

I tried not to focus on that (the money). I just tried, especially during the last 30 shots, to focus on getting one ball in at a time. There was that lot of pressure because you had the camera and the audience and the money, so I just wanted to focus on each individual ball... focus on what I am doing right now.

Carol was task-focused and blocked out distractions during the final 30 shots of the B phase. It appears that Carol used imagery to help refocus attention, "While focusing on the ring, I thought about the ball going in. ... I imagined the ball going up, over the ring and in." Perhaps she used imagery to help stay in the present moment. That is, imagery was a method of remaining task-focused and decreasing distracting thoughts related to the pressure manipulations.

Positive interpretation was apparent when Carol discussed her cognitions about the audience during the B phase. Carol explained that the presence of the audience was a positive experience and she imagined them as teammates.

The audience standing around the circle, that's quite similar (to a game). I didn't think of them as the audience, I thought of them as my team in their positions... everyone is watching me and it kind of seems like (the audience was saying) come on you can get it in, you can get it in, so I said that I can get it in.

Imagining her teammates around the circle may have increased the sense of familiarity and certainty of the situation. Similarly, imagining her teammates was possibly a coping response to decrease uncertainty and manage the pressure experienced in the B phase. The positive cognitive restructuring was again illustrated when Carol stated, "I've done it many times before and I can do it again."

*General summary of Carol.* The DM-CSAI-2 data and interview indicated that pressure increased prior to the A<sub>1</sub> and B phases. The interview also indicated that Carol

experienced an increase in A-state prior to commencing the initial two phases. It is, thus, difficult to state with certainty that the pressure manipulations operated as planned, for Carol, because of the similar A-state experienced during the A<sub>1</sub> and B phases.

One advantage of SCD research is being able to compare performance between phases. The A<sub>2</sub> phase was possibly a “true” baseline phase because Carol was more relaxed during this phase. Considering that Carol was equally affected by uncertainty and increased A-state during the initial two phases, a performance comparison between the high-pressure (B) phase and what can reasonably be argued as actually low-pressure (i.e., the A<sub>2</sub> phase) indicates that performance decreased by 20% during the A<sub>2</sub> phase. This was a considerable decrement in performance when less pressure was involved (see Figure 3.8). This provides support that Carol exhibited non-choking behaviour during the B phase because she performed worse during the “true” baseline (i.e., A<sub>2</sub>) phase. From this performance analysis, it appears that the psychological inventories helped to predict Carol’s likely resistance to choking effects. Carol did, however, need time to adjust and select appropriate coping strategies during the B phase.

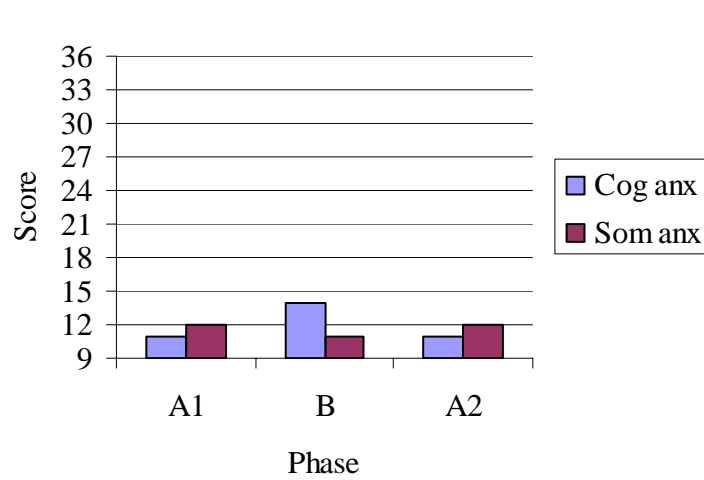
Based on the interview analysis, three key themes were performance fluctuations, avoidance coping, and positive interpretation. Performance fluctuations were evident when Carol performed poorly during the initial 30 shots of the B phase possibly because the video camera increased S-A. Carol consciously monitored technique to increase performance, which was paradoxical and debilitating to performance. These results provided support for the self-focus model of choking (Baumeister, 1984). Avoidance coping and positive interpretation were themes expressed in reference to the final 30 attempts during the B phase. Carol used various coping strategies, such as remaining in

the present moment and imagery, perhaps as a method of being task-focused and blocking out distractions.

#### *CR Participant- Debbie*

*Participant profile.* Debbie was 19 years old and had been playing netball since age 11. She had played division (association) level for 8 years, had played on a state league team for the past 4 years, and had played in a shooting position for 6 years. Debbie was purposively sampled as a CR participant because she was low in S-C, low in A-trait, and typically used avoidance coping. Specifically, Debbie's scores were 33 on the SCS (1st to 25th percentile), 25 on the SAS (1st to 25th percentile), and 0 on the CSIA differential score (25th to 50th percentile).

*Pressure analysis.* Visual inspection of Figure 3.9 shows that Debbie's intensity scores for cognitive anxiety were 11, 14, and 11 prior to the A<sub>1</sub>, B, and A<sub>2</sub> phases, whereas intensity scores for somatic anxiety were 12, 11, and 12 immediately before the three phases, respectively. The DM-CSAI-2 scores illustrate that Debbie experienced relatively low levels of, and minimal fluctuations in, A-state preceding the three phases.



*Figure 3.9.* Cognitive and somatic anxiety intensity scores for Debbie.

*Interview analysis: Pressure manipulation.* During the interview, Debbie reported experiencing only minor changes in A-state during all phases, thus complementing the DM-CSAI-2 results. Debbie was apprehensive during the A<sub>1</sub> phase because she was unfamiliar with the procedures of the study. When asked to compare the different phases, Debbie stated,

It was sort of a different nervousness. ... The first session (phase) was not knowing what to expect and it was the first time I was doing it, whereas the second session (phase) I knew what I was going to be doing, but then there was the added camera and the people there. So the second session I was more worried about my performance in front of other people than being so much nervous. ... I felt more relaxed today (A<sub>2</sub> phase) than all the other days.

This quote indicates that Debbie might have experienced multiple sources of anxiety, resulting in minimal differences in nervousness between the A<sub>1</sub> and B phase. Debbie was concerned about performing in front of people, but interpreted the audience as positive, “The audience was helpful... just having people there, it was similar to a normal game situation. Probably helped me to do better.” This positive interpretation may indicate Debbie was able to interpret the situations in a positive manner. Debbie was characterised as a CR participant partially because of her low A-trait. For Debbie, perhaps the B phase was not a particularly threatening situation and thus she was resistant to the effects of the pressure manipulation.

*Performance analysis.* Mean performance for Debbie was  $5.50 \pm 1.52$  in the A<sub>1</sub> phase and was  $8.33 \pm 1.37$  during the B phase. This equated to a 51% improvement between the A<sub>1</sub> and B phase. During the A<sub>2</sub> phase, mean performance was  $6.67 \pm 1.37$ , which represented a 25% decrement between the B and A<sub>2</sub> phase. Mean performance



increased by 21% from the A<sub>1</sub> to the A<sub>2</sub> phase whereas the B<sub>1</sub> phase changed substantially (see Figure 3.10). Mean performance results should be view with caution because the DM-CSAI-2 and interview results indicated the pressure manipulation was not effective.

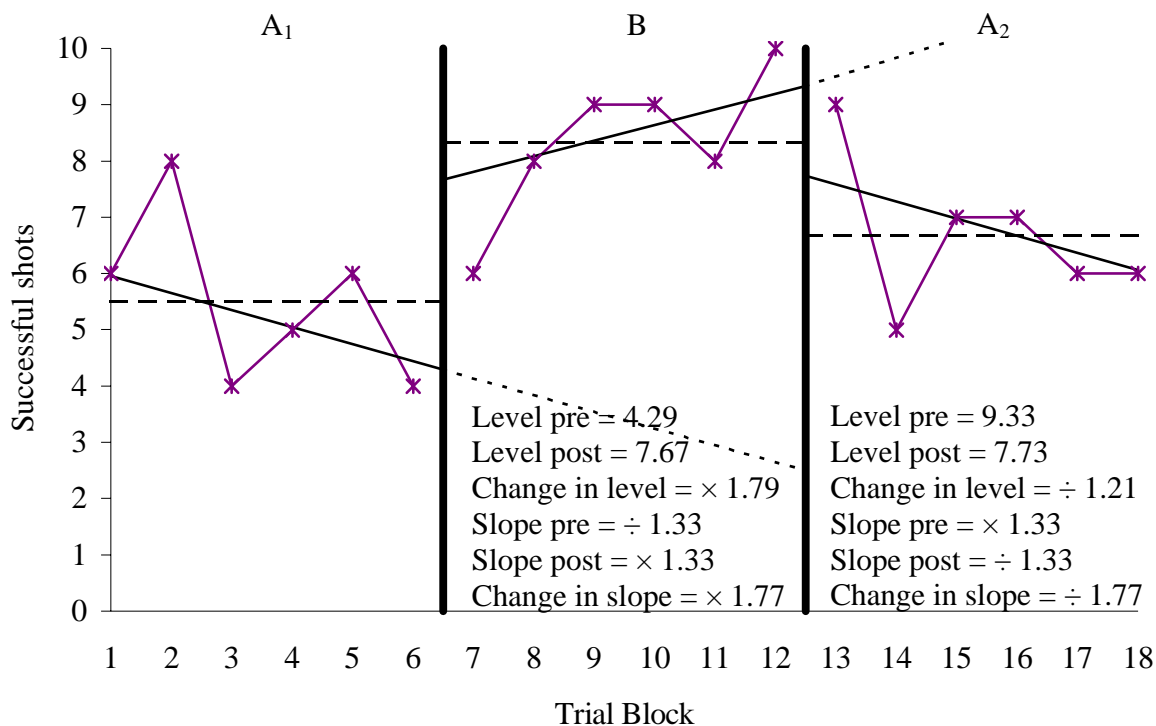


Figure 3.10. Split-middle analysis for Debbie.

The slope of the trend line during the A<sub>1</sub> phase was  $\div 1.33$ , whereas the slope of the trend line for the B phase was  $\times 1.33$ . This signified a change in slope between the A<sub>1</sub> and B phase of  $\times 1.77$ . The slope of the trend line for the A<sub>2</sub> phase was  $\div 1.33$ . The change in slope between the B and A<sub>2</sub> phase was  $\div 1.77$ .

In summary, shooting success rate for Debbie increased by a mean score of nearly three successful shots from the A<sub>1</sub> to the B phase, a considerable improvement in performance. It is difficult to conclusively determine the reason for Debbie's increase in performance because the A<sub>1</sub> phase scores were slightly unstable. A large amount of performance variability also occurred during the A<sub>1</sub> phase. Researchers have suggested

that excessive variability in pre-pressure baseline phase data may interfere with conclusions about interventions and may lead to misinterpretation of the data (Kazdin, 1982). Considering the current design, however, it was difficult to justify modifications to the procedures for only one participant. Although one option could have been to extend the A<sub>1</sub> phase, a risk would have been a loss of participant motivation. In hindsight, it appears that the task was well chosen and the distance appropriate as reflected by the absence of ceiling and practice effects in relation to the participant's high skill level. That is, skill level was high enough to minimise practice effects that might occur with less experienced participants or with a novel task.

*Interview analysis: Cognitive themes.* During the interview, Debbie was relatively taciturn in explaining her specific cognitions during the phases. As a result, there were no obvious themes that emerged during the interview analysis. It is relevant, nevertheless, to discuss how the manipulation affected Debbie during the B phase. For example, the audience was beneficial to Debbie's performance, as she explained,

I think it was helpful; you always have an audience at a netball game... although they weren't making any noise. I suppose a couple of times going through the shots, I was aware of them standing there watching, but it didn't really affect me too much.

The audience seemingly facilitated performance possibly because Debbie perceived that they helped to normalise the situation. This perception might have been expected of a person low in S-C; Debbie was not inclined to self-focus under pressure. Debbie's results support the contention that people low in S-C increase performance under pressure. It seems Debbie may have noticed the audience, but adjusted quickly and was task-focused.

Debbie's interview was one of the shortest (lasting approximately 30 minutes), yet, important information related to choking could still be obtained from the section of the

interview focusing on past experiences. That is, I asked participants to “describe a past experience (outside of the study) that involved pressure and describe how they dealt with the situation.” Debbie responded by describing a situation in which “I was in a grand final (championship game). I would get a few goals in but I wasn’t getting very many and I got very down on myself.” It appears that Debbie was experiencing the pressure of the grand final and performed poorly. On further probing, it seems that the pressure experienced was the social pressure from teammates.

They (teammates) rely on you. They’ve worked hard to get the ball down into you in the circle, they’ve done their job so now it’s up to me to do my job. Sometimes if it’s a close game, the pressure is really on to get the goals in and that’s when you start worrying about getting it in and concentrating too much. You feel that they’ve worked really hard to get the ball down to you and you just basically throw it away. ... I’m a shooter, I feel that it comes down to me to get the goals in.

