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Exploring the possible negative effects of self-efficacy upon performance

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"Exploring the possible negative effects of self-efficacy upon performance"

Ph. D. Thesis

By

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Thesis submitted to the University of Wales in fulfilment of the requirements for the degree of Doctor of Philosophy at the School of Sport, Health, and Exercise Sciences, University of Wales, Bangor

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Abstract

The thesis contains five chapters (including three empirical chapters), which attempt to further our knowledge of the reciprocal relationship between self-efficacy and performance. The thesis attempts to answer questions related to the possible negative effects that self-efficacy can have on subsequent performance by considering the limitations of previous research (e.g., Bandura & Lock, 2003; Vancouver, Thompson, Tischner, & Putka, 2002; Vancouver, Thompson, & Williams, 2001).

Chapter 1 provides a general conceptual overview of the self-confidence and self-efficacy literature, the majority of which has typically supported the positive relationship between efficacy beliefs and performance in a range of settings. The chapter then provides a detailed review of how and when self-efficacy may be negatively related to subsequent performance. Finally, the limitations and future directions that are offered form the basis of the ensuing three empirical chapters.

Chapter 2 addresses the limitation that previous tests of the reciprocal relationship between self-efficacy and performance tend to be of short duration (i.e., approx. 8–10 trials). This short duration may limit the mastery experiences that are an important source of self-efficacy beliefs. This chapter explores the reciprocal relationship between self-efficacy and performance in a longitudinal golf putting study where participants complete 40 trials of 20 putts each (800 putts in total). The results supported the positive effects of self-efficacy on performance in only one of the four putting sessions, where self-efficacy had a significant albeit weak positive reciprocal relationship with putting performance.

Chapter 3 explores the criticism that mundane tasks (or tasks that remain static throughout testing) generally do not vary or intrude on attentional focus (Bandura & Locke, 2003). Two studies were conducted to examine the reciprocal relationship between self-efficacy and performance using a complex task (car racing simulation). Participants were

required to learn to race on a difficult computer racing track across trials where performance was assessed in relation to improvement on the preceding lap time (Study 1) and in relation to a baseline time (Study 2). The results supported the positive reciprocal effects of self-efficacy on performance over time (Bandura, 1997).

Chapter 4 reports a golf putting study which examined the effects of feedback on the reciprocal relationship between self-efficacy and performance. Previous tests of the reciprocal relationship between self-efficacy and performance tend to ignore previous performances in the measurement of self-efficacy. Consequently, important information regarding previous performances may be ignored. The current test provides a performance diary where participants have access to all previous performance results, upon which they can base their subsequent self-efficacy beliefs. Again, support was shown for the positive reciprocal effects of self-efficacy on performance (Bandura, 1997).

Chapter 5 provides a summary and integrated discussion of these findings. Furthermore, methodological and conceptual limitations, implications, and future research directions for the study of the reciprocal relationship between self-efficacy and performance are discussed.

Chapter 1

INTRODUCTION

INTRODUCTION

1.1 Self-confidence

Self-confidence is accepted as one of the most important variables that have a positive relationship with sport performance (Martens, Vealey, & Burton, 1990) and its importance in relation to success in sport has been revealed in several sport settings (Feltz, 1994; Mahoney, 1999; Mahoney & Avener, 1977; Woodman & Hardy, 2003). However, research findings have not always supported the positive effects of self-confidence on performance. Some studies have shown that self-confidence has no relationship with performance (e.g., Beattie, Hardy, & Woodman, 2004; Gould, Petlichkoff, & Weinberg, 1984; Maynard & Cotton, 1993; Williams & Krane, 1992). Furthermore, Gould, Petlichkoff, Simons and Vevera (1987) reported a significant negative relationship between self-confidence and performance.

Self-confidence in sport has typically been explored within two different theoretical frameworks: Vealey's (1986) sport confidence model and Bandura's (1977) self-efficacy theory. First, Vealey's sport confidence model (1986) is based on two important components: trait sport confidence (SC-trait) and state sport confidence (SC-state). According to the original definition of self-confidence, SC-trait is defined as an individual's general belief in his/her ability to succeed in sport. SC-state is defined as the belief or degree of certainty that individuals hold at a particular moment about their ability to be successful in sport performance (Vealey, 1986). The main prediction of Vealey's model (1986) is that SC-trait (dispositional) and goal orientations interact to determine SC-state, which can influence performance. A lack of empirical research into the sport confidence model led Vealey, Hayashi, Garner-Holman, and Giacobbi (1998) to expand their model to include sources of self-confidence in sport, which in essence extended Bandura's (1977, 1986) four sources of self-efficacy to nine (cf. Beattie et al., 2011).

1.2 Self-efficacy theory

Self-efficacy theory (Bandura, 1997) has been used to predict behaviour by assessing an individual's personal judgement in his/her ability to perform to specific levels of performance (e.g., Weinberg, Yukelson, & Jackson, 1980; Feltz, 1982; Mcauley& Gill, 1983). Self-efficacy is a situation-specific form of self-confidence and is defined as *"beliefs in one's capabilities to organize and execute courses of action required to produce given attainments"* (Bandura, 1997, p. 3). However, self-efficacy beliefs in one particular area of life do not guarantee that they will be effective in other areas of interest. Hence, it is also a domain-specific form of self-confidence. The reciprocal relationship between self-efficacy and performance (further explained later) suggests that an improvement in performance will boost an individual's level of self-efficacy, which in turn will improve subsequent performance, and so forth (Bandura, 1991).

Self-efficacy theory is generally regarded as one of the most significant theories in social cognitive research (Beattie et al., 2011). It has been observed that self-efficacy has a direct impact on behaviour. For example, individuals with high self-efficacy show greater commitment to their work (Lee & Bobko, 1994; Locke & Latham, 1990), display good progress in the attainment of goals (Sheldon & Kasser, 1998), and demonstrate high levels of task engagement (Walker, Greene & Mansell, 2006). They also choose goals that are challenging for them and difficult to achieve (Chase, 2001) and their efforts to achieve such goals are deliberate and intensified when goal progress or accomplishments are threatened (Peake & Cervone, 1989).

Self-efficacy beliefs also provide people with perceived control over their environment. These beliefs reflect a person's potential to comprehend situations and assess their capability to execute strategies for the accomplishment of desired goals (Bandura, 1997). According to Williams (1995), self-efficacy affects the processes of inspiration and

self-regulation. Individuals take part in activities that they feel confident about; in other words they approach and like activities because they feel confident about their ability in those activities.

Bandura (1986) noted that self-efficacy is a precursor of individuals' investing more effort in their work in order to solve problems. As mentioned previously, individuals high in self-efficacy set challenging goals in life and invest extra effort in order to achieve them (Bandura, 1986). Furthermore, when beset with failure and barriers, highly efficacious individuals do not turn their backs on their difficulties, because they consider that dealing with such difficulties is part of the strategy to succeed (Bandura, 1990).

2. Sources of Efficacy Beliefs

According to the self-efficacy theory (Bandura, 1977, 1986, 1997), there are four sources of efficacy information: mastery experience, verbal persuasion, vicarious experiences, and physiological states (see Figure 2).

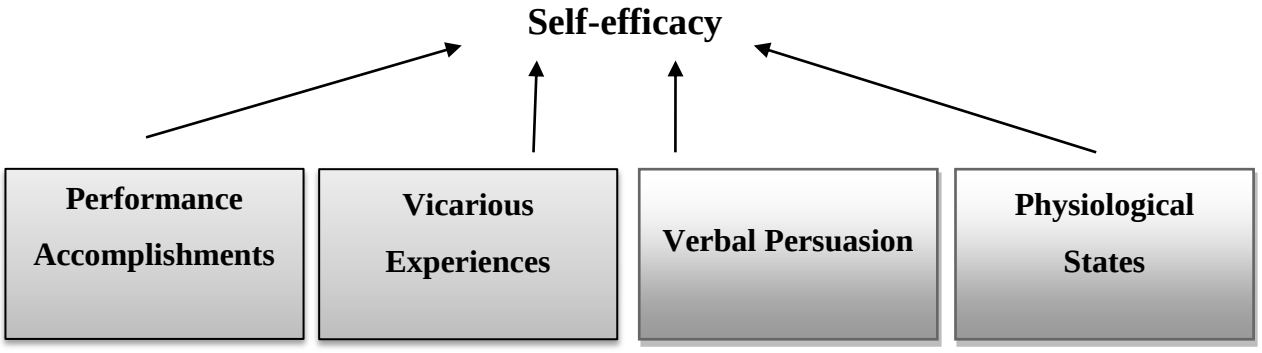

Figure 2. The four sources of self-efficacy (Bandura, 1986).

2.1 Performance Accomplishments

Performance accomplishments are considered to be the strongest source of information for the development of self-efficacy (Bandura, Adams, & Beyer, 1977; Biran & Wilson, 1981; Feltz, Landers & Raeder, 1979; McAuley, 1985; Wise & Trunnell, 2001). Individuals with past experience of success develop strong feelings of confidence and are less

likely to doubt their potential for subsequent success. Conversely, past failures can lower one's self-efficacy. According to Bandura (1986), the feeling of successfully completing a task can promote positive feelings in the performer, while failures can reduce self-efficacy and thereby weaken subsequent performance. Evidence from Beattie et al. (2011) in their golf putting experiments found that previous performance was a strong predictor of subsequent performance when they examined the reciprocal relationship within-person.

The relationship between self-efficacy and performance accomplishments is influenced by other essential factors such as how individuals perceive the difficulty of a task, and how much effort they have invested in achieving such tasks. Bandura (1986) reported that the self-appraisal of individuals who complete difficult tasks successfully with less effort is greater, when compared with individuals who accomplish the same task but only after earlier failures and a large amount of investment. However, according to Feltz (2007) some individuals who experience failure do not necessarily experience a decrease in their efficacy beliefs in their ability, but rather may lead them to increase their effort on subsequent performance. Further, Beattie, Hardy, Savage, Woodman, and Callow (2010) found that individuals with high levels of trait robustness of self-confidence tended to remain confident after poor performances that their lower robust counterparts. To conclude, performance accomplishments are an influential variable in predicting and building robust self-efficacy beliefs (Mitchell, Hopper, Daniels, George, & James, 1994; Usher & Pajares, 2006).

2.2 Vicarious Experiences

When an individual lacks task experience, observing significant others who are similar to oneself contributes to self-efficacy beliefs. In such circumstances, one may observe others' experiences and learn from them. Furthermore, observing a model may provide an individual with a wealth of information that might be missing from verbal feedback (Gould & Weiss, 1981). Several studies have examined the treatment of participant modelling. These

studies have shown that self-efficacy increases when individuals perceive that they are similar to or more capable than the actual model (e.g., Bandura & Adams, 1977; George, Feltz, & Chase, 1992; Lirgg & Feltz, 1991).

The positive effects of participant modeling seem to be enhanced when a significant other is present such as a coach. This allows the learner first to look at an activity and later to perform it himself/herself, and to learn it through proper guidance with feedback (Bandura, 1977). Singelton and Feltz (1999) found that collegiate hockey players who were exposed to seceral weeks of self-modeling videotapes showed greater shooting acuracy and higher efficacy bleiefs than a control group. McAuley (1985) examined the effects of modeling coupled with verbal feedback. In this study, a model performed a forward roll on a gymnastic balance beam and then asked female performers to do the same task. The model guided the participants and then provided physical assistance when they started to roll on the beam, while slowing them down and holding them to show them the correct way to perform the task. Based on the results, McAuley (1985) found that a person from a modelling group who was given instructions by an instructor, managed to succeed in the task, while individuals who received no physical guidance (but only modeilling) to help them master the task were not able to finish the task.

2.3 Verbal Persuasion

Verbal persuasion is another way of gaining efficacy information and involves other people (or the self) telling an individual that he/she has the capability to succeed (Bandura, 1997; Baron, 1988). Self-efficacy theory suggests that positive self-appraisals are likely when individuals are given some encouragement and other people show faith in their performance abilities (Bandura, 1997). However, this source is thought to be weaker than the previous two sources discussed above, as the performer has to believe what the persuader is saying to him/her (Pajares, Johnson, & Usher 1997), which may depend on many factors such as

credibility, prestige, expertise or knowledge, and the perceived trustworthiness of the persuader (Feltz, Short, & Sullivan, 2008). Beauchamp and Whinton (2005) noted that athletes who were provided verbal persuasion by coaches exerted greater effort to achieve the riding task, which in turn increased performance.

Bandura (1997) stated that false appreciation and pointless talks should not be mixed up with realistic persuasion. Erikson (1980) also acknowledged that "false comments should not be used to build up confidence levels in children" (p. 95). Bandura (1986) also stated that negative comments may reduce a person's self-efficacy, and that verbal feedback should be carefully constructed.

2.4 Physiological States

Feltz and Riessinger (1990) stated that physiological and emotional states have been shown to be a more influential source of efficacy information with respect to sport and physical activities than in the case of non-physical tasks. This type of source can be used for sports tasks that involve physical exertion (Chase, Feltz, Tully, & Lirgg, 1994). Physiological states (e.g., pain, fatigue, arousal) have been reported to influence self-efficacy judgments (Bandura, 1986), with aches, fatigue and pain showing physical inefficacy (Ewart, 1992).

Self-efficacy may be enhanced via physiological arousal. However, Bandura (1977) claimed that the way arousal is interpreted is the main determinant of how self-efficacy will be influenced (Taylor, 2006). That is, if arousal is perceived to facilitate performance, then self-efficacy should increase. On the contrary, when individuals perceive arousal as a negative factor and suffer from anxiety and self-doubt, then self-efficacy should decrease.

Kavanagh and Bower (1985) stated that individuals' moods can influence judgments of efficacy such that positive moods improved self-efficacy, while negative moods decreased self-efficacy. This finding was supported by Maddux and Meyer (1995), who found that appreciation, and exhilaration, and happiness increased self-efficacy. Conversely, some

factors such as discouragement, depression, and sadness might have a negative effect on self-efficacy.

3. Examining Between-person and Within-person Self-efficacy - performance Relationships

The majority of the self-efficacy and performance studies reviewed so far have been conducted at the between-person level of analysis. At a between-person level and under a variety of settings, the positive relationship between efficacy and performance has been well documented. For example, in a meta-analysis carried out by Multon, Brown, and Lent (1991) based on 36 studies, a modest positive between-person relationship emerged between self-efficacy and performance (r = .38). In sport, Self-efficacy has been shown to have a positive relationship with athletic performance (Kane, Marks, Zaccaro & Blair, 1996; Moritz, Feltz, Fahrbach & Mack, 2000). Stajkovic and Luthans (1998) noted that self-efficacy predicted up to 28% of work related performance variance, showing that it had a stronger influence than many other variables such as feedback, goal setting, and behaviour modifications. Furthermore, self-efficacy's relationship with work-related performance found a significant positive correlation of .38. According to Sitzmann & Ely (2011) a meta-analysis, 93% of research in self-efficacy and performance supports the positive effect of self-efficacy on performance. In sport, Woodman and Hardy's (2003) meta-analysis of the relationship between self-confidence and sport performance revealed an effect size that ranged from r = -0.27 to r = 0.64.

