I '*THINK*', THEREFORE I '*CHOKE*': EVIDENCE TOWARDS ADAPTIVE AND MALADAPTIVE PROCESSING STYLES IN DETERMINING SPORTS PERFORMANCE

SINDHUJA SANKARAN

A dissertation submitted to the School of Psychology, Cardiff University, in partial fulfilment of the requirements for the degree of
DOCTOR OF PHILOSOPHY

June 2012

Under the supervision of
Dr. Ulrich von Hecker
School of Psychology
Cardiff University, UK

Dedication

To my father, Sankaran and my mother, Usha, for their relentless patience and support; for their liberality; for their generosity and for their unconditional encouragement, without which I wouldn't be here.

Acknowledgment

I owe my gratitude to a lot of people for their support during the course of this PhD. To begin with, I thank my parents for comforting me both emotionally and financially while I pursued an academic career. I extend my appreciation to my supervisor, Ulrich von Hecker whose vivacious and reassuring guidance made my experience as a PhD student fulfilling to the most. I am very grateful to be part of the Spears-Manstead labgroup and the Social Psychology Club for their constructive feedback about my research and I particularly thank Tony Manstead, Greg Maio and Russell Spears who took that extra mile to fine tune my work. I thank my colleagues and friends Marlon, Elena, Colin, Dimitrios, Gabi, Dina, Lee, Sian, Martha who proved to be a brilliant source of distraction and great company to satisfy my intellectual curiosity.

I thank the School of Psychology for their support to attend various conferences that I certainly benefitted from. I would also like to extend my thanks to the support staff for all their help. Of course I cannot forget some of the extended Cardiff Social Psychology family members; Gloria, Marcin, Sole and Katerina whose vibrant presence only made the stressful times more bearable.

I developed some meaningful relationships during the time I was here and I would like to thank these people specifically. To Verbon, Caroline and Reem, the dynamic trio; I thank them for their help with statistics and personal ‘dramas’. To Joe, Job and James; I thank them for all the brilliant collaborative meetings we’ve had and for all the times our inane chatter proved to be great conversations. To Eleni, Mikael, Amanda and Astrid, my closest possible inner circle; I thank them for their patience, warmth and entertainment; my time in Cardiff would have not been the same without them. I also thank Toon, who pushed me to try to be someone better than what I already am in his own idiosyncratic way. I would also like to thank my friends in India particularly Sneha, Ajay and Ashwin, who continued to interact with me despite my generous use of psychological jargon and intense stressful outbursts- they’ve known me long enough, they don’t really have a choice!

Finally I thank my coach from India, who tried to make me a better athlete but I had to quit much to his disappointment. I also thank the Welsh academy of sports and other athletes and coaches from India and Oxford who agreed to have me test my theory on potential ‘lab rats’.

Thesis summary

This thesis develops a model that predicts sports performance, particularly ‘choking under pressure’. The model describes a cognitive framework along with dispositional factors that might affect performance. The premise of the research is based on two quasi-experimental groups called Training Champions (TC) – those who perform better in training than competitions and Competition Champions (CC) – those who perform better in competitions than training. It was assumed that TC are more vulnerable to ‘choking under pressure’ than CC, based on the premise that TC have repetitive exposure to failure and CC have repetitive exposure to success. The thesis thus develops a model that could potentially explain why TC decline in performance and continue to do so and why CC improve their performance. The model comprises various stages which is included in respective experimental chapters.

The first experimental chapter sets the stage for rest of the model by showing that certain information types – positive, negative and neutral would have difference effects on performance between TC and CC.

The second experimental chapter throws light on the impact of various levels of ‘thinking’ traits like rumination, trait anxiety, maladaptive perfectionism and need for cognition. In other words higher levels of these traits would indicate a maladaptive nature, while lower levels of these traits would indicate an adaptive nature. It was predicted that TC would possess maladaptive traits and thereby engage in maladaptive information processing while CC would possess adaptive traits and would engage in an adaptive processing style.

The third experimental chapter examined how TC and CC maintain such processing styles by studying the construct of perceived controllability. It was theorized that information processing would lead to perceiving future outcomes with certain levels of control. Hence it was predicted that TC would show perceived uncontrollability and CC would show an illusion of control over future outcomes.

The fourth and fifth experimental chapters examined in detail the nature of maladaptive and adaptive processing styles by associating negativity biases with TC and positivity biases with CC. Finally, it was predicted that the reason why TC continue to engage in this style is because they are in a learned helplessness loop constantly reinforced due to repetitive failure, while CC are in a positive feedback loop reinforced by repetitive success.

Table of Contents

INTRODUCTION AND OVERVIEW 1
Choking under pressure 1
Introducing the Training and Competition Champions 8
Information processing models 13
Inherent cognitive traits 17
The bidirectional nature of information processing 23
Predicted models for TC and CC 29
Model Summary 31
Overview 35

ARE 'CHOKERS' 'THINKERS'? EVIDENCE TOWARDS INFORMATION PROCESSING DIFFERENCES IN PREDICTING PERFORMANCE OUTCOMES - INTRODUCTION 36
Study 1a 39
Method 40
Results 43
Discussion 48
Study 1b 52
Method 52
Results 54
Discussion 56

TOWARDS A MODEL: THE ROLE OF 'THINKING' TRAITS IN PROPAGATING ADAPTIVE AND MALADAPTIVE INFORMATION PROCESSING STYLES - INTRODUCTION 59
Study 2a 62
Method 63
Results 65
Discussion 71
Study 2b 76
Method 76
Results 78
Discussion 79

STUCK IN A RUT: EVIDENCE TOWARDS A LEARNED HELPLESSNESS MODEL AND AN INVERSED LEARNED HELPLESSNESS MODEL FOR FAILURE AND SUCCESS MAINTENANCE-INTRODUCTION 82
Study 3a 87
Method 88
Results 91
Discussion 95
Study 3b 103
Method 104
Results 106
Discussion 109

THE BIDIRECTIONAL NATURE OF INFORMATION PROCESSING: EXAMINING THE ROLE OF NEGATIVITY AND POSITIVITY BIASES IN PREDICTING SPORTS PERFORMANCE - INTRODUCTION 112
Study 4 118
Method 119
Results 121
Discussion 129

'CONTROLLABILITY' LIES IN THE EYE OF THE BEHOLDER: THE ROLE OF REPETITIVE SUCCESS AND FAILURE EXPERIENCES IN PREDICTING PERCEIVED CONTROLLABILITY - INTRODUCTION 136
Study 5 138
Method 139
Results 142
Discussion 148

THEORETICAL AND PRACTICAL IMPLICATIONS OF THE PROPOSED MODEL 154
General Discussion 154
The model in detail 156
The chicken or egg story 162
Theoretical implications 163
Practical implications 168
Potential intervention 170
Future research 174
Limitations 175
Conclusions 176

REFERENCES 177
APPENDIX 191

Chapter 1: Introduction and overview

1.1 Choking under pressure

1.1.1 The case of the 'choker'

Imagine an athletic stadium filled with anxious audience, waving their respective countries' flags; anticipating the victory of the athlete who will be tagged as the 'fastest man in the world'. Conditions seem perfect in every aspect, be it the weather or the general enthusiasm displayed by the crowd. All athletes have finished warming up and are walking towards the starting blocks at the command of the official's 'On your mark'. The athletes take their position and wait for the sound of the gun shot. Less than 10 seconds later, the world celebrates the success of the fastest man in the world. This is the story of Athlete 'A'. Athlete 'B' on the other hand missed a medal by one tenth of a second. Experts then comment on Athlete B's performance explaining that he had clocked timings better than the one he did at the current event and that he consistently displayed this pattern. Athlete 'B' was hence labelled as the 'choker'.

A real life example of Athlete 'B' can be examined in the case of Asafa Powell. Asafa Powell is a Jamaican sprinter who specialises in the 100 metres. He has held the world record for 100 metres and has several times broken the 10-second barrier, that is, ran under 10 seconds. However on the big occasions like the World championships and the Olympics he fails to convert his prior success repetitively. One such event that made him infamous for his 'choking' tendencies was at the 2007 World Athletics Championships in Osaka. He was competing against the rising American star, Tyson Gay, who had also held world records in the same event. The race began at the shot of the gun; Powell had a brilliant start which got him to the leading position until 70m into the race. The last 30m witnessed a change in positions, wherein Powell slipped from the first position and finished third while Tyson Gay took home the gold medal. When interviewed, Powell said that he felt Tyson Gay coming on his shoulder, which made him panic. He admitted to "giving up" halfway and just having stopped running as he watched Tyson Gay pass him. He also said "I really have a point to prove but it can become a mental problem if you think about it too much". Former American sprinter Michael Johnson critically commented on Powell's performance stating "You could see him thinking, I'm losing it, and he just gave up at that point". Thus, the question coaches, sport psychologists and journalists wonder about is why Asafa Powel would falter on big occasions like the Olympics or the World Championships. However, during smaller events not only would he win the events but would also dip way below ten seconds throughout the

athletic season. Asafa Powell did the improbable, the unpredicted, and the unjustifiable given his ability: He slipped from the first position to the third position and thereby missing the chance of being the world champion, he 'choked under pressure'.

1.1.2 Athletes 'choke', so what? – The rationale to study sports performance

The rationale for choosing this particular area not only comes from the fact that the phenomenon of choking is rather elusive and needs more concrete explanation, but also from my personal choking experience in track events, particularly in 400 metres. However, the most important reason to choose sports performance is the curiosity to apply existing social cognitive theories to practice. Sports have been part of our tradition across many cultures. What once used to be a display of pure athleticism now has financial implications and entertainment value too. Imagine the following scenarios, an athlete who is experiencing anxiety prior to his competition, an athlete who is unable to deal with his poor performance in his competition, an athlete who is injured and is unable to participate in an upcoming competition, an athlete who might have to incorporate certain mental strategies during the competition, an athlete's relationship with the coach during training, an athlete having to deal with performance enhancement drug scandals, or something as simple as the entire country depending on that athlete to win a gold medal at the Olympics. These various circumstances are prone to elicit concern, worries and extensive thinking in some athletes more than in others, and as such they certainly validate the need for a scientific approach to sports performance.

A handful of classic social psychology research areas have in fact explored certain domains of sports performance. One of earliest studies conducted was on social facilitation and coaction effects (Triplett, 1897). This area was further developed with Zajonc's (1965) theory on arousal and task complexity. Other areas of research included personality variables (e.g., Cox, 1994; Vealey, 1992), attentional and interpersonal style (Nideffer, 1990), intrinsic motivation (Deci & Ryan, 1985), and of course choking under pressure (Baumeister, 1984) to name a few. Sports performance however is still surprisingly neglected as an area of study or behavioural measurement, even though several concepts in social psychology are directly related to sports performance as mentioned above. Thus a primary motivation to conduct the present research is to build the bridge between existing social cognitive theories and theories about sports performance outcomes. I am going to address this by focusing on track and field events because these disciplines use straightforward physical measures to record performance; hence there is good reliability in the pertinent dependent variables. The present

research thus aims to investigate the antecedents that initiate the choking response amongst Track and Field athletes.

1.1.3 What is 'Choking under pressure'?

Anecdotally it has been suggested that choking occurs in a situation that creates performance pressure. The earliest evidence for a clear explanation of the phenomenon was suggested by Baumeister (1984), defining choking as worse performance than expected given what a performer is capable of doing and what this performer has achieved in the past. Choking may occur across many diverse task domains where incentives for optimal performance are at a maximum (Beilock & Carr, 2001; Lewis & Linder, 1997; Masters, 1992). It is important to remember that when people 'choke under pressure', they do not just exhibit poor performance in absolute terms, rather it is suboptimal performance when compared to previous standards. This less-than-optimal performance does not reflect a random fluctuation in skill level but rather occurs in response to a high pressure situation. Thus, the general notion is that when an athlete for instance faces a competition situation, the pressure to perform well increases. This pressure builds and they choke. It is commonly assumed that this increase in pressure is reflected in an increase in anxiety (e.g.,Hardy, Mullen, & Jones, 1996; Jackson, Ashford, & Norsworthy, 2006; Masters, 1992; Mullen & Hardy, 2000). The experience of anxiety by an individual can manifest itself physiologically in terms of heightened levels of arousal or drive (Spence & Spence, 1966), or cognitively in terms of heightened levels of worry or anxiety (Beilock, Kulp, Holt, & Carr, 2004). Physiological arousal and anxiety may accompany choking, and dispositional trait anxiety may make an individual more prone to choke under pressure. Thus one can assume that athletes who 'choke under pressure' are more likely to appraise the pressure situation as a threat and are hence vulnerable to experiencing heightened anxiety. While there are several theories that try to explain the link between experiencing pressure, anxiety and choking, the present research contributes to the existing choking literature by developing a framework that focuses on the interplay between cognitive processes and dispositional factors that could serve as antecedents to 'choking under pressure'.

1.1.4 Theories of 'Choking under pressure'-Drive theories

A number of theories have been proposed to account for 'choking under pressure'. One of the more classic theories is based on some general principles of drive theory. According to general drive theory models, an individual's performance level is determined by one's current

level of arousal, or "drive" (Spence & Spence, 1966). A classic example of this particular theory is that of the Yerkes-Dodson (1908) effect, also known as the inverted U-shape theory which explains that as arousal increases, so does performance but only to a certain level. In other words, peak performance takes place at intermediate levels of arousal. With arousal being too low, the athlete might not have the adrenalin to push forward in a race, whereas too much arousal can result in heightened anxiety and the athlete might 'choke under pressure'. Another variant of the inverted-U theory is Hardy's (1990) sport adaptation of the cusp catastrophe model (CCM). The CCM and the inverted-U theories are similar in that both predict that increases in arousal will facilitate performance to a certain degree. However the main difference lies in the idea that while the inverted-U hypotheses conceptualize arousal in largely physiological terms, the CCM suggests that it is the interaction of physiological arousal and cognitive anxiety that serve to impact performance.

Another classic theory in the social psychology literature that discusses the relation between arousal and performance is that of Zajonc's (1965) theory of social facilitation. This theory captures the idea that as drive increases, one's dominant response will be exhibited. However, under heightened levels of drive or arousal (usually created by the presence of an audience) novices would exhibit poor performance while experts should still perform at a high level, with regards to their dominant response. In a real sporting situation this theory would claim that elite athletes would never 'choke under pressure' because their skills would be their dominant response. This is of course not the case in reality, as the issue concerning 'choking under pressure' is how even professional athletes succumb to high pressure and decline in performance. Understandably, social facilitation theories have received mixed support in motor skill research. It has been argued that since there are different kind of motor tasks like coordination, power and stamina tasks, a unified social facilitation theory cannot be used to predict changes in performance due to the presence of others (for a review, see Strauss, 2002). Furthermore, Manstead and Semin (1980) proposed a model wherein the presence of an audience facilitates performance for 'overlearned' tasks by focussing attention on the task. On the other hand, presence of an audience debilitates performance for novel or complex tasks wherein the attentional demands are quite high to learn the new task thereby implying that audience presence can either improve or impair performance depending on varied conditions. Thus, although drive theories do explain the basic nature of performance deterioration in terms of arousal, with anxiety being the precursor to a choke response; these theories are more descriptive than explanatory (Beilock & Gray, 2007).

1.1.5 Theories of 'Choking under pressure'-Attentional theories

The Attentional theories explain the mechanisms of choking based on a cognitive model. The various attentional theories of choking however make contrasting predictions about how pressure impacts performance. One such theory is the distraction theory which proposes that performance pressure creates a distracting environment for the expert performer, thereby diverting the attention away from skill execution to task irrelevant thoughts such as worries about the situation and its consequences (Beilock et al., 2004; Beilock & Carr, 2005; Carver & Scheier, 1978; Lewis & Linder, 1997; Wine, 1971). This occurs when one's working memory capacity resources are compromised. Working memory is a short-term memory system that maintains a limited amount of information which is of immediate relevance to the task at hand while preventing distractions from the environment and irrelevant thoughts (Kane & Engle, 2000). Thus, if the ability of the working memory to maintain focus is disturbed, performance may be compromised. For example, when an individual feels heightened pressure then s/he immediately shifts attentional focus to task-irrelevant cues like consequences of potential loss or the feeling of worry and anxiety building up. This could be an overload for the limited working memory resources that an individual might have available. Thus, skill execution that relies on working memory is affected and hence performance is compromised (Beilock & DeCaro, 2007; Gimmig, Huguet, Caverni, & Cury, 2006; Markman, Maddox, & Worthy, 2006, as cited in DeCaro et al., 2011). This theory certainly holds true in situations where individuals use working memory resources like in a test situation while solving difficult problems (Beilock, Kulp, et al., 2004). However, motor skills do not rely heavily on working memory, especially well-learned skills that become proceduralized with practice. These skills do not require constant online attentional control and are in fact known to run largely outside of working memory (e.g., Beilock, Carr, et al., 2002; Fitts & Posner, 1967; Proctor & Dutta, 1995). Hence such motor skills should be relatively robust to conditions that use working memory resources. Keeping this in mind, a second set of theories were proposed known as the explicit monitoring theories which are known to explain motor behaviour performance decrements better.

Explicit monitoring or skill-focus theories suggest that pressure in a situation results in an increase in one's self-consciousness about performing correctly, which in turn leads individuals to focus all their attention on skill execution to ensure that the outcome is optimal and successful (Beilock & Carr, 2001). However, this explicit attention to step-by-step processes is thought to disrupt the execution of proceduralized processes, as in the case of motor or sports performance; that normally run outside one's conscious awareness

(Baumeister, 1984; Beilock, Bertenthal, McCoy, & Carr, 2004; Beilock & Carr, 2001; Kimble & Perlmuter, 1970; Langer & Imber, 1979; Masters, 1992). The main idea however stems from the fact that being in a pressure-filled situation, where one is being evaluated and judged, one's self-consciousness and thereby anxiety about performing correctly increases (Baumeister, 1984). This is most commonly seen in sports settings as the athlete is aware of the fact that the audience would be watching him, as would the coach. Thus an athlete susceptible to pressure and anxiety will be more self-aware of his/her actions, and the skill that is meant to be delivered with ease and flow becomes strained and constricted, thereby resulting in performance decrements. Interestingly, it was found that unlike expert performance, novice performance is thought to require attentional control (Beilock & Carr, 2001; Fitts & Posner, 1967; Gray, 2004; Proctor & Dutta, 1995). That is, when learning a new task novice performers need to pay attention to it in order to register the task accurately in their working memory. Thus, novices are hurt when attention is taken away from execution rather than by conditions that draw attention to performance. Thus, distraction and explicit monitoring theories of 'choking under pressure' propose very different mechanisms of skill failure. Whereas distraction theories suggest that pressure harms performance by shifting attention and working memory resources *away from* execution, explicit monitoring theories suggest that pressure shifts too much attention *toward* skill processes and procedures. To address the contrasting explanations for 'choking under pressure' DeCaro et al. (2011) suggested that certain aspects of the pressure situation itself can lead to distraction and/or explicit monitoring, differentially harming skills that rely more or less on working memory and attentional control. In other words, pressure affects working memory when individuals are performing demanding cognitive tasks, whereas it brings attention to skill processes during proceduralized motor skill execution. However, whatever the theoretical explanation might be there is still the lingering notion that some individuals are predisposed to experience choking while some are not. Thus, are there any individual differences that already exist that might help identify a 'choker'?

1.1.6 Who is a 'Choker'?

Research has shown that there are a number of individual differences amongst performers that could serve as predictors of susceptibility to performance decrements under pressure. One of the more prominent theories claiming individual differences was developed by Baumeister (1984) where he explains that individuals low in dispositional self-consciousness would be more prone to performance decrements under pressure than those

high in self-consciousness. Self-consciousness refers to one's level of awareness about internal states and processes (Baumeister, 1984; Fenigstein, Scheier, & Buss, 1975). High self-conscious individuals are habituated to attending to their performance. Thus, when pressure prompts attention to execution, high self-conscious individuals should be less impacted by increased self-awareness than those who are dispositionally low in self-consciousness. Recent work by Wang et al. (2004) also examined individual differences in self-consciousness as a predictor of 'choking under pressure' in a well-learned basketball free-throw shooting task. It was found that highly self-conscious athletes (specifically, privately self-conscious; see Fenigstein et al., 1975) were *more* susceptible to choking under pressure, not *less*, as Baumeister (1984) had found. These disparate findings could be because of the skill level, that is, attention to execution (increased by high levels of dispositional self-consciousness) may have harmed a well-learned skill (Wang et al., 2004). In Baumeister's work, these same attentional processes may have aided (or at least did not hurt) performance of a relatively unpractised task. Thus, in the case of elite athletes one could assume that high levels of dispositional self-consciousness would harm their performance because athletes might give more attention to execution, much in line with the explicit monitoring theory (Baumeister, 1984; Beilock, Bertenthal, McCoy, & Carr, 2004; Beilock & Carr, 2001; Kimble & Perlmuter, 1970; Langer & Imber, 1979; Masters, 1992).

Another area that points to individual differences in proneness to choke comes from research by Masters, Polman and Hammond (1993). They proposed an individual difference personality variable termed "reinvestment" which was assessed by a scale they developed called the Reinvestment Scale. This scale predicted an individual's propensity for performance failure under stress. The Reinvestment Scale measures the likelihood that one will try to "reinvest" explicit knowledge or attempt to perform one's skill using conscious control in certain situations. Masters et al. (1993) suggested that under high-pressure conditions, those scoring higher on the Reinvestment Scale should be more likely to show signs of stress-induced performance failure. Although more work is needed to determine the exact relationship between reinvestment, self-consciousness and 'choking under pressure', the work discussed here suggests that it may be possible to identify a priori those athletes who will be most susceptible to 'choking under pressure'(Beilock & Gray, 2007) by investigating particular classes of individual difference variables.

Possibly one of the most obvious candidates for an individual difference variable to predict susceptibility to 'choke under pressure' would be trait anxiety. In the academic test anxiety literature, a number of studies have demonstrated that those with high levels of trait

anxiety are more vulnerable to the detrimental influence of stressful situations (Eysenck & Calvo, 1992, as cited in Beilock & Gray, 2007). However, in the sports field several studies show that those with higher levels of trait anxiety were more susceptible to show performance decline in a stress induced situation than those who were low on trait anxiety (Murray & Janelle, 2003; Wang et al., 2004). One of the main reasons for differential effects as a function of different levels of anxiety is because of the way people attribute and appraise the pressure they feel in competitions. Giacobbi and Weinberg (2000) found that in response to stressful situations, high trait-anxious athletes used different and often non-productive coping behaviours (e.g. self-blame) in comparison to low trait-anxious athletes. Hill et al. (2009) support the notion by stating that the 'chokers' will negatively appraise both their ability to cope with the demands and their emotional response to such demands. They also claim that those athletes low on self-confidence, those who exhibit dysfunctional thinking, have a lack of a balanced sport/life perspective, and those low on mental toughness are more likely to 'choke under pressure' than others. It has thus been established that some athletes might have more of a tendency to 'choke' than others based on inherent traits.

Many studies in the sports domain have indicated that successful athletes might differ from unsuccessful athletes with regards to an individual difference trait. For instance, Highlen et al. (1979) researched the psychological characteristics of successful and unsuccessful elite wrestlers. The level of success was determined by whether they qualified for the final team. It was seen that self-confidence was the most important factor distinguishing success and failure amongst athletes. Kerr and Cox (1991) later surmised that successful athletes during competition were less affected by negative emotional responses than less successful players. Both these studies show a direct link towards existing literature as discussed earlier on the mechanisms that govern choking. However, it is a reasonable claim to assume that every athlete at some point in his/her athletic career might have experienced performance pressure resulting in a less than optimal level of performance. The difference lies in the notion that when these athletes consistently experience success or failure they might develop a pattern of approaching a competition and could be labelled as a 'successful' or an 'unsuccessful' athlete.

1.2 Introducing the Training and Competition Champions

1.2.1 Stuck in a rut

As explained earlier, it is one thing to have a tendency to 'choke under pressure' but the perspective changes a bit when athletes consistently show a decline in performance over an

extended period of time in the face of high pressure situations thereby being stuck in a rut of unsuccessful performance. Evidence towards the above claim is seen from research on the characterization of unsuccessful athletes- Training Champions and successful athletes- Competition Champions. According to Tschakert (1987), a *training champion* is an athlete who repeatedly fails in competition despite good results during training. In contrast, a *competition champion* excels in not only transferring his/her achievements from training to competition, but possibly surpasses them and achieves even better results in competition by showing his/her peak performance (Gould & Damarjian, 1996; Taylor, 1996; Williams & Kranen, 1993). Going by this definition, it seems plausible that Training Champions could perhaps experience choking in high pressure situations like competitions and are hence unable to perform as well in competitions, while Competition Champions are not susceptible to experience choking and hence improve their performance. While there are not many studies directly linking these athletic groups and susceptibility to choking, Barkhoff et al. (2004) studied artistic roller skaters and argued that the differences between the Competition Champions and Training Champions were a function of performance anxiety and activation, wherein TC showed less activation and more anxiety before and after the competition than the former. Activation measured here was part of a subscale of the **Be**findlichkeits**f**ragebogen (BEF-2; Kuhl, 1997, as cited in Barkhoff et al., 2004), which was designed to measure situational mood. In this case arousal and activation were considered as the same concept, except 'activation' as used in the mood questionnaire was used to operationalize arousal. This inventory was developed by Kuhl according to the Activation-Deactivation Adjective Check List by Thayer (1989). Based on the mood model by Thayer, 'activation' in this case implies changes in self-regulation of mood from tense-tiredness to calm energy. So, although Barkhoff et al. (2004) did find some evidence towards differentiating Training Champions and Competition Champions, there is much work required to study these two groups of athletes and find a link between individual differences between these groups and their susceptibility to 'choke under pressure'.

1.2.2 Training Champions and Competition Champions in the present research

The present research aims to combine two unexplored areas in social psychology and sports research. The first concerns the antecedents of choking related to a general framework comprising cognitive mechanisms and dispositional factors. The second area concerns the mechanism of why and how Training Champions 'choke' more than Competition Champions. Throughout the thesis the Training Champions will be referred to as TC and

Competition Champions will be referred to as CC. One important conceptualization made throughout the present research is in terms of TC's constant exposure to failure and CC's constant exposure to success. As per the TC definition, they perform better in training than in competition, implying they 'fail' in competitions and CC perform better in competition implying they 'succeed'. However, the training versus competition comparison is intra-personal while 'failing' or 'succeeding' could have interpersonal implications since being in a competition would involve competing with other competitors and being susceptible to choking. It is rather difficult to disentangle these two overlapping operationalizations, but it is intuitively assumed that success and failure amongst CC and TC is based on the final outcome, that is, whether they win or lose based on the goal previously set. It is most likely possible that for TC, failure in competition is indicated by outcome loss and also by poorer objective performance in competitions compared to training. Similarly, success for CC in competition could be indicated by outcome win and also by greater objective performance in competitions compared to training. It is also worth noting performance pressure or choking was never induced in the lab or in the field. Choking usually takes place in a situation where the pressure to perform is high; in almost all cases the competition would be a pressure inducing situation. If athletes consistently fail to perform as well in competitions compared to training, it is assumed that performance deterioration in competitions when compared to training is an outcome of a choke response. Thus, the focus was on how and why TC and CC developed into being so and how they maintained their respective status.

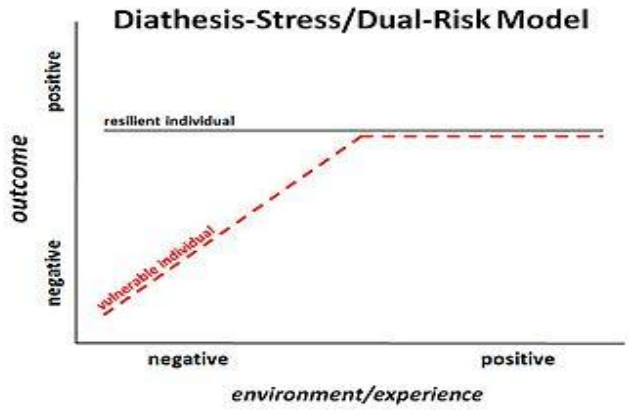
1.2.3 Development of TC and CC

An intriguing question one might ask is how athletes end up being classified as TC and CC. Surely they are not 'born' this way, nor do the coaches train them exclusively as TC and CC. The only aspect athletes might inherently possess would be certain traits that could benefit or hinder their performance. For example, athletes like any other regular individual could possess high trait anxiety which may interact with several other factors, such as appraisal of the stressful situation, coping mechanisms, or attention being paid to particular types of stimuli, and could therefore influence one's performance. In other words, those with high trait anxiety need not necessarily be classified as chokers, and those with low trait anxiety need not necessarily be classified as non-chokers. Thus, there may be a combination of several factors that could direct the way athletes respond to a pressure situation based on the inherent traits they possess. For instance, an athlete with high trait anxiety, when exposed to repetitive failure in a pressure inducing situation like a competition, might develop a

pattern of repeatedly failing in competitions, but doing well in training. The key component seems to be the initial experience in competition, as being failure or success.

As explained earlier, presumably no one is born as a TC or CC, and when athletes begin training with a coach they are still very early in their respective athletic careers. However, their encounter with initial competition experience could make or break them. If this athlete constantly 'chokes under pressure' over a repeated period of time in competitions, s/he might develop into a Training Champion. Similarly, someone with low trait anxiety is most likely to experience low state anxiety in the face of a competition, thus a repeated exposure to escaping choking in terms of a successful performance could lead to the development of a Competition Champion. The important feature to remember here is that there is not one individual difference measure that could determine the tendency to choke. Thus some traits interact with various other factors like information processing, attribution and so on along with repetitive exposure to failure or success; which is perhaps an outcome of choking, thereby determining the category athletes would belong to – TC or CC. The claim that is being made through the present research is that the development of TC and CC shows similarity with the stress-diatheses model (Monroe & Simons, 1991). This model assumes, as depicted in Figure 1.1 below, that the onset of a disorder is due to the combination of an individual's biological predisposition towards that disorder and the stressful events that lead to the disorder. Although the model is usually used to explain mental disorders like Schizophrenia, anxiety disorders and major depression, it has not been used to explain athletic behaviour, and, as is the case in this research, performance decrements as a consequence of choking.

Figure 1.1: Stress-Diathesis Model



Thus, in the light of the present research it is predicted that athletes develop into TC when their pre-dispositional traits conducive to 'choking under pressure' interact with a stressor, in this case a competition. Athletes are then expected to be more likely to choke and experience a performance decline. However, since this pattern is repeated over a period of time, they are conditioned to experience stress and anxiety at the onset of the stressor, and this association becomes automatic. Athletes develop into CC when their pre-dispositional traits are not conducive to 'choking under pressure'; thereby resulting in success in competitions. This pattern is repeated and they are conditioned to control stress and anxiety at the onset of a competition, thereby strengthening more associations between their behaviour and success experiences. The present research will thus aim to provide evidence towards the idea that TC's and CC's inherent traits could be the starting point of their performance decline/improvement.

1.2.4 Maintenance of TC and CC

So far it has been explained how athletes could develop into TC and CC, however there is a reason why they continue to maintain their status as TC and CC. In other words, why don't CC slip into the TC category and TC improve to become CC? There is of course no evidence for or against this trend suggested, but if TC and CC are indeed developed based on the stress-diathesis model, the chances are that their constant exposure to failure and success respectively would condition them to respond to a stressor in an automatic way conducive to their existing TC/CC status. This could potentially trap them in their respective ruts and they continue to display a similar pattern of behaviour. In other words, TC remain TC because they automatically react negatively to a stressor and CC remain CC because they automatically react positively to a stressor as this association is strengthened by their repetitive exposure to failure or success.

For the major part of the thesis, I will be focusing on the psychological mechanisms that may help to consolidate the status of an athlete to remain either TC or CC. Going by the argument that TC automatically react negatively to a stressor and CC react positively to a stressor; reinforced by their repetitive failure and success, it is safe to assume that TC would be more negatively tuned and CC more positively tuned to the performance-related information they receive from the environment. This brings to one's attention the characteristics of information processing in TC and CC. The consequence before the choking response is that of appraisal of the stressor, the competition and then the experience of either high or low levels of state anxiety. There are of course various other sources of information

that the athletes are consciously processing, such as audience pressure, the presence of competitors, thinking about past performance, and so on, that could potentially intensify the stressor appraisal. In fact, Murray and Janelle (2003) argue that higher dispositional levels of anxiety may not be beneficial in processing information under stress. In other words, there is some emphasis on the way athletes process information under stress. Thus, the basic question is whether an athlete may become and remain either a TC or a CC is largely dependent on the way they process information and move into a behavioural loop that sustains their respective status. To be more specific, it is predicted that TC might have developed a rather maladaptive style of information processing; similarly, CC might have developed a more adaptive cognitive style.

1.3 Information processing models

1.3.1 Information processing in sports

As previously claimed, an athlete's qualification as either TC or CC is largely dependent on the way they process information. A prominent information processing theory was developed by Lutz and Huitt (2003) explaining the model in terms of four basic principles. This theory depicts a process model that implies a sequence while explaining information processing. The first stage is when individuals identify and store new information. So, athletes might receive information about their performance from the most recent competition. The second stage is when this information is processed. Hence, the athlete is encoding and storing this new performance information in their executive system. The third stage is when the new information interacts with the old information. This is perhaps the most important stage as this is when athletes might compare the new performance feedback with what they have achieved in the past. If the performance is better than the past, the appraisal might be more positive, if the performance is worse than the past, the appraisal might be more negative. The final stage is that of genetic predisposition, that is, the way individuals processes information is inherently determined. This stage fits well with the theory of stress-diathesis model (Monroe & Simons, 1991) and the fact that susceptibility to 'choke under pressure' is based on certain inherent traits. Thus if athletes are more prone to 'choke under pressure' it seems likely that the same factors might also contribute to the way athletes process information. In other words, if the inherent traits are maladaptive in nature, athletes might process information in a maladaptive fashion which makes them appraise outcomes negatively. Hence, the athletes are prone to high levels of state anxiety, resulting in a choking response. Similarly, if athletes possess adaptive traits they might process

information in an adaptive manner and appraise outcomes positively, thus being able to cope with the competition stressor, which would increase performance. This model supports the understanding of the significance of information processing in sports performance.

One link that would establish a connection between information processing theories and social psychology theories was suggested by Bless, Fiedler and Strack (2004). They argue that social information is perceived, encoded, transferred to and recalled from memory based on an information processing framework. This framework is then used to explain social judgements, attributions and decisions. In a sports context judgements of performance are predominant amongst competitive athletes. In relation to TC and CC group classifications, TC 'judge' their performance in competitions worse than during training and CC 'judge' their performance better during competitions than training. Thus, it is safe to assume that judgements are a very important consequence of information processing. As a matter of fact when athletes think about past performance they could make judgements of it stating whether it was good or bad and then make attributions about the performance. To strengthen the link between information processing and judgements Bless et al. (2004) introduced a sequence of information processing as a framework for the analysis of social judgments. At first, a stimulus has to be perceived (e.g., the feedback from one's performance). Next, the perceived stimulus is encoded (e.g., the feedback of 10.23 seconds in a 100 metre race is registered). This second step relies heavily on prior experience (e.g., the athlete thinks about past performance or performance during training and makes evaluative comparisons to judge the current performance). The last step is the interpretive stage wherein the information perceived and encoded is compared with the past experience to make a judgement (e.g., the performance is good or bad). However it is argued that errors or biases in judgement could occur due to biases in these different stages of information processing (Plessner, 2005). For example, TC judging their performance as bad could be due to the bias in the final stage, which is of interpretation of the initial performance. This claim is supported by Plessner and Haar (2006) where they suggest that sports performance judgements are as prone to biases as other social judgements. However both theories speak only in terms of judgements from the coach/referee's point of view, that is, judgements made by the referee when they perceive a performance outcome from the athlete. Plessner and Haar (2006) also argue that the social cognitive principles to explain basic social judgements can be extended to sports judgements as well. The present research however claims that these sports judgements need not be affiliated to only a referee's decision but also an athlete's own decision. As indicated earlier

through examples, the athlete constantly evaluates new information and processes it to make judgements of one's performance. Only based on these judgements will the athlete make further attributions. Understandably, an error during the information processing stages could lead to an error in judgement which includes misperception, false memory, poor information integration and also misattribution (Plessner & Haar, 2006).

By taking into account the theories proposed by Bless et al. (2004), Lutz and Huitt (2003) and Plessner and Haar (2006) one can assume that biases in judgements could particularly occur in the stage where the stimuli is interpreted. Thus TC could interpret the stimuli with a negativity bias, thereby making misattributions towards outcomes which is facilitated by their inherent traits that could make them vulnerable to 'choking under pressure'. Similarly, CC would show a bias towards positive stimuli thereby making more goal-congruent judgements of outcomes facilitated by their adaptive inherent traits. Thus, once the information gets processed it is obviously directed towards an outcome and the outcome is in turn based on a goal. Thus, is there a motivational process that interacts with this flow of information?

1.3.2 Information processing and goals

Based on the previously stated theoretical models (Bless et al., 2004; Lutz & Huitt, 2003; Plessner & Haar, 2006) it can be inferred that when information gets processed and construed, the athlete would need to make a decision about future goals for upcoming competitions. However for TC and CC it is likely that their goals might differ. For instance, both TC and CC might set certain goals, however these goals could be of a high or a low standard, depending on the valence of information that is processed and the comparison being made to previous experiences. Thus, depending on the standard, the goal gets immediately translated to actual performance. But the motivation to reach the goal remains unchanged, that is, TC are as motivated to achieve their goal of certain standard and style as are CC. Evidence towards the idea that choosing goals are based on one's performance outcomes comes from Locke and Latham (1990) who suggest that cognitive factors play a role in choosing one's goals and also in explaining the degree of success based on the goals people choose. They explain that goals are based on factors like beliefs about what they can achieve, their recollections of past performance, their beliefs about consequences and so on. The degree of success will depend on knowing whether they are in fact performing in line with the goals, which would provide a useful feedback, and their knowledge of appropriate task strategies. Thus, if athletes were to choose appropriate goals based on their past performance,

TC will have lower standard goals than CC which could immediately translate into actual performance. To extend this argument further, Dweck and Elliot (1983) suggest that the goal an individual is pursuing establishes a framework for interpretation and appropriate responses to events that occur. So, the same event may have an entirely different meaning and impact on TC and CC. So, TC and CC might share the same goals, but they might differ in their performance expectations. For instance, if the general goal is to win the event, a competition situation might be given a different meaning by TC than by CC. This different interpretation could in turn direct the way they frame their performance expectations of future events. In other words, their motivation to perform remains unaltered but in the face of a competition they might alter their current expectations. This is in line with what Baumeister (1984) suggested,namely that those who 'choke under pressure' do not show a decline in motivation. Furthermore, this claim is strengthened by Bandura and Cervone (2000) who described the relation between goals, expectations and performances as a cognitive comparison process. According to them, performance knowledge and a standard of comparison are needed to produce the desired motivational effects, which is that of performance expectations or self-efficacy. Thus, with athletes, one can assume that when they compare their past performance to a standard that they have, that is, their current performance goal, they immediately base their future expectations on these cognitive comparisons.

So far the story unfolds into the idea that since TC are exposed to repetitive failure, their information processing is maladaptive in nature, which is further enhanced due to their pre-existing traits that make them more vulnerable to 'choking under pressure'. CC on the other hand are exposed to repetitive success, and hence the way they process information is adaptive in nature, which is propagated by their inherent traits that make them less vulnerable to 'choking under pressure'. So far it is known that the individual differences between those who are more prone to choke and those who are not concern self-consciousness (Baumeister, 1984; Wang et al., 2004), reinvestment (Masters et al., 1993), trait anxiety (e.g., Baumeister & Showers, 1984; Eysenck, 1992; Giacobbi & Weinberg, 2000; Murray & Janelle, 2003; Wang et al., 2004; Giacobbi & Weinberg, 2000), self-confidence and mental toughness (Hill et al., 2009). However, it is important to identify individual differences trait measures that differentiate between TC and CC based on cognitive constructs, because the general claim is that their judgements of future outcomes is largely dependent on the way they process information which is influenced by inherent traits. Thus, it seems reasonable to identify traits that would coincide with characteristics of information processing.

1.4 Inherent cognitive traits

1.4.1Rumination

The basic theme of information processing involves attending to stimuli and then processing them, which may be termed 'thinking'. One of the most common 'thinking' traits is the disposition to ruminate. Rumination is generally defined by Martin and Tesser (1996) as a recurrent series of thoughts related to a common theme. However, ruminative thought is more likely to be negative than positive (Segerstrom et al., 2003) and is generally repetitive, aversive, and uncontrollable. It is also known that ruminative thoughts generally contain themes associated with failure (Martin & Tesser, 1996). The most common form of ruminative thought studied however is that of depressive rumination, which is defined as recurrent thought focused on the causes, symptoms, and implications of one's distress (Nolen-Hoeksema & Morrow, 1991). The content of ruminative thought in depressed people is typically negative in valence, similar to the automatic thoughts, schema, and negative cognitive styles that have been studied extensively examined by cognitive theorists (e.g., Beck, 1967). This overlap between the two theories makes it plausible to develop more general theories about how rumination might be seen even amongst the non-depressive population, especially since rumination is correlated with many maladaptive cognitive styles such as negative inferential or attributional styles, dysfunctional attitudes, and neuroticism even after controlling for levels of depression (Lam et al., 2003; Nolen-Hoeksema, Parker, & Larson, 1994; Roberts, Gilboa, & Gotlib, 1998). So far it has been established that ruminative thoughts are both maladaptive in nature and are associated with failure, much in line with the predicted model that TC would possess inherent maladaptive traits leading to maladaptive information processing which is propagated due to their constant exposure to failure. The link between ruminative thinking leading to faulty information processing is well researched (Smith & Greenberg, 1981; Ingram & Smith, 1984; Lewinsohn et al., 1985; Pyszczynski & Greenberg, 1987; Nolen-Hoeksema, 1991) wherein it was found that ruminative responses propagate negative thinking by increasing the effects of negative moods on information processing. Lam et al. (2003) further added that in depressive rumination dwelling on depressive symptoms is often associated with biased information processing. Furthermore, it was also found that those who had a tendency to ruminate show greater negative expectancies about the future (Carver et al., 1979; Needles & Abramson, 1990). Thus, all these studies provide a link to the fact that the presence of a 'thinking' trait which is maladaptive in nature could lead to a maladaptive style of information processing and thereby affect future

expectations. However it is still unclear why ruminative thought makes negative emotions and expectancies more accessible.

Several studies have discussed the maladaptive consequences of rumination. For instance it is known that rumination activates an individual's negative schema and memories amongst depressed individuals (Ingram & Smith, 1984; Lam et al, 2003; Nolen-Hoeksema, 1991; Pyszczynski & Greenberg, 1987). Thus one could assume that in the face of repetitive failure, the dominant memories are those of failure and thereby negative in nature; making these memories easily accessible. It has also been suggested that depressed individuals associate negative information with negative memories and then ruminate upon them (see Matt et al., 1992, for a review). Alloy et al. (1999) further added that depressed individuals tend to engage in negatively toned information processing when they encounter stressful events. In the light of the present research, no claims are made about the depressive tendencies of athletes; however, it is hypothesised that some show a tendency to rely on negative or unsuccessful memories and therefore ruminate on them. Thus it is predicted that pre-existing tendencies to ruminate will result in a maladaptive information processing style amongst TC, and that CC's lack of rumination traits would make information processing on their part more adaptive. The final evidence towards the idea that rumination could be an important trait determining 'choking under pressure' comes from research by Lewis and Linder (1997) stating that rumination includes a proliferation of intrusive and negative thoughts (e.g. doubts about one's ability to perform task successfully, concerns regarding the consequences of failure) that divert attention away from task performance by increasing the level of self-focus. This claim is in line with the distraction theory of the 'choking under pressure' hypothesis (Beilock et al., 2004; Beilock & Carr, 2005; Carver & Scheier, 198; Lewis & Linder, 1997; Wine, 1971) which proposes that performance pressure creates a distracting environment for the expert performer thereby diverting the attention away from skill execution to task irrelevant thoughts such as worries about the situation and its consequences. The general idea is that every athlete would experience successes and failures at intermittent times, thus those who have stronger tendencies to think and ruminate, particularly after failure could be most prone to qualify as TC. Thus, it is reasonable to assume that rumination indeed can be an inherent 'thinking' trait that could predict choking differences amongst TC and CC.

1.4.2 Anxiety

It has already been established previously that trait anxiety contributes to predict an individual's vulnerability to 'choking under pressure' (e.g., Baumeister & Showers, 1984; Eysenck et al., 1992; Giacobbi & Weinberg, 2000; Murray & Janelle, 2003; Wang et al., 2004). However could trait anxiety also affect performance in a way that it is linked to maladaptive thinking style? For the purpose of the present research, a connection between anxiety and rumination would thus be essential. As a matter of fact research has shown that a ruminative response style might not only be characteristic for depression but is also related to anxiety (Fresco et al., 2002). Both are repetitive forms of thought that are self-focused (Barlow, 2002; Borkovec, Alcaine, & Behar, 2004; Segerstrom et al., 2003). Both are associated with cognitive inflexibility and difficulty in shifting attention away from negative stimuli (Nolen-Hoeksema & Davis, 1999). Thus, rumination seems to be a cognitive vulnerability factor for both depression and anxiety.

Another angle that could help create the association between anxiety and 'thinking' comes from the research by Beck et al. (1997) who propose an information processing model of anxiety. The model comprises the following stages (a) the initial registration of a threat stimulus; (b) the activation of a primary threat mode; and (c) the secondary activation of more elaborative and reflective modes of thinking. So far it has thus been established that both trait anxiety and rumination can be considered as 'inherent thinking' traits that could predict differences in choking tendencies amongst TC and CC through the process of either maladaptive or adaptive information processing. However, it is not enough to identify traits that are only related to 'thinking'. Sports performance in general requires some amount of discipline and motivation. It is thus important to identify a trait that would comprise characteristics of both 'cognition' and 'motivation'. One such trait is perfectionism which is characterized by striving for flawlessness and setting excessively high standards for performance, accompanied by tendencies toward overly critical evaluation of one's behaviour (Flett & Hewitt, 2005). In fact, many researchers regard perfectionism as a psychological characteristic that makes Olympic champions (Gould, Dieffenbach,Moffett, 2002), whereas others regard perfectionism as a maladaptive characteristic that undermines, rather than helps, athletic performance (Flett & Hewitt, 2005). This bidirectional nature of perfectionism is an important indicator of how athletes might maintain similar level of motivation to perform, however the difference in actual performance lies in the way they make interpretations of previous performance and thereby react negatively to not reaching one's perfectionistic standards. For instance, both TC and CC could exhibit equal levels of perfectionism that

motivates them to reach their goal, however when TC are unable to reach their goal due to their maladaptive information processing, they might react negatively to mistakes and standards. In fact, it is known that motivation is not affected amongst 'chokers' (Baumeister & Showers, 1984) and that setting goals and having standards is an important aspect of an individual's performance (Locke & Latham, 1990). It is thus very crucial to indicate that perfectionism as a trait is perhaps the only one that explains similar motivational levels amongst TC and CC but different appraisals based on the extent to which the athletes possess the maladaptive trait.

1.4.3 Perfectionism

Perfectionism in athletes has been shown to be related to characteristics such as competitive anxiety that may undermine performance (Flett & Hewitt, 2005). However, perfectionism is said to be multidimensional. The negative dimension of perfectionism subsumes those facets that relate to concern over mistakes, doubts about actions and negative reactions to mistakes. This dimension has been associated with anxiety (Beiling et al., 2004). The positive dimension subsumes those facets of perfectionism that relate to perfectionistic strivings such as having high personal standards and a self-oriented striving for excellence. The distinction between the positive and negative facets of perfectionism may also prove crucial when investigating perfectionism and anxiety in competitive athletes. Frost and Henderson (1991) investigated perfectionism and competitive anxiety wherein overall perfectionism showed a positive correlation with competitive anxiety.

An association between perfectionism and cognitive rumination about negative events or experiences should be expected to some extent since both constructs highlight the experience of cognitive perseveration. It is known that rumination has many correlates and consequences that are consistent with the empirical literature on maladaptive perfectionism (e.g., Blankstein and Dunkley, 2002). According to Hewitt and Genest (1990), the ideal self is likely to encode and process information indicating that perfection has not been obtained. When an individual experiences a negative event, the attention given to this experience is emotion-focused. S/he might also experience cognitive intrusions based on the negative life event. These intrusions would serve as prominent cues that underline the fact that perfection has not been attained and this could facilitate the emergence of perfectionistic thoughts, which could be maladaptive in nature. So in the sports domain, an athlete would have an ideal goal to obtain, and when their performance does not reach those standards, the associated experience is interpreted with negative thoughts and emotions, as well as worry, thereby

resulting in intrusive thoughts which may be seen as a form of ruminative behaviour. Thus, when these processes are constantly in use in the estimation of performance outcomes, athletes may become vulnerable to choking. Instead of facilitating athletic development and elite performance (Anshel & Eom, Gould, 2002; Dieffenbach, & Moffett, 2003, as cited in Hill et al., 2009) these processes emphasize the self-defeating and incapacitating trends of cognition and emotion and may weaken performance (Hill et al, 2009). So finally three basic thinking traits have been identified – rumination, trait anxiety and perfectionism that provide an association between the adaptive/maladaptive domain, thinking and motivation especially regarding performance. The claim of the theoretical model states that these traits will guide the information processing style in an adaptive or a maladaptive manner depending on the levels of these traits. An important point to note is that theories of distraction (Beilock et al., 2004; Beilock & Carr, 2005; Carver & Scheier, 198; Lewis & Linder, 1997; Wine, 1971) and explicit monitoring (Baumeister, 1984; Beilock, Bertenthal, McCoy, & Carr, 2004; Beilock & Carr, 2001; Kimble & Perlmuter, 1970; Langer & Imber, 1979; Masters, 1992) both explain the mechanisms of choking under the aspect of 'too much attention'. In case of the former, there is *too much attention* given to task irrelevant stimuli and in the case of latter, there is *too much attention* given to one's own automatic motor movements. In other words one could assume that individuals pay selective attention to a large extent to a particular aspect of performance. When an individual allocates extra attention to stimuli like audience shouting , presence of the competitor, worrying thoughts about upcoming performance, coach's reminder about a particular technique learnt during training or friends casually betting who would 'win' the race and so on , it can be inferred that they 'think' more about these stimuli. Thus, the next question should be, is there an inherent trait that could determine the general need to think? Would athletes choke especially if they think a lot?

1.4.4 Need for cognition

Early social psychology theories elaborate on the view that people actively process information. Some theories are based on the notion that people are always engaged in active information search and processing as they steer their course through their environment (Fishbein & Ajzen, 1975; Whitely & Frieze, 1985, as cited in Cacioppo et al., 1996). But when the information is being processed, do people wish to think more effortfully about material or do they prefer to remain at a more superficial level of thinking? The idea of individual differences in a level of desire to engage in cognitive activities was first discussed by Cacioppo and Petty (1982). According to them, both individuals who are low and high in

need for cognition always make sense of their world, but they tend to abstract meaning, assume various positions and solve problems differently. Individuals high in need for cognition are thought to be more likely to use effort in information acquisition, reasoning, and problem solving to cope with a wide range of predicaments in their world. Individuals who are high in need for cognition are also characterized generally by active, exploring minds and, through their senses and intellect, reach and draw out information from their environment. So with elite athletes, the natural tendency to draw information from their external or internal environment is perhaps greater amongst those who are high in need for cognition than those who are low in need for cognition. In a very common sporting situation, where one must be able to block out information, to focus on the task at hand, those who are high on this construct are perhaps less able to do so, and hence the information gets processed, 'thinking' gets activated and performance slumps can be seen. It has been argued that individuals high in need for cognition have a lesser tendency to ignore, avoid, or distort new information (Venkataraman et al., 1990). This claim is based on Cox's (1967) theory on an individual's characteristic way of dealing with uncertainty. According to him, 'simplifiers' are those who ignore new information, deny it, distort it, or in other ways defend themselves against its impact, thereby avoiding ambiguity and cognitive stress. Venkataraman et al. (1990) thus explain that those with high need for cognition would differ from 'simplifiers'.

It has also been found that need for cognition is positively related to an individual's tendency to formulate complex attributions (Fletcher et al., 1986, as cited in Cacioppo et al., 1996); or to devote attention exclusively to an ongoing cognitive task (Osberg, 1987, as cited in Cacioppo et al., 1996). According to the latter claim, devoting attention to an ongoing task is related to high levels of private self-consciousness. In other words, those with high need for cognition are absorbed in the cognitive task and also show tendencies to introspect and pay attention to inner feelings, which is otherwise characteristic of private self-consciousness. In fact, research has shown that those who are privately self-conscious are more susceptible to 'choke under pressure' (Baumeister, 1984). It was also found that high need for cognition was related to greater information processing activity (Cacioppo & Petty, 1982), greater desire for control (Thompson, Chaiken, & Hazlewood, 1993, as cited in Cacioppo et al., 1996) and greater need to evaluate (Cacioppo et al., 1996). All these studies point towards the general direction that need for cognition is indeed related to information processing, and that the presence or absence of this trait could influence the way athletes perceive stimuli, make attributions, or make judgements about future outcomes, finally resulting in an increase or decrease in performance.

So far the structure of the predicted model is that athletes possess certain inherent 'thinking' traits like rumination, anxiety, perfectionism and need for cognition. Lower levels of these traits indicate an adaptive feature as it would be seen amongst CC and higher levels indicate a maladaptive feature as in the case of TC. These traits will then guide the direction of information processing based on stimuli athletes encounter, parallel to their existing adaptive or maladaptive features. TC would thus show a maladaptive style of information processing due to some errors during the early stages of processing, and CC would show an adaptive style of information processing by avoiding errors or biases. As both groups of athletes are aiming towards a similar goal, these distinctions in information processing styles would lead them to appraise the competition situation differently and thereby alter their expectations. TC would thus see the competition situation as a huge stressor and lower their expectations, whereas CC would not appraise the competition as a huge stressor and would increase their expectations. Finally, in the face of the competition TC would exhibit greater levels of state anxiety and 'choke under pressure', whereas CC would exhibit appropriate levels of arousal, thereby improving their performance. Whilst the details of traits and the direction of expectations and performance have been determined, it is still unclear as to what would constitute an adaptive and a maladaptive information processing style.

1.5 The bidirectional nature of information processing

1.5.1 The maladaptive information processing style

It was explained earlier that the development of TC and CC unfolds primarily on the basis of the stress-diathesis model (Monroe & Simons, 1991), that is, inherent traits that are responsible for performance decline interact with actual stress in the competition, thereby resulting in 'choking under pressure'. When this pattern of behaviour is unfortunately repeated over a period of time, the 'failure' gets reinforced and a certain appraisal pattern of the competition situation as a potential stressor becomes automatic. In other words, consistent and repetitive failure drives the maintenance of TC and CC. It is argued here that an athlete will tend to become (and remain) a TC or a CC as a consequence of the way they process information, much in line with the pre-existing traits of rumination, anxiety, perfectionism and need for cognition that are adaptive or maladaptive in nature. It is reasonable to assume that the associations with failure and the tendency to ruminate would result in a proliferation in negative affect amongst TC. In fact, research has shown that a negative consequence of rumination includes maintenance of negative affect (Martin & Tesser, 1996; Martin, Tesser, & McIntosh, 1993; Pyszczynski & Greenberg, 1987). Studies have also shown that

ruminative responses propagate negative thinking by increasing the effects of negative moods on information processing (Smith & Greenberg, 1981; Ingram & Smith, 1984; Lewinsohn et al., 1985; Pyszczynski & Greenberg, 1987; Nolen-Hoeksema, 1991). Thus one of the basic aspects of maladaptive information processing could be related to a negativity bias amongst TC. Based on this it can be predicted that TC think more in the development stage and continue to think more but also think bad in the maintenance stage.