The perceived pressure from teammates appeared to have affected Debbie’s cognitions and increased worry, “When there’s more pressure on me to get shots in, sometimes I think about it too much. ... But then I miss it anyway because I am so worried about it.” When asked what she meant by “think about it too much,” Debbie suggested,

Just mainly, I’ve got to get this one in, and I try and concentrate really hard on getting the movement right but I think I can concentrate too hard and force it too much. ... It doesn’t allow me to relax properly and just let it happen and I just sort of control it too much.

The preceding quotes correspond with Eysenck and Calvo’s (1992) Processing Efficiency Theory (PET) of anxiety. According to Eysenck and Calvo, worry causes a reduction in the storage and processing capacity of working memory available for a concurrent task,

along with an increment of on-task effort. When individuals encounter an anxiety-inducing situation, increased effort and compensatory strategies are utilised. Performance may remain similar in high-pressure as compared to low-pressure circumstances, but the individual works harder in the high-pressure condition to maintain performance (Janelle, 2002). According to advocates of PET, a crucial distinction exists between performance effectiveness (quality of performance) and processing efficiency (performance effectiveness divided by effort); the major difference being that anxiety impairs efficiency more than effectiveness. As such, increases in anxiety typically result in decrements in processing efficiency due to extra effort invested in performance and reduced attentional resources. Performance effectiveness, however, could be maintained or improved with extra effort, or could be impaired despite the extra effort. In Debbie's case, when explaining her past experience, there may be a threshold where an excessive amount of effort is detrimental to performance. Another key point is that Debbie provided excellent insight into previous unsuccessful performance, and learned from the experience. That is, Debbie was invested in the team during her experience, but, after the performance decrease, made the connection between her cognitions and performance, illustrating constant self-learning.

*General summary of Debbie.* Debbie's performance improved by 51% between the A<sub>1</sub> and B phase, a considerable increase in performance. Debbie did not experience a substantial increase in pressure during the B phase and was not affected by the pressure manipulation. It seems that Debbie's answers to the psychological inventories were helpful in successfully predicting Debbie's likely resistance to choking effects. That is, Debbie was relatively impervious to the pressure manipulation, providing support that the psychological inventories helped to select Debbie as a highly CR participant. Perhaps

Debbie had experienced greater pressure during “real-world” competitions and the pressure experienced in the study was minimal in comparison, “If you’re in a game and it’s like a draw and there’s a few seconds left, and you’ve got to shoot the goal, you get more nervous because there’s something to play for.” Competitive situations may be more pressure inducing because of team pressure. Netball is a team sport where only two of the seven members are permitted to shoot. Debbie explained that the pressure to shoot successfully was greater in competitions because other teammates were dependant on her shooting to score goals.

#### *Choking-Susceptible (CS) Participants*

Four CS participants are now presented followed by a discussion related to a cross-case analysis among those athletes. The CS participants were named Emma, Felicity, Grace, and Helen.

#### *CS Participant- Emma*

*Participant profile.* Emma was 18 years old and had been playing netball for 8 years. She started playing netball at club level and then progressed into division (association) level, where she played for 3 years before having a 2-year break due to injury. At the time of data collection, Emma was playing at club level and had been playing as a shooter for 5 years. Emma met the strict selection criteria and was purposively sampled as a CS participant because she was high in S-C, high in A-trait, and primarily used approach coping. Specifically, Emma scored 51 on the SCS (75th to 100th percentile), 39 on the SAS (75th to 100th percentile), and + 17 on the CSIA differential score (75th to 100th percentile).

*Pressure analysis.* Visual inspection of Figure 3.11 illustrates Emma’s reported A-state prior to completing the netball-shooting task in each of the three phases. Specifically,

Emma's intensity scores for cognitive anxiety were 20, 32, and 22 prior to the respective A<sub>1</sub>, B, and A<sub>2</sub> phases. Intensity scores for somatic anxiety were 14, 20, and 13 before the three phases. The reported DM-CSAI-2 scores show that Emma experienced a sizeable increase in perceived pressure prior to the B phase in comparison to the A<sub>1</sub> and A<sub>2</sub> phases. For Emma, absolute levels of cognitive anxiety increased from moderate prior to the A<sub>1</sub> and A<sub>2</sub> phases to high anxiety prior to the B phase. Absolute levels of somatic anxiety increased from low preceding the A<sub>1</sub> and A<sub>2</sub> phases to moderate preceding the B phase.

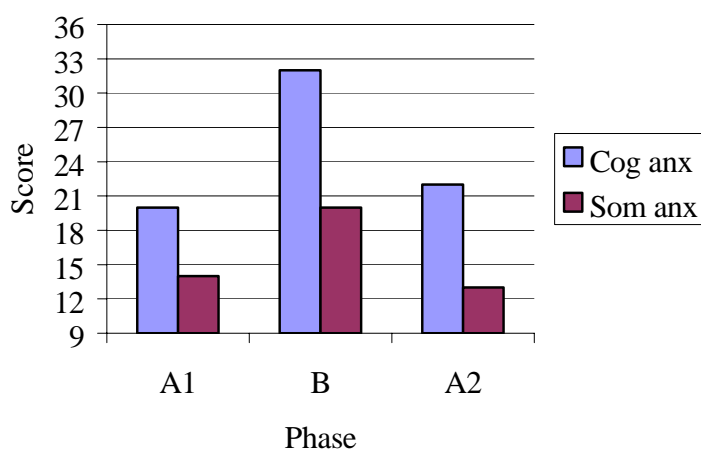


Figure 3.11. Cognitive and somatic anxiety intensity scores for Emma.

*Interview analysis: Pressure manipulation.* During the interview, Emma explained that she experienced an increase in pressure during the B phase and similar lower levels of pressure during the A<sub>1</sub> and A<sub>2</sub> phases,

In the first (A<sub>1</sub> phase) and third (A<sub>2</sub> phase), there was no pressure pretty much and in the second (B phase) there was heaps of pressure... they were so opposite that from how I was feeling, having the people there (in the B phase) was really horrible, I would have thought I'd done about 15 or 20 shots less in the second (phase).

This quote indicates that Emma perceived the audience as a source of threat and she was aware of the pressure during the B phase. Threat refers to the perception of danger arising

from the objective competitive situation (Martens et al., 1990). Apparently, the threat of the audience altered the intensity of A-state and, as a result, Emma exaggerated her subjective interpretation,

Having that dropped on you, that everyone was going to be watching, that they were going to be writing down our movements, that we were going to be videotaped, going from one person watching you to 20, that was a big thing.

The perceived threat and A-state experienced was overwhelming and Emma magnified the situation's significance to "20", as opposed to the actual number of eight audience members. Scheier and Carver (1977) and Buss (1980) have suggested that individuals high in private S-C might exaggerate the intensity of an emotional experience because of their inherent self-focus. From this quote, it appears that Emma's propensity to self-focus led to magnification of the situational pressure. Another explanation is that perhaps Emma exhibited underdeveloped coping strategies and limited defence mechanisms in terms of decreasing the threat. According to Weiten (2001), defence mechanisms tend to distort reality so that a situation appears less threatening. Emma's exaggeration of the number of audience members may indicate her inability to use, or lack of, defence mechanisms or coping strategies to effectively decrease, as Emma stated, "the horrible, nervous, nervous feeling" of the B phase.

One theme that was evident for Emma and related to the pressure manipulation was fear of evaluation. Passer (1983) defined fear of evaluation as "expectations of receiving negative evaluation in the event of poor performance" (p. 178). The A<sub>1</sub> and A<sub>2</sub> phases were designed as low-pressure phases, but Emma reported that she experienced some apprehension during the A<sub>1</sub> phase, perhaps because of a fear of evaluation, "I wasn't really nervous, I was just thinking, I probably won't make that many shots and it would be

embarrassing.” Emma then explained, in more detail, the source of the threat, “I was being monitored. You (the researcher) were counting what I was doing. You were going to know an exact number (of successful shots), so you would know if I screwed up.” Thus, the threat of the researcher knowing “an exact number” of successful shots increased fear of evaluation, perhaps in anticipation of receiving a negative evaluation.

The audience was a major source of perceived threat. The threat was possibly because if Emma were unsuccessful, audience members could formulate negative judgments and criticisms. Fear of evaluation was explained when Emma suggested, “I was really nervous because they could make a judgment on me and my performance.” Emma then discussed an attempt to reduce A-state and fear of evaluation,

I felt that I was in this awkward situation (during the B phase). I just wanted to go home. ... It's like giving an oral presentation, I'm standing up in front, they're watching me for information. ... It's better when they have to do the same thing. In that situation, I'd always say to myself, they're going to 'suck' too, you have to watch them, they'll get just as nervous as you. ... They could lay judgment on me and my performance, but I didn't get to do it (lay judgment) to them. That's one of my main things that I use to calm myself down and I couldn't use it.

During the experimental phases, Emma felt exposed and was at risk of being negatively evaluated by the audience. In social comparison situations, Emma projects negative thoughts (i.e., “they're going to 'suck' too”) and feelings (i.e., “they'll get just as nervous as you”) in an attempt to diminish fear of evaluation and A-state. It seems Emma lacked appropriate coping strategies to deal effectively with the threat and she defaulted to defence mechanism (i.e., projection) that has been shown to have anxiolytic effects (Bennett & Holmes, 1975). The situation, however, did not allow her to use projection



effectively. The desire to use projection may indicate that judgments about others serve as the anchors for criticisms about the self (Krueger, 2000). Emma's fear of evaluation may originate directly from self-criticisms, for example, "They could just say, she's crap and not have to prove that they were crap as well." Evaluating oneself unfavourably may lead to the expectation that others will evaluate negatively as well (Leary & Kowalski, 1995). The negative evaluation Emma believed others would make (i.e., "she's crap") perhaps indicated that Emma was very self-critical, and as a result, wanted to avoid the situation (i.e., "I just wanted to go home").

*Performance analysis.* Mean performance for Emma decreased from  $5.00 \pm 0.89$  in the A<sub>1</sub> phase to  $3.83 \pm 0.75$  during the B phase. This demonstrated a 31% decrease between the A<sub>1</sub> and B phase. During the A<sub>2</sub> phase, mean performance was  $5.17 \pm 0.75$  and represented a 35% performance increase between the B and A<sub>2</sub> phase. For Emma, mean performance increased by only 3% from the A<sub>1</sub> to the A<sub>2</sub> phase whereas performance for the B<sub>1</sub> phase changed considerably, indicating the pressure manipulation was successful (see Figure 3.12).

The slope of the trend line for the A<sub>1</sub> phase was  $\times 1.33$  and the slope of the trend line for the B phase was  $\div 1.33$ . This demonstrated a change in slope between the A<sub>1</sub> and B phase of  $\div 1.77$ . The slope of the trend line in the A<sub>2</sub> phase was  $\times 1.33$ . The change in slope between the B phase and A<sub>2</sub> phase was  $\times 1.77$ .

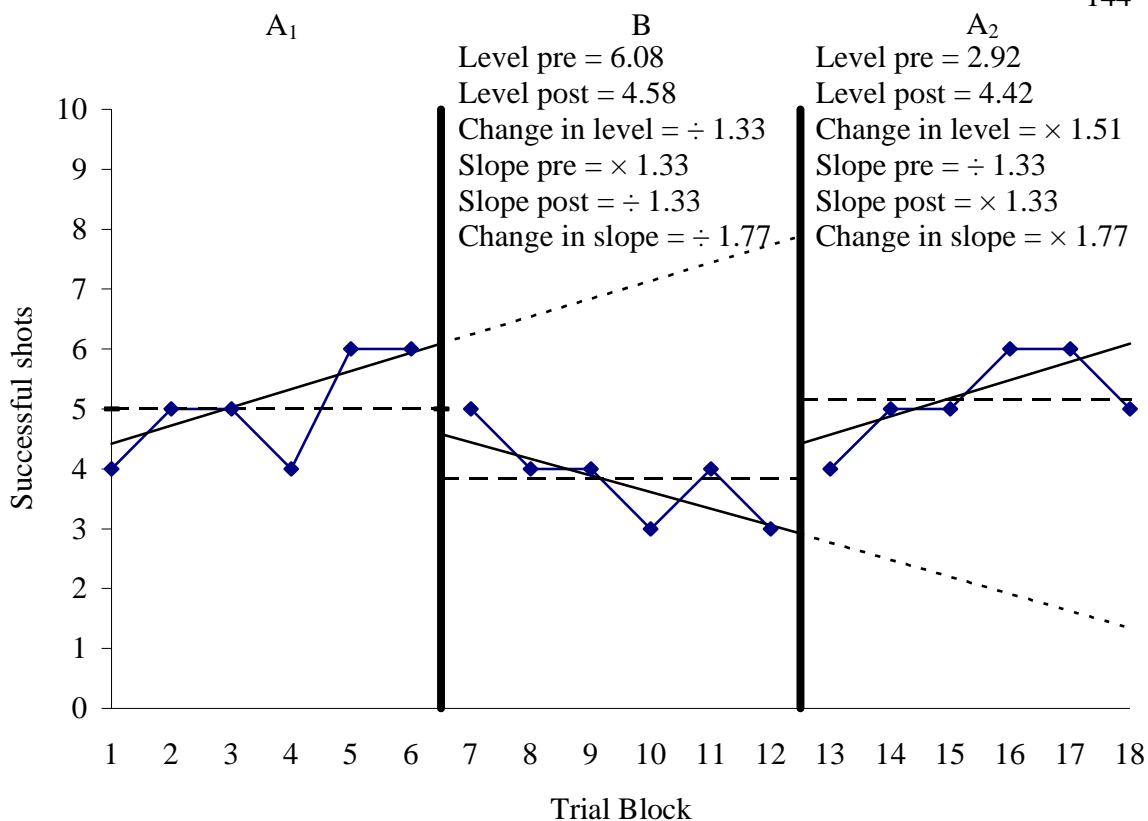


Figure 3.12. Split-middle analysis for Emma.