4. Criticism of Self-efficacy Research:

The general overview that self-efficacy has a positive effect on subsequent performance has been recently scrutinised (e.g., Vancouver et al., 2001; 2002). Vancouver suggested that the positive relationship presented in the literature may be due to the influence of previous performance on self-efficacy rather than the effect of self-efficacy on subsequent

performance. Further, relying on cross sectional data seems to have biased perceptions of the actual usefulness of self-efficacy in predicting performance.

Other evidence exists that supports this potentially contentious view. For example, in a sample of baseball players, George (1994) examined the effects of past experiences on subsequent self-efficacy beliefs and vice versa. He found that previous performance was a significant predictor of self-efficacy in six of the nine games. However, self-efficacy was a significant predictor of subsequent performance in only three of the nine games. These results indicate that the preceding performance may have a greater impact on self-efficacy than self-efficacy has on subsequent performance.

To address the potential between-persons limitation testing the self-efficacy and performance relationship, Vancouver et al. (2001, 2002) examined the relationship between self-efficacy and performance at a within-person level across time. Participants played a computerized analytical game (Mastermind) in which success was achieved by determining the colour and position of four pegs in a row (i.e., the solution set). Players had to guess the four colours by placing their own set of pegs in the right formation. On the computer screen, they received their feedback by pressing a response button which indicated the number of columns for which their guess was right and the number of colours in their guess that matched the colours in the solution set (but not necessarily the column). If the guess was wrong, they tried again until they either found the solution or ran out of tries. For each game, participants had 10 tries. Each participant played 10 games, including 2 practice and 8 experimental trials. Feedback for the previous attempts and current progress remained on the screen for players to review.

In accordance with the vast majority of self-efficacy research, a positive relationship between self-efficacy and performance was revealed at the between-person level of analysis. However, at the within-person level of analysis, the results showed something rather

different. Although the outcome of the previous game was positively and significantly related to subsequent self-efficacy beliefs, self-efficacy had a weak but significant negative relationship with subsequent performance. In other words, although performance accomplishments increased self-efficacy beliefs, high self-efficacy beliefs appeared to increase the likelihood of participants committing to their guess too early, and hence increased the chances of participants committing to the wrong answer.

When explaining the rationale for these negative effects, Vancouver et al. (2001, 2002) drew upon perceptual control theory (Powers, 1991). Perceptual control theory stresses the role of discrepancy reduction in regulating goal progress (Carver & Scheier, 1981, 1990, 2000; Powers, 1978; Vancouver, 2005). In line with Powers (1991), Vancouver et al. (2001, 2002) argued that high self-efficacy beliefs may bias the perception of one's goal state leading one to believe that one has reached the goal more readily than if one had lower efficacy beliefs. Thus, if individuals believe that they are making more progress than is necessary (due to high efficacy beliefs) then they may reduce their efforts in terms of goal pursuit. Consequently, according to Powers (1973) and Vancouver and Kendall (2006) individuals with high efficacy beliefs may invest less effort in achieving their goals than individuals with low efficacy beliefs. In support of this thinking, Woodman, Akehurst, Hardy, and Beattie (2010) found that the experimental decrease of self-confidence led to a significant increase in performance.

However, Bandura and Locke (2003) criticized Vancouver et al.'s (2001, 2002) research by arguing that Mastermind is a guessing game where each trial is independent from the previous one (i.e., the answer changes with each trial). According to Bandura and Locke (2003), this limits the effects that self-efficacy has upon performance, as there is nothing to be learned over time. Further criticisms included that Vancouver and his colleagues (2001,

2002) failed to accurately measure self-efficacy by asking "How likely are you to find a solution? Rather than "how confident are you that you will find the solution?"

More recently, research has set out to address earlier limitations of the reciprocal self-efficacy and performance relationship. Vancouver and Kendall (2006) conducted research to address some of the criticisms (i.e., measurement and task issues) raised by Bandura and Locke (2003). They used a comparable methodology (e.g., Vancouver et al., 2001, 2002) by examining 63 undergraduate students over the course of five examinations. Self-efficacy (in terms of grade) was measured before each exam and matched up to actual performance and the study time that was allocated to each exam.

At the between-person level, the results revealed a positive relationship between self-efficacy and performance. At the within-person level of analysis the results indicated that the previous performance had a significant and positive relationship with subsequent self-efficacy. However, self-efficacy had a significant negative relationship with subsequent examination performance. It was noted that as self-efficacy increased by a grade (e.g., self-efficacy for a B to self-efficacy for a B+), study time decreased by 15 minutes and actual exam performance decreased by a quarter of a grade.

Richard, Diefendorff and Martin (2006) also examined the reciprocal relationship between self-efficacy and performance via two studies. They used exam performance and a computer-based chemical reactor simulation task. Four (as opposed to Vancouver & Kendal's five) multiple-choice exams were examined across time in the first study. Controlling the temperature of a simulated chemical reactor (6 rounds comprising 20 trials each) was examined across time in the second study. Across all four tests, self-efficacy and performance were positively correlated at the between-person level. Further, previous performance had a positive and significant relationship with subsequent self-efficacy in both tasks within individuals. However, Richard et al. found that in Study 1 self-efficacy was negatively related

to subsequent exam performance. This result did not fully support those of Vancouver et al. (2001, 2002, 2006), who found no significant within-person relationship between self-efficacy and subsequent performance over time. In Study 2 at the within-person level Richard et al. found a positive but non-significant relationship between self-efficacy and subsequent performance, which also failed to support self-efficacy theory (Bandura, 1986).

Yeo and Neal (2006) examined the reciprocal relationship between self-efficacy and performance using a computer-based air traffic control laboratory task. Participants were asked to identify whether a pair of aircrafts would collide with one another or pass by each other safely. The more quickly that participant responded the higher score they received. At the between-persons level, a significant positive relationship emerged between self-efficacy and performance, which is consistent with the vast majority of research and self-efficacy theory (Bandura, 1997). However, at the within-person level of analysis, a significant negative relationship emerged between self-efficacy and subsequent performance thus supporting the findings of Vancouver et al. (2001, 2002, 2006). Yeo and Neal did not examine the effect of previous performance on subsequent self-efficacy.

Several limitations have also been noted from the research cited above. One possible limitation of using exam performance is that as the course material is likely to change over time, and so the exam is also likely to change. If this is the case, then efficacy beliefs are also less likely to build over time as each exam performance may be independent from the last (Beattie et al., 2011).

To deal with these limitations, Beattie et al. (2011) re-examined the reciprocal self-efficacy and performance relationship wherein self-efficacy and performance (i.e., learning) could increase across time. Two studies, (one with a moderately easy and one with a more difficult golf putting task) were conducted by examining novice golfers putting across a series of eight trials of 20 putts each. Self-efficacy was assessed by asking participants to

state how many out of the next 20 putts in that trial they could successfully make. The actual putting performance was recorded by the number of successful putts made within each trial. In support of Bandura's (1997) self-efficacy theory, at the between-person level of analysis, self-efficacy was significantly correlated with performance on each subsequent trial. Across both studies, at the within-person level of analysis, previous performance had a significant, strong and positive relationship with subsequent self-efficacy. However, a weak negative effect of self-efficacy on subsequent performance was observed at the within-person level of analysis, although this was not statistically significant.

Beattie et al.'s (2011) research was not without its own limitations. It appears that the task they used was too difficult to observe meaningful learning across trials. That is, performance across the eight trials (160 putts) only increased by one putt. In other words, very limited learning occurred. As the self-efficacy measure required participants to record how many successful putts they could make in the next trial, a learning paradigm where minimum learning occurred did not provide much variability in the dependent variable. This could account for the non-significant relationship between self-efficacy and subsequent performance. Further, research conducted by Masters (1992) and Hardy, Mullen, and Jones (1996) found that putting performance (learning) in novices continued to increase over the duration of 500 putts.

Thus, one of the purposes of Chapter 2 was to re-examine the reciprocal relationship between self-efficacy and performance across a larger number of trials and putts (i.e., 40 trials containing 800 putts in total). The purpose of Chapter 3 was to examine the reciprocal relationship between self-efficacy and performance in a more complex driving simulation task when participants judged their efficacy beliefs in relation to their previous trial (Study 1). In Study (2) participants judged their efficacy beliefs in terms of a baseline score rather than simply their previous trials. However, in order to gain as much performance information

as possible on which to base efficacy judgments upon, Chapter 4 conducted a study that allows an individual to see every trial score before they make efficacy judgements. This in turn should show a stronger and positive efficacy and performance relationship.

To conclude, Vancouver et al.'s (2001, 2002) work continues to be debated (e.g., Bandura, 2012; Vancouver, 2012). Despite the limitations noted in Vancouver's work above, his original point that self-efficacy research was limited in that it was generally confined to a between-person level of analysis remains a strong and valid point. This line of work has sparked a renewed interest in the self-efficacy – performance reciprocal relationship where the within-person longitudinal design has become an important consideration for any examination of such relationships. When considering this within-person level of analysis, the traditionally accepted positive reciprocal relationship between self-efficacy and performance is called into question and self-efficacy sometimes appears to have negative effects on subsequent performance.

5. Thesis Format

The thesis contains three empirical chapters that attempt to address limitations in previous research by investigating the possible negative effect of self-efficacy on subsequent performance by examining the following hypotheses:

Between-person Level of Analysis

In support of the generalised finding of self-efficacy research, self-efficacy will show a strong positive relationship with subsequent performance at the between-person level of analysis. To examine this relationship at the between-person level of analysis, correlations will be conducted by correlating each previous trial self-efficacy score with performance score across participants. According to this method, self-efficacy ratings for the subsequent trial should be significantly correlated with actual performance on the subsequent trial, and so on. In line with previous research (e.g., Beattie et al., 2011; Vancouver et al., 2001, 2002), a

further correlation was produced that examined the average self-efficacy score with the average performance score across all trials.

Within-person Level of Analysis

To examine the hypothesis that learning and efficacy beliefs would significantly increase over time, hierarchical multi-level modelling (HLM; Raudenbush & Bryk, 2002) was used. To examine the trajectory of performance and self-efficacy across time (or trials), the following Level 1 Equations were used:

(1) Performance = $\beta 0j + \beta 1j$ (Trial number) + rij

(2) Self-efficacy = $\beta 0j + \beta 1j$ (Trial number) + rij.

To examine the hypothesis that previous performance would be a strong and significant predictor of personal self-efficacy beliefs (while controlling for trial number), the following equation was used:

(3) Self-efficacy = $\beta 0j + \beta 1j$ (Trial number) + $\beta 2j$ (Previous performance) + rij.

To examine the hypothesis that self-efficacy has a negative relationship with subsequent performance (where trial number and previous performance were controlled for), the following equation was used:

(4) Subsequent Performance = $\beta 0j + \beta 1j$ (Trial number) + $\beta 2j$ (Previous performance)+ $\beta 3j$ (Self-efficacy) + rij.

To examine Level 1 individual slopes and intercepts for each Level 1 unit (e.g., number of trials, previous performance, and self-efficacy) across Level 2 units (e.g., group of participants), the following Level 2 equations were used:

(7) $\beta_{0j} = \gamma_{00} + u_{0j}$

(8) $\beta_{1j} = \gamma_{10} + u_{1j}$

(9) $\beta_{2j} = \gamma_{20} + u_{2j}$

(10) $\beta_{3j} = \gamma_{30} + u_{3j}$.

To summarize, the main purpose of the present thesis was to address some of the limitations highlighted by Bandura and Locke (2003). For example, they highlighted that the task used in Vancouver et al.'s (2001, 2002) studies were inappropriate for testing such effects. According to Bandura and Locke (2003), the use of such guessing games did not allow efficacy beliefs to build up over trials as each trial outcome is independent from the last as presented previously. In addition, the thesis starts by addressing two of the limitations highlighted by Beattie et al. (2011). Firstly, the typical use of eight repeated trials in self-efficacy research may limit the amount of mastery experiences that individuals are exposed to. Secondly, the performance measure of successful putts used by Beattie et al. (2011) may be an insufficiently sensitive measure of performance, as participants could over hit the ball, which may directly drop into the hole (as opposed to someone who weights the ball perfectly). The first empirical chapter addresses these two limitations by extending the learning trials to 40 and using a target zone to assess putting performance. The second empirical chapter (Chapter 3 in the thesis) addresses Bandura and Locke's (2003) criticism that in mundane laboratory tasks where nothing is to be learned or nothing intrudes on attentional focus quickly stabilizes performance. Hence, a more complex task is used (i.e., race car simulation where participants had to learn to drive on a complex race track). Finally, the last empirical chapter (Chapter 4 of the thesis) addresses findings from the first two empirical chapters in that typical within-person self-efficacy research only asks participants to compare their self-efficacy based on either no reference terms or with reference only to their previous trial. This lack of performance-related information limits the degree to which participants can make informed efficacy judgments. Consequently, in the final empirical study of the thesis, participants completed a performance diary where they could access each of their previous performances with a view to being able to make more informed self-efficacy judgments.

Chapter 2

Chapter 2

The Influence of Mastery Experience on

Reciprocal Relationship Between Self-efficacy and subsequent Performance

Introduction

Self-efficacy is defined as "a belief in one's capabilities to organize and execute courses of action required to produce given attainments" (Bandura, 1997; p. 3). The self - efficacy theory has been one of the most influential theories in social cognitive research since its inception (Beattie, Lief, Adamoulas, & Oliver, 2011). According to self-efficacy theory (Bandura, 1977) there are four main sources of self-efficacy that constructs one's perception of personal efficacy: (1) Mastery Experience; (2) Vicarious Experience; (3) Verbal Persuasion; and (4) Emotional and Physiological States. Mastery experience is considered the most influential of all the sources because it is based upon first-hand personal accomplishments (Bandura, 1986).

A large body of research has typically supported the positive relationship between efficacy beliefs and performance in a range of settings. For example, Multon, Brown, and Lent, (1991) meta-analysis based on 36 studies revealed that self-efficacy has a positive and statistically significant effect (r =.38) on academic performance. Self-efficacy has also shown to be a strong predictor of sport performance (Moritz, Feltz, Fahrbach, & Mack, 2000). Further, according to Feltz and Lirgg, (2010) previous performance is a robust predictor of self-efficacy.