In general there is a strong claim that there is greater power of bad events, bad emotions, and bad feedback over good ones (Rosin & Royzman, 2001). It is known that events that are negatively valenced, for example, losing money, receiving criticism or even poor performance will have a greater impact on an individual than those events that are positively valenced, for example, winning money, receiving praise or an outstanding performance (for a review, see Baumeister et al., 2001). Similarly it is known that undesirable events have more pervasive effects on mood, self-esteem, anxiety, causal uncertainty and perceived control over the environment than desirable events (Nezlek & Gable, 2001). This could be the case for TC, at least in terms of their sports performance which usually plays a pivotal role in their day to day functioning. TC experience repeated exposure to failure in competitions, which is interpreted as a series of bad events. Assuming they also have higher levels of maladaptive traits like rumination, anxiety and perfectionism, it appears likely that they might become more sensitive to negative events. Thus, one aspect of maladaptive information processing could be the fact that TC would show greater sensitivity to negative information. But the question is what aspect of the processing reinforces them to maintain this state of negativity. Surely just repetitive exposure to failure could not elicit such a bias.

Memory for events or emotions could possibly determine the way one processes information. It was in fact seen that there was superior recall for unfavourable events as compared to favourable events (e.g., Bless et al., 1992; Dreben, Fiske & Hastie, 1979; Riegler & Winton, 1996). Similarly Finkenauer and Rimé (1998) found that events involving bad emotions remain more salient in people's minds than events involving good emotions. This is a good explanation for TC's style of processing. Their exposure to repetitive failure would obviously elicit negative emotions such as sadness, frustration or disappointment, and these probably become relatively more salient than positive emotions. Furthermore, it is known that bad moods elicit more thorough and careful information processing than good moods (e.g., Clore, Schwarz, & Conway, 1994; Schwarz, 1990). This is again in line with the idea that TC not only process information with a negativity bias but also do so thoroughly. In

other words, one could say that TC think more and they are also sensitive to negative information.

1.5.2 The adaptive information processing style

In a complete bidirectional manner, it can be predicted that if TC show a negativity bias, CC would show a positivity bias. This is again in line with the general claim that CC developed into being so because of their repetitive exposure to success and them escaping the effects of stress-diathesis. If CC possess lower levels of traits like rumination, anxiety, perfectionism and need for cognition, their information processing will also be conducive to the levels of the traits they possess. In other words, one of the features of an adaptive information processing style could be sensitivity to positive stimuli. Thus CC would think less and show a positivity bias. Compelling evidence leading to the above mentioned argument is by Skowronski and Carlston (1987) where they explain that positivity bias especially occurs if the information refers to competence-related qualities of the target. They further suggest that positive behaviours are more diagnostic than negative ones predominantly in the competence domain. This can be a very good reason as to why CC could be more sensitive to positive stimuli, first of all they are in the competence domain where they succeed, and hence their competence is reinforced. However for TC, although they are also competent, their lack of experience of success makes them less in tune with feeling competent in their domain so they are not necessarily sensitive to positive stimuli. This leads to the question, how is information processed if one has a positivity bias? Studies showed that information processing is more thorough and elaborate when negativity biases are present (e.g., Clore, Schwarz, & Conway, 1994; Schwarz, 1990). Thus, would the processing be similar or differ for those who are more positively tuned?

Evidence suggests that those who are negatively tuned process more information carefully and those who are positively tuned tend to cluster information and process it superficially (Bless, Hamilton & Mackie, 1992). Fiske and Taylor (1991) also explained that those individuals with high motivation and with pragmatic concerns process only relevant information more thoroughly. They prioritize their cognitive resources on what is important. This is a very important claim especially in the distinction between the processing styles of TC and CC. For CC it can thus be predicted that they would process predominantly goal-congruent information, and TC would not do the same since in general they would ‘think’ more, especially about failures. Evidence from Lavie et al. (2004) suggests that attentional focussing on goal-relevant stimuli can be explained by the load theory of attention.

According to these authors, goal-directed behaviour requires focusing attention on goal-relevant stimuli while ignoring irrelevant distracters. The theory states that there are two mechanisms of selective attention. The first is a perceptual selection mechanism that allows for excluding irrelevant distracter stimuli from perception under situations of high perceptual load (see Lavie, 1995; Lavie & Tsal, 1994). The second mechanism is a more active mechanism of attentional control that is needed for rejecting irrelevant distracters even when these are perceived. This form of control depends on higher cognitive functions, such as working memory, that are required for actively maintaining current processing priorities to ensure that low-priority stimuli do not gain control of behaviour. This theory seems to fit with the model with athletes because it is assumed that athletes initially perceive information either from the environment or by thinking about their own past experiences. So if TC perceive all information without rejecting irrelevant ones, they could in fact experience high perceptual load. Thus it can be predicted that CC would pay attention to only goal-congruent information by not paying attention to other stimuli in the perceptual field and by also exercising great attentional control to reject irrelevant distractors. This prediction is in line with the distraction theory of choking (Beilock et al., 2004; Beilock & Carr, 2005; Carver & Scheier, 1987; Lewis & Linder, 1997; Wine, 1971) wherein non-chokers do not divert their attention to irrelevant stimuli. So far it has been established that inherent traits will moderate the direction of information processing in an adaptive or a maladaptive style, but how does this happen?

1.5.3 Information processing styles and inherent traits

Compelling evidence that addresses this issue is presented by Cacioppo and colleagues where they have incorporated the negativity bias into a more general model of evaluative space in which positive and negative evaluative processes are assumed to result from the operation of separable positive and negative motivational substrates, respectively (Cacioppo & Berntson, 1994; Cacioppo, Gardner, & Berntson. 1997). These motivational systems influence information processing, that is, biases towards particular kind of information. Thus the negative motivation system is characterized by a negativity bias. This refers to a tendency for the negative motivational system to respond more intensely than the positive motivational system to comparable amounts of activation. Thus one can assume that TC are more engaged in a negative motivational system while CC are more engaged in a positive motivational system. The prediction made is that by having certain motivational systems, TC and CC would process information they receive in the respective direction. This would mean that

negativity or positivity bias would manifest at the initial evaluative categorization stage. Research has indicated that the model of evaluative space (Cacioppo & Berntson, 1994; Cacioppo, Gardner, & Berntson, 1997; Ito et al., 1998) views the negativity bias as an inherent characteristic of the underlying motivational substrate. It is important to clarify that while the motivational theories mentioned here are more related to processes involved in information processing and could differ between TC and CC, the general motivation to perform at competitions remains the same for TC and CC. It can thus be assumed that TC could possess an inherent negatively tuned motivational substrate, accentuated by the presence of maladaptive traits, and when they encounter stimuli, they are more sensitive to negative stimuli than positive stimuli. Similarly, CC could have an inherent positively tuned motivational substrate, due to the presence of more adaptive traits, and when they encounter some stimuli there is an increase in sensitivity to positive stimuli. This further adds to the basic proposition that TC and CC differ in the way they perceive stimuli, process the information and then respond appropriately, in that TC are more negatively tuned and CC are more positively tuned.

So far we know that TC would engage in a maladaptive information processing style and CC would engage in an adaptive information processing style. But what would they do once they process, for instance, information regarding feedback from the coach? Intuitively the next step would be to understand this information and make inferences about it before perceiving outcomes or making judgements. It is again important to note that TC / CC differences arise because of biases in the information processing stage that is related to the interpretive processes. Thus, based on the interpretations they make they would try to find a cause that provides them with an answer to the question as to why certain events happened. Evidence suggests that negative events cause people to engage in greater search for meaning than positive events (e.g., Baumeister, 1991; Frankl, 1963; Taylor, 1983). A similar conclusion emerged from a review of 17 studies on causal attribution by Weiner (1985) saying that spontaneous attributional activity was defined as people's efforts to explain what is happening to them and to identify a cause for what happened. In all studies spontaneous attributional activity was greater for failures than for successes. Thus the question is how would TC and CC make causal attributions of the information they process?

1.5.4 Causal attribution in sports

It has already been established that making attributions is particularly frequent when encountered with a negative event; hence it is not unrealistic to assume that TC and CC

would have specific attribution styles to explain their successes and failures. Studies have shown that explanatory styles reflect the way people usually explain bad or good events (e.g. Peterson, 2000; Peterson & Park, 1998; Peterson & Steen, 2002; Peterson & Vaidya, 2001). People who usually explain bad events by causes that are stable in time (‘‘it’s going to last forever’’), global in effect (‘‘it’s going to challenge everything that I do’’), and internal (‘‘it’s me’’) and who explain good events with unstable, specific, and external causes are said to have a pessimistic explanatory style. People with the opposite attributional pattern, that is make stable, global and internal attributions for good events and make unstable, specific and external attributions for bad events are said to have an optimistic explanatory style. It has been shown that those athletes with a negative explanatory style gave more internal and recurring causes for explaining failure (Prapaevessis & Carron, 1988). Similarly Seligman, Nolen-Hoeksema, Thornton, and Thornton (1990) found that after a failure feedback performance was lowered for pessimistic athletes but not for optimistic athletes. In fact, several studies found that a pessimistic explanatory style correlated positively with anxiety (e.g. Helton et al., 2000; Mineka et al., 1995). Furthermore Martin-Krumm et al. (2003) add that those with an optimistic explanatory style were less anxious, more confident, and performed better than pessimistic participants. Thus one could assume that TC might have a pessimistic explanatory style, and CC might have an optimistic explanatory style.

So far it has been argued that maladaptive information processing for TC would lead to more pessimistic attributions and an adaptive explanatory style for CC would lead to more optimistic attributions. The next step in the model would be to predict how these two groups perceive outcomes. According to Plessner and Haar (2006) the biases that people make during information processing is what leads to skewed judgements. In this case, we interpret errors as something leading to the maladaptive style for TC. Only after an athlete perceives the outcome would they alter expectations and thereby face the potential competition situation. Alteration of expectations need not only be based on prior performance in competition but could also be due to thinking about past performance. Thus the apparent competition situation and the anticipated competition situation could both be influenced by the alteration of expectations. Research has in fact shown that for a successful performance athletes gave more ‘controllable’ causal attributions than an unsuccessful performance (Santamaria & Furst, 1994). Similarly, the feeling of a lack of control over outcomes is characteristic of a pessimistic profile, and can lead to an increase in perceived threat and in turn the individual’s state anxiety. This will in turn alter the availability of certain cognitive and physiological resources to performers (e.g. Parfitt & Hardy, 1987). When failure is

attributed to uncontrollable causes, performance is shown to be less effective (Dweck, 1975). Alloy and Abramson (1979) in fact argue that perceived uncontrollability is an important determinant of learned helplessness. Thus for TC, would prior exposure to repetitive failure result in judgements of perceived uncontrollability as a result of maladaptive information processing and could it be therefore seen as a product of learned helplessness? The story is slightly different for CC. Santamaria and Furst (1994) argue that athletes gave more personally-controlled attributions for successful performances. CC by definition experience more successes in competitions, thus it is sufficient to assume they would make judgements of high perceived control over outcomes. Hence for CC, would prior exposure to repetitive success result in judgements of illusion of control (Langer, 1975) as a result of adaptive information processing, which thereby could be seen as a product of 'inversed' learned helplessness?

1.6 Predicted models for TC and CC

1.6.1 The vicious cycle for TC – Learned Helplessness

According to the original theory of learned helplessness (Abramson et al., 1978; Maier & Seligman, 1976; Seligman, 1975), when organisms are exposed to uncontrollable events, subsequent behaviour is disrupted. The organism then learns that the outcomes are independent of its responses, in other words, the outcomes are uncontrollable. Hence, the organism forms an expectation that future outcomes will also be the same. Another line of thought to explain the effect of learned helplessness is that of repeated failure rather than noncontingency which produces performance deficits in subsequent tasks (e.g., Boyd, 1982; Coyne, Metalsky, & Lavelle, 1980; Frankel & Snyder, 1978; Kuhl, 1984, as cited in Kofta & Sedek, 1989). It has been documented that failure can lead to performance deficits on subsequent tasks (eg., Hiroto & Selgiman, 1975; Mikulincer, 1986, 1989a; Stiensmeier-Pelster & Schurmann, 1990, as cited in Witkowski & Stiensmeier-Pelster, 1998). Thus there is some evidence linking the basic idea that repetitive failure can induce learned helplessness effects. But can this effect be specifically seen in sports?

Dweck (1980) demonstrated that learned helplessness does exist in sport. She emphasized the importance of understanding the mechanisms involved by using examples from various famous athletes' careers. Unfortunately there have been very few studies that have directly examined learned helplessness in sports (Prapavessis & Carron, 1988; Seligman *et al.,* 1990). Prapavessis and Carron (1988) argue that attributional style differences exist between athletes who demonstrate maladaptive achievement patterns associated with learned

helplessness versus those who do not. Seligman *et al.* (1990) induced failure, giving false feedback in terms of swimming times to swimmers who were characterized by optimistic versus pessimistic attributional styles. Subsequently, optimistic swimmers improved or maintained their performances, whereas pessimistic swimmers became helpless and their performances deteriorated. Both these studies point in the direction of pre-existing attributional styles. The latter study is especially useful because it characterizes the model that is predicted for TC and CC; in that TC make more pessimistic attributions and CC make more optimistic attributions. Biddle et al. (2001) and Hardy, Jones, and Gould (1996) suggest that controllability may be an important predictor of expectations which is directly linked to performance. This supports the basic idea that attributions may lead to particular outcome perceptions and finally framing expectations that influence performance. Thus it can be predicted that TC will predict future outcomes with perceived uncontrollability leading to lowered expectations and experiencing failure in competitions. Hence, they may find themselves in a learned helplessness loop.

1.6.2 The positive feedback loop for CC- Inversed learned helplessness

A reliable and intriguing finding in the field on subjective judgements of control is that in certain situations, people exhibit an illusion of control (Langer, 1975) and act as if objectively uncontrollable events were, in fact, controllable. For instance, in a broad range of studies, Langer (1975) demonstrated that when elements typically associated with skill-relevant situations (e.g., practice, competition, choice, and so on) are introduced into situations in which events are objectively uncontrollable, people's expectancies of personal success are inappropriately higher than the objective probabilities would warrant. For example, gamblers playing the slot machines in Las Vegas pull the handles with the intention of getting a winning combination. Now when this handle pulling is followed by a desirable outcome, the feeling of personal success is heightened. This in turn sets the stage for gamblers to think they have more control over the situation than is warranted. Langer (1975) further adds that performance on a chance task, on the other hand, results in a variable pattern of successes and failures. Thus, the sequence of outcomes may help an individual to infer the overall controllability of the environment, signalling whether or not a task is controllable and whether or not one has that control. When one expects or wants to see oneself as a causal agent and begins to more consistently succeed on a task, one will make internal attributions (Langer, 1975). Langer (1975) also suggested that the illusion of control is the inverse of learned helplessness. This is close to what D'Agostino & Pitman (1982) argue about how

participants, when exposed to an uncontrollable situation, appeared to engage in intense efforts to solve subsequent problems. This is otherwise known as the control motivation theory (Pittman, 1993; Pittman & D'Agostino, 1989). They argue that an exposure to uncontrollable situations heightens the basic need for control. Perhaps one theory answers the gaps of the other, but the more important aspect of study is who is susceptible to experience and illusion of control versus experiencing uncontrollability? Alloy and Abramson (1982) showed that nondepressed students exposed to uncontrollable events in the laboratory create an illusion of control effect. However it is important to note the possibility that individuals with chronic, generalized expectations of no control may fail to succumb to the illusion of control.

This idea could have a great implication in a sport situation. Although the competing situation is not completely ambiguous or due to chance, there are several factors like weather, warm up, time of the event, track order, general fatigue, mental state and so on, that could contribute to success or failure in the event regardless how good or bad the training has been. The athletes would possibly infer the overall controllability of the outcome based on the competition outcomes. In other words, those with a 'failed' outcome in competitions could experience uncontrollability for future outcomes and those with a 'successful' outcome could experience an illusion of control. Thus it can be expected that CC will predict future outcomes with an illusion of control leading to greater expectations and experiencing success in competitions.

1.7 Model Summary

The present research aimed to explain the mechanisms as to why athletes would develop into TC or CC, and what factors would stabilise this development such that an athlete would remain in their respective category with regard to 'choking under pressure'. The model predicted for both groups describes a process that leads to performance decline or improvement, and explains the style of information processing which would reinforce the negative, or positive, performance loops for TC and CC, respectively (see Figure 1.2 & Figure 1.3). It is assumed that both TC and CC possess certain 'thinking' traits like rumination, anxiety, perfectionism and need for cognition. TC however have higher levels of these traits, thereby making them more maladaptive in cognitive style, whereas CC have lower levels of these traits, thereby making them more adaptive in cognitive style. Athletes then encounter similar situations and scenarios, such as the presence of an audience in the stadium, presence of competitors, general track and field conditions, particular coach's input,

feedback from previous performance during the day, or self-generated stimuli such as thinking about past experiences, expectations about future events, worrying about the next event, and so on. TC and CC will perceive these stimuli differently, in that TC would be an "information sponge", that is, they would tend to take in and think about all information they receive. CC on the other hand would selectively pay attention to goal-congruent information. This is the first step in distinguishing between maladaptive and adaptive information processing styles. TC will continue to engage in a maladaptive information processing style by thinking more and showing more negativity bias. CC will continue to engage in an adaptive information processing style thinking less and showing more positivity bias. Finally when they reach the stage of making inferences about the information they have been processing, TC would make more pessimistic attributions while CC would make more optimistic attributions. Once athletes make sense of why certain events took place, they would have to make judgements about future outcomes as well. It is predicted that TC with a pessimistic explanatory style would predict outcomes under the aspect of a lack of control, whereas CC would do the same with an illusion of control, thus applying an optimistic explanatory style. Finally, since TC perceive outcomes with a lack control, they will also lower their expectations, and CC with a sense of heightened control will increase their expectations. The athletes finally face the competition situation that poses as a potential stressor. The initial stress-diathesis mechanism in TC becomes automatic, in that, they immediately experience heightened state anxiety due to repetitive associations with stress and inherent traits, resulting in a choke response. CC on the other hand face the competition situation as a challenge rather than a threat and escape the choke response. The 'failure' information gets fed back to TC and the whole vicious process starts again. The 'success' information is reinforced for CC and the positive feedback loop commences again. Thus, to summarise, it is predicted that TC remain in a *learned helplessness* loop while CC remain in an *inversed learned helplessness* loop.

Figure 1.2: Learned helplessness loop for TC

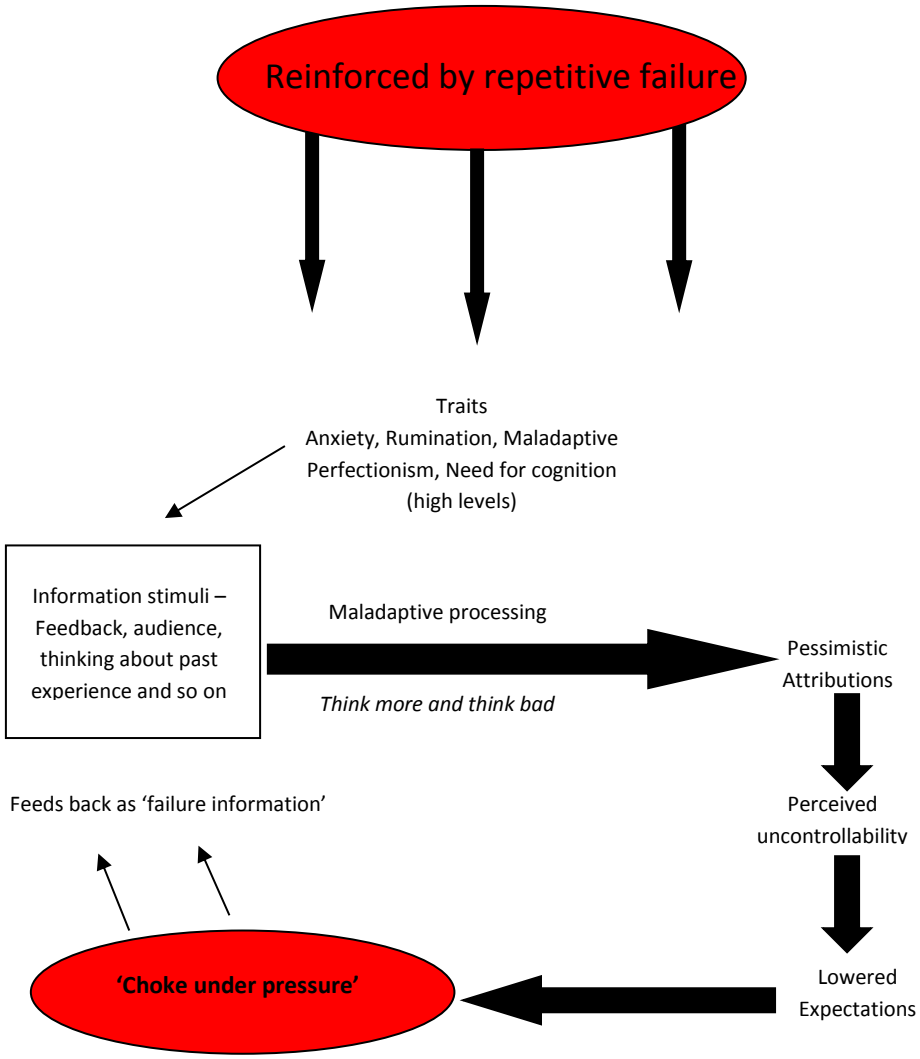
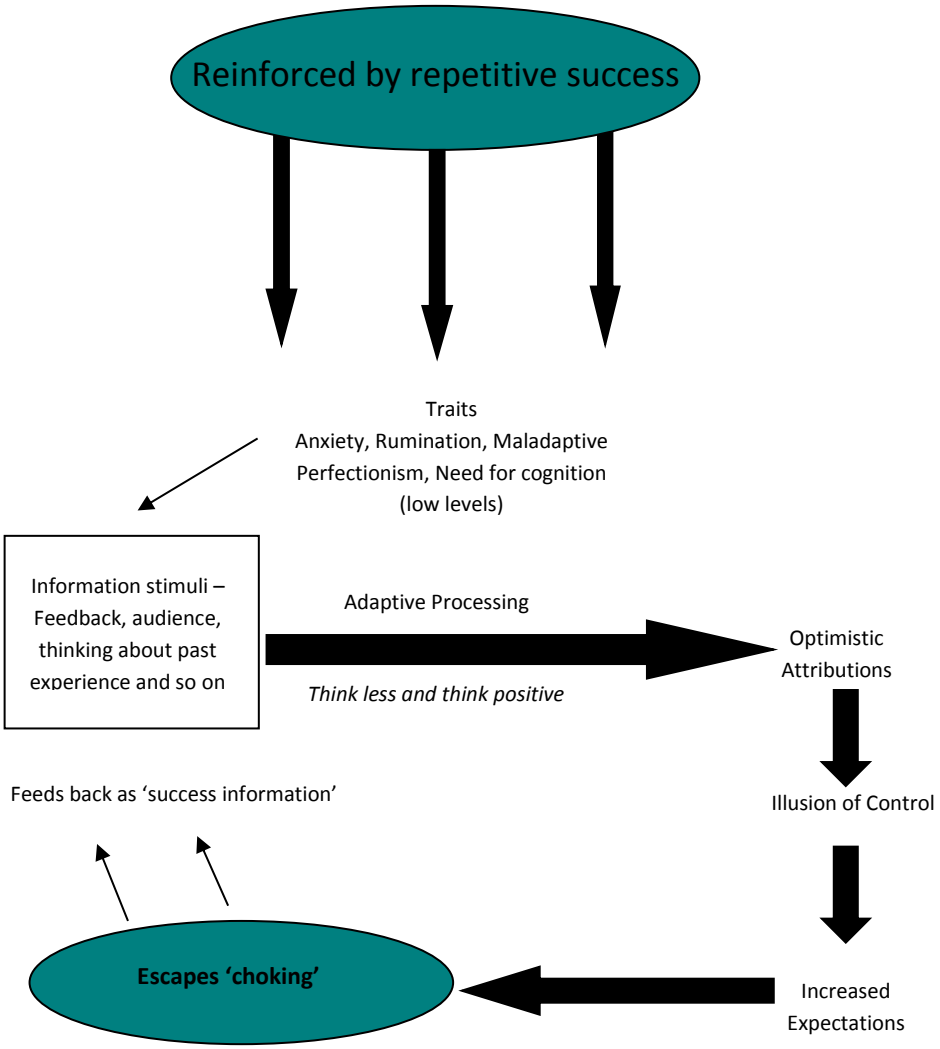


Figure 1.3: Inversed learned helplessness loop for CC



1.8 Overview

The current chapter presented an overview of the existing social cognitive theories that could be incorporated to explain the development and maintenance of TC and CC with respect to 'choking under pressure'. Chapter 2 presents studies 1a and 1b that explore the basic idea that TC's performance is in fact negatively affected by information, whilst CC's performance remains unaffected or might be positively affected by information. This study was conducted to bring to the foreground the notion that information processing styles could differ between TC and CC using objective performance measures. Chapter 3 presents studies 2a and 2b that explore the differences between TC and CC as a result of the inherent thinking traits discussed earlier – rumination, anxiety, perfectionism and need for cognition. This chapter sets the stage for the first part of the predicted model saying that the TC show greater levels of thinking traits and CC show lower levels of these thinking traits, thereby propagating appropriate information processing styles. Chapter 4 presents studies 3a and 3b that aim to measure perceived controllability amongst TC, CC and non-athletes, to test the prediction that TC would show perceived uncontrollability whereas CC would show an illusion of control, thereby examining support for learned helplessness and inversed learned helplessness models. Chapter 5 presents study 4 that elaborates the specificity of the direction of information processing with TC showing a negativity bias and CC showing a positivity bias. This chapter also explores various causal dimensional differences between TC and CC based on the idea that TC make more pessimistic attributions and CC make more optimistic attributions. The final experimental Chapter 6 presents study 5 wherein a part of the predicted model was tested amongst non-athletes to see if the thinking traits moderated the effects of perceived controllability when exposed to either repetitive success or failure. The final chapter discusses the results obtained in general theoretical claims and also in terms of interventions, future directions and limitations of the present research.

Chapter 2: Are 'chokers' 'thinkers'? Evidence towards information processing differences in predicting performance outcomes.

2.1 Introduction

Typically, athletes receive some kind of information from various sources. Understandably, athletes are often exposed to various kinds of information from the environment, they can be external (weather, track and field conditions, location), physiological (muscle tightness, general fatigue), social (audience presence, coach's feedback, fellow competitors) and psychological (previous competition experiences, existing anxiety, thinking about one's training). Whatever the source is, it is still some kind of information that the mind receives and perceives. Thus it can be concluded that all athletes process information initially, however the outcome of information processing specific for TC and CC depends on the style and content biases towards particular kinds of information. As previously suggested in Chapter 1, since TC are exposed to repetitive failure and CC are exposed to repetitive success, TC's choking tendencies could be observed due to a maladaptive information processing style compared to CC's adaptive cognitive style. However, the first step is to test whether the groups are in fact affected by the presence or absence of information before predicting the processing differences. Thus, the following two studies were designed to investigate the role of information provided to the athletes, in the form of primes, and to see whether manipulating such information would have an effect on their performance, with regards to differences between TC and CC.

2.2 Information processing model and sports

One of the most prominent cognitive theories in sport is that of the information processing model described by Lutz and Huitt (2003). This model describes the encoding, storage and retrieval of new information and then the interaction between the new and existing information by making appropriate interpretations. He further adds that the way one processes new information may to some extent genetically determined. Thus, for example, when athletes detect feedback about their performance, they start comparing this feedback to their past performance and make relevant interpretations. So, assuming the coach said "your timing was 10.67 seconds" for a 100m run, the athlete would then interpret this information, compare it to the previous time of 10.48 seconds and draw conclusions. The conclusion could either be that the time was good or bad. After the information has been processed and a meaning has been attached to it, the athletes will perform again. If the information was

inferred as something ‘negative’ s/he would probably see it as an ‘obstacle’ and if the information was inferred as something ‘positive’ s/he would probably see it as a ‘facilitator’. Based on such associations, the final output, which is performance, is executed and the outcome again serves as information that is waiting to be processed. This thus creates a feedback loop. Thus, it can be assumed that, if there are evaluative differences to the information received, there could be differences in final performance outcome as well.

2.3 Translating information processing to actual performance

So far it stands that information processing could affect performance outcomes, however what could drive the differences in information processing? In other words, why would TC show maladaptive information processing while CC exhibit an adaptive style? This can be answered by a theory suggested by Plessner and Haar (2006). According to them, when a stimulus is perceived, one gives meaning to it (based on prior knowledge and association). This is then stored in the episodic memory and is then combined with knowledge in order to generate an appropriate judgement. Understandably, an error during any of these stages could lead to an error in judgement which includes misperception, false memory, poor information integration and also misattribution. However, the judgement they speak of is in terms of the referee’s judgement, but if this is a basic information processing theory, it could be generalized to judgements made by athletes as well. These judgements could thus include predicting future outcomes, setting goals and expectations. Goals, which are very important in information processing (Locke & Latham, 1990), could either be of high or low standard; it could be specific or general all depending on the valence of information that is processed and the comparison being made to previous experiences. For example, if athletes compare their current performance to a failed previous experience, then the goal could be of a lower standard, than when the previous experience was successful. Depending on the standard, the goal could get immediately translated to actual performance, which in turn proves as a feedback for some more information processing resulting in yet another feedback loop of how goals could serve as a source of information for both TC and CC. However, it is also possible that TC and CC could have similar goals when they start but as the competition looms closer, their expectations might be altered. TC might lower the expectations and CC might increase their expectations.

2.4 The relationship between goals, expectancies and performance

One of the most prominent theories explaining the relation between goals, expectancies and performance was Bandura's (1982) concept of self-efficacy which is defined as one's judgement of "how well one can execute courses of action required to deal with prospective situations" (Bandura, 1982, p.122). Within the sports context Weiss, Weise and Klint (1989) found a correlation between self-efficacy and competitive performance in high level sports. That is, the better performance accomplishments during competition, the higher would be one's self-efficacy. But how does this relate to the goals they create? A three-way relationship has been described wherein expectation affects the level of personal goal chosen, but is also independently related to performance (Bandura & Cervone, 1986). Meyer and Gellatly (1988) further explain that goals can also affect self-efficacy even before any performance has taken place. They say that goals appear to convey normative information to the individual by indicating the level of performance the individuals could be expected to attain. Thus, as explained earlier TC and CC could exhibit similar goals, however TC's lower self-efficacy to achieve these goals might result in lowered expectation and CC's higher self-efficacy might lead to heightened expectations. It is however important to note that it's not just the comparison with past performance that facilitates goal setting but also the effect of immediate feedback on one's performance (Weinberg et al., 1993).

2.5 Feedback and performance

It has been a consistent finding of sport psychology research that knowledge of results facilitates performance (Schmidt, 1991). So assuming an athlete just finished the race, s/he has been given the performance timing. This constitutes a feedback. The athlete then appraises this feedback which would then lead to an automatic evaluation of the timing as one understands it in relation to one's previous standards, in the athlete's case, maybe in relation to the training standards or a past competition standard. After making such cognitive comparisons, the strength of the valence extracted from the feedback would depend on the degree of discrepancy between the athletes's goal and the actual timing and also the importance given to the current timing. As a result of these cognitive appraisals, there could be difference implications for actions. One can lower expectations or one can increase expectations for the following race. This is an example of how an individual sets a goal in response to the feedback provided.

2.6 Present Research

The present research was conducted to examine the concepts described above, and to see how TC and CC individuals would differ in the way they process information, and, as a result, differ in their overall performance. In the context of social-cognitive methodologies, feedback or providing information can be looked at in terms of a variant of the 'priming' technique (Bruner, 1957; Moskowitz, 2005). In fact research has shown that a retrieval of an already existing construct from memory is brought to one's current level of awareness through a prime (Bruner, 1957). Thus athletes were primed with general sports performance-related information, and due to its high personal significance, it was assumed that the category of one's own performance will be triggered. It was assumed that the evidence of information processing amongst athletes would be indicated by the impact the performance related primes on their objective performance. Thus studies 1a and 1b included an objective measurement of the performance during the athlete's training period that were compared to previous competition timings to categorize the athletes as Training or Competition champions. All performance measurements were converted to standardized points based on the IAAF scoring tables of athletics (International Association of Athletic Federation, 2011) for comparing across all disciplines of track and field events. For instance a 100m timing of 10.32 seconds for men would be converted to 1099 points and a height of 2.44 metres for high jump amongst men would be converted to 1297 points. When comparing the two points together, it can be concurred that the performance of the athlete in high jump was better than the 100m performance of the other athlete.

2.7 Study 1a

Study 1a looked at the impact of positive and negative primes on objective performance and expectations. Thus, there were two independent dependent variables, one of objective performance and other of performance expectations. The primes contained information about general sports performance pertaining to a particular group, either TC or CC. A positive prime, for example, contained information on a particular group's ability to remain calm and the ability to handle stressful situations with utmost control and concentration. A negative prime comprised information about the respective group parallel manner to above, experiencing high anxiety and greater susceptibility to evaluation apprehension. It should be noted that each group received both types of prime, positive and negative (see Appendix A.1). The primes were administered by the experimenter by means of a casual conversation, so the athletes were not aware of the prime deliverance. An objective measurement of the

post-prime performance was taken apart from the measurement of pre-prime performance. Athletes' performance expectations were also measured immediately after the prime administration, by asking them to state how they expected to perform in the forthcoming competition. The basic aims of the study were to objectively determine the existence of TC and CC groups based on the difference between training and competition timings, to examine the impact of positive and negative primes on TC's performance and expectations. It was predicted that TC's post-prime performance would deteriorate and CC's post-prime performance would improve. Similarly TC's expectations would be lower than CC. This bidirectional prediction is based on the general idea that TC exhibit a maladaptive style of processing information while CC have an adaptive style of the same.

2.7.1 Method

2.7.1.1 Participants

Sixty-five athletes, including 36 men and 29 women, between the ages of 16 – 30 years, were recruited from sports training institutes in India and Wales. There were 30 athletes recruited from India and 35 athletes recruited from Wales. Their mean age was 21.12 years, *SD* = 2.13. The athletes were selected based on the criteria that they were training and competing for a minimum period of three years and were under the supervision of a coach. The athletes belonged to the elite/sub-elite sporting category wherein they had participated in county, national or world championships. Athletes with physical disabilities and those who were marathon runners were excluded from this study. The athletes were primarily divided into two groups, Training and Competition champions (see Procedure) and were then randomly assigned to one of the two prime conditions: – Positive vs. Negative. The experiment was conducted in individual sessions of approximately 30 minutes.

2.7.1.2 Materials

The materials included were the sociodemographic data sheet (see Appendix B.8) that asked for information with regard to age, gender, the particular athletic event they were participating in, and a self-perceived classification of their performance category – Training or Competition Champions. Relevant information about the current training measures and the five most recent competition measures that were recorded was also included in this data sheet. A script was also available for positive and negative primes that contained information about TC and CC (see Appendix A.1).

2.7.1.3Procedure

2.7.1.3.1 Establishing Training and Competition champions

All 65 athletes were classified as Training or Competition champions by comparing their current training performance and the average competition performance. For example, 100 m runners were asked by the coach to run their races during training, and the timing was recorded. This was considered as the pre-prime performance. The athletes were then asked to report their previous five competition timings over the last year. Two measurements of the track events were recorded during training and three measurements of the field events were recorded during training. All measurements were recorded using a stop-watch or a measuring tape, depending on the event. An average score of the competition performance was taken and compared with the average of the respective training performance. If the competition performance was better than the training performance, the athlete was classified as a *'competition champio*n'. If the training performance was better than the competition performance the athlete was classified as a *'training champion*'. It is important to make note here that every minimum difference in performance would be interpreted psychologically as meaningful by the athletes; therefore no statistical consideration would be required. The performance measured during training was taken two weeks prior to their actual competition, implying that the measures were a good indication of their current level of performance.

2.7.1.3.2 Positive vs. Negative Prime manipulation

After determining the group the athlete would belong to, the primes (positive/negative) were randomly introduced verbally. The athletes were instructed by their coach to 'have a chat' with the experimenter. This included discussing their event, their current preparation for it and so on. The primes were included as a part of the conversation. The primes contained information about an athlete's mental and physical state when performing in a competition. The primes used are as follows: a) *Training negative:* I just mentioned about the existence of the two groups. Researchers in fact say that those who perform better during training tend to be anxious and stressed during the competition. They are easily bothered by the presence of others and they constantly think about their performance – whether it will be as good as before. They also seem to show poor concentration and are easily distracted by other's presence. b) *Competition negative:* I just mentioned about the existence of the two groups. Researchers in fact say that those who perform better during competition tend to be anxious and stressed during the competition as they compare their performance to how it was during training or previous competitions. They seem bothered by the presence of others and they

constantly think about their performance – whether it will be as good as before. They also seem to show poor concentration and are easily distracted by other's presence. *c) Training positive:* I just mentioned about the existence of the two groups. Researchers in fact say that those who perform better during training tend to be calm and composed, have adequate coping skills when stressed during the competition. They are motivated by the presence of others. They also seem to show great concentration and focus during their event. *d) Competition positive:* I just mentioned about the existence of the two groups. Researchers in fact say that those who perform better during competition tend to be calm and composed, have adequate coping skills when stressed during the competition. They are motivated by the presence of others. They also seem to show great concentration and focus during their event.

After administering the primes, the athletes were given time to respond to it. This was followed by asking the athletes where they thought they performed better, training or competition in order to include a measure of self-perceived TC/CC classification.

2.7.1.3.3 Performance Expectation measurement

Athletes were first asked to state objectively in terms of timings, distances or heights, their perception of a typical performance level in their discipline that they would classify as successful or unsuccessful. For example, if a 100 metre athlete was asked "What according to you is a really good performance in your event?" the athlete might answer "10.21 seconds". This was followed by "What according to you is a really bad performance in your event?" Subsequently they were asked "How do you expect to perform in the upcoming competition?" The order of the questions about good and bad performances was counterbalanced but the expectation for the forthcoming competition was always asked as the last question.

2.7.1.3.4 Performance outcome measurement

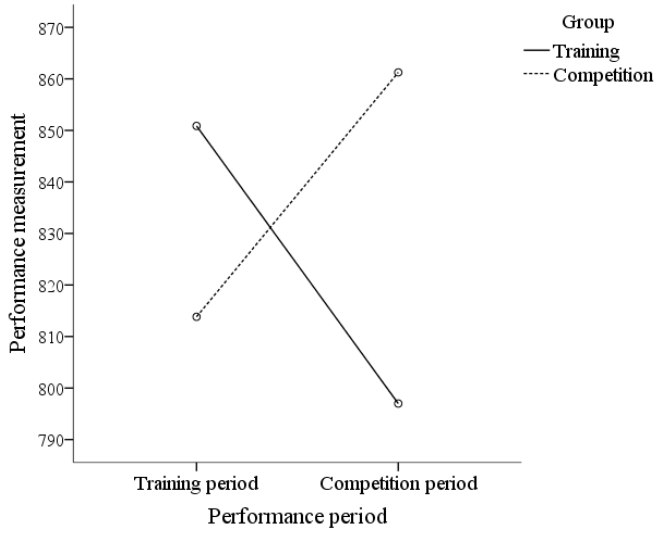
The athletes were thanked and informed that they would be required to perform their event again after sufficient recovery. The athlete's post-prime performance was recorded and s/he was later debriefed about the experiment. All performance measurements were converted to the IAAF (International Association of Athletic Federation, 2011) standardization scales for comparing across disciplines as explained earlier.

2.7.2 Results

The first section presents the manipulation checks of the reliability of the TC and CC distinction. The second section demonstrates the difference in objective performance, which was calculated using repeated measures ANOVA by comparing the pre-prime measurement and the post-prime measurement. Interactions were interpreted through analysis of simple effects with Bonferroni corrections. Differences in performance expectations were determined by comparing the pre-prime measurement and the current expectation level reported using an ANOVA.

2.7.2.1 Manipulation Checks

Figure 2.1: Establishment of training and competition champions



The manipulation check entailed the establishment of TC and CC by comparing the performance during the training period with the average of last five competition performances. To confirm the group establishment, a repeated measures ANOVA revealed a significant interaction, $F(1, 63) = 29.95$, $MSE = 2766.78$, $p < .01$, *partial* $\eta^2 = .322$. Furthermore, pairwise comparisons made using simple effects with Bonferroni correction revealed that TC declined in performance during competitions ($M = 797.00$, $SE = 20.04$) in comparison to how they perform during training ($M = 850.87$, $SE = 21.02$), $t(63) = 3.41$, $p < .01$, while CC showed an increase in performance during the competitions ($M = 861.28$, $SE = 18.56$) when compared to their training performance ($M = 813.83$, $SE = 19.46$), $t(63) = 3.77$, $p < .01$. Also, the competition performance for TC was significantly lower than the CC, $t(63) = 2.35$, $p < .05$. However, there was no significant difference between TC and CC with regard

to their training performance, t (63) = 1.29, p = .201, emphasising their consistency in performance during training. The main effects of Group and performance difference between training and were not significant, p = n.s. This thus indicates how TC and CC's performance remains the same during training however, the difference occurs only in competitions thereby leading to the quasi-experimental assignments of athletes to either TC or CC group. [1]

2.6.2.2 Main Results – Objective Performance

A repeated measures ANOVA was used to test main effects and interactions during a period from pre-prime performance measurement to post-prime performance measurement between TC and CC and positive and negative primes, as shown in Table 2.1 and Figure 2.2, the latter also indicating post hocs using simple effects.

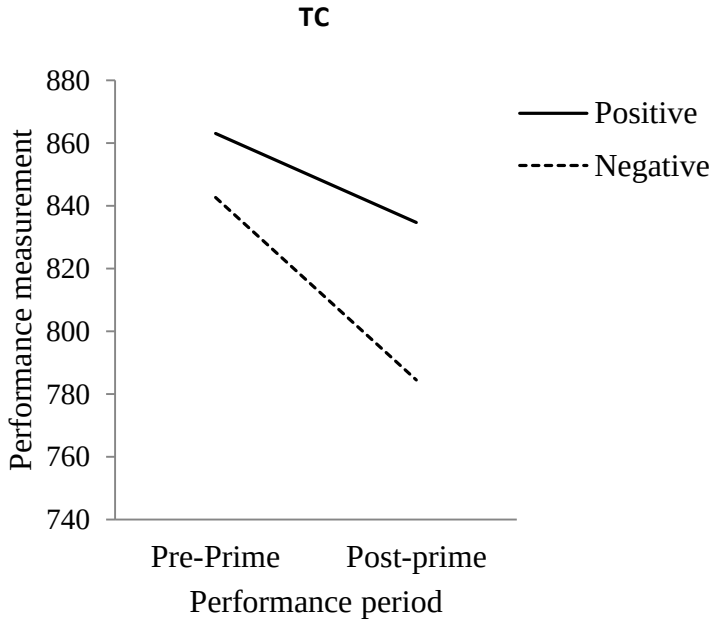
Table 2.1: Interactions between group and prime on objective performance

	Sum of Squares	df	Mean Square	F	Sig.
Pre-prime and Post-prime performance difference	11674.214	1	11674.214	14.547	<.001
Group x Pre-prime and Post-prime performance difference	17375.550	1	17375.550	21.651	<.001
Prime x Pre-prime and Post-prime performance difference	6538.608	1	6538.608	8.148	.006
Error	48953.923	61	802.523		

[1] Another analysis using ANCOVA was conducted to confirm the basic notion that TC and CC did not differ in their performance during training. Thus, pre-prime performance was used as a covariate to test the main effects of group and prime. Results revealed that despite pre-prime being significant as covariate, F (1, 64) = 533.38, MSE = 1621.84 , p <.01, η^2 = .899, differences still existed between groups, F (1, 64) = 21.72, MSE = 1621.84, p <.01 , $\eta 2$ = .266, and prime conditions, F (1, 64) = 7.51, MSE = 1621.84, p <.01, η^2 = .111, with respect to post-prime performance. This indicates that group and prime differences are significant in predicting performance.

Table 2.1 shows the interactions between group and prime on objective performance amongst TC and CC. The repeated measures ANOVA revealed a significant main effect of pre-prime and post-prime performance, F (1, 61) = 14.55, MSE = 802.52, p <.01, *partial* η^2 = .193, indicating a difference in the level of performance pooled across both groups when performance measurements were taken at different time periods. A significant group by performance (pre-prime vs. post-prime) interaction, F (1, 61) = 21.651, MSE = 802.52, p < .01, *partial* η^2 = .262 and a prime by performance (pre-prime vs. post-prime) interaction, F (1, 61) = 8.15, MSE = 802.52, p < .01, *partial* η^2 = .118 is also seen. The main effects of group and prime were not significant, p = n.s. This indicates that differences could exist in the way specific primes act on particular groups with regard to objective performance. The following section shows figures that address the effect of specific primes-positive versus negative on performance between TC and CC.

Figure 2.2: The effect of positive and negative primes on objective performance between TC and CC



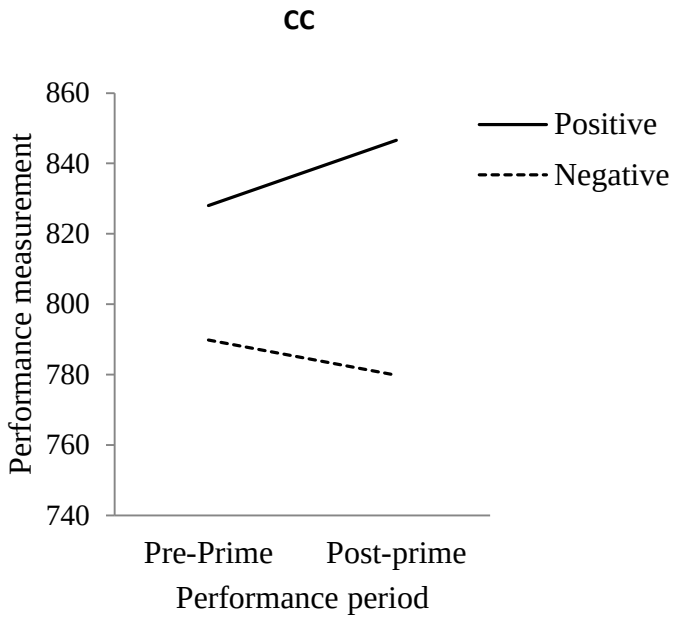


Figure 2.2 points out the effect of specific primes on performance amongst TC and CC groups analysed by a repeated measures ANOVA. Although there was no significant three-way interaction between group x prime x performance, F (1, 61) = .004, MSE = 802.52, p = .951, *partial* η^2 = .000, or a group x prime interaction, F (1, 61) = .079, MSE = 28419.71, p = .779, *partial* η^2 = .001, post hocs were tested using simple effects with Bonferroni correction. This revealed that within TC there was a decline in performance from pre-prime (M = 863.08, SE = 34.31) to post-prime (M = 834.67, SE = 35.14) under the influence of a positive prime, t (28) = 2.10, $p < .05$. TC also declined in performance from pre-prime (M = 842.72, SE = 28.00) to post-prime (M = 784.44, SE = 28.69) for a negative prime, t (28) = 5.29, $p < .01$. Also, there were no differences in pre-prime, t (28) = 0.46, p = .649 and post-prime performance, t (28) = 1.27, p = .216, between positive and negative primes respectively amongst TC. TC also showed a significant overall decline in performance from pre-prime (M = 852.90, SE = 22.14) and post-prime (M = 809.56, SE = 22.70) combining both primes, t (28) = 4.81, p <.01. This indicates that regardless of the kind of prime used, TC always declined in performance. On the other hand, amongst CC, there was an increase in performance from pre-prime (M = 828.00, SE = 24.19) to post-prime (M = 846.59, SE = 27.46) under the influence of a positive prime, t (33) = 2.62, p = .013, but showed no difference in performance from pre-prime (M = 789.85, SE = 31.47) to post-prime (M = 779.85, SE = 35.73) for a negative prime, t (33) = 1.08, p = .287. Also, there were no differences in pre-prime, t (33) = 0.96, p = .343, and post-prime performance, t (33) = 1.48, p = .148, between positive and negative primes respectively amongst CC. CC also did not show a change in performance from pre-prime (M = 808.92, SE = 19.85) and post-prime (M =

813.22, *SE* = 22.53) combining both primes, *t* (33) = 0.74, *p* = .466. This could show that the nature of prime has very minimal effect on CC, and if at all any effect, only the positive prime seems to play a role.

2.6.2.3 Main Results – Performance Outcome Expectation

Two separate analyses were conducted to examine the differences in performance outcome expectations using an ANOVA and differences in perceived best and worst performances using a MANOVA amongst TC and CC. Performance outcome expectation was calculated by comparing the performance measurement during training with the current performance expectation reported in the forthcoming competition. If the current expectation was greater than the training measurement (a positive value) it was interpreted as higher performance outcome expectation compared to their current level of performance. If the current expectation was lower than the training measurement (a negative value) it was interpreted as lower performance outcome expectation compared to their current level of performance.

Figure 2.3: Group differences in performance expectation

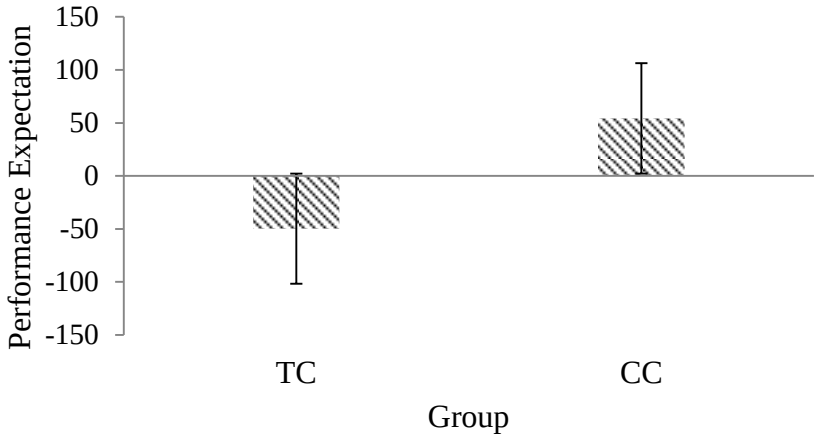


Figure 2.3 shows the difference in performance outcome expectations between TC and CC that was analysed using an ANOVA. A significant main effect of group on performance outcome expectation, F (1, 64) = 22.00, MSE = 7953.22, $p < .01$, *partial* η^2 = .259, indicates that TC showed lower expectations (M = -49.77, SD = 74.97) than CC (M = 54.31, SD = 99.71).

Table 2.2: Group differences in good and poor performance projection

	Dependent variable	Sum of squares	df	Mean square	F	Sig.
Group	Good performance projection	58384.844	1	28100.614	1.998	.162
	Poor performance projection	71385.201	1	16911.243	4.600	.036
Error	Good performance projection	1841057.310	63	29223.132		
	Poor performance projection	977636.552	63	15518.041		

Table 2.2 shows the differences between TC and CC in terms of what they would consider as a good performance and as a poor performance. The MANOVA revealed that the groups did not differ in terms of good performance projection, F (1, 64) = 1.99, MSE = 29223.13, p =.162, *partial* η^2 = .031, but did differ significantly in terms of poor performance projection, F (1, 64) = 4.60, MSE = 15518.04, $p < .05$, *partial* η^2 = .068. TCs' perception of what would constitute a poor performance is far below (M = 681.27, SD = 125.41) what CCs would consider as a poor performance (M = 747.74, SD = 123.85).

2.7.3 Discussion

The present study was conducted to study the differences in objective performance and performance expectations between Training Champions (TC) and Competition Champions (CC) as an outcome of a 'performance related' source of information, which was administered as primes (positive vs. negative). To begin with, it was important to establish the classification of TC and CC on an objective basis. According to Tschakert (1987), a training champion is someone who repeatedly fails to transfer one's training performance into competition, while a competition champion not only transfers the skills but also tends to perform at a higher level in the competition. According to this definition one would expect differences in performance in the competition between the two groups as seen in Figure 2.1. Interestingly, there was no difference in their level of performance during the training period which further reiterates the point that, although TC and CC are similar in their level of competence, the relevant differences only arise in the competition set up where TC show

lower performance levels than CC. Thus it could be inferred that TC could have a tendency to choke more than CC, as the competition is a situation that creates performance pressure (Baumeister, 1984; Hardy, Mullen, & Jones, 1996). We thus argue that TC's tendency to choke more could be due to interplay of cognitive, motivational and inherent traits. We claim that the core mechanism that drives the tendency to choke lies within a particular style of information processing, maladaptive in nature, which is prerequisite to any cognitive process that unfolds in performance-relevant contexts.

Now that it has been established that TC and CC differences can be seen amongst a group of athletes, the question is, are the athletes aware of these differences? That is, do they know where they perform better consistently? Obviously, the coach would not be training them any differently to prevent any blatant performance discrimination, but an athlete's self-perception of performance during training in relation to the competition, might certainly be one of the key factors that might propagate their current mode of information processing. Results indicated that athlete's perception of group belongingness was significantly positively correlated to the quasi experimental groups created by the experimenter (See Appendix C.1 for Table). The perception of which group one would belong to further reiterates the notion that TC perceive information of failure and CC perceive information of success and thereby set appropriate expectations for future performance. So, presumably TC and CC know their level of performance, they train and compete under similar conditions, but still when it comes to the actual competition, TC and CC differ in the way they perform. What could possibly be this additional variable driving the difference?

Several theories propagate the role of information processing in the way an individual behaves (Lutz & Huitt, 2003; Plessner & Haar, 2006). The role of such information processing mechanism in a semi-controlled environment was tested in the above study and the results from Figure 2.2 and Table 2.1 clearly indicate that there is a tendency wherein TC and CC process information differently and as a result show differences in objective performance, too.

Within TC, regardless the kind of prime, positive or negative, there was a decline in post-prime performance, while CC show no difference in performance for a negative prime but a slight increase in performance for a positive prime. One possible explanation for this effect could be that since the information delivered was through priming, there was perhaps a retrieval of an already existing construct from the memory, perhaps of a past experience and the prime brought that to one's current level of awareness (Bruner, 1957). Thus for TC the primes could have activated 'failure' experiences which could be most salient to them and

brought to awareness the aspects associated with failure like anxiety, lack of focus, performance pressure and so on. Thus in case of such performance related primes, athletes may process the information contained in the primes to the self-relevant 'trait' construct of a TC or CC and thereby decline or increase in performance . Similarly, CC's competition performance is usually better than at training, thus their immediate memory would be that of their 'success', which is again translated into actual objective performance. It is thus safe to assume that TC and CC will potentially process and interpret information in a maladaptive and adaptive fashion respectively, thereby leading to differences in performance. However, after they interpret information, how do they make future judgements? In other words, do they set different goals and have different expectations for the forthcoming performance?