Clearly, the pressure manipulation negatively affected Emma's performance as exhibited by the decrease in performance from the A<sub>1</sub> to the B phase, as well as the subsequent increase in performance during the A<sub>2</sub> phase. The mean performance decrease of 31% from the A<sub>1</sub> to the B phase is a considerable performance decrement. The declining slope direction of the B phase in comparison to the rising slope directions of the A<sub>1</sub> and A<sub>2</sub> phases also indicated the pressure negatively influenced performance.

*Interview analysis: Cognitive themes.* Two persistent themes, related to Emma's cognitions during the B phase, were public self-awareness (S-A) and social comparison. Before explaining the themes, a review regarding the use of the terms self-consciousness (S-C) and S-A is needed. Self-consciousness is the tendency to direct attention either inward or outward, whereas S-A is the existence of self-directed attention, as a result of transient situational variables, chronic dispositions, or both (Fenigstein et al., 1975). The

fundamental difference between S-C and S-A is that S-C is a predisposition to direct attention to self or others, whereas S-A is a state of attentional focus reflected inwardly during a specific event. Thus, public S-A is the ephemeral state of an inward focus due to the perception of self as a social object, whereas public S-C is the trait or disposition to be publicly S-A (Buss, 1980).

During the interview, public S-A was evident when Emma expressed phrases related to the audience, as she “hated the feeling of being watched.” The audience was a prevalent source of Emma’s increase in public S-A.

In Session 2 (B phase), I just wanted it to be over because I didn’t want everyone (the audience) to concentrate on me anymore. They couldn’t do anything except watch me and even if they weren’t looking at me, they weren’t doing anything else. They could hear the ball miss the ring or smack into the back wall. There was no other distractions, there was pretty much only me to watch, so I knew they had (Emma chuckles) to have been concentrating on me.

Buss (1980) defined social anxiety as “being upset or disturbed by others’ scrutiny or remarks, or merely because others are present” (p. 204). Social anxiety is a typical characteristic associated with individuals high in public S-C. Fenigstein et al. (1975) provided a modest correlation ( $r = .21$ ) between social anxiety and public S-C. Schlenker and Leary (1982) explained that there must be a sense of apprehension about evaluation from others in a social context, or doubt about creating adequate self-presentations (i.e., behaviour aimed at conveying an image of self to others [Schlenker, 1980]), to produce social anxiety. Social anxiety, then, would seem to derive from public S-C in that the subjective anxiety experience presupposes a focus on the public self. The relationship between public S-A and social anxiety was expressed when Emma stated,

People were sitting watching my every move. People not having anything else to do but watch and make judgments on me... (I was) thinking about the people and what they were thinking. I was just worrying, "I missed that shot, they are thinking I'm a loser." I was thinking, it wasn't positive, it was I better get this in because otherwise, I'll look like a fool.

This quote corresponds with Woody's (1996) supposition that self-focused attention reliably increases negative cognitions. According to Woody, excessive self-focusing directs attentional resources to the tasks of monitoring arousal, assessing ongoing performance, appraising others' perceptions, and anticipating evaluation consequences. Emma was excessively self-focused due to her preoccupation with the audience's covert judgments and fear of negative evaluation. In this context, it is logical that Emma performed poorly under pressure. Emma's interview data included a plethora of negative self-talk examples. Other qualitative studies (e.g., Gould et al., 1993; Scanlan et al., 1991) have identified social evaluative concerns and "worry about what others think" as a source of stress among elite figure skaters.

Fenigstein (1979; Woody, 1996) have suggested that self-conscious individuals believe themselves to be the target of others' observations. This heightened sensitivity to social evaluation may have led Emma into being hypersensitive to the audience's anticipated reactions,

I tried to just focus on the ring, but then as soon as I dropped my eyes, I could just see everyone or also they would make a noise or drop a pen or turn a page or move their foot and I would go "oh, there they are" (Emma chuckled). So I couldn't pretend they weren't there because they very clearly were to me.

Audience members were instructed not to interact with and simply observe, with interest, participants' performance. Emma was acutely sensitive to the audience's movements and reactions, often hearing minute noises or seeing insignificant movements, during the B phase. Emma's high predisposition to S-C possibly promoted her hypersensitivity to the audience.

Emma's constant self-focused attention may have negatively affected her ability to process task-related information. For example, Emma explained that it was difficult to maintain concentration (i.e., a task-relevant focus) because her attention was constantly diverted to the audience, "I was thinking more about the people and what they were thinking than what I needed to do." The following quote illustrates how Emma's attention was divided:

I could not concentrate on that (the task), they (audience) were sticking out way too much in my head for me to concentrate properly, and for that period of time. I could concentrate for one or two shots, but they would always just stick their heads back in the picture. ... I tried to focus on the ring, but then as soon as I dropped my eyes (from watching the ring), I could see everyone.

Masters et al. (1993) have suggested that a predisposition to be self-conscious promotes the likelihood of being self-aware during pressure situations. Emma's propensity to experience public S-C may have increased public S-A during the B phase. Related to the inability to concentrate, Emma provided an example, in a dance context, that may explain her cognitive approach when in a pressure situation.

I don't like being in the spotlight, I just get really nervous, because that's happened to me in dancing. In ballet, there's a part where... they tell you to do this move by yourself and I would always just go (showing a frozen position), and my mind

would go blank and I would just go (showing frozen position again and chuckling).

... Being put on the spot knowing they were testing me is what really gets to me. ...

In my head I'm going, crap, what if I get it wrong? I don't give my head space to think about what I was supposed to be doing.

Although Emma did not discuss the performance outcome, she implied that poor performance was related to her inability to free up attentional space. Emma discussed how anxiety (i.e., "nerves") induced a response under pressure whereby she was unable to process information related to the dance. It appears that Emma's results substantiate aspects of Nideffer's (1992) distraction model of choking. Specifically, Emma's preoccupation with the audience along with an increase in arousal may have distracted her from a task-relevant focus. This finding also supports the contention by Drinan et al. (2000) that choking may be a combined anxiety and attention problem.

During the interview, another theme that emerged was social comparison.

Festinger's (1954) social comparison theory posits that people have a drive to evaluate their opinions and abilities. Social comparison theory is related to self-evaluation and individuals make stable evaluations by comparing their opinions and abilities to others. In regard to social comparison theory, Singer (1966) explained,

People do not compare with others in order to evaluate only one opinion or ability.

Implicitly they are also evaluating their opinions of themselves. In the general case, they are evaluating their self-esteem. When a person asks "How much X do I have?"

he is also asking "What kind of person am I for possessing that much X?" (p. 105)

Emma was using social comparison throughout the B phase. For example, when asked about her cognitions, she explained, "One of the girls played at the same level as Amy (CR participant) and she was watching me. She was probably saying 'holy shoot, I can't

believe I'm watching her, I should be in this study, not her.'" This response indicated that Emma's performance was possibly affected by low self-efficacy. Emma implied that she should not participate in the study because of low ability level and speculated about the audience members' cognitions. To further support this contention, she expressed negative self-expectations prior to commencing, "I was thinking, I'm probably not going to do as well as I want to." Likewise, Emma expressed a lack of confidence prior to the A<sub>2</sub> phase, "I didn't have great expectations for my results, I thought I'd be disappointed." Perhaps the lack of self-confidence and self-efficacy was a residual effect of her experience during the experimental phases. That is, low self-efficacy possibly resulted because Emma performed poorly during the study.

Schlenker, Weigold, and Hallam (1990) suggested that people with low self-esteem aim for self-protection, that is, they focus on trying to minimise their weaknesses rather than enhance their strengths. Emma provided a number of examples that indicated she was in a process of self-protection. For example, when asked about how the shot distance affected performance, Emma responded,

The shot distance was fine, I don't like shooting in too close and I don't know why. I've always liked shooting from further out (from the goal). I've been more successful from out there, or maybe it's not successful, but I get a better reaction. When I was younger, I tried to take shots as far out as I could and if I got them in, all the mums and dads would go, WOOW!, and they would come congratulate me after the game for that top shot. I was younger and not everyone can take a shot (and make it) from that far out (Emma chuckles).

Emma may typically choose to shoot from longer distances, during a game situation, in order to minimise her apparent weaknesses. According to Baumeister et al. (1985,

Experiment 1), performance is worse when the performer privately expects failure (e.g., low self-efficacy), but knows that the audience expects success. For Emma, low self-efficacy combined with the perception that the audience expected success might increase pressure and result in shots taken from longer distances in game situations in case she was unsuccessful. If Emma performed from a shorter distance and was unsuccessful, she may experience embarrassment and possible negative evaluation from others. Conversely, if she performed from farther away and was unsuccessful, consequences would not be as severe because of others' low expectations. Performing from a considerable distance from the goal may obscure her imperfections and preserve her already low self-esteem.

*General summary of Emma.* As expected for a CS participant, Emma's mean performance decreased by a considerable 31% from the A<sub>1</sub> to the B phase. The results of the DM-CSAI-2 indicated that she experienced a substantial increase in perceived pressure during the B phase, reaching a particularly high level of cognitive A-state. Emma also confirmed this increase in A-state during the interview. From the interview analysis, a theme related to the pressure manipulation was fear of evaluation. Apparently, the audience was a potential threat and Emma indicated on a number of occasions that she was concerned with the audience's judgments. It seems that the psychological inventories helped to predict Emma's likely susceptibility to choking effects.

During the interview, it was evident that Emma was particularly focused on social evaluation. To this end, two obvious themes were public S-A and social comparison. Public S-A was expressed as Emma conversed about attention being constantly drawn to the audience leading to processing issues related to concentration. That is, the inability to concentrate on task-relevant cues may have negatively affected performance. Emma's results provide support for Nideffer's (1992) distraction model of choking. Specifically, as



arousal increased, Emma's attention was diverted to irrelevant thoughts (i.e., the audience) that may have distracted her from a task-relevant focus. Thus, it appears that during the B phase, Emma's decrease in performance was particularly related to social and public aspects of the self.

#### *CS Participant- Felicity*

*Participant profile.* Felicity was 22 years of age and had been playing netball since the age of 14. She played on a division level team for 2 years, and also played in an underage state league team. In her 6 years of representing her state in national competitions and an international tournament, Felicity played in a goal shooting position for 4 years. Felicity was purposively sampled as a CS participant because she was high in S-C, moderately high in A-trait, and predominantly used approach coping. Felicity's scores were 50 on the SCS (75th to 100th percentile), 36 on the SAS (50th to 75th percentile), and + 8 on the CSIA differential score (75th to 100th percentile).

*Pressure analysis.* Visual inspection of Figure 3.13 shows that Felicity's intensity scores for cognitive anxiety before the A<sub>1</sub>, B, and A<sub>2</sub> phases were 17, 20, and 15, and intensity scores for somatic anxiety were 17, 20, and 13, respectively. Scores on the DM-CSAI-2 illustrate that Felicity experienced a similar, but minimal, increase in intensity of cognitive and somatic anxiety during the B phase. For Felicity, absolute levels of cognitive and somatic anxiety increased from low levels prior to the A<sub>1</sub> and A<sub>2</sub> phases to moderate levels prior to the B phase.

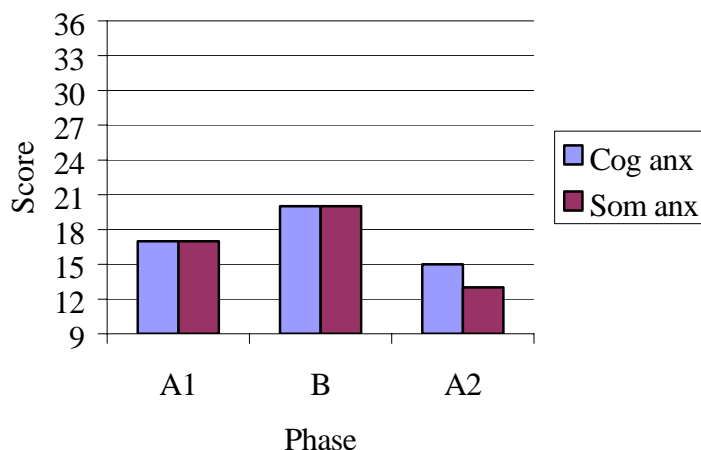


Figure 3.13. Cognitive and somatic anxiety intensity scores for Felicity.