In spite of the considerable amount of research to support the positive effects of self-efficacy (Bandura, 1997), criticisms of this evidence have long since emerged. For instance, Vancouver, Thompson, and Williams (2001) reported that when looking at the relationship between self-efficacy and performance, there has been an over dependence on cross-sectional correlational research designs which may explain the frequency of the positive correlations between self-efficacy and performance (e.g., Stajkovic & Luthans, 1998). Vancouver et al. (2001) suggests that this positive correlation may be due to the influence of previous performance on self-efficacy, rather than the influence of self-efficacy on performance.

To address the problems of cross sectional correlational designs, Vancouver et al. (2001) and Vancouver, Thompson, Tishner, and Putka (2002) used a longitudinal research design to examine the relationship between self-efficacy and performance at a within persons level. They conducted a series of four studies using an analytical guessing task to examine the reciprocal relationship between self-efficacy and performance. Participants played a computer game (Mastermind) where the purpose of the task was to try to determine the colour and position of four pegs in a row (the solution set). Participants each had 10 attempts (including 2 practice trials) to find the correct solution. After each game, participants were asked to rate their efficacy in terms of how many rows they could find the correct combination by. Across all four studies, Vancouver et al. (2001, 2002) found significant and positive between person correlations with self-efficacy and performance, thus supporting the majority of previous self-efficacy research. Further, at the within-person level of analysis, previous performance was significantly and positively related to subsequent self-efficacy, but self-efficacy had a significant weak negative relationship with subsequent performance. In short, past performance had a positive effect on subsequent self-efficacy, but that efficacy had a negative effect upon performance.

Vancouver et al. (2001, 2002) used Powers (1973) control theory to explain such possible negative effects. In general, individuals with high levels of self-efficacy tend to invest fewer resources in achieving their goals than individuals with low efficacy beliefs (Powers, 1973; Vancouver & Kendall, 2006). The explanation provided by Powers is that, high efficacy beliefs may create a positive bias in how well one perceives they are doing. Therefore, the subsequent effects of self-efficacy upon performance might produce a null or negative reciprocal relationship.

However, Vancouver et al.'s studies (2001, 2002) were criticized by Bandura and Locke (2003) as the task that they used was in essence a guessing task that did not allow

efficacy beliefs and learning to develop over time (as each trial is independent from the last i.e., the answer changes with each trial). Furthermore, the self-efficacy measure used by Vancouver et al. (2001, 2002) measured perceptions of chance (i.e. "How likely are you to find a solution") rather than perceptions of ability. To address these criticisms Vancouver and Kendall (2006) used a similar within person methodology to examine the effect of self-efficacy on motivation and performance. They investigated 63 undergraduate students where self-efficacy preparation and performance was assessed over five consecutive exams. In accordance with the majority of self-efficacy studies, they found a significant positive relation between previous performance and self-efficacy. However, at the within-person level of analysis, self-efficacy had a negative relationship with subsequent exam preparation and performance. That is, as self-efficacy increased by a grade, individuals studied 15 minutes less and exam performance decreased by approximately a quarter of a grade.

More recently Beattie et al. (2011) reported two studies that address previous limitations mentioned by Bandura and Locke (2003). Specifically, Beattie et al. (2011) used a golf putting task where learning could be observed over time. Further, they also addressed the above mentioned self-efficacy criticism where Vancouver and his colleagues (2001, 2002) failed to accurately measure self-efficacy by asking participants "How likely are you to find a solution" rather than how "confident".

Beattie et al. (2011) re-examined the within person relationship between self-efficacy and learning (performance) in novice golfers in two putting conditions that varied in difficulty. Participants were required to make 20 putts per trial. There were 8 performance trials in each condition. Results showed that self-efficacy had a strong positive and significant relationship with performance at the between-person level in every trial across both conditions. Furthermore, in both conditions results showed that performance had a significant, strong and positive relationship with subsequent efficacy beliefs. However, self-

efficacy had a weak and negative (but not significant) relationship with subsequent performance. However, Beattie et al. (2011) admit that the task they used may not have offered an optimal amount of learning to occur over time. For instance, performance increased on average by 1 putt across the 8 trials in both studies (7.29 putts to 8.29 putts in Study 1, and 4.64 to 5.45 putts in Study 2).

Bandura and Locke (2003) noted that Vancouver's et al.'s (2001, 2002) results were more likely to be due to methodological issues rather than any negative effects of self-efficacy on performance. They called for within-person longitudinal designs to be examined with tasks where skill learning will occur over time. Therefore, the purpose of the current study was to address this limitation highlighted by Bandura and Locke (2003) and in addition to addressing the possible lack of learning within Beattie et al.'s (2011) study. One further limitation is that Vancouver et al. (2001, 2002) and Beattie et al. (2001) only assessed learning across 8 trials. Hence significant learning may not have occurred in such a short space of time. In other putting studies that use a learning paradigm, Masters (1992) and Hardy, Mullen and Jones (1996) found that putting performance in novices continued to increase over the duration of 500 putts. Therefore, we increased the number of putts from 200 (e.g., Beattie et al. 2011) to 800 which should provide the right opportunity for mastery experience to build up across trials.

The hypothesis mirrored that of previous tests of the within person relationship. Firstly, with regards to previous research (Bandura, 1997; Beattie et al., 2011; Richard et al., 2006; Vancouver et al., 2001, 2002, 2006; Yeo & Neal., 2006), it was predicted that at the between-person level of analysis self-efficacy would have a strong and positive relationship (correlation) with performance. Secondly, with regards to the within-person level of analysis it is predicted that learning (i.e., performance) will significantly increase across trials, as will self-efficacy beliefs (as mastery experiences increase efficacy beliefs). Thirdly, previous

performance will be a strong positive predictor of subsequent self-efficacy beliefs. Fourthly, according to Bandura (1997) a positive relationship between self-efficacy and subsequent performance should occur. However, according to Vancouver et al. (2001, 2002, 2006) at the within person level of analysis, self-efficacy may have a negative relationship with subsequent performance.

Method

Participants

45 participants (41 male, 4 female; mean age = 25.35, *SD* = 6.13) volunteered to take part in the study. All participants had either no previous or minimum experience of golf putting (i.e., play 1-3 times a year). Informed consent (see Appendix A) was obtained from all participants before taking part in the study.

Materials and Measures

Self-efficacy Magnitude. Following Beattie et al. (2011) self –efficacy was recorded by asking participants to indicate (*yes*/*no*) if they believed they were able of achieving a certain level of performance (e.g., "I have the skills and resources to beat my previous score by 1 point"; "I have the skills and resources to beat my previous score by 2 point" in similar intervals to "I have the skills and resources to beat my previous score by 10"). In case they needed to do so, participants were also given the opportunity to state if they could beat their previous score by more than 10 points.

Self-efficacy strength. Self-efficacy strength was recorded by asking participants to rate their confidence in their ability to perform at that particular level on a scale of 0-100% (where 0 = no confidence at all and 100 = completely confident). Participants only responded for each score against a magnitude level answered *yes* to give a total between 0 and 1000.

Design

Participants were shown the apparatus and briefed about the nature of the task. Formed consent was obtained and completed by the participants before the task began. The data collection was split into 4 sessions across 2 days. The first and second sessions were completed on day 1 and the third and fourth sessions were completed on the following day. Each session contained 10 trials of 20 putts (200 putts per session). There were 4 starting positions 210cm's from the target hole that rotated 30cm around the hole (actual putting distance did not change). Participants started from different start positions at each trial. A target was created around the hole that consisted of 4 concentric circles each 5cm's apart. A scoring system was put in place where participants scored 5 points if they successfully putted the ball; four points if it missed the hole but landed in the closest zone (5cm from the hole); three points if it landed in zone 3 (5-10cm's from the hole) and so on. No points were awarded if the participant missed the outer target zone (i.e., they missed by at least 20cm's). After the first trial of 20 putts (and every trial thereafter) participants indicated how much they could beat their previous performance score by on a score of 1 to 10 or above 10 (self-efficacy magnitude). They were then asked how confident they were that they could achieve that score (self-efficacy strength). After each trial participant were informed that how many points they had just obtained before completing the self-efficacy magnitude and strength questionnaire. After completion of session 1, a 10 minute break was given to the participants before moving on to the next session. This was repeated on day 2. To increase motivation to participate, participants were paid £10 cash and cash prizes were offered for the three highest performers that had the highest total score from any one trial; £50 for the highest points overall; £30 for the second highest overall; and £20 for the third highest points overall. Performance was measured by the researcher who recorded the total points that participants achieved in their current trial.

Apparatus

Golf putts were performed on an Astroturf surface using a standard Prosimmon KT25 putter and a standard Slazenger Raw Distance 432 dimple pattern golf ball. The four starting positions consisted of 3cm diameter circles and the hole measured 10.8 cm in diameter.

Session 1:

Results

Table 1 illustrates the means, standard deviations, interclass correlations and bivariate correlations for the study's variables of interest. At the between person level of analysis, average self-efficacy and performance across trials were significant and negative for a magnitude (r= -. 328**) and for strength (r= -. 347**). This direction reflected that higher efficacy was related to a lower performance showing opposite findings to that of previous research (i.e., Beattie et al., 2011; Vancouver et al., 2001, 2002). The ICC 2 (Cronbach's alpha) values reported indicate the reliability of a measure over time. Alpha values were considered acceptable at a > 0. 6 (Robinson, Shaver, & Wrightsman, 1991). The interclass correlation coefficient (ICC 1) for performance, self-efficacy magnitude and strength was .580, .638 and .571 suggesting that 58% of performance variance and 57.1% – 63.8% of efficacy beliefs variance was accounted for at the between person level of analysis. ICC 2 shows high reliability of all variables across time, self-efficacy magnitude was .834, strength .870, and performance .925.

Table1 (1) Means, Standard Deviations and Intercorrelations at the Between Person Level of Analysis

Variable	Mean	SD	ICC 1	ICC 2	1	2
Performance	35.53	10.41	.580	.925	------	------
Self-efficacy magnitude	6.20	2.46	.638	.834	-.328**	------
Self-efficacy Strength	496.58	252.54	.571	.870	-.347**	.942**

*P<.05, **P<.01, ***P<.001

At the individual trial level, results show that self-efficacy magnitude was significantly related to subsequent performance only in trial 6 and 7 with correlations ranging from *r* = -. 398 to -. 575 respectively (see Table 2). Self-efficacy strength was significantly related to performance only in trials 2, 3, 6, and 7 with correlations ranging from *r* = -.296 to -.558. Mean performance at Trial one was 23.71 points which increased to 40.42 points in trail number ten showing that the performance increased across trials by 16.71 points.

To examine the within person set of hypothesis Hierarchical Linear Modeling (HLM; Bryk & Raudenbush, 1992) Version 7 was used throughout. At the within person level of analysis performance significantly increased (γ_{10}= 1.73, *p* <.001; as trial increased by 1 performance increased by 1.73). Further, self-efficacy slightly decreased over trials (magnitude $\gamma 10$ = -.02, *p* =.612; strength $\gamma 10$ = -5.510 *p* =.202) indicating that as trial increased by 1, self-efficacy magnitude and strength scores decreased by .02 and 5.51 respectly. In essence both self-efficacy magnitude and strength beliefs remained relatively stable across time.

Table (2) Means, and Intercorrelations for Independent Trials

Mean	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6	Trial 7	Trial 8	Trial 9
Previous Performance	23.71	27.37	29.17	32.80	34.33	35.02	38.86	40.75	39.73
SE-Magnitude	6.08	6.17	6.60	6.20	6.42	6.08	6.13	5.93	6.20
SE-Strength	497.33	502.26	543.33	498.44	513.11	490.33	484.33	468.88	471.24
Subsequent Performance	27.37	29.17	32.80	34.33	35.02	38.86	40.75	39.73	40.42
SE-Mag/ Sub Performance *r*	-.033	-.207	-.193	-.014	-.091	-.398**	-.575**	-.264	.062
SE-Strength Sub Performance *r*	.068	-.336*	-.296*	-.059	-.170	-.438**	-.558**	-.237	.057

**P<.05, **P<.01, ***P<.001*

With regards to the third Hypothesis (previous performance would be a strong and significant predictor of self-efficacy), results showed that previous performance had a

significant negative effect upon self-efficacy magnitude ($\gamma 20 = -.216$, $p < .001$) and strength ($\gamma 20 = -.21.05$ $p < .001$). Showing that as performers became more skilled at the task, room for perceived improvement decreased. Furthermore, previous performance (with trial) predicted 41.53 % and 42.96 % of self-efficacy magnitude and strength variance respectively. Variance change signified that previous performance accounted for 38.87 to 39.68 % of magnitude and strength variance (See Table 3).

Table (3) multilevel Modeling at the within- person Level of Analysis

Self-efficacy magnitude as dependent variable					
Step	**Slope γ**	**SE**	**DF**	**% Var**	**Δ % Var**
1.Trial	-.022	.043	44	4.35	------
2.Previous performance	-.216***	.024	44	41.53	38.87
Self-efficacy strength as dependent variable					
Step	**Slope γ**	**SE**	**DF**	**% Var**	**Δ % Var**
1.Trial	-5.510	4.25	44	5.44	------
2.Previous performance	-21.05***	2.49	44	42.96	39.68

*P <.05, **P <.01, ***P<.001

Regarding the fourth Hypothesis, according to Vancouver et al. (2001, 2002, 2006) at the within person level of analysis, self-efficacy may have a negative relationship with subsequent performance. Results showed that self-efficacy magnitude ($\gamma 30 = -.217$ $p = .231$) and strength ($\gamma 30 = -.001$ $p = .454$) were negatively but not significant related to subsequent performance when trial and previous performance was accounted for. Trial accounted for 40.26% of the variance in performance, previous performance failed to add any significant variance (2.71%). Further, self-efficacy strength and magnitude also failed to add any significant variance (.74% and .11% respectively). This result offers partial support for Vancouver et al. (2001, 2002, 2006) and full support of Beattie et al. (2011) in that self-efficacy had a slight negative but non-significant relationship with subsequent performance (see Table 4 and Figure 1 and 2).