Figure 2.3 shows how TC and CC differ in their performance outcome expectations. As explained earlier, performance outcome expectations were calculated by comparing their current expectation at a forthcoming competition and their training measurement which is indicative of their current level of performance. As expected, TC's expectations were significantly lower than CC's. This is indeed puzzling because regardless of one's objectively good performance during training as seen in Figure 2.1, for TC, when it comes to setting goals, they seem to under represent their level of performance, while CC seem to think that they would definitely perform better than how they are currently performing in training. This again is in line with the theory that TC and CC are well aware of their level of performance and how much they should expect. This also supports the theory by Locke and Latham (1990) that when people choose goals, the goals are based on beliefs about what they can achieve, recollections from past experience, and their beliefs about the consequences. Thus once TC process information, they could make 'errors' (Plessner & Haar, 2006) in the interpretative stage of information processing thereby affecting forthcoming judgements. This could result in lowered expectations and thereby choosing more attainable goals. Similarly, CC might process information without 'errors' in the following sequence of events and thereby heighten their expectation and choose goals that are obviously attainable, which are more ambitious than their training performance level.

The relation between performance and expectations was further explained by Weiss et al. (1989) when they found a significant correlation between self-efficacy and competitive performance in high level sports. This is a good explanation for a vicious cycle argument. The better accomplishments during competitions, the higher would be one's self-efficacy and thereby one's performance would again be better. But the question is, if there is an automatic tendency to think about previous experiences, why don't TC or CC think about their

performance during training? For TC at least, they know that they do perform better in training, so if they did base their expectations on how they perform in training, perhaps they wouldn't have such a discrepancy. To address the above question, it was found that athletes create realistic expectations based on their performance in competitions, if one compared the relation between competition performances and the current expectation of a forthcoming competition (data not shown). This is understandable as the results in the competition are more salient than how they perform in the training. One's evaluation of performance as 'successes' or 'failures' is seen only in competitions, and this is presumably one reason for why we have the TC and CC distinction and also addressing the assumption that successes and failures are interpreted based on competition outcomes rather than an intra-personal comparison between performances during training and competitions.

Adding to the above premise another interesting point that can be discussed is seen in Table 2.2. When the athletes were asked to state what according to them would be their best performance, one would immediately translate this as the 'goal' they might want to achieve. The lack of a significant difference in this aspect shows that, TC and CC do not differ in their ultimate goal. So for example, a 100m TC could have a goal that he must clock 10.3 seconds, and a CC could have a similar goal regardless of one's current level. The difference clearly lies in the expectation. Goals in this regard could be an ideal, distant construct, but expectation seems more real. Thus for a TC, before the information processed reaches the goal that is set, s/he decreases the expectation. In other words, there probably exists a huge discrepancy between expectations and goals, as Bandura et al. (2000) suggest that goals enhance performance effort only under the conditions of a personal standard with performance feedback of progress towards it. According to them, performance knowledge and a standard of comparison are needed to produce the desired motivational effect, which is that of performance expectations or self-efficacy. So although they might have similar goals as to those of CC, because of their previous performance knowledge of 'failure' leads to lowering the expectations and thereby performance as well. Interestingly, when the athletes were asked to state what according to them would be their worst performance, TC's perception of a bad performance was far worse than CC's perception of a bad performance. This finding gives rise to the question of TC's tendency engage in catastrophism of already existing stimuli, perhaps due to their constant exposure to 'failure'. This question will be addressed in the following chapters.

The above study gave preliminary evidence to the idea that i) There could exist group differences (TC and CC) amongst athletes in terms of how well they perform in competitions

and ii) The groups may differ in the way they process information and thereby have different expectations. Study 1a delivered performance related information which was loaded with positive or negative valence. Results revealed that TC could show a maladaptive information processing style as they declined in post-prime performance and CC could show an adaptive information processing style as their post-prime performance either improved or remained unchanged. However the question is would the groups show a similar trend when the information was not loaded with any valence or was not present at all?

2.8 Study 1b

Study 1b addresses the concern about having an appropriate 'no prime' control. The basic aim was to replicate the procedure of the earlier study, except that primes in the form of performance-related information were substituted with purely technical performance related information, which was given by the coach and had no success/failure implication. As one group at random received technical feedback about their performance without any references to personal performance (good or bad), another group received no such feedback, hence acting as a control group. It was predicted the results would be replicated those of study 1a, such that as far as differences between TC and CC in objective performance are concerned, TC will show a decline in performance only in the feedback condition while the CC will show no such effects in either condition. The idea is to show that feedback or some salient information must be presented to the group of athletes, for the performance-relevant information processing to take place. Thus the prediction is that some presence of a source of performance-relevant information, even if not directly related to concerns about success or failure, is sufficient for performance fluctuation effects to be shown. The lack of valence attached to the information provided is to further augment the proposition that TC's maladaptive style could be observed even in a neutral condition while CC's adaptive style gets reinforced only in the presence of positive information.

2.8.1 Method

2.8.1.1 Participants

Forty-seven athletes, including 22 women and 25 men, between the ages of 16 – 30 years were included. Mean age was 21.17 years, *SD* = 2.14. The selection criteria were the same as for Study 1a. Out of 47 athletes, 10 were repeat participants from Study 1a. The procedure was not repeated for those participants who took part in Study 1a. The other athletes were divided into two groups, Training and Competition champions, based on their

performance measures during training when compared to the average of last five competition performance measures. The athletes were then randomly assigned to one of the two feedback conditions – Technical vs. No Feedback. The experiment was conducted in individual sessions of approximately 30 minutes.

2.8.1.2 Materials

The materials included were the sociodemographic data sheet that asked for information with regard to age, gender, the particular athletic event they were participating in, and a self-perceived classification of their performance category – Training or Competition Champions. Relevant information about the current training measures and the five most recent competition measures that were recorded was also included in this data sheet. See Appendix A.2 for the kind of technical feedback given by coaches.

2.8.1.3 Procedure

2.8.1.3.1 Establishing Training and Competition champions

The athletes who took part in this study had already been through the training time vs. average competition time comparison for the group establishment as described in Study 1a, so the procedure was not repeated. In this study however, the coaches were given instructions about their role with regard to giving technical feedback or withdrawing such information.

2.8.1.3.2 Feedback vs. No feedback manipulation

Once the coach was debriefed, the athletes' performance was recorded in their respective event. Following which, feedback vs. no feedback was randomly assigned to athletes. In the feedback condition the coach gave the athletes feedback about their previous performance. The feedback was technical in nature; any praise or encouragement was avoided. The coach also withheld information about the objective performance measure. In the no feedback condition, the coach did not give the athletes any feedback about their performance, but just a nod of acknowledgment. The two conditions followed a post-feedback objective performance measurement.

2.8.1.3.3 Performance Outcome measurement

The athletes were thanked and asked to perform their event again after sufficient recovery. The athlete's post-feedback performance was recorded and he/she was later debriefed about the experiment. All performance measurements were converted to the IAAF

(International Association of Athletic Federation) standardization scales for comparing across disciplines as in Study 1a.

2.8.2 Results

A repeated measures ANOVA was used to examine the role of condition (feedback vs. no feedback) on objective performance as a function of the two groups – TC and CC. Post hocs were analysed using simple effects with Bonferroni corrections.

Table 2.3: Main effects and interactions between group and condition on objective performance

	Sum of squares	df	Mean square	F	Sig.
Group	55100.356	1	55100.356	5.128	.029
Condition	820.970	1	820.970	0.076	.784
Group x Condition	27263.637	1	27263.637	2.538	.118
Group x pre-post measurement	6798.499	1	6798.499	20.441	<.001
Condition x pre-post measurement	3557.492	1	3557.492	10.697	.002
Group x Condition x pre-post measurement	9250.277	1	9250.277	27.813	<.001

Table 2.3 shows the main effects and interactions between group, condition and pre-post condition measurement on objective performance. The repeated measures ANOVA revealed a significant main effect of group on objective performance, F (1, 43) = 5.12, MSE = 10744.17, $p < .05$, *partial* $\eta^2 = .107$. There was no significant condition main effect on objective performance nor a significant group x condition interaction. There were significant interactions between group x pre-post condition measurement, F (1, 43) = 20.44, MSE = 332.58, $p < .01$, *partial* $\eta^2 = .322$ and condition x pre-post condition measurement, F (1, 43) = 10.70, MSE = 332.58, $p < .01$, *partial* $\eta^2 = .199$. A significant three-way interaction between group x condition x pre-post condition measurement can also be seen, F (1, 43) = 27.81, MSE = 332.58, $p < .01$, *partial* $\eta^2 = .393$. There was also a significant main effect of pre-post

condition measurement, F (1, 43) = 19.16, MSE = 332.58, p <.01, *partial* η^2 = .308. These results point to the fact that, condition of feedback vs. no feedback alone is not a determinant of predicting objective performance but also the belonging to either TC or CC plays a crucial role in determining performance. The following figures depict in detail the three way interaction where performance differences are seen between TC and CC as a function of the two conditions (feedback vs. no feedback) independently.

Figure 2.4: Group differences in objective performance in Feedback and No feedback conditions.

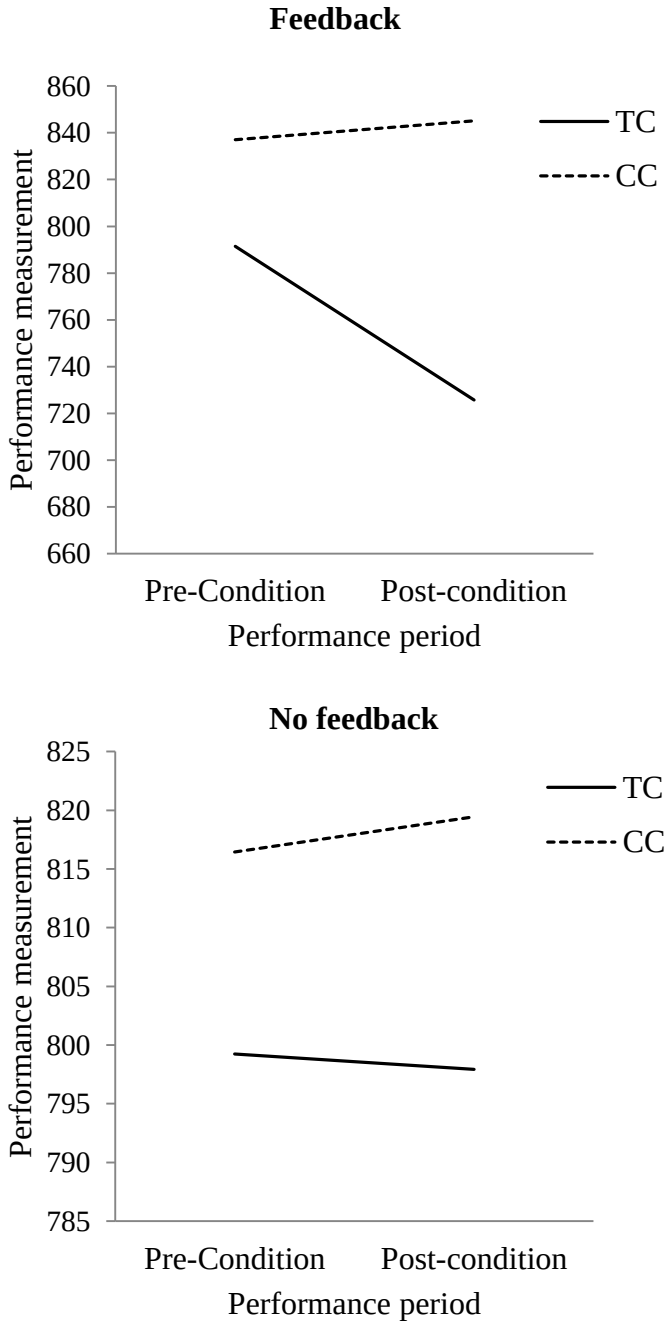


Figure 2.4 depicts the three way interaction between group x condition x performance that was analysed using a repeated measures ANOVA. In the feedback condition, simple effects with Bonferroni correction indicated that there is a decline in performance amongst TC from pre-condition (M = 791.42, SE = 21.14) to post-condition (M = 725.75, SE = 22.25) measurement, t (21) = 8.91, p < .01. For CC, however there was no change in performance from pre-condition to post-condition, t (21) = 1.10, p = .285. Furthermore, there was no difference in pre-condition performance between TC and CC, t (21) = 1.53, p = .141, but a significant difference in post-condition performance between TC and CC, t (21) = 3.81, p <.01. These results show that TC decline in performance when they receive feedback, while there are no performance fluctuations seen amongst CC. In the no feedback condition, there was no change in performance amongst TC, t (21) = 0.18, p =.861, and CC, t (21) = 0.89, p =.383 as seen in the above figure. Furthermore, there were no differences between TC and CC in pre-condition performance, t (21) = 0.58, p = .573, and the post-condition performance, t (21) = 0.38, p = .717. This goes to show that the presence or absence of feedback is sufficient to see differences in performance between TC and CC.

2.8.3 Discussion

Study 1b was designed to replicate the procedure and findings of the previous study, except that the performance related primes loaded with valence were substituted with technical performance-related primes without any valence, as delivered by the coach. This study was also conducted to act as a 'no prime' control for the previous one. Therefore the two conditions involved were feedback vs. no feedback. Some of the results from Study 1a replicated were a main effect of group on objective performance and an interaction between group and pre-post condition measurement pooled across both conditions as shown in Table 2.3. This is indicative of the fact that the groups certainly differ in objective performance when measured across different times with appropriate manipulations. Table 2.3 further goes on to show an interaction between pre-post condition measurement and condition and also a three way interaction between group, condition and pre-post condition measurement. This again shows some evidence of the role of presence and absence of feedback in the way the group would perceive the information and transform it to actual performance. Here, we are under the assumption that the presence of an information source, in this case feedback would be an important factor in information processing, whereas when there is no feedback, there is no salient source of information and therefore performance fluctuations cannot be seen.

Examining the results closely, Figure 2.4 further explains the three-way interactions between TC and CC, the presence and absence of feedback, and pre-post condition measurement. One of the main aims of this study was to test the effects of a prime vs. no prime condition, to reinstate the point that the presence of information in the most salient form is sufficient for any form of information processing to take place. The presence of information could trigger an over-thinking response amongst TC that could distract them from their immediate concern or goal about performance and hence result in an anxiety reaction leading to performance decline. It can be seen that within the feedback condition, as expected, TC declined in performance, while CC's performance remains unchanged. This is quite similar to the results from Study 1a, wherein TC declined in performance regardless the kind of prime (positive and negative) and CC's performance remained unchanged for a negative prime, and showed a slight increase in performance for the positive prime. The impact of the positive prime on CC's performance is probably because of the valence associated with the prime. With the feedback, since it was technical in nature, with no implied performance evaluations, CC have nothing to 'read into' and just took the information at face value. It is however notable that, despite the information being just technical, wherein they were given feedback by the coach about swinging arms or running tall, TC still declined in performance. This fits well again into the "biases in information processing" argument (Plessner & Haar, 2006). The information they receive as a prime perhaps triggered memories associated with it (Bruner, 1957). Since it was previously established that athletes would most of the time think of only competition performances to gauge their level, the memory of a 'failed' competition was perhaps activated, leading to biases in processing and thereby going through the vicious cycle of lowered expectations and thereby lowered performance. This finding is crucial because, it paves way to the argument that, TC have a maladaptive processing style for any kind of information. Another explanation could be that there could be an information overload. TC might not just start thinking about 'failed' competition experiences, but also evoke the corresponding emotions and cognitions. In other words, TC might show inherent maladaptive thinking styles which further propagates the 'biases in information processing. CC on the other hand, when receiving similar information, are able to 'block' unwanted memories and associations, and, perhaps by engaging in adaptive thinking styles, would prevent the 'biases in information processing. The above argument is further supported when looking at Figure 2.4 in the no feedback condition. As predicted, there were no changes in performance between the TC and CC and even within the two groups. This is a rather important finding, as it reiterates the idea

that the presence of salient information is sufficient for the kind of processing to take place that could rely on ruminative tendencies thereby distracting oneself from the actual task at hand and perhaps focusing on irrelevant thoughts.

The previous priming study focused on either negative or positive information which was related to a group's (TC vs. CC) tendencies to experience anxiety and the ability to remain focused in competition situations. There could have been a tendency for the athletes to make some personal references to themselves while presented with such information. While making personal references, especially if the information is loaded with negative attributes, it is understandable that this might affect one's performance. But with study 1b, the information presented was technical in nature. The coach did not make any personal references. He did not mention whether the performance was good or bad. Despite the objectivity, the information he provided still resulted in a decline in performance amongst the TC. It is quite obvious that the presence of information indeed plays a role in the processing. But the question is why does any kind of information interfere with their task at hand? Could it be that the information they hear is immediately misconstrued in a negative sense? So, for e.g.: If the coach said "Run Tall" perhaps a TC athlete would interpret this as something that they were doing wrong, and might immediately catastrophize the situation. Or is it that TC construe the information as more self-relevant? Going by previous predictions, if most of TC's memory activation is that of 'failed' competitions, then by making information more self-relevant, it would be perceived as something negative anyway. Do CC just block out unnecessary information, and only make what important to their performance self-relevant? For example, in Study 1a, CC showed heightened performance and expectations with a positive prime and not with a negative prime. Thus, do they block out the negative information and make only the positive ones self-relevant? Of course, another question that needs answering is whether this entire process is driven by specific inherent thinking tendencies. If the above holds true, one can hypothesize that having a maladaptive thinking style might result in rumination about existing information and bring to surface other irrelevant information which, by making it highly self-relevant, would lead to biases in processing for a TC. For a CC, perhaps an adaptive thinking style aids in appropriate blockage of information, holding just what is required within the self-relevant realm, thereby having no errors in processing. The following chapter addresses the above mentioned issues.

Chapter 3: Towards a model: The role of 'thinking' traits in propagating adaptive and maladaptive information processing styles.

3.1 Introduction

The previous chapter addressed questions about how TC and CC could possibly engage in varied information processing style. The fact that TC declined in performance regardless the nature of prime- positive, negative and neutral supports the assumption of a maladaptive processing style. Similarly CC's performance improvement following a positive prime and unchanged performance following negative and neutral primes was indicative of an adaptive cognitive style. The arguments were that, for TC, the information could be misconstrued in a negative sense or they could make it more self-relevant, thereby making it negative, since most of the experiences they encounter are ones of failure in competitions. In other words, most of TC's memory activation would be of 'failed' competitions. With regard to CC, the question raised was if they had a tendency to block out unnecessary information and make only information salient to their performance self-relevant. The premise for these questions lies in possible inherent tendencies of different 'styles of thinking'. Inherent traits, adaptive or maladaptive in nature, could propagate information processing in a specified direction. Someone who has a tendency to over think and ruminate and at the same time make negative attributions might make errors in information processing, while those who engage in thoughts just congruent with their current goals and action and block out unnecessary information from entering their thought spectrum might engage in error-free processing. These predictions have led to the design of two studies, one addressing the role of inherent tendencies of rumination, related to anxiety and perfectionism, mostly pertaining to the maladaptive domain, and the other addressing the more general role of 'thinking' in the form of measuring need for cognition amongst TC and CC.

3.2 Rumination

Rumination is generally defined by Martin and Tesser (1996) as a recurrent series of thoughts combined by a common theme. Depressive rumination, however, is the most common form of ruminative thought (Nolen-Hoeksema & Morrow, 1991) and due to the presence of negative valence is similar to negative cognitive styles studied by cognitive theorists (e.g., Beck, 1967). Therefore one can assume that this negative cognitive style could have a significant effect on information processing. In fact research shows that ruminative dwelling is often associated with faulty information processing by focusing on depressive

symptoms (Lam et al., 2003), by increasing negative thinking by increasing the effects of negative moods (Ingram & Smith, 1984; Lewinsohn et al, 1985; Nolen-Hoeksema, 1991; Pyszczynski & Greenberg, 1987; Smith & Greenberg, 1981) and by showing greater negative expectancies about the future (Carver et al. 1979; Needles & Abramson, 1990). Thus it was hypothesised that pre-existing tendencies to ruminate would result in errors in information processing which would in turn reinstate the ruminative cycle. 'Errors' could be translated in terms of biases that are associated with processing. These errors could include misperception, false memory, poor information integration and also misattribution leading to subjective evaluations of self-efficacy, feelings of control and goal intentions (Plessner & Haar, 2006). But the question is how do these errors/biases occur? Why is rumination associated with faulty information processing? A possible explanation could be that rumination activates negative memories and schemas (Ingram & Smith, 1984; Lam et al., 2003; Nolen-Hoeksema, 1991; Pyszczynski & Greenberg, 1987). Thus it can be predicted that in the presence of a competition stressor or anticipating a competition stressor TC would start thinking about the past failures and ruminate upon them. This claim is supported by Alloy et al. (1999) who explain that depressed individuals tend to engage in negatively toned information processing when they encounter stressful events. It has also been pointed out that a ruminative orientation towards performance is often associated with performance difficulties (Morrow & Nolen-Hoeksema, 1990). Furthermore, rumination is said to involve a proliferation of intrusive and negative thoughts (e.g. doubts about one's ability to perform a task successfully, concerns regarding the consequences of failure) that diverts attention from task performance by increasing the level of self-focus (Lewis & Linder, 1997). Thus one can assume that rumination can indeed affect one's task performance due to the way individuals process information. However most of the literature has been catered to address depression and rumination, but more generally, and going by the definition of 'recurrent thoughts', it appears highly plausible to assume that rumination could also work on the basis of anxiety-related thoughts and ideas.

3.4 Rumination and Anxiety

Research has also shown that a ruminative response style might not only be characteristic for depression but is also related to anxiety (Fresco et al., 2002). Both are repetitive, preservative forms of thought that are self-focused (Barlow, 2002; Borkovec, Alcaine, & Behar, 2004; Segerstrom et al., 2000). Both are associated with cognitive inflexibility and difficulty in shifting attention away from negative stimuli (Nolen-Hoeksema

& Davis, 1999). Thus there seems to be some strong evidence suggesting that ruminative responses can be seen in depression and anxiety. It was already established that rumination could affect information processing and rumination could also be related to anxiety, thus is there any evidence for the idea that anxiety also could affect information processing? As a matter of fact Beck et al. (1997) propose when an initial threat is detected and interpreted one could engage in more elaborate forms of thinking. All these theories centre on the assumption that there exists a relationship between rumination, anxiety and performance which could be related to the way one processes information. But the question still remains, could there be yet another inherent trait related to motivational levels and performance? Many researchers regard perfectionism as a psychological characteristic that makes Olympic champions (Gould, Dieffenbach,& Moffett, 2002) and others regard perfectionism as a maladaptive characteristic that undermines, rather than helps, athletic performance (Flett & Hewitt, 2005). In any case, it is evident that perfectionism is a construct that could have an impact on sports performance.

3.5 The link to perfectionism

Perfectionism is a personality trait characterized by striving for flawlessness and setting excessively high standards for performance, accompanied by tendencies toward overly critical evaluation of one's behaviour (Flett & Hewitt, 2005). In athletes particularly this trait is known to be related to competitive anxiety that could affect one's performance (Flett & Hewitt, 2005). This obviously hints at the multidimensionality of perfectionism. The negative dimension of perfectionism subsumes those facets that relate to concern over mistakes, doubts about actions and negative reactions to mistakes. This dimension has been associated with anxiety (Beiling et al., 2004). The positive dimension subsumes those facets of perfectionism that relate to perfectionistic strivings such as having high personal standards and a self-oriented striving for excellence. The association with anxiety and concern over mistakes in the negative dimension of perfectionism can lead to assumptions about its relation with rumination. Research has shown that rumination has many correlates and consequences that are consistent with the empirical literature on maladaptive perfectionism (e.g., Blankstein & Dunkley 2002). According to Hewitt and Genest, 1990 (as cited in Flett et al., 2002), when an individual is unable to reach ideal standards, this discrepancy is associated with negative thoughts and emotions and worry. This invariably results in ruminative thoughts about the particular behaviour exhibited. It can be predicted that those high or low on inherent traits of anxiety and perfectionism could trigger the appropriate

cognitive response – high on rumination or low on rumination. This notion is supported by the idea that when perfectionism induces harsh self-criticism, a ruminative response style and a focus upon personal and interpersonal inadequacies motivational depletion is prompted (Flett & Hewitt, 2006; Flett, Madorsky, Hewitt, & Heisel, 2002; Thompson & Zuroff, 2004, as cited in Hill et al., 2008). Thus, it is important to make clear that perfectionism and anxiety are traits that could determine the strength of cognitive processes of rumination. When these processes are in use constantly in the estimation of their performance outcomes, athletes may become vulnerable to choking. Instead of facilitating athletic development and elite performance (Anshel & Eom, 2002; Gould, Dieffenbach, & Moffett, 2002, as cited in Hill et al, 2008) these maladaptive perfectionistic tendencies emphasize the self-defeating and incapacitating trends of cognition and emotion and may weaken performance (Hill et al., 2008).

3.6 Present Research

The present research proposes to examine the inherent maladaptive traits related to cognition such as trait anxiety, rumination and perfectionism in Study 2a and inherent adaptive cognitive traits like need for cognition in Study 2b. The present research will focus on just the inherent antecedents that could potentially affect performance and not the connection between these antecedents and performance. The primary aim is to see if the TC and CC differ in the above mentioned traits.

3.7 Study 2a

Study 2a was conducted to examine the role of the individual differences measures of trait anxiety, rumination and perfectionism in determining differences between TC and CC. Furthermore to address the concept of information processing, experience recall (successful vs. unsuccessful) was manipulated in determining ruminative responses. The idea was that experience could be a form of information to the individual the valence of which could interact with ruminative tendencies. It was predicted that there would be a difference between TC and CC with regard to rumination and anxiety, in that TC would show higher levels of these traits than CC. It was also hypothesised that, regardless the kind of experience (successful vs. unsuccessful) recalled, TC would show greater ruminative tendencies than CC. With regard to perfectionism, it was predicted that TC would show greater levels of maladaptive perfectionism than CC. It was also predicted that the inherent motivation and performance-related trait of perfectionism would play a moderating role in determining the

levels of rumination in TC and CC. Finally, all these comparisons were also made with a non-athlete student sample to serve as a control, and it was predicted that all three groups would differ significantly from one another on the individual differences measured.

3.7.1 Method

3.7.1.1 Participants

A total of 98 participants were recruited of which 67 were elite and semi-elite track and field athletes from Wales and England, and 31 were undergraduate students of psychology. These included 42 men and 56 women in the age range of 16 – 30 years. Mean age was 21.44 years, *SD* = 2.86. These athletes were training and competing for a minimum period of three years. Amongst the athletes, 47 had participated in Studies 1a and 1b and therefore the procedure to classify them as TC and CC was not repeated. The remaining athletes were divided into two groups, Training and Competition champions, based on their performance measures during training when compared to the average of last five competition performance measures. Participants in both groups were randomly assigned to recall either a successful or an unsuccessful competition performance. The non-athletes were recruited for the same study, to act as a control group. These students had no prior experience in any kind of competitive sports and were also excluded from the experience recall manipulation.

3.7.1.2 Measures and Materials

Socio Demographic Data Sheet: This questionnaire asks for information with regard to one's personal information like age, gender and the particular athletic event they were participating in. It also contained relevant information about the training measures and last five competition measures and a self-perceived rating of their performance category.

Rumination: For athletes, cognitive rumination was measured using the Rumination on Sadness Scale (RSS; Conway et al., 2000), which was modified to make it suitable for the sports setting. The scale contains 13 items that measures a general tendency to ruminate but pertaining to a sports context. An example of an item is like 'I repeatedly analyze and keep thinking about the reasons for my performance outcome in the competition'. Each item is followed by a 5-point scale with endpoints *not at all* (1) and *very much* (5). The RSS shows high internal consistency, α=.90, and good test-retest reliability, r=.70. The higher the RSS score the greater are one's ruminative tendencies. For non-athletes, cognitive rumination was measured using the original Rumination on Sadness Scale (Conway et al., 2000). For

example, “I repeatedly analyse and keep thinking about the reasons for my sadness.” (see Appendix B.1).

Anxiety: For the athletes, competitive anxiety in sports was measured using the Sports Competition Anxiety Test (SCAT; Martens et al., 1990). This test is used to measure competitive trait anxiety. Test scoring is based on 10 questions that ask individuals how they feel when competing in sports and games. For example, “When I compete, I worry about making mistakes.” Each item was answered on a three-point scale (often, sometimes, hardly ever), and a summed score ranging from 10 (low competitive trait anxiety) to 30 (high competitive trait anxiety) was computed for each respondent. A satisfactory test-retest reliability (r = .77) and internal consistency (r = .95) have been reported for the SCAT (see Appendix B.2).

For the non-athletes, anxiety was measured using the State-Trait Anxiety Inventory (STAI), Form Y (Spielberger et al., 1970). This questionnaire was administered to measure the state and trait anxiety in adults. There are 40 items in total, divided into two sections of 20 questions each. The items are marked on a four-point Likert scale (Not at all, A little, Somewhat, Very much so). The magnitude of the number on the scale is indicative of the anxiety related to in the question. For example, “I feel tense, I feel jittery”. Only the scores on the trait anxiety domain were calculated to compare across both the scales. The range of scores is 20-80, with higher scores indicating greater anxiety. A good test-retest reliability was obtained for the trait measure (r = .86). With respect to concurrent validity between the STAI-T Anxiety Scale and other scales that measure anxiety, the Anxiety Scale Questionnaire (ASQ) and Manifest Anxiety Scales (MAS) have positive correlations of scores (.73 and .85) with the STAI –T. All anxiety scores from both SCAT and STAI were later converted to Z scores to make the two scales comparable (see Appendix B.5).

Perfectionism: For athletes, the two dimensions of perfectionism, striving for perfection (adaptive) and negative reactions to imperfection (maladaptive) during competitions, were measured using 10 items from the Multidimensional Inventory of Perfectionism in Sport (MIPS; Stober, Otto, & Stoll, 2004). The scale comprises 10 items, five measuring striving for perfection during competitions, for example, “During competitions/league games, I strive to be as perfect as possible”; and five measuring negative reactions to imperfection during competitions, for example, “During competitions/league games, I feel extremely stressed if everything does not go perfectly”. Participants were asked to respond on a 6-point scale from 1 = ‘‘never’’ to 6 = ‘‘always’’ on reading the items, and a summary score ranging from 5 (low) to 30 (high) for each dimension was computed. The reliability was satisfactory for both

striving for perfection during competitions (Cronbach's a = .93, .90, .90, .93) and negative reactions to imperfection during competitions (a = .92, .86, .84, .84). For the non-athletes, the same scale was modified (MIP-modified) in a more general, rather than a sport set up, where they were asked to indicate the degree to which they do certain things generally in their life. For example, "I feel extremely stressed if everything does not go perfectly." (see Appendix B.3).

3.7.1.3 Procedure

3.7.1.3.4 Establishing Training and Competition champions

Sixty-seven athletes from Wales, both males and females, were selected. The 'Training' and 'Competition' champions were determined using an objective measurement of the performance that was taken during the athlete's training period and compared against an average score of previous five competition measures. This procedure was exactly the same as that used in Study 1a. However, this procedure was not repeated for athletes who had participated in the previous study where the classification was already made. After determining the group the athlete would belong to, they were also asked a self-perceived rating of where they thought they performed better – Training or Competition.

3.7.1.3.5 Nature of Experience recalled

The athletes were asked to think about either a successful or an unsuccessful experience in competitions for a minute. They were later instructed to narrate the experience to the experimenter in detail. The content of the experience included the venue, weather conditions, date, and description of their warm up, how one was feeling before, during and after the event and so on. The assignment of the experience recall was random.

3.7.1.3.6 Questionnaire administration

Questionnaires - RSS (modified), SCAT and MIPS were administered to athletes and to non-athletes – RSS, STAI, and MIP (modified). This was followed after the experience recall for the athletes. The order of questionnaires was always counterbalanced.

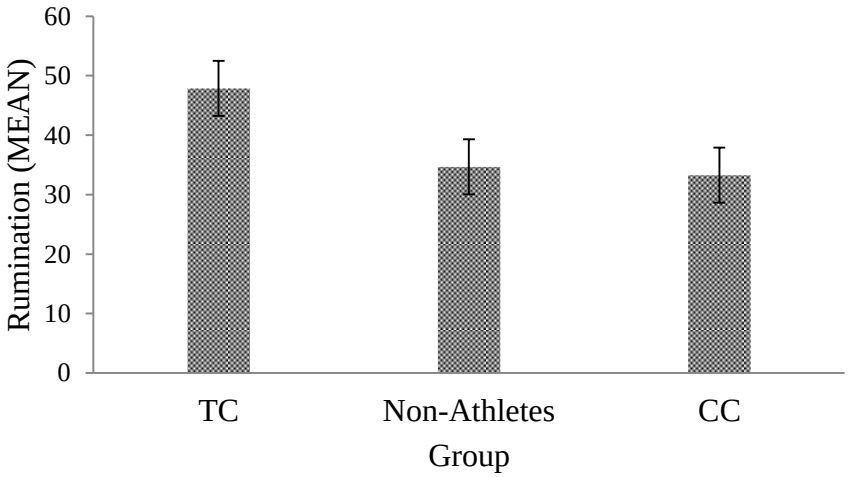
3.7.2 Results

All performance measurements were converted to IAAF (International Association of Athletic Federation) points scale to compare across disciplines. The results obtained are explained below in two sections: The first section reveals general group differences (TC vs.

CC vs. Non-athletes) in cognitive rumination, perfectionism and competition anxiety data and were analysed using a between-subjects multivariate analysis of variance (MANOVA). The second section shows interaction effects of cognitive rumination and experience recalled (successful vs. unsuccessful) and also the role of perfectionism in predicting cognitive rumination in the two groups was determined using moderation analysis.

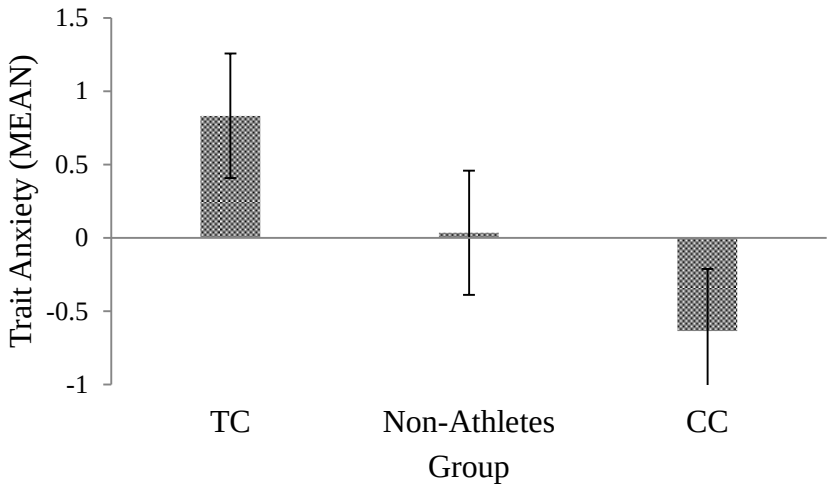
3.7.2.1 Main effects

Figure 3.1: Group differences in cognitive rumination



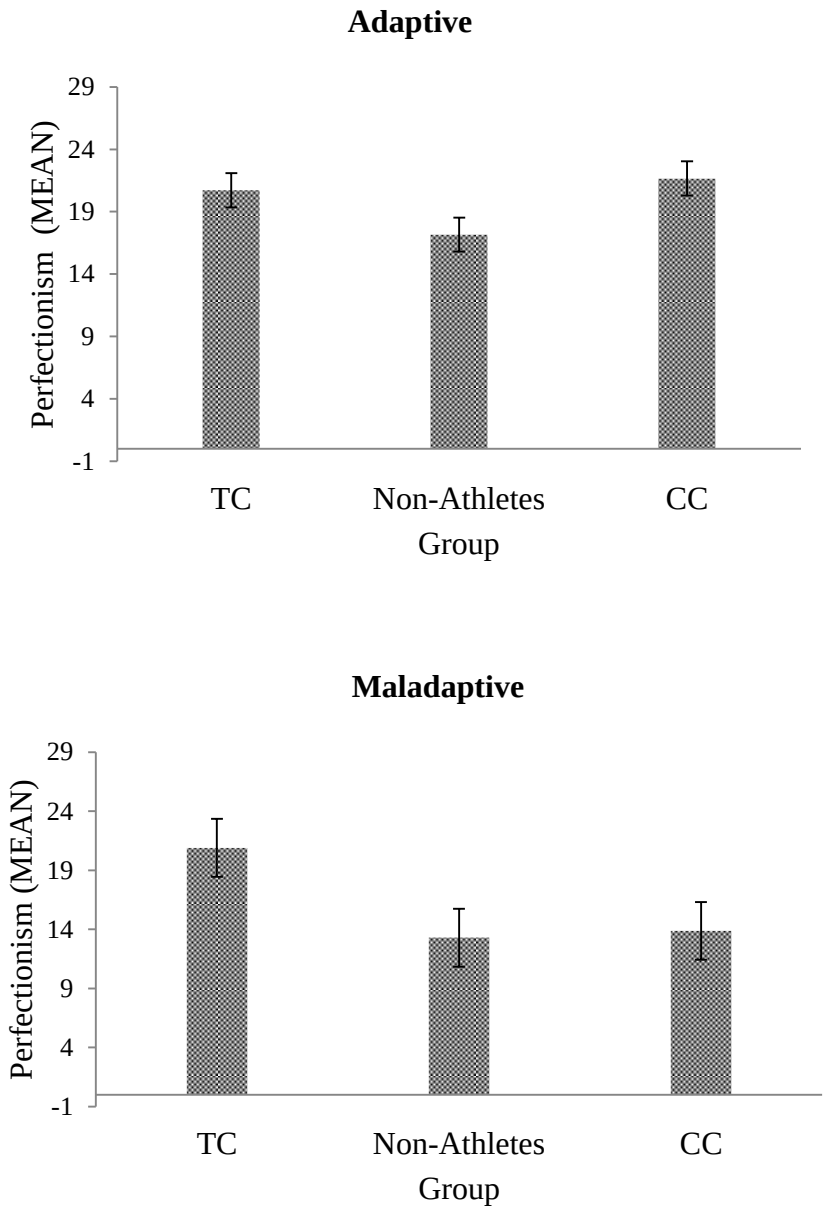
The total score on the RSS scale was calculated for each participant to obtain the overall rumination score. The ANOVA revealed a significant main effect of group on rumination, F (2, 95) = 32.77, MSE = 61.12, $p < .01$, *partial* η^2 = .408. As seen in Figure 3.1, TC show greater levels of rumination (M = 47.86, SD = 5.20) than CC (M = 33.28, SD = 5.94) and the non-athletes (M = 34.68, SD = 11.16). An LSD post hoc test was conducted and it was seen that, TC showed significantly higher levels of rumination when compared to CC, t (95) = 12.65, p <.01 and non-athletes, t (95) = 6.53, p <.01. However, there was no difference in levels of rumination between non-athletes and CC, t (95) = 0.74, p = 1.00.

Figure 3.2: Group differences in anxiety



The total score on the SCAT and STAI scales was calculated for each participant to obtain the overall anxiety score. All scores from both scales were converted to Z scores to make the scales comparable. The ANOVA revealed a significant main effect of group on anxiety, F (2, 95) = 29.19 MSE = .606, p < .01, *partial* η^2 = .381. As seen in Figure 3.2, TC show greater levels of anxiety (M = 0.832, SD = 0.647) than CC (M = -0.635, SD = 0.714) and the non-athletes (M = 0.035, SD = 0.948). An LSD post hoc test was conducted and it was seen that TC showed significantly higher levels of anxiety when compared to CC, t (95) = 7.64, p <.01, and non-athletes, t (95) = 3.96, p <.01. While the non-athletes seemed to maintain an average level of anxiety, CC showed significantly lower levels when compared to non-athletes, t (95) = 3.55, p <.01.

Figure 3.3: Group differences in perfectionism



The total score on the MIPS scale was calculated for each participant to obtain the adaptive and maladaptive perfectionism score, respectively. For adaptive perfectionism, the MANOVA revealed a significant main effect of group, F (2, 95) = 13.68 MSE = 13.50, p < .01, *partial* η^2 = .224. As seen in Figure 3.3, TC (M = 20.72, SD = 3.46) and CC (M = 21.66, SD = 3.57) show similar levels of adaptive perfectionism, although greater than those of non-athletes (M = 17.16, SD = 3.98). An LSD post hoc test was conducted and it was seen that, TC and CC did not differ in the levels of adaptive perfectionism, t (95) = 1.03, p = .305, although the non-athletes showed lower levels of adaptive perfectionism when compared to both TC, t (95) = 3.75, p <.01 and CC, t (95) = 5.05, p <.01. For maladaptive perfectionism,

the MANOVA again revealed a significant main effect of group, F (2, 95) = 29.19 MSE = 10.35, p < .01, *partial* η^2 = .526. As seen in Figure 3.3, TC (M = 20.90, SD = 3.06) show higher levels of maladaptive perfectionism than CC (M = 13.87, SD = 3.26) and the non-athletes (M = 13.29, SD = 3.30). An LSD post hoc was conducted and it was seen that, TC's level of maladaptive perfectionism was significantly higher than CC, t (95) = 8.86, p <.01 and non-athletes, t (95) = 9.15, p <.01. However, CC and the non-athletes did not differ in the levels of maladaptive perfectionism, t (95) = .074, p = .460.

3.7.2.2 Interactions

Figure 3.4: The role of experience (successful vs. unsuccessful) recalled in predicting rumination between TC and CC

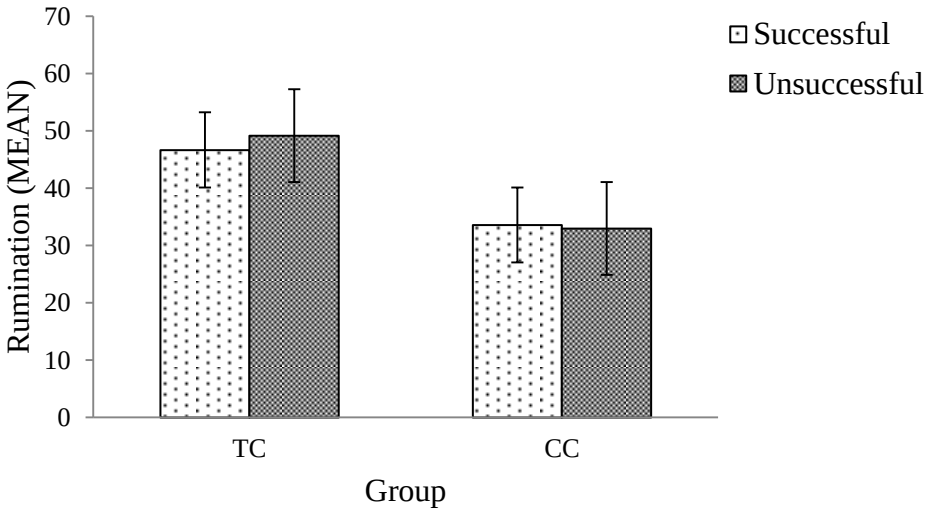


Figure 3.4 shows whether the experience recalled, either successful or unsuccessful, had an impact on the rumination scores amongst TC and CC. The ANOVA revealed a clear main effect of group, F (1, 95) = 56.69, MSE = 61.91, p <.01, *partial* η^2 = .379, as seen earlier. However, there was no main effect of experience nor was there an interaction between group and experience, p = n.s. This demonstrates that, regardless of the valence of experience recalled, rumination is higher for TC than for CC.

Table 3.1: Regression of rumination on (a) maladaptive perfectionism, (b) group (TC vs. CC) and (c) their interaction

	R Square	Beta	t	Sig.
Group	.822	-.750	-6.246	<.01
Maladaptive perfectionism		-.563	-1.534	.130
Maladaptive perfectionism x Group interaction		.714	2.224	.030

Figure 3.5: The role of maladaptive perfectionism in predicting rumination between TC and CC

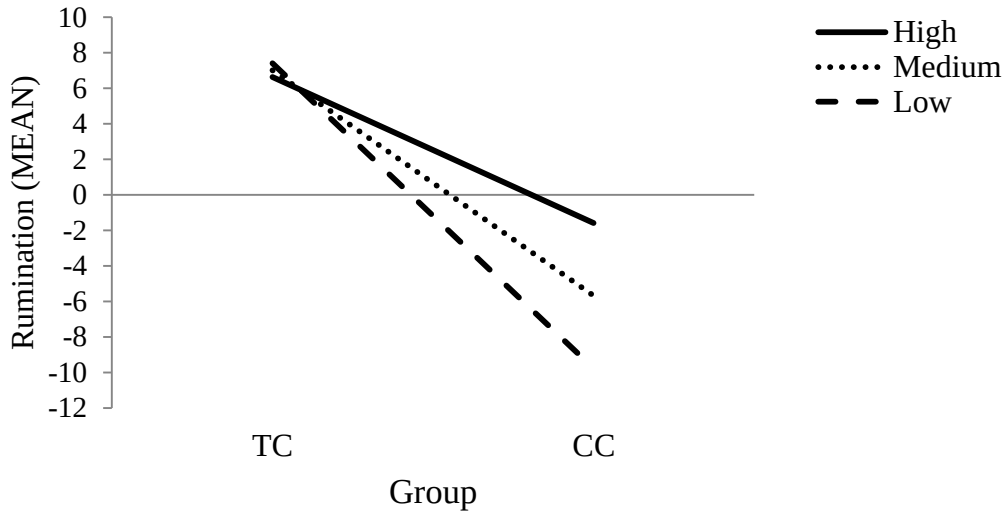


Table 3.1 and Figure 3.4 depict the significant interaction between group and maladaptive perfectionism when predicting rumination in a linear multiple regression analysis. The variables were centred before computing the interactions. The high, medium and low levels in the legend depict the levels of maladaptive perfectionism which were operationalized by +1SD (High) and -1SD (Low) from the mean. A moderation analysis was conducted and the results are illustrated in Figure 3.5. It can be clearly seen that maladaptive perfectionism moderates the differences in ruminating tendencies between TC and CC. The regression analysing the difference between TC and CC revealed a significant main effect, such that TC were higher on cognitive rumination than CC, $t(64) = -6.246$, $\beta = -0.750$, $p <$

.01. Tests also revealed a Group x Maladaptive Perfectionism interaction t (63) = 2.224, β = .714, p <.01 as seen in Table 3.1 and Figure 3.5. It can be seen from the figure that TC show high levels of cognitive rumination for high, medium and low levels of maladaptive perfectionism. Thus, regardless the levels of maladaptive perfectionism, TC exhibit high levels of rumination. In contrast, level of maladaptive perfectionism does play a role in CC, wherein higher levels of higher levels of maladaptive perfectionism results in higher level of ruminative tendencies than when maladaptive perfectionism is lower. The simple slopes calculated for high (B = -8.238), medium (B = -12.715) and low (B = -17.191) levels of maladaptive perfectionism were all significant at p <.01, indicating a clear difference between TC and CC in terms of rumination with maladaptive perfectionism as a moderator.

3.7.3 Discussion

The present study was designed to study group differences (TC vs. CC vs. Non-athletes) in cognitive rumination, anxiety and perfectionism. Results revealed that TC show greater levels of cognitive rumination than CC and the non-athletes, which is in line with the prediction made. Perhaps their higher levels of rumination tendencies reinforce their existing inclination to think about their past unsuccessful experience. Some of the questions in the RSS (modified) scale pertained to worrying and repetitive thinking, or analysing events concerning a competing situation. This could be indicative of the idea that ruminative tendencies proliferate existing need for constant evaluation of performance, particularly unsuccessful ones. It is important to note that most rumination research has been done only in the depression context (Nolen-Hoeksema & Morrow, 1991), so one can assume that the construct of rumination that is being studied is predominantly maladaptive in nature, or that the focus would be on negative aspects. Rumination has also been linked to worry (Fresco et al., 2002), indicating a maladaptive thinking style explanation. Thus, perhaps TC do indeed engage in a maladaptive thinking style which could go alongside the errors and biases in information processing argument (Plessner & Haar, 2006). Many theories support the idea that rumination is seen in a maladaptive style (Ingram & Smith, 1984; Lam et al, 2003; Nolen-Hoeksema, 1991; Pyszczynski & Greenberg, 1987) by discussing how rumination activates an individual's negative schema or memory. Thus when athletes encounter a stimulus, for example, feedback about their immediate performance, some of them (TC) would think about their previous unsuccessful experience or some (CC) would think about their previous successful experience. The premise of the following prediction is that if TC in

general show higher ruminative tendencies, in the event of a stressful situation, TC could make the information more self-relevant and thereby engage in faulty information processing, thereby reinstating the negative memories. These misperceptions or misattributions could lead to lowering one's expectations for the upcoming performance and thereby cause a decline in performance. The picture is obviously different for CC as their lower ruminative tendencies would not make them brood over their unsuccessful performance, and even if they do think about a successful performance, it would not consume their resources so much that it would impair the processing of information. In other words, their goals and expectations remain unaltered, regardless of the kind of information they receive or the kind of memory they think about, because they do not engage in maladaptive ruminative thoughts, similar to the case of non-athletes. The interesting aspect here is that although the non-athletes do not significantly differ from CC, they do so from TC, further reiterating the point that TC engage in maladaptive cognitive styles to a greater extent than non-athletes or CC. But the main point to address is how rumination could be a potential antecedent to 'choking'. Do athletes ruminate minutes before their event? TC perhaps have a stronger disposition to think more than CC and could ruminate more before the event, leading to 'choking', and also after the event by evaluating the negative consequences of the immediate performance thereby reinforcing a ruminative response cycle.

Similarly, results revealed that TC show higher levels of trait anxiety than CC and non-athletes. Previous research also indicated that TC experience higher levels of anxiety (Barkhoff et al., 2004) than CC. Interestingly, non-athletes seem to maintain average levels of anxiety, but CC show lower than average levels of anxiety. Potential sources of anxiety may be intrusive thoughts that either are worrisome ruminations, poor self-efficacy statements, or helplessness-oriented thoughts such as a sense of not being in control (Schachter, 2007), all pointing to the key concept of rumination. Both constructs are associated with cognitive inflexibility and difficulty in switching attention from negative stimuli (Nolen-Hoeksema & Davis, 1999). It has also been pointed out that a ruminative orientation towards performance is often associated with performance difficulties (Morrow & Nolen-Hoeksema, 1990) and is seen to increase the content of intrusive and negative thoughts that invariably diverts attention from task performance by increasing the level of self-focus (Lewis & Linder, 1997). Thus, high levels of rumination about one's performance (past, present or future) is likely to build more intrusive thoughts that might result in distraction from the task at hand, as well as in a greater focus on the negative aspects, like worry and self-doubt, thereby resulting in 'choking'. It is important here to understand the different explanations already available for

'choking'. Baumeister (1984) explains that there is an equal motivation level to perform well, but while facing the situation of self-evaluation, the pressure to perform well results in 'choking'. Beilock and Carr (2001) further contribute to the explanations for 'choking' in terms of attentional disturbances caused by heightened anxiety. Hill et al. (2009) add that all athletes show equal levels of motivation prior to the event; however, moments before the event they experience 'choking' due to anxiety and as a result expect failure. Thus the process that is predicted would be that for TC, rumination tendencies could potentially lead to faulty information processing, thereby leading to lowered expectations. This, coupled with the high levels of trait anxiety, could lead to 'choking' when confronted with the potential evaluative stressor - the competition. For CC the low levels of trait anxiety and perhaps optimal levels of state arousal, without the presence of ruminative tendencies, might prevent them from experiencing a 'choke' response. This model addresses the processes involved in 'choking' before the event, in the form of lowered expectations and also 'choking' during the event, in the form of the experience of state anxiety.

Results were seen in the expected direction with anxiety and cognitive rumination. For perfectionism it was found that TC showed higher levels of maladaptive perfectionism than CC and the non-athletes. Maladaptive perfectionism is concerned with negative reactions to mistakes and doubts about one's own actions. It has been found earlier that perfectionism in athletes is related to competitive anxiety that may ultimately undermine performance (Flett & Hewitt, 2005). Thus one can interpret that TC scrutinize themselves rigidly and when their striving for perfection is replaced with negative reactions to goals that were not achieved. This might in turn result in an anxious state of being and thereby, performance slumps can be seen. This is an important finding that re-establishes the idea that certain inherent traits play a role in determining one's cognitive styles. This is however only a proposed explanation, as the studies do not measure actual objective performance but just group differences in the antecedents that could potentially affect performance. It can be proposed that high levels inherent trait anxiety and maladaptive perfectionism could reinforce ruminative thinking styles and thereby show greater tendencies to choke amongst TC. But the adaptive dimension of perfectionism, which elaborates on striving for perfectionism yielded different results. There was no difference between TC and CC, but the non-athletes showed significantly lower levels of this trait compared to both TC and CC. This is expected since both groups comprise elite and semi-elite athletes. These athletes must have a certain standard of perfection and goal setting, for their careers depend on that, and they are equally motivated in achieving those goals. This finding is consistent with the basic notion that TC and CC do not differ in

the general level of motivation to perform. An interesting point to note is that for non-athletes, with no exposure to competitive sports, they do not necessarily have pre-set sports-related goals that they must strive towards. Also for students, since academic performance is of most salience, it is important to note that while academic performance relies on multidimensional skills, sports performance relies on very specific skills. Students' academic performance shows a more diverse pattern of success and failure. For example, failure in biology can easily be compensated by a success in mathematics. For athletes, they depend on the learning of very specific skills, for example, a pole vaulter would evaluate the performance purely on the way s/he jumps in that event and not the overall physical fitness. In other words, while evaluation of success and failure is more lenient for students without a clear cut boundary, it's not the same with athletes. This could explain why elite track and field athletes have a higher standard of perfectionism than students, mainly because of the specificity of the skill being used for performance evaluation. To summarise, Ellis, 1982 (as cited in Koivula et al., 2002) said that more traits of adaptive perfectionism and fewer traits of maladaptive perfectionism result in greater championship performance, as one can see amongst CC. The difference clearly lies in the maladaptive dimension of perfectionism. With maladaptive perfectionism there is a tendency to focus on the mistakes and evaluate the situation negatively, thereby one might lose concentration on the task at hand, such there might be a dip in performance (Frost & Henderson, 1991). A clear link is thus established between maladaptive perfectionism and performance.