*Interview analysis: Pressure manipulation.* Felicity explained that she perceived more pressure during the B phase. When asked to compare the pressure involved in the three phases, Felicity stated,

I was more nervous during Session 2 (B phase) than Session 1 (A<sub>1</sub> phase). Just that extra bit of pressure (with people) watching, I sort of felt a bit more jittery. ... I was not nervous at all during Session 3 (A<sub>2</sub> phase). I think because I remember the last session (B phase), I was a bit relieved in Session 3.

This quote fits with her reported DM-CSAI-2, where Felicity perceived an increase in both cognitive and somatic anxiety during the B phase. Felicity also confirmed the A<sub>2</sub> phase was the least anxiety-evoking phase.

Felicity's reaction to the pressure manipulation led to an increase in perceived pressure, as she stated, "I put more expectation on myself to shoot a bit better. I didn't want to miss every shot with more people watching, therefore, that made me more nervous and I started to stress out." This quote denotes how Felicity perceived the audience as a potential threat and explains the source of the increased A-state. Threat, in Felicity's case, was the potential for receiving an unfavourable evaluation from the audience. The

presence of the audience may have resulted in a fear of evaluation. Support for this fear about potential criticism was evident when Felicity stated,

I just thought with this many people, I didn't want to look like a dickhead (Felicity laughs). ... It's like anything, I'm standing there, I'm the subject and everyone is staring at me, you worry about what they are looking at, what criticisms do they have.

For Felicity, performing in front of others is partly about avoiding unpleasant feelings and embarrassment.

A theme that was evident for Felicity was uncertainty. Uncertainty was evident in the A<sub>1</sub> phase, when Felicity suggested she was unsure about the requirements of the study, "When I don't know what is going on, it's something new, I am always hesitant until I actually start it... but once I started shooting, I was fine." The A<sub>1</sub> and A<sub>2</sub> phases were both purported to be low-pressure situations, however, Felicity explained the anxiolytic effects of the A<sub>2</sub> phase, "I think because I've done it and I knew what was there, I was pretty good. Not nervous at all (during the A<sub>2</sub> phase). ... I knew the drill (the task), so that was good." The difference in pressure of the two phases was possibly because of the elevated perceived uncertainty during the A<sub>1</sub> phase.

The theme of uncertainty was still evident in the B phase. Now, however, the uncertainty centred on the introduction of new elements, comprising the pressure manipulation. Kagan (1972) explained that when uncertainty occurs, a primary motive is resolution and if no appropriate responses are immediately available, A-state, distress, or fear may result. In an attempt to reconcile the uncertainty, Felicity used information seeking to understand the situation and reduce perceived threat,

I kept thinking, what are they (the audience) watching me for? I kept thinking, are they here to distract me or are they actually here for themselves? Do they have to take notes? Are they here as a ploy to distract me to miss goals?

One reason for selecting Felicity as a CS participant was because of her approach coping predisposition. As perceived anxiety increased, Felicity used approach coping in the form of information seeking to decrease uncertainty. By obtaining additional information about the situation, uncertainty can be transformed into certainty and a concomitant reduction in A-state occurs (Kagan). From the quote, Felicity's questions about the pressure manipulation may not have fully transformed the uncertainty into certainty because answers to the proposed questions could not be readily obtained during the B phase.

*Performance analysis.* Mean performance for Felicity during the A<sub>1</sub> phase was  $4.67 \pm 1.21$  and was  $3.50 \pm 2.07$  during the B phase. This represented a decrease of 33% from the A<sub>1</sub> and B phase. Mean performance for the A<sub>2</sub> phase was  $5.17 \pm 0.98$ , representing a 48% increase in performance between the B and A<sub>2</sub> phase. Mean performance increased by 11% from the A<sub>1</sub> to the A<sub>2</sub> phase whereas the B<sub>1</sub> phase performance decreased substantially, indicating the pressure manipulation was effective (see Figure 3.14).

The slope of the celeration line for the A<sub>1</sub> phase was  $\times 1.67$  and the slope of the celeration line for the B phase was  $\div 1.33$ . This represented a change in slope between the A<sub>1</sub> and B phase of  $\div 2.22$ . During the A<sub>2</sub> phase, the slope of the celeration line was  $\times 1.33$ . Thus, the change in slope between the B and A<sub>2</sub> phase was  $\times 1.77$ .

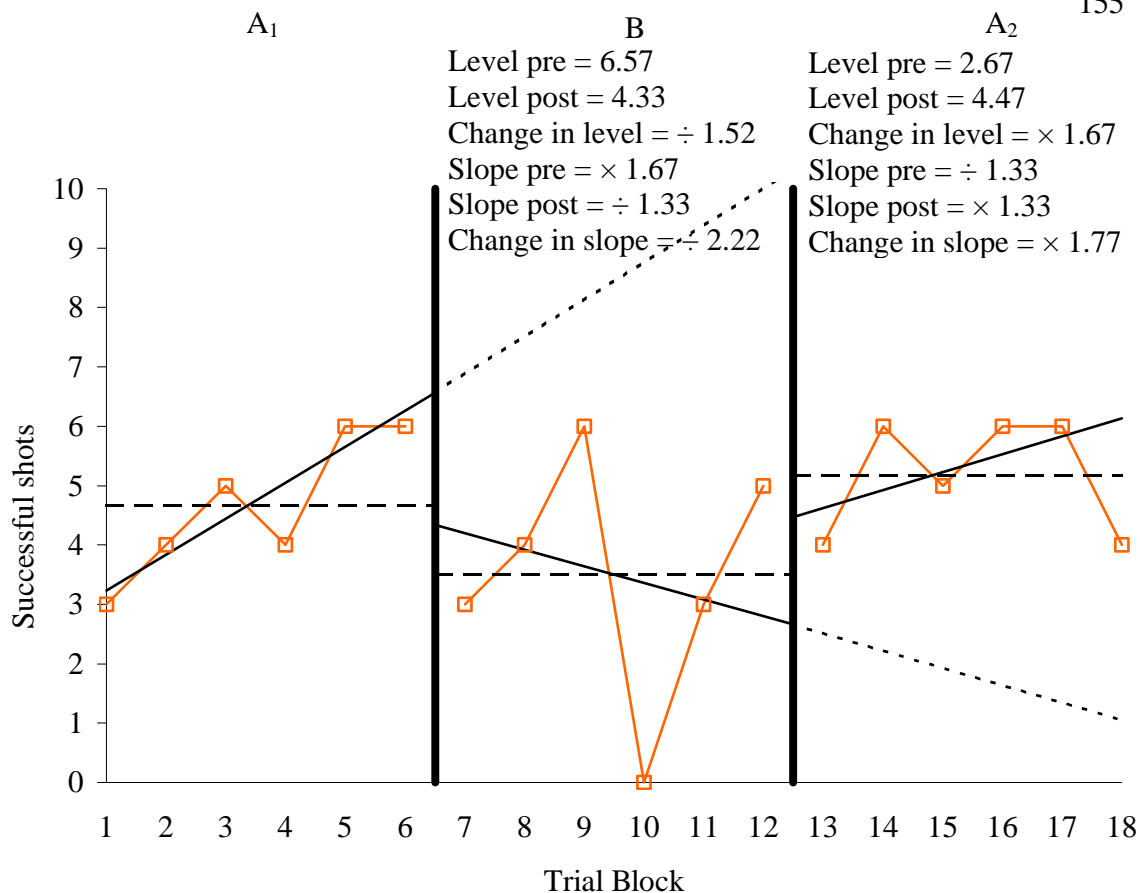


Figure 3.14. Split-middle analysis for Felicity.

In summary, I will discuss four performance-related issues that indicate Felicity was negatively affected by the pressure manipulation. First, Felicity's data shows that performance was unstable during the A<sub>1</sub> phase. A positive trend of the baseline may indicate the link between the baseline performance and the success of the pressure manipulation. Generally, the projected celeration line of the A<sub>1</sub> phase indicates the expected performance during the B phase. A substantial performance decrease, however, was apparent during the B phase in comparison to the projected celeration of the A<sub>1</sub> phase. Second, Felicity's mean performance was virtually equal during the A<sub>1</sub> and A<sub>2</sub> phases, but decreased somewhat in the B phase. The mean performance decrease of 33% from the A<sub>1</sub> to B phase is a considerable decrement in performance. The pressure particularly affected Felicity, a very experienced and high-level netball shooter. For example, in Trial Block 10

(see Figure 3.14), she was unsuccessful in all 10 shooting attempts. Performance in the phases followed the expected high-low-high pattern for a CS participant. Third, Felicity was less consistent during the B phase compared to the A<sub>1</sub> and A<sub>2</sub> phases. Finally, the slope of the celeration line changed from an initial upward trend in the A<sub>1</sub> phase to a downward trend in the B phase. This change in slope indicates that the pressure manipulation had a robust, negative influence on performance. The unstable baseline during the A<sub>1</sub> phase, decrease in mean performance, concomitant increase in variability, and change in slope provide further support for the claim that the pressure manipulation negatively affected performance.

*Interview analysis: Cognitive themes.* In describing her cognitions during the interview, an approach-avoidance conflict was evident for Felicity. Reber (1995) in the Dictionary of Psychology defines approach-avoidance conflict as,

A conflict resulting from being both drawn and repelled by the same goal. This type of conflict is particularly difficult to resolve in that with distance the goal appears more desirable than fearful whereas with proximity its aversive qualities tend to dominate, causing withdrawal which, of course, leads to an increase in the goal's perceived positive features relative to the negative ones. (p. 151)

It appears that, during the B phase, an internal struggle developed within Felicity between remaining positive about her ability and attending to the consequences of unsuccessful performance. This conflict was possibly because of the increase in perceived pressure and was discussed when Felicity explained how she coped with unsuccessful performance, “I could keep going and tell myself, ‘I’m going to keep missing, who cares.’ But I tried to turn it around and say ‘ok, I didn’t even take any (shots) and let’s start from scratch.’” The psychological conflict was between Felicity’s motivation to perform successfully and the

pressure effect to deter her from achieving success during the B phase. The psychological conflict was possibly because Felicity experienced an imbalance between perceived ability and expected outcomes. That is, Felicity was experiencing low self-confidence (i.e., “I’m going to keep missing”) and struggled to remain positive and perform successfully (i.e., “I tried to turn it around”).

Lack of self-confidence was discussed, by Felicity, only during the B phase and was perhaps a product of the elevated pressure. Low self-confidence was evident when Felicity explained and compared her experience during all three phases. She constantly used words such as “tried” and “pretended” during the B phase, for example, “I just tried to imagine that they (the audience) weren’t there.” I interpreted quotes that began with phrases like “I tried...” or “I pretended...” as expressions that Felicity was attempting, but was not successfully in completing. During the A<sub>1</sub> and A<sub>2</sub> phases, Felicity used positive and assertive self-talk, for example, “I would tell myself all right, I’m going to get this one in.” The modification of responses from using active voice and clear, confident intentions during the A<sub>1</sub> and A<sub>2</sub> phases to internal dialogue that reflected a lack of confidence and conviction during the B phase indicates that the pressure affected self-confidence.

Felicity demonstrated a dearth of self-confidence when she explained her cognitions by switching between first and second person descriptions during the different phases. For example, during the A<sub>1</sub> phase she primarily explained cognitions in the first person (e.g., “I would tell myself ‘all right, I’m going to get this one in’”), whereas during the B phase, she used the second person (e.g., “You get really down and then you just think ‘oh, you just keep missing and missing’”). For example, when I asked her to explain the meaning of “worrying about the audience”, she explained, “If you worry about people, then I would have missed everything because you get nervous and then you start stuffing up and then I

have to try and stay relaxed.” Felicity’s inconsistent use of first (i.e., I) and second person (i.e., you) can arguably be interpreted as a need to psychologically “distance” from the pressure situation. Martens et al. (1990) suggested, “It appears that as individuals perceive they cannot affect the outcome of their behaviour, they psychologically dissociate themselves with the outcome as a means to cope with the inevitable failure they anticipate” (p. 226). In general psychology research, Folkman, Lazarus, Dunkel-Schetter, DeLongis, and Gruen (1986) explained that individuals use psychological distancing in situations that must be accepted. This form of coping allows the participant to focus less on the pressure situation. In this instance, distancing was an adaptive response to an outcome that is seen as negative and unalterable (Collins, Baum, & Singer, 1983). That is, the inability to change the B phase result may have led Felicity to use a subconscious defence mechanism (i.e., psychological distancing) to establish a division between herself and performance. Perhaps she depersonalised cognitions to preserve self-confidence, essentially, not “owning” or wanting to be linked to negative performance.