Table (4) multilevel Modeling at the within- person Level of Analysis

Subsequent performance as dependent variable					
Step	**γ**	**SE**	**DF**	**% Var**	**Δ% Var**
1.Trial	1.73***	.118	44	40.26	------
2.Previous performance	.145	.056	44	41.88	2.71
3.Self-efficacy magnitude	-.217	.178	44	42.32	.74
4. Self-efficacy strength	-.001	.001	44	41.88	.11

*P <.05, **P <.01, ***P<.001

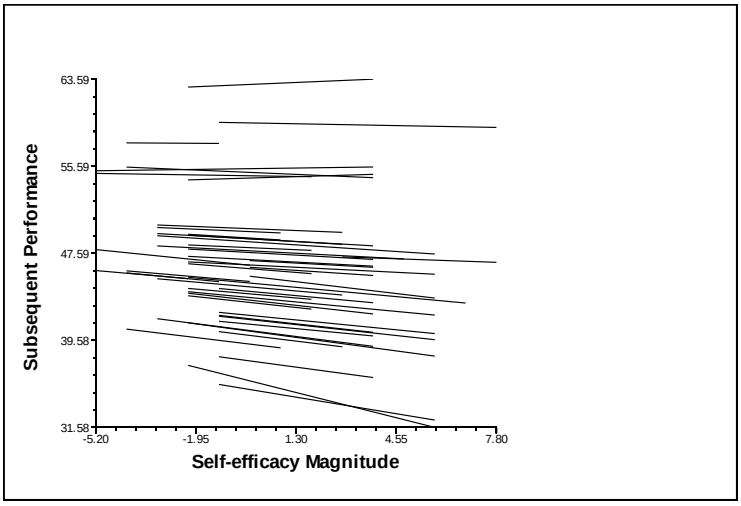

Figure 1. **Individual regression slopes showing the slight negative relationship between self-efficacy magnitude and subsequent performance across trial.**

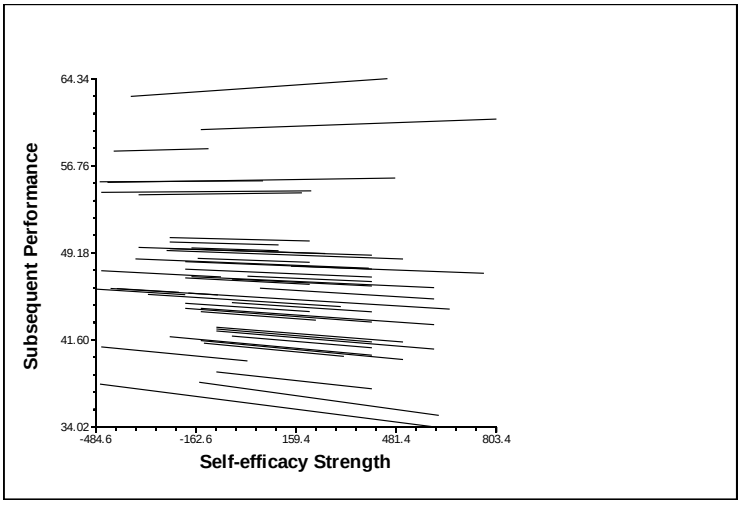

Figure 2. **Individual regression slopes showing the slight negative relationship between self-efficacy Strength and Subsequent Performance across time.**

Session 2:

Results

Table 5 shows the means and standard deviations among the study variable. At the between person level of analysis, results showed a significant and negative correlation between average self-efficacy magnitude (-.198**) and strength (-.151**) which reflects the results of session 1. The interclass correlation coefficient ICC 1for performance and self-efficacy strength and magnitude was .440, .660 and .771 suggesting that 44.0% , 66.0% and 77.1% of performance variance and efficacy beliefs variance was accounted for at the between person level of analysis. ICC 2 shows high reliability of all variables across time, self-efficacy magnitude was .797, strength .830, and performance .922.

Table1 (5) Means, Standard Deviations and Intercorrelations at the Between Person Level of Analysis

Variable	Mean	SD	ICC 1	ICC 2	1	2
Performance	50.20	10.44	.440	.922	------	------
Self-efficacy magnitude	4.21	2.68	.771	.797	-.198**	------
Self-efficacy Strength	293.12	258.92	.660	.830	-.151**	.958**

*P<.05, **P<.01, ***P<.001

Results showed that mean performance was 41.66 points in trial number one and increased to 54.06 points in trail number ten. This reflects that the performance increased across trials by 12.4 points (see Table 2). Self-efficacy magnitude and strength were only significantly related to the subsequent performance in trial 2. As in session 1, these results do not support the positive effect of self-efficacy on performance at the between person level of analysis.

Table (6) Means, and Intercorrelations for Independent Trials:

Mean	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6	Trial 7	Trial 8	Trial 9
Previous Performance	41.66	44.46	47.24	49.15	49.08	51.13	51.31	51.84	51.55
SE-Magnitude	4.31	3.97	3.75	3.60	3.97	4.15	4.15	4.68	5.44
SE-Strength	294.66	263.55	247.11	239.33	266.11	279.11	279.11	347.33	421.11
Subsequent Performance	44.46	47.24	49.15	49.08	51.31	53.11	53.11	51.55	54.06
SE-Mag /Sub Performance *r*	.014	-.258*	-.118	-.002	.014	.063	.063	.020	.140
SE-Strength /Sub Performance *r*	.020	-.312*	-.161	.106	-.032	.091	.091	.078	.147

**P<.05, **P<.01, ***P<.001*

According the second set of Hypothesis with regards to the within-person level of analysis it is predicted that learning (i.e., performance) and self-efficacy will significantly increase across trials. Results showed that performance did significantly increase over trials ($\gamma_{10=}$ 1.01, p <.001; as trial increased by 1 performance increased by 1.01). Furthermore, self-efficacy also significantly increase over trials (magnitude $\gamma 10$ = .12, p <.01; strength $\gamma 10$ =14.37 p <.01) as mastery experiences increase efficacy beliefs increased over trials. When trial increased by one, self-efficacy magnitude and strength scores increased by.12 and 14.37 respectively. Finally, trial accounted for 6.80%, 9.74%, and 21.89 of variances in self-efficacy magnitude; strength and performance respectively (see Table 7).

The third hypothesis stated that previous performance will be a strong positive predictor of subsequent self-efficacy beliefs. Results found a significant negative relationship between previous performance and self-efficacy magnitude (magnitude ($\gamma 20$ = -.253, p <.001) and strength ($\gamma 20$ = -.23.15 p <.001) as performance increase room for improvement decreased. Further, previous performance was a strong predictor of self-efficacy magnitude and strength variance 54.47 - 57.51 %. Moreover, previous performance accounted for 31.45 to 52.92 % of magnitude and strength variance above trial (see Table 7)

Table (7) multilevel Modeling at the within- person Level of Analysis:

Self-efficacy magnitude as dependent variable					
Step	**Slope γ**	**SE**	**DF**	**% Var**	**Δ % Var**
1.Trial	.129*	.048	44	6.80	---
2.Previous performance	-.253***	.023	44	54.47	31.45
Self-efficacy strength as dependent variable					
Step	**Slope γ**	**SE**	**DF**	**% Var**	**Δ % Var**
1.Trial	14.37*	4.81	44	9.74	------
2.Previous performance	-23.15***	2.32	44	57.51	52.92

*P <.05, **P <.01, ***P<.001

In terms of hypothesis four, according to Bandura (1997) at the within person level of analysis a positive relationship between self-efficacy and subsequent performance should occur. Results showed that self-efficacy magnitude and strength were not significantly related to performance (γ30 = .077 p =.66; γ30 = .000 p =.86) which offers no support for self-efficacy. However, neither was there a negative effect. Self-efficacy strength and magnitude accounted for very little variance above that of trial and previous performance (.007% and .031% respectively).

Table (8) multilevel Modeling at the within- person Level of Analysis:

Subsequent performance as dependent variable					
Step	**γ**	**SE**	**DF**	**% Var**	**Δ% Var**
1.Trial	1.01***	.151	44	21.89	------
2.Previous performance	.193***	.055	44	20.96	1.18
3.Self-efficacy magnitude	.077	.179	44	20.90	.007
4. Self-efficacy strength	.000	.001	44	21.21	.031

*P <.05, **P <.01, ***P<.001

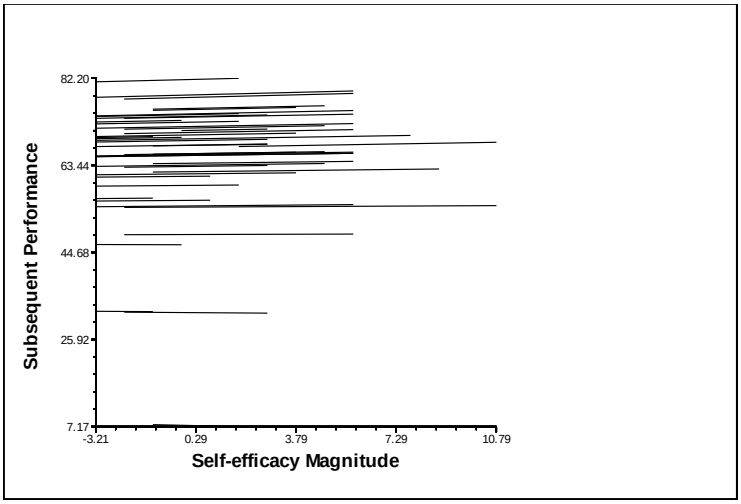

Figure 3. **Individual regression slopes showing the relationship between self-efficacy magnitude and Subsequent performance across time.**

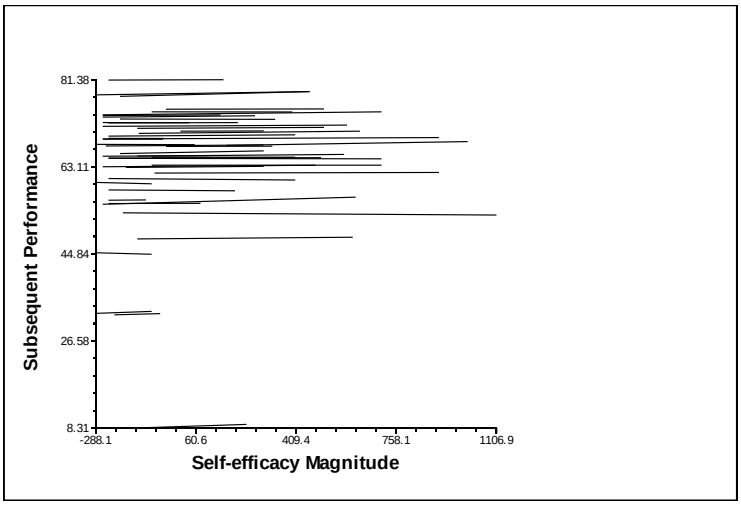

Figure 4. **Individual regression slopes showing the relationship between self-efficacy Strength and subsequent performance across time.**

Session 3:

Results

Table1 9 shows means, standard deviations and interclass correlations and bivariate correlations for study's variables. At the between person level of analysis results showed a significant negative correlation between average self-efficacy and performance across trials self-efficacy magnitude (-.254**) and strength (-.252**). This finding replicated that of

session 1 and 2. Interclass correlation (ICC 1) shows that 62.1% of performance variance and 76.4- 90.3% of self-efficacy variance was at the between person level (see Table 9). However, ICC 2 shows high reliability of all variables across time, self-efficacy magnitude was .753, strength .756, and performance .876.

Table1 (9) Means, Standard Deviations and Intercorrelations at the Between Person Level of Analysis:

Variable	Mean	SD	ICC 1	ICC 2	1	2
Performance	50.62	9.18	.621	.876	------	------
Self-efficacy magnitude	4.20	2.71	.764	.753	-.254**	------
Self-efficacy Strength	281.44	249.09	.903	.756	-.252**	.949**

*P<.05, **P<.01, ***P<.001

On a trial by trial basis self-efficacy magnitude and strength were significantly related to subsequent performance only on trial 9 with correlations ranging from (r = -.360 to -.397) (see Table 10). Thus, this result failed to support self-efficacy theory but showed similar results to Session 1 and 2.

Table (10) Means, and Intercorrelations for Independent Trials:

Mean	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6	Trial 7	Trial 8	Trial 9
Previous Performance	42.11	43.48	46.28	50.35	49.37	51.62	53.84	54.15	52.44
SE-Magnitude	4.91	4.77	4.22	3.82	4.68	3.97	3.28	3.93	4.24
SE-Strength	328.00	334.00	293.66	237.22	310.77	263.33	198.00	259.88	308.11
Subsequent Performance	43.37	46.28	50.35	49.37	51.62	53.84	54.15	53.64	52.93
SE-Mag/ Sub Performance *r*	.061	.193	-.092	-.117	-.130	.154	-.086	-.099	-.360*
SE-Strength/ Sub Performance *r*	-.102	.019	-.098	-.040	-.178	.123	-.038	-.038	-.397**

*P<.05, **P<.01, ***P<.001

Regarding the second set of Hypothesis, at a within-person level of analysis it was predicted that learning (i.e., performance) and self-efficacy will significantly increase across trials. Results shows that mean performance time on Trial one was 42.11 points while in trial ten it had increased to 52.93 points. This reflects that on the average putting performance increased across trials by 10.82 points. The within person level of analyses shows that performance did significantly increases across trials ($\gamma 10 = 1.20$, $p < .001$). However, self-efficacy (magnitude) significantly decreased across trials (magnitude $\gamma 10 = -.11$, $p < 05$; strength $\gamma 10 = -7.78$, $p = 09$). This finding may indicate that as improvement becomes increasingly difficult efficacy beliefs are reduced as a consequence. Finally, trial accounted for 3.42, 6.61%, and 20.59% of variance in self-efficacy strength, magnitude and performance respectively.

The third hypothesis stated that previous performance would be a positive and significant predictor of subsequent self-efficacy beliefs. After controlling for trial number results found that previous performance was a significant negative predictor self-efficacy magnitude ($\gamma_{20} = -.251$ $p < .001$) and strength ($\gamma_{20} = -23.24$, $p < .001$). As previous performance increased room for perceived improvements decreased. Further, trial and previous performance accounted for 53.48% and 53.83% in self-efficacy magnitude and strength variance respectively. Previous performance accounted for 50.19% to 52.20% of self-efficacy magnitude and strength above trial (See Table 11).

Table (11) multilevel Modeling at the within- person Level of Analysis

Self-efficacy magnitude as dependent variable					
Step	**Slope γ**	**SE**	**DF**	**% Var**	**Δ % Var**
1.Trial	-.115*	.052	44	6.61	------
2.Previous performance	-.251***	.023	44	53.48	50.19
Self-efficacy strength as dependent variable					
Step	**Slope γ**	**SE**	**DF**	**% Var**	**Δ % Var**
1.Trial	-7.78	4.48	44	3.42	------
2.Previous performance	-23.24***	2.21	44	53.83	52.20

*P <.05, **P <.01, ***P<.001

The fourth hypothesis stated that self-efficacy should have a positive effect upon subsequent performance. When trial and previous performance was controlled for, both self-efficacy magnitude (γ_{30}= -.612, p < .001) and strength (γ_{30} = -.006, p <.001) showed a significant and negative relationship with subsequent performance. In other words, when self-efficacy magnitude increased by one putt, subsequent putting performance decreased by.612 (see Figures 11& 12). The full model accounted for 28.07% - 28.73% of subsequent performance variance above trial (see Table 12). Previous performance had added (6.32%) of subsequent performance variance above trial. Further, self-efficacy strength and magnitude also accounted for 3.31% - 4.20% of the subsequent performance variance above trial and previous performance. In this session, it appears that self-efficacy did indeed have a negative effect upon subsequent performance which offer fully supported of Vancouver et al. (2001, 2002).