Results further revealed that that maladaptive perfectionism seemed to play a major role in determining when TC and CC would demonstrate greater levels rumination. Research indicated that maladaptive perfectionists tend to experience excessive cognitive rumination about the need to attain perfection (e.g. Frost, Marten, Lahart, & Rosenblate, 1990, as cited in Flett et al., 2002). Interestingly, it was seen that maladaptive perfectionism seemed to act as a moderator in determining the ruminative tendencies amongst TC and CC. The level of maladaptive perfectionism makes a difference for rumination only in CC but not in TC. That is, regardless of the level of maladaptive perfectionism (high vs. medium vs. low), TC will always show higher levels of rumination, whereas in CC, higher levels of maladaptive perfectionism could lead to greater cognitive rumination than lower levels of maladaptive perfectionism. It is important to note that the highest level of rumination in CC is still lower than the level of rumination in TC, which again supports previous assumptions that TC are generally high on maladaptive perfectionism and cognitive rumination, consistent with the above predictions of TC having a more maladaptive cognitive style than CC. To add to the

above discussions results also revealed significant correlations ($p < .01$) between rumination, anxiety and maladaptive perfectionism, indicating that all these measures are related to each other.[2]

Finally, with regard to the experiences recalled (successful vs. unsuccessful), and as predicted, there were no differences within the groups with respect to ruminative tendencies between successful and unsuccessful experiences. Regardless of the kind of experience recalled, TC showed greater levels of rumination than CC. This is again in line with Study 1a, wherein the kind of information did not play a role in TC's performance or expectations as it always declined or was lower when compared to CC. This finding is important to link the key concepts of traits like maladaptive perfectionism and trait anxiety to rumination and information processing. So far we have been predicting that rumination activates an individual's negative schema and memories (Ingram & Smith, 1984; Lam et al, 2003; Nolen-Hoeksema & Morrow, 1991; Pyszczynski & Greenberg, 1987). Thus, one would assume that when TC encounter negative performance feedback, the previous unsuccessful performance memory is activated, and hence the rumination only increases. Thus once again the results point in the direction that TC could potentially show different cognitive styles, perhaps a more maladaptive style than CC. This could however raise one important point of discussion. So far we have only looked at maladaptive thinking styles, but the question is, whether TC in general think more than CC?

3.8 Need for Cognition

The idea of individual differences in a level of desire to engage in cognitive activities was first discussed by Cacioppo and Petty (1982). According to them, individuals who are low and high in need for cognition always make sense of their world, but they tend to abstract meaning, assume various positions and solve problems differently. Individuals high in need for cognition are thought to be more likely to use effort in information acquisition, reasoning, and problem solving to cope with a wide range of predicaments in their world. Previous studies already predicted the role of information processing in determining subsequent performance amongst athletes, thus it can be assumed that athletes with high need for cognition could process any kind of information (presence of the audience, internal worries or fears, expectations from self and others, past experiences and so on). And since the effort used to continually process the information is of a great extent, one might not have enough

[2] See Appendix C.2 for Table

resources to cope with the existing anxiety or stress thereby proliferating the existing condition. It has been argued that those individuals high in need for cognition have a lesser tendency to ignore, avoid, or distort new information (Venkataraman et al., 1990). Thus, in a sports context, one is required to be able to block out irrelevant information that is not pertaining to one's immediate goals in order to focus on the task at hand. Thus, those who are high inn need for cognition would perhaps find it difficult to block out irrelevant information. This 'extra' information then gets processed, 'thinking' gets activated and performance decrements can be seen. It was also found that high need for cognition was related to greater information processing activity (Cacioppo & Petty, 1982) and greater need to evaluate (Cacioppo at al., 1996). All these studies point towards the desirability to study this construct amongst athletes. Although most research in this area and performance has been done in the academic context, the theory could hold true for elite athletes as well, where performance is more in terms of a motor task rather than in terms of reading or preparing for exams. Could athletes with higher need for cognition, in a critical performance situation process more information from the environment which diverts attention from the task at hand? This again is an instance of how the two theories in the choking literature could be moderated by yet another construct.

3.9 Study 2b

The following study assessed need for cognition amongst athletes and non-athletes, using the Need for Cognition Scale developed by Cacioppo and Petty (1982). In line with the previous findings that TC were higher on rumination than CC, it was predicted that the TC will also be higher on the need for cognition construct than CC and non-athletes. Also, in order to test the assumption that those with high need for cognition would show greater information recall (Cacioppo et al., 1983), two stories were presented to the participants. One was about a volcano that erupted in Iceland, and the second was specific to sports performance, being about how the Jamaican athletes dominated the sprint events at the 2008 Beijing Olympics. Information recall was measured by calculating the number of keywords that the participant recalled out of a total of fifteen keywords presented by the experimenter.

3.9.1 Method

3.9.1.1 Participants

A total of 91 participants were included, of which 60 were elite track and field athletes from Wales and England, and 31 were non-athletes who were undergraduate students of

psychology. Forty-seven men and 44 women were recruited in the age range of 16 – 30 years. Mean age was 22.47 years, *SD* = 3.25. These athletes had been training and competing for a minimum period of three years. All 60 athletes were repeat participants from Studies 1a, 1b and 2a and so the procedure to divide them into TC and CC groups was not repeated. For the second part of the study a total of 32 elite track and field athletes from India were recruited, including 23 men and nine women, in the age range of 16 – 30 years. Mean age was 20.25 years, *SD* = 2.93. These athletes were training and competing for a minimum period of three years. Twelve athletes had taken part in Study 1a while the rest were divided into two groups, Training and Competition champions, based on their performance measures during training when compared to the average of last five competition performance measures.

3.9.1.2 Measures and Materials

Sociodemographic data sheet: This questionnaire asked for information with regard to age, gender, the particular athletic event they were participating in, and a self-perceived classification of their performance category – Training or Competition Champions. Relevant information about the current training measures and the five most recent competition measures that were recorded was also included in this data sheet.

Need for cognition Scale: The Need for Cognition (NFC) Scale developed by Cacioppo and Petty (1982) was used to measure "the tendency for an individual to engage in and enjoy thinking". This scale asks individuals to rate the extent to which they agree with each of 18 statements about the satisfaction they gain from thinking, e.g. "I find satisfaction in deliberating hard and for long hours," "The notion of thinking abstractly is appealing to me," and "Thinking is not my idea of fun". Each item was answered on a 5-point scale, ranging from ‘strongly agree’ to ‘strongly disagree’. Out of the 18 items, 9 are reverse scored. The final score for each individual is a tally of the individual’s points from each of the 18 questions. Higher mean scores indicate a higher Need for Cognition. The Cronbach’s alpha for the scale was .85 (see Appendix B.4).

Information Recall: A paradigm similar to the Immediate Memory Recall subtest of the Wechsler Memory Scale (WMS) was designed to measure information recall amongst athletes. Two stories were presented to participants. One was about a volcano that erupted in Iceland and the second one was specific to sports performance which was about how the Jamaican athletes dominated the sprint events at the 2008 Beijing Olympics (see Appendix A.3). Information recall was measured by calculating the number of keywords that the participant recalled out of a total of 15 keywords identified by the experimenter.

3.9.1.3 Procedure

3.9.1.3.1 Establishing Training and Competition champions

The same procedure was used as in Study 1a.

3.9.1.3.2 Questionnaire administration

The athletes were instructed to fill out the NFC scale.

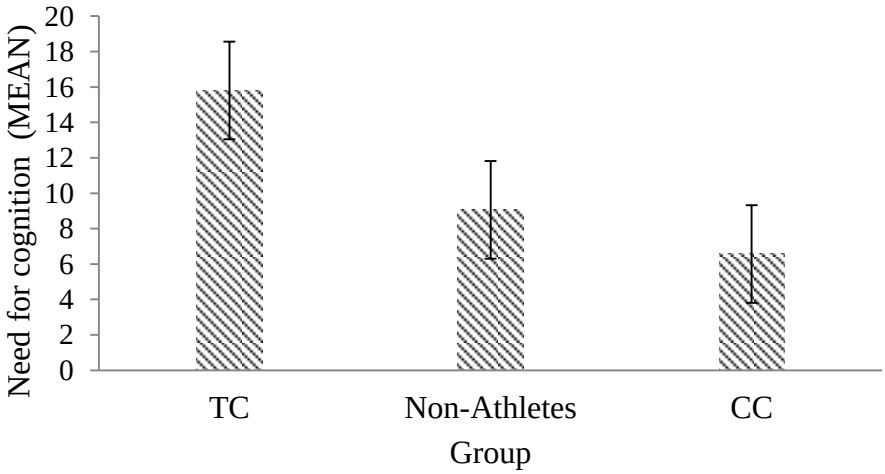
3.9.1.3.3 Information Recall

The two stories were assigned to the athletes at random. The experimenter read out the story twice, subsequent to which the participant was given a pen and paper to write down in any format (as bullet points or as running sentences) the content of the story that was presented. Each participant was given a total time of five minutes to recall.

3.9.2 Results

All performance measurements were converted to IAAF (International Association of Athletic Federation) points scale to compare across disciplines for the TC vs. CC classification. The following section presents group differences (TC vs. CC vs. Non-athletes) in Need for Cognition and information recall which were analysed using between-subjects ANOVA.

Figure 3.6: Group differences in Need for cognition



The total score on the NFC scale was calculated for each participant to obtain the overall Need for Cognition score. The ANOVA revealed a significant main effect of group, *F*

(2, 90) = 8.36, *MSE* = 76.505, $p < .01$, *partial* $\eta^2 = .160$. As seen in Figure 3.6, TC show the highest levels of need for cognition (*M* = 15.80, *SD* = 7.76) when compared to CC (*M* = 6.57, *SD* = 9.34) and the non-athletes (*M* = 9.06, *SD* = 8.80). Post hoc tests with Bonferroni correction were conducted, and TC showed significantly higher levels of need for cognition when compared to CC, *t* (90) = 4.03, *p* <.01, and non-athletes, *t* (90) = 2.87, *p* <.01. However, there was no difference in levels of need for cognition between non-athletes and CC, *t* (90) = 1.15, *p* = .251.

Figure 3.7: The role of information theme (general vs. specific) in predicting information recall between TC and CC

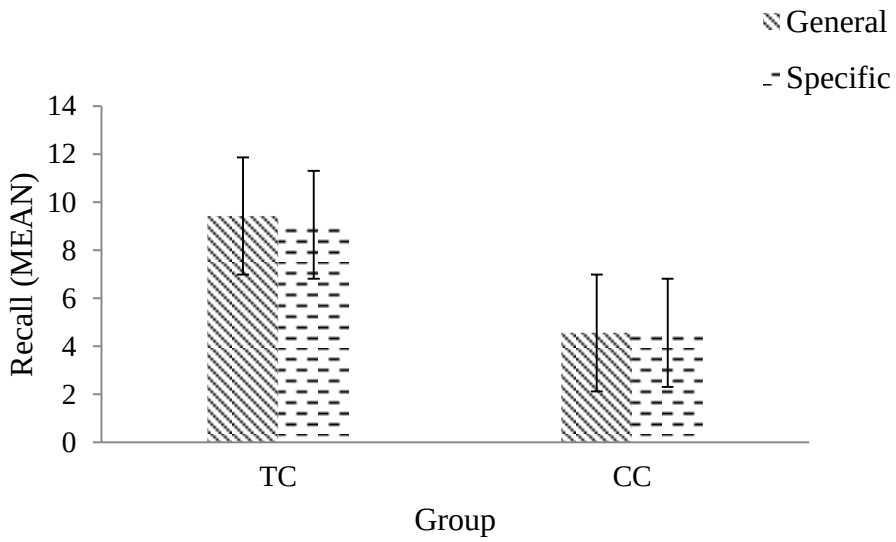


Figure 3.7 shows whether the kind of information presented, general or sports specific, had an impact on the overall information recall scores amongst TC and CC. The ANOVA revealed a clear main effect of group, *F* (1, 31) = 78.88, *MSE* = 2.21, $p < .01$, *partial* $\eta^2 = .738$. However, there was no main effect of information type and nor was there an interaction between group and information type. This implies that, regardless the kind of information presented, general or sports specific, TC always recalled more information (*M* = 9.23, *SD* = 1.18) than CC (*M* = 4.56, *SD* = 1.64).

3.9.3 Discussion

This study was designed to examine the role of need for cognition amongst TC, CC and non-athletes, and also measure information recall as a variable tapping need for cognition. As predicted, TC showed higher levels of need for cognition than CC and the non-athletes. The

findings here again point to the importance of the role of differences in information processing between TC and CC. Here we see a general tendency to think, which, as a psychological trait, is not seen as maladaptive per se. For TC one can predict that inherent higher levels of trait anxiety and maladaptive perfectionism, coupled with a relatively high need for cognition would combine to result in ruminative thinking patterns when certain stimuli are encountered. Perhaps the overriding presence of maladaptive traits in TC exacerbates the general tendency to engage in active thinking and search for information from various sources –even sources that are irrelevant as explained by Cacioppo and Petty (1982). TC thus are more susceptible to engage in receiving new information and are unable to avoid irrelevant information (Venkatraman et al., 1990) and would ruminate about existing information, past unsuccessful memories, current states of anxiety and worry, engage in altering their expectations, lose focus from the existing task at hand and finally 'choke' under pressure. For CC obviously the picture is different, as their low need for cognition facilitates disengagement from new irrelevant information, thereby aiding in obtaining optimal performance (Venkatraman et al., 1990).

It is known that athletes in general are exposed to different kinds of information, be it a message from coaches, audience expectations or managing one's own worries. Greater effort in information processing and analysing was associated with those individuals high in need for cognition (Cacioppo & Petty, 1982). It is of course impossible to ignore all information available but as implied earlier, the key to successful competition performance probably lies in focusing on information pertaining to one's immediate goal and blocking out other irrelevant information. Given such preconditions, as TC show higher need for cognition, they perhaps draw out more information from the environment than required and are unable to block out irrelevant ones which theoretically means that they might engage in more effortful information processing. It was also found that high need for cognition was related to greater desire for control (Thompson, Chaiken, & Hazlewood, 1993, as cited in Cacioppo at al., 1996) and greater need to evaluate (Petty & Jarvis, 1996). As a matter of fact, one could even argue that these pre-existing need for cognition tendencies perhaps contribute to an athlete developing into a TC, because excessive thinking is considered to be an important antecedent to choking. If TC continuously choke in competitions, or in other words, experience failure in competitions, they immediately fall into the TC loop.

To extend the above mentioned findings further, the present results revealed that regardless of the kind of information presented, general or sports specific, the overall information recall was higher amongst TC compared to CC. This further promotes the

existing notion that the presence of information is sufficient for any kind of thinking process to be activated amongst TC. This is again in line with results from Study 2a, wherein regardless of the kind of information recalled (successful or unsuccessful), TC showed greater levels of rumination than CC. This again was very specific to sports and entailed a manipulation that was evaluative towards the athletes' performance levels. These constructs point to one basic idea – that the role of thinking/cognition might integrate the existing theories of choking and might add more substance to what seems like an elusive concept.

As of now it has been established that one of the constructs that differentiate TC and CC is need for cognition. Information processing activity is highly related to this construct (Cacioppo & Petty, 1982). It is however vital to understand the role of information processing in detail, especially with regard to the specific kind of information that an athlete might process. Study 1a on priming and performance used negative and positive primes as a source of information. The information provided was about general performance about an athlete with regard to the group they belong to. Study 1b focused more on technical feedback as a source of information, which again showed that TC declined in performance when this information was presented. Study 2a explored the relation between inherent traits of anxiety, perfectionism and the maladaptive thinking style of rumination and how that could potentially affect information processing. Study 2b stressed the importance of the presence of information, regardless of its content, with respect to its role in triggering information processing. Both studies 2a and 2b seem to fill the gap in the picture seen in Studies 1a and 1b. The presence of information affects performance, detrimentally for TC and beneficially for CC. But what are the crucial factors for the change in performance, from the time the information was presented? This question has been partially addressed in studies 2a and 2b. So the question remains, why is this maladaptive style of information processing maintained amongst TC? How do CC disengage from irrelevant stimuli and facilitate adaptive processing? The maintenance of a particular cognitive style surely could be a result of some basic processes of conditioning. In other words, one sees a stimulus and one responds to that based on a familiar pattern due to prior repetitive exposure. Thus if TC are constantly exposed to failure and CC are exposed to success, could it be that this 'failure' or 'success' exposure triggers a pre-existing cognitive style? Could TC thus be a product of learned helplessness and CC continue to maintain a positive feedback loop?

Chapter 4: Stuck in a rut: Evidence towards a learned helplessness model and an inversed learned helplessness model for failure and success maintenance.

4.1 Introduction

So far it has been established that TC objectively perform better during training when compared to competitions and CC objectively perform better in competitions when compared to training. In other words, one might translate this as TC experiencing 'failure' in competitions and CC experiencing 'success' in the same. Study 1a revealed that TC's performance in competitions was lower than CC's performance in competitions. This finding further reiterates the experience of repetitive failure and success amongst TC and CC. The bigger question however is whether this repetitive exposure to failure and success would have an impact on the athletes' cognitive styles, and thereby an impact on their performance during competitions, in as much as cognitive styles might prove predictive of performance outcomes. The previous chapters introduced the idea that both TC and CC would be subjected to similar stimuli but TC would engage in a maladaptive information processing style while CC would disengage from irrelevant stimuli and facilitate adaptive processing. It is thus predicted that since TC already display maladaptive levels of rumination, anxiety, perfectionism and need for cognition, these traits could have an influence on the way they process information, especially after prior exposure to failure experiences. Similarly, CC's adaptive levels of rumination, anxiety, perfectionism and need for cognition would influence the information processing style in a way conducive to one's success experiences and thereby result in having a more 'adaptive' cognitive style. Perhaps the maintenance of these cognitive styles for TC and CC respectively is because of the conditioning of failure and success experiences. Furthermore research has shown that repeated exposure to failure could induce learned helplessness amongst individuals (e.g., Boyd, 1982; Coyne, Metalsky, & Lavelle, 1980; Frankel & Snyder, 1978; Kuhl, 1984, as cited in Kofta & Sedek, 1989). Alloy and Abramson (1979) also argue that perceived uncontrollability is an important determinant of learned helplessness. Thus for TC would prior exposure to repetitive failure result in judgements of perceived uncontrollability as a result of their maladaptive information processing style and thereby be a product of learned helplessness (Abramson et al., 1978; Maier & Seligman, 1976; Seligman, 1975)? CC on the other hand have more successes than failures in competitions. Hence would prior exposure to repetitive success result in judgement of illusion of control (Langer, 1975) for CC as a result of an adaptive information processing style and thereby be a product of 'inversed' learned helplessness? Learned helplessness

however as a concept has a few overlapping definitions, some based on exposure to prior uncontrollable situations and some based on exposure to prior failure situations. This chapter encompassing two studies addresses the following:

Most learned helplessness research has been conducted in depression or the cognitive performance domain. The effects always pertain to performance decrements in the subsequent task. This concept has not been explored in the sports domain, which seems like a fairly obvious application. Thus the following studies would help address the idea that learned helplessness could exist in sports.

There exist overlapping definitions of learned helplessness either due to prior exposure to uncontrollable events or prior exposure to failure experiences. The following studies would try to address the fact that the experience of learned helplessness in not an 'either/or' situation, but could be a combination of both. The following two studies will also throw some light on the concept of 'illusion of control' and try to explain the phenomenon as interacting with a motivational component.

4.2 Learned Helplessness

According to the original theory of learned helplessness (Abramson et al., 1978; Maier & Seligman, 1976; Seligman, 1975), when organisms are exposed to uncontrollable events, subsequent behaviour is disrupted. The organism then learns that the outcomes are uncontrollable. Hence, the organism forms an expectation that future outcomes will also be the same. This makes new contingencies difficult to learn and undermines the motivation to initiate activity which leads to subsequent performance deficits. Therefore, according to this position, impaired performance followed by the experience of uncontrollability is due to a decrease in motivation (Hiroto & Seligman, 1975). Another line of thought to explain the effect of learned helplessness is that of repeated failure rather than noncontingency which produces performance deficits in subsequent tasks (e.g., Boyd, 1982; Coyne, Metalsky, & Lavelle, 1980; Frankel & Snyder, 1978; Kuhl, 1984, as cited in Kofta & Sedek, 1989).

4.3 Learned Helplessness due to repeated failure

It has been documented that failure can lead to performance deficits on subsequent tasks (e.g., Hiroto & Selgiman, 1975; Mikulincer, 1986, 1989a; Stiensmeier-Pelster & Schurmann, 1990, as cited in Witkowski & Stiensmeier-Pelster, 1998). When offering both success and failure feedback, helplessness was produced among participants who had previously been confronted with insoluble problems (Griffth, 1977, as cited in Gernigon et

al., 1999). It was also shown that although the manipulations of controllability are specified as "uncontrollable events" (Abramson et al., 1978), they can be accurately described as experimenter-induced failure (Buchwald et al., 1978; Lavelle, Metalsky, & Coyne, 1979, as cited in Coyne et al., 1980). However the speculations still exist as to what really causes the learned helplessness effect. For instance, Kofta and Sedek (1989) argue that the helplessness effect is independent of the severity of failure experience during pre-exposure, and a mere contact with noncontingency can evoke performance deterioration in subsequent tasks. On the other hand, Witkowski and Stiensmeier-Pelster (1998) argue that performance deficits following failure are interpreted in the line of self-esteem protection. They further add that this effect is particularly seen only in public testing conditions rather than private testing conditions as seen in other learned helplessness literature. One very common public 'testing' condition is the context of sports events. Competitions can be seen as an analogy to a 'testing' condition because no competition is devoid of loyal audiences, hence making the event 'public'. Thus, is there any evidence of learned helplessness effects in the sporting context?

4.4 Learned Helplessness in Sports

Dweck (1980) demonstrated that learned helplessness does exist in sport by using examples from various famous athletes' careers. In fact, many athletes who are not so helpless as to drop out continue to practise their discipline even though they do not believe they will succeed at the highest level (Dweck, 1980 as cited in Gernigon et al., 1999). Unfortunately, there have been very few studies that have directly examined the presence of learned helplessness in sports with regard to attributional differences. Seligman *et al.* (1990) found that swimmers with an optimistic explanatory style improved or maintained their performances, whereas pessimistic swimmers became helpless and their performances deteriorated. Prapavessis and Carron (1988) also argue that attributional style differences exist between athletes who demonstrate maladaptive achievement patterns associated with learned helplessness versus those who do not. Furthermore Biddle et al. (2001) and Hardy, Jones, and Gould (1996) argue that controllability may be an important predictor of expectations which is directly linked to performance (as cited in Rees et al., 2005). Hence, one can gather that studying aspects of controllability is essential in investigating learned helplessness effects in sports.

4.5 Measuring controllability

One of the key concepts to understanding the construct of 'controllability' is to define the way it is measured. That is, how accurate are people in judging how much control they exert over events (Alloy et al., 1982). Thus it basically includes making judgements of control on a task and the level of estimation – underestimation or overestimation - determines the magnitude of perceived controllability. Alloy and Abramson (1979) for instance noticed that depressed college students underestimated how much control they had over objectively controllable events when compared to nondepressed students. Another area which hints at the possibility and scope for extending controllability studies is that of causal learning. David Hume (1739/2010) was the pioneer in explaining causal learning as a crucial cognitive process that provides us with the ability to interact with our environment. Creating a representation of the causal structure of the world around us allows us not only to understand and predict the occurrence of events but also to intervene in the world and control our environment, directing our behaviour in order to achieve goals and fulfil desires. Representations of causal relations must therefore be constructed in some way using information about the events that occur in the world around us. Hume further proposed that there are crucial "cues to causality" that underpin causal learning, and he identified the most important determinants as (a) temporal order—causes must precede their effects; (b) contingency— regular co-occurrence of putative causes and effects; and (c) contiguity—the closeness in time and space of these events. Later on, Shanks, Pearson, and Dickinson (1989), demonstrated the crucial role played by contiguity by developing a paradigm that involved judging how effective pressing the space bar on a keyboard was in causing a triangle to flash on a computer screen. This paradigm was later used and replicated by several researchers studying causal learning (e.g., Beuhner and May, 2003; Reed, 1993). But how does this translate to studying 'perceived controllability' or 'judgements of control'? If one examines the determinants of causal learning carefully, it can be seen that they can be applied to explain learned helplessness. Temporal order—causes must precede their effects; uncontrollable experience occurs before learned helplessness effects. Contingency— regular co-occurrence of putative causes and effects; most often the uncontrollability experience and performance deficits occur together. Contiguity—the closeness in time and space of these events; the time from experiencing uncontrollability to producing performance deficits is immediate. Thus it would be interesting to approach learned helplessness from the perspective of causal learning. The following studies described in the present chapter use a paradigm closely related to the concept of 'causal learning' wherein 'controllability' is

measured as the difference between perceived and actual contingency. If control judgements show an underestimation, it can be interpreted as showing a 'lack of control' and if these judgements show an overestimation, it can be interpreted as showing an 'illusion of control'.

4.6 Illusion of control

Langer (1975) coined the term 'illusion of control' wherein people act as if objectively uncontrollable events were, in fact, controllable. For instance, in a broad range of studies, Langer (1975) demonstrated that when elements typically associated with skill situations (e.g., practice, competition, choice, and so on) are introduced into situations in which events are objectively uncontrollable, people's expectancies of personal success are inappropriately higher than the objective probabilities would warrant. Langer (1975) also suggested that the illusion of control is the inverse of learned helplessness. This theory runs parallel to the control motivation theory (Pittman & D'Agostino, 1989) which suggests how participants when exposed to an uncontrollable situation appeared to engage in intense efforts to solve subsequent problems. They say that an exposure to uncontrollable situations heightens the basic need for control. But the question is why would people experience an illusion of control? Research has shown that illusion of control effects are mostly seen in situations that focus on success rather than failure (Alloy & Abramson, 1979). Thus it could be predicted that CC, due to their constant exposure to success might experience an illusion of control. In fact researchers argue that in situations where outcomes are largely determined by chance, people perceive more control than they actually have because they use a 'chance' heuristic (Ayeroff & Abelson, 1976; Benassi, Sweeney & Drevno, 1979; Langer, 1975; Wortman, 1975, as cited in Gino et al., 2011). A competition situation has a lot to do with ambiguity and chance, thus could CC demonstrate such illusion of control effects because they use a 'chance' heuristic? Furthermore Thompson et al. (1998) argue that if one's action is followed by a success it could easily lead to overestimations of control based on the control heuristic theory. According to this theory perceptions of control are dependent on one's intention to achieve the outcome and the perceived connection between one's action and the desired outcome. Thus if CC succeed most of the time their perception of control is increased due to strengthened connection between the action and the outcome. Thus, those with a 'failed' outcome in competitions could experience uncontrollability for future outcomes and those with a 'successful' outcome could experience an illusion of control.

4.7 Present Research

The present research was designed to systematically address the existence of learned helplessness in sports. The fundamental idea is that repetitive exposure to success or failure would result in either a sense of control or uncontrollability over the future outcomes of a similar performance related task. The basic postulate is that both TC and CC experience the same amount of motivation to achieve their goals in the competition. However, due to varied experiences of perceived controllability, expectations get altered and thereby the performance itself for TC and CC respectively. Thus the motivation to perform remains the same, but the motivation to increase control is seen only amongst CC and not amongst TC. The present studies examined the role of 'perceived controllability' in tasks that involve a stimulus-response-outcome contingency paradigm. It is important to note that these paradigms involve experiencing different levels of controllability, while at the same time measuring one's perceived controllability of the particular event occurring. These studies do not look at the impact of uncontrollability on a subsequent task performance. It is only assumed that effects seen on these tasks could be translated as an explanatory mechanism in the real performance domain as it has already been established that TC and CC have prior repetitive exposure to 'failure' and 'success'.

4.8 Study 3a

Study 3a was designed to examine differences in perceived controllability amongst a group of athletes and non-athletes in a sports-related paradigm which included a race track with two athletes on a computer screen. One of the virtual athletes was controlled by the participant; the other athlete's speed on the race was predetermined by the computer program. The aim was to make the controlled athlete increase its speed and finish the race. The speed increase was determined by the press of a space bar. Participants were instructed to press the space bar only when they heard the sound of a horn. At the end of the experiment participants made ratings of how much control they had over the athlete's speed. Three controllability schedules (High, Average, Low), were included wherein high indicates that 80% of the time the key press had the desired outcome, average indicates that it worked 50% of the time, and low indicates that the key press resulted in the desired outcome only 20% of the time. 0 indicated that the key press had no effect on the desired outcome and 10 indicated that the key press had a maximal effect on the desired outcome. Perceived controllability was calculated by taking the difference between perceived contingency and the actual contingency, such that a positive deviation from zero indicated an overestimation, whereas a

negative deviation from zero indicated an underestimation of control. Study 3a also included an additional win/loss component wherein, after every race condition, if the controlled athlete won the race participants would receive a visual feedback stating "Congrats, you won" and if the controlled athlete lost the race, participants would receive a similar feedback stating "Sorry, you lost". Although it seems quite obvious when the controlled athlete would win or lose, to make this information more salient and accessible these visual feedback aids were used. All participants received all six conditions which were presented at random. The participants were both athletes and non-athletes.

It was hypothesised that, in general, TC would show an underestimation of perceived controllability; CC would show overestimation of perceived controllability while the non-athletes would show average estimation of perceived control in both studies. It was further hypothesised that all control judgements in the win condition would be higher than in the loss condition.

4.8.1 Method

4.8.1.1 Participants

A total of 67 participants were included of whom 39 (one was excluded as an outlier) were elite and semi-elite track-and-field athletes from Wales, and 28 (one was excluded as an outlier) participants were non-athletes, who were undergraduate students of psychology. The outliers were excluded on the grounds that since the task involved judging control over an outcome, there could be cases where the question was misunderstood or it was difficult to understand contingencies. This was done so using the Cook's distance. Twenty-four men and 43 women, in the age range of 18 – 37 years, were included in the total sample. Mean age was 20.55 years, *SD* = 3.09. The athletes were training and competing for a minimum period of 3 years. All athletes were repeat participants from Studies 1a and 1b and so the procedure to classify them as TC and CC was not repeated. Both athletes and non-athletes were required to participate in a computer-based task that was conducted in individual sessions of approximately 10 minutes.

4.8.1.2 Apparatus and materials

The experiment was programmed in Python 2.4 and was conducted on a laptop at the athletics stadium for the athletes or in individual testing booths at the university for and non-athletes. Participants used the laptop's touchpad to click on appropriate buttons on the screen,

and used the keyboard to type in their responses about perceived control at the end of each condition.

The experiment began by presenting participants with an image of a race track on the computer screen, resembling those at athletics stadiums (the image was created using Adobe Photoshop 7.0). At two different points on the track two figures were presented. These were positioned at the start of the race track, in different lanes. In other words, they shared the same location on the y-axis but different locations on the x-axis. These figures were intended to represent athletes running a race along the track. One athlete was coloured blue, the other red. When participants clicked the appropriate button to begin the race, the participant-controlled athlete and the computer-controlled athlete began an animation cycle to create the impression that they were running across the race track. Whichever athlete crossed the finish line first was designated the winner. At end of the experiment, participants were directed to a screen where they typed in their demographic details such as age and gender, and additionally for athletes, the particular athletic event they were participating in. Participants also typed in their self-perceived rating of their performance category (TC vs CC). Participants used headphones to listen to the auditory stimuli, which was the sound of a horn during each condition. The horn was used as a cue for the participants to make an attempt to control the speed of the athlete.

4.8.1.3 Procedure

4.8.1.3.1 Establishing Training and Competition champions

The athletes who participated in this study were previously classified objectively as TC and CC (see Study 1a), and thus the classification procedure was not repeated.

4.8.1.3.2 Perceived Controllability Task

Participants were informed that the red athlete was “their” athlete, and that they could influence that athlete’s behaviour, while the blue athlete was controlled solely by the computer. Thus the instructed goal was to make the controlled athlete in, run as fast as it could to finish the race, while competing with the computerized athlete. They read on-screen instructions that outlined the nature of the task and went on to the experimental set-up by pressing the button ‘BEGIN EXPERIMENT’. Participants were informed that both athletes would automatically start to run with the pressing of the button ‘START RACE’ on the screen. It was explained that while they were not in full control of the athlete in red, they could affect their athletes’ speed by pressing the space bar, which may then deliver a speed

boost to their athlete, at various points in time. Thus the role of the participant was to try and improve the athlete's speed. At regular intervals throughout the race, a horn sound would be heard. At the sound of the horn, participants were instructed to press the 'SPACE BAR' as quickly as possible. The 'SPACE BAR' managed the speed of the controlled athlete. The horn was used as a cue for the participant to make an attempt to control the speed of the athlete. This either gave the athlete a temporary speed boost or had no effect at all. The race automatically ended once both the athletes crossed the finish line. At the end of each race, participants received a feedback of either 'win' if their athlete won the race or a feedback of 'loss' if their athlete lost the race. There were six such races, and at the end of each race participants typed their answers into the appropriate text box and clicked on the SUBMIT button to proceed to the next condition. In total, the experiment lasted around 10 minutes.

4.8.1.4 Design

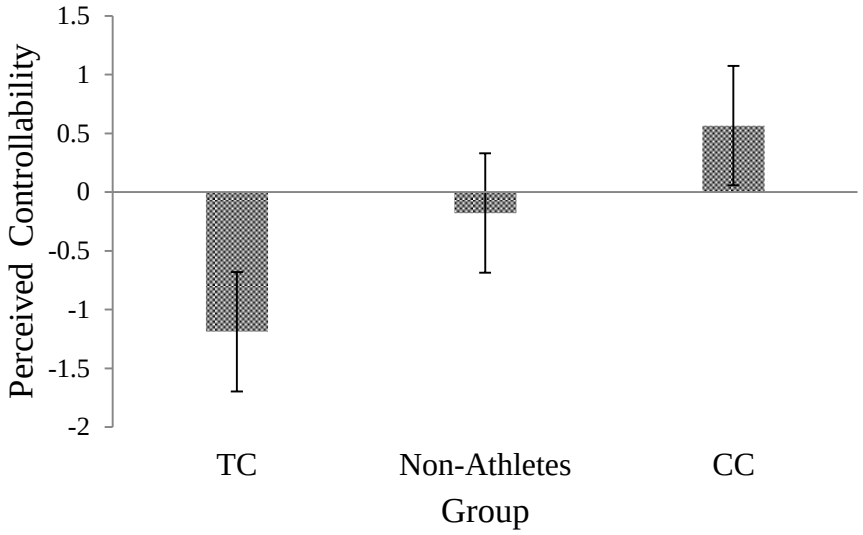
Two factors were manipulated in this experiment, controllability schedules (High vs. Average vs. Low) and win-loss feedback (Win vs. Loss) and were tested between participants (TC vs. CC vs. non-athletes). Thus, a 3x 3 x 2 mixed design was used. Each participant was subject to 6 different conditions. The controllability schedules were based on the probability of an outcome following an action (e.g., Shanks & Dickinson, 1991Wasserman; Chatlosh & Neunaber, 1983). A high-control schedule had an outcome probability of .80, an intermediate-control schedule had an outcome probability of .50, and a low-control schedule had an outcome probability of .20. In other words, each response performed had either an 80%, 50% or 20% chance of producing the outcome (causing the controlled athlete to run faster) respectively. Accordingly, with each race providing 10 opportunities to respond, there were also a maximum of 10 possible outcomes. It is crucial to note that participants were required to respond only after the sound of the horn. The time window to respond with a key press to the horn was between the sound of the first horn and the sound of the second horn. The horns were strategically designed in accordance to where the athletes were on the track. Thus, if the participant pressed the space bar immediately after the horn and if there was a speed boost it would be at its maximum level. The later the participant pressed the space bar lower was the intensity of the speed boost. Having said that there would always be an obvious increase in speed from the regular running speed, but the intensity would decrease if the participant pressed the space bar later than the sound of the horn. This is because the speed boost was designed to cover a specific distance from the sound of the first horn to the sound of the second horn. However, successive boosts did not carry over, that is, if

participants failed to press at the sound of the first horn and heard the next horn, it was considered that they had missed the previous chance. At the end of each race, participants either received a win feedback saying 'Congrats, you won' if the controlled athlete won the race, or a loss feedback saying 'Sorry, you lost' if the controlled athlete lost the race. Subsequently, participants were asked to indicate on a rating scale ranging from 0-10 how effective they thought pressing the space bar was at making the controlled athlete run faster, with 0 indicating that the button press on the athlete's speed was totally ineffective, and 10 indicating that the button press on the athlete's speed was maximally effective. Perceived controllability as a dependent variable was measured by calculating the difference between perceived and actual contingency. It is important to note that contingency was based on the conditional probability of an effect occurring, given the participant had emitted a response after a horn signal. The effects were always contingent on a participant's responses. A negative value indicated tendencies towards a lack of control and a positive value indicated tendencies towards and illusion of control. Values averaging around 0 were interpreted as having accurate levels of perceived controllability. Thus, each participant experienced 6 races – High controllability Win, High controllability Loss, Average controllability Win, Average controllability Loss, Low controllability Win and Low controllability Loss. The presentations of races were randomized.

4.8.2 Results

The first section presents the main effects of group (TC vs. CC vs. Non-athletes), win/loss condition and controllability schedules (High vs. Average vs. Low) on perceived controllability. The second section illustrates the interaction between group and controllability schedules on perceived controllability. All these results were achieved on the basis of a 3 x 2 x 2 repeated measures ANOVA, with post hoc comparisons being calculated using simple effects with Bonferroni corrections.

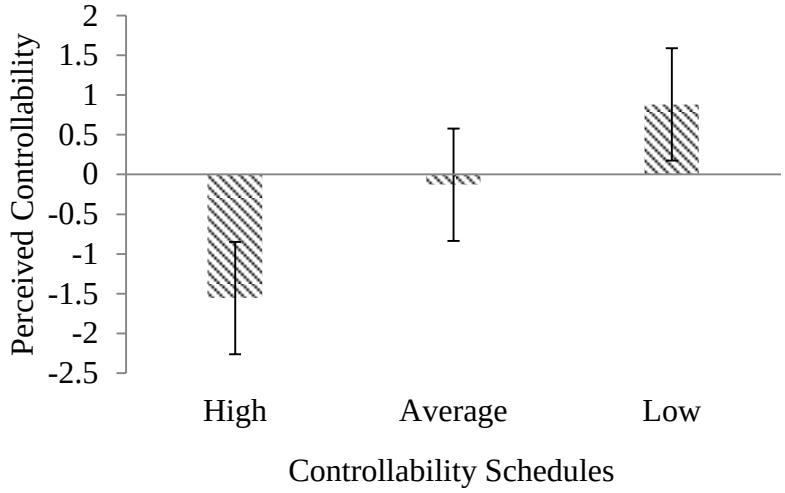
Figure 4.1: Group differences in perceived controllability



The repeated measures ANOVA revealed a significant main effect of group on perceived controllability, F (2, 64) = 10.25, MSE = 7.25, $p < .01$, *partial* η^2 = .243, pooled across all three levels of controllability schedules (High, Average, Low) and the feedback (Win, Loss). As seen in Figure 4.1, an LSD post hoc test revealed that TC (M = -1.189, SE = .278) showed significantly lower levels of perceived controllability than CC (M = .565, SE = .224), t (64) = 4.53, $p < .01$, and the non-athletes (M = -.179, SE = .203), t (64) = 2.54, p = 0.14. CC showed higher levels of perceived controllability when compared to non-athletes, t (64) = 2.40, p = 0.19. The non-athletes seem to however show average levels of perceived controllability with their scores being close to '0'.[3]

[3] Group differences as a function of perceived controllability were tested against '0', under the assumption that '0' is the level of 'accurate' ratings. Both TC and CC significantly differed from '0' (p<.01), while the difference was non-significant amongst non-athletes.

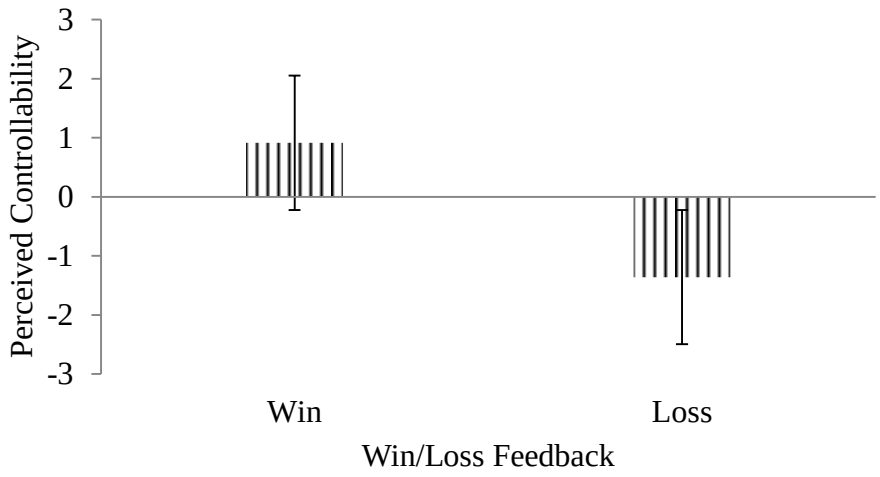
Figure 4.2: Differences in controllability schedules in perceived controllability



The repeated measures ANOVA revealed a significant main effect of controllability schedules on perceived controllability, F (2, 128) = 62.78 MSE = 2.964, , p < .01, *partial* η^2 = .495, pooled across all three groups (TC, CC, Non-Athletes) and the feedback (Win, Loss) as seen in Figure 4.2. Simple effects with Bonferroni corrections further revealed that when exposed to a high controllability schedule, that is, where 80% of the time the key press increased the participant controlled the own athlete's speed, the level of perceived controllability was much lower (M = -1.519, SE = .202) compared to average (M = -.0.44, SE = .184), t (128) = 7.34, p <.01, and low controllability schedules (M = .898, SE = .172) , t (128) = 10.15, p <.01. When exposed to a low controllability schedule, the level of perceived controllability was much higher than the average schedule, t (128) = 4.44, p <.01. That is, when only 20% of the time the key press actually increased the participant controlled athlete's speed, the perceived controllability seemed to be higher. When exposed to an average controllability schedule (50%) the levels of perceived controllability were close to '0'.[4]

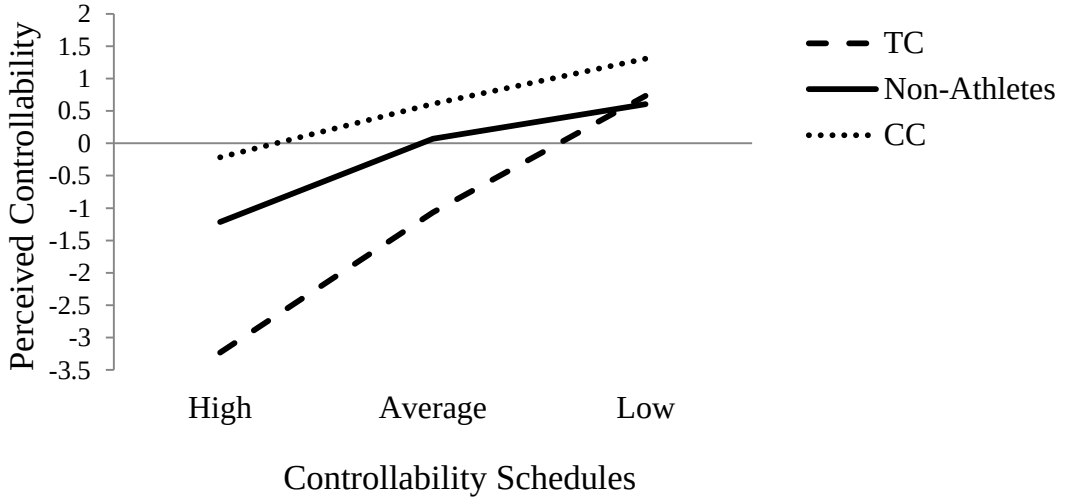
[4] Controllability schedule differences as a function of perceived controllability were tested against '0', under the assumption that '0' is the level of 'accurate' ratings. Both high and low schedules significantly differed from '0' (p<.01), while the difference was non-significant in the average schedule.

Figure 4.3: Differences in Win/Loss feedback in perceived controllability



The repeated measures ANOVA revealed a significant main effect of win/loss feedback on perceived controllability, F (1, 64) = 80.76, MSE = 6.104, $p < .01$, *partial* η^2 = .558, pooled across all three levels of controllability schedules (High, Average, Low), and all three groups (TC, CC, Non-Athletes). As seen in Figure 4.3, when exposed to a 'win' feedback the levels of perceived controllability was higher (M = .916, SE = .194) than when exposed to a 'loss' feedback (M = -1.359, SE = .180).[5]

Figure 4.4: Group differences in perceived controllability as a function of controllability schedules



[5] Win/Loss feedback differences as a function of perceived controllability were tested against '0', under the assumption that '0' is the level of 'accurate' ratings. Both 'Win' and 'Loss' feedbacks significantly differed from '0' (p<.01).

The repeated measures ANOVA revealed a significant two-way interaction of controllability schedules and group on perceived controllability, F (4, 128) = 5.25, MSE = 3.00, $p < .01$, *partial* $\eta^2 = .141$ as can be seen in Figure 4.4. Simple effects with Bonferroni corrections further revealed that amongst TC, the difference in the levels of perceived controllability significantly differed from high (M = -3.125, SE = .402) and average (M = -.813, SE = .367), t (63) = 5.78, $p < .01$, high and low (M = .781, SE = .343), t (63) = 8.24, $p < .01$, and average and low, t (63) = 3.78, $p < .01$, controllability schedules. Within CC, there was a significant difference between high (M = -.217, SE = .336) and low (M = -3.125, SE = .402), t (63) = 3.85, $p < .01$ and high (M = -.217, SE = .336) and average (M = .609, SE = .306), t (63) = 2.47, $p < .05$, but the difference was not significant between average and low schedules, t (63) = 1.98, p = .157. Finally, within the non-athletes, a similar trend as in CC was obvious wherein there was a significant difference between high (M = -1.214, SE = .304) and low (M = .607, SE = .259), t (63) = 3.59, $p < .01$, and high (M = -1.214, SE = .304) and average controllability schedules (M = .071, SE = .277), t (63) = 4.26, $p < .01$, but no significant difference between average and low schedules, t (63) = 1.68, p = .294. Looking at the controllability schedules, within the high schedule TC's level of perceived controllability was significantly lower than CC, t (64) = 5.55, $p <.01$, and the non-athletes, t (64) = 3.78, $p <.01$, however CC's level of the same was only marginally higher than the non-athletes, t (64) = 2.20, p = .094. Within the average controllability schedule, TC were significantly lower than CC, t (64) = 2.97, p = .012, however the non-athletes did not significantly differ from TC, t (64) = 1.92, p = .177, and CC, t (64) = 1.30, p = .594. Within the low controllability schedule, all three groups did not significantly differ from each other. [6], [7]

4.8.3 Discussion

The present study was designed to examine differences in perceived controllability amongst a group of athletes and non-athletes in a sports related paradigm. All participants were exposed to three levels of controllability schedules, high, average and low, based on a

[6] The interaction was tested against '0', under the assumption that '0' is the level of 'accurate' ratings. In the High controllability schedule, CC did not significantly differ from '0', while TC ($p<.01$) and the non-athletes ($p<.05$) did. In the Average schedule, CC were higher than '0' and TC were lower than '0' ($p<.05$), while the non-athletes were close to '0'. In the Low schedule, all three groups were higher than '0' ($p<.05$).

[7] Similar analyses were conducted using the absolute causal ratings as the dependent variable. All main effects were replicated; however the group by controllability schedule interaction was not significant. (See Appendix C.3 for Table)

stimuli-response-outcome contingency paradigm. Perceived controllability was calculated for each participant as the difference between perceived and actual contingency. Results confirmed the main hypothesis that TC experienced a general lack of control, CC experienced a general illusion of control, whilst the non-athletes' perceived controllability was close to accurate. This is in line with proposed notion that TC and CC are subject to competition experience of repetitive failure and success respectively. This experience reinforces a cognitive style hindering or conducive to one's performance on a particular task. As previously established by several researchers (e.g., ; Boyd, 1982; Coyne et al., 1980; Frankel & Snyder, 1978; Griffth, 1977; Hiroto & Selgiman, 1975; Kuhl, 1984; Mikulincer, 1986, 1989a; Williams & Teasdale, 1982) failure can be a powerful source to elicit learned helplessness effects. The present findings provide hints about the genesis of the phenomenon, even if the measured outcome is that of perceived controllability. Alloy and Abramson (1979) have argued that controllability is a good indicator of one's inclination towards a learned helplessness tendency. Also, Biddle et al. (2001) and Hardy, Jones, and Gould (1996) argue that controllability may be an important predictor of expectations which is directly linked to sports performance. This further supports the expectation that measuring controllability would be a good indicator of impending learned helplessness effects. It is however not surprising to expect learned helplessness in sports as this phenomenon was previously established by researchers (Dweck, 1980; Prapavessis and Carron, 1988; Seligman *et al.*, 1990). Thus it can be argued from the results that TC who show an underestimation of perceived controllability could be susceptible to learned helplessness effects. The effects of learned helplessness are known to be those of performance decrements (Abramson et al., 1978; Maier & Seligman, 1976; Seligman, 1975). The effects of 'choking under pressure' are also those of performance decrements (Baumeister, 1984). This makes way for the argument that there are several antecedents leading to 'choking under pressure', and one of them could be experiencing learned helplessness. Baumeister (1988) in fact argues that learned helplessness could have implications for individuals when they fail at tasks they might have otherwise succeeded at with effort. He further adds that it arises from underestimating the self's abilities and misjudging environmental contingencies. Thus, perhaps TC underestimate control over outcomes and as a result lower their expectations; these lowered expectations, in turn, make them exert less effort and interact with a choking response thereby declining in performance. If TC lower their expectations and do not put in as much effort why would they still choke, as the pressure is potentially removed? This notion could be explained by the fact that choking by definition occurs when there is a performance pressure. For TC, they are

aware that they perform better in training, so even though they might lower their expectation during competition, there is still a comparison process that is taking place between training and competition which would create a pressure situation.

However what could be the mechanism that prevents CC from experiencing this perceived uncontrollability and avoiding a learned helplessness situation? The results show that CC exhibit higher levels of perceived control. Assuming that '0' is the baseline or accurate levels, CC show levels greater than '0', so one can interpret these results as reflecting an 'illusion of control'. As Langer (1975) suggested, an illusion of control could be the inverse of learned helplessness, thus it could be possible that CC approach a situation with an illusion of control that is, they perceive outcomes with an illusion in order to avoid being sucked into the learned helplessness rut. Furthermore, illusion of control effects are mostly seen in situations that focus on success rather than failure (Alloy and Abramson, 1979). In other words, having a motivation component in assessing outcomes could enhance or deplete one's perceived control. When CC examine the outcomes with an illusion of control, their reinforced success becomes most salient and would thereby heighten their expectations and they would be motivated to put in more effort. They are already aware that they perform as well as in training, so the positive experience of success becomes most active and they are able to avoid a choke response and continue performing optimally. But how is it that the non–athletes are able to predict accurate levels of control? Langer (1975) suggested that hypothetical situations might have caused an *intrusion of reality*, that is, when the aspects of the situation is confounded with one's world view of reality. She further adds that the detachment of assessing a hypothetical situation, rather than being immersed in the situation may be a factor that promotes a more realistic assessment. In other words, if the situation seems hypothetical, sometimes people might be able to address the 'chance' aspects of the situation and would make more realistic judgements rather than heightened judgements of control. The present paradigm is a sports related design catering to the interest and motivational needs of the athletes. Therefore, perhaps to non-athletes it did not really matter if they received a win/loss feedback based on the race as it is not a direct simulation of their real lives and hence they made more realistic judgements. However, for athletes who watch themselves win or lose a race, although just a computerized game, could have more direct effects in assessing control, thereby showing a lack of, or an illusion of, control.
The above explanation is pointing in the direction of the presence of motivational and goal-related factors that drive such effects.

The results also revealed a classic main effect of win and loss feedback on perceived controllability. That is, pooled across all participants, in a win condition, control was perceived to be much higher than in a loss condition. In other words, a feedback emulating success makes way for higher levels of perceived controllability whereas a feedback addressing failures results in lower levels of perceived controllability. This again is supported by Alloy and Abramson's (1979) research, where they found that judgements of control were significantly stronger in a success condition. Similarly, underestimations of control are found in situations where there is an evidence of failure (Thompson et al., 1998). Thus one can assume that a win feedback is synonymous to success whereas a loss feedback is synonymous to failure, thereby resulting in high vs. low estimates of control. Translating a simple win or loss feedback into a real life setting is intriguing since a simple feedback can increase or decrease perceptions of control, so there might be even more pronounced effects of prolonged exposure to failure or success with respect to a person's perception of outcome control. This suggests that learned helplessness could develop based on prior repetitive success or failure experiences, and can be manifested in terms of perceived controllability.

It has already been established in previous chapters that TC and CC process information differently, which could be disadvantageous to some pre-existing maladaptive traits, but advantageous to other pre-existing, adaptive traits. Classic learned helplessness theories claim that in the event of an uncontrollable situation, people experience uncontrollability for the forthcoming outcome. So the question is would TC and CC, with prior exposure to success and failure, exhibit specific patterns of perceived controllability based on the amount of 'control' they experience in a task? This particular task was unique in that it not only paved way to assess perceived controllability of an outcome, but individuals were also subject to different schedules of controllability (high, average and low). Results first of all revealed a main effect of the controllability schedules wherein in the high schedule condition, judgements of control were much lower than in average condition which was again lower than in low schedule condition.

On further examining this effect, it was found that this pattern was replicated amongst TC, CC and the non-athletes too, that is, their judgements of control were lower in high schedules of controllability than in low schedules. So even though the main effect of controllability schedule was maintained, it is interesting to see how for example, even within the high controllability schedule, there were clear differences between TC, CC and non-athletes. TC's judgements of control were significantly lower than the non-athletes and CC. However, CC's judgements of control were nearing accuracy which leads to the question,

why do TC and non-athletes underestimate their personal control in events of high controllability, while CC are able to make accurate judgements? Gino et al. (2011) argue that people tend to underestimate their personal control when the actual control is high. They say that the explanation is simple and mundane in terms of inaccuracy in estimating personal control. That could be the reason for why non-athletes with no competitive sports experience might respond to this task as they did in the present study, but the question is why do TC show significantly lower levels and how is it that CC are able maintain accuracy? Thompson et al. (1998) discuss the control heuristic, wherein perceptions of control are dependent on one's intention to achieve the outcome and the perceived connection between one's action and the desired outcome. Perhaps then, in the present paradigm, when 'actual control' is high, the heuristic is more 'personal' rather than dependent on 'chance'. In other words, when control is obviously high, there is more room for personal attributions rather than events occurring by chance, and hence in order to avoid 'losses' in the task, people underestimate control. This is further supported by Thompson et al. (1998) who argue that people may be motivated to reduce their estimates of control to avoid blame for failure or to avoid seeing themselves as responsible. This seems like a plausible explanation as to why TC underestimate control, given their pre-existing traits of anxiety, maladaptive perfectionism and ruminative thought. Perhaps the way they process this information is that when they see a situation with obvious high control, it becomes apparent that their actions would affect the outcome; however due to their constant exposure to failure, TC would look at this situation as a threatening one, especially if they believe that failure is inevitable. Hence to relieve some pressure they approach the situation with a perception of low personal control. So in the event of failure, one can always say that the outcome was beyond their control. To support the above notion researchers have argued that individuals who fail at a task will attempt to protect their ego against the damaging effects of further failure by withdrawing effort and providing a self-protective excuse (Pittman & Pittman, 1980). CC on the other hand make accurate judgements of perceived control. This could be as simple an explanation as when CC see an objectively high control situation, they see it as it is. With their prior exposure to success, they have no reason to underestimate control as they would attribute the success to them having control in any case. In other words, there is no need to deflate control if they already see it. This again could be associated with the idea that CC are low on trait anxiety and other maladaptive cognitive traits, they are able to process just the required goal-relevant information and block out unnecessary stimuli. In other words, they are focused on the objective reality of success; if they see it, they embrace it. These explanations are under the

assumption that the heuristic people use in a situation with high control is ‘personal’. However, it is known that sometimes heuristics may lead to correct judgements, as in the case of CC, and sometimes they are associated with systematic errors, as in the case of TC and non-athletes (Tversky & Kahneman, 1974). It is also known that under some circumstances people do not always use heuristics; they just engage in more central, effortful, systematic processing (Chaiken, 1980; Petty & Cacioppo, 1986). This seems like a reasonable explanation as to how heuristics may help or hinder people with different predispositions. A ‘personal’ heuristic may help making accurate control judgements for those with prior exposure to success, whereas the same heuristic may result in making lower control judgements for those with prior exposure to failure. This interpretation of the observed effect is even more plausible given the nature of the paradigm, which is sport-related. This is an important finding leading in the direction that motivation and goals play a role in determining performance deficits as an outcome of learned helplessness through the experience of perceived uncontrollability of future outcomes.