Another possible explanation for the psychological conflict was an increase in public S-A. Felicity’s increase in public S-A was evident through expressions related to the audience’s judgments and motives for attending. Felicity explained her acute awareness of the audience, “I sat there and worried too much about what they were thinking, what are they looking at, it puts you off (i.e., is distracting).” Apparently, ruminations about the audience’s judgments occupied attention and Felicity became concerned with public evaluation, ultimately affecting her ability to maintain a task-relevant focus. This comment exemplifies the tendency for individuals high in S-C to use attentional space to process possible audience reactions.



Felicity's elevated A-state also influenced her shooting technique during the B phase. For example, Felicity explained, "I felt a bit more jittery, and I didn't push the ball as well as I wanted to." Felicity's increase in somatic anxiety (i.e., "more jittery") possibly caused a physical reaction that disrupted the ability to perform typical of an experienced athlete. When asked how she recovered from unsuccessful shots, Felicity stated,

I took a breath and tried to feel the ball a bit better and position my hand slightly different because when I missed I always had my hands wrong. Just took my time and (felt) how heavy the ball was and tried to watch the back of the ring and know exactly how to get it in. I tried to block them (the audience) out again.

Felicity's quote supports the Carver and Scheier (1987) belief that the presence of a video camera or audience may encourage a degree of evaluation related to public S-C because the audience influenced Felicity's attentional focus. Public S-A may have resulted in an attempt to consciously process shooting technique. This provides qualitative support for the self-focus model of choking (e.g., Baumeister, 1984; Beilock & Carr, 2001; Masters, 1992). Advocates of the self-focus model suggest that an increase in pressure may promote S-A and can lead to individuals' explicit monitoring information related to the mechanics of the skill. This increase in explicit monitoring is paradoxical to performance effects and is likely to cause decrements in performance. Felicity's adjustment of the ball position and her reaction to the ball's heaviness may be indicative of conscious processing under pressure.

Public S-A may have also affected Felicity's performance, resulting in divided attention between the audience and the task, ultimately distracting her from shooting. For instance, Felicity explained,

I think because you are worrying about blocking them (the audience) out, it is sort of like you are not concentrating 100% on the shooting. But when it was just you (the researcher) there, I was just concentrating on the shooting and not worrying about you watching me. But with six people, it's a bit different. You are worrying more about that (the people) than shooting.

According to Nideffer's (1992) distraction model of choking, as arousal increases, attention is diverted internally to task-irrelevant thoughts (e.g., worry) because of elevated physiological sensations resulting in failure to attend to important cues. In accordance with Nideffer's distraction model, it appears that worrying about the audience affected Felicity's ability to perform successfully, subsequently distracting her from task performance and leading to decreased performance. Thus, from the previous qualitative results, when athletes experience choking, self-focusing and distraction may overlap to produce detrimental effects on performance. Baumeister and Showers (1986) first suggested that the distraction and self-focus model of choking might overlap somewhat, however, no research to date has provided support for the argument. This overlapping effect is discussed in more detail in the *General Discussion* of this dissertation.

As Felicity experienced an increase in pressure and public S-A, she also "attempted" to cope by using an approach coping strategy (i.e., cognitive restructuring) to relax. When asked about her cognitions, Felicity explained, "I was trying to relax myself, I was sort of saying to myself it's not a big deal, who cares." Approach coping involves actively dealing with a perceived problem (Krohne, 1993). Another internal conflict, between the realisation that the situation was important (i.e., the need to relax) and an attempt to decrease the situation's importance (i.e., not a big deal, who cares), was evident. In this quote, I have interpreted cognitive restructuring as approach coping because Felicity

attempted to actively decrease A-state (i.e., “it’s not a big deal, who cares”) and manage the pressure. Felicity was also cynical about receiving the monetary reward, “I thought, I won’t probably beat them (score during the A<sub>1</sub> phase shots) anyway so don’t even worry about the money, don’t keep that as an incentive in case you get disappointed.” This attempt at cognitive restructuring was possibly a defence mechanism to deal with likely failure (Martens et al., 1990). Apparently, Felicity was learning as she reflected on the cognitive restructuring process during this study, “I do my best when I don’t place too much importance on what other people think. I know I do my best when I am not worrying about doing my best.”

*General summary of Felicity.* As expected for a CS participant, Felicity decreased performance by a considerable 33% from the A<sub>1</sub> to the B phase. The results of the DM-CSAI-2 and interview indicate that Felicity experienced an increase in perceived pressure that contributed to the performance decrement. During the interview analysis, a theme that was again evident was uncertainty. Felicity explained that she experienced some nervousness during the A<sub>1</sub> phase because she was uncertain about the procedures, whereas she was “not nervous at all” during the A<sub>2</sub> phase. In line with the competitive anxiety theory by Martens et al., Felicity’s increase in perceived uncertainty and perception of the situation’s importance might have increased perceived threat and subsequent A-state during the A<sub>1</sub> phase. Performance during the A<sub>2</sub> phase may have represented a “true” baseline phase. That is, Felicity’s DM-CSAI-2 and interview data indicated she experienced less pressure and was more relaxed during the A<sub>2</sub> phase.

During the B phase, Felicity decreased performance compared to the A<sub>1</sub> phase. Was this performance decrement evidence of choking? As discussed earlier, to conclude an athlete has “choked,” a number of elements must be represented (i.e., increased anxiety

under pressure, and critical deterioration in skilled performance under pressure). During the B phase, Felicity's perceived anxiety increased, performance decreased by a total of seven shots, and Felicity was a skilled netball player. In response to the question of whether Felicity succumbed to choking, I believe Felicity's results meet even a strict definition of choking. Thus, it appears that the psychological inventories predicted Felicity's susceptibility to choking.

During the B phase, at least two approach coping strategies were used to manage the pressure, including cognitive restructuring and information seeking. Generally, these approach coping strategies were emotion-focused. According to Endler and Parker (1990), emotion-oriented strategies involve a focus on the person rather than the task and, although they are employed to reduce stress, they can sometimes exacerbate the stress response. Felicity's attempt to actively seek information was probably used in an effort to reduce A-state, however, the information seeking may have had paradoxical effects. For example, Miller (1987) provided support that participants using active information seeking were more aroused and anxious than participants avoiding the same anxiety-inducing information. In some sport situations, information seeking may not be an effective coping strategy because of the limited time available to make decisions. Information seeking reduces task-focused attention and when task performance is imminent, there may not be enough time to reduce A-state. Conversely, avoidance coping helps to distract from the situation and can increase the capacity to relax. This supports results from Wang, Marchant, and Morris (2004) expectation that approach coping is a predictor of choking. Related to Miller's results, Felicity's approach coping mechanisms were perhaps counterproductive because approach coping increased A-state and also reduced attention

to task-relevant information, leading to a decrease in performance. The performance decrement, in turn, further increased anxiety, potentially creating a vicious cycle.

*CS Participant- Grace*

*Participant profile.* Grace was 19 years old at the time of data collection and had been playing netball for 13 years. She initially played at a club level for 6 years and progressed to division (association) level, where she played for 7 years. Grace had played in a shooting position for the past 4 years. Grace was purposively sampled as a CS participant because she was high in S-C, high in A-trait, and predominantly used approach coping. Grace's scores were 54 on the SCS (75th to 100th percentile), 49 on the SAS (75th to 100th percentile), and + 8 on the CSIA differential score (75th to 100th percentile).

*Pressure analysis.* Visual inspection of Figure 3.15 shows that Grace's intensity scores for cognitive anxiety leading into the A<sub>1</sub>, B, and A<sub>2</sub> phases were 21, 27, and 20, respectively. Grace's intensity scores for somatic anxiety prior to the three respective phases were 15, 23, and 11. Scores on the DM-CSAI-2 show that Grace experienced a parallel elevation of intensity for cognitive and somatic anxiety during the B phase. Absolute levels of cognitive anxiety, for Grace, increased from moderate prior to the A<sub>1</sub> and A<sub>2</sub> phases to high levels prior to the B phase. Absolute levels of somatic anxiety increased from low immediately before the A<sub>1</sub> and A<sub>2</sub> phases, but increased to moderate levels directly before the B phase.

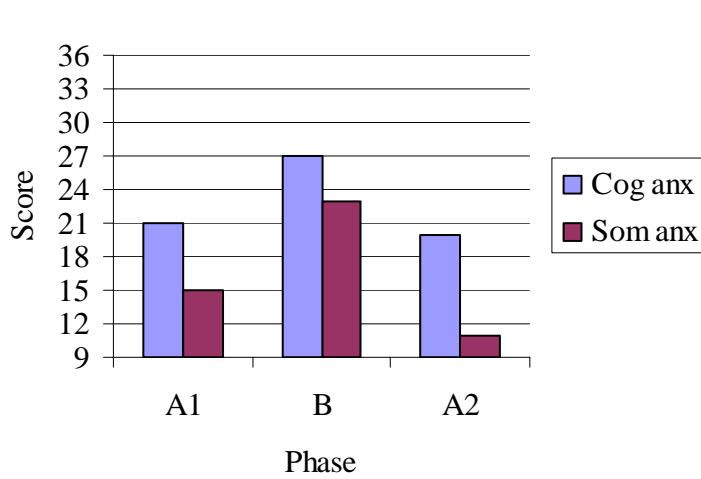


Figure 3.15. Cognitive and somatic anxiety intensity scores for Grace.

*Interview analysis: Pressure manipulation.* During the interview, Grace explained that she perceived the A<sub>1</sub> and B phases similarly threatening, however, differentiated between the two types of threats. That is, the threat during the A<sub>1</sub> phase was because of the unfamiliar procedures, whereas the pressure manipulation was threatening during the B phase. Grace elaborated by comparing her A-state during the three phases,

Session 1 (A<sub>1</sub> phase), I felt a little bit uncomfortable because I didn't know you (the researcher) and I was uncomfortable with the procedure. When I first started I was like, hmmm, this is a bit different, being observed and watched (by the researcher). ... But then compared to Session 2 (B phase), I was more uncomfortable with the environment. I knew the procedures because I'd done it before, but with all the people (audience members) being there, that sort of made it intimidating. ... I was pretty good in Session 3 (A<sub>2</sub> phase). I was very relaxed, like I felt pretty comfortable, I was familiar with the surroundings and the procedure and felt a bit cruisy (i.e., easy, not overly extended), because I was used to it a bit more.

In this quote, Grace suggests that the intended low-pressure (A<sub>1</sub>) phase actually induced pressure because of the heightened uncertainty. Grace also felt the least anxiety-inducing

phase was the A<sub>2</sub> phase because of the reduction in uncertainty. Similar to other participants, uncertainty increased A-state for Grace, providing additional support for Martens et al. (1990).

During the B phase, Grace explained that the environment was intimidating. As a result, I interpreted the strong language she used when explaining the B phase as awareness of elevated pressure. For example, Grace used graphic and seemingly exaggerated language to explain her experience during the B phase.

I always have this pressure and it increases when times are intimidating or stressful. ... I was scared (during the B phase), it was weird, being watched shoot and the centre of attention. I don't like that, I was even more intimidated (than the A<sub>1</sub> phase) because not only did I not really know the people, but I had to perform in front of them. So I was edgy and scared.

Grace perceived the B phase as a relatively serious threat and reacted with a response that perhaps originated from a fear of evaluation. The fear possibly derived from the researcher having evidence of unsuccessful performance and the possibility of criticism.

When I walked in I saw it (the camera). ...So I was pretty scared. Normally I hate being on camera because you (the researcher) would have a record of what I would do and look like and perform like... so it did affect my performance. I thought I'd have to perform well for myself because if I go real bad you'll have it on video.

Apparently, Grace perceived the camera as a threat because, if she performed unsuccessfully, the researcher could scrutinise and evaluate her physical appearance and poor performance.

*Performance analysis.* Mean performance for Grace during the A<sub>1</sub> phase was  $6.00 \pm 1.27$  and  $6.67 \pm 2.16$  in the B phase, an increase of 11% between the A<sub>1</sub> and B phase.

Mean performance for the A<sub>2</sub> phase was  $7.67 \pm 1.63$ , representing a 15% increase in performance between the B and A<sub>2</sub> phase. For Grace, mean performance increased by 28% from the A<sub>1</sub> to the A<sub>2</sub> phase (see Figure 3.16). The successive increase in performance during the three phases will be explained in more detail briefly.