Table (12) multilevel Modeling at the within- person Level of Analysis

Subsequent performance as dependent variable					
Step	**γ**	**SE**	**DF**	**% Var**	**Δ% Var**
1.Trial	1.20***	.120	44	20.59	------
2.Previous performance	.207***	.054	44	25.53	6.32
3.Self-efficacy magnitude	-.612***	.184	44	28.07	3.31
4. Self-efficacy strength	-.006***	.002	44	28.73	4.20

P <.05, **P <.01, ***P<.001

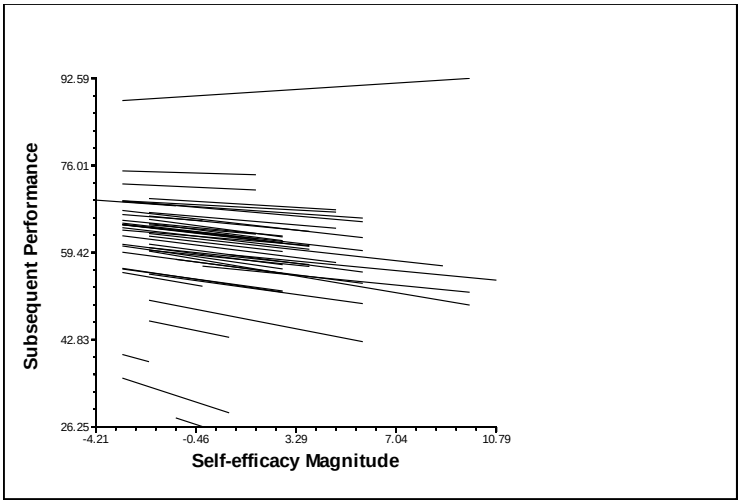

Figure 5. **Individual regression slopes showing the relationship between self-efficacy magnitude and subsequent performance across time.**

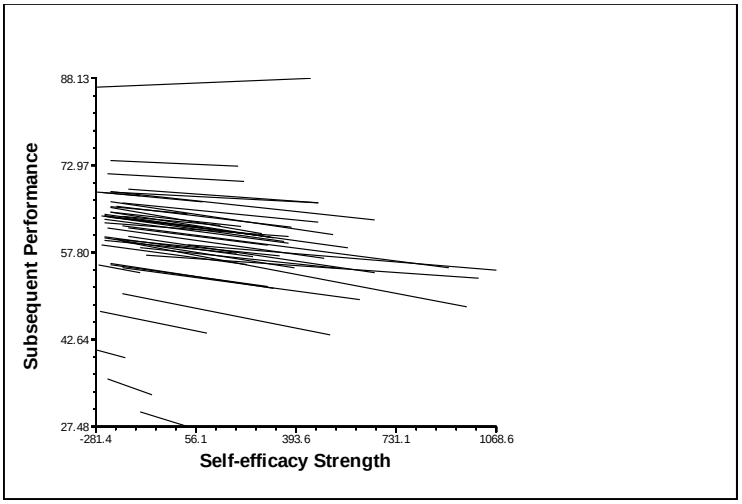

Figure 6. **Individual regression slopes showing the relationship between self-efficacy Strength and subsequent performance across time.**

Session 4:

Results

The first hypothesis explored whether self-efficacy and putting performance was positively related at the between-person level of analysis. Table 13 shows the means, standard deviations, interclass correlations and bivariate correlations among the study variables. The Cronbach's alpha for self-efficacy magnitude, strength and performance were all above .6. Interclass correlation (ICC 1) revealed that 48.5%, 84.8% and 80% of performance, self-efficacy magnitude and strength variance was at the between person level of analysis. However, ICC 2 shows high reliability of all variables across time, self-efficacy magnitude was .635, strength .697, and performance .895.

According first set of hypothesis, at the between person level of analysis results showed a significant and negative correlation between average self-efficacy magnitude (-.324**) and strength (-.340**; supporting results from all previous sessions).

Table1 (13) Means, Standard Deviations and Intercorrelations at the Between Person Level of Analysis

Variable	Mean	SD	ICC 1	ICC 2	1	2
Performance	53.34	9.60	.485	.895	------	------
Self-efficacy magnitude	4.99	3.26	.845	.635	-324**	------
Self-efficacy Strength	350.28	308.30	.800	.697	-.340**	.933**

*P<.05, **P<.01, ***P<.001

Table 14 shows the means and correlations for independent trials. There were no significant effects between self-efficacy and performance at the between person level. Results showed that performance on Trial one was 47.93 points while in Trial 10 it had increased to 52.08 points. This reflects that on the average performance increased across trials by 4.15 points.

Table (14) Means, and Intercorrelations for Independent Trials

Mean	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6	Trial 7	Trial 8	Trial 9
Previous Performance	47.93	50.06	53.42	53.60	53.26	55.55	53.22	53.82	55.04
SE-Magnitude	6.31	5.53	4.26	4.75	4.82	4.13	5.68	5.00	4.44
SE-Strength	491.55	381.22	311.33	323.66	327.55	280.77	378.88	359.00	298.55
Subsequent Performance	50.06	53.42	53.60	53.26	55.55	53.22	53.82	55.04	52.08
SE-Mag/ Sub Performance *r*	-.077	-.163	-.097	.177	-.085	-.047	.172	-.080	-.222
SE-Strength/ Sub Performance *r*	-.067	-.145	-.084	.191	-.061	-.028	.076	-.124	-.214

*P<.05, **P<.01, ***P<.001

The second set of hypothesis predicted that performance and self-efficacy would increase over time. Results revealed that performance did not significantly increase over trial (γ_{10} = .22, p =.17). This was probably due to a learning effect as participants had already performed 600 putts. Further, as in previous sessions, self-efficacy magnitude and strength slightly decreased over trial (γ_{10} = -.11, p =.068; γ_{10} = -12.44, p =.054) respectively. Trial

accounted for 2.88%, 7.37% and 9.25% of the variance in self-efficacy magnitude, strength, and performance respectively.

The third hypothesis stated that previous performance would be a positive significant predictor of subsequent self-efficacy beliefs. Result found that previous performance was negative and significant predictor self-efficacy magnitude (γ_{20} = -.338 p < .001) and strength (γ_{20} = -32.52, p < .001). The better participants performed, the less they think they could improve. Trial and previous performance accounted for 63.15% and 74.29% in self-efficacy magnitude and strength variance respectively. Previous performance accounted for a high proportion of variance above that of trial ranging from 62.05% to 72.24% of self-efficacy magnitude and strength (see Table 15).

Table (15) multilevel Modeling at the within- person Level of Analysis

Self-efficacy magnitude as dependent variable

Step	Slope γ	SE	DF	% Var	Δ % Var
1.Trial	-.114	.061	44	2.88	------
2.Previous performance	-.338***	.024	44	63.15	62.05

Self-efficacy strength as dependent variable

Step	Slope γ	SE	DF	% Var	Δ % Var
1.Trial	-12.44*	6.28	44	7.37	------
2.Previous performance	-32.52***	2.42	44	74.29	72.24

*P <.05, **P <.01, ***P<.001

Finally, the results of fourth hypothesis revealed that self-efficacy magnitude and strength had a negative relationship with subsequent performance (only strength was significant), (γ_{30}= -.260, p =.147; γ_{30} = -.004, p < .001). The full model accounted for 13.72% - 14.63% of performance variance (See table 16). Previous performance accounted for 2.95% of the variance above trial. Further, self-efficacy strength and magnitude accounted for 2.03% and 3.06% above trial and previous performance.

Table (16) multilevel Modeling at the within- person Level of Analysis

Subsequent performance as dependent variable					
Step	**γ**	**SE**	**DF**	**% Var**	**Δ% Var**
1.Trial	.222	.162	44	9.25	------
2.Previous performance	.246**	.050	44	11.93	2.95
3.Self-efficacy magnitude	-.260	.176	44	13.72	2.03
4. Self-efficacy strength	-.004***	.001	44	14.63	3.06

P <.05, **P <.01, ***P<.001

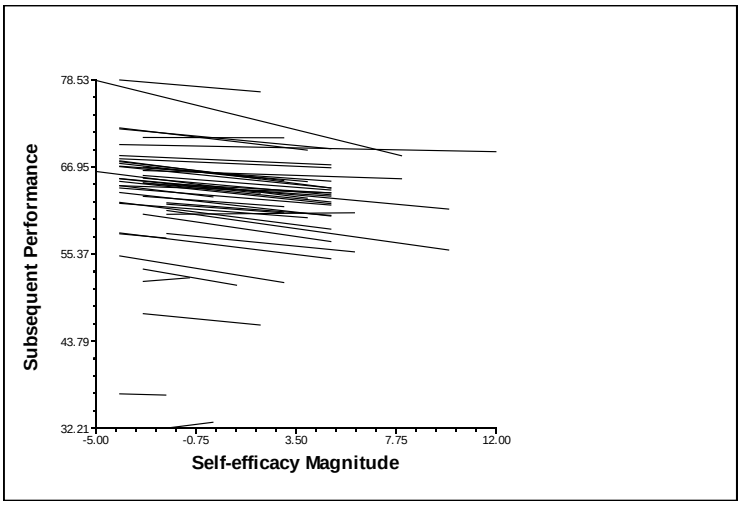

Figure 7. **Individual regression slopes showing the relationship between self-efficacy magnitude and subsequent performance across time.**

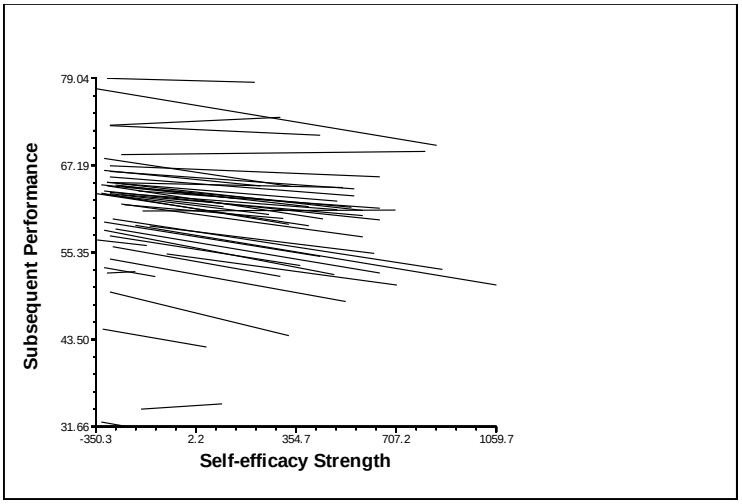

Figure 8. **Individual regression slopes showing the relationship between self-efficacy Strength and subsequent performance across time.**

All 4 sessions

To examine the longitudinal effects of self-efficacy upon performance, a further analysis was conducted that included all 40 trials. The hypothesis were the same as the individual session hypothesis. Table 17 illustrates the means, standard deviations, interclass correlations and bivariate correlations. At the between person level of analysis, average self-efficacy and performance across trials were negative and significant for magnitude (r= -.226**) and for strength (r= -.236**). Further, the interclass correlations (ICC1) show that 21.4% of performance variance and 15.6% – 18.5% of efficacy beliefs variance was accounted for at the between person level of analysis. However, the Cronbach's alpha (ICC 2) shows high reliability of all variables across time self-efficacy magnitude was .852, strength .838, and performance .930.

Table1 (17) Means, Standard Deviations and Intercorrelations at the Between Person Level of Analysis

Variable	Mean	SD	ICC1	ICC2	1	2
Performance	47.62	11.33	.214	.930	_	
Self-efficacy magnitude	4.88	2.90	.156	.852	-.226**	_
Self-efficacy Strength	356.28	282.30	.185	.838	-.236**	.955**

*P<.05, **P<.01, ***P<.001

For independent trials, Table 18 shows the means, and intercorrelations. Results stated that the mean of performance was 23.71 points in trial number one and increased to 55.04 points in trail number 36. Mean performance increased across trials by 31 points.

Table (18) Means, and Intercorrelations for Independent Trials

Mean / Trial	**Performance**	**SE-Magnitude**	**SE-Strength**	**SE-Magnitude Performance r**	**SE-Strength Performance r**
1	23.71	6.08	497.33	-.033	.068
2	27.37	6.17	502.26	-.207	**-.336***
3	29.17	6.60	543.33	-.193	**-.296***
4	32.80	6.20	498.44	-014	-.059
5	34.33	6.42	513.11	-.091	-.170
6	35.02	6.08	490.33	**-.398****	**-.438****
7	38.86	6.13	484.33	**-.575****	**-.558****
8	40.75	5.93	468.88	-.264	-.237
9	39.73	6.20	471.24	.062	.057
10	41.66	4.31	294.66	.014	.020
11	44.46	3.97	263.55	**-.258***	**-.312***
12	47.24	3.75	247.11	-.118	-.161
13	49.15	3.60	239.33	-.002	.106
14	49.08	3.97	266.11	.014	-.032
15	51.13	4.15	279.11	.063	.091
16	51.31	4.15	281.32	.063	.091
17	51.84	4.68	347.33	.020	.078
18	51.55	5.44	421.11	.140	.147
19	42.11	4.91	328.00	.061	-.102
20	43.48	4.77	334.00	.193	.019
21	46.28	4.22	293.66	-.092	-.098
22	50.35	3.82	237.22	-.117	-.040
23	49.37	4.68	310.77	-.130	-.178
24	51.62	3.97	263.33	.154	.123

25	53.84	3.28	198.00	-.086	-.038
26	54.15	3.93	259.88	-.099	-.038
27	52.44	4.24	308.11	**-.360***	**-.397****
28	47.93	6.31	491.55	-.007	-.067
29	50.06	5.53	381.22	-.163	-.145
30	53.42	4.26	311.33	-.097	-.084
31	53.60	4.75	323.66	.177	.191
32	53.26	4.82	327.55	-.085	-.061
33	55.55	4.13	280.77	-.047	-.028
34	53.22	5.68	378.88	.172	.076
35	53.82	5.00	359.00	-.080	-.124
36	55.04	4.44	298.55	-.222	-.214

According to the second set of hypothesis, at the within person level of analysis results showed that performance significantly increased over trial (γ_{10}= .628, p <.001; as trial increased by 1 performance increased by .628). Further, self-efficacy significantly decreased over trials (magnitude γ10 = -.039, p <.001; strength γ10 = -4.85 p <.001) which meant that when trial increased by 1, self-efficacy magnitude and strength scores decreased by .039 and 4.85 respectively. As participants got better at the task self-efficacy decreased over trials (i.e., room for improvement decreased across time). Further, trial accounted for 5.70%, 7.44% of variance in self-efficacy magnitude and strength. Performance accounted for 37-39% of the variance in self-efficacy above that of trial (see Table 19).