The results become more interesting while looking at the medium controllability schedule condition, where there is only a 50% chance that the key press was effective in improving the athlete’s speed. Results in this condition showed that TC and CC significantly differed from each other, that is, while TC were still making low control judgements, CC were making higher control judgements. Thus, it is only in this condition that the direction of TC’s and CC’s perceived controllability was consistent with the prediction, that is, TC showed perceived uncontrollability while CC showed an illusion of control. This is further validated from the finding that there were significant differences between TC and CC’s level of perceived controllability when compared against ‘0’, which was considered as the baseline or a level of accurate levels of perceived controllability. Although the non-athletes did not significantly differ from the two groups, they still averaged close to ’0’. This is a situation in which one could potentially exert control to influence one’s outcome, so it's beneficial to see that or even inflate that perception a bit. This is perhaps what separates CC from TC - CC have an efficacy belief that they can exert control, and this helps motivate them to achieve in this situation. On the other hand, TC do not see or can't acknowledge the possibility that they might be able to control the course of the race. Their perceived efficacy is low so they're not especially motivated to achieve. In the face of ambiguity, where the outcome could be in either direction, TC may choose a ‘personal’ heuristic and CC may choose a ‘chance’ heuristic. According to the latter, in situations where outcomes are largely determined by chance, people perceive more control than they actually have (Ayeroff & Abelson, 1976;

Benassi, Sweeney & Drevno, 1979; Langer, 1975; Wortman, 1975, as cited in Gino et al., 2011). Hence in the face of ambiguity, CC may rely on chance, and their previous successful experiences would direct their intention to achieve that outcome. Later the perceived connection between their action and the desired outcome is strengthened. Thus the stage is set for CC to think that they have more than required control in this particular situation, based on the control heuristic principle (Thompson et al., 1998). For TC, on the other hand, given the ambiguity of the outcome, their 'personal' heuristic is the dominant source of justification and hence they opt for a 'play it safe' mechanism. This is again in line with the idea that TC's style of information processing is damaging, compared to CC's. As far as we know now, regardless of the situation with high or average control, TC will always make lower judgements of control and CC will be accurate or show an illusion of control. The interesting aspect is that the underestimation amongst TC is lower in the high controllability schedule than in the average controllability schedule, further reinstating the idea of 'personal' heuristic versus the 'chance' heuristic that CC would adopt. Greater actual control means less scope to make faulty attributions, which means greater personal responsibility and thus more chances for adverse attributional consequences, and the best way to counteract that is to perceive the situation as one of low control. But how would TC, CC and the non-athletes perceive control in a situation that objectively lacks control?

Results puzzlingly revealed that all three groups showed tendencies towards an illusion of control in a situation where there was only a 25% probability that a key press would increase their athlete's speed. This might seem perplexing, especially for TC, where the argument so far has been that because of their prior exposure to failure experiences, they would approach situations with lower perceived control. It therefore seems obvious that if a situation is one of low control, they would make objective ratings. But this was not the case, which brings us back to the phenomenon mentioned by Gino et al. (2011), that is, the mundane issue of inaccuracy in personal control. TC show signs of a disadvantaging mode of information processing, thereby make errors in judging control. Throughout the schedules, TC's judgements of control were always in the opposite direction of the actual level of control, for example, TC made lower control judgements for a high controllability schedule and made higher judgements for a low controllability schedule. Thus, could TC be more susceptible to inaccuracy? That is one line of thought; the other is, when people objectively lack control, they artificially inflate their control perceptions because it protects against the threatening thought that you might not have control. This is otherwise known as the control motivation theory (Pittman, 1993; Pittman & D'Agostino, 1989). These authors argue that an

exposure to uncontrollable situations heightens the basic need for control. But why would the TC see a need to increase their control? Based on previous explanations, if the situation is one of low control, TC have nothing to lose, so they might as well approach it as if they have high control to make way for more flexible attributions. Research has in fact shown that the lack of attributing one's behaviour to stable and internal characteristics allows for the flexibility required to meet the demands of a changing environment (see Wortman, 1976 for a review, as cited in Pittman & Pittman, 1980). Thus, when faced with an objectively uncontrollable situation, TC are more flexible to meet the demands of the environment. Perhaps this is also the reason why TC are generally more 'flexible' in making attributions depending on the environment – high control or low control. However for CC it seems fairly obvious why they would inflate their control perception. Their regular state of being in control could be threatened and therefore they are motivated to increase the perception to regain some stability. On the whole, all three groups show an illusion of control, because if intentionality and connection are strong (Thompson et al., 1998), along with a strong need to regain control, one can say that people tend to think they have some control in the situation. The above trend can also be explained in the theory of self-serving bias (Miller & Ross, 1975). This occurs when people attribute their successes to internal or personal factors but attribute their failures to situational factors beyond their control. In the case of CC, where they are consistently used to success and reinforced by the same, they are able to attribute their performance to internal/personal characteristics; however TC are exposed to failure in general which is probably the reason why they make way for flexible attributions of behaviour being beyond their control even if the situation demands otherwise. As an overall picture, TC show trends of lack of control, CC show an illusion of control, and non-athletes show accurate levels of control, except in situations with low control. But how can one tie all this to learned helplessness?

It is true that nondepressed individuals tend to overestimate their control whereas depressed individuals have a more realistic assessment of their ability to control an outcome (Alloy & Abramson, 1979). However, the cardinal difference here is that TC and CC are not in the clinical realm of depressed vs. non-depressed. TC do share some characteristics of anxiety and rumination with the depressed, but the difference lies in motivation. While depressed people lack motivation, TC are still motivated to perform and achieve their goals. This could be one of the reasons why TC also show an illusion of control effect for situations with objectively low control. In terms of the actual sporting situation, most often the competition situation is perceived as ambiguous, with an average level of control. Athletes

have prior knowledge of their training but at the same time they are aware that anything could happen in the competition; they could pull a hamstring, the weather conditions might not be suitable, they are unaware of their competitor's form, anxiety during the competition, and so on. These factors could shape results either way. CC, with an 'illusion of control' mindset, approach the situation in terms of making higher judgements of control and, with their prior success exposure, increase their self-efficacy to perform well. TC, with their 'lack of control' mindset, approach the situation in terms of their prior failure exposure, thereby decreasing their self-efficacy to perform well. Although one would expect an interaction between group and win/loss feedback condition, this interaction was not significant. What is important however is that the win/loss feedback manipulation made the aspects of a 'real race' more salient to the athletes. This 'real race' like feature of the task could have enhanced the perceptions of control in the athletes' respective directions. In other words, receiving feedback about winning or losing the race might have made the motivational qualities of the task more prominent. However, would one see similar effects amongst athletes and non-athletes in a task that is not related to sports and has no motivational component to it? The following study was designed to examine differences in perceived controllability amongst athletes and non-athletes in a non-sports-related paradigm.

4.9 Study 3b

Study 3b was designed to address the same issues in a non-sports-related paradigm, similar to the paradigm developed by Shanks et al. (1989) which included a triangle on the screen and button press below it. The aim was to press the button at any frequency during an interval of one minute to find out whether or not the button pressing resulted in the triangle lighting up. Similar to Study 3a, three controllability schedules of high – 80%, average – 50% and low – 20% were included. Perceived controllability was again measured by means of a judgement-of-control scale. 0 indicated that the key press had no effect on the desired outcome and 100 indicated that the key press had a maximal effect on the desired outcome. Perceived controllability was calculated by taking the difference between perceived contingency and the actual contingency, such that a positive deviation from zero indicated an overestimation, whereas a negative deviation from zero indicated an underestimation of control. An ambiguity measure was included wherein the time interval between pressing the button and triangle lighting up was either fixed (2s) or variable (0-4s). The assumption here is that the fixed condition where the triangle lit up 2 seconds after the button press was more stable and less ambiguous; in the variable condition the time range was between 0-4s, thus

the predictability of the triangle lighting up after the key press becomes more difficult and hence more ambiguous. Thus it was assumed that that the variable condition is suitable to address the construct of ambiguity. All participants received all six conditions which were presented at random. The participants were both athletes and non-athletes. It was again predicted that TC would show an underestimation of perceived controllability; CC would show overestimation of perceived controllability while the non-athletes would show average estimation of perceived control in both studies. It was further hypothesised that all control judgements in the fixed condition would be higher than in the variable condition.

4.9.1 Method

4.9.1.1 Participants

A total of 57 participants were included, of which 38 were elite and semi-elite track and field athletes from Wales, and 19 were non-athletes, who were undergraduate students of psychology. Thirty-four men and 23 women, in the age range of 16-32 years were included in the total sample. Mean age was 20.47 years, *SD* = 3.09. The athletes had been training and competing for a minimum period of 3 years. All athletes were repeat participants from Studies 1a and 1b and the procedure to classify them as TC and CC was not repeated. Athletes and non-athletes were required to participate in a computer-based task that was conducted in individual sessions of approximately 10 minutes.

4.9.1.2 Apparatus and materials

The experiment was programmed in Python 2.4 and conducted on a laptop at the athletics stadium from the athletes, and in individual testing booths at the university for non-athletes. Participants used the laptop's touchpad as the mouse to click on appropriate buttons on the screen as the experiment required, and they used the keyboard to type in their responses at the end of each condition. The experiment included a triangle presented in the centre of the screen. Under the triangle was a button labelled PRESS. At end of the experiment, participants were directed to a screen where they typed in their demographic details like age, gender, the particular athletic event they were participating in, their self-perceived rating of their performance category (TC vs. CC) for athletes, and just age and gender details for non-athletes.

4.9.1.3 Procedure

4.9.1.3.1 Establishing Training and Competition champions

The athletes who participated in this study had been previously objectively classified as TC and CC (see Study 1a) and thus the procedure was not repeated.

4.9.1.3.2 Perceived Controllability Task

The participants were instructed that the aim of the experiment was to judge the extent to which their actions can cause something to happen on the computer screen. They also read on-screen instructions that outlined the nature of the task and went on to the experimental set-up by pressing the button 'BEGIN EXPERIMENT'. In each condition, a triangle was presented in the centre of the screen and a button below it was labelled PRESS. The goal was to find out whether clicking the button had any effect on whether or not the triangle lit up. The participants were given the flexibility to choose at any time whether or not they would click the button (i.e., a free-operant procedure was applied; see Skinner, 1938). They were specifically instructed to press and release the button, rather than press and hold. They were informed that sometimes the triangle would flash after the button was pressed and sometimes it would not. The triangle may also light up of its own accord. They were further instructed that they could press the button at any time and as many times as they liked, and that it would be to their advantage if they tried pressing it sometimes and tried not pressing it sometimes, within each condition, in order to adequately assess the impact of their responses on the behaviour of the triangle relative to its baseline behaviour. They were reminded that it was important to press at least a few times during every condition in order to provide an informed judgement. Each condition lasted for 1 minute. There were six conditions in total, and at the end of each condition participants typed their answers about how pressing the button influenced the lighting up of the triangle into the appropriate text box and clicked on the SUBMIT button to proceed to the next condition. In total, the experiment lasted around 10 minutes.

4.9.1.4 Design

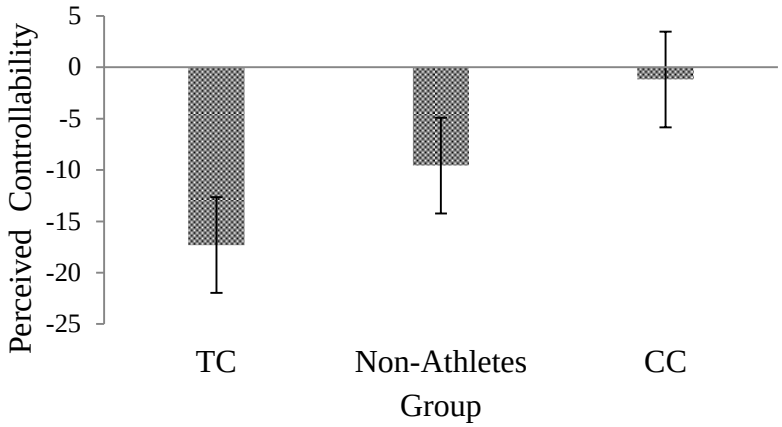
Two factors were manipulated in this experiment – controllability schedules (High vs. Average vs. Low) and ambiguity – the time interval between pressing the key and the triangle lighting up (Fixed vs. Variable). A 3 x 2 x 2 within-subject design was used, producing 6 different conditions which were tested between three groups (TC vs. CC vs. non-athletes). The controllability schedules were based on the principle of probability of an outcome

following an action (e.g. Shanks & Dickinson, 1991; Wasserman, Chatlosh & Neunaber, 1983). A high controllability schedule had a probability value of .80, an average controllability schedule had a probability value of .50, and a low controllability schedule had a probability value of .20. Ambiguity was also manipulated by varying the interval between pressing the key and the triangle lighting up. In the fixed conditions, the interval was always the same, held at a constant value of 2s. In the variable condition, the interval for any given cause-effect pair was introduced by generating a random value within the specified range of 0s to 4s, with any value equally as likely to occur as another. At the end of every condition, participants were asked how effective they thought pressing the button was at making the triangle light up by means of a rating scale ranging from 0-100, 0 indicating that the button press on the triangle lighting up was completely ineffective and 100 indicating that the button press on the triangle lighting up was maximally effective. Perceived controllability as a dependent variable was measured by calculating the difference between the perceived and actual contingency. Contingency is the probability of an outcome following a response and the probability of the outcome occurring on its own. The actual contingency in this case was calculated by dividing the number of effects by the total number of presses made by the participant per condition. Again, the contingency was based on probability. A negative value indicated tendencies towards a lack of control and a positive value indicated tendencies towards and illusion of control. Values averaging around 0 were interpreted as having accurate levels of perceived controllability. Thus, each participant was exposed to 6 conditions – High controllability Fixed, High controllability Variable, Average controllability Fixed, Average controllability Variable, Low controllability Fixed and Low controllability Variable. The order of conditions was randomized.

4.9.2 Results

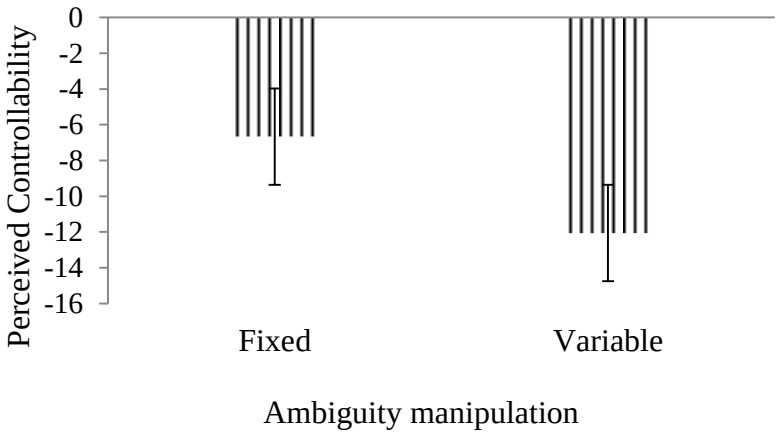
The first section presents the main effects of the factors group (TC vs. CC vs. Non-athletes) and ambiguity measures (fixed vs. variable) on perceived controllability. The second section illustrates the interaction between group and ambiguity measures on perceived controllability. All analyses were done using a 3 x 2 x 2 repeated measures ANOVA design and post hocs were calculated using simple effects with Bonferroni corrections.

Figure 4.5: Group differences in perceived controllability



The repeated measures ANOVA revealed a significant main effect of group on perceived controllability, F (2, 54) = 5.34, MSE = 1409.40, $p < .01$, *partial* η^2 = .165, pooled across all three levels of controllability schedules (High, Average, Low) and the ambiguity measures (Fixed, Variable). As seen in Figure 4.5, an LSD post hoc test revealed that TC show significantly lower levels (M = -17.32, SE = 3.35) of perceived controllability than CC (M = -1.19, SE = 3.72), t (54) = 3.23, p <.01, and do not differ from the non-athletes (M = -7.80, SE = 3.52), t (54) = 1.96, p = .165. CC also do not significantly differ from the non-athletes, t (54) = 1.29, p = .606. [8]

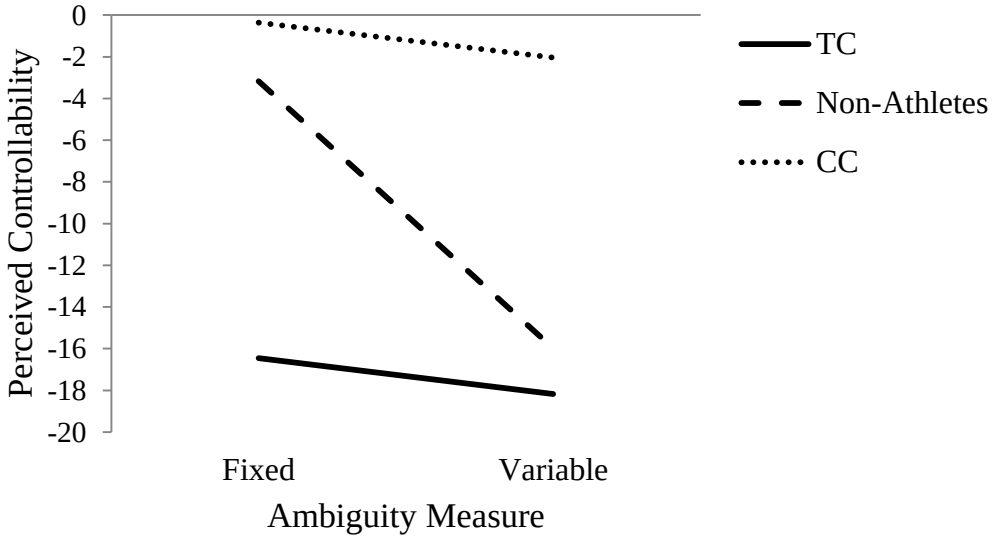
Figure 4.6: Differences in ambiguity manipulation in perceived controllability



[8] There was a significant main effect of controllability schedules on perceived controllability F (2, 108) = 17.39, MSE = 489.93, $p < .01$, *partial* η^2 = .244 pooled across all three levels of controllability schedules (High, Average, Low) and the ambiguity measures (Fixed, Variable). These results replicated those from Study 3a, as illustrated in Figure 4.2.

The repeated measures ANOVA revealed a significant main effect of ambiguity measures on perceived controllability, F (2, 54) = 7.26, MSE = 326.18, *partial* η^2 = .119, p < .01, pooled across all three levels of controllability schedules (High, Average, Low) and all three groups (TC, CC, Non-Athletes). As seen in Figure 4.6, when exposed to the 'fixed' condition, the levels of perceived controllability were much higher (M = -6.13, SE = 2.19) than when exposed to the 'variable' (M = -11.41, SE = 2.34) condition.

Figure 4.7: Group differences in perceived controllability as a function of ambiguity manipulation



As seen in Figure 4.7, the repeated measures ANOVA revealed a significant two-way interaction of ambiguity measures and group on perceived controllability, F (2, 54) = 3.37, MSE = 326.18, *partial* η^2 = .111, p < .05. Simple effects with Bonferroni corrections further revealed that TC and CC did not differ between fixed and variable ambiguity measure, that is, TC were always low in perceived controllability, and CC were always high on perceived controllability. The non-athletes however, showed higher levels (M = -1.57, SE = 3.77) of perceived controllability in the fixed condition, but declined (M = -14.03, SE = 4.03) in the variable condition, t (54) = 3.68, p < .01. In the fixed condition TC were significantly lower (M = -16.46, SE = 3.59) in perceived controllability than CC (M = -.355, SE = 3.98), t (54) = 3.00, p = .012 and non-athletes (M = -1.57, SE = 3.77), t (54) = 2.86, p = .018. In the variable condition TC were again significantly lower than CC (M = -18.18, SE = 3.83), t (54) = 2.82, p < .05 but did not differ from non-athletes, t (54) = 0.75, p = .136. Similarly, CC also did not

differ from non-athletes in both fixed, t (54) = 0.22, p = 1.00, and variable, t (54) = 2.05, p = .136 conditions.

4.9.3 Discussion

The present study was designed to examine differences in perceived controllability amongst a group of athletes and non-athletes in a non-sports-related paradigm. All participants were exposed to three levels of controllability schedules – high, average and low, based on a stimulus-response-outcome contingency paradigm. Results again confirmed the general trend supporting the present main hypothesis which is that TC's judgements of control were lower than CC's and non-athletes'. And CC's judgements of control were higher than TC's and non-athletes'. This further supports the idea from study 3a that TC as a group always experience a lack of control, compared to CC. The results in this case is particularly fascinating because in a paradigm completely unrelated to sports, where participants' task was to click a button and see if the triangle lights up. The chances of them getting bored or making inaccurate judgements were quite high, yet, regardless of the presumably low level of motivation, the trend was still maintained wherein TC show lower levels of perceived controllability compared to CC and non-athletes. Furthermore, this paradigm lacked a motivational component; there was no goal or aim to win or lose the race and participants received no feedback. Despite this, TC still showed lower ratings than CC. However, although CC showed higher ratings than TC, their ratings were not high enough to be classified as showing an 'illusion of control'. Rather, their ratings showed that they were accurate in judging control. This could perhaps occur due to the fact that there was no motivational component. As explained in the previous study, having a goal is important in inflating one's control judgements, as there should be a standard one might need to compare to, that is, there should be an opportunity to use the control heuristic (Thompson et al., 1998). For instance, the previous task constantly had participants receive win or loss feedback, and this feedback, could have interfered with their already existing exposure to success and failure thereby leading participants to they would approach the situation with appropriate levels of control. In the present paradigm, there was no such feedback; the process tapped into was purely cognitive, which makes it even more interesting because TC's judgements of control are low in both a motivational paradigm and a purely cognitive paradigm. For CC, the motivational component only increases existing, accurate perceptions of control to engage in an illusion of control. This argument is not negating the concepts of control motivation in a low control situation, as results do show that in situations with low control the perceptions are

higher than in situations with high control. The difference lies in the magnitude of difference which is primarily driven by a motivational component. So without the motivational manipulation how is it that the non-athletes made low control judgements in this paradigm?

This paradigm included an ambiguity manipulation, wherein the time interval between pressing the button and triangle lighting up was either fixed (2s) or variable (0-4s). When one pressing the button, if the time of the lighting of the triangle is not consistent, one is unsure about the action and outcome connection; in other words, one may even interpret this event as something 'uncontrollable'. As the previous literature already states that exposure to uncontrollable events leads to interpreting the outcome as uncontrollable, based on the classic learned helplessness literature (Abramson et al., 1978; Maier & Seligman, 1976; Seligman, 1975), it is not surprising to find that in the variable condition, judgements of control were much lower than in the fixed condition. The ambiguity manipulation by itself is part of the generic learned helplessness uncontrollability manipulation, therefore the control judgements are lower. The question is why judgements in the fixed condition were not even close to accuracy? The answer lies in the interaction these conditions had with the group. Interestingly, in the fixed condition, both CC and non-athletes are close to accuracy, but TC are again low in perceived controllability; but in the variable condition, while CC are still close to accuracy, TC are still close to uncontrollability, the non-athletes drop from accuracy to lower control judgements. This is an exciting finding because it reinforces the idea that TC and CC have a pre-existing cognitive style, probably formed and reinforced by their previous history of failures or successes, and an ambiguity manipulation within a general scenario that was lacking motivational component did not change this pre-existing, habitual style. However for non-athletes, judgements dropped only in the variable condition, which is again in line with the classic learned helplessness literature, where in the face of ambiguity or uncontrollability, people lower their judgements of control (Abramson et al., 1978; Maier & Seligman, 1976; Seligman, 1975).

To summarise, one can predict a model wherein certain traits like anxiety, rumination, perfectionism, need for cognition, if maladaptive in nature, will propagate a maladaptive style of information processing, not conducive to one's goals, which is constantly reinforced due to repeated failure experiences, and, as a result, the outcome is always approached with a lack of control. Perceiving a lack of control may, in turn, affect one's performance expectations (Rees et al., 2005). Lowered expectations are then immediately translated into actual performance which is further deteriorated due to choking, as seen amongst TC. The same traits, if adaptive in nature, will propel an adaptive style of information processing conducive

to one's goals which is reinforced due to constant success experiences, and, as a result, the outcome is approached with an illusion of control, thereby increasing one's expectations and consequently the actual performance, by preventing a choke response, as seen amongst CC. Thus, these two studies support a learned helplessness model vs. inversed learned helplessness model amongst athletes that is reinforced due to an adaptive or maladaptive information processing style. The following chapter will address the specificities of the information processing styles and also tap into the area of causal attributions as a lot of the present findings discuss misattribution tendencies, especially amongst TC.

Chapter 5: The bidirectional nature of information processing: Examining the role of negativity and positivity biases in predicting sports performance

5.1 Introduction

Results from previous studies have established the factors that could potentially impede or improve performance amongst TC and CC through a predictive model. In case of TC, the model talks about the heightened presence of inherent cognitive traits such as rumination, trait anxiety and maladaptive perfectionism which in itself maladaptive in nature. The model also includes the trait need for cognition which measures the general need to engage in thinking. These traits set the stage for the information processing that occurs when an individual encounters various stimuli like recalling past experiences or praises and criticisms from the coach, and so on. It was predicted that TC's information processing would be disadvantageous to the extent that it is determined by these inherent traits. This further leads to predicting that future outcomes might be seen in the light of perceived uncontrollability, and that repeated exposure to failure will pull them towards a learned helplessness situation, a rut TC are unable to get out of. During the whole process, TC still process information based on the situational feedback they receive from their immediate environment. So, although their motivation to perform well is relatively high, 'good sense' tells TC's to lower expectations in order to avoid an ego-threatening defeat. Hence they lower their expectations and face the competition situation that again acts as a potential stressor. TC's heightened state anxiety takes the lead role in the face of the stressor which ultimately leads to a choking response.

The picture is different for CC as the same cognitive traits are present but at lower levels indicating that these traits are less maladaptive. The way CC process information would be goal-congruent and would help to block out irrelevant information. They thus predict future outcomes with an illusion of control which is reinforced due to the repeated exposure to success. So one might say, CC's are also in a feedback loop, except that it is advantageous and an inversed learned helplessness is present. Thus, with a heightened sense of control they predict their forthcoming performance with heightened expectations. This, combined with a strong motivation to achieve their goal, prevents the choking response as they are less affected by any degree of state anxiety that might exist in the face of a competition stressor.

These models for TC and CC however do not explain what aspect specifically drives the direction of information processing. The present study aims to identify the specificities of TC's and CC's respective information processing styles. Elaborating further, the present

study was designed to investigate the components that would comprise an adaptive/maladaptive style for CC and TC respectively. It was generally predicted that TC would engage in a maladaptive style by displaying greater sensitivity to stimuli with a negative valence and make more pessimistic causal attributions. Similarly it was predicted that CC would engage in an adaptive style by displaying greater sensitivity to stimuli for positive valence and make more optimistic causal attributions.

5.2 The bidirectional nature of affective information processing – The role of negativity bias

There is evidence that in general there is greater power of bad events, bad emotions, and bad feedback over good ones (for a review, see Baumeister et al., 2001; Rosin & Royzman, 2001). Several other researchers have examined the magnitude by which negativity overshadows positivity by means of potential losses over gains on an individual's emotional states (Kahneman & Tversky,1984) and undesirable events negatively affecting mood, self-esteem, anxiety, causal uncertainly, perceived control over the environment than desirable events (Nezlek & Gable, 1999). Sheldon, Ryan and Reis (1996) commented that bad events in general had longer lasting effects than good events. Specifically, participants were likely to have lower well-being the following day, after being exposed to a negative event. These studies highlight the basic point that negative events are given more weight than positive events and this could be further exacerbated by experiencing further undesirable events. This is exactly the case for TC, at least in terms of their sports performance which usually plays a pivotal role in their day-to-day functioning. TC have had a repeated exposure to failure in competitions, and this is interpreted as a series of bad events. They also have higher levels of maladaptive traits like rumination, anxiety, perfectionism that could increase their chances to be more sensitive to negative events. Thus it is quite understandable that TC would in fact show a clear negativity bias towards events and situation. This means that the athletes' cognitive processing would also follow a similar pattern. But how does this bias get activated? Could it be that exposure to a negative event activates previous negative events from memory?

Research shows that there is superior recall for unfavourable events as compared to favourable events (e.g., Bless et al., 1992; Dreben, Fiske & Hastie, 1979; Riegler & Winton, 1996). Similarly Finkenauer and Rimé (1998) found that events involving bad emotions remain more salient in people's minds than events involving good emotions. Thus it could be possible that events associated with bad emotions remain more salient, and retrieval of these events from memory could also be easier. This may serve as a good explanation for TC's

style of processing. Their exposure to repetitive failure would elicit negative emotions such as sadness, frustration or disappointment, and these probably become more salient than positive emotions. These negative emotions may further access negative memories of past failures thereby increasing the general negativity in the mood. Furthermore, it is known that bad moods elicit more thorough and careful information processing than good moods (e.g., Clore, Schwarz, & Conway, 1994; Schwarz, 1990). Further evidence by Klinger, Barta and Maxeiner (1980) suggests that bad things attract more thought and involve greater processing. This is again in line with the idea that TC not only process information with a negativity bias but also do so thoroughly. This claim can be further strengthened by prospect theory (Kahneman & Tversky, 1979) which holds that losses have more impact than gains. In other words, one could say that TC think more and they are also sensitive to negative information. However most of these studies conducted have illustrated that in general people have a tendency to favour bad over good. Whilst the theories hold true for TC, the prediction is that the opposite would hold true for CC, that is, CC would show greater sensitivity to positive information, and would definitely show lesser negativity bias than CC. So what could possibly drive information processing in the positive direction?

5.3 The bidirectional nature of affective information processing – The evidence for positivity bias

Several studies point in the direction that bad is stronger than good, as stated previously. However, Skowronski and Carlston (1987) explain that positivity bias is likely to occur if the information refers to competence-related qualities of the target rather than morality-related qualities. Thus positive behaviours are more indicative of competence and negative behaviours are more indicative of morality. Following this claim it can be argued that CC are more sensitive to positive stimuli as they are involved in the competence domain in which they are successful most of the time thereby reinforcing successful competence. Although TC are also competent, their irregular exposure to repetitive success makes them feel less competent and are thus not sensitive to positive stimuli. But how is information processed if one has a positivity bias? Studies showed that information processing is more thorough and elaborate for negativity bias (e.g., Clore, Schwarz, & Conway, 1994; Schwarz, 1990). Thus, would the processing be similar or differ for those who are more positively tuned?

Evidence suggests that those who are positively tuned process only relevant information by prioritizing cognitive resources on what is important (Fiske & Taylor, 1991).

It was assumed that CC would process only goal-congruent information, and TC would not do the same as they would think about other irrelevant information like feeling anxious or thinking about past performance. Mischel, Ebbesen and Zeiss (1976) also found that participants remembered more positive than negative feedback overall, but the effects were strongest when they either expected success or had a recent success experience. This is the perfect example of how CC might have developed a tendency to recall more positive events, probably due to their repetitive exposure to success.

5.4 The good versus bad information processing orientation

The most important aspect that would drive such differences in information processing is that of individual differences. Evidence from Cacioppo and colleagues revealed that negativity bias could be integrated into a more general model of evaluative space in which positive and negative evaluative processes are assumed to result from the operation of separable positive and negative motivational substrates, respectively (Cacioppo & Berntson, 1994; Cacioppo, Gardner, & Berntson. 1997). According to this model those who are more engaged in either a negative or positive motivational system would respond more to negative or positive stimuli, respectively. Thus TC could be more engaged in a negative motivational system while CC are more engaged in a positive motivational system. The prediction made is that by having certain motivational systems, TC and CC would process information they receive in different directions.

5.5 Negativity Bias and Depression

Most studies that bring out salient differences in negative and positive biases in information processing have been conducted with healthy participants. However, this distinction is further strengthened when addressing depressed versus non-depressed participants. Research shows that depressed people are more biased toward recalling less positive and more negative information than non-depressed people (Pyszczynski et al., 1987; Williams et al., 1997). Non-depressed people seem to seek out more positive information and avoid negative information more than depressed ones. This could manifest itself in the form of optimism regarding the future (Taylor & Brown, 1988) and biased recall for positive information (Matt et al., 1992). The findings of a negative memory bias among depressed individuals often suggest that their self-schemata are more negative than non-depressed people (Beck, 1967; Bradley & Matthews, 1983; Kuiper, Derry & MacDonald, 1982; Rogers, 1981, as cited in Pyszcynski et al., 1987). Thus it is evident that depressed individuals are

more sensitive to negative information than positive information. Although there is no claim being made that TC are depressed while CC are not, TC do exhibit some characteristics of depressed individuals like heightened anxiety and rumination. It does seem like a logical inference that TC would also be tuned to negative stimuli while CC, comparable to nondepressed individuals, would block the negative stimuli and will be more tuned to positive stimuli.

5.6 Biases and Causal Attributions

It is generally assumed that people seek to understand events that happen to them and attributional processing is part of this search for meaning. People try to find a cause that provides them with an answer to the question as to why certain events happened, or they can try to find a different interpretation and reframe their experiences. Evidence suggests that negative events cause people to engage in greater search for meaning than positive events (e.g., Baumeister, 1991; Frankl, 1963; Taylor, 1983). A similar conclusion emerged from a review of 17 studies on causal attribution by Weiner (1985) saying that spontaneous attributional activity was defined as people's efforts to explain what is happening to them and to identify a cause for what happened. In all studies spontaneous attributional activity was greater for failures than for successes. Other studies show that those individuals with low self-esteem would engage in a self-defeating attributional pattern, while those with high self-esteem would engage in a self-enhancement attributional pattern (Baumeister et al., 1989; Tice, 1991). This suggests that TC who are exposed to failure would make more self-defeating attributions, whereas CC would make more self-enhancing attributions in the face of both negative and positive events. A common symptom of a self-defeating pattern is assuming that the cause for a negative event is an internal factor and the cause for a positive event is an external factor. However, this pattern is rather uncommon as a population without the self-defeating pattern would tend to attribute negative events to external causes (e.g., Pyszczynski & Greenberg, 1987; Weiner, 1985). So what factors would make TC and CC susceptible to attributing causes for positive and negative events to either internal or external factors?

5.7 Causal attribution in sports

It has already been established that making attributions is particularly frequent when faced with a negative event; hence it is not unrealistic to assume that TC and CC would have specific attribution styles to explain their successes and failures. Furthermore, previous

studies (3a & 3b) in Chapter 4 also indicate that TC show lower perceived controllability and CC show higher perceived controllability; controllability being a dependent variable often studied in attribution research. It has been argued that perceptions of uncontrollability are, themselves, a product of the attribution process. Thus if TC already experience a lack of control, perhaps they would search more for causes to explain their experience. Searching more is directly interpretable as processing more information which again brings us back to the basic idea that TC would process information more than CC. However it was also stated that the information TC process would be more negative and CC would process more positive information. Thus, referring back to the original hypothesis, it was predicted that TC would have a more self-defeating attributional style, which is, attributing failures to be stable and internally caused, and successes to be unstable and externally caused. CC would have a self-enhancing attributional style, by attributing failures to unstable and external causes and successes to stable and internal causes. This prediction is supported by the explanatory style theory. Explanatory styles reflect the way people usually explain bad or good events (e.g. Peterson, 2000; Peterson & Park, 1998; Peterson & Steen, 2002; Peterson & Vaidya, 2001). People who usually explain bad events by causes that are stable in time (‘‘it’s going to last forever’’), global in effect (‘‘it’s going to undercut everything that I do’’), and internal (‘‘it’s me’’) and who explain good events with unstable, specific, and external causes are said to have a pessimistic explanatory style. People with the opposite attributional pattern are said to have an optimistic explanatory style. It has been shown that those athletes with a negative explanatory style gave more internal and recurring causes for explaining failure (Prapaevessis & Carron, 1988). Similarly Seligman, Nolen-Hoeksema, Thornton, and Thornton (1990) found that after a failure feedback performance was lowered for pessimistic athletes but not for optimistic athletes. Thus one could assume that TC have a pessimistic explanatory style, and CC have an optimistic explanatory style. In fact several studies found that a pessimistic explanatory style correlated positively with anxiety (e.g. Helton et al., 2000; Mineka, Pury, & Luten, 1995). Furthermore Martin-Krumm et al. (2003) add that those with an optimistic explanatory style were less anxious, more confident and performed better than pessimistic participants, which is again in line with the attribution style that was predicted for CC.

5.8 Present study

The present study was designed to address the issue of the bidirectional nature of information processing styles amongst TC and CC. Although research has shown that TC have some maladaptive traits and CC have more adaptive levels of the same traits (see

Chapter 3,studies 2a & 2b), the assumption that TC would also engage in a maladaptive information processing style, and CC in an adaptive processing style, has not yet been tested. Furthermore, the study was also designed to test the way TC and CC would make attributions as it is known that attributions are one of the primary sources of how people interpret past performance-related experiences. In other words, the study aims to tap into a process that occurs in two stages. The first one addresses the sensitivity to certain kinds of performance-relevant information in the athletes, and the second one is how they interpret their past experience. The sensitivity to relevant information was measured by using response time measures and ratings. That is, if an athlete responded faster and made more extreme ratings in a particular direction then that athlete would be assumed to be more sensitive to that corresponding kind of information. The interpretation of information was measured in terms of causal attributions for successful and unsuccessful performances.

5.9 Study 4

The athletes were presented with twenty statements, ten of them 'barriers' and ten 'facilitators'. Barriers were statements that could hinder one's performance. For example, "You pulled your hamstring during warm up". Facilitators were statements that could enhance one's performance. For example, "Your coach saw your heats and gave good feedback". Reaction times were measured for the classifications made by the participants which were Hinders performance, Enhances performance, Could hinder or enhance performance. After each classification, the same statement was presented and participants were instructed to rate it on a scale from -5 to +5 implying how much that statement would have an impact on their performance, -5 indicating performance impairment and + 5 indicating performance improvement. This was followed by administering a questionnaire that measured causal attributions for both successful and unsuccessful experiences and this was followed by a free recall task of all the statements that were initially presented. It was predicted that TC would show a negativity bias, that is, they would be relatively quick to identify barrier statements and would also make ratings of barriers in the direction that indicates a hindering of performance. Similarly, CC would show a positivity bias, that is, they would be quick to identify facilitator statements and would also make ratings of facilitators in the direction that indicates performance enhancement. Furthermore, a variable called "miscategorizations" indicated the degree to which athletes classified barriers as either facilitators, or neutral and facilitators as barriers or neutral. This variable represented the basic idea that the more miscategorizations an individual makes, the more time they spend

thinking about the statements, implying greater information processing. It was thus predicted that TC would miscategorise more statements, both barriers and facilitators, than CC. It was also predicted that TC would make more performance-debilitating ratings of these miscategorised statements than CC. It was also hypothesised that TC in general would be slower to classify miscategorizations than CC, indicating greater information processing. With regard to attributions it was assumed that TC would make self-defeating attributions, that is, explain unsuccessful events with causes that are stable and internal, and successful events with causes that are unstable and external. CC would make self-enhancing attributions, that is, explain unsuccessful events with causes that are unstable and external and successful events with causes that are stable and internal. It was also predicted that TC in general would recall more items than CC.

5.9.1 Method

5.9.1.1 Participants

A total of 45 elite and semi-elite track and field athletes from Wales, including 25 men and 20 women, in the age range of 18 – 32 years were recruited. Mean age was 22.08 years, *SD* = 3.61. These athletes had been training and competing for a minimum period of 3 years. All athletes were repeat participants from Studies 1a and 1b and so the procedure to classify them as TC and CC was not repeated. Athletes were required to participate in a computer-based task that was conducted in individual sessions of approximately 15 minutes.

5.9.1.2 Apparatus and Materials

The experiment was programmed in Python 2.4 and conducted on a laptop at the athletics stadium. Participants used the laptop's touchpad as the mouse to click on appropriate buttons on the screen as the experiment required, and they used the keyboard to type in their responses at the end of each condition. The experiment proceeded in three parts; the first part was the presentation, classification and ratings of twenty barriers and facilitators statements, which was primarily a reaction time task.

The second part involved administering the Revised Causal Dimension Scale (CDS-II; McAuley, Duncan & Russell, 1992). The CDS-II is a 12-item self-report scale assessing four attribution dimensions with the following reliability coefficients: locus of causality - .79 (the degree to which the attribution is perceived as internal or external), stability - .78 (the degree to which the attribution is stable or variable over time), personal control - .79 (the degree to which the athlete has control over attribution) and external control - .72 (the degree to which

other people have control over the attributed factor). The CDS-II has shown adequate factorial validity for the four-factor model within adult sport populations (McAuley et al., 1992). The total scores for each dimension were obtained by summing the specific items for the dimension (see Appendix B.6).

The third part comprised a free recall task of the barriers and facilitators statements with no time limit. At end of the experiment, participants were directed to a screen where they typed in their demographic details such as age and gender and the particular athletic event they were participating in. Participants also typed in their self-perceived rating of their performance category (TC vs. CC).

5.9.2 Design

The first part of the experiment involved measuring the sensitivity to the valence of the information presented, by means of observing how participants would classify and rate certain statements. After a total of 20 barriers and facilitators presentations, ten of each type, the second part of the experiment involved a task that served as a distracter task. This was intended to clear people's short-term memory of the statements presented earlier. This was done by measuring causal attributions for both successful and unsuccessful experiences for each participant using the appropriate questionnaire as described earlier. This was followed by a free recall task of all the statements that were initially presented. Initially they had a forced 2 minute time period to recall implying that they had to engage in retrieval for at least 2 minutes after which they could either move on to the next page by pressing continue or spend some more time (without any limit) trying to recall the statements and then move to the next page.

The dependent variables measured were the reaction times to classify statements (barriers vs. facilitators), degree to which participants made misclassifications, that is, barriers being miscategorised as facilitators and neutral categories and facilitators being miscategorised as barriers and neutral categories, ratings of specific statements (barriers vs. facilitators), ratings of miscategorised statements (facilitators miscategorised vs. barriers miscategorised), amount of statements recalled and individual causal attribution differences (Locus of Causality, Stability, Personal control, External control). All these variables measured were tested as a function of group category (TC vs. CC).

5.9.3 Procedure

5.9.3.1 Sentence presentation

Participants were asked to imagine a situation in which they had to perform their event the following day. They were further instructed to think about the 'goal' they wish to achieve. They were instructed to think about this 'goal' throughout the first part of the experiment. Following this, they were given specific instructions about the nature of the task wherein they had to make categorizations of twenty barriers/facilitators statements as hinders performance, enhances performance, could hinder or enhance performance. They were informed that the classification had to be done only based on their own goal and performance and not sports performance in general. After reading these instructions on the screen they were presented with 20 statements and they had to make categorizations of those statements and then specific instructions were given when they had to rate the same statement with respect to how much it would affect their performance.

5.9.3.2 Causal Attribution

After the first part of the experiment participants were asked to think about a successful and an unsuccessful experience, one at a time, and then write down the cause for the outcome. Based on the cause written down, they had to answer the Causal Dimension Scale – II questionnaire for each of the successful and unsuccessful experience.

5.9.3.3 Free Recall

After filling out the questionnaire, participants were instructed to recall as many statements as they could from the first part of the experiment. Since there was no time limit, they were given the flexibility to continue however long they wanted or stop whenever they wanted. Finally they were directed to a screen where they had to type in their demographic details.

5.9.4 Results

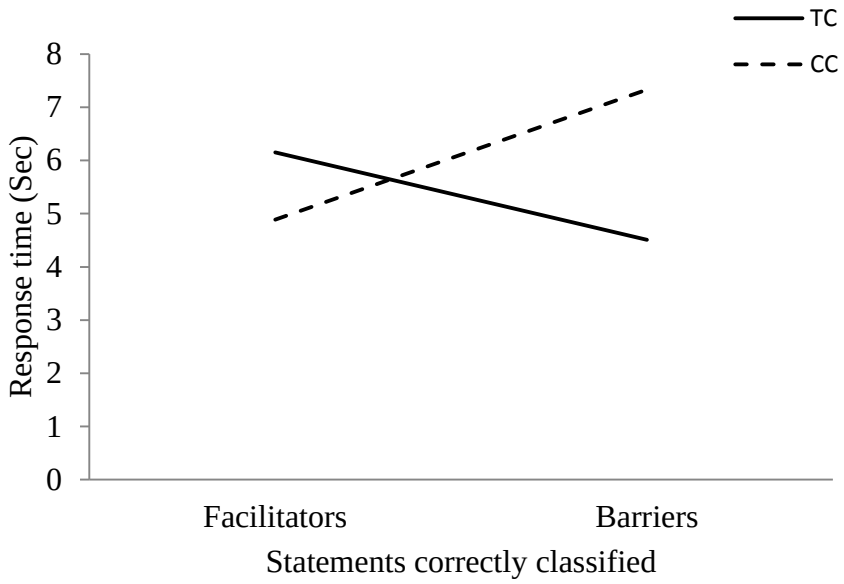
The first section presents results pertaining to the group differences (TC vs. CC) in response times to the statements (barriers vs. facilitators) which were analysed using repeated measures ANOVA. The second section focuses on results of group differences (TC vs. CC) in ratings of statements (barriers vs. facilitators) using repeated measures ANOVA. The third section comprises results on group differences in individual causal dimensions and total recall which were analysed using repeated measures ANOVA. The last section consists of results

pertaining to the degree to which miscategorizations were made in terms of absolute number, reaction times and ratings and were analysed using repeated measures ANOVA. All post hocs were analysed using simple effects with Bonferroni corrections. Miscategorizations were classified into two categories:

a) Facilitators miscategorised = facilitators miscategorised as barriers combined with facilitators miscategorised as neutral.
b) Barriers miscategorised = barriers miscategorised as facilitators combined with barriers miscategorised as neutral. [9]

5.9.4.1 Response Time Results

Figure 5.1: Group differences in reaction times of barriers and facilitators correctly classified



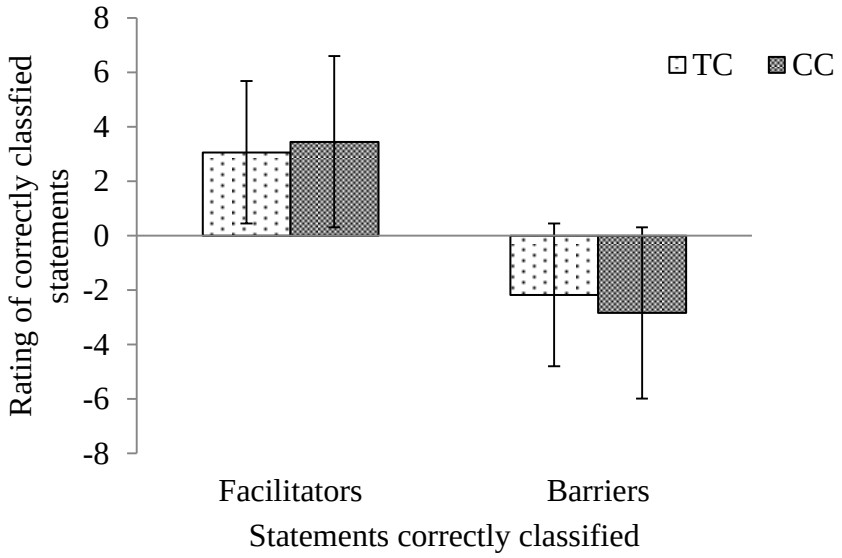
A repeated measures ANOVA revealed a significant interaction between the two groups and the statements correctly classified, F (1, 43) = 29.97, MSE = 3.125, p < .01, *partial* η^2 = .411. Simple effects with Bonferroni correction revealed that TC were faster in classifying barriers (M = 4.51, SE = .482) than facilitators (M = 6.15, SE = .252), t (43) = 3.16, p <.01. CC, on the other hand, were faster in classifying facilitators (M = 4.89, SE = .257) than barriers (M = 7.33, SE = .493), t (43) = 4.57, p <.01. Also, TC were faster in

[9] Some of the measures violated the assumption of homogeneity of variances which was determined using the Levene's test; however analysis was continued using the ANOVA but a non-parametric test – Mann-Whitney U was also used to support the primary effects determined by ANOVA.

classyfying barriers compared to CC, t (43) = 4.09, p <.01, and CC were faster in classying facilitators compared to TC, t (43) = 3.50, p <.01. Results also revealed that there was no significant main effect of barriers and facilitators, and only a marginal a significant main effect of group F (1, 43) = 3.714, MSE = 3.684, p = .061, *partial* η^2 = .080, reflecting a tendency for TC in general to be quicker (M = 5.33, SE = .283) in classifying statements than CC (M = 6.11, SE = .289).

5.9.4.2 Ratings of correctly classified statements results

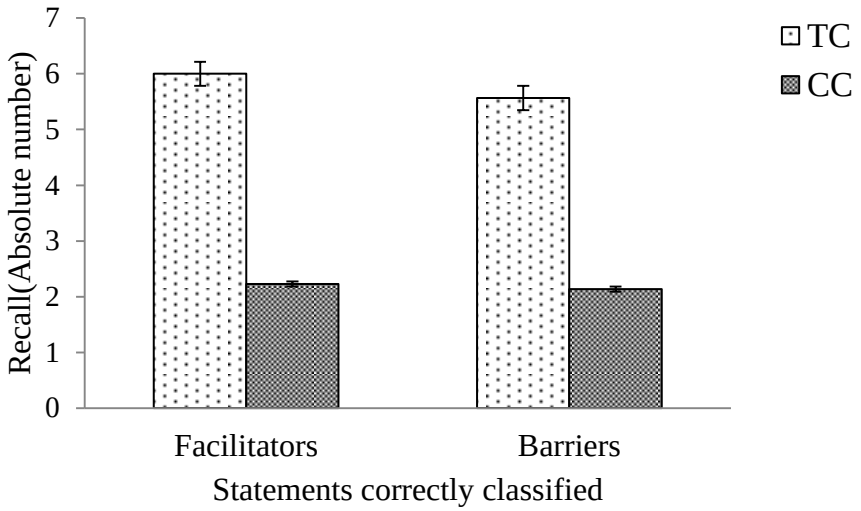
Figure 5.2: Group differences in rating barriers and facilitators



Repeated measures ANOVA revealed a significant interaction between the two groups and the statements correctly classified as barriers and facilitators F (1, 43) = 8.745, MSE = .699, p < .01, *partial* η^2 = .17. Simple effects with Bonferroni correction revealed that TC rated barriers (M = -2.18, SE = .203) as more performance deteriorating than facilitators (M = 3.063, SE = .289), t (43) = 21.22, p <.01 and CC also rated barriers (M = -2.84, SE = .207) as more deteriorating than facilitators (M = 3.45, SE = .144) , t (43) = 24.94, p <.01, following the trend of the main effect of barrier/facilitator ratings, F (1, 43) = 1068.52, MSE = .699, p < .01, *partial* η^2 = .961. It was also found that within facilitators there was a marginally significant difference between TC and CC wherein TC made lower ratings than CC, t (43) = 1.92, p =.062 and but within barriers CC also made more performance deteriorating ratings than TC, t (43) = 2.26, p < .05. The main effect of group was not significant, F (1, 43) = .582, MSE = .702, p = .450, *partial* η^2 = .013.

5.9.4.3 Recall results

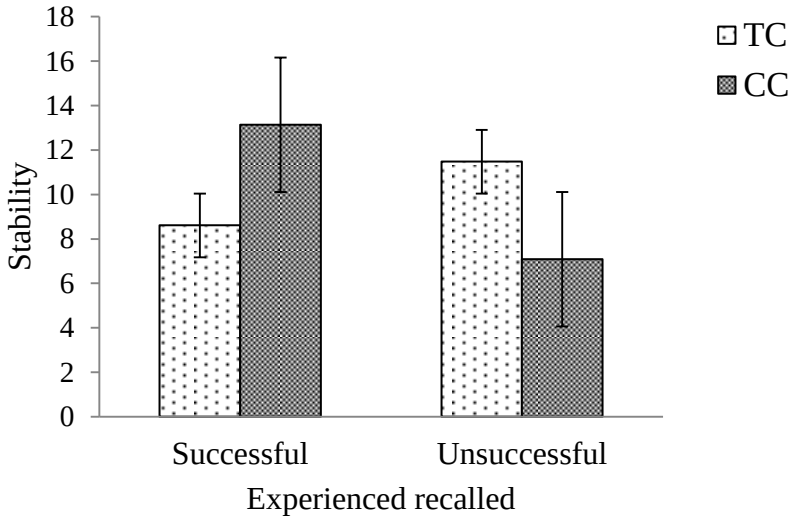
Figure 5.3: Group differences in recall of barriers and facilitators



Repeated measures ANOVA revealed no significant interaction between group and statement correctly classified and no main effect of the statements presented. However there was a significant main effect of group, F (1, 43) = 61.517, MSE = 4.457, p <.01, *partial* η^2 = .604. In general TC recalled more items (M = 5.78, SE = .311) than did CC (M = 2.18, SE = .318), regardless of whether they were barriers or facilitators.