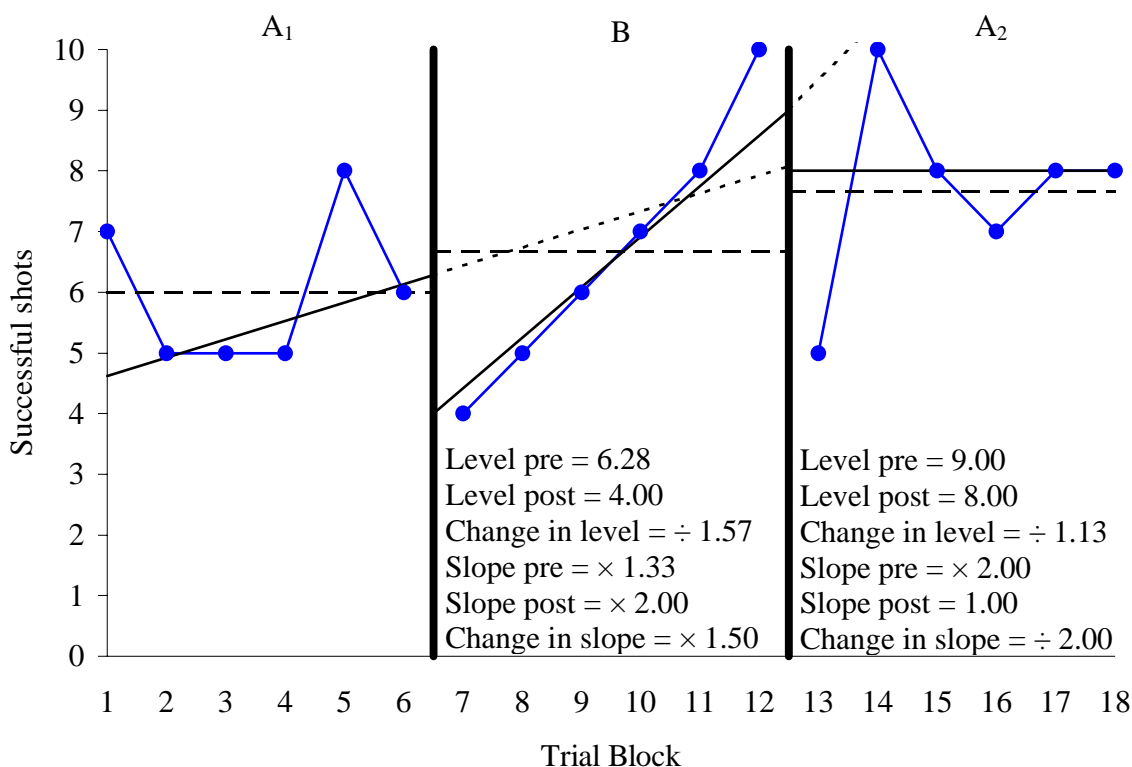


Figure 3.16. Split-middle analysis for Grace.

The slope of the trend line for the A<sub>1</sub> phase was  $\times 1.33$ , whereas the slope of the trend line for the B phase was  $\times 2.00$ . This represented a change in slope between the A<sub>1</sub> and B phase of  $\times 1.50$ . The slope of trend line for the A<sub>2</sub> phase was 1.00. This demonstrated a decreasing change in slope between the B and A<sub>2</sub> phase of 2.00.

In summary, it seems that Grace's performance was initially affected by the pressure manipulation during the B phase. Grace, however, seems to become acclimatised to the pressure as her performance level progressively increased during the final three trial blocks. This was evident, during the interview, as she explained, "I still don't know why,



but the ‘surprise factor’ was something I got out of. I got into a state where I could maintain that pressure for an amount of time and then I’d get shots in.” This acclimatisation effect may be a potential problem to researchers investigating choking because participants’ A-state can diminish to a point that pressure does not affect performance.

For Grace, mean performance also increased in succession across the three phases. SCD researchers (e.g., Barlow & Hersen, 1984; Kazdin, 1982) suggest that a progressive increase in performance is typically due to an ineffective intervention. Translated in the context of the present study, the pressure manipulation was not effective in disrupting typical performance rates. A tentative explanation for the successive increase in performance was that Grace was feeling “uncomfortable” during the A<sub>1</sub> phase and performance was not indicative of a “true” baseline phase. For Grace, A-state was somewhat elevated during the A<sub>1</sub> phase, which may have negatively affected shooting performance. Nevertheless, performance data indicates that Grace increased performance from the A<sub>1</sub> to the B phase, indicating that Grace did not experience choking during the B phase.

*Interview analysis: Cognitive themes.* During the interview, two themes that were evident from Grace were public S-A and emotion-focused coping. She provided a number of quotes that supported the contention that the audience affected her S-A. For example, when asked about her anxiety during the B phase, Grace stated, “Being in front of a lot of people, like giving talks, I hate it. So doing something like this is not my ideal environment.” The threat was clearly associated with uncertainty about the audience’s judgments,

They (the audience) intimidated me. ... I am always judging myself, but it is more intimidating to think and not know what other people are thinking of me. ... They made me more nervous because I didn't know what they were thinking and I was trying to interpret what they might have been thinking.

Thus, perceptions of audience judgments increased A-state possibly because Grace feared the audience would negatively evaluate her performance. Grace then explained how the audience affected her thinking from what could be described as a S-A perspective, "Everyone judges, so they were inclined to think in their head about how my performance went, so I was constantly worried about that. ... You know, (the audience saying) she shoots weird or she's not that good." This quote indirectly indicates that public S-A affected Grace. That is, perceived negative evaluation from others was promoted by constant self-evaluation. Leary and Kowalski (1995) argued that evaluating oneself unfavourably may lead to the expectation that others will evaluate negatively as well. This was apparent when Grace stated that the audience affected her cognitions, "When people were looking at me, I felt like I might be getting judged. ... I wondered what they thought, you know, 'she's crap', stuff like that. I didn't really have that much confidence." Grace's performance was perhaps contingent on the audience's perceptions, which was a reflection of individual negative self-talk.

Another theme that was evident from Grace's interview was emotion-focused coping. According to Endler and Parker (1990), emotion-oriented coping involves a focus on the person, rather than the task, and are typically employed to reduce stress. Emotion-focused coping can be functional in the early stages of dealing with uncontrollable stressors (Suls & Fletcher, 1985), but can also be dysfunctional because focusing on emotion sometimes delays or inhibits active (task-focused) coping (Carver, Scheier, &

Weintraub, 1989). Endler and Parker found that A-trait was positively correlated with the use of emotion-oriented coping. Perhaps CS participants are likely to use emotion-focused coping under pressure because of their tendency to be high in A-trait. Grace provided numerous statements that indicated she frequently uses emotion-focused strategies, for example,

I sort of tried to relax myself, I don't know whether it was more of relaxing myself or psyching myself up. Like when I sort of stand, I sort of move or shake my hands or bounce up and down on the spot a bit, I don't know if that calms me or motivates me or makes me determined to do well. It's a weird thing, yeah.

From this quote, it seems that using emotion-focused coping may be an ineffective means of maintaining a task-relevant focus. Grace's focus on "calming" or "psyching up" may have reduced attention to shooting and increased focus on emotions, resulting in an initial decline in performance during the B phase. Holahan and Moos (1987) found that the combination of high self-focus and low confidence might generate a pattern of coping that substitutes emotion-focused for task-focused coping, even in situations affording opportunities for external action. Perhaps an elevation in self-attention also increased Grace's likelihood of emotion-focused coping, an ineffective coping strategy to increase performance.

Two specific issues related to emotion-focused coping were self-handicapping and use of humour. Self-handicapping has been characterised as a coping strategy (Baumgardner & Arkin, 1987) designed to deflect the negative implications of contaminated self- and social-esteem (Shepperd & Arkin, 1989a). According to Jones and Berglas (1978), "Self-handicapping involves any action or choice of performance setting that enhances the opportunity to externalise (or excuse) failure and to internalise

(reasonably accept credit for) success” (p. 406). That is, self-handicapping is a process of proactively protecting self-esteem in the face of potential threat. Researchers have found that individuals high in public S-C (Shepperd & Arkin, 1989a), individuals low in self-esteem (e.g., Harris & Snyder, 1986; Rhodewalt, 1990), and individuals who perceive a situation as important (Self, 1990; Shepperd & Arkin, 1989b) are increasingly likely to use self-handicapping. Self, for example, argued that the tendency to self-handicap must be viewed in a social context because self-handicapping strategies are only used when there are potential threats to self-esteem. It appears that Grace is at high risk for self-handicapping because she perceived an elevation in public S-A, perceived the B phase as important, and experienced low self-confidence. Grace illustrated her tendency to self-handicap by stating,

When I missed I would get totally frustrated, but then I would make up an excuse to make myself feel better. I’m like, “Yeah, there are people around me that I don’t really know and there is the camera there, so that’s ok to be a little bit off peak performance.”

By making “an excuse,” Grace used self-handicapping in an attempt to reduce A-state during the B phase. Snyder and Higgins (1988) suggested that affect management is one of the primary goals of excuse making, whereby excuse making is defined as,

The motivated process of shifting causal attributions for negative personal outcomes from sources that are relatively more central to the person’s sense of self to sources that are relatively less central, thereby resulting in perceived benefits to the person’s image and sense of control. (p. 23)

An alternative sport-specific explanation, adopted from Prapavessis, Grove, Maddison, and Zillman (2003), was that self-handicapping provides an opportunity for either self-

protection or self-enhancement, depending on the subsequent outcome. In this situation, if Grace were unsuccessful, then self-esteem would be protected because failure could be externally attributed (i.e., audience). Conversely, if Grace were successful despite the presence of the audience, then self-esteem would be enhanced because perceived difficulties were overcome. The generation of situation-specific excuses may be effective in the short-term, but may be ineffective for long-term coping.

Another strategy related to emotion-focused coping was use of humour. When asked about her cognitions during the B phase, Grace stated,

I was thinking about the camera, audience, performance, and the money. I was wondering how I am going. What did I do last time? Then when I started and I went real bad I said, "I'm sooooo not getting the money" (Grace laughed). No I didn't say that, but it was a motivation and it was extra pressure.

Overt sarcasm is frequently used and prevalent in terms of Australian humour. In the above quote, Grace used sarcasm to downplay the pressure of the situation. In analysing the stress-reducing effects of humour, Dixon (1980) found that understanding a humorous aspect of a stressful situation redefines the situation in a less threatening way.

*General summary of Grace.* The pressure manipulation seemed to be effective in elevating pressure during the B phase. A consecutive performance increase, however, was displayed during the three phases. A performance comparison between the A<sub>1</sub> and B phases indicated that Grace increased performance by 11% during the B phase. In considering the pressure manipulation and performance analyses collectively, Grace increased performance under pressure, uncharacteristic of a CS athlete, and also indicates that the psychological inventories did not necessarily help to predict Grace's choking susceptibility effectively.

During the interview, two themes that were evident from Grace were public S-A and emotion-focused coping. It appears that S-A led to emotion-focused coping to manage the increase in perceived pressure during the B phase. Grace was predisposed to self-focusing, typical of a person high in S-C, and environmental factors (e.g., the audience) led her to direct attention to self during the B phase. Elevated attention to self subsequently increased the likelihood to use emotion-focused coping possibly because she noticed a discrepancy between her typical A-state and unusually high A-state during the B phase. Grace used emotion-focused coping, in the form of self-handicapping and humour, possibly to reduce A-state. From the interview results, it appears that Grace experienced cognitions associated with CS participants (e.g., increased S-A, self-handicapping) during the B phase.

#### *CS Participant- Helen*

*Participant profile.* Helen was 22 years old and had played competitive netball for 11 years. Helen had played on a division (association) level team for 6 years, in a state league team for 2 years, and in a shooting position for the past 4 years. Helen was purposively sampled as a CS participant because she was moderately high in S-C, high in A-trait, and primarily used approach coping. Helen's scores were 46 on the SCS (50th to 75th percentile), 39 on the SAS (75th to 100th percentile), and + 6 on the CSIA differential score (75th to 100th percentile).

*Pressure analysis.* Visual inspection of Figure 3.17 shows that Helen's intensity scores for cognitive anxiety were 14, 20, and 13 prior to the A<sub>1</sub>, B, and A<sub>2</sub> phases, respectively. Helen's intensity scores for somatic anxiety were 16, 13, and 14 for the three respective phases. Helen increased intensity of cognitive anxiety during the B phase, but decreased intensity of somatic anxiety from the A<sub>1</sub> to the other phases. For Helen, absolute

levels of cognitive anxiety increased from low prior to the A<sub>1</sub> and A<sub>2</sub> phases to moderate anxiety levels prior to the B phase, whereas absolute levels of somatic anxiety remained low throughout the three phases.

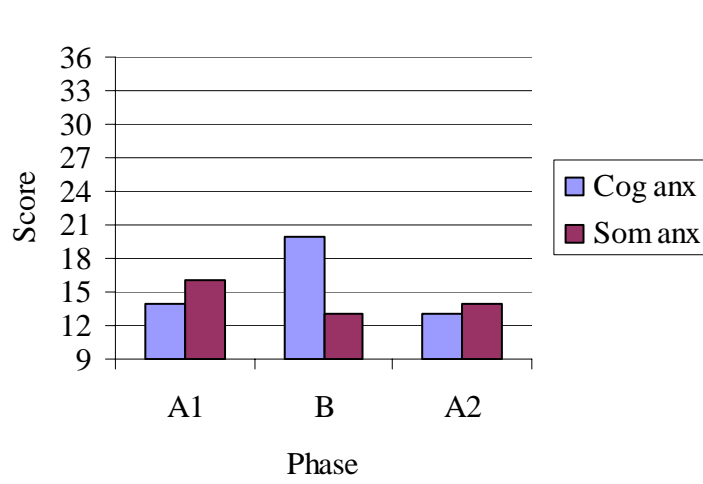


Figure 3.17. Cognitive and somatic anxiety intensity scores for Helen.