With regards to the third hypothesis (previous performance would be a strong and significant predictor of self-efficacy), results showed that previous performance had a significant negative effect upon self-efficacy magnitude (γ20 = -.338, p <.001) and strength (γ20 = -32.52 p <.001). Again showing that as performers became more skilled at the task, room for improvement decreased. Furthermore, previous performance (with trial) predicted 40.89 % and 43.54 % of self-efficacy magnitude and strength variance respectively.

Table (19) multilevel Modeling at the within- person Level of Analysis

Self-efficacy magnitude as dependent variable					
Step	**Slope γ**	**SE**	**Df**	**% Var**	**Δ % Var**
1.Trial	-.03***	.009	44	5.70	------
2.Previous performance	-.338***	.024	44	40.89	37.31
Self-efficacy strength as dependent variable					
Step	**Slope γ**	**SE**	**df**	**% Var**	**Δ % Var**
1.Trial	-4.85***	0.88	44	7.44	------
2.Previous performance	-32.52***	2.42	44	43.54	39.00

*P <.05, **P <.01, ***P<.001

Regarding the fourth Hypothesis, according to Bandura (1997) a positive relationship between self-efficacy and subsequent performance should occur. Results showed that self-efficacy magnitude (γ30 = .123, *p* = .167) and strength (γ30 = .000, *p* = .368) were not significantly related to subsequent performance when trial and previous performance was accounted for. Trial accounted for 43.37% of the variance in performance, previous performance accounted for 31.97% of the variance above trial. Further, self-efficacy magnitude added very little variance above that of trial and previous performance (.09% and .11% respectively). This result offers partial support for self-efficacy theory (Bandura, 1986) in that self-efficacy had a slight positive but not significant relationship with subsequent performance (see Table 20 and Figures 9 and 10).

Table (20) multilevel Modeling at the within- person Level of Analysis

Subsequent performance as dependent variable					
Step	**γ**	**SE**	**DF**	**% Var**	**Δ% Var**
1.Trial	.628***	.039	44	43.37	------
2.Previous performance	.566***	.035	44	61.47	31.97
3.Self-efficacy magnitude	.123	.087	44	61.84	.09
4. Self-efficacy strength	.000	.000	44	61.90	.11

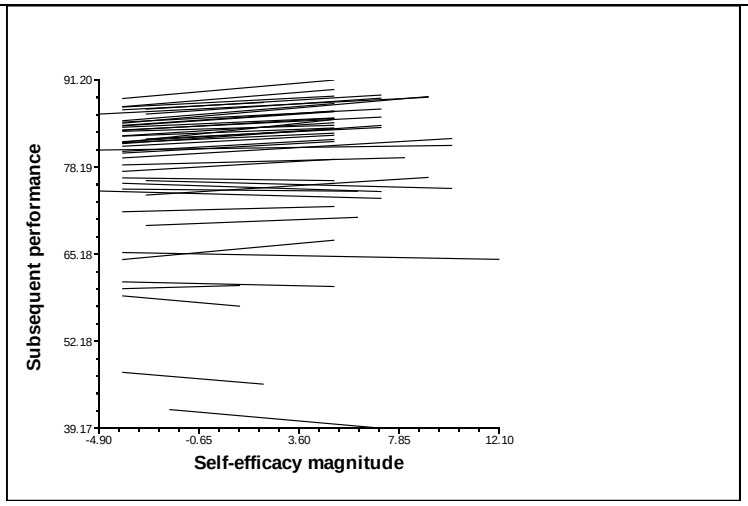

Figure 9. **Individual regression slopes showing the relationship between self-efficacy magnitude and subsequent performance across time.**

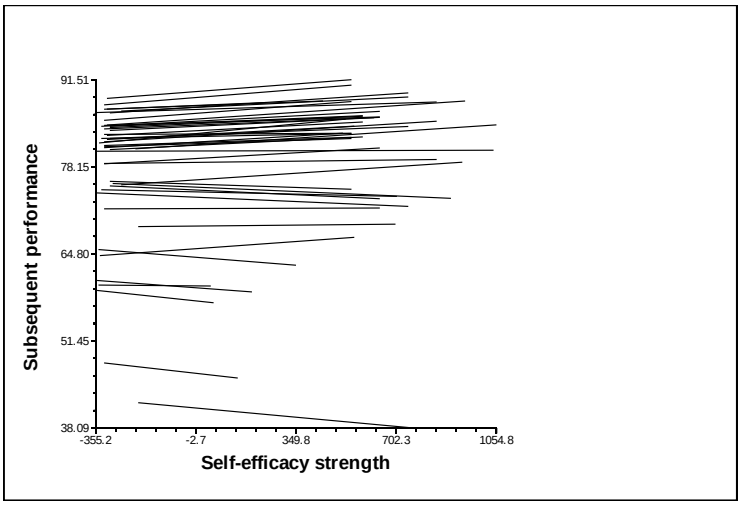

Figure 10. **Individual regression slopes showing the relationship between self-efficacy strength and subsequent performance across time.**

General Discussion

The main aim of this research was to address some of Bandura and Locke's (2003) criticisms which presented above. Further, the study attempted to address the possible lack of learning shown within Beattie et al.'s (2011) study. In previous studies when considering the possible negative effects of self-efficacy upon subsequent performance, Bandura & Locke (2003) reported that the tasks did not allow for learning to occur over time. The current study reported allowed for skill development to occur in a golf putting task where learning could be transferred across trials and sessions. The putting environment changed in two ways from Beattie et al. (2011). First, instead of measuring performance by successful putts made, the present study used a target zone where putts near the hole (up to 20cm's) counted. Secondly, to allow for participants to gain more mastery experiences, the learning environment was extended to 800 putts from 200. The data was analyzed at two levels, at the between-person level of analysis and at the within person level of analysis.

Regarding the first set of hypothesis; at the between-person level of analysis self-efficacy should have a strong and positive relationship (correlation) with performance. Results indicated at the individual trial level, results were extremely erratic. Results showed a moderate and significant negative correlation between average self-efficacy with average performance across trials in all four separate sessions and in the combination of all 4 sessions. This goes against the large wealth of previous research (e.g., Moritz et al., 2000; Stajkovic & Luthans, 1998) where self-efficacy has a strong and positive effect with performance at a between person level. Perhaps one reason for this finding is due to performance variability. For example, in Beattie et al.'s (2011) study performance only ranged from 1-20 putts. In Vancouver et al.'s work performance ranged from 1-10 rows. In the present study, performance ranged from 0-100 points. Perhaps as performance variation increases, the accuracy of ones self-efficacy judgements decreases especially when learning. Further, there

may have been some individual differences that were not tapped into. For example, some participants may have been more optimistic about increasing their performance but failed to do so.

With regards to the second set of hypothesis, at the within-person level of analysis it was predicted that learning (i.e., performance) would significantly increase across trials, as would self-efficacy beliefs (as mastery experiences increase efficacy beliefs). At within-person level of analysis results revealed that performance significantly increased over trials in sessions 1, 2, and 3 but seemed to plateau in session 4. Further, there was a general trend for self-efficacy to decrease across time. Perhaps not surprisingly as performance increased room for improvement (efficacy) decreased. This effect has also been shown in exam performance (e.g., Richard et al., 2006).

According to the third set of hypothesis, previous performance would be a strong and positive predictor of subsequent self-efficacy beliefs. However, results in all sessions (1, 2, 3, 4, and all 36 trials) showed that previous performance was a significant negative predictor of subsequent self-efficacy. In fact the opposite of social cognitive theory predicts (Bandura, 1986) was shown where better performance was related to weaker efficacy effects. This finding appears at first inconsistent with social cognitive theory (Bandura, 1986) that reports perceived successful performance can lead to increased and enhanced efficacy beliefs. However, due to the nature of the task and self-efficacy measurement these results can be explained in that when participants improve through practice, it becomes increasing difficult to improve upon a previous performance. Therefore efficacy beliefs became smaller (not necessarily weaker) as a byproduct on an increasing skill level only.

With regards to the fourth hypothesis (opposite of what Bandura (1997) predicts), according to Vancouver et al. (2001, 2002) self-efficacy may have a negative effect upon performance. After increasing the number of sessions from 1 to 4 and trials 8 to 40 (e.g.,

Beattie et al. 2011), results showed that self-efficacy in sessions (1, and 2) self-efficacy emerged to have no relationship with subsequent performance. This result offers partial support for Vancouver et al. (2001, 2002). In a more recent meta-analysis of within person self-efficacy effects, Sitzman & Yeo (2013) revealed that the self-efficacy and performance relationship (when controlling for trial/time) is also null. Only in sessions 3 both magnitude and strength and session 4 (only strength) did self-efficacy shows significant negative effect upon subsequent performance (hence supporting Vancouver's hypothesis). However, even when the analysis was collated across all trials (hence increasing mastery experiences), self-efficacy was still not a significant predictor of subsequent performance (though the sign did become positive). This supports the conclusion that self-efficacy is more likely a by-product of previous performance than it is a predictor of subsequent performance (e.g., Sitzman & Yeo, 2013; Vancouver et al., 2001, 2002).

Based on perceptual control theory, Powers (1973) noted that high efficacy beliefs can lead to decrease in motivation and cause complacency which therefore induce negative relationship with subsequent performance. Consequently, in this case individuals with high self-efficacy beliefs can provide themselves with an unrealistic sense of certainty which may lead to overconfidence leading in the end to reduced performance (Vancouver et al., 2001, 2002). When looking at performance and self-efficacy scores (Table 18) it can be seen that on almost every trial self-efficacy beliefs outstrip actual performance attainments. For example, on trials 30-35 there is virtually no performance increase. But on average participants thought they could improve by 4 or 5 points. This was also a common finding in Beattie et al.'s (2011) study. Therefore it seems that the inflationary effect of previous performance upon subsequent self-efficacy beliefs explanation may have some merit (e.g., Vancouver et al., 2001, 2002).

Limitations of the current study are that the task (800 putts) may be perceived as an easy unchallenging and uninteresting task. This might lead to reduced motivation where participants become somewhat bored by the task and decrease their efforts. Bandura (2012) noted that mundane tasks usually lead self-efficacy to have no effects which may also explain the current findings. Further, participants were only asked to rate their efficacy beliefs on how well they could perform on the present trial with regards to their immediate previous trial. Hence a wealth of information regarding previous accomplishments (scores on previous trials) is ignored. Therefore, one is only as good as ones previous attempt.

The nature of the task had a negative effect upon efficacy beliefs in that they decreased across time. That is, as one improves at the task room for improvement decreases. This may not be self-efficacy decreasing in absolute terms but participants may be less motivated to invest effort if they see that performance accomplishments are getting less and less. A final limitation of the study is that the task is generally mundane and uninteresting that may do little to challenge the participants and may have contributed to the non-significant efficacy effects. Therefore, the purpose of Chapter 3 was to address some of the above criticisms by examining whether the null self-efficacy and performance relationship in the present study, was null due to a low level of task complexity and self-efficacy only being based upon the predeceasing trial.

Chapter 3

Chapter 3

Two studies: Examining the Reciprocal Relationship between Self-Efficacy and Subsequent Performance upon a Complex Car Racing Task

Introduction

Bandura's (1997) self-efficacy theory refers to the belief that one is capable of organizing and executing the courses of action required to achieve desired levels of attainment. It is a theory that accounts for 'within person' behavior. As Bandura (1997) notes, self-efficacy judgments are about what one thinks one can do with one's skills. Therefore, it seems rather strange that the majority of self-efficacy research has been conducted at the between person level of analysis (C.F. Vancouver, Thompson, & Williams, 2001; Vancouver, Thompson, Tischner, & Putka, 2002). Vancouver et al. (2001, 2002) conducted a series of studies to explain occasions when higher levels of self-efficacy can result in decreased performance by using the concept of perceptual control theory (Powers, 1973) as a framework.

Richard, Diefendorff and Martin (2006) examined the reciprocal relationship between self-efficacy and performance on two separate tasks: exam performance and a computer-based chemical reactor simulation. In the first task, self-efficacy and performance were assessed over four multiple choice exams. In the second task, participants attempted to control the temperature of a reactor over six different rounds of 20 trials. In both studies results showed a strong positive relationship between self-efficacy and performance across individuals. However, in neither task did they fully support Vancouver et al.'s findings, in that no significant within-person relationship emerged between self-efficacy and subsequent performance over time. However, one limitation of using exam performance is that there is little opportunity for efficacy belief to build over time as the course material is likely to change across time and therefore, each exam would be relatively independent of the last (Beattie et al., 2011).

Yeo and Neal (2006) also examined the reciprocal relationship between self-efficacy and performance over time by using a computer-based air traffic control lab task. Findings

showed that at the between-person level of analysis there was a strong positive relationship between self-efficacy and performance. The results also revealed that at the within-person level of analysis there was a significant negative relationship between self-efficacy and subsequent performance. These results supported those of Vancouver et al. (2001, 2002, & 2006). Yeo and Neal (2006) also found that performance and self-efficacy increased with practice. A further limitation is that they did not examine or at least report the effects of previous performance upon subsequent self-efficacy. It also appears that the air traffic control task that they used is open to question as a suitable learning task. The task asked participants to state whether two aircraft were on a collision course or not. They were awarded points if they were correct and deducted points if they made the wrong response. However, as in Vancouver's (2001, 2002) mastermind task, the air traffic control task is open to guess work with a 50/50 chance of getting the answer right or wrong.

More recently, strong methodological criticisms have been leveled at some of the above research (Bandura, 2011). For instance, Bandura (2011) provides a comprehensive list of methodological issues that he believes limits such research. These span issues such as poor measurement of self-efficacy (e.g., Vancouver et al., 2001, 2002, 2006; Yeo & Neal., 2006) ; confounded study designs (e.g., Yeo & Neal, 2006); and lack of stringent hypothesis testing (e.g., Richard et al., 2006; Yeo & Neal., 2006; see Bandura (2011) for a more comprehensive list).

Further additional limitations were reported in the previous chapter. In the previous chapter, we asked participants only to rate how well they could beat their previous performance. For example, on trial 10 a participant is asked to rate their self-efficacy in how well they could increase from trial 9, but performance on trials 1-9 are ignored. This in essence ignores all the preceding mastery experiences (as long as one assumes they do not access that information). The current set of studies set to address this limitation. A second

limitation also addresses Bandura and Locke's (2003) criticism in that, tasks that are mundane and do little to intrude upon attentional demands, usually produce non-significant self-efficacy effects. Therefore a more complex driving simulation task replaced the putting task from Chapter 2.

To examine whether the measurement of self-efficacy influences the direction of the efficacy/performance relationship two studies are presented in the current chapter. Study 1 reflects the measurement used in Chapter 2 and asks participants to judge their efficacy beliefs based on decreasing their previous lap times. In Study 2, participants were asked to judge their beliefs based upon continually improving upon a baseline performance. These set of studies were also conducted in a more complex task (race car simulator) than a flat surface putting task.