5.9.4.4 Causal dimension results

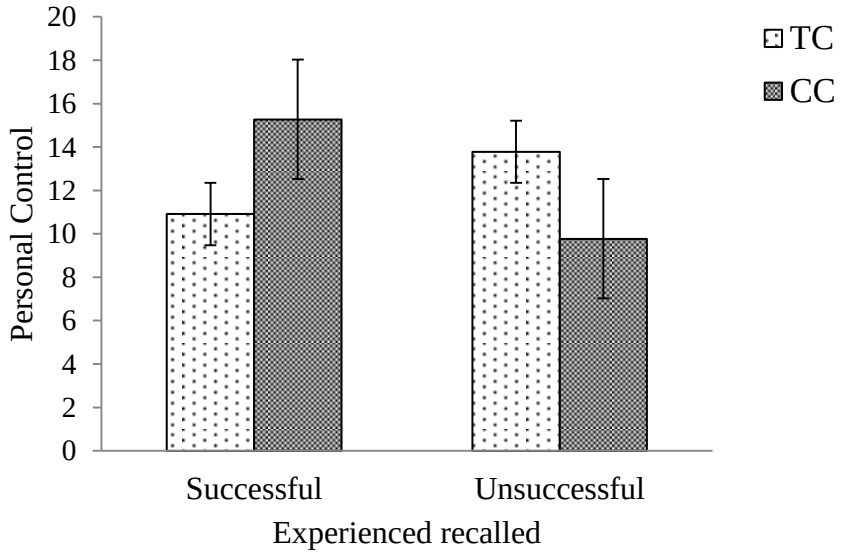
Figure 5.4: Group differences in Stability for successful and an unsuccessful event



Stability

Repeated measures ANOVA revealed a significant interaction between group and type of experience recalled, F (1, 43) = 48.67, *MSE* = 9.181, $p < .01$, *partial* $\eta^2 = .531$. This interaction is depicted in Figure 5.4. Simple effects with Bonferroni corrections further revealed that TC attributed more stability to unsuccessful experiences (*M* = 11.48, *SE* = .795) than successful experiences (*M* = 8.61, *SE* = .702), *t* (43) = 3.21, $p < .01$, and CC attributed more stability to successful experiences (*M* = 13.14, *SE* = .718) than unsuccessful experiences (*M* = 7.09, *SE* = .813), *t* (43) = 6.61, $p < .01$. Similarly, for a successful experience CC attributed more stability than TC, *t* (43) = 4.51, $p < .01$, and for an unsuccessful experience TC attributed more stability than CC, *t* (43) = 3.86, $p < .01$. There was a significant main effect of experiences recalled, *F* (1, 43) = 6.18, *MSE* = 9.181, $p = .017$, *partial* $\eta^2 = .126$, but no significant main effect of group, *p* = n.s.

Figure 5.5: Group differences in Personal control for successful and an unsuccessful event

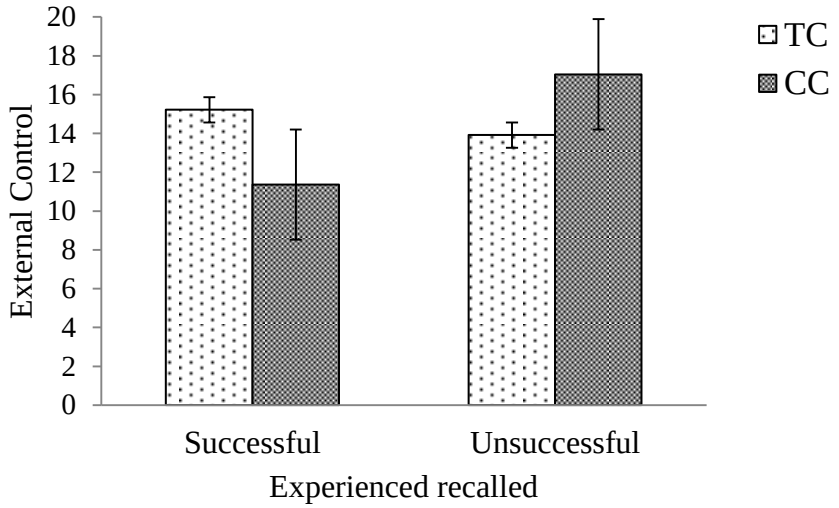


Personal Control

Repeated measures ANOVA revealed a significant interaction between group and type of experience recalled, F (1, 43) = 17.494, *MSE* = 22.513, $p < .01$, *partial* $\eta^2 = .289$. This interaction is depicted in Figure 5.5. Simple effects with Bonferroni corrections further revealed that TC attributed more personal control to unsuccessful experiences (*M* = 13.78, *SE* = 1.18) than successful experiences (*M* = 10.91, *SE* = 1.19), *t* (43) = 2.05, $p < .01$, and CC attributed more personal control to successful experiences (*M* = 15.27, *SE* = 1.22) than

unsuccessful experiences (M = 9.77, SE = 1.20), t (43) = 3.84, p <.01. Similarly, for a successful experience CC attributed more personal control than TC, t (43) = 2.55, p = .014, and for an unsuccessful experience TC attributed more personal control than CC, t (43) = 2.39, p <.05. There was no significant main effect of group or the type of experience recalled.

Figure 5.6: Group differences in External control for successful and an unsuccessful



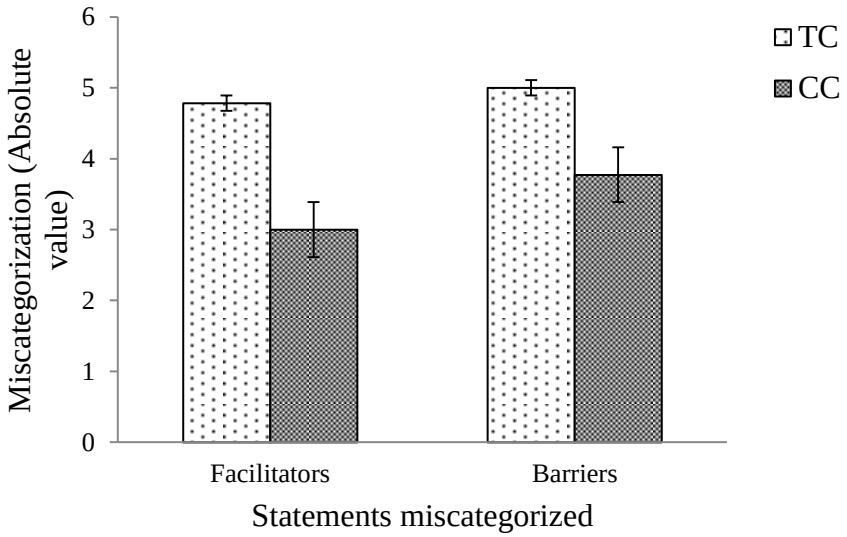
External Control

Repeated measures ANOVA revealed a significant interaction between group and experience recalled, F (1, 43) = 24.540, MSE = 11.182, p <.01, *partial* η^2 = .363. This interaction is depicted in Figure 5.6. Simple effects with Bonferroni corrections further revealed that TC attributed personal control over both unsuccessful experiences (M = 13.91, SE = .768) and successful experiences (M = 15.22, SE = .847) to the same degree, t (43) = 1.32, p = .986, and CC attributed more external control to unsuccessful experiences (M = 17.05, SE = .785) than successful experiences (M = 11.36, SE = .866), t (43) = 5.64, p < .01. Similarly, for a successful experience TC attributed more external control than CC, t (43) = 3.19, p < .01, and for an unsuccessful experience CC attributed more external control than TC, t (43) = 2.85, p < .01. There was no significant main effect of group, p = n.s, but a significant main effect of type of experience, F (1, 43) = 9.635, MSE = 11.182, p <.01, *partial* η^2 = .183.[10]

[10] For the dimension Locus of Causality, no main effects F (1, 43) = 2.06, MSE = 11.739, p =.158, *partial* η^2 = .046 or interactions F (1, 43) = .184, MSE = 11.739, p = .670, *partial* η^2 = .004. were significant. TC and CC scored relatively high for both successful and unsuccessful experiences.

5.9.4.5 Miscategorization results

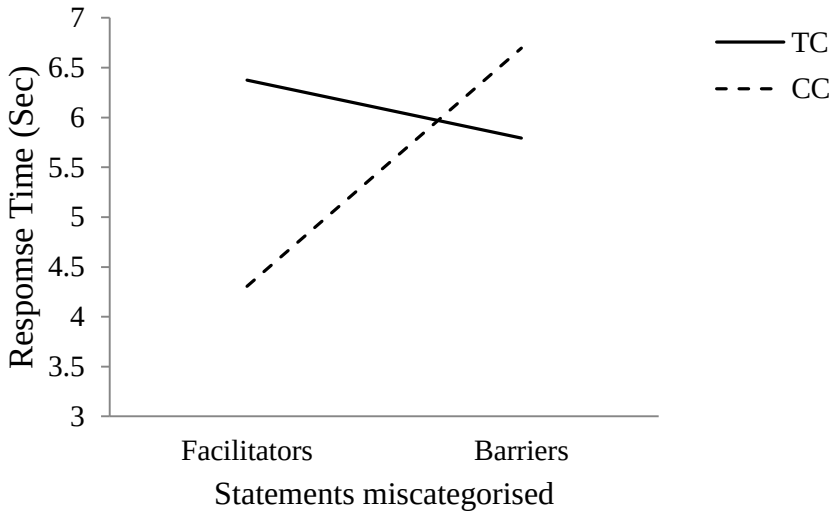
Figure 5.7: Group differences in the total number of barriers and facilitators miscategorised



Number

Repeated measures ANOVA revealed that the interaction between group and statements miscategorised was not significant, nor was the main effect of type of miscategorizations. However as can be seen in Figure 5.7, there was a significant main effect of group, F (1, 43) = 16.237, MSE = 3.137, $p < .01$, *partial* η^2 = .274. TC (M = 4.89, SE = .261) made more miscategorizations than CC (M = 3.39, SE = .267), regardless of whether they were barriers or facilitators.

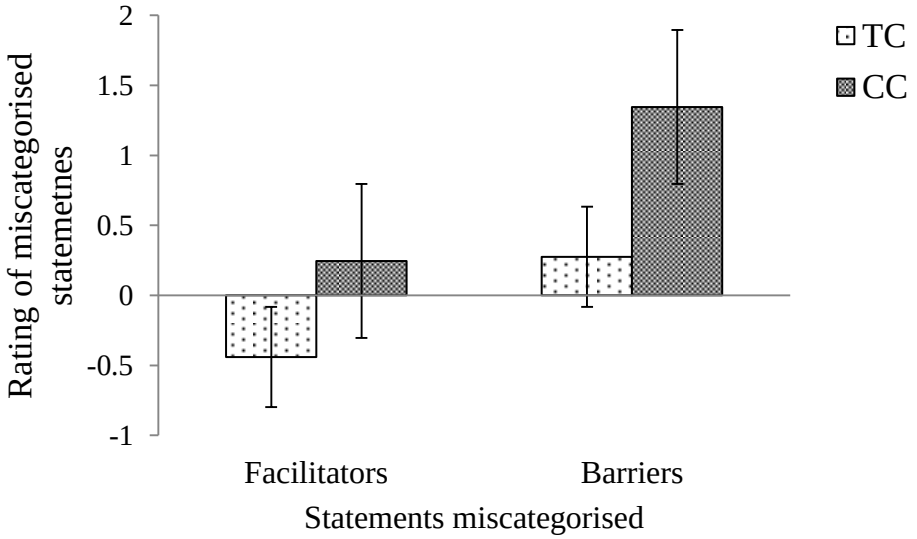
Figure 5.8: Group differences in the reaction times of barrier and facilitator miscategorizations



Reaction time

Repeated measures ANOVA revealed a significant interaction between group and statements miscategorised, F (1, 43) = 4.935, MSE = 3.729, $p < .01$, *partial* η^2 = .236, as was the main effect of type statement miscategorised, F (1, 43) = 4.935, MSE = 3.137, $p <$ .05, *partial* η^2 = .103. These effects are shown in Figure 5.8. Simple effects with Bonferroni corrections further revealed that TC did not differ in reaction times in miscategorising barriers (M = 5.60, SE = .429) and facilitators (M = 6.38, SE = .392), t = 1.02, p = .313, whereas CC were slower to miscategorise barriers (M = 6.70, SE = .438) than facilitators (M = 4.31, SE = .401), t = 4.11, $p < .01$. It was also seen that TC were slower than CC to miscategorise facilitators, t = 3.69, $p < .01$, but the two groups did not differ in response times when it involved miscategorising barriers, t = 1.47, p = .148. The main effect of group was found to be non-significant F (1, 43) = 1.90, MSE = 4.036, p = .175, *partial* η^2 = .042.

Figure 5.9: Group differences in the ratings of barriers and facilitators miscategorised



Rating

Repeated measures ANOVA revealed that the interaction between group and statements miscategorised was not significant, although the main effect of miscategorizations ratings was significant, F (1, 43) = 38.851, MSE = .477, $p < .01$, *partial* η^2 = .475. Facilitator miscategorizations were more deteriorating (M = -.097, SE = .090) than barrier miscategorizations (M = .810, SE = .126) as can be seen in Figure 5.9. The main effect of group was also significant, F (1, 43) = 28.738, MSE = .603, $p < .01$, *partial* η^2 = .401. TC

rated miscategorizations as more deteriorating (*M* = -.082, *SE* = .115) than CC (*M* = .796, *SE* = .117) regardless of whether they were facilitator or barrier miscategorizations.

5.9.5 Discussion

The present research confirms the basic notion that information processing styles differ between TC and CC. More specifically, TC show a maladaptive style and CC show a style that is more adaptive, thereby supporting the hypotheses. Response time measurements were used to assess the sensitivity to kind of information. TC were faster in identifying barriers than facilitators. This implies that when TC saw a statement like "You pulled your hamstring before the event" they categorized this as a barrier faster than when TC saw a statement like "You ran your personal best in the heats" and classified that as a facilitator. In other words, TC were more alert and sensitive to negative information than positive information. It could well be that the negativity bias is long-lasting due to TC's repetitive exposure to failure, which could be considered as a series of bad events, as research has shown that bad events have longer lasting effects (Sheldon, Ryan & Reis, 1996). Furthermore, perhaps TC tend to recall negative events frequently and thus the relevant bad emotions remain more salient in their minds than good ones (Fikenauer & Rimé, 1998). For example, if TC constantly recalled more negative events like losing a race by just a second from the competitor, the feeling of disappointment and frustration would linger on. These emotions would become more salient in their minds, and they would probably ruminate on these events and emotions as previously suggested (Study 2a, Chapter 3). They would then process information thoroughly and carefully (e.g., Clore, Schwarz, & Conway, 1994; Schwarz, 1990), which presents other emotional states and information from entering the system. Hence when they are asked to identify potential performance enhancing or deteriorating statements, they might be faster in identifying the barriers as these statements are then more salient and accessible. In other words, TC are cognitively busy with negatively valenced information.

Interestingly, CC were faster in identifying facilitator statements than barrier statements. For example, when CC saw a statement like "Your coach just gave you good feedback after your run", they categorized this statements as a facilitator faster than when they saw a barrier statement like "Your warm up before the event was not very good". Thus, it could well be that CC show a positivity bias, as predicted earlier. One important factor to note here is that CC have had regular exposure to success. Research has shown that having performed well, that is, competently, leads to stronger predictions about future performance than having performed badly (Skowronski & Carlston, 1987). Amongst CC, it has already

been established in Study 1a, Chapter 2, that they show greater expectations for future events than TC. Hence it is quite clear why they would show more sensitivity to positive information. Moreover, Baumeister et al. (1989) commented that people with high self-esteem do not worry much about failure because they do not expect this to happen and are hence tuned to a positive frame of mind. Thus, when CC are exposed to repetitive success, the memories that are salient in their minds are those of success, hence corresponding emotions of happiness and pride could also be at increased levels. Thus, when CC see statements that could bring about similar emotions, they tend to recognize them faster. Results also revealed that when they involved barriers, TC were faster than CC in categorizing statements, and when they involved facilitators, CC were faster than TC in categorizing them. This is an important finding as it throws light on the main strategy that CC would block out irrelevant information and focus on only relevant material. One could always assume that TC show a negativity bias, but CC could be just as accurate in identifying barriers and facilitators. CC were in fact faster in identifying facilitators compared to barriers showing that they are probably more tuned to positive information. This sensitivity towards positive information can be seen as reflecting their constant reinforcement by successful events and positive emotional states. In fact research has shown that those who are positively tuned tend to cluster information and process it superficially (Bless, Hamilton & Mackie, 1992). Fiske and Taylor. (1991) also explained that those individuals with high motivation and with pragmatic concerns process only relevant information more thoroughly. They focus their cognitive resources on what is important. Thus, CC are able to block out irrelevant information, in this case any form of negative information, be it memories or emotional states associated with it, and when they need to process information, they only do so with what is relevant, hence goal-congruent information processing. Previous studies (2a and 2b) from Chapter 3 show that CC in general are low on maladaptive cognitive traits like rumination, perfectionism, anxiety and are also low in need for cognition. All of this points to the idea that CC are more selective in the way they attract and process information. They are able to focus on what is important and block out irrelevant information. Plus, they are also tuned to a positivity bias which only helps them increase their self-esteem and future expectations which would directly help them in facing competition stress with relative ease. Thus, in other words, CC's states of mind are preferentially occupied with goal-congruent, positive information.

Further evidence to indicate that TC in general are occupied in intensive thinking comes from the results based on the ratings the athletes provided for presented barrier and

facilitator statements. Interestingly barriers were rated as more performance deteriorating by CC when compared to TC and facilitators were rated as more performance enhancing by CC compared to CC. Although these pairwise comparisons were only marginally significant, it can be inferred with caution that this could reflect TC's general thinking ability, given that when people think more they tend to make less extreme ratings. In other words, when TC see a statement, they think about it and immerse themselves in the content of the stimuli and then make appropriate judgements. CC, on the other hand, may superficially process the information and therefore make more extreme ratings. Although TC were quicker to identify barriers, whereas CC were quicker to identify facilitators, identifying statements is different from evaluating them. TC are probably quick to identify barriers due to their negatively tuned mind set, but after they identify it, when asked to rate it, they think about and give less extreme ratings. CC on the other hand, identify facilitators faster than barriers and TC, but also engage in more superficial processing, thereby making extreme ratings.

So far it has been established that TC and CC engage in a maladaptive/adaptive information processing style. But what happens once they process this information? How do they try to make sense of what they process? Evidence suggests that negative events cause people to engage in greater search for meaning than positive events (e.g., Baumeister, 1991; Frankl, 1963; Taylor, 1983). Understandably, since TC are more exposed to failure, they would engage in an active process to make more attributions, which also means they think more. Results from the present study revealed the kind of attributions TC and CC made for both successful and unsuccessful events. It was hypothesised that TC would make more self-defeating attributions, much in line with the current findings that they are tuned to negative information and show negativity bias. The attributions they make would cater to their negative self-schemata, in tune with their active processing. CC, on the other hand, were predicted to make self-enhancing attributions, much in line with the theory that they are more sensitive to positive information, blocking out irrelevant information and doing anything to improve their self-esteem. Thus CC would be more attentive to their positive self-schemata and would make attributions based on that. Results showed that for the causal dimension stability, that is, how stable people thought the event would be over a period of time, TC showed lesser stability for successful than unsuccessful events and CC shower lesser stability for unsuccessful than successful events. For example, if the successful event was winning a gold medal at an important athletic competition, TC attributed the cause for this event to be less stable than CC. If the unsuccessful event was finishing fourth at an important athletic competition, TC attributed the cause for this event to be more stable than CC. Research by

Agostinelli, Sherman, Preston and Chassin (1992) showed that after failure people rated failure as more common. There is thus is a clear pattern that can be seen, wherein TC are more self-defeating in assuming that success is temporary and failure is permanent, while CC are more self-enhancing in assuming that success is permanent and failure is temporary.

The second set of attributional dimensions studied was that of controllability which was divided into personal control and external control. Results revealed that TC attributed lesser personal control than CC and correspondingly attributed more external control than CC to successful events. For example, if the successful event was improving one's personal best timing for a race, TC attributed this to something not in their control and CC attributed this to something they had a lot of control over. Similarly, TC attributed more personal control than CC and correspondingly less external control than CC to unsuccessful events. For example, if they did not perform in the finals as well as they performed in the heats, TC attributed the cause to something in their own personal control, whereas CC attributed the same event to something outside their personal control. These findings are in line with findings from previous studies (3a & 3b) from Chapter 4, wherein TC showed lower perceived controllability than CC for outcomes with explicit chance of success and showed higher perceived controllability for outcomes with explicit chance of failure. This is yet another indication of the fact that TC are constantly extracting information from the environment and due to their negativity bias, make attributions that are more self-defeating. CC, on the other hand, conformed to the existing literature on how negative events tend to be attributed to external causes (e.g., Pyszczynski & Greenberg, 1987; Weiner, 1985). Another valuable contribution to understanding these effects is in terms of the explanatory styles theory (e.g. Peterson, 2000; Peterson & Park, 1998; Peterson & Steen, 2002; Peterson & Vaidya, 2001). People who usually explain bad events by causes that are stable in time (''it's going to last forever''), global in effect (''it's going to undercut everything that I do''), and internal (''it's me'') and who explain good events with unstable, specific, and external causes are said to have a pessimistic explanatory style. People with the opposite attributional pattern are said to have an optimistic explanatory style. This is exactly what is observed with TC and CC; TC's self-defeating attributions can be explained due to a pessimistic explanatory style while CC's self-enhancing attributions can be explained due to an optimistic explanatory style. Thus, these results show yet again how repetitive exposure to failure or success experience could shape the divergent nature of information processing and result in self-defeating or self-enhancing attributions.

The final set of results captures the basic notion of 'thinking'. The idea that TC process more information is because they think more and do so negatively; similarly, CC process less show a positivity bias, which is evidenced by the following results. TC in general recalled more statements than CC during the free recall task. Regardless of whether they were facilitators or barriers, TC recalled more items than CC. These findings replicated those from a previous study 2b, Chapter 3, that TC are high in need for cognition than CC and consequently recalled more items than CC. Research has shown that those with high need for cognition exert greater effort in information processing and analysing information, thereby recalling more items (Cacioppo & Petty, 1982). Thus it is quite possible that TC show a negativity bias but not at the cost of extensive information processing. This finding also provides empirical support for the idea that CC are able to block out irrelevant information, as their recall rate was lower than TC. Evidence suggests that those who are positively tuned tend to cluster information and process it superficially (Bless, Hamilton & Mackie, 1992). For CC their low need for cognition thus facilitates the disengagement from new irrelevant information, thereby aiding in obtaining optimal performance (Venkatraman et al., 1990).

Another aspect of the results that points towards the 'thinking' theory are those based on the miscategorization calculations. Miscategorizations were split into two categories, miscategorised facilitators and miscategorised barriers. The former comprised all the statements that were originally facilitators but were classified as barriers or neutral statements by the participants. The latter comprised statements that were originally barriers but classified as facilitators or neutral statements. The basic notion is that when people make such miscategorizations, it is assumed that they spend some extra time thinking about that particular statement. For example, if a facilitator statement was presented like "Your performance during the heats was close to your personal best", people could have miscategorised it as either a barrier or a neutral statement. However to take a seemingly positive statement and categorise it as an ambiguous or an opposite category would require some amount of extra thought. When people bring in this elaborate thinking strategy to justify their categorization, miscategorizations occur and more time is spent processing this information. Thus the view is that higher numbers of miscategorizations are directly associated with longer response time to do so. Having said so, results revealed that, in general, TC made more miscategorizations (both barriers and facilitators) than CC. This is consistent with the previous finding that TC recalled more items (both barriers and facilitators) than CC. Both constructs are indicative of heightened thinking. Hence a greater

absolute number of miscategorizations by TC are again indicative of the fact that they tend to mull over information and think more.

It was also found that in general the response times to miscategorise barriers was slower than the response times to miscategorise facilitators. This could seems plausible, in that when one reads a negative statement like "You were thinking of your last performance which was not good", if one had to miscategorise it into something positive or neutral it would require more thinking and more interpretations than usual, because one is thinking of how a seemingly negative event could be positive. On the other hand, in case of a positive statement like "You are about to start your event and you are focused" it could be easier to think about the negative aspects of that statement, as research has shown that there exists greater sensitivity to negative interpretations (for a review, see Baumeister et al., 2001) from neutral and positive stimuli. Thus, this could be a reason why miscategorised facilitators are quicker to be classified as such. However, TC were slower than CC in making facilitator miscategorizations, that is, taking a positive statement and miscategorising it. This goes against the general idea that TC show a negativity bias, although it is important to remember that the reaction times of miscategorizations are a measure of 'thinking' rather than the valence bias attached to it. Thus TC took longer than CC to think about a facilitator statement and then classify it as a barrier or a neutral statement. An interesting trend here is that TC did not differ in their reaction times between facilitator and barrier miscategorizations. That is, even when TC had to miscategorise barriers as facilitators they took as much time as they took to miscategorise facilitators. This is evidence towards the heightened information processing hypothesis since TC in general just think more while processing information. CC are able to categorize a barrier, as something positive or neutral slower than when they miscategorise a facilitator and there are no differences between TC and CC in the reaction times of barrier miscategorizations. Thus in general people are slower in making barrier miscategorizations and the effect seems most prominent for facilitator miscategorizations. As already established, TC are slower indicating that they need more time to process a positive statement, perhaps because their mind set is not used to identifying positive information, and when they do receive it, they take their time to misattribute it to something negative or neutral. For CC, on the other hand, even though they too make miscategorizations, positive statements are in line with their mind set and they therefore identify them faster and do not require more time to process the information.

TC also rated miscategorised facilitators as more performance deteriorating than did CC and rated miscategorised barriers as more performance deteriorating than did CC. Thus

TC in general made lower ratings than CC. This is again in keeping with the negativity bias hypothesis for TC. The interesting aspect here is that when TC miscategorise a barrier as something neutral or positive, they do not make extreme ratings of performance enhancement to the same degree as CC. CC, on the other hand, are following a predictable trend wherein they rate barrier miscategorizations as more performance enhancing than facilitator miscategorizations. This is a very good indication for a positivity bias for CC and a negativity bias for TC. Thus connecting all miscategorisation results together it can be concluded that TC in general miscategorise more, hence process more information and thus think more. While they do so they also show a bias towards negativity. Similarly, CC in general miscategorise less, and process information superficially by blocking out unwanted information, and they think less. They show, on the other hand, a tendency towards a positivity bias.

In conclusion, the difference in the way TC and CC process information is consistent with the evaluative space model (Cacioppo & Berntson, 1994; Cacioppo, Gardner, & Berntson. 1997). The reason why these two groups differ in the way they process information is because TC respond more intensely to the negative motivational system and CC respond more intensely to the positive motivational system. It has already been established that TC's negative system could be due to their experience with failure and their maladaptive cognitive traits which make them more sensitive to information, especially when it is negative. Thus, these findings point in the direction that TC think more, think bad, maintain and respond bad while CC think less (or appropriate), think good, maintain and respond good. The next chapter will address the predicted model discussed earlier by testing it amongst non-athletes through the use of simple false feedback about success and failure. The idea is to see whether the model, in combination with pre-existing traits of anxiety, rumination, perfection and need for cognition, will be successful in predicting judgements of experienced control.

Chapter 6: 'Controllability' lies in the eye of the beholder: The role of repetitive success and failure experiences in predicting perceived controllability.

6.1 Overview

Previous experimental chapters (2 to 5) have demonstrated the evidence of a potential model that proposes that TC engage in a maladaptive information processing style whereas CC process information that is adaptive and goal congruent. The maladaptive style is conducive to the idea that TC's pre-existing high levels of rumination, trait anxiety, maladaptive perfectionism and high need for cognition makes them 'maladaptive thinkers' in general and are thus more sensitive to environmental cues and draw out more information. Furthermore, TC's exposure to repetitive failure reinforces negativity biases that guide their informational processing style. In other words, TC think more and think bad. Thus, as TC continue to engage in a maladaptive information processing style, the attributions they make are self-defeating in nature and approach future outcomes with perceived uncontrollability, leading to lowered expectations which are in turn translated into actual performance. Thus TCs remain TCs because they enter a vicious cycle of learned helplessness. CC on the other hand are able to block out irrelevant information from the environment and are more tuned to positive information that would potentially enhance their performance by processing information more conducive to their immediate goal. This style comes from their lower levels of inherent traits of rumination, trait anxiety, maladaptive perfectionism and need for cognition compared to TC. CC's exposure to repetitive success makes them more tuned towards positive information and more likely to exhibit a positivity bias. In other words, CC think less and think good. As they continue in their goal congruent style of information processing, the attributions they make are self-enhancing which invariably results in approaching the outcome with an illusion of control. This leads to heightened performance expectations thereby escaping the learned helplessness loop. CC thus maintain their high performance status by entering the positive loop of inversed learned helplessness. The following chapter will address the above-mentioned model by testing it amongst non-athletes via use of simple false feedback about success and failure, and to see if this, along with pre-existing traits of anxiety, rumination, perfection and need for cognition, might have an effect on judgements of control and performance expectations.

6.2 Inherent traits and performance

As already established in Chapter 3, specific traits of rumination, anxiety, perfectionism and need for cognition seem to play an important role in shaping the performance of TC and CC. Several studies have examined the relation between these traits and performance outcomes. More specifically, research has shown that when these traits are maladaptive in nature it leads to performance deterioration and when these traits are adaptive it leads to performance improvement. When considering rumination it has been pointed out that a ruminative orientation towards performance is often associated with performance difficulties (Morrow & Nolen-Hoeksema, 1990). It has also been established that both trait and state anxiety is an important component of a 'choking' response (Barkhoff et al., 2004; Baumeister & Showers, 1986; Beilock & Carr, 2001; Carver & Scheier, 1981). Perfectionism is often associated with performance decrements, specifically when coupled with anxiety. It is said that an individual experiences anxiety when s/he perceives a discrepancy between the ideal and the actual self (e.g., Beiling et al., 2004; Borkovec, Pruzinsky, & Metzer, 1986; Carver & Scheier, 1986; Flett & Hewitt, 2005; Frost & Henderson, 1991; Higgins, 1987). Similarly, evidence exists indicating a strong relation between perfectionism and rumination (e.g., Blankstein & Dunkley, 2002). This notion is supported by the idea that when perfectionism induces harsh self-criticism, a ruminative response style is prompted, along with a focus upon personal and interpersonal inadequacies (Flett & Hewitt, 2006; Flett, Madorsky, Hewitt, & Heisel, 2002; Thompson & Zuroff, 2004, as cited in Hill et al., 2008). These findings concur with the first part of the proposed model suggesting the role of such inherent traits in affecting sports performance amongst TC and CC.

6.3 Inherent traits and the control experience

A prominent part of the model discusses how these traits could affect one's perception of control that interferes with experiencing state anxiety. This claim is well validated by research associated with perceived loss of control and anxiety (Bandura, 1991; Lazarus & Folkman, 1984). Mor et al. (1995) further argue that perfectionists with a low sense of control are more likely to experience performance-related anxiety and stress while perfectionists with a high sense of control should experience relatively lower levels of anxiety. Some of the explanations for the above-mentioned link are that many stressful events are beyond the reach of a person's control (e.g., Fleming, Baum, & Singer, 1984; Heppner & Peterson, 1982; Seligman, 1975) and these stressors may reduce attentional resources needed to cope with the environment, thereby producing a sense of control loss (Kahneman, 1973). Thus to see it fit

in the proposed model, one can assume that part of the maladaptive information processing that occurs in TC could be because of their tendency to divert their attention to their internal states and other sources that are not congruent to their current goals, while CC are able to focus attention on what exactly is required. It is thus vital to remember that the way one experiences control is determined by inherent traits, on the one hand, and certain information processing styles, on the other.

6.4 The learned helplessness vs. Inversed learned helplessness loop

One of the most important determinants of performance deficits is previous failure experience (e.g., Hiroto & Selgiman, 1975; Mikulincer, 1986, 1989a; Stiensmeier-Pelster & Schurmann, 1990, as cited in Witkowski & Stiensmeier-Pelster, 1998). Several theoretical alternatives propose that repeated failure, not noncontingency per se, is a main source of helplessness (e.g., Boyd, 1982; Coyne et al., 1980; Frankel & Snyder, 1978; Kuhl, 1984; Williams & Teasdale, 1982, as cited in Sedek & Kofta 1990). Thus, experiencing repetitive failure or success is bound to have subsequent effects either on the same kind of task or the effect can be displaced to other areas too. Chapter 1 proposed the idea that TC are products of repetitive failure exposure and CC are products of repetitive exposure to success. Results from study 3a and 3b inChapter 4 indicated that TC would approach outcomes with perceived uncontrollability and CC would approach outcomes with an illusion of control. Thus, the final part of the overall model proposes that the experience of perceived control is dependent on certain inherent traits which would guide the information processing in a particular style leading to a learned helplessness loop or an inversed learned helplessness loop.

6.5 Study 5

The following study was designed to test the effects of repetitive failure and success on non-athletes as moderated by inherent traits of anxiety, rumination, maladaptive perfectionism and need for cognition, on perceived controllability. It is important to note that only the short term effects of a possible experimental model of TC and CC were tested in laboratory as it is impossible to simulate TC and CC emergence, given that the athletes in the samples studied in the field experiments reported so far had been experiencing the competition situation for over five years.

The study involved recruiting undergraduate students who had no prior experience in any kind of competitive sports. The participants were instructed to fill out questionnaires that measured rumination, trait anxiety, perfectionism and need for cognition. This was followed

by a bogus Stroop task which was used to manipulate the experience of success and failure. Participants were instructed on the importance of the Stroop task and what it was supposed to measure. A cover story of a 'font effect' was included to incorporate the importance of including a training series in font 'Times New Roman' and a main test series in font 'Courier New'. The participants were instructed that the training series would prepare their response accuracy and quickness for the ensuing main series, which was portrayed as being of primary interest. Both series comprised the congruent and incongruent Stroop task with 10 trials in each. The congruent trials involved displaying a colour word in the same colour as the colour word. For example, the word 'RED' would be displayed in the colour red. The incongruent trials involved displaying a colour word in a different colour to the colour word. For example, the word 'RED' would be displayed in the colour blue. At the end of each block, participants received feedback (success or failure) by displaying the average reaction time of the 'training' series and then the average reaction time of the 'main test' series, and then informing them on the screen whether their performance was BETTER or WORSE in the main test series. In the failure feedback condition, the participant would receive 8 failures and 2 success feedbacks after every block. In the success feedback condition, the participant would receive 8 success and 2 failure feedbacks after every block. At the penultimate block a sheet of paper was presented which contained questions relevant to one's performance expectations on the last block of the Stroop Task. Finally perceived controllability was measured using the sports-race paradigm as described in Chapter 4, Study 3a.

It was hypothesised that exposure to success and failure would have an effect on perceived controllability that would be moderated by the traits. That is, exposure to failure along with high levels of traits like rumination, trait anxiety, maladaptive perfectionism and need for cognition would result in making lower control judgements and exposure to success along with low levels of the above mentioned traits would result in making higher control judgements. It was also predicted that failure exposure would result in lower expectations and success exposure would result in higher expectations.

6.5.1 Method

6.5.1.1 Participants

A total of 51 psychology undergraduate students including 15 men and 36 women in the age range of 18 – 32 years were included. Mean age was 21.73 years, *SD* = 2.91. Participants were randomly exposed to either a failure or success condition on the bogus Stroop task. These students had no prior experience in sports competitions.

6.5.1.2 Measures and Materials

Questionnaires administered werethe Rumination Sadness Scale (Conway et al., 2000) to measure rumination; the State-Trait Anxiety Inventory (STAI) Form Y (Spielberger et al., 1970) to measure trait anxiety; the Multidimensional Inventory of Perfectionism in Sport, modified to a general set up (Stober, Otto, & Stoll, 2004), to measure perfectionism; and the Need for Cognition scale (Cacioppo & Petty, 1982). These questionnaires were the same as the ones described in Chapter 2, Study 2a and 2b respectively.

Bogus Stroop Task: This task was used to manipulate the experience of success and failure through false feedback. The experiment was programmed using Direct RT and conducted in individual testing booths. Participants used designated keys on the keyboard to make appropriate responses.

Performance expectation measure: Before the last block of the Bogus Stroop task a sheet of paper was presented which contained questions relevant to one's performance expectation on the last block of the Stroop Task (see Appendix B.7)

Perceived Controllability measure: This was measured using the sports-race paradigm as described in Chapter 4, Study 3a. At the end of the experiment, participants were directed to a screen where they typed in their demographic details such as age and gender.

6.5.1.3 Design

Two dependent variables were measured, performance expectations and perceived controllability, in participants who were subjected to false feedback conditions (success vs. failure). The success/failure manipulation comprised ten blocks in total. Each block comprised a training series and main test series. The font type used in the training series was Times New Roman, and the font type used in the main test series was Courier New. Both training and main test series comprised ten congruent and ten incongruent trials of the Stroop task. The congruent trials involved displaying a colour word in the same colour as the colour word. For example, the word 'RED' would be displayed in the colour red. The incongruent trials involved displaying a colour word in a different colour as the colour word. For example, the word 'RED' would be displayed in the colour blue. The colours used were Red, Green, Yellow, Blue and White. Thus in total, each participant would engage in 40 trials of both congruent and incongruent series as training and main test series. In other words, each block comprised forty Stroop stimuli. All participants were exposed to ten such blocks. They received false feedback about their performance at the end of each block. The feedback was in the form of reaction times for the training and main test trials. Thus for a success feedback

condition, the main test reaction time was 0.14-0.23 seconds faster than the training reaction time 8 out of 10 times. For the failure feedback condition, the training reaction time was 0.14-0.23 seconds faster than main test reaction time 8 out of 10 times. Participants were also informed in words whether their main test performance was BETTER or WORSE than the training trial. The false positive or negative feedback was randomly presented. The average reaction times were predetermined by computing the ratio of performance difference of training time vs. competition time for athletes, and using the same ratio differences with average reaction times on a Stroop task.

6.5.1.4 Procedure

6.5.1.4.1 Questionnaire administration

Questionnaires (Rumination Sadness Scale, State-Trait Anxiety Inventory, the Multidimensional Inventory of Perfectionism in Sport, modified to a general set-up, and the need for cognition scale) were administered to all participants. The order of questionnaires was always counterbalanced. This was followed by the bogus Stroop task to manipulate the experience of success and failure through false feedback.

6.5.1.4.2 Bogus Stroop task

Participants were seated and given oral instructions as well as instructions on the screen. They were first told that the Stroop task measured mental alertness. A cover story was also included stating that recent theories would link the Stroop effect and a font style and that results indicated that a particular font style was an important predictor of one's attentional flexibility. Participants were then instructed that to test this 'font effect' the Stroop response would be pre-trained with a different font to minimise unfamiliarity with the Stroop response.

It was important to establish the 'font effect' as the cover story, because this enabled the design to include a training series and a main series in different fonts. Thus participants were instructed that they would receive pairs of training and main test series and that they should try their best in both. They were specifically informed that the training series would prepare one's response accuracy and quickness for the ensuing main test series, which was of primary interest. Each series, training and main test, involved an equal number of congruent and incongruent Stroop trials. Participants were instructed to respond by pressing the appropriate key on the keyboard marked with specific colours. For example, if they had to respond to the colour Red they would press they key with a red sticker on it. The aim was to be as quick and accurate as possible in responding.

Participants were then informed that at the end of each block of training and main test, the program would compute the average reaction time and that they would receive feedback about their performance. Thus at the end of each block, participants received false feedback about their performance. Their reaction times in seconds were presented for the training and main test trials. In case of a success feedback, participants also received the message "Congrats, your main test performance was BETTER than your training performance. Good job". In case of a failure feedback participants received the message "Sorry, your main test performance was WORSE than your training performance. Better luck next time".

6.5.1.4.3 Performance Expectation

Before the last block, participants were asked to report in the form of a choice response whether their expectation about the main test performance in the upcoming block would be better or worse than the results of the training series. They were also asked to indicate approximately the average response time they would expect in the upcoming block in both the training and main test series.

6.5.1.4.4 Perceived Controllability

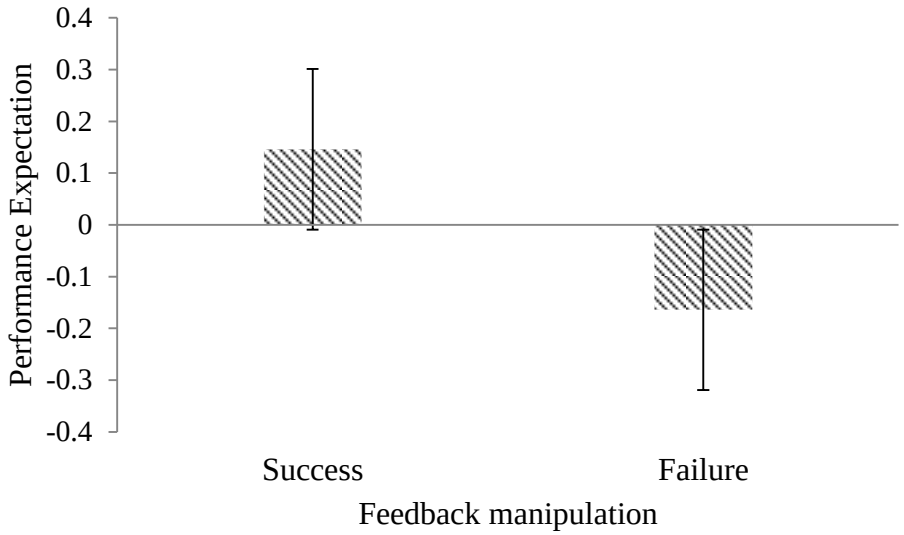
At the end, participants were required to complete the perceived controllability task as described in Chapter 4, Study 3a. The task involved a sports paradigm which included a simulated race and participants had to make judgements on how much control they had on the athlete's speed on the screen. The levels of controllability were distributed across High (80%), Average (50%) and Low (20%) probability schedules. At the end of each race, participants received a feedback of either 'win' if their athlete won the race or a feedback of 'loss' if their athlete lost the race. At the end of the experiment, participants were thanked and debriefed about the nature of the experiment. They were specifically informed that the performance feedback was bogus and was not related to their actual performance.

6.5.2 Results

The results obtained are explained below in two sections: The first section presents the main effects of feedback manipulation (success/failure) on performance expectation which was analysed using a between-subjects ANOVA. Performance expectation was measured by calculating the difference between the expected average reaction time for the training and main test series for the upcoming block of the Stroop task as indicated by the participants at the penultimate block. The second section presents the interaction effects of traits and

feedback manipulation on perceived controllability which was determined using moderation analysis which was used to test the model stated earlier. The final section gives an overview of the results from the task that measured perceived controllability, using a 3 x 2 x 2 repeated measures ANOVA with controllability schedules (high vs. average vs. low), win/loss feedback (win vs. loss) and condition (Success vs. Failure). Perceived controllability was calculated by taking the difference between the actual and perceived contingency.

Figure 6.1: Differences between success and failure feedback manipulations as a function of performance expectations



The ANOVA revealed a significant main effect of feedback manipulation on performance expectation, F (1, 49) = 33.395, MSE = .036, $p < .01$, *partial* η^2 = .405. As seen in Figure 6.1, those who received failure feedback showed lower expectations about their performance on the upcoming trial (M = -0.164, SD = 0.245) than those who received success feedback (M = 0.146, SD = 0.059).

6.5.2.1 Moderation results

Table 6.1: Regressions of perceived controllability on success vs. failure feedback manipulation and (1) anxiety, (2) rumination, (3) maladaptive perfectionism, and (4) need for cognition, and their respective interactions with the feedback manipulation

	R square	Beta	t	Sig
Feedback manipulation-Success vs. Failure	.383	.125	.921	.362
Anxiety		-.254	-1.527	.133
Anxiety Interaction with feedback manipulation		.423	2.518	.015
Feedback manipulation-Success vs. Failure	.407	.166	1.199	.237
Rumination		-.435	-2.637	.011
Rumination Interaction with feedback manipulation		.361	2.153	.036
Feedback manipulation-Success vs. Failure	.453	.131	1.000	.323
Maladaptive Perfectionism		-.424	-2.726	.009
Maladaptive Perfectionism Interaction with feedback manipulation		.447	2.888	.006
Feedback manipulation-Success vs. Failure	.263	.186	1.323	.192
Need for cognition		.253	1.138	.261
Need for cognition Interaction with feedback manipulation		-.362	-1.381	.174

Table 6.1 summarises all the interaction values for feedback manipulation of success/failure and anxiety, rumination, maladaptive perfectionism and need for cognition which were calculated using linear multiple regression analysis. Four separate analyses were conducted for the four moderators – anxiety, rumination, maladaptive perfectionism and need for cognition in predicting perceived controllability. All variables were centred before computing the interactions. A moderation analysis was conducted and the results are illustrated in Figures 6.2, 6.3 and 6.4. It can be seen that the interactions for feedback manipulation and anxiety, rumination and maladaptive perfectionism were significant while the interaction for need for cognition was not significant. The following figures depicted

below, show the moderating roles of individual traits on perceived controllability when exposed to success or failure feedback manipulations.

Figure 6.2: The effect of success or failure feedback on perceived controllability moderated by anxiety

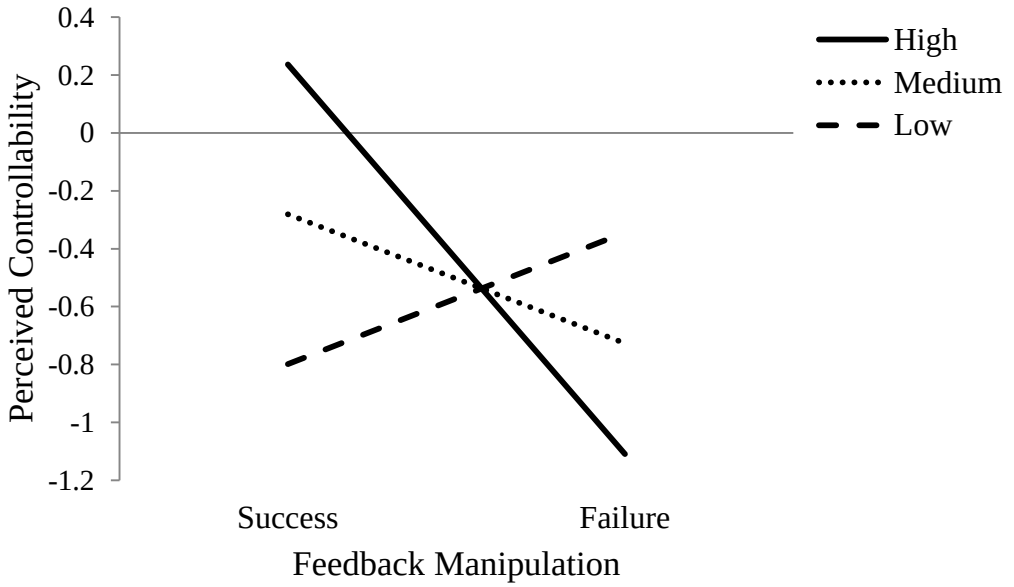


Figure 6.2 depicts the significant interaction between feedback manipulation and anxiety in predicting perceived controllability. The high, medium and low levels in the legend depict the levels of anxiety which were operationalized by +1SD (High) and -1SD (Low) from the mean (Medium). The regression did not reveal a significant main effect of feedback, but there was a significant feedback x anxiety interaction, t (51) = 2.52, β = .423, p = .015, as seen in Table 6.1. A moderation analysis was conducted and the results are illustrated in Figure 6.2. It is seen that anxiety moderated the way people perceive control when exposed to either success or failure feedback manipulations. It can be seen from the figure that, when exposed to repetitive failure, those with high levels of anxiety perceived less control than did those exposed to repetitive success. The simple slope calculated for high (β = 1.22) levels of anxiety was significant at p <.01, while the slopes for medium and low levels of anxiety were not significant, thus implying that when people experience high levels of anxiety, being exposed to repetitive failure or success will have an influence on the way they perceive control.

Figure 6.3: The effect of success or failure feedback on perceived controllability moderated by rumination

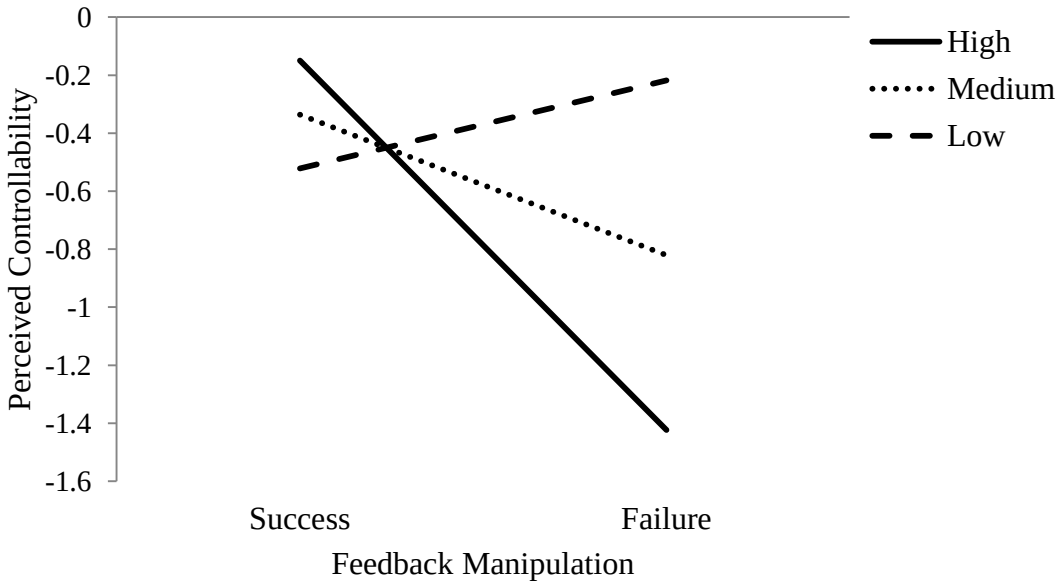


Figure 6.3 depicts the significant interaction between feedback manipulation and rumination in predicting perceived controllability. The high, medium and low levels in the legend depict the levels of rumination which were operationalized by +1SD (High) and -1SD (Low) from the mean (Medium). The regression revealed a significant main effect of feedback, $t(51) = -2.64$, $\beta = -.435$, $p = .011$, and a significant feedback x rumination interaction, $t(51) = 2.15$, $\beta = .361$, $p < .05$ as seen in Table 6.1. A moderation analysis was conducted and the results are illustrated in Figure 6.3. It can be seen from the figure that when exposed to repetitive failure, those with high levels of rumination perceived less control than did those exposed to repetitive success. The simple slope calculated for the high ($\beta = 1.21$) level of rumination was significant at $p < .01$, while the slopes for medium and low levels of rumination were not significant, thus implying that when people experience high levels of rumination, being exposed to repetitive failure or success will have an influence on the way they perceive control.

Figure 6.4: The effect of success or failure feedback on perceived controllability is moderated by maladaptive perfectionism

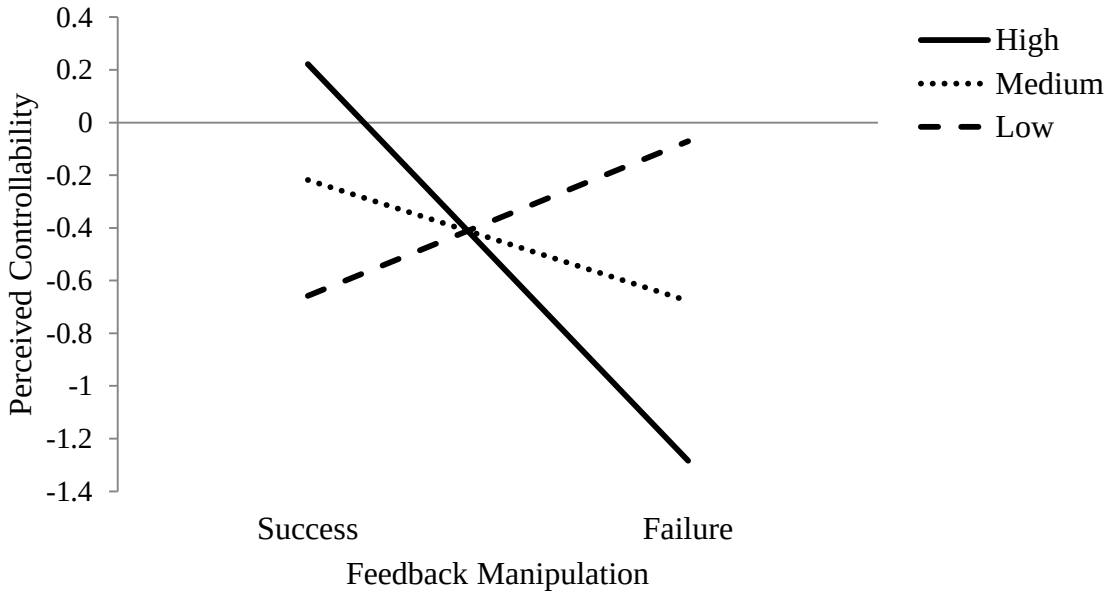


Figure 6.4 depicts the significant interaction between feedback manipulation and maladaptive perfectionism in predicting perceived controllability. The high, medium and low levels in the legend depict the levels of maladaptive perfectionism which were operationalized by +1SD (High) and -1SD (Low) from the mean (Medium). The regression revealed a significant main effect of feedback, $t(51) = -2.73$, $\beta = -4.24$, $p < .01$, and also a significant feedback x maladaptive perfectionism interaction $t(51) = 2.89$, $\beta = .447$, $p < .01$, as seen in Table 6.1. A moderation analysis was conducted and the results are illustrated in Figure 6.4. It can be seen from the figure that, when exposed to repetitive failure, those with high levels of maladaptive perfectionism perceived less control than did those exposed to repetitive success. The simple slope calculated for high ($\beta = 1.38$) level of maladaptive perfectionism was significant at $p < .01$, while the slopes for medium and low levels of maladaptive perfectionism were not significant, thus implying that when people experience high levels of maladaptive perfectionism, being exposed to repetitive failure or success will have an influence on the way they perceive control.

Table 6.2: Summary of differences in win/loss race feedback, controllability schedules and feedback manipulation of success/failure as a function of perceived controllability

	Sum of Squares	df	Mean Square	F	Sig
Controllability Schedule	156.020	2	78.010	39.724	<.01
Win/Loss feedback	345.544	1	345.54	97.735	<.01
Feedback manipulation	16.711	1	16.711	1.722	.196

The repeated measures ANOVA revealed a significant main effect of controllability schedules on perceived controllability, F (1, 49) = 39.724, MSE = 1.964, $p < .01$, *partial* η^2 = .448, which was calculated by taking the difference between the actual and perceived contingency. When exposed to the high controllability schedule, where the participant's key presses had an 80% probability of increasing their own athlete's speed, the level of perceived controllability was much lower (M = -1.02, SD = 2.66) compared to average (M = -0.20, SD = 1.99), and low controllability schedules (M = 0.51, SD = 1.47). Results also revealed a significant main effect of win/loss feedback on perceived controllability, F (1, 49) = 97.735, MSE = 3.535, p < .01, *partial* η^2 = .666, that is, when exposed to a 'win' feedback the levels of perceived controllability was higher (M = 1.48, SD = 2.91) than when exposed to a 'loss' feedback (M = -0.691, SD = 2.57). However, the main effect of success or failure feedback manipulation on perceived controllability was not significant p = n.s.