*Interview analysis: Pressure manipulation.* During the interview, Helen explained that she experienced similar pressure during the A<sub>1</sub> and B phases, whereas the A<sub>2</sub> phase was perceived as low-pressure. Apparently, being a participant in the study was, according to Helen, “a bit of a privilege,” leading to an increase in pressure during the intended low-pressure (A<sub>1</sub>) phase. Helen justified this statement by saying, “A bit nervous about it was the main feeling from the start. ... It was because of you (the researcher) that I was there and my performance brings out the outcome, so you (the researcher) being there definitely has an affect on me.” Helen then explained the difference in intensity of pressure among the three phases.

I think in a way, there’s a slight difference (between the A<sub>1</sub> and B phases), but it still has the same effect on you. The nervousness in the first session (A<sub>1</sub> phase), having someone (the researcher) new there and everything was unfamiliar, compared to the second session (B phase), where it was a lot quicker to get used to because the

netball part was familiar. I was just adapting to having the people (audience) there, so that nervousness was just the people, it wasn't so much the netball. ... I was very relaxed today (A<sub>2</sub> phase) compared to the last two (A<sub>1</sub> and B phases), I felt more confident, more relaxed.

It appears that Helen experienced similar A-state because the A<sub>1</sub> phase was an unfamiliar situation, whereas she was concerned with the audience during the B phase.

Like a number of other participants, a theme that was apparent during the A<sub>1</sub> was uncertainty. In discussing the A<sub>1</sub> phase, it appears that Helen reacted to the uncertainty with an increase in information seeking,

First thing was probably curiosity. Trying to work out what they (the researchers) are looking for. A bit nervous about it because I was not sure what I was doing, what they are looking for, whether I was going to succeed at what they want.

As perceived A-state increased, Helen may have attempted to decrease uncertainty by seeking additional information about the situation. By obtaining additional information about the situation, uncertainty is transformed into certainty and may lead to a concomitant reduction in A-state (Kagan, 1972). Helen perceived minimal uncertainty during the A<sub>2</sub> phase, "I think knowing you (the researcher) now more, made it easier. ... I knew when I was coming today what I was going to do, so I was a bit more relaxed." The A<sub>1</sub> and A<sub>2</sub> phases were planned as low-pressure situations, however, Helen explained that reduced uncertainty during the A<sub>2</sub> phase might have led to an associated reduction in A-state. This supports the suggestion that uncertainty can increase A-state (Martens et al. 1990). Apparently, the uncertainty, information seeking, and the presence of the researcher occupied attention, "During the first session, it is a bit off-putting (i.e., distracting). Things go through your head like, is that looked at badly, it's got more of a



negative impact because I was worried about my performance in front of someone.”

Wankel (1984) suggested that size of an audience has little systematic effect on performance, however, Helen explained that even one person observing performance can affect her.

*Performance analysis.* Mean performance for Helen during the A<sub>1</sub> phase was  $5.50 \pm 1.52$ , whereas mean performance during the B phase was  $6.33 \pm 1.51$ . This represented an increase of 15% between the A<sub>1</sub> and B phase. During the A<sub>2</sub> phase, mean performance was  $7.00 \pm 1.27$ , indicating an 11% increase between the B and A<sub>2</sub> phase. Mean performance improved by 27% from the A<sub>1</sub> to the A<sub>2</sub> phase (see Figure 3.18). Similar to Grace, Helen experienced a successive performance increase for the three phases and a possible explanation is provided shortly.

The slope of the celeration line for the A<sub>1</sub> phase was  $\times 1.33$  and the slope of the celeration line for the B phase was  $\times 2.00$ . This represented a change in slope between the A<sub>1</sub> and B phase of  $\times 1.50$ . During the A<sub>2</sub> phase, the slope of the celeration line was  $\times 1.67$ . This reflected a change in slope between the B and A<sub>2</sub> phase of  $\div 1.20$ .

In summary, similar to Grace’s performance results, Helen’s performance increased in a stepwise manner. This was possibly because of the similarity in perceived pressure, for Helen, during the A<sub>1</sub> and B phases. Data variability was equivalent in the A<sub>1</sub> and B phase, whereas variability decreased during the A<sub>2</sub> phase. Helen’s performance results indicated that she experienced a 15% increase in performance from the A<sub>1</sub> to the B phase. It appears that Helen did not experience choking in the B phase in comparison to the A<sub>1</sub> phase.

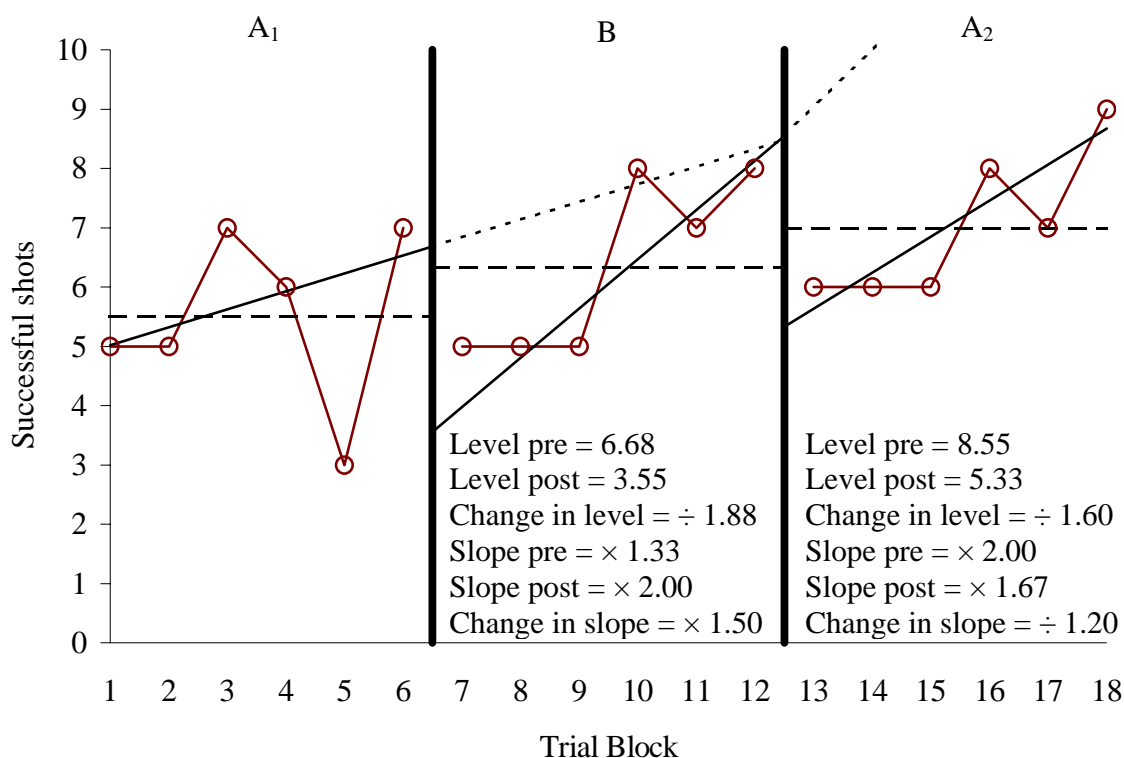


Figure 3.18. Split-middle analysis for Helen.

*Interview analysis: Cognitive themes.* During the interview, two themes for Helen were self-evaluation (SE) and on-going learning. Helen predominantly discussed SE during the A<sub>2</sub> phase but also made comparisons to the other phases, explaining SE was used after performing unsuccessfully.

If I am shooting well, I am confident. As soon as I start shooting bad, I almost step out and look at myself and go, ok, I feel myself not bending my knees as much, don't feel as relaxed in the wrists, so I can step back and change that.

During the A<sub>2</sub> phase, Helen reported evaluating performance prior to shot attempts, diagnosing any problems with mechanics, and changing technique where necessary. When asked whether SE was beneficial, Helen stated, "Self-evaluation can be good as long as I don't rely on it too much. Something like today (A<sub>2</sub> phase), in the right state, self-evaluation meant I shot better, I was just focusing on the target, so it helped."

Apparently, Helen was reluctant to self-evaluate during the high-pressure (i.e., A<sub>1</sub> and B) phases, as she stated,

I think I was too scared to go there (i.e., use self-evaluation). Again, taking it seriously, and putting expectation on myself, everything, the new people (audience) being there, just doing the whole study, everything is new, just do what you know, just do what you know.

It appears that Helen was unable to use SE as a coping mechanism to process task-relevant information during the A<sub>1</sub> and B phases. This supposition fits with Kahneman's (1973) central resource theory. In Helen's circumstance, an excessive amount of arousal may have initially reduced attentional capacity to a point where she was unable to self-evaluate. Helen explained the effects of increased A-state on cognitive functioning by saying, "When I get nervous, I don't think as clearly, so in the first two sessions when I was not shooting so well, I stressed more and I didn't stop to think." This also supports Kahneman's argument that attention is a limited capacity and that arousal diminishes attentional resources. If the majority of attentional resources are dedicated to processing one particular set of information, fewer resources are available to process other data (Kahneman). To further explain her difficulty in using SE during the high-pressure phases, Helen suggested,

When I was relaxed and still wasn't shooting too well during Session 3, I was looking for more reasons why I wasn't shooting well and changing that, whether it be focus on my point or whatever... I can look at it all and go, "ok, can I change my technique? Can I focus more on my (focal) point?" When I was nervous and not shooting well during the first two sessions, I didn't stop and think about how to

change that. ... So although being relaxed I still miss shots, every now and then, I am able to change it up a bit and correct it.

It appears that Helen's attentional focus narrowed under pressure and she was unable to select appropriate cues for proper adjustments quickly proceeding to the next attempt. This indirectly supports Easterbrook's (1959) cue utilisation theory where at high arousal levels (e.g., A<sub>1</sub> and B phases), discrimination among selection of relevant cues due to narrowed attention, decreases efficiency of cue selection. Helen focused her attention on emotional and environmental factors rather than task-relevant cues, which diminished her capability to select appropriate information. Helen explained the ramifications of the pressure,

I just wanted to shoot, I didn't let myself step back and look at different ways of making the shot, and give myself those options. ... I didn't take it back to basics. I tried to get that (the pressure) out of my head and focus on the basics of shooting, but I was still taking everything else in and I lost sight of what comes naturally.

Whereas Session 3, being a bit more relaxed, I am more open-minded. I miss and I go, ok, I can change that.

It appears that Helen's capability to use selective attention appropriately was affected by the pressure. Summers and Ford (1995) explained that selective attention involves the ability to focus attention without being overloaded (i.e., exhausting attentional capacity) and the ability to direct that focus to the most important stimuli for successful task completion. When attentional resources are overloaded, there may be a general impairment of coping in the self-focused person (Wells & Matthews, 1994). It seemed that Helen was cognitively overloaded by several factors (e.g., self-expectations, audience) during the A<sub>1</sub> and B phases, thus, limiting her ability to effectively cope with the situation. Coping successfully in sport involves regaining one's composure, establishing the proper

psychological readiness to respond to subsequent stimuli, and maintaining optimal arousal and concentration (Singer, 1982).

Another theme that was evident from Helen was on-going learning. Helen alluded to a number of learning experiences during the study and from past competitions that provided useful self-knowledge in terms of being more successful under pressure. For example, Helen explained, “When I’m relaxed, I play better... I think I learned a lot in Session 3. When things aren’t working, I can change it and I can pull myself out of it. I now know I have that ability.” A number of researchers (e.g., Orlick, 2000; Singer, 1986) have suggested that ongoing learning is an essential component in the pursuit of performance excellence. For example, Orlick proposed that ongoing learning is necessary for quicker skill development. Learning from past mistakes also helps athletes develop coping mechanisms to deal with adversity. Helen often used self-reflection in order to develop knowledge about herself. Self-reflection represents a non-anxious, healthy form of private S-C, a genuine curiosity about the self, where the person is intrigued and interested in learning more about his or her emotions, values, thought processes, and attitudes (Morin, 2005). Helen frequently self-reflected about past experiences and what she had learned from participating in the current study.

Just how much the mental side affects my game. I think I’ve always known that I’m hard on myself, I’ve always known I’ve had high expectations on myself, but just what goes through my head mentally and how I feel before I actually take any shots, how much a difference that makes. ... When I’m relaxed, I end up playing better... I think I learned a lot in Session 3, about when things aren’t working, you can change it and you can pull yourself out of it. I now know I have that ability to do that. ... A little bit of nerves or something unfamiliar can have a fair affect on me.