The hypotheses for the current set of studies were identical to that of Chapter 2. With regards to previous research (e.g., Bandura, 1997; Beattie et al., 2011; 2006; Richard & Diefendorff, 2006; Vancouver et al., 2001, 2002; Yeo & Neal, 2006), it was predicted that at the between-person level of analysis self-efficacy would have a strong and positive relationship (correlation) with performance. Secondly, with regards to the within-person level of analysis it is predicted that learning (i.e., performance) will significantly improve throughout practice. With regards to self-efficacy based on Chapter 2 findings, self-efficacy beliefs should decrease across time in Study 1 as participants improve at the task there will be less room for significant improvement. However, in Study 2, as participants are asked to rate how well they can beat a baseline score then self-efficacy beliefs should increase across time. Thirdly, previous performance will be a strong positive predictor of subsequent self-efficacy beliefs. Fourth, according to Vancouver et al. (2001, 2002) at the within person level of analysis, self-efficacy will have a negative relationship with performance. However,

according to Bandura (1989) and by addressing previous limitations, a positive relationship between self-efficacy and subsequent performance should occur.

STUDY 1

Method

Participants

Fifty nine participants (50 male, 9 female; mean age = 27.08, *SD* = 3.97) volunteered to take part in the study. A driving simulation task was the main task in both studies. All participants had either no previous or minimum experience of driving simulation games (i.e., play less than 2 hours per week). Informed consent was obtained from all participants before taking part in the Study.

Measures

Self-efficacy magnitude. Following Beattie et al. (2011) measures, self –efficacy magnitude was recorded by asking participants to indicate (*yes*/*no*) if they believed they were able to reduce a previous race time through different levels of performance e.g., "I'm confident in my ability to reduce the above time (previous racing time) by one second"; "I'm confident in my ability to reduce the above time (previous racing time) by two seconds" in similar intervals to "I'm confident in my ability to reduce the above time (previous racing time) by ten seconds". Therefore, a score of 0-10 was recorded for each performance. Self-efficacy strength was recorded by asking participants to rate their confidence in their ability to perform at that particular level on a scale of 0-100% (where 0 = no confidence at all and 100 = completely confident). Participants only responded for each score against a magnitude level answered *yes* to give a total between 0 and 1000.

Performance

Performance time was recorded in the amount of seconds that a participant could drive 2 laps of a designated race track from a rolling start.

Apparatus

The driving task was undertaken in a purpose-built driving simulator incorporating a Logitech G25 game seat, steering wheel, pedals and gear shift lever set. The games console was a PlayStation 3 displayed on a Hewlett Packard w2207h LCD display - TFT – 22 inch widescreen TV. The game used was Gran Turismo 5 prologue software and racing track 2 (Super speed way track) was used as a warm up track with competitive laps occurring on race track number 3 (Fuji speed way track). The main researcher was present at all times.

Procedure

The Study consisted of ten trials split over two separate tracks that differed in difficulty level. In order for participants to become familiar with the task and equipment, two practices of two timed consecutive laps occurred on track number 2 of the Gran Turismo 5 prologue software (super speed way track). This track was chosen because it is an oval track and easy to navigate. During the testing phase participants completed 8 trials on track number 3 (Fuji Speedway). This track is a more difficult track to learn because of the many curves and corners which requires heavy use of brake pedal, accelerator pedal and the steering wheel. At all times automatic transmission was used. Both tracks were used without the presence of other cars as they would interfere with race time performance. Overall race time (combined time over two laps) was used as the performance score. Participants were told that the first two trials were practiced and that they should familiarize themselves with the car set up. They were then told that their best performance time in the remaining eight trials would count towards the chance of winning prize money. A £100 cash prize was offered for the fastest time recorded during the Study. In order for the participants to become familiar with the full study protocol, self-efficacy magnitude and strength questionnaires were administered after participants viewed their race times on the first and second practice trial. These were not used in the main analysis. After finishing practice trial number 2, the track

was changed to track number 3 (Fuji Speed Way; a more complex track). After completion of the first racing trial, participants were informed of their lap time upon which they completed the self-efficacy questionnaire; this was done on all consecutive trials. At the conclusion of the study, all participants were thanked and told they would be contacted if their performance time warranted a prize. Only performance from track 3 was used in all subsequent analyses.

Normality

Normality was assessed in across participants in each trial. After statistical outliers were removed from the data (19 performance data points due to crashing cars) all variables (performance, self-efficacy magnitude and strength) were normally distributed. The removal of the performance trials was treated as missing data in the HLM analysis.

Analysis

To examine the relationship at the between-person level of analysis, Pearson's Product Moment correlations were conducted by correlating each trial self-efficacy score with subsequent performance times across participants (i.e., self-efficacy for trial 1 was correlated with actual performance on trial 2 and so on). A further correlation was produced that examined the average self-efficacy score with the average performance score across all 8 trials. To examine the within person set of hypothesis Hierarchical Linear Modeling (HLM; Bryk & Raudenbush, 1992) Version 7 was used throughout.

Results

The first hypothesis explored whether self-efficacy and race time performance was positively related at the between-person level of analysis. Table 1 shows the means, standard deviations, interclass correlations (examination of the between and within person level of variance) and bivariate correlations among the study variables. Interclass correlation (ICC1) shows that 50.3% of performance variance and 24-26% of the self-efficacy variance was at the between person level. That is, as one might expect the majority of self-efficacy variance

occurred within participants. The Cronbach's alpha (ICC 2) shows high reliability of all variables across time (self-efficacy magnitude was .717, strength .732, and performance .823). Further, at between person level of analysis result showed a significant and positive correlation between average self-efficacy magnitude (r = .204**) and strength (r = .253**) with average performance which support self-efficacy theory (Bandura, 1986; see Table 1) but is in an opposite trend to Chapter 2.

Table1 (1) Means, Standard Deviations and Intercorrelations at the Between Person Level of Analysis

Variable	Mean	SD	ICC1	ICC2	1	2
Performance (Time)	325.23	19.85	.503	.923		
Self-efficacy magnitude	5.91	2.35	.244	.717	.204**	_
Self-efficacy Strength	482.46	244.45	.261	.732	.253**	.942**

*P<.05, **P<.01, ***P<.001

Table 2 shows the performance means, standard deviations, and between person correlations for independent trials. On a trial by trial basis self-efficacy magnitude and strength were significantly related to subsequent performance on all trials except trials (2, and 5) with correlations ranging from r = .235 to .394. Thus, this result offer partially supports self-efficacy theory.

Regarding the second set of hypothesis mean performance time on trial 1 was 332.47 seconds while in trial number eight it had decreased to 307.12 seconds. This decrease was significant in that average performance time significantly decreased across trials by 25.35 seconds ($\gamma 10$ =-3.35, p <.001). This equated to 3.16 seconds per trial. Further, we hypothesized that self- efficacy would significantly decrease over time as a result of task learning. Results showed that self-efficacy did significantly decreased over time (magnitude $\gamma 10$ = -0.16, p <.01; strength $\gamma 10$ =-17.21, p <.001). Finally, trial accounted for 10.47%,

10.04%, and 63.37% of variance in self-efficacy magnitude; strength and performance respectively (see Table 3).

Table (2) Means, and Intercorrelations for Independent Trials

Mean	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6	Trial 7
P-Performance	332.74	325.40	323.60	316.73	319.72	310.05	309.45
SE-Magnitude	6.30	6.28	5.71	6.27	6.01	5.64	5.15
SE-Strength	523.89	523.13	465.67	518.38	474.49	469.83	401.86
Sub-Performance	325.40	323.60	316.73	319.72	310.05	309.45	307.12
SE-Magnitude Performance *r*	.297*	.007	.299*	-.257*	-.029	.328**	.235*
SE-Strength performance *r*	.317*	.057	.294*	.247*	-.010	.332**	.394**

**P<.05, **P<.01, ***P<.001*

The third hypothesis stated that previous performance would be a positive and significant predictor of subsequent self-efficacy beliefs. After controlling for trial number results found that previous performance significantly predicted self-efficacy magnitude (γ_{20} = .035, $p < .001$) and strength (γ_{20} = 4.17, $p < .001$). Further, trial and previous performance accounted for 14.76% and 19.61% in self-efficacy magnitude and strength variance respectively. Variance change signified that previous performance accounted for 4.78% to 10.64 % of magnitude and strength variance above trials (Table 3).

Table (3) multilevel Modeling at the within- person Level of Analysis

Self-efficacy magnitude as dependent variable					
Step	**Slope γ**	**SE**	**DF**	**% Var**	**Δ % Var**
1.Trial	-0.16**	.060	58	10.47	---
2.Previous performance	.035***	.009	58	14.76	4.78
Self-efficacy strength as dependent variable					
Step	**Slope γ**	**SE**	**DF**	**% Var**	**Δ % Var**
1.Trial	-17.21**	6.13	58	10.04	---
2.Previous performance	4.71***	1.12	58	19.61	10.64

*P <.05, **P <.01, ***P<.001

The fourth hypothesis stated that self-efficacy could have a positive (e.g., Bandura, 1986) or a negative relationship with subsequent performance (e.g., Vancouver et al., 2001, 2002). When trial and previous performance was accounted for, both self-efficacy magnitude (γ_{30}= -.22, p =.356) and strength (γ_{30} = -.004, p =.06) showed no significant relationship upon subsequent performance. However, as self-efficacy magnitude and strength increased by one, performance time did decrease which was almost significant for self-efficacy strength. Trial accounted for 38.78% of the variance in performance. Previous performance accounted for only an additional 1.89% of performance variance. Further, self-efficacy strength and magnitude added a further sizeable amount of variance (6.96% and 6.11% respectively). This result offers partial support for self-efficacy theory (Bandura, 1986) at within person level of analysis self-efficacy had a positive trend (albeit non-significant) upon subsequent performance (see Table 4 & Figures 1 & 2).

Table (4) multilevel Modeling at the within- person Level of Analysis

Subsequent performance as dependent variable					
Step	**Slope γ**	**SE**	**DF**	**% Var**	**Δ% Var**
1.Trial	-3.35***	.252	58	38.78	---
2.Previous performance	.11**	.041	58	39.94	1.89
3.Self-efficacy magnitude	-0.22	.246	58	44.13	6.96
4. Self-efficacy strength	-.004	.002	58	43.61	6.11

*P <.05, **P <.01, ***P<.001

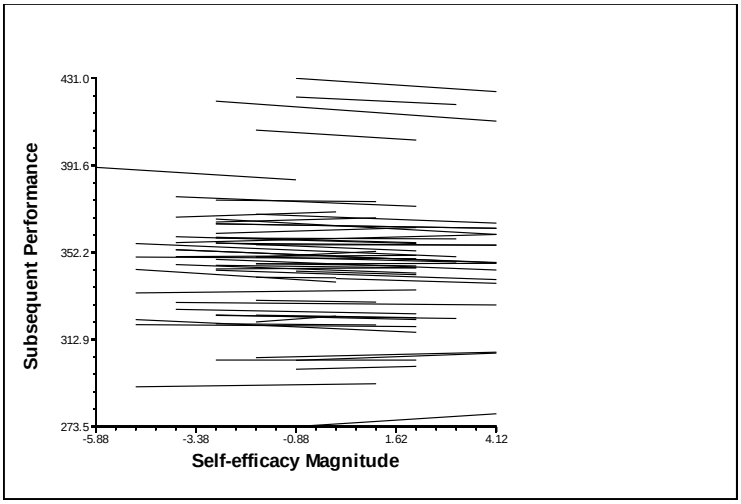

Figure 1. **Individual regression slopes showing the relationship between Self-efficacy Magnitude and Subsequent performance across time.**

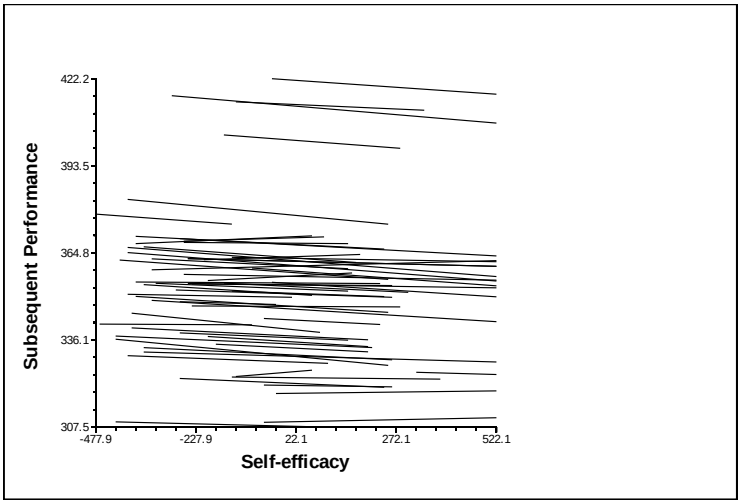

Figure 2. Individual regression slopes showing the relationship between Self-efficacy Strength and Subsequent Performance across time.

Discussion

According to our first hypothesis, results showed that average self-efficacy was positively related to average performance (magnitude = .204**; strength= .253**) which reflected higher efficacy beliefs were related to lower/better race times. Regarding the second set of hypothesis performance time significantly decreased across trials by 23 seconds ($\gamma 10 = -3.35$, $p < .001$). This equated to about 3.35 seconds per trial. Further, as hypothesized that

self- efficacy would significantly decrease over time as a result of task learning (magnitude $\gamma 10 = -0.16$, $p < .01$; strength $\gamma 10 = -17.21$, $p < .001$). Again, as presented in the previous chapter findings, as performance time reduced participants found it more difficult to improve upon, hence the amount one felt they could decrease performance by reduced across trials in relation to performance gains.

At the within person level of analysis (and after controlling for trial) results found that previous performance predicted 4.78 % to 10.64 % of self-efficacy variance. Finally, self-efficacy had a slight positive effect upon subsequent performance but it was not significant. These results failed to fully support Bandura & Locke (2003) or Vancouver et al. (2001, 2002).

The purpose of the second study was to replicate and extend study 1 by providing the participants with much more information upon which to base their self-efficacy beliefs upon. As noted earlier, by asking participants how well they can improve upon an immediate past performance ignores all the previous performances where learning has occurred. To rectify this possible limitation efficacy beliefs are examined with regards to how well one could improve upon a baseline level of performance. Therefore a participant would become more aware of mastery experiences. The hypothesis remained the same except that self-efficacy should increase over time due to the change in how it is measured.

Study 2

Method

Participants

Fifty participants (43 male, 7 female; mean age = 26.10, *SD* = 3.85) volunteered to take part in the study. All participants had either no previous or minimum experience (2 hours or less a week) of driving simulations. Informed consent was obtained from all participants before taking part in the study.