6.5.3 Discussion

The present study was designed to replicate with non-athletes the experimental model studied so far, which claims that the presence or absence of certain maladaptive traits in people moderates the way they perceive control as a function of their prior experience with repetitive failure or success. Moreover the study also tested the prediction that expectations are largely determined by prior exposure to failure or success. This study presents a simple model of how repeated exposure to success or failure in a task of some importance could influence future judgements in the form of expectations and perceived control. In that regard the effects found in this study are purely 'immediate', and short-term, in nature. It is however reassuring that these 'immediate' effects are significant on their own, implying a considerable impact that multiple repetitive events paired with success or failure over a large period of time would probably have. To begin with, as seen in Table 6.2, results from the previous

studies on perceived controllability were replicated, in that all ratings in the win feedback condition were higher than the ratings in the loss feedback condition. However, the lack of a difference between success and failure manipulations on perceived controllability was supportive as the claim that traits drive this effect could be more clearly justified.

One of the immediate effects tested was that of performance expectation. On the penultimate block, participants were asked to estimate how well they would perform in the forthcoming block in relation to training and main test series. Performance expectation was calculated by taking the difference between the average reaction time predicted for the training and main test series. As expected, those who were in the failure feedback condition expected to perform much worse in the forthcoming block than those in the success feedback condition. This pattern replicated the one seen in Chapter 2, Study 1a, where TC showed lower expectations than CC on their forthcoming performance in a competition. It is expected to see such a pattern of results, as people would have a tendency to base their future expectations on past performance. Bandura and Cervone (2000) point out that the effort to perform well is largely determined by the performance feedback of progress towards a particular goal. In this case, the goal was to have a main test series reaction time faster than the training reaction time. If participants received feedback in a goal-congruent way, that is, marked as success, this would have a positive impact on their expectations. Likewise, if it was incongruent, that is, marked as failure, this would lower their expectations. This is perhaps what goes on with the athletes as well; the difference is that athletes are usually exposed to success or failure over a prolonged period of time. Hence the feedback they receive after a competition has an impact on their future expectations. This begs the question why, if they lower their expectations after failure in a competition, would they still perform well in training? This is perhaps the problem where there is a discrepancy between expectations and goals. Their goal might be to achieve success, but their expectation of that happening is low. Bandura and Cervone (2000) also commented that performance knowledge and a standard of comparison are needed to produce the desired motivational effects, which is that of performance expectations or self-efficacy. So although TC might have similar goals to those of CC, because of their previous performance knowledge of ‘failure’, their expectations are lowered, and thereby performance as well. Hence this result is not only an indication of the fact that the manipulation in the present study is strong enough to induce feelings of success and failure in a particular task and then measure other variables that go with it, but that this study also may constitute a first step towards verifying the model proposed in previous chapters, with athletes.

Since it has now been established that the success/failure manipulation as administered by the bogus Stroop task is indeed strong, it is safe to interpret the following results. As can be seen in Figure 6.2, trait anxiety acts as a moderator in determining perceived controllability when exposed to success or failure feedback manipulations. Thus it can be interpreted that once people with high levels of trait anxiety experience repetitive failure, they are likely to show a lack of perceived control. Similarly, those who experience success show an illusion of control and would approach a situation with heightened sense of control. The findings are although puzzling when it involves those individuals with low levels of trait anxiety, as the slope was not significant. This could be because with low levels of trait anxiety, there might not be sufficient arousal during the task so that a participant might not have paid much attention to the perceived controllability task. In other words, those with low trait anxiety, regardless of whether they received success or failure feedback, were not affected by success or failure. But how would one translate this effect to the athletes? Results from previous studies (2a, 3a & 3b) in Chapter 3 & 4 respectively show that in a group of athletes TC show higher levels of trait anxiety than CC and TC show lower levels of perceived controllability than CC. Thus, even if CC have traits of high anxiety, this does not influence actual control perception or performance. This could possibly be due to the proposition that CC have a goal-congruent style of information processing wherein they are able to block out unnecessary information. TC, on the other hand, lack these resources due to a maladaptive style of information processing where they are unable to block irrelevant information, much in line with what Beilock and Carr (2001) proposed about having attentional disturbances caused by heightened anxiety, thereby leading to performance decrements.

Similarly, Figure 6.3 shows the role of rumination in perceived controllability when participants were exposed to either success or failure feedback manipulations. As expected, the results were in the direction of the hypothesis and also followed a similar trend as shown in people with high trait anxiety. As can be seen, those with high levels of rumination made lower judgements of perceived control when exposed to repetitive failure feedback than when exposed to success feedback. Again the slope for those who have lower levels of rumination was not significant, thus supporting the idea that those with lower levels of rumination, regardless whether they are exposed to success or failure will not show differences in the way they perceive control. The rumination measure used here was an individual difference measure, focusing on the concept of rumination over an experience of feeling sad. Thus when one has low levels of rumination, which means one is not thinking or brooding over events, it

would not matter if one is exposed to success or failure, as the control ratings made were independent of the experience. Now if these results were translated to what was earlier described with regard to TC and CC, as seen in Chapter 3, study 2a, it can be seen that TC show higher levels of rumination than CC, the rumination measured here being specific to sports. Hence one cannot assume that CC do not ruminate at all, just that TC ruminate more than CC and even if CC do ruminate, they perhaps think about goal relevant information, unlike TC. The present study shows that those who are high on rumination and who are exposed to success feedback make higher control judgements than those exposed to failure. To translate this into TC/CC distinction, this again comes back to point that those CC who do have higher tendencies to ruminate, probably do so in a more goal-congruent style which is reinforced by their constant success.

The final result as shown in Figure 6.4 suggests that maladaptive perfectionism contributes to the moderating effects traits might have on control perception when exposed to failure or success feedback. As the results indicate, following a trend similar to the previous results, those who are high on maladaptive perfectionism tend to show lower judgements of control when exposed to failure feedback than when exposed to a success feedback. Once again, these results can be translated into what was previously established with TC and CC from study 2a in Chapter 3, wherein TC showed higher levels of maladaptive perfectionism and CC showed lower levels of the same. Perfectionism as a dimension has been associated with anxiety (Beiling et al., 2004; Flett, Hewitt, Endler & Tassone, 1993; Frost & Henderson, 1991). This is primarily because of the fact that the individual perceives a discrepancy between the ideal and the actual self (Borkovec, Pruzinsky, & Metzer, 1986; Carver & Scheier, 1986; Higgins, 1987). Thus with TC, when they have a goal to obtain and they are unable to reach their goal, especially because they have lower expectations, this experience of failure is associated with negative thoughts that could also be intrusive in nature, in other words they would ruminate. Furthermore Mor et al. (1995) argue that perfectionists with a low sense of control are more likely to experience performance-related anxiety and stress, while perfectionists with a high sense of control should experience relatively lower levels of anxiety. This relation can also be inversed, that is, TC who are high on maladaptive perfectionism and experience high levels of anxiety would have a lower sense of control, while CC low on these traits would experience an illusion of control. The sense of control by itself could help or create havoc in the way athletes perceive performance pressure in a competition situation. Thus one can draw conclusions that being high on the maladaptive perfectionism trait, which focuses on negative reactions to mistakes, is often linked with

anxiety and rumination, and if exposed to repetitive failure and success, one might see differences in the way people perceive control, as one would expect with TC and CC.
To sum up, it can be argued that the experience of failure and success is indeed crucial to the experience of control, and that this is largely moderated by presence of some inherent traits. In fact, studies have shown that the experience of stress is strongly associated with a perceived loss of control (Fisher, 1986; Lazarus & Folkman, 1984; Sells, 1970). These traits could be seen as different aspects of one latent maladaptive personality construct. Although the traits were measured independently, the similarities between anxiety, maladaptive perfectionism and rumination point to the basic idea that these traits promote a maladaptive thinking style. Further evidence for the above claim can be derived from the results from Study 2a, Chapter 3 wherein the above mentioned traits were highly correlated with each other (see Appendix C.2).

Surprisingly, none of the moderation results were significant for the need for cognition construct. A possible explanation is that the other three traits of anxiety, rumination and maladaptive perfectionism are more maladaptive in nature than need for cognition. However, previous studies did establish that TC were greater on need for cognition than CC. However, there is a cardinal difference between TC and CC and the non-athletes exposed to failure/success. The former have been exposed to failure/success experience for over five years, the latter have been exposed to the same for less than 20 minutes. Although the interaction term between need for cognition and success/failure manipulation was not significant, one can speculate that if the success/failure manipulation had lasted over a longer period of time, this trait would have been a significant moderator. The role need for cognition plays in the overall information processing model proposed here is that it drives TC to think more, to draw more information from the environment. Unfortunately, with TC's bias towards information with a negative valence, being high on this construct only makes things worse. In fact one could argue that need for cognition is the construct that primarily drives TC and CC into drawing more information or blocking out irrelevant information respectively. This claim could not be supported by examining correlations in Chapter 3 as need for cognition was independently measured in Study 3b. However results in the present study not only replicated the significant correlations from Study 3a, Chapter 3 with anxiety, maladaptive perfectionism and rumination but also revealed a significant relation between trait anxiety and need for cognition (see Appendix C.4). This finding could validate the idea

that the need for cognition plays an overall role in the way information processing is directed amongst those with repetitive exposure to failure or success.

Thus the model for the antecedents that could potentially lead to 'choking' amongst athletes is based on the claim that sense of control over outcomes might have consequences for behaviour through various routes. This sense of control is what drives athletes with prior exposure to repetitive failure and success to make sense of the future outcome. However, the loop does not end there, because this sense of control would again drive one to make judgements about forthcoming performance and attributions about past performance. The present study was primarily conducted to show that a simple exposure to failure and success would have effects on control perception, but the moderating aspect of the traits is of utmost importance especially since results revealed that in terms of main effects, there was no difference between failure and success manipulations on perceived control, such that this difference came into existence only because of the moderating role of the traits. With TC and CC, their pre-existing traits of anxiety, rumination, maladaptive perfectionism and need for cognition direct the way they process information which results in the way they experience control over future outcomes depending on the levels of such traits. When TC experience a lack of control they lower their expectations partly to alleviate the discomfort. However when faced with the stress of a competition, their heightened state anxiety would make them unable to cope with the stress and they 'choke under pressure'. When they choke under pressure, their performance declines and the outcome is marked as a 'failure' which gets reinforced by the way they process this information, thereby getting them trapped in a learned helplessness loop. When CC experience an illusion of control they heighten their self-efficacy and thereby their expectations and have their success reinforced thereby engaging in an inverse learned helplessness loop. This study thus helps to provide support for a concrete model as to how TC are indeed in a learned helplessness loop, whereas CC are in a loop of inversed learned helplessness.

Chapter 7: Theoretical and practical implications of the proposed model

7.1 General Discussion

Choking is a rather elusive phenomenon, implying immense scope for research in this area. Prior research on choking includes explaining the mechanisms that could lead to the immediate choke response. That is, the mechanisms describing the process from the time the athlete experiences state anxiety to the time the athlete deteriorates in performance. Some of these theories include drive theories (Hardy, 1996; Spence & Spence, 1966; Zajonc, 1965), distraction theories (Beilock et al., 2004; Beilock & Carr, 2005; Carver & Scheier, 198; DeCaro, 2011; Lewis & Linder, 1997; Wine, 1971) and explicit monitoring theories (Baumeister, 1984; Beilock, Bertenthal, McCoy, & Carr, 2004; Beilock & Carr, 2001; Kimble & Perlmuter, 1970; Langer & Imber, 1979; Masters, 1992). The present research contributes to the existing literature on choking by investigating the antecedents predicting 'choking under pressure' using a general framework that includes both cognitive mechanisms and dispositional factors. This was conducted by creating two quasi-experimental groups based on prior research, Training Champions (TC) (Tschakert, 1987) and Competition Champions (CC) (Gould & Damarjian, 1996; Taylor, 1996; Williams & Kranen, 1993). It was predicted that TC and CC would exhibit certain dispositional factors and cognitive mechanisms that would differ between the two groups and as a result one group – TC might experience more choking than the other – CC. Thus throughout the present research results have been discussed in comparative terms between TC and CC. Eight experimental studies were reported in Chapters 2-6 that delineated a model that would help predict cognitive and individual trait differences amongst TC and CC.

It is important to note that the present research did not empirically test how TC and CC were developed but only the way TC and CC remained in their respective categories through repetitive reinforcement of their performance type. It was however assumed that TC and CC were developed based on the stress-diathesis model (Monroe & Simons, 1991) that subsumes the idea that TC and CC both have certain dispositional traits (like trait anxiety) and in the face of a stressor, like a competition situation, there would be an interaction between the two facets thereby resulting in differential performances. In the case of TC, predisposition towards experiencing anxiety in the face of a stressor could lead to performance failure and for CC predisposition towards experiencing less anxiety in the face of a stressor could lead to performance improvement. When this pattern is repeated over a period time, each success or failure gets reinforced thereby resulting in TC/CC pattern development. The focus of the

present research is on how these TC and CC athletes remain in their respective failure reinforced/success reinforced groups. Thus, the theory of TC/CC development was assumed while the mechanisms of TC/CC maintenance were tested.

The empirical results revealed a model that includes dispositional factors and information processing styles that would ultimately affect performance expectations. The model presents the basic idea that TC and CC possess some 'thinking' traits like rumination, maladaptive perfectionism, trait anxiety and need for cognition. TC in general are higher on these traits than CC, indicating that they think more and engage in maladaptive thinking while CC think less and engage in adaptive thinking. These traits then lead the way towards either a maladaptive style of information processing amongst TC or an adaptive style of information processing amongst CC. The maladaptive style would entail TC showing a negativity bias towards incoming stimuli and the adaptive style would entail CC showing a positivity bias towards incoming stimuli. Thus TC 'think more and think negative' and CC 'think less and think positive' in an adaptive style which focuses on goal-congruent information processing. As they interpret their incoming information, TC in a slightly maladaptive style and CC in an adaptive style, they give explanations to occurrences of events. For instance, if TC interpreted their past performance as something that was disastrous they would try to explain why this performance was disastrous. It was found TC in general made self-defeating attributions, wherein they think they are personally responsible for their failures but when they succeed they attribute it to more external factors. Furthermore, they think that these failures are more stable than successes. On the other hand CC made more ego-enhancing attributions, wherein they took complete responsibility for their successes which were also stable but attributed failures to external factors. After making these attributions, the next step would be to make judgements about future outcomes. So both TC and CC explain their past behaviour in a particular pattern, however, they still need to plan and prepare for their forthcoming competition. In this regard, they need to make judgements about the outcome of the forthcoming competition. It was found that TC perceived the outcome with a lack of control, that is, they assumed the outcome in a competition was left to chance and it was beyond their control while CC perceived the same with an illusion of control where they assumed that they had complete control over the outcome. Thus TC approach a competition with perceived uncontrollability, and as the competition approaches, because they feel they do not have control over the outcomes of the event, they also reduce their expectations to perform at a certain standard. CC, on the other hand, increase their expectations because they believe the success, which is the likely

outcome, is completely under their control. Reduced expectations invariably result in a decrease in performance along with experiencing heightened state anxiety and TC thus, 'choke under pressure'. However CC work towards their increased expectations and experience just the right amount of arousal and therefore increase in their performance output. The following section will explain the model in detail. The basic idea presented in the model is that of the role of repetitive failure in reinforcing TC's performance thereby leading to a learned helplessness loop. For CC, however exposure repetitive success seemed to play an important in the development of the positive feedback loop.

7.2 The model in detail

The model began with the basic idea that both TC and CC possess some 'thinking' traits. The traits selected were rumination, trait anxiety, perfectionism and need for cognition. The aim was thus to distinguish the levels of these traits, high or low between TC and CC. Higher levels of these traits indicate more maladaptive thinking and lower levels of these traits indicate adaptive thinking. Results from studies 2a and 2b from Chapter 3 showed that TC were higher on rumination, trait anxiety, perfectionism and need for cognition than CC. It has been suggested that rumination as a trait is generally associated with recurrent thoughts related to a common theme, especially failure (Martin and Tesser, 1996). This implied that TC had a tendency to engage in repetitive thinking especially about their failed competitions, whilst CC would not pay too much attention to it. The second trait of interest was perfectionism. Whilst TC and CC did not differ in the adaptive dimension of perfectionism that implies a striving for certain standards, TC were higher on the maladaptive dimension of perfectionism which includes negative reactions and thoughts associated with certain standards of performance. This is an interesting trait to consider because not only does perfectionism reiterate the importance of thinking and cognition in sports performance but also taps into the motivational aspect, which is much needed in sports performance. The fact that TC and CC did not differ in adaptive perfectionism confirms the idea that they are both equally motivated to achieve their goals, whatever these might be. They strive for perfection to achieve that goal, but TC being higher on the maladaptive perfectionism scale indicates that they react more negatively to failures and worry about mistakes which are again an important indication of maladaptive cognition. In other words, an athlete might set a goal to clock under 10 seconds for a 100 metre race, and so s/he would train and compete to achieve this standard. The motivation to achieve the standard is what drives adaptive perfectionism. Thus CC are high on the adaptive dimension and low on the maladaptive dimension

indicating that they would strive for excellence and would not exhibit negative reactions to mistakes. However when TC are unable to achieve these standards even though they are highly driven to do so, they are overly concerned about mistakes, and have doubts about their actions thereby reinforcing their tendency to ruminate. Thus, so far the model identified two very important traits of rumination and perfectionism that could drive performance in a positive or a negative direction. It is also known that maladaptive perfectionism is often related to anxiety (Beiling et al., 2004), leading us to the third trait examined, trait anxiety. Again, as predicted, TC were higher on trait anxiety than CC. The presence of high trait anxiety is related to other thinking traits because highly anxious individuals would tend to ruminate more (Fresco et al., 2002) and would experience more negative reactions to perfectionistic standards (Flett & Hewitt, 2005). These findings certainly tie together a triadic structure that could easily delineate differences between adaptive thinking styles and maladaptive thinking styles. While rumination, maladaptive perfectionism and trait anxiety are related and maladaptive traits by definition, it was important to identify a neutral trait that would still indicate cognition. In other words, it was established that TC have a tendency to engage in maladaptive cognitions and CC in adaptive cognition, but do they also have a tendency to think more in general than CC? Study 2b addressed this question by examining the trait need for cognition. As expected, TC were higher on this trait than CC, indicating that they have a general tendency to think more, draw more information from the environment and are unable to block out irrelevant information (Cacioppo and Petty, 1982; Venkataraman et al., 1990). The idea that those who are high in need for cognition are unable to block irrelevant information as suggested by Venkataraman et al., (1990), was based on the findings by Cox (1967) who argued that some individuals who ignore new information, deny it, distort it, are called ‘simplifiers’. These individuals are characterised by the way they deal with uncertainty thereby avoiding ambiguity and cognitive stress. These findings license the assumption that TC tend to think more and CC tend to think less. Further evidence pointing towards the above notion comes from study 2a, Chapter 3 wherein, regardless of the kind of experience athletes recalled (i.e., successful or unsuccessful), TC were still high on rumination and CC were still low on rumination. This is of course based on the assumption that thinking about one’s past performance by itself may feed back into TC’s information processing, for them to ruminate about. In fact, it can be claimed that this is perhaps the most important mechanism that helps to maintain TC and CC’s difference in performance behaviour, as a function of received performance-relevant information.

Chapter 2 comprised Studies 1a and 1b that were designed to address the intuitive notion that athletes are sensitive to information type and individual processing differences would be exhibited by TC and CC respectively. Chapter 2 already established the presence of certain pre-dispositional traits with which the athletes perceive and interpret information from their environment. This could be audience presence, feedback about immediate performance, feedback from coach, thinking about the past performance, focussing on one's worries, framing relevant expectations, the weather conditions, and presence of a competitor and so on. Since TC possess maladaptive traits, it was assumed that the way they process information would also be maladaptive in style. Study 1a addressed this notion revealing that TC are affected by both positively and negatively valenced information, that is, after TC received either a positive or a negative information, their performance declined compared to when that same type of performance was recorded before they received the information. For CC, however, after they received positive or negative information, their performance slightly improved for positive information and remained the same for negative information. Furthermore, Study 1b included a neutral informational category which was more technical in nature, that is, devoid of any valence. Again, when TC received such information they declined in performance, while CC's performance remained unchanged. However, with no information provided both TC's and CC's performance remained unchanged. This finding was an important milestone in establishing the notion that TC and CC could appraise the same information differently. This gave way to the idea that the TC might have a problem in the interpretive stage of information processing (Bless et al., 2004; Lutz, 2003; Plessner & Haar, 2006). It was thus predicted that TC would appraise information in a more maladaptive fashion, thereby steering towards the route of maladaptive information processing, whereas CC would process information in a more adaptive manner. But what would drive TC and CC to have specifically different information processing styles?

So far the model states that TC and CC possess certain traits that would guide the way they process information, that is, TC would engage in a more maladaptive manner while CC would engage in an adaptive manner. However why do they continue to engage in such styles? Chapter 4 addressed a part of this question with studies 3a and 3b. Consider a TC athlete who just failed at yet another competition, and on the way home, s/he is thinking about the performance. The athlete's inherent maladaptive traits get activated and the 'failure' becomes the most salient thought. S/he is then thinking about the mistakes and also is also thinking in retrospect. S/he is then comparing the current failure to previous failures. S/he is convinced that regardless of how well the training goes, failure in competition is

inevitable. S/he becomes helpless and thinks about the forthcoming race the next day by concluding that s/he will try hard to perform well, although the outcome will be beyond one's control. Thus the following day the athlete perceives uncontrollability over the situation and as a result lowers expectation in order to cope with failure easily. In other words, the athlete foresees a failure, but is still motivated to try his/her best and masks the forethought with perceived uncontrollability in the hope that s/he would be able to handle failure better if s/he knew that the outcome was beyond control. This example draws on learned helplessness theory (Abramson et al., 1978; Maier & Seligman, 1976; Seligman, 1975). Repetitive exposure to failure would cause individuals to perceive future outcomes with a lack of control (eg., Hiroto & Selgiman, 1975; Mikulincer, 1986, 1989a; Stiensmeier-Pelster & Schurmann, 1990, as cited in Witkowski & Stiensmeier-Pelster, 1998). Studies 3a and 3b were designed to measure perceived controllability amongst athletes and non-athletes to serve as a control. As predicted, TC showed more perceived uncontrollability than non-athletes and CC. In fact, non-athletes were more accurate in estimating control. CC on the other hand showed an illusion of control, another effect that was predicted. Why would CC show an illusion of control? According to control motivation theory (Pittman, 1993; Pittman & D'Agostino, 1989), when individuals are exposed to uncontrollable situations, they are motivated to heighten the basic need for control. Presumably, a competition situation tends to be uncontrollable; one can't predict the weather, the kind of audience support, whether one can be injury free, what form the fellow competitor will be in, and so on. There are too many factors involved that could create an ambiguous competition situation. Hence, if the basic need is to restore control, why is it that TC are doing just the opposite? It is obvious that following an adaptive information processing style, CC will foresee the outcome with an illusion of control because in case of success they can easily make a self-serving attribution for it, and because CC constantly experience success, this illusion of control outcome would become automatic. TC on the other hand are more exposed to failure, thus even though the competition situation might turn out to be ambiguous, they would foresee failure in a competition, thereby eventually lowering the motivation to restore control, hence they would continue to experience a lack of control. At this point an important point must be made. To assume that TC decline in motivation to restore control does not mean to also assume that they are not motivated to perform well. Thus performance motivation is the same for TC and CC, however the motivation to restore control is lower for TC than CC. Thus, a story unfolds wherein TC's maladaptive information processing style is maintained because they are in a loop of learned helplessness, whilst CC's adaptive information processing style is maintained

because they are in a loop of inversed learned helplessness. This brings us to a basic question, what exactly comprises the adaptive and maladaptive information processing styles?

Results from previous studies through Chapters 2-4 have indicated the presence of two distinctly different processing styles for TC and CC. The claim that was made for TC's processing style was that in general they tend to think a lot, regardless of the valence of the information provided. But under what circumstances exactly is this maladaptive? A maladaptive style in itself focuses on negative attributes, thus the question tested was if TC think a lot, do they also focus on the negative characteristics? It has already been established that TC indeed possess traits that are maladaptive in function, hence it is plausible that the way they process information would show some bias towards negativity. As predicted, results from study 4 (Chapter 5) indicated the presence of a negativity bias amongst TC. That is, TC are more sensitive to information loaded with negative valence. Thus, if TC's dominant thoughts revolve around negative content, their tendency to think more accelerates this pre-existing negative thought, thereby forcing them towards the learned helplessness loop. As predicted, the results were different for CC, indicating that CC were more sensitive to information with positive valence. The positivity bias of CC, combined with their ability to think less and block out irrelevant information, is what reinforces the inversed learned helplessness loop. In other words, TC think more, with a negativity bias, and CC think less, with a positivity bias. Thus, if TC's processing is already charged with negative valence, the causal attributions they make would probably also reflect negativity. Similarly, since CC's processing style is dominated by positive valence, they would thus make positive attributions. As expected, in the present studies, TC engaged in a more pessimistic style (e.g. Peterson, 2000; Peterson & Park, 1998; Peterson & Steen, 2002; Peterson & Vaidya, 2001) of explaining successful and unsuccessful events, wherein they believed that the occurrence of a successful event was not stable over time, and believed that external factors like 'luck' contributed to success more than their own personal factors. For an unsuccessful event, however, TC believed that the event was more stable in time and that they were personally responsible for the event. For CC, on the other hand, the explanatory styles were reversed such that they showed a more optimistic style (e.g. Peterson, 2000; Peterson & Park, 1998; Peterson & Steen, 2002; Peterson & Vaidya, 2001) of explaining both successful and unsuccessful events. CC believed that successful events were stable in time and that they were personally responsible for the achievement, whilst for unsuccessful events they believed that these were not stable over time, and were primarily caused by other external factors.

At this point it is important to discuss the results from Chapter 4 and Chapter 5 in an interrelated way, as the former chapter's results indicated that TC usually perceive a lack of control over future outcomes, and CC usually perceive an illusion of control over future outcomes. The present results claim that TC attribute external control to successful events rather than unsuccessful events and CC attribute external control to unsuccessful events rather than successful events. While there seems to be an overlap between the two constructs, there is a small distinction. In the case of TC's perennial state of experiencing 'uncontrollability', this occurs before an athlete is about to perform in a competition, that is, just before they set their expectations and goals; similarly for CC's perennial state of experiencing an 'illusion of control'. However, after they finish competing and receive performance feedback, they then start thinking about the performance. In the case of a failure TC would believe that they were personally responsible for it, and in the case of a success CC would believe they had personal control over the outcome. It seems rather straightforward for CC as they continually experience success and therefore make attributions of high personal control and foresee outcomes with an illusion of control. For TC, on the other hand, a dissonance is created between TC's anticipated future outcomes and retrospective explanation for past outcomes. TC approach the competition situation with a perceived lack of control, probably in the hope that in case of a failure they would not need to take responsibility for it. So, at this stage, TC engage in an ego protective mechanism, however after the event, given that in most cases since it's a failure, the negativity bias in their processing style overrides the ego protective mechanism and they begin to believe that they are responsible for their failure. Thus the conflicting states by themselves could lead to some sort of cognitive dissonance (Festinger, 1957), which could prove detrimental to one's performance. Thus TC approach the outcome with a lack of control and later explain the cause of the outcome by taking full responsibility for failures, whereas CC approach the outcome with an illusion of control, explaining it by taking full responsibilities for success. Thus, this particular attribution pattern for TC could be referred to as a self-defeating style and for CC it could be referred to as an ego-enhancing style.

The following results show further evidence towards what comprises a maladaptive and adaptive information processing styles. However, there is one last step missing, which is perhaps the most important one just before athletes perform in competitions – shaping expectations. From the beginning of their training athletes aim towards a particular goal and they train for it. Goals would be similar for both TC and CC, but the difference lies in the expectations they generate. For example, an athlete's goal might be to clock under 10 seconds

for a 100 metre race. This goal may have been set 3 months before training, and through training the aim was to reach the goal. The day before the competition is probably when the athlete can make an accurate estimate of his goal. Perhaps during the last training session the athlete clocked 9.91 seconds and so would face the competition expecting a timing of 9.91 seconds or less. Now if the athlete was a TC, because of the maladaptive information processing style s/he might lower the expectation to 'anything between 10 and 10.10 seconds', again as an ego protective mechanism. Thus, if by chance s/he does clock below 10 seconds, it would be good and even if that were not happening it would be consistent with the expectation. However, once expectations are lowered, the performance outcome may become a consequence of the expectation. On the other hand, if the athlete was a CC, the adaptive information processing style would help the athlete maintain the congruency between the goals and expectations; in fact s/he might even consider increasing the expectation to clocking 9.82 seconds. The athlete will thus perform according to the expectation set and will most likely result in a successful performance. Thus, the question is, do TC and CC differ in the kind of expectations they set? They do, as shown in Study 1a in Chapter 1. Even though TC performed at a particular level during training, when asked about their forthcoming competitions, they always projected lower performance expectancy than CC. So the most important question is why TC do not base their expectation on their training performance. This brings one back to the model predicted that most of the maladaptive information processing occurs in the face of a competition stressor, and clearly the training ground is not as anxiety-provoking as a pressure-filled competition situation.

7.3 The chicken or egg story

While it seems straightforward to predict an information processing style model for athletes, the question still remains, what came first: Do TC engage in a maladaptive processing style and therefore choke or do TC choke and therefore begin to engage in a maladaptive processing style? As already mentioned, both TC and CC are engaged in their respective vicious cycles and positive feedback loops; in other words, it's hard to tell what could be the trigger for such processing styles. However, as previously discussed in Chapter 1, it is assumed here that the athletes acquire the states of TC and CC due to their repetitive experience with failure or success in competitions. Thus it is most likely that athletes' continuous experience with state anxiety resulting in a 'choking' response begins to activate the maladaptive information processing style. As already discussed, information feedback about a failure is the most important source of information. Thus the present model suggested

is the precursor to the various other theories of choking under pressure that were already discussed above.

7.4 Theoretical implications-Self regulation theory

Although the present research was not explicitly designed to examine self-regulatory behaviour amongst athletes, it can be assumed that the whole model so presented could be an outcome of self-regulatory mechanisms. In other words, based on the model it can be inferred that when TC have certain maladaptive dispositions and information processing styles and also experience repeated stress they would 'choke under pressure', whereas CC's adaptive dispositions would help them to prevent the choke response. Thus, it is plausible that certain self-regulatory skills could moderate the experience of choking. It is worthy noting, however, that these self-regulatory skills can come into use only in the information processing stage, as this stage requires most amount of regulation, but has nothing to do with pre-existing dispositions and TC's repetitive exposure to failure and CC's exposure to success.

Self-regulation is often associated with behaviour change (e.g., Bandura, 1977; Kanfer, 1970; Meichenbaum & Asarnow, 1979; Thoresen & Mahoney, 1974; Turk & Salovey, 1986, as cited in Fiske & Taylor, 1991) and goal-directed and corrective behaviour (Carver & Scheier, 1978; Masters & Santrock, 1976). Baumeister and Vohs (2007) define the process of self-regulation as comprising four ingredients. The first one is about standards, wherein a clear and well-defined standard is required for effective self-regulation, rather than uncertain and inconsistent standards. Drawing parallels to the predicted model amongst athletes, it can be assumed that although TC and CC might set certain standards and goals they need to achieve, CC have a clearer, consistent pattern, while TC could have too many interplaying and overlapping goals that could make them lose focus on what is actually important. For example, a CC's goals would comprise mastering the new technique taught during training, keeping calm and focused, and finally clocking under 10 seconds for a 100m race during competition. A TC's goal, on the other hand, could involve making sure the coach is satisfied with one's performance, not making the same mistakes as the previous time, focusing on mastering the new technique, making sure that the new technique is delivered with no mistakes, ensuring good warm up during the race, making sure that one does not get too anxious, aiming to clock under 10 seconds for a 100m race or between 10.01-10.10 seconds is also acceptable and so on. As can be seen, CC's goals are more clear and defined whereas TC's show a goal overload. The problem probably arises when TC are unable to prioritize

goals, for instance they might focus more on avoiding mistakes rather than achieving the goal. Hence goal setting is very crucial in maintaining self-regulation.

The next step in self-regulation requires monitoring. It is difficult if not impossible to regulate any behaviour without keeping track of it. For instance, athletes need to pay attention to internal states (thoughts, feeling, and sensations) and external states (bodily movement and environment), and they are supposed to keep track of how these states could affect them, and in case of a negative consequence, must find a way to change. This is a good example of how information processing styles affect TC and CC in different ways. As athletes continue to process information, CC are able to monitor what they perceive, thus they only pay attention to relevant goal-congruent information and discard irrelevant information. TC, on the other hand, pay attention to every kind of information, because to them the information they perceive seems to be relevant to the multiple goals they have set. Thus, the inability to prioritize goals along with an inability to monitor the amount of information they need to pay attention to could certainly hinder the self-regulatory mechanism.

The third ingredient is called self-regulatory strength, also known as willpower. Understandably, when an individual experiences a disturbed state not conducive to one's goals, changing the self-regulatory mechanisms can be rather difficult and would require some willpower. Regulating the self appears to depend on a limited resource that operates like a strength or energy and becomes temporarily depleted afterward (e.g., Baumeister, Bratslavsky, Muraven, & Tice, 1998; Muraven & Baumeister, 2000; Vohs & Heatherton, 2000, as cited in Baumeister & Vohs, 2007), thus creating the state of ego depletion. Looking at athletes one can assume that both TC and CC would go into a state of ego-depletion, however CC may recover from it quicker than TC. This can happen because CC prioritize their goals, so when one of the goals is threatened they know exactly what to do due to their high self-monitoring skills, and once they achieve that they are back in the running. But TC do not prioritize goals and are unable to carry out effective self-monitoring, thus when a goal or multiple goals are threatened their willpower to change a threatening situation could be misplaced leaving them yet in a state of discomfort. Interesting evidence towards CC's quick recovery comes from the work by Tice et al. (2001) where they say that positive affect helps improve self-regulation after ego depletion. One can now draw parallels to CC's positivity bias and ego enhancing attributions as already established in study 4, chapter 5, while they process information. Positivity bias would induce a positive affect and CC perhaps recover faster after an ego depleted state. A contradictory theory by Job, Dweck and Walton (2010), however, argues that self-regulation may reflect people's beliefs about the availability of

willpower rather than true resource depletion. This theory could also hold true for TC and CC as CC perhaps have more positive beliefs about willpower availability and TC believe that they do not have the willpower to carry on. This component of willpower availability versus ego depletion subsumes aspects of control and their adjustment to aversive events. If TC are in an ego-depleted state they lack the willpower to exercise more self-regulatory mechanisms, and thereby might experience a state of helplessness and perceived uncontrollability as shown by previous results from Chapter 4, studies 3a and 3b. The state of experiencing a lack of control over outcomes or even over one's own ability to change behaviour is crucial to disrupting the self-regulation mechanism. CC, on the other hand, have a heightened sense of control and are therefore able to self-regulate with ease.

The last component is motivation – specifically, motivation to achieve the goal or meet the standard, which in practice amounts to motivation to regulate the self. Even if the standards are clear, monitoring is fully effective, and the person's resources are abundant, he or she may still fail to self-regulate due to not caring about reaching the goal. In fact, motivation may be especially effective at substituting for willpower (Baumeister & Vohs, 2007). This is much in line with the argument posed by Job, Dweck and Walton (2010) as motivation to exercise willpower could go hand in hand with the belief in exercising willpower. Again, it is important to note that both TC and CC are motivated to achieve goals, as shown in study 2a, Chapter 3, where both CC and TC show equally high levels of adaptive perfectionism. However, TC are not motivated to regulate their cognitive processes like perceived controllability due to a state of helplessness they are in, while CC with an illusion of control show tendencies towards good regulatory skills as seen in studies 3a and 3b, Chapter 4. Again it is important to note that while these self-regulatory mechanisms were not empirically tested, the implication however is important to the understanding of the maintenance of TC's learned helplessness loop and CC's positive feedback loop.

7.5 Theoretical implication – Counterfactual thinking

A large part of the predicted model discusses how athletes compare past performances to prepare for a forthcoming event and how they form expectations based on these comparisons they make. If the past performance was not good and the athlete is not satisfied with the current training, the athlete might lower the expectations. On the other hand, if the past performance was successful then the athlete might heighten one's expectations. Many theories have validated these comparative aspects of behaviour in terms of outcome satisfaction (Festinger, 1957; Suls & Miller, 1977; Taylor & Lobel, 1989). However research

has shown that people seem to be greatly affected by how their objective outcomes compare to imagined outcomes that "might have been" (Kahneman & Miller, 1986; Kahneman & Tversky, 1982b; Miller, Turnbull & McFarland, 1990). In other words, counterfactual thinking speaks of retrospective thinking. For instance, a TC might have failed to perform well in the competition and would probably think about "If only I had warmed up better" or "If only I did not miss training two days before the event". Research has shown that counterfactual thinking particularly based on a negative outcome heightens judgements of blame (Branscombe, Owen, Garstka & Coleman, 1996; Miller & Gunasegaram, 1990; Nario-Redmond & Branscombe, 1996) and also amplifies emotional reactions particularly of shame and regret (Kahneman & Miller, 1986). Thus, if TC engage in counterfactual thinking their tendency to blame themselves for negative outcomes gets heightened, which is exactly shown in Study 4 (Chapter 5) as TC tend to blame themselves and take responsibility for unsuccessful performances. But do CC also engage in counterfactual thinking? Studies have shown individual differences in the type of counterfactual thinking wherein upward counterfactuals refer to the imagination of an alternative outcome that is better than reality and downward counterfactuals refer to an imagined alternative that is worse than reality (e.g., Markman, Gavanski, Sherman & McMullen, 1993; Roese, 1997; Sanna, 1996). In this case perhaps TC are upward counterfactual thinkers and CC are downward counterfactual thinkers. This distinction could hold true even in case of successful performance as TC might attribute success to chance and would thus think it would be better if they succeeded on their own and CC would be satisfied with their performance by thinking "It could be worse". Thus counterfactual thinking seems to play a very crucial role in making attributions amongst athletes.

7.6 Theoretical implication – Flow

So far the story has mainly been about TC, why they choke, how they are the disadvantaged group, how they are unable to get out of the learned helplessness rut. In fact even the basic traits that govern the information processing model are more inclined at explaining TC's rather than CC's behaviour. So apart from exhibiting good self-regulatory skills, do CC have something extra that could help them maintain their state of success? Csikszentmihalyi (1975, 1990) conceptualized the 'flow theory' and described a state of flow as characterized by ''an almost automatic, effortless, yet highly focused state of consciousness'' (p. 110). A flow state ensues when one becomes so deeply focused on a task and pursues it with such passion that all else disappears, including a sense of time or the

worry of failure. The person experiences an almost euphoric state of joy and pleasure, in which the task is performed, without strain or effort, to the best of the person's ability. Thus, to experience a state of 'flow' one must be actively engaged in the following dimensions (a) clear goals; (b) balance between challenges and skills; (c) action and awareness merged; (d) concentration on a task; (e) sense of potential control; (f) loss of self-consciousness; (g) altered sense of time; and, (h) self-rewarding experience. Thus, one can assume that CC's secret to success is the state of 'flow' they are in during the competition. They are doing everything right in terms of adaptive information processing, but for them to reach the peak success they experience 'flow'. CC set clear goals, and with good self-monitoring skills they are aware of the challenges and skills they have to face. As they progress they foresee outcomes and behaviour with an 'illusion of control' as seen in studies 3a and 3b, Chapter 4, thereby resulting in making ego-enhancing attributions. In the face of competition all these factors play their parts synchronously in order to help CC to achieve a state of 'flow'.

7.7 Theoretical implication – Stereotype threat

The present research has pointed out a crucial aspect in the performance outcome of TC and CC. TC go into the competition field expecting to choke under pressure, and CC face the competition with successful expectations. As a matter of fact, repetitive choking responses might even get TC tagged as 'chokers' as in the case of the Jamaican athlete Asafa Powell. Thus TC enter the sports field with a tag name as 'chokers' and CC do the same with a 'non-choker' tag. This situation parallels that of the theory of stereotype threat (Steele & Aronson, 1995). According to this theory, merely introducing a negative stereotype about a social group in a particular task domain, especially a cognitive task, could reduce the quality of performance exhibited by members of that group. Beilock and McConnell (2004) examined stereotype threat effects amongst athletes. However both these lines of research used groups with pre-existing minority-majority group stereotypes. For instance, men are seen as better than women in math and women are seen as better than men in verbal skills. Also, African Americans are stereotypically not intelligent, while Whites are stereotypically not naturally athletic. These stereotypes have existed amongst our society for a large period of time. Most stereotype threat research is confined to these existing majority and minority groups; however it is important to consider such effects even on stereotypes that have been introduced to reflect the consequence of one's behaviour. In other words, when an athlete consistently fails in competitions, he might have a negative performance stereotype attached and might experience stereotype threat effects because they belong to the group of 'chokers'. It is thus

important to extend the current work on stereotype threats to induced stereotypes rather than pre-existing stereotypes.

7.8 Practical implications – Drawing TC and CC profiles

The premise of the entire model is based on the notion that certain pre-existing traits exist in athletes in higher or lower levels. These traits, when interacting with relevant experiences of success or failure in competitions, result in a pattern which could be predictive for an athlete to be a TC or a CC. Thus one of the most practical implications in the sports field is the early identification of someone with TC and CC tendencies and containing the problem, at least for TC, before it gets any worse. Individual differences assessments could be considered amongst athletic clubs to streamline the training of potential TCs and CCs. An athlete with high levels of rumination, anxiety, perfectionism and need for cognition would be a TC candidate if the athlete encounters repetitive failure. At this stage, certain preventive measures can be taken, for example, avoiding too much negative feedback or priming athletes with successful performances, limiting the amount of information provided to them, train them in the way they need to set goals, and so on. In case of a potential CC, the job is perhaps easier for sport psychologists, coaches and parents because all they need to do is reinforce positive feedback and train them consistently with strategies involving focus and concentration. In fact, coaches can even consider teaching newer techniques as the risk of information overload for athletes would not be present.

7.9 Practical implication – Relevance to team sports

Team sports dynamics are quite different from individual sports as the primary motive is to work together as a team to reach a particular goal. One needs to find the balance between the skill levels of players, and their personalities in terms of social interaction in the team. Team sports also test leadership qualities as the team captain is required to facilitate goal setting, decision making before and during the match, communication, managing internal conflicts and also solving problems in a manner that is helpful for team players and also help them accomplish their objectives. Team sports include football, rugby, basketball, cricket, hockey, baseball and so on. However it is known that teams also ‘choke under pressure’. For instance, the ‘All Black Chokers’ of the New Zealand Rugby team are known to falter at big occasions. Surely, all players cannot choke under pressure the same time. It is thus possible that individual players might contribute to the overall effect. For instance, even though football is a team sport, individuals might be motivated to enhance their status by

increasing the number of goals they score on their own. For example, player A made it to the national football team; however his skill level is still not as good as the other players. He has a point to prove to himself and others that there is a good reason he was chosen to be part of the team. This obviously increases the pressure on himself accompanied by the pressure to win the match. He is thus stressed, nervous and ultimately 'chokes under pressure' when the ball is at his feet. This choking might consequently deter the process further as now player A is concerned about his bad play strategy. When this pattern is repeated player B from the same team reprimands player A for his poor play which further injures the situation. There is tension amongst the whole team and amongst individual players. Expert players might also start to feel the pressure and might stumble upon certain occasions, and overall they lose the match. Thus, it is very likely that individual players contribute to the entire group effect especially when they play individually rather than for a team. It would thus be important for sport psychologists and coaches to attend to such individuals by again screening players with TC/CC tendencies.

7.10 Practical implication – Media interference

It is somehow quite easy to forget the fact that sport persons perform for an audience and the audience see the sporting situation as entertainment. Thus it is understandable to involve media at high level games. One major finding from the present research is that TC have a tendency to think more and think negatively when they encounter stimuli. Now for instance an athlete just finished the race and unfortunately lost the race. One can immediately see the media pouncing on the athlete asking questions about the failure and how s/he is prepared for the next race. Most of the time the athlete would have to make statements that is rather diplomatic like "Will try my best" because s/he would not want to appear weak in front of a national audience. The athlete will then think about this interview over and over again thereby reinforcing the maladaptive information processing style, which probably wouldn't help for the forthcoming event. There are two problems in this scenario, the media reinforcing the athlete's failure and the athlete experiencing dissonance between what s/he feels and what s/he expressed to the media. In case of CC, the athletes probably like the attention and enthusiasm and would be motivated to perform better. But TC are more delicate and prone to maladaptive cognitive styles. It is of course not practical to avoid interviews, but the solution can be twofold : a) The coach decides or the athlete decides when to discuss the performance, in that, the athletes could discuss their performance after all their events so that they are not interfered with their frame of mind b) Media could be more sensitive to such

issues by avoiding asking questions like “What happened out there, were you nervous?” at least not during the competition. Unfortunately retrospective thinking about previous comments would be inevitable especially if they are negative, but that’s where the training comes for TC to block out such irrelevant information.

7.11 Practical implication – Expanding beyond sports

The model proposed based on traits and processing styles could be expanded to other performance domains as well like music, art or even academia. The premise is that certain cognitive and motivational traits determine the way one processes forthcoming performance related information based on repetitive experiences of failure or success in a particular task of high importance. For example, an academic who continuously gets papers rejected might be susceptible to maladaptive information processing if s/he possesses high levels of traits like rumination, anxiety, perfectionism and need for cognition. This might impair future paper writing skills as s/he would have lowered the expectations of producing a good paper. Thus, although the present research focused only on sports performance, the general concept is that repetitive experiences along with certain dispositional traits play a major role in shaping future performance.

7.12 TC to CC transition

7.12.1 Potential intervention – Implementation Intentions

One of the widely used self-regulatory intervention techniques is that of implementation intentions (Gollwitzer, 1993, 1996; summaries by Gollwitzer, 1999; Gollwitzer, Bayer, & McCulloch, 2005; Gollwitzer & Sheeran, 2006; Sheeran, Milne, Webb, & Gollwitzer, 2005). This method encompasses ‘if-then’ plans that link situational cues (i.e., good opportunities to act, critical moments) with responses that are effective in attaining goals. (“If situation Y is encountered, then I will initiate behaviour Z in order to reach goal X!”). The main purpose of this method is to translate goal intentions to action. It is argued that the realization of the intention promoted by forming if-then plans can enable people to deal effectively with self –regulatory problems. Within the context of the present research it has been established that TC could exhibit self-regulatory problems at various levels, goal setting and prioritizing being the most important one. The problem could be seen in two areas, the nature of goal intentions and the lack of a structure to translate these goals into action. Implementation intentions are subordinate to goal intentions because, whilst a goal intention specifies what one will do, an implementation intention spells out the when, where,

and how of what one will do. When it comes to goal intentions it is known for instance that better performances are observed when people set themselves challenging, specific goals as compared with challenging but vague goals (so-called "do your best" goals; Locke & Latham, 1990). So, for example, TC could set a challenging yet specific goal like aiming for a particular distance in long jump. However, this is still just a goal intention. As discussed earlier, although TC do set goals, they have a problem implementing them effectively due to goal-overload and not being able to prioritize. First of all, if TC start setting more specific goals, because if the goal is more specific there is a higher chance of it getting prioritised. For example, having goals like “I will try my best” and “I will not get anxious” are vague and difficult to prioritize, at least for TC, however if they set a goal like “I will aim to jump over 6 metres in Long Jump” versus “I will not get anxious”, the performance-specific goal becomes more salient. Once the specific goal intention is established, one will have to find a way to implement them. Implementation intentions serve the purpose of promoting the attainment of the goal specified in the goal intention. To form an implementation intention, the person must first identify a response that is necessary for goal attainment and then anticipate a critical cue to initiate that response. Thus a TC who ‘chokes under pressure’ might specify a behaviour to relieve some stress for example, “I will think about my training performance” and specify a situational cue “just before I’ve been given the first call for the event”, in order to attain the goal of jumping over 6 metres in long jump. Thus, an association is formed between mental representations of specified cues, in this case, moments before taking part in the event, and the means of attaining goals, that is, thinking about the training performance that was good. This association becomes reinforced and therefore behaviour invariably becomes automatic. Forming an implementation intention implies choosing a critical future situation (competition), so the mental representation of this situation becomes highly activated and hence more accessible (Gollwitzer, 1999). In other words, this heightened accessibility means that people can identify and notice the critical cue with ease when they subsequently encounter it. Thus, the more frequently they make if-then plans, the more the association is strengthened and the behaviour becomes automatic when actually faced with the situation.

Thus the initiation of the goal-directed response specified in the if-then plan becomes automated, that is, exhibits features of automaticity including immediacy, efficiency, and redundancy of conscious intent (Bargh, 1994). While research has been conducted on physical exercise and health behaviour concerning implementation intentions, this technique

has not yet been tested or used amongst elite and semi-elite athletes as an intervention for 'choking under pressure', which is something that needs to be looked into in the future.

7.12.2 Potential intervention – Mindfulness

The concept of mindfulness has its roots in Eastern traditions and is most often associated with the practice of mindfulness meditation (Kabat-Zinn, 2003; Thera, 1962, as cited in Shapiro et al., 2006). However, Brown and Ryan (2003) argue that mindfulness is a state of consciousness which involves consciously attending to one's moment-to-moment experience (Brown & Ryan, 2003). It is thus a distinct form of awareness and attention. Researchers have developed several clinical interventions based on mindfulness training (Kabat-Zinn, 1982; Teasdale et al., 2000, as cited in Bernier et al., 2009). There have been a few studies examining the relation between mindfulness and sport performance (Gardner & Moore, 2004, 2006; Kee & Wang, 2008, as cited in Bernier et al., 2009). They found that mindfulness is linked to present-moment focus, which is the essence of the psychology of peak performance in sport (Jackson & Csikszentmihalyi, 1999; Ravizza, 2002, as cited in Bernier et al., 2009). The peak performance in sports is related to the concept of 'flow' (Csikszentmihalyi, 1975, 1990) which was used to explain CC's performance in competitions. Kee and Wang (2008) suggested that athletes who tend to be more mindful are also more likely to experience the flow state. Gardner and Moore (2004) later developed a mindfulness- and acceptance-based intervention program for performance enhancement, called the Mindfulness-Acceptance-Commitment (MAC) approach. The authors presented two case studies and reported that training in the form of scheduled self-regulation of present-moment awareness enhanced participants' athletic performance and enjoyment (Bernier et al., 2009; Gardner & Moore, 2004). Thus, the goal of this approach is to teach athletes to accept their cognitions, emotions, and sensations and to commit themselves to action, rather than fighting against negative thoughts and unpleasant emotions. One could assume that perhaps CC already practice 'mindfulness' while competing and training, especially since it is speculated that they experience flow because they are focused. In other words, the adaptive information processing style could also include the state of 'mindfulness'. The main problem TC seem to have is failed self-regulation during the informational processing stage, thus if they are trained to be aware of each of their thoughts, this might help them improve their regulatory mechanisms. The important component here is 'acceptance' as pure attention to one's experience could interfere with performance based on the 'explicit monitoring theory' (Baumeister, 1984; Beilock, Bertenthal, McCoy, & Carr, 2004; Beilock & Carr, 2001;

Kimble & Perlmuter, 1970; Langer & Imber, 1979; Masters, 1992). Thus, TC need to be aware that they are worried about future performance, they are reminded of their failure, they feel a lack of control, but at the same time accept that. The problem arises because of the cognitive dissonance already discussed earlier, TC perform better in training, and are aware of their skill level, but fail to do the same in competitions.

7.12.3 Present model-based suggestions

Whilst the other intervention techniques described above involve a bit of training and perhaps the presence of a sport psychologist, there is a 'take home message' for coaches that could help athletes improve their performance based on the model described throughout the present research. Some coaches have a tendency to give a lot of negative feedback in the hope to motivate the athletes to perform better. It would be useful for a coach to know about specific TC and CC profiles as described earlier, and deliver feedback about performance based on these profiles. Unfortunately, based on findings from study 1b (Chapter 2), TC seem to be affected by technical feedback as well, due to their negativity bias, so an important step would be to make them aware of their successes. Surely, TC do not fail in all competitions hence the coach could take some measures to remind TC of successful performances or remind them before a competition of how well they did during training. An interesting option would be to video record athletes during training and competitions and play these recordings back to them, based on the idea that successes as positive stimuli might have enhancing effects. The problem with TC is that they are stuck in a learned helplessness rut based on maladaptive associations they have formed. Thus, new associations need to be formed again and this can be done through repetitive reminding of successes. Another important finding through the research was regarding perceived controllability. As it was seen in study 3a, chapter 4, TC showed an illusion of control when actual controllability was very low. That is, when the controllability schedule had only 20% chance of the action having a desired effect, TC made higher control ratings. In other words, if TC can be trained to recognize the competition situation with a trace of ambiguity, wherein they believe that "anything is possible" rather than thinking that "I will choke and result in another failure", they could approach the situation with an illusion of control because they have 'nothing to lose'. In other words, if the situation is posed to look more ambiguous where anything could happen due to factors like weather, injuries from competitors and so on, then TC could adopt a strategy that makes it easier for them to misattribute success and failure. Perhaps one of the most important associations would be training the TC to base their expectations on their training

level; of course this can only be established if they are more aware of their training performance. Thus the key is to strengthen this association so they automatically start perceiving outcomes with an illusion of control.

7.13 Future research

As already implied previously there is a lot of scope for the present line of work based on the proposed model. TC and CC profiling has many implications and thus some more research needs to be done to identify other self-regulatory factors that could contribute to TC and CC differences, especially since failure in self-regulation seems to be the most crucial problem amongst TC. An example of a classic self-regulation research area is the regulatory focus theory that includes components of promotion and prevention focus (Higgins, 1997) where the former includes a state concerned with the presence or absence of positive outcomes and the latter is a state concerned with presence of absence of negative outcomes. It can be predicted that TC would be more likely to be in a prevention focus state and CC would be more likely to be in a promotion focus state. Thus it would be interesting to test this theory in understanding the antecedents of choking. Similarly, a lot of emphasis has been given on valence of information. It was seen that TC show a negativity bias and CC show a positivity bias. This means that there are emotions involved during the processing of information. If TC think about a past failure, the extra component that could drive the rumination could be negative affect. It can be predicted that CC show more regulatory control over emotions while TC are unable to do so. Thus it would be interesting to explore the role of emotions in predicting TC and CC differences. Another area could be to explore the mechanisms deeper as to why TC and CC show specific biases. This can be achieved through embodiment research. Do TC feel physically 'closer' to negative stimuli and do CC feel physically 'closer' to positive stimuli? By studying the mental representations of TC and CC it would be easier to delineate the antecedents involved in choking under pressure. Another area would be to study biofeedback while delivering certain information. For instance, does athletes' muscle tension increase or decrease while running when provided with negative or positive information? Research certainly needs to be carried out based on the intervention techniques mentioned above and finally more replications must be made based on the model. That is, repetitive success and failure should be manipulated amongst athletes and non-athletes and the effects of that on self-regulatory processes are crucial to understanding the role of success and failure experience. Another interesting angle to look into would be in terms how TC and CC perceive failure and success. Is it purely outcome based, that is, an apparent win or loss in

the competition? Or is it based on intrapersonal comparisons, that is, would athletes consider themselves as successful if their competition performance was better than training regardless whether they win or not? It can be predicted that TC could be more outcome focused thereby relying their success measures only on outcomes. Finally, the information processing model presented here needs to be tested in other domains apart from sports in order to test its generalizability.