Helen has learned through experience that an increase in self-expectations may affect her negatively and relaxation generally improves her performance. To illustrate, Helen stated, “Things (affect me) like, don’t have too high expectations because that was a big thing growing up for me, putting too much pressure on myself.” Helen then elaborated that sometimes her mindset interferes with her mechanics when under pressure.

I just don’t play to my full potential (when under pressure)... I don’t give myself every chance to play to the best I could on that day. I sometimes let what goes on in my head affect the physical side and that I’ve been working on for a couple years.

Buss (1980) suggested, “Private self-conscious people regularly inspect their bodily processes and moods, reflect about their motives and goals. ... As a result of repeated self-reflection, they know themselves very well” (p. 20). In an attempt to more effectively deal with pressure, Helen had previously worked with a sport psychologist, as she explained, “It (the pressure) throws you around a bit more. I’ve seen a sport psychologist before and I need to get those things (negative effects of pressure) out of my head to do well.”

Helen understood the importance of decreasing self-expectations during the study, but her inability to use appropriate coping strategies hindered performance under pressure. For instance, Helen explained that during the A<sub>1</sub> and B phases, she used a form of avoidance coping,

During my experience, when things aren’t working, walk away and come back. I think I did it out of habit more than anything, just knowing that nothing was working. That second session, having people there. That first session being all new, different things going on, walk away, try and clear your head and then come back.

Helen has learned that avoidance coping strategy (i.e., walking away) can help decrease the cognitive load and help maintain task focus. It was unclear, however, whether Helen perceived this as helpful.

*General summary of Helen.* In conclusion, Helen experienced similar pressure during the A<sub>1</sub> and B phases. Helen exhibited a 15% improvement in mean performance from the A<sub>1</sub> to the B phase. It appears that the psychological inventories were helpful in predicting Helen's tendency toward heightened A-state during the initial two phases. Helen's results may indicate that the psychological inventories are helpful in predicting her choking susceptibility, but the similar perception of pressure limits the conclusions to be extracted from the performance data.

During the interview, self-evaluation (SE) and on-going learning were evident. Apparently, Helen uses SE during performances to modify unsuccessful shots. This strategy was helpful during the A<sub>2</sub> phase because Helen was relaxed and she had enough attentional resources available to process information. During the A<sub>1</sub> and B phases, however, the pressure seemingly reduced attentional capacity and Helen was unable to self-evaluate to the same extent. This provides support for Kahneman's (1973) central resource theory where problems in attention occur because of the limited amount of processing resources distributed when arousal increases.

#### *Cross-Case Analysis of CS Participants*

The primary focus of this dissertation is on CS participants, thus, a cross-case analysis of 3 CS participants was completed to develop an understanding of the cognitive processes and coping strategies used by CS athletes as a whole. Helen experienced similar pressure during the A<sub>1</sub> and B phases and, therefore, was not included in the cross-case analysis. Using the themes identified in the within-case analysis as a basis for the cross-

case analysis, I attempted to make connections across CS participants. By interpreting across interviews, the intention was to compile an integrated summary of the similarities in participants' experiences. To this end, I elaborate on cognitions used during the B phase, explaining emergent categories from the interview results. These findings should only be interpreted as an indication of typical cognitions associated with CS athletes, rather than generalising to all athletes.

In the cross-case analysis, cognitive processes are separated into three categories: public S-A, low self-confidence, and fear of evaluation/ failure. The CS participants reported an increase in public S-A during the B phase. Participants explained that performance was affected by awareness of the audience during the B phase. Emma and Felicity (the 2 participants who experienced choking), for example, were both preoccupied and disliked the audience being present. The increase in public S-A differentially affected each participant's performance, with Emma experiencing an increase in negative cognitions and Felicity experiencing elevations in worry regarding perceptions of audience criticism. Grace, conversely, increased public S-A and negative self-talk initially, however, she maintained composure and was able to increase performance during the B phase.

Another category that was evident from the CS participants was low self-confidence. These CS participants explained, during the B phase, that they experienced self-confidence or self-efficacy issues. Felicity, for example, discussed her experiences through negative tones, and passive voice, which I interpreted as a lack of self-confidence. Emma and Grace described incidents of self-protection when they explained their cognitions during the B phase. Schlenker et al. (1990) suggested that people with low self-esteem might use self-protection to minimise their weaknesses, rather than enhance their



strengths. Emma, for example, used social comparison as a means of self-protection, comparing herself to others and minimising her apparent weaknesses. Grace, likewise, used self-handicapping as a means of self-protection or self-enhancement. By using self-handicapping, self-esteem is protected when unsuccessful because failure can be externally attributed. The use of self-protective cognitions provides indirect support that the CS participants experienced low self-confidence, either prior to or during performance of the B phase.

A final category that was evident from the CS participants' interviews was fear of evaluation/ failure. The CS participants were all, at least to some extent, concerned with thoughts of negative audience evaluations and, as a result, increased anxiety. The CS participants' results provide evidence for the evaluation apprehension hypothesis of social facilitation (Henchy & Glass, 1968; Weiss & Miller, 1971), whereby activation of drive (e.g., anxiety) increases when audience members represent a threat or performers fear a negative evaluation, constituting an aversive state associated with fear. Geen (1991) has supported the evaluation apprehension hypothesis in a review, arguing that social facilitation effects are related to social anxiety that occurs when individuals fear that a potential failure in the presence of others will have negative consequences (e.g., negative feedback, loss of face, or embarrassment). With CS participants, the presence of an audience increased their public S-A, leading participants to fear the evaluation of others or the consequences of failure. Distinct from most perspectives on choking, Loehr (1995) described choking as performing poorly because of fear (of failure or evaluation). Loehr suggested that fear distances the athlete from the goal by initiating negative cognitions and leads to cautious performance. Wallace et al. (2005) argued that cautious performance might lead to choking. The comments by Loehr and Wallace et al. may indirectly indicate

the connection between fear (of failure or evaluation) and choking. The results from this cross-case analysis of CS participants support the contentions that fear of evaluation or the consequences of unsuccessful performance are, at least, a part of the choking experience.

### Discussion and Conclusion

The purpose of the current study was to investigate whether non-choking and choking behaviour may be predicted using established psychological inventories. All 4 CR participants performed as anticipated, increasing performance under pressure. Only 2 CS participants, however, decreased performance under pressure, providing partial support that the established inventories assist in predicting choking and non-choking behaviour. A secondary purpose was to investigate cognitions associated with CS and CR athletes. Thoughts associated with CS participants included emotion-focused attention and approach coping strategies, whereas cognitions associated with CR participants were task-focused attention and avoidance coping strategies. Findings are discussed separately regarding the primary and secondary purposes.

#### *Predicting Choking*

The pressure manipulation was effective in elevating perceived A-state for 7 out of 8 participants, supporting the contention that performance differences between phases were closely related to the pressure manipulation. The pressure manipulation was not successful in increasing pressure for one CR participant (Debbie) and one CS participant (Helen) also experienced similar pressure during the initial two phases. Findings indicated that the established psychological inventories helped to reasonably predict non-choking behaviour and, to a lesser extent, predicted choking behaviour.

The current findings, along with results of other studies (e.g., Masters et al., 1993; Wang, Marchant, Morris, & Gibbs, 2004), indicated that individuals high in S-C are more

likely to experience choking than those low in S-C. These results are consistent with Wang et al., who found that the best predictors of choking were private S-C and somatic A-trait that together accounted for 35% of the explained variance, a relatively large amount. The combined influences of high S-C, high A-trait, and approach coping partially predicted choking, however, other factors may also influence choking susceptibility. Anshel (1997), for example, suggested that introverts perform more effectively during less arousing situations, whereas extroverts generally prefer more arousal-inducing situations for optimal performance. It may be expected, then, that introverts perform poorly under pressure, considering their predisposition to be influenced more negatively by arousal-inducing situations. Additional research on predictors of choking is required to identify other CS factors in order to increase the likelihood of predicting choking.

#### *Qualitative Investigation*

One psychological characteristic that was evident among all participants was uncertainty. Uncertainty was normally experienced during the A<sub>1</sub> phase, where participants were concerned about the procedures of the study. Most participants explained that they required time to acclimatise to the unfamiliar procedures. As uncertainty increased, participants reported an elevation in A-state and performance generally decreased. During the B phase, some participants further increased anxiety, in part, because of additional uncertainty. Thus, as explained more thoroughly in the case studies, all participants provided qualitative support for the contention by Martens et al. (1990) that uncertainty increases the perception of A-state.

Several differences between the CR and CS participants were also evident. For example, CR participants used a broader range of coping strategies to manage the pressure of the B phase, whereas some CS participants were almost devoid of effective coping

strategies. With the exception of Debbie, who did not experience anxiety, thus provided limited information, CR participants discussed examples of both approach and avoidance coping strategies they employed to effectively manage the pressure of the B phase. For example, whereas Amy used a number of avoidance coping strategies throughout the B phase, Carol initially and unsuccessfully utilised approach coping before switching to an avoidance coping strategy to deal with the pressure.

CS participants seemed to have less coping strategies in their repertoire to choose from than CR participants. For example, instead of using active coping strategies to deal with the pressure, Emma “unsuccessfully” attempted to use defence mechanisms (i.e., projection) to reduce anxiety. She possibly had not acquired the necessary coping skills to manage the pressure of the B phase. Perhaps, partly because of her high S-C predisposition, Emma had a magnified appraisal of the pressure situation compared to other participants. Within the CS participants, there were also differences in the coping strategies implemented. For example, Grace and Helen (the 2 CS participants who improved their performance during the B phase) seemed to have a more developed coping skills compared to Emma and Felicity. The coping strategy that Grace used (i.e., self-handicapping) was possibly maladaptive in one sense, but also adaptive from the perspective of decreasing anxiety.

#### *Methodological Issues*

Many participants seemed apprehensive about participating in the A<sub>1</sub> phase; one limitation of the current research was the lack of a “true” baseline during the A<sub>1</sub> phase. The level of pressure during the A<sub>1</sub> phase may have negatively affected participants’ performance. CS participants were perhaps more negatively influenced because of their predisposition to being highly trait anxious. That is, the participants’ shooting capability

was negatively influenced because of the pressure of the A<sub>1</sub> phase. Helen was affected particularly by the pressure of the A<sub>1</sub> phase, perceiving similar pressure intensity for the A<sub>1</sub> and B phases, respectively. To overcome this limitation, researchers could consider providing a pre-test phase in which participants become accustomed to the research environment to ensure a true baseline phase.

Although perceived pressure was increased for a number of participants, another limitation was the inadequate amount of pressure induced in comparison to “real” competitive situations. The potential pressure experienced by elite athletes is much greater considering the situational factors (e.g., audience size, monetary incentive) associated with competition. With ethical guideline criteria, however, it may be difficult to experimentally exceed the amount of pressure induced during this study.

#### *Future Research*

During the current study, qualitative results indicated that choking was largely due to higher levels of public S-C, whereas Wang, Marchant, Morris, and Gibbs (2004) suggested that choking was due to higher levels of private S-C. Considering these findings, perhaps the self-focus model and the distraction model of choking may be expanded to separately include increases in either public S-C or private S-C. That is, individuals high in private S-C may be more inclined to increase private S-C under pressure and focus attention on personal aspects of self, possibly leading to choking due to self-focused attention. Individuals high in public S-C may be more predisposed to increase public S-C under pressure and focus attention on audience judgments and perceptions. This task-irrelevant focus of attention may cause the individual to experience choking due to distraction. Future research should investigate whether private S-C and public S-C may lead to different methods of choking.

Findings in the current study indicate that choking was partially due to emotion-focused attention. A closer examination of Masters (1992) study (see Chapter 2 of this dissertation for a more detailed discussion) provides some evidence that performance is likely to decrease due to emotion-focused attention under pressure. For example, the stress control (SC) group in Masters' study may have applied emotion-focused attention during the stress session. Similar to the explicit motor learning (EL) group, the SC group decreased performance during the B phase, however, identified fewer explicit rules than the EL group. Perhaps due to the lack of explicit knowledge, more attentional space was available to process information related to emotion, resulting in a performance decrement. Future research should explore whether emotion-focused attention may be a possible rationale for choking.

Study 1 indicated that CS participants who performed poorly under pressure became concerned with their emotion and also used approach coping to deal with pressure. CR participants who increased performance used a task-focused approach and avoidance coping strategies to deal with the pressure. It appears that interventions to inoculate choking should be adapted to increase focus on the task or decrease emotion-focused attention. Although many suggestions have been proposed regarding choking interventions (e.g., Anshel, 1995; Hall, 2004; Nideffer & Sagal, 2001), it seems appropriate, based on the current findings, that choking interventions should apply either a task-focused or avoidance coping approach to alleviate choking. Using interventions that promote a task-focus may help the athlete maintain task-relevant attention and help eliminate emotion-focused attention. Similarly, applying avoidance coping strategies seems to decrease emotion-focused attention, ultimately alleviating choking.