7.14 Limitations

The studies presented have some limitations that need to be addressed. To begin with, due to the nature of participants, the sample size was always limited to not more than 70 athletes; certain studies have as few as 32 which might limit the statistical power. However since the groups TC and CC are remarkably different from each other, the effects could be interpreted as quite robust. Most of the experimental work done is during the training period, that is, when performances were measured on two occasions, pre-prime and post-prime as in studies 1a and 1b, Chapter 2, all interpretations that were made based on post-prime performance were directly linked to how athletes would perform in an actual competition. The model predicts that certain informational processing styles would predict 'choking under pressure'. However, the real experience of performance pressure was never measured. Although it would be ideal to manipulate measures in an actual competition set-up, it will also be unethical to hamper an athlete's performance. Most of the sample was also collected soon after athletes finished their training, which means that fatigue could act as a potential confound while participating. Rumination was measured with a questionnaire, and most of the questions were directed towards the thought process that happens during competitions. It would be essential to see if athletes ruminate even during training rather than only making the assumption that they do. Another problem in the same area is the direction of rumination, do people ruminate and hence choke under pressure or do people choke under pressure and as a result ruminate about it? This issue was not empirically tested and only assumptions were made about the latter causal link. A potential confound could have also been the presence of the experimenter when she was testing or administering questionnaires. That might have induced some sort of evaluation apprehension which could have declined performance or have skewed results in questionnaires. But again, if it was the evaluation apprehension that caused it, it still points to the direction that TC have more trait anxiety than CC. Regarding the model, each stage was tested on its own and was interpreted as a whole model. For example, the links between attribution, outcome judgements and lowered expectations were

not tested in one study together but were tested independently in separate studies. Thus assumptions were based on causal consequences of each study conducted. It was not possible to test the variables together statistically since the athletes who participated varied from study to study and just choosing the ones that participated in all studies would result in low test power. Another important limitation was based on the conclusions from previous work on need for cognition (Cacioppo and Petty, 1982; Venkataraman et al., 1990). Claims were made that CC would be able to block out irrelevant information because they were low on need for cognition. There was no direct evidence for such conclusions, but they were made purely based on what the researchers had already addressed. The only evidence towards need for cognition tendencies were based on the questionnaire administered and the fact that TC recalled more items than CC in studies 2b and 4, Chapter 3 and 5 respectively. It can probably be inferred that since TC recalled more items of positive, negative and neutral valence than CC, TC were more tuned to all sources of information while CC blocked out unnecessary information. Furthermore, study 4, Chapter 5 also revealed that CC were more sensitive to facilitator statements, which could again imply that they did not pay attention to barriers, thereby blocking out unwanted information. Finally, the present research claims to explain TC and CC based on their self-regulatory mechanisms without testing for the same specifically. An interesting aspect to be addressed in future research would be to measure objective performance after inducing 'uncontrollability' amongst athletes, in order to assess the various components of the proposed model in a more direct, experimental way.

7.15 Conclusions

The basic conclusion is that TC engage in a maladaptive information processing pattern reinforced by their learned helplessness loop. They begin to engage in such a pattern due the presence of maladaptive cognitive and motivational dispositions further reinforced by repetitive failure. Similarly CC engage in an adaptive information processing model reinforced by their inversed learned helplessness loop, due to the presence of adaptive cognitive and motivational dispositions reinforced by repetitive success. TC tend to 'choke under pressure' while CC tend to experience the 'flow' in competitions.

REFERENCES

Abramson, L. Y., Seligman, M. E. P., & Teasdale, J. D. (1978). Learned helplessness in humans: Critique and reformulation. *Journal of Abnormal Psychology, 87,* 49-74.

Agostinelli, G., Sherman, S. J., Presson, C. C, & Chassin, L. (1992). Self-protection and self-enhancement biases in estimates of population prevalence. *Personality and Social Psychology Bulletin, 18,* 631-642.

Alloy, L.B., & Abramson, L.Y. (1979). Judgement of contingency in depressed and nondepressed students: Sadder but wiser? *Journal of Experimental psychology: General, 108,* 441-485.

Alloy, L. B., & Abramson, L. Y. (1982). Learned helplessness, depression, and the illusion of control. *Journal of Personality and Social Psychology, 42 (6),* 1114–1126.

Alloy, L. B., Reilly-Harrington, N. A., Fresco, D. M., Whitehouse, W. G., & Zechmeister, J. S. (1999). Cognitive styles and life events in subsyndromal unipolar and bipolar mood disorders: Stability and prospective prediction of depressive and hypomanic mood swings. *Journal of Cognitive Psychotherapy: An International Quarterly, 13,* 21 – 40.

Bandura, A. (1982). The assessment and predictive generality of self-percepts of efficacy. *Journal of Behavior Therapy and Experimental Psychiatry, 13,* 195-199.

Bandura, A. (1991). Self-efficacy conception of anxiety. In R. Schwarzer & R.A. Wicklund (Eds.), *Anxiety and self-focussed attention.* (pp. 89-110). New York: Harwood Academic Publishers.

Bandura, A., & Cervone, D. (2000). Self-evaluative and self-efficacy mechanisms of governing the motivational effects of goal systems. In T. E. Higgins & A. W. Kruglanski (Eds.), *Motivational Science: Social and personality perspectives. Key readings in social psychology (pp. 202-214).* Philadelphia: Psychology Press.

Bargh, J. A. (1994). The four horsemen of automaticity: Awareness, efficiency, intention, and control in social interaction. In R. S. Wyer, Jr., & T. K. Srull (Eds.), *Handbook of social cognition* (2nd ed., pp. 1-40). Hillsdale, NJ: Erlbaum.

Barkhoff, H. & Heiby, E. (2004). Differences in mood among elite athletes in artistic roller, artistic figure and inline speed skating before and after competition. *European Journal of Sport Science, 4*, 22-32.

Barlow, D.H. (2002). *Anxiety and its disorders: The nature and treatment of anxiety and panic* (2nd ed.). New York: Guilford Press.

Baumeister, R. F. (1984). Choking under pressure: Self- consciousness and paradoxical effects of incentives on skilful performance. *Journal of Personality and Social Psychology, 46,* 610-620.

Baumeister,R. F., Bratslavsky, E., Finkenauer, C., & Vohs, K. D. (2001). Bad is stronger than good. *Review of General Psychology, 5,* 323-370.

Baumeister, R. F., & Showers, C. J. (1986). A review of paradoxical performance effects: Choking under pressure in sports and mental tests. *European Journal of Social Psychology, 16,* 361-383.

Baumeister, R. F., & Vohs, K. D. (2007). Self-Regulation, Ego Depletion, and Motivation. *Social and Personality Psychology Compass, 1,* 1-14.

Beck, A.T. (1967). *Depression: Clinical, experimental, and theoretical aspects.* New York: Hoeber. Republished as *Depression: Causes and treatment.* Philadelphia: University of Pennsylvania Press).

Beilock, S. L., Bertenthal, B. I., McCoy, A. M., & Carr, T. H. (2004). Haste does not always make waste: Expertise, direction of attention, and speed versus accuracy in performing sensorimotor skills. *Psychonomic Bulletin & Review, 11,* 373–379.

Beilock, S. L., & Carr, T. H. (2001). On the fragility of skilled performance: What governs choking under pressure? *Journal of Experimental Psychology: General, 130,* 701-725.

Beilock, S. L., & Carr, T. H. (2005). When high-powered people fail: Working memory and "choking under pressure" in math. *Psychological Science, 16,* 101–105.

Beilock, S. L., Carr, T. H., MacMahon, C., & Starkes, J. L. (2002). When paying attention becomes counterproductive: Impact of divided versus skill-focused attention on novice and experienced performance of sensorimotor skills. *Journal of Experimental Psychology: Applied, 8,* 6 –16.

Beilock, S. L., & DeCaro, M. S. (2007). From poor performance to success under stress: Working memory, strategy selection, and mathematical problem solving under pressure. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 33,* 983–998.

Beilock, S. L., & Gray, R. (2007). Why do athletes "choke" under pressure? In G. Tenenbaum & R. C. Ecklund (Eds.), *Handbook of sport psychology* (3rd ed., pp. 425–444). Hoboken, NH: Wiley.

Beilock, S.L., Kulp, C.A., Holt, L.E., & Carr, T.H. (2004). More on the fragility of performance: Choking under pressure in mathematical problem solving. *Journal of Experimental Psychology: General, 133,* 584–600.

Beilock, S. L. & McConnell, A. R. (2004). Stereotype threat and sport: Can athletic performance be threatened? *Journal of Sport and Exercise Psychology, 26,* 597-609.

Bernier, M., Thienot, E., Codron, R., & Fournier, J.F. (2009). A multi-study investigation examining the relationship between mindfulness and acceptance approaches and sport performance. *Journal of Clinical Sports Psychology, 3,* 320-333.

Biddle, S. J. H., Hanrahao, S. J., & Sellars, C. N. (2001). Attributions: Past, present, and future. In R. N. Singer, H. A. Hausenblas, & C. M. Janellc (Eds.), *Handbook of sport psychology,* 2nd ed (pp. 444–471). New York: Wiley.

Bieling, P. J., Israeli, A. L., & Anthony, M. M. (2004). Is perfectionism good, bad, or both? Examining models of the perfectionism construct. *Personality and Individual Differences, 36,* 1373-1385.

Blankstein, K. R., & Dunkley, D. M. (2002). Evaluative concerns, self-critical, and personal standards perfectionism: A structural equation modeling strategy. In G. L. Flett & P. L. Hewitt (Eds.), *Perfectionism: Theory, research, and treatment* (pp. 285- 315). Washington, DC: American Psychological Association.

Bless, H., Fiedler, K., & Strack, F. (2004). *Social cognition*: *How individuals construct social reality.* Philadelphia: Psychology Press.

Bless, H., Hamilton, D. L., & Mackie, D. M. (1992). Mood effects on the organization of person information. *European Journal of Social Psychology, 22,* 497-509.

Borkovec, T.D., Alcaine, O., & Behar, E. (2004). Avoidance theory of worry and generalized anxiety disorder. In R.G. Heimberg, C.L. Turk, & D.S. Mennin (Eds.), *Generalized anxiety disorder: Advances in research and practice*. New York: Guilford Press.

Branscombe, N. R., Owen, S., Garstka, T., & Coleman, J. (1996). Rape and accident counterfactuals: Who might have done otherwise and would it have changed the outcome? *Journal of Applied Social Psychology, 26,* 1042-1067.

Brown, K.W., & Ryan, R.M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology, 84,* 822–848.

Bruner, J.S. (1957). On perceptual readiness. *Psychological Review, 64,* 123-152.

Buehner, M. J., & May, J. (2004). Abolishing the Effect of Reinforcement Delay on Human Causal Learning. *Quarterly Journal of Experimental Psychology, 57B*(2), 179-191.

Cacioppo, J. T., & Berntson, G. G. (1994). Relationship between attitudes and evaluative space: A critical review, with emphasis on the separability of positive and negative substrates. *Psychological Bulletin, 115,* 401-423.

Cacioppo, J. T., Gardner, W. L., & Berntson, G. G. (1997). Beyond bipolar conceptualizations and measures: The case of attitudes and evaluative space. *Personality and Social Psychological Review, 1,* 3-25.

Cacioppo, J. T, & Petty, R. E. (1982). The need for cognition. *Journal of Personality and Social Psychology, 42,* 116-131.

Cacioppo, J. T., Petty, R. E., Feinstein, J. A., & Jarvis, B. W. G. (1996). Dispositional differences in cognitive motivation: The life and times of individuals varying in need for cognition. *Psychological Bulletin, 119,* 197 – 253.

Carver, C.S. (1979). A cybernetic model of self-attention processes. *Journal of Personality and Social Psychology, 37,* 1251-128.

Carver, C. S., & Scheier, M. F. (1987). Self-focusing effects of dispositional self-consciousness, mirror, presence, and audience presence. *Journal of Personality and Social Psychology, 36,* 324 –332.

Clore, G. L., Schwarz, N., & Conway, M. (1994). Affective causes and consequences of social information processing. In R. Wyer & T. Srull (Eds.), *Handbook of social cognition* (2nd ed., pp. 323-417). Hillsdale, NJ: Erlbaum.

Coyne, J. C., Metalsky, G. I., & Lavelle, T. L. (1980). Learned helplessness as experimenterinduced failure and its alleviation with attentional redeployment. *Journal of Abnormal Psychology, 89,* 350–357.

Cox, D. F. (1967). *In Risk Taking and Information Handling in Consumer Behavior*, Boston: Harvard University.

Cox, R. H. (1994). Personality and the athlete. *Sport Psychology: Concepts and Applications* (3rd ed., pp.18-51). Dubuque, IA: Brown & Bench.

Csikszentmihalyi, M. (1975). *Beyond boredom and anxiety*. San Francisco, CA: Jossey-Bass.

Csikszentmihalyi, M. (1990). *Flow: The Psychology of Optimal Experience*. New York: Harper & Row.

D'Agostino, P. R., & Pittman, T. S. (1982). Effort expenditure following control deprivation. *Bulletin of the Psychonomic Society, 19,* 282–283.

DeCaro, M. S., Thomas, R., Albert, N. B., & Beilock, S. L. (2011). Choking under pressure: Multiple routes to skill failure. *Journal of Experimental Psychology: General, 140,* 390 – 406.

Deci, E.L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behaviour*. New York: Plenum.

Dreben, E. K., Fiske, S. T., & Hastie, R. (1979). The independence of evaluative and item information: Impression and recall order effects in behaviour based impression formation. *Journal of Personality and Social Psychology, 37,* 1758-1768.

Dweck, C.S. (1975). The role of expectations and attributions in the alleviation of learned helplessness. *Journal of Personality and Social Psychology, 31*, 674-685.

Dweck, C. S. and Elliott, S. (1983). Achievement motivation. In P. Mussen (Ed.), *Handbook of Child Psychology: Socialization, personality, and social development* (Vol. 4, pp. 643-691). NY: Wiley.

Eysenck, M. W., & Calvo, M. G. (1992). Anxiety and performance: The processing efficiency theory. *Cognition and Emotion, 6,* 409-434.

Fenigstein, A., Scheier, M. F., & Buss, A. H. (1975). Public and private self-consciousness: Assessment and theory. *Journal of Consulting and Clinical Psychology, 43,*522-527.

Festinger, L. (1957). *A theory of cognitive dissonance.* Evanston, IL: Row, Peterson.

Finkenauer, C, & Rime, B. (1998). Socially shared emotional experiences vs. emotional experiences kept secret: Differential characteristics and consequences. *Journal of Social and Clinical Psychology, 17,* 295-318.

Fiske, S. T., & Taylor, S. E. (1991). *Social cognition*. New York: McGraw-Hill.

Fitts, P.M., & Posner, M.I. (1967). *Human performance.* Belmont. CA: Brooks/Cole.

Fleming, R., Baum, A., & Singer, J.U. (1984). Toward an integrative approach to the study of stress. *Journal of Personality and Social Psychology, 46,* 939-949.

Flett, G. L., & Hewitt, P. L. (2005). The perils of perfectionism in sports and exercise. *Current Directions in Psychological Science, 14,* 14 – 18.

Flett, G. L., Madorsky, D., Hewitt, P. L., & Heisel, M. J. (2002). Perfectionism cognitions, ruminations, and psychological distress. *Journal of Rational – Emotive & Cognitive – Behaviour Therapy,* 20, 33 – 47.

Frankl, V. E. (1963). *Man's search for meaning: An introduction to logotherapy.* New York: Washington Square Press.

Fresco, D.M., Heimberg, R.M., Mennin, D.S., Turk, C.L., 2002. Confirmatory factor analysis of the Penn State Worry Questionnaire. *Behaviour Research and Therapy, 40(3):* 313-323.

Frost, R. O., & Henderson, K. J. (1991). Perfectionism and reactions to athletic competition. *Journal of Sport and Exercise Psychology, 13,* 323–335.

Gardner, F.L., & Moore, Z.E. (2004). A mindfullness-acceptance-commitment-based approach to athletic performance enhancement: Theoretical considerations. *Behavior Therapy, 35,* 707-723.

Gernigon, C., Thill, E., & Fleurance, P. (1999). Learned helplessness: A survey for cognitive, motivational and perceptual–motor consequences in motor tasks. *Journal of Sports Sciences, 17(5),* 403−412.

Giacobbi, P.R., & Weinberg, R.S. (2000). An examination of coping in sport: Individual trait anxiety differences and situational consistency. *Sport Psychologist, 14,* 42-62.

Gino, F., Sharek. Z., & Moore, D.A. (2011). Keeping the illusion of control under control: Ceilings, floors and imperfect calibration. *Organizational Behavior and Human Decision Processes, 114,* 104-114.

Gray, R. (2004). Attending to the execution of a complex sensorimotor skill: Expertise differences, choking and slumps. *Journal of Experimental Psychology: Applied, 10, 42-54.*

Gollwitzer, P. M. (1993). Goal achievement: The role of intentions. In W. Stroebe & M. Hewstone (Eds.), *European Review of Social Psychology* (Vol. 4, pp. 141-185). Chicester: Wiley.

Gollwitzer, P. M. (1999). Implementation intentions: Strong effects of simple plans. *American Psychologist, 54*, 493-503.

Gollwitzer, P. M., Bayer, U. C., & McCulloch, K. C. (2005). The control of the unwanted. In R. R. Hassin, J. S. Uleman, & J. A. Bargh (Eds.), *The new unconscious* (pp. 485-515). New York: Oxford University Press.

Gollwitzer, P. M., & Sheeran, P. (2006). Implementation intentions and goal achievement: A metaanalysis of effects and processes. *Advances in Experimental Social Psychology, 38, 69*-119.

Gould, D., & Damarjian, N. (1996). Imagery training for peak performance. In J. L. Van Raalte & B. W. Brewer (Eds.). *Exploring sport and exercise psychology* (pp. 25-50). Washington, DC: American Psychological Association.

Gould, D., Dieffenbach, K., & Moffett, A. (2002). Psychological characteristics and their development in Olympic champions, *Journal of Applied Sport Psychology, 14*, 172-204.

Hardy, L. (1990). A catastrophe model of performance in sport. In J.G. Jones & L. Hardy (Eds.), *Stress and performance in sport (pp. 81-106).* Chichester, England: Wiley.

Hardy, L., Jones, J. G., & Gould, D. (1996). Understanding psychological preparation for sport: Theory and practice of elite performers. Chichester: Wiley.

Hardy, L., Mullen, R., & Jones, G. (1996). Conscious control of motor actions under stress. *British Journal of Psychology, 87*, 621–636.

Helton, W. S., Dember, W. N., Warm, J. S., & Matthews, G. (2000). Optimism, pessimism, and false failure feedback effects on vigilance performance. *Current Psychology, 18,* 311–325.

Heppner, P.P., Petersen, C.H. (1982). The development and implications of a personal problem solving inventory. *Journal of Counseling Psychology, 29(1),* 66-75.

Hewitt, E L., & Genest, M. (1990). The ideal-self: Schematic processing of perfectionistic content in dysphoric university students. *Journal of Personality and Social Psychology, 59*, 802-808.

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

Hill, M., Hanton, S., Fleming, S., and Matthew, N. (2009). A re-examination of choking in sport. *European Journal of Sport Science, 9,* 203 -212.

Hiroto, D. S., & Seligman, M. E. P. (1975). Generality of learned helplessness in man. *Journal of Personality and Social Psychology, 31,* 311-327.

Hume, D. (1739/2010). A treatise of human nature. In L. A. Selby-Bigge (Ed.), *Hume's treatise of human nature*. Oxford, UK: Clarendon Press.

Ingram, R.E. & Smith, T.W. (1984). Depression and internal versus external focus of attention. *Cognitive Therapy and Research, 8,* 139-152.

Ito, T. A., Cacioppo, J. T., & Lang, P. J. (1998). Eliciting affecting using the International Affective Picture System: Bivariate evaluation and ambivalence. *Personality and Social Psychology Bulletin, 24,* 855-879.

Jackson, R. C., Ashford, K. J., & Norsworthy, G. (2006). Attentional focus, dispositional reinvestment, and skilled motor performance under pressure. *Journal of Sport & Exercise Psychology, 28,* 49-68.

Job, V., Dweck, C. S., & Walton, G. M. (2010). Ego depletion--Is it all in your head?: Implicit theories about willpower affect self-regulation. *Psychological Science, 21,* 1686-1693.

Kahneman, D. (1973). *Attention and effort*. Englewood Cliffs, NJ: Prentice-Hall.

Kahneman, D., & Miller, D.T. (1986). Norm theory: Comparing reality to its alternatives. *Psychological Review, 93,* 136-153.

Kahneman, D. and A. Tversky (1979), "Prospect Theory: An Analysis of Decision under Risk," *Econometrica, 47,* 263-91.

Kahneman, D., & Tversky, A. (1982). Variants of uncertainty. *Cognition, 11,* 143- 157.

Kahneman,D., & Tversky, A. (1984). Choices, values, and frames. *American Psychologist 39,* 341-350.

Kane, M.J., & Engle, R.W. (2000) Working-memory capacity, proactive interference, and divided attention: Limits on long-term memory retrieval. *Journal of Experimental Psychology: Learning, Memory and Cognition, 26,* 336-358.

Kee, Y. H., & Wang, C. K. (2008). Relationships between mindfulness, flow dispositions and mental skills adoption: A cluster analytic approach. *Psychology for Sport and Exercise, 9,* 393-411.

Kerr, J. h., & Cox, T. (1991). Arousal and individual differences in sport. *Personality and Individual Differences, 12,* 1075-1085.

Kimble, C.E., & Rezabek, J.S. (1992). Playing games before an audience: Social facilitation or choking? *Social Behavior and Personality, 20,* 115-120.

Klinger, E., Barta, S. G., & Maxeiner, M. E. (1980). Motivational correlates of thought content frequency and commitment. *Journal of Personality and Social Psychology, 39,* 1222-1237.

Kofta, M., & Sedek, G. (1989). Repeated failure: A source of helplessness, or a factor irrelevant to its emergence? *Journal of Experimental Psychology: General,* 118, 3-12.

Koivula, N., Hassmen, P., & Fallby, J. (2002). Self – esteem and perfectionism in elite athletes: effects on competitive anxiety and self – confidence. *Personality and Individual Differences*, 32, 865 – 875.

Lam, D. H., Watkins, E. R., & Hayward, P. R. (2003). A randomised controlled study of cognitive therapy for relapse prevention for bipolar affective disorder: outcome of the first year. *Archives of General Psychiatry, 60,* 145– 152.

Langer, E. (1975), "The Illusion of Control," *Journal of Personality and Social Psychology, 32,* 311-328.

Langer, E., & Imber. G. (1979). When practice makes imperfect: Debilitating effects of overlearning. *Journal of Personality and Social Psychology, 37,* 2014-2024.

Lavie, N., Hirst, A., De Fockert, J.W., & Viding, E. (2004). Load theory of selective attention and cognitive control. *Journal of Experimental Psychology: General, 133,* 339–354.

Lavie, N., Tsal, Y. (1994). Perceptual load as a major determinant of the locus of selection in visual attention. *Perception and Psychophysics, 56,* 183–197.

Lavie, N. (1995). Perceptual load as a necessary condition for selective attention. *Journal of Experimental Psychology: Human Perception and Performance, 21,* 451–468.

Lazarus, R S and Folkman, S, (1984). *Stress, Appraisal, and Coping.* New York: Springer.

Lewis, B. P., & Linder, D. E. (1997). Thinking about choking? Attentional processes and paradoxical performance. *Personality and Social Psychology Bulletin, 23,* 937 944.

Lewinsohn, P.M., Hoberman, H.M., Teri, L., & Hautzinger, M. (1985). An integrated theory of depression. In S. Reiss & R. Bootzin (Eds.), *Theoretical issues in behavior therapy* (pp. 331-359). New York: Academic Press.

Locke, E. A., & Latham, G. P. 1990. *A Theory of Goal Setting and Task Performance.* Englewood Cliffs, NJ: Prentice Hall.

Lutz, S., & Huitt, W. (2003). *Information processing and memory: Theory and applications. Educational Psychology Interactive.* Valdosta, GA: Valdosta State University.

Maier, S. E, & Seligman, M. E. P. (1976). Learned helplessness: Theory and evidence. *Journal of Experimental Psychology: General,* 105, 3-46.

Manstead, A. S. R., & Semin, G. R. (1980). Social facilitation effects: Mere enhancement of dominant responses? *British Journal of Social and Clinical Psychology, 19,*119-136.

Markman, K. D., Gavanski, I., Sherman, S. J., & McMullen, M. N. (1993). The mental simulation of better and worse possible worlds. *Journal of Experimental Social Psychology, 29,* 87-109.

Martin-Krumm, C., Sarrazin, P., Peterson, C., & Famose, J. P. (2003). Explanatory style and resilience after sports failure. *Personality and Individual Differences, 35,* 1685–1695.

Martin, L. L., & Tesser, A. (1996). Some ruminative thoughts. In R. S. Wyer, Jr. (Ed.), Some ruminative thoughts: *Advances in social cognition* (Vol. 9, pp. 1-48). Mahwah, NJ: Erlbaum.

Martin, L. L., Tesser, A., & McIntosh, W. D. (1993). Wanting but not having: The effects of unattained goals on thoughts and feelings. In D. M. Wegner & J. W. Pennebaker (Eds.), *Handbook of mental control* (pp. 552-572). Englewood Cliffs, NJ: Prentice Hall.

Masters, R. S. W. (1992). Knowledge, knerves and know-how. *British Journal of Psychology, 83,* 343-358.

Masters, R.S.W., Polman, R.C.J. & Hammond, N.V. (1993) 'Reinvestment':A dimension of personality implicated in skill breakdown under pressure. *Personality and Individual Differences, 14,* 655–666.

Masters, J.C. & Santrock, J.W. (1976). Studies in the self-regulation of behaviour. *Developmental Psychology, 12,* 334-348.

Matt, G.E., Vazquez, C., & Campbell, W.K. (1992). Mood-congruent recall of affectively toned stimuli: a meta-analytic review. *Clinical Psychology Review, 12, 227–*55.

Meyer, J.P., & Gellatly, I.R. (1988). Perceived performance norm as a mediator in the effect of assigned goal on personal goal and task performance. *Journal of Applied Psychology, 73,* 410-420.

Miller, D.T., & Gunasegaram, S. (1990). Temporal order and the perceived mutability of events: Implications for blame assignment. *Journal of Personality and Social Psychology, 59,* 1111–1118.

Miller, D.T., Turnbull, W., & McFarland, C. (1990). Counterfactual thinking and social perception: Thinking about what might have been. In M.P. Zanna (Ed.), *Advances in Experimental Social Psychology* (Vol. 23, pp. 305-332). San Diego, CA: Academic Press.

Mineka, S., Pury, C. L., & Luten, A. G. (1995). Explanatory style in anxiety and depression. In G. M. Buchanan, & M. E. P. Seligman (Eds.), *Explanatory style* (pp. 135–158). Hillsdale, NJ: Erlbaum.

Mischel, W., Ebbesen, E. B., & Zeiss, A. R. (1976). Determinants of selective memory about the self. *Journal of Consulting and Clinical Psychology, 44,* 92-103.

Monroe, S. M., & Simons, A. D. (1991). Diathesis-stress theories in the context of life-stress research: Implications for the depressive disorders. *Psychological Bulletin, 110,* 406-425.

Mor, S., Day, H.I., Flett, G.L., & Hewitt, P.L. (1995). Perfectionism, control and components of performance anxiety in professional artists. *Cogntive Therapy and Research, 19,* 207-225.

Moskowitz, G.B. (2005). *Social Cognition: Understanding Self and Others.* New York, NY: Guilford Press.

Mullen, R. & Hardy, L. (2000). State anxiety and motor performance. *Journal of Sports Sciences, 18,* 785–799.

Murray, N.P., & Janelle, C.M. (2003). Anxiety and performance: A visual search examination of the processing efficiency theory. *Journal of Sport & Exercise Psychology, 25,* 171–187.

Nario-Redmond, M.R., & Branscombe, N.R. (1996). It could have been better or it might have been worse: Implications for blame assignment in rape cases. *Basic and Applied Social Psychology, 18, 345-366.*

Needles, D. J., & Abramson, L. Y. (1990). Positive life events, attributional style, and hopefulness: testing a model of recovery from depression. *Journal of Abnormal Psychology, 99,* 156-165.

Nezlek, J. B., & Gable, S. L. (2001). Depression as a moderator of relationships between positive daily events and day-to-day psychological adjustment. Personality and Social *Psychology Bulletin, 27,* 1692-1704.

Nideffer, R. M. (1981*).* Use of the test of attentional and interpersonal style (TAIS) in sport. *The Sport Psychologist, 4,* 285-300.

Nolen-Hoeksema, S., & Davis, C. G. (1999). "Thanks for sharing that": Ruminators and their social support networks. *Journal of Personality and Social Psychology, 77,* 801-814.

Nolen-Hoeksema, S., & Morrow, J. (1991). A prospective study of depression and posttraumatic stress symptoms after a natural disaster: The 1989 Loma Prieta earthquake. *Journal of Personality and Social Psychology, 61,* 115–121.

Nolen-Hoeksema, S., Parker, L. E., & Larson, J. (1994). Ruminative coping with depressed mood following loss. *Journal of Personality & Social Psychology, 67,* 92–104.

Parfitt, C. G. & Hardy, L. (1987). Further Evidence for the Differential Effects of Competitive Anxiety Upon a Number of Cognitive and Motor Sub components. *Journal of Sports Science, 5,* 62-72.

Peterson, C. (2000). The future of optimism. *American Psychologist, 55,* 44–54.

Peterson, C., & Park, C. (1998). Learned helplessness and explanatory style. In D. F. Barone, V. B. Van Hasselt, & M. Hersen (Eds.), *Advanced personality* (pp. 287–310). New York: Plenum.

Peterson, C., & Steen, T. A. (2002). Optimistic explanatory style. In C. R. Snyder, & S. J. Lopez (Eds.), *Handbook of positive psychology* (pp. 244–256). Oxford University Press.

Peterson, C., & Vaidya, R. S. (2001). Explanatory style, expectations, and depressive symptoms. *Personality and Individual Differences, 31,* 1217–1223.

Pittman, T. S., & D'Agostino, P. R. (1989). Motivation and cognition: Control deprivation and the nature of subsequent information processing. *Journal of Experimental Social Psychology, 25,* 465-480.

Pittman, T. S., & Pittman, N. L. (1980). Deprivation of control and the attribution process. *Journal of Personality and Social Psychology, 39,* 377-389.

Plessner, H. (2005). Positive and negative effects of prior knowledge on referee decisions in sports. In T. Betsch, & S.Haberstroh (Eds.), *The routines of decision making* (pp. 311–324). Hillsdale: Lawrence Erlbaum.

Plessner H., & Haar, T. (2006). Sports performance judgments from a social cognitive perspective. *Psychology of Sport and Exercise,* 7, 555–575.

Prapavessis, H. and Carron, A.V. (1988) Learned helplessness in sport. *The Sport Psychologist, 2,* 189-201.

Proctor, R.W., & Dutta, A. (1995). *Skill acquisition and human performance.* Thousand Oaks, CA: Sage.

Pyszczynski, T. & Greenberg, J. (1987). Self-regulatory perseveration and the depressive self-focusing style: A self-awareness theory of the development and maintenance of reactive depression. *Psychological Bulletin, 102,* 122-138.

Reed, P. (1993). Influence of the schedule of outcome presentation on causality judgements. *Quarterly Journal of Experimental Psychology, 46A*(2), 327-345.

Rees, T., Ingledew, D.K., & Hardy, L. (2005). Attribution in sport psychology: seeking congruence between theory, research and practice. *Psychology of Sport and Exercise, 6,* 189-204.

Roberts, J., Gilboa, E., & Gotlib, I. H. (1998). Ruminative response style and vulnerability to depressive episodes: Factor components, mediating processes, and episode duration. *Cognitive Therapy and Research, 22,* 401-425.

Robinson-Riegler, G. L., & Winton, W. M. (1996).The role of conscious recollection in recognition of affective material: Evidence for positive-negative asymmetry. *Journal of General Psychology, 123,* 93-104.

Roese, N.J. (1997). Counterfactual thinking. *Psychological Bulletin, 121,* 133–148.

Rozin, P., & Royzman, E. (2001). Negativity bias, negativity dominance, and contagion. *Personality and Social Psychology Review, 5,* 296-230.

Sanna, L. J. (1996). Defensive pessimism, optimism, and simulating alternatives: Some ups and downs of prefactual and counterfactual thinking. *Journal of Personality and Social Psychology, 71,* 1020-1036.

Santamaria, V. L., & Furst, D. M. (1994). Distance runners' causal attributions for most successful and least successful races. *Journal of Sport Behavior, 17,* 43 – 52.

Schachter, R. (2007). Enhancing performance on the scholastic aptitude test for test-anxious high school students. *Biofeedback, 35,* 105-109.

Schmidt, R. A. (1991). Frequent augmented feedback can degrade learning: Evidence and interpretations. In J. Requin & G. E. Stelmach (Eds.), *Tutorials in motor neuroscience* (pp. 59-75). Dordrecht, The Netherlands: Kluwer Academic.

Schwarz, N. (1990). Feelings as information: Informational and motivational functions of affective states. In E. T. Higgins & R. M. Sorrentino (Eds.), The handbook of motivation and cognition: Foundations of social behavior (Vol. 2, pp. 527-561). New York: Guilford Press

Segerstrom, S.C., Stanton, A.L., Alden, L.E., & Shortridge, B.E. (2003). A multidimensional structure for repetitive thought: What's on your mind, and how, and how much? *Journal of Personality and Social Psychology, 85,* 909-921.

Seligman, M. E. P. (1975). *Helplessness: On depression, development, and death*. San Francisco: W. H. Freeman.

Seligman, M. E. P., Nolen-Hoeksema, S., Thornton, N. & Thornton, K. M. (1990). Explanatory style as a mechanism of disappointing athletic performance. *Psychological Science, 1,* 143-146.

Shanks, D. R., & Dickinson, A. (1991). Instrumental Judgment and Performance Under Variations in Action Outcome Contingency and Contiguity. *Memory & Cognition, 19*(4), 353-360.

Shanks, D. R., Pearson, S. M., & Dickinson, A. (1989). Temporal Contiguity and the Judgment of Causality by Human Subjects. *Quarterly Journal of Experimental Psychology, 41B*(2), 139-159.

Shapiro, S.L., Carlson, L.E., Austin, J.A., & Freedman, B. (2006). Mechanisms of mindfulness. *Journal of Clinical Psychology, 62,* 373–386.

Sheeran, P., Milne, S. E., Webb, T. L., & Gollwitzer, P. M. (2005). Implementation intentions. In M. Conner & P. Norman (Eds.), *Predicting health behavior* (2nd ed., pp. 276-323) Buckingham, UK: Open University Press.

Sheldon, K. M, Ryan, R., & Reis, H. T. (1996). What makes for a good day? Competence and autonomy in the day and in the person. *Personality and Social Psychology Bulletin, 22,* 1270-1279.

Skinner, B. F. (1938). *The behavior of organisms*. New York: Appleton-Century.

Skowronski, J. J., & Carlston, D. E. (1987). Socialjudgment and social memory: The role of cue diagnosticity in negativity, positivity, and extremity biases. *Journal of Personality and Social Psychology, 52,* 689 - 699.

Smith, T.W. & Greenberg, J. (1981). Depression and self-focused attention. *Motivation and Emotion, 5,* 323-331.

Spence, J.T., & Spence, K.W. (1966). The motivational components of manifest anxiety: Drive and drive stimuli. In C.D. Spielberger (Ed.), *Anxiety and behavior.* New York: Academic Press.

Strauss, B. (2002). Social facilitation in motor tasks: A review of research and theory. *Psychology of Sport and Exercise, 3,* 237-256.

Steele, C. M., & Aronson, J. (1995). Stereotype threat and the intellectual test performance of African Americans. *Journal of Personality and Social Psychology, 69(5),* 797–811.

Suls, J., & Miller, R. L. (Eds.) (1977). *Social comparison processes: Theoretical and empirical perspectives.* Washington, D.C.: Hemisphere Publishing Company.

Taylor, J. (1996). Intensity and athletic performance. In J. L. Van Raalte & B. W. Brewer (Eds.),*Exploring sport and exercise psychology* (pp. 75–106). Washington, DC: American Psychological Association.

Taylor, S. E. (1983). Adjustment to threatening events: A theory of cognitive adaptation. American Psychologist, 38, 1161-1173.

Taylor, S. E., & Brown, J. D. (1988). Illusion and well-being: A social psychological perspective on mental health. *Psychological Bulletin, 103,* 193-210.

Taylor, S.E., & Lobel, M. (1989). Social comparison activity under threat: Downward evaluation and upward contacts. *Psychological Review, 96,* 569-575.

Thayer, R. E. (1996). *The origin of everyday moods. Managing energy, tension, and stress.*New York: Oxford University Press.

Tice, D. M. (1991). Esteem protection or enhancement? Self-handicapping motives and attributions differ by trait self-esteem. *Journal of Personality and Social Psychology, 60,* 711-725.

Triplett, N. (1897). The dynamogenic factors in pacemaking and competition. *American Journal of Psychology, 9,* 505 – 523.

Tschakert, R. (1987). Trainingsweltmeister – Was tun? Psychoregulationstraining eines Tennisspielers [Training champion – What to do? Self-regulation of a tennis player]. *Sportpsychologie, 1,* 14-17.

Vealey, R.S. (1992). Personality and sport: a comprehensive view. In T.S. Horn, *Advances in sport psychology* (pp. 25-60). Champaign, IL: Human Kinetics.

Venkatraman, M. P., Marlino, D., Kardes, F. R., & Sklar, K. B. (1990). The interactive effects of message appeal and individual differences on information processing and persuasion. *Psychology & Marketing, 7,* 85-96.

Wang, J., Marchant, D., & Morris, T. (2004). Coping style and susceptibility to choking. *Journal of Sport Behavior,* 27, 75-92.

Wasserman, E. A., Chatlosh, D. L., & Neunaber, D. J. (1983). Perception of Causal Relations in Humans: Factors affecting judgments of response-outcome contingencies under free-operant procedures. *Learning and Motivation, 14*(4), 406-432.

Weinberg, R. S., Burton, D., Yukelson, D., & Weigand, D. (1993). Goal setting in competitive sport: An exploratory investigation of practices of collegiate athletes. *The Sport Psychologist, 7,* 275–289.

Weiner, B. (1985). "Spontaneous" causal thinking. *Psychological Bulletin, 97,* 74 - 84.

Weiss, M . R, Wiese, D.M., & Khnt, K.A. (1989). Head over heels with success. The relationship between self-efficacy and performance m competitive youth gymnastics. *Joumal of Sport and Exercise Psychology, 11.* 444-451.

Williams, J. M., & Krane, V. (1993). Psychological characteristics of peak performance. In J. M. Williams (Ed.), *Applied sport psychology: Personal growth to peak performance* (pp. 137-147). Mountain View, CA: Mayfield.

Williams, J. M. G., Watts, P. N., MacLeod, C. & Mathews, A. (1997). *Cognitive Psychology and Emotional Disorders*, 2nd edn.Wiley : Chichester.

Wine, J. (1971). Test anxiety and direction of attention. *Psychological Bulletin, 76,* 92–104.

Witkowski, T., and Stiensmeier-Pelster, J. (1998). Performance deficits following failure: Learned helplessness or self-esteem protection? *British Journal of Social Psychology, 37,* pp 59-71.

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

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

APPENDIX A
SCRIPTS

A.1 KINDS OF PRIME

Training negative

I just mentioned about the existence of the two groups. Researchers in fact say that those who perform better during training tend to be anxious and stressed during the competition. They are easily bothered by the presence of others and they constantly think about their performance – whether it will be as good as before. They also seem to show poor concentration and are easily distracted by other's presence.

Competition negative

I just mentioned about the existence of the two groups. Researchers in fact say that those who perform better during competition tend to be anxious and stressed during the competition as they compare their performance to how it was during training or previous competitions. They seem bothered by the presence of others and they constantly think about their performance – whether it will be as good as before. They also seem to show poor concentration and are easily distracted by other's presence.

Training positive

I just mentioned about the existence of the two groups. Researchers in fact say that those who perform better during training tend to be calm and composed, have adequate coping skills when stressed during the competition. They are motivated by the presence of others. They also seem to show great concentration and focus during their event.

Competition positive

I just mentioned about the existence of the two groups. Researchers in fact say that those who perform better during competition tend to be calm and composed, have adequate coping skills when stressed during the competition. They are motivated by the presence of others. They also seem to show great concentration and focus during their event.

A.2 TECHNICAL FEEDBACK

Swing your arms faster.
Run Tall.
Use your toes while running (Sprints).
Relax your shoulders.
Accelerate the last 30m.

A.3 INFORMATION RECALLPASSAGES

General Passage

Up to 4000 flights were cancelled with airspace closed in Norway, Sweden, Finland and Denmark. U.K.'s air traffic control said "No flights would be allowed in U.K.'s air space

because of engine damage". The volcano continues to throw ash and the wind direction is expected to bring clouds into U.K, and European air space. Six hundred thousand people are affected. The officials say that "it is very unlikely that the situation over England will improve in the near future" Experts have said that tiny participles of rock, glass and sand in the ash cloud could damage the engines. The passengers are very unhappy with the situation.

Sports specific Passage

Sprint events at the 2008 Beijing Olympics expected a straight battle between the U.S.A and Jamaica. However, at the end, Jamaicans won with Bolt winning the 100m and 200. The women's 100m and 200m were also won by Jamaica. Usain and Asafa smashed the world record in the 4 x 100m relay. For the first time the U.S.A did not win any sprint gold. So what's the secret behind Jamaica's success? The country's sports ministers Olivia Grange says that, Jamaica gets a jump start on its rivals. She says, "I always talk about the Triple T – Tradition, Talent and Training". In our primary schools, physical education is made compulsory and we start competing from early childhood.

APPENDIX B
QUESTIONNAIRES

B.1 RSS SCALE (MODIFIED)

The statements below describe some thoughts that elite athletes may have when they are performing in competitions. Please read each statement and decide how much you do what the statement describes when you are competing. Indicate the degree to which you do what is described by circling the appropriate number on the scale.

WHEN I PERFORM IN COMPETITIONS,

A. **I have difficulty getting myself to stop thinking about the outcome of my performance during the competition.**

1	2	3	4	5
NOT AT ALL	RARELY	SOMETIMES	QUITE A BIT	VERY MUCH

B. **I repeatedly analyse and keep thinking about the reasons for my performance outcome in the competition.**

1	2	3	4	5
NOT AT ALL	RARELY	SOMETIMES	QUITE A BIT	VERY MUCH

C. **I search my mind many times to try and figure out if there is anything about my personality that may have led me to feel anxious during competitions.**

1	2	3	4	5
NOT AT ALL	RARELY	SOMETIMES	QUITE A BIT	VERY MUCH

D. **I get absorbed in thinking about the way I perform and find it difficult to think about other things.**

1	2	3	4	5
NOT AT ALL	RARELY	SOMETIMES	QUITE A BIT	VERY MUCH

E. **I search my mind repeatedly for events during my early competitions that may help me understand my current performance state.**

1	2	3	4	5
NOT AT ALL	RARELY	SOMETIMES	QUITE A BIT	VERY MUCH

F. **I keep wondering about how my performance was better at other points in my career.**

1	2	3	4	5
NOT AT ALL	RARELY	SOMETIMES	QUITE A BIT	VERY MUCH

G. I lie in bed and keep thinking about my motivation levels – good or bad to perform better.

1	2	3	4	5
NOT AT ALL	RARELY	SOMETIMES	QUITE A BIT	VERY MUCH

WHEN I PERFORM IN COMPETITIONS,

G. **If people try to talk to me or ask me questions it feels as though they are interrupting an ongoing silent conversation I am having with myself about my performance.**

1	2	3	4	5
NOT AT ALL	RARELY	SOMETIMES	QUITE A BIT	VERY MUCH

H. **I question and keep wondering about the nature of my training to find clues that may help me understand my current performance levels.**

1	2	3	4	5
NOT AT ALL	RARELY	SOMETIMES	QUITE A BIT	VERY MUCH

I. **I repeatedly think about improving my performance by concentrating on my thoughts and actions.**

1	2	3	4	5
NOT AT ALL	RARELY	SOMETIMES	QUITE A BIT	VERY MUCH

J. **I get the feeling that if I think long enough about my performance I will be able to understand myself current level of performance better because of it.**

1	2	3	4	5
NOT AT ALL	RARELY	SOMETIMES	QUITE A BIT	VERY MUCH

K. **I keep thinking about the mistakes I usually make while performing my event and try to examine where things went wrong.**

1	2	3	4	5
NOT AT ALL	RARELY	SOMETIMES	QUITE A BIT	VERY MUCH

L. **I exhaust myself by thinking so much about my performance and the reasons for my outcomes.**

1	2	3	4	5
NOT AT ALL	RARELY	SOMETIMES	QUITE A BIT	VERY MUCH

B.2 SCAT

Read each statement below, decide if you "Rarely", "Sometimes" or "Often" feel this way when competing in your sport, tick the appropriate box to indicate your response.

	Rarely	Sometimes	Often
1. Competing against others is socially enjoyable	☐	☐	☐
2. Before I compete I feel uneasy	☐	☐	☐
3. Before I compete I worry about not performing well	☐	☐	☐
4. I am a good sportsman when I compete	☐	☐	☐
5. When I compete, I worry about making mistakes	☐	☐	☐
6. Before I compete I am calm	☐	☐	☐
7. Setting a goal is important when competing	☐	☐	☐
8. Before I compete I get a queasy feeling in my stomach	☐	☐	☐
9. Just before competing, I notice my heart beats faster than usual	☐	☐	☐

10. I like to compete in games that demands a lot of physical energy	☐	☐	☐
11. Before I compete I feel relaxed	☐	☐	☐
12. Before I compete I am nervous	☐	☐	☐
13. Team sports are more exciting than individual sports	☐	☐	☐
14. I get nervous wanting to start the game	☐	☐	☐
15. Before I compete I usually get uptight	☐	☐	☐

B.3 MIPS

The statements below describe some thoughts that elite athletes may have when they are performing in competitions. Please read each statement and decide how much you do what the statement describes when you are competing. Indicate the degree to which you do what is described by circling the appropriate number on the scale.

1. During competitions/league games, I strive to be as perfect as possible.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	FREQUENTLY	ALWAYS

2. During competitions/league games, it is important to me to be perfect in everything I attempt.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	FREQUENTLY	ALWAYS

3. During competitions/league games, I feel the need to be perfect.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	FREQUENTLY	ALWAYS

4. During competitions/league games, I am a perfectionist as far as my targets are concerned.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	FREQUENTLY	ALWAYS

5. During competitions/league games, I have the wish to do everything perfectly.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	FREQUENTLY	ALWAYS

6. During competitions/league games, I feel extremely stressed if everything does not go perfectly.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	FREQUENTLY	ALWAYS

7. After competitions/league games, I feel depressed if I have not been perfect.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	FREQUENTLY	ALWAYS

8. During competitions/league games, I get completely furious if I make mistakes.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	FREQUENTLY	ALWAYS

9. During competitions/league games, I get frustrated if I do not fulfill my high expectations.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	FREQUENTLY	ALWAYS

10. If something does not go perfectly during competitions/league games, I am dissatisfied with the whole competition/game.

1	2	3	4	5
NEVER	RARELY	SOMETIMES	FREQUENTLY	ALWAYS

B.4 NFC

Please read each statement below carefully and decide how much you personally relate to the statements by circling the appropriate choice on the scale.

1. **I would prefer complex to simple problems.**

a) Strongly Agree b) Agree c) Neutral d) Disagree e) Strongly Disagree

2. **I like to have the responsibility of handling a situation that requires a lot of thinking.**

a) Strongly Agree b) Agree c) Neutral d) Disagree e) Strongly Disagree

3. **Thinking is not my idea of fun.**

a) Strongly Agree b) Agree c) Neutral d) Disagree e) Strongly Disagree

4. **I would rather do something that requires little thought than something that is sure to challenge my thinking abilities.**

a) Strongly Agree b) Agree c) Neutral d) Disagree e) Strongly Disagree

5. I try to anticipate and avoid situations where there is likely a chance I will have to think in depth about something.

a) Strongly Agree b) Agree c) Neutral d) Disagree e) Strongly Disagree

6. I find satisfaction in deliberating hard and for long hours.

a) Strongly Agree b) Agree c) Neutral d) Disagree e) Strongly Disagree

7. I only think as hard as I have to.

a) Strongly Agree b) Agree c) Neutral d) Disagree e) Strongly Disagree

8. I prefer to think about small, daily projects to long-term ones.

a) Strongly Agree b) Agree c) Neutral d) Disagree e) Strongly Disagree

9. I like tasks that require little thought once I've learned them.

a) Strongly Agree b) Agree c) Neutral d) Disagree e) Strongly Disagree

10. The idea of relying on thought to make my way to the top appeals to me.

a) Strongly Agree b) Agree c) Neutral d) Disagree e) Strongly Disagree

11. I really enjoy a task that involves coming up with new solutions to problems.

a) Strongly Agree b) Agree c) Neutral d) Disagree e) Strongly Disagree

12. Learning new ways to think doesn't excite me very much.

a) Strongly Agree b) Agree c) Neutral d) Disagree e) Strongly Disagree

13. I prefer my life to be filled with puzzles that I must solve.

a) Strongly Agree b) Agree c) Neutral d) Disagree e) Strongly Disagree

14. The notion of thinking abstractly is appealing to me.

a) Strongly Agree b) Agree c) Neutral d) Disagree e) Strongly Disagree

15. I would prefer a task that is intellectual, difficult, and important to one that is somewhat important but does not require much thought.

a) Strongly Agree b) Agree c) Neutral d) Disagree e) Strongly Disagree

16. I feel relief rather than satisfaction after completing a task that required a lot of mental effort.

a) Strongly Agree b) Agree c) Neutral d) Disagree e) Strongly Disagree

17. It's enough for me that something gets the job done; I don't care how or why it works.

a) Strongly Agree b) Agree c) Neutral d) Disagree e) Strongly Disagree

18. I usually end up deliberating about issues even when they do not affect me personally.

a) Strongly Agree b) Agree c) Neutral d) Disagree e) Strongly Disagree

B.5 STAI

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you *generally* feel.

4 = Almost Always
3 = Often
2 = Sometimes
1 = Almost Never

1. I feel pleasant **1 2 3 4**
2. I feel nervous and restless.....**1 2 3 4**
3. I feel satisfied with myself.....**1 2 3 4**
4. I wish I could be as happy as others seem to be **1 2 3 4**
5. I feel like a failure..... **1 2 3 4**
6. I feel rested..... **1 2 3 4**
7. I am "calm, cool, and collected"..... **1 2 3 4**
8. I feel that difficulties are piling up so that I cannot overcome them.....**1 2 3 4**
9. I worry too much over something that really doesn't matter..... **1 2 3 4**
10. I am happy..... **1 2 3 4**
11. I have disturbing thoughts..... **1 2 3 4**
12. I lack self-confidence..... **1 2 3 4**
13. I feel secure..... **1 2 3 4**
14. I make decisions easily **1 2 3 4**
15. I feel inadequate..... **1 2 3 4**
16. I am content..... **1 2 3 4**
17. Some unimportant thought runs through my mind and bothers me..... **1 2 3 4**
18. I take disappointments so keenly that I can't put them out of my mind **1 2 3 4**
19. I am a steady person..... **1 2 3 4**
20. I get in a state of tension or turmoil as I think over my recent concerns and interest..... **1 2 3 4**

B.6 CDS-II

Think about the reason or reasons you have written. The items below concern your impressions or opinions of this cause or causes of your performance. Circle one number for each of the following questions.

Is this cause (s) something:

That reflects an aspect of yourself	9 8 7 6 5 4 3 2 1	reflects an aspect of the situation.
Manageable by you	9 8 7 6 5 4 3 2 1	not manageable by you
Permanent	9 8 7 6 5 4 3 2 1	temporary
You can regulate	9 8 7 6 5 4 3 2 1	you cannot regulate
Over which others have control	9 8 7 6 5 4 3 2 1	over which others have no control
Onside of you	9 8 7 6 5 4 3 2 1	outside of you
Stable over time	9 8 7 6 5 4 3 2 1	variable over time
Under the power of other people	9 8 7 6 5 4 3 2 1	not under the power of other people
Something about you	9 8 7 6 5 4 3 2 1	something about others
Over which you have power	9 8 7 6 5 4 3 2 1	over which you have no power
Unchangeable	9 8 7 6 5 4 3 2 1	changeable
Other people can regulate	9 8 7 6 5 4 3 2 1	other people cannot regulate

B.7 EXPECTATION MEASUREMENT

You have now completed 9 blocks and you have one more block to go

Please answer the following questions about your forthcoming performance

- My expectation about my MAIN TRIAL performance in the upcoming block would be:

a) Better than my training trial
(or)
b) Worse than my training trial

- Please indicate approximately the average response time you would expect in the upcoming block in the following categories:

TRAINING TRIAL:

MAIN TEST TRIAL:

B.8 SOCIODEMOGRAPHIC DATA SHEET

Age:

Gender:

Event:

Pre prime:
1)
2)
3)
Avg:

Avg Comp:
1)
2)
3)
4)
5)
Avg:

Group:

Training / Competition (Self report):

Post prime:

Expectations:

a) What according to you is a very good performance in your event?
b) What according to you is a very bad performance in your event?
c) How do you expect to perform in the upcoming competition?

APPENDIX C
TABLES

Table C.1: Relation between self – perceived and the measured group distinction – TC vs. CC

	Group	Self-perceived rating (TC vs CC)
Group		.815**
Self-perceived rating (TC vs CC)	.815**	

** p < .01

Table C.2: Relation between maladaptive traits of rumination, trait anxiety and maladaptive perfectionism amongst athletes

	Trait Anxiety	Rumination	Maladaptive perfectionism
Trait Anxiety		.765**	.576**
Rumination	.765**		.623**
Maladaptive perfectionism	.576**	.623**	

** p < .01

Table C.3: Main effects and interactions of group, controllability schedules and win/loss feedback over absolute causal ratings

	Sum of squares	df	Mean square	F	Sig.
Controllability schedule	885.374	2	442.687	151.631	.000
Group	98.441	2	49.220	5.366	.007
Group x Controllability schedule	12.761	4	3.190	1.093	.363
Win/Loss feedbak	573.757	1	573.757	87.318	.000

Table C.4: Relation between traits of rumination, trait anxiety ,need for cognition and maladaptive perfectionism amongst non-athletes

	Trait Anxiety	Rumination	Need for Cognition	Maladaptive perfectionism
Trait Anxiety		.473**	.431**	.462**
Rumination	.473**		-.203	.390**
Need for Cognition	.431**	-.203		.150
Maladaptive perfectionism	.462**	.390**	.150	

** $p < .01$