Measures

Self-efficacy. Magnitude was measured by asking the participants to respond with a *yes* or *no* response regarding 30 different performance levels as opposed to 10 in Study 1 (e.g., "I'm confident in my ability to reduce my best time (baseline performance time) by one second"; "I'm confident in my ability to reduce the best time (baseline performance time) by two seconds" in similar intervals to "I'm confident in my ability to reduce the my time (baseline performance time) by thirty seconds". Therefore, a score of 0-30 was recorded for each trial. Thirty seconds was chosen as on average in Study 1 performance was reduced by twenty-three seconds. Self-efficacy strength was recorded by asking participants to rate their confidence in their ability to perform at that particular level on a scale of 0-100% (where 0 = no confidence at all and 100 = completely confident). Participants only responded for each score against a magnitude level answered *yes* to give a total between 0 and 3000.

Performance

The performance was recorded in identical fashion to that of study 1.

Apparatus

The apparatus was identical to that of study 1. Further, only race track number 3 (Fuji Speedway track) was used throughout the study.

Procedure

Procedure was identical to that of Study1 except that participants had 3 practices of two timed consecutive laps on the track they were tested on. They then completed a further 8 racing trials identical to the practice trials. After completion of the 3 practices trials, the best base line time out of the three practices for that particular participant was used as a the baseline performance measure on which to improve upon.

Normality

Normality was assessed identical to that of Study 1. The data was normalized after the removal of 17 data points (7 self-efficacy magnitude and 10 self-efficacy strength). This was treated as missing data points in the HLM analysis.

Analysis

The same analytical procedures were used to that of Study 1.

Results

The first hypothesis explored whether self-efficacy and race time performance was positively related at the between-person level of analysis. Table 5 shows the means, standard deviations, interclass correlations and bivariate correlations among the study variables. The Cronbach's alpha (ICC 2; reliability) for self-efficacy magnitude, strength and performance was .889, .873 and .984. Interclass correlation (ICC 2) revealed that 86% of performance variance and 19% of self-efficacy magnitude and 17% of self-efficacy strength was at the between person level of analysis. At the between person level of analysis, average self-efficacy and performance across trials were significant and negative for a magnitude (r= -.168**) and for strength (r= -.130**). Therefore, as self-efficacy beliefs increase, performance times decrease (supporting the majority of self-efficacy studies).

Table1 (5) Means, Standard Deviations and Intercorrelations at the Between Person Level of Analysis

Variable	Mean	SD	ICC1	ICC2	1	2
Performance (Time)	311.11	11.78	.867	.984		
Self-efficacy magnitude	9.95	4.45	.197	.889	-.168**	_
Self-efficacy Strength	858.18	415.88	.173	.873	-.130**	.976***

*P<.05, **P<.01, ***P<.001

Table 6 shows the means, standard deviations, and correlations for independent trials. Results reported that the mean subsequent performance time on trial 1 was 315.02 seconds while in trial number 7 it had decreased to 307.14 seconds. This reflects that on average performance time decreased across trials by 7.88 seconds.

Table (6) Means, and Intercorrelations for Independent Trials

Mean	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6	Trial 7
performance	315.02	313.72	313.45	310.33	309.77	307.77	307.70
SE-Magnitude	5.56	7.43	9.37	9.14	11.08	12.62	14.27
SE-Strength	465.91	618.52	793.31	749.95	973.33	1120.31	1266.25
Sub-Performance	313.72	313.45	310.33	309.77	307.77	307.70	307.14
SE-Magnitude Performance *r*	-.117	-.137	-.069	-.259	-.098	-.075	-.025
SE-Strength performance *r*	-.056	-.076	-.130	-.140	-.011	.024	.004

**P<.05, **P<.01, ***P<.001*

The second set of hypothesis predicted that performance and self-efficacy should increase over time at within person level of analysis. Results revealed that performance time significantly decreased over time (γ_{10} = -1.32, p <.001) reflecting a decrease of 1.32 second per trial. Self-efficacy magnitude and strength also significantly increased over time (γ_{10} = 1.37, p <.001 and γ_{10} = 129.07, p <.001) respectively. This shows that self-efficacy magnitude beliefs increased by 1.37 seconds per trial. Trial accounted for 71.26%, 72.58%

and 46.73% of the variance in self-efficacy magnitude, strength, and performance respectively (see Table 7).

After controlling for trial number, results found that previous performance was significantly but negatively related to self-efficacy magnitude (γ 20 = -.637, $p < .001$) and strength (γ 20 = -61.46, $p < .001$). That is, better (or lower) performance led to an increase efficacy beliefs which, in essence reflects a positive performance self-efficacy effect. Further, trial and previous performance accounted for 88.36% and 89.59% in self-efficacy magnitude and strength variance respectively. Variance change signified that previous performance accounted for 59.52 to 62.03 % of magnitude and strength variance above trial (see Table 7).

Table (7) multilevel Modeling at the within- person Level of Analysis

Self-efficacy magnitude as dependent variable					
Step	**Slope γ**	**SE**	**DF**	**% Var**	**Δ % Var**
1.Trial	1.45***	.123	49	71.26	---
2.Previous performance	-.637***	.043	49	88.36	59.52
Self-efficacy strength as dependent variable					
Step	**Slope γ**	**SE**	**Df**	**% Var**	**Δ% Var**
1.Trial	137.44***	12.60	49	72.58	---
2.Previous performance	-61.46***	4.44	49	89.59	62.03

*P <.05, **P <.01, ***P<.001

In terms of the fourth hypothesis, according to Bandura (1997) a positive relationship between self-efficacy and subsequent performance should occur. When trial and previous performance were controlled, both self-efficacy magnitude (γ_{30}= -.213, $p < .05$) and strength (γ_{30} = -.002, $p < .001$) were significantly related to subsequent performance. In other words when self-efficacy magnitude increased by one second, performance time decreased by .213 of a second which offers support of the self-efficacy theory (Bandura, 1997), (see Table 8 & Figures 7 & 8). Further, trial accounted for 49.26% of the variance in performance; previous

performance accounted for an additional 21.06%, while self-efficacy magnitude and strength accounted for a further additional 3.07% and 1.43% respectively.

Table (8) multilevel Modeling at the within- person Level of Analysis

Subsequent performance as dependent variable					
Step	**Slope γ**	**SE**	**DF**	**% Var**	**Δ% Var**
1.Trial	-1.35***	.106	49	49.26	---
2.Previous performance	.02	.070	49	50.33	21.06
3.Self-efficacy magnitude	-.213*	.012	49	50.17	3.07
4. Self-efficacy strength	-.002***	.000	49	49.61	1.43

*P <.05, **P <.01, ***P<.001

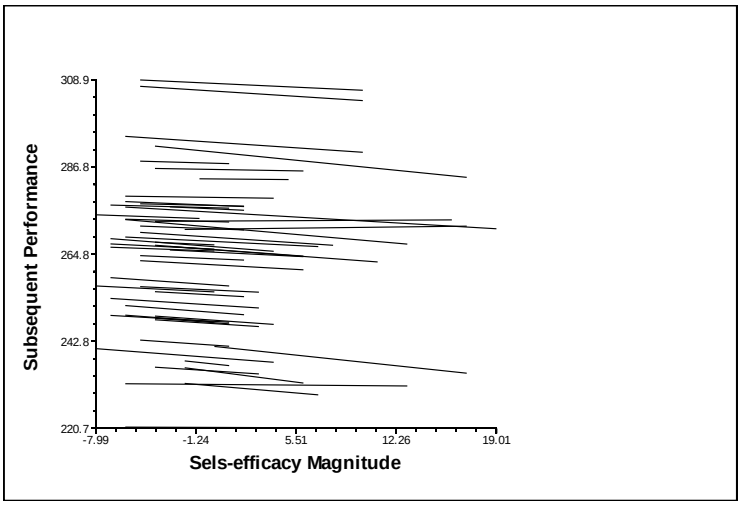

Figure 7. Individual regression slopes showing the relationship between Self-efficacy Magnitude and Subsequent Performance across time.

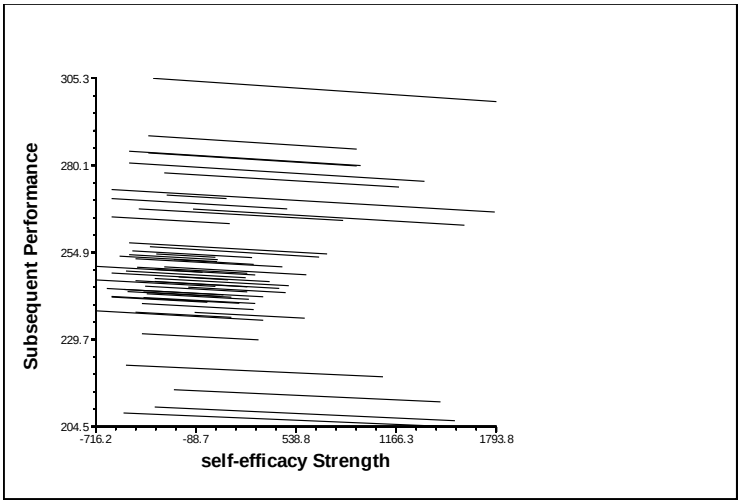

Figure 8. **Individual regression slopes showing the relationship between Self-efficacy Strength and Subsequent Performance across time.**

Discussion

According to our first hypothesis, results showed that average self-efficacy was negatively related to average performance time for a magnitude (r= -. 168**) and for strength (r= -.130**) which meant that high efficacy beliefs lead to better performance (lower race times) supporting the majority of self-efficacy research (e.g., Bandura, 1997). Regarding the second set of hypothesis, at within person level of analysis results showed that performance time significantly decreased across trials. Self-efficacy magnitude and strength also significantly increased over time.

At the within person level of analysis (and after controlling for trial) results found that previous performance had a strong and positive relationship with subsequent self-efficacy and trial and previous performance predicted that 88.36% and 89.59% in self-efficacy magnitude and strength variance respectively. By asking participants to rate their efficacy beliefs in terms of beating their baseline time instead of their previous time (i.e., study 1), results showed that self-efficacy had a significant positive effect upon subsequent performance. This is in contrast to study 1, where self-efficacy was not related to subsequent performance.

General Discussion

The main purpose of studies 1 and 2 was to address the limitations that were put forward from chapter 2. First, we incorporated a task that was more challenging than a simple mundane putting task. Secondly, negative self-efficacy effects may occur due to the context in which they are measured. That is, when participants were asked to rate their efficacies regarding their immediate previous performance, other previous performance accomplishments are ignored. Therefore, they may not be fully aware of their own performance standard on which to base their efficacy beliefs upon as they are only as good as their previous trial. To rectify this possible explanation, efficacy beliefs were examined with regards to how well one could improve upon a baseline level of performance compared to how well one can beat a previous time. A driving simulation task was used where learning could occur in a more complex environment rather than the more mundane tasks that Bandura and Locke (2003) and Bandura (2011) criticize. Results revealed slightly stronger efficacy effects when baseline performance was used as an anchor point.

Relating to the first set of hypothesis, at the between-person level of analysis, self-efficacy magnitude and strength (in both studies) had significant correlations with performance (as efficacy beliefs increased performance times decreased). Although they showed opposite directions (as a result of the context in which they were measured in), this result supports self-efficacy theory (Bandura, 1977) and previous self-efficacy research at the between-person level (e.g., Vancouver et al., 2001).

With regard to second set of Hypothesis that learning (performance) and efficacy beliefs would increase with task practice at within-person level, results revealed that performance times in both (studies) was significantly decreased, showing a strong learning environment. Across both studies learning seemed to differ. In study 1 participants increased performance by 23 seconds, however, they were only able to increase performance in study 2

by seven seconds. It is likely that having the opportunity to practice the task first removed the sharp learning curve seen in study 1. It may be that the self-efficacy and performance relationship would be better described through curvilinear relationships rather than linear when the task is novel.

According to self-efficacy theory (Bandura, 1986), previous performance should have a strong, significant and positive relationship with subsequent self-efficacy beliefs. In study 1 previous performance had a significant and negative effect upon subsequent self-efficacy beliefs. As previous performance improved (i.e., race time decreases) subsequent self-efficacy beliefs decrease because through learning the task, room for subsequent improvement deceased. This effect has been shown in previous research (e.g., Richard et al., 2006) but does not affect the overall self-efficacy and performance relationship. In Study 2, by asking participants to refer their expectation to improvement upon a baseline time rather than their previous time, self-efficacy beliefs increase over time. In both studies, previous performance emerged as a positive and significant predictor of subsequent self-efficacy beliefs at the within-person level of analysis. This result is consistent with previous research (e.g., Beattie et al., 2011; Richard et al., 2006; Vancouver et al., 2001).

Furthermore, in Study 1 variance change signified that previous performance accounted for 4.78 to 10.64 % of magnitude and strength variance above trial. While in Study 2, previous performance accounted for 59.52% to 62.03% of magnitude and strength variance above trial. This is a very large difference which may add to the argument that when little is known about previous performances, one cannot accurately infer subsequent efficacy expectations. This may also lead to self-efficacy being a poor predictor of subsequent performance as seen in Study 1.

With regard to the fourth hypothesis, in Study (1) results indicated that self-efficacy had a slight positive effect on subsequent performance (although the effect was not

significant for both self-efficacy magnitude and strength .The negative slopes reflected that when self-efficacy magnitude increase by one second subsequent performance time was decreased by .22 of a second which in essence offers slight support of Bandura (1986). However, as noted above the reciprocal relationship in study 1 may have been adversely affected by participant's lack of knowledge of their actual performance standard. In Study 2, self-efficacy magnitude and strength were positively and significantly related to subsequent performance in that when self-efficacy magnitude increases by one second performance time decreased by .21 of a second offering support of self-efficacy theory (Bandura, 1986). However, it is odd to notice that self-efficacy strength and magnitude predicted more performance variance in Study 1 (6.96% & 6.311 %) than Study 2 (3.07% & 1.43%) but the relationship was not significant for Study 1 whereas it was for Study 2.

It appears that the context in which self-efficacy is measured does influence the relationship between self-efficacy and subsequent performance. In Study 1 where participants rated their efficacy beliefs only with regard to beating their previous performance, then there was no significant relationship between self-efficacy and subsequent performance. In study 2 where self-efficacy was based on improving from a base line score and participants practiced the task first, self-efficacy had a positive effect upon subsequent performance. Therefore, the self-efficacy measure and more specifically what it measures may moderate the reciprocal self-efficacy and performance relationship.

These findings offer some mixed support for our hypothesis. Firstly, using complex tasks did increase the strength of the self-efficacy and performance relationship as Bandura and Locke (2003) would suggest. However, by changing to a complex task but not changing the efficacy measure, the efficacy and performance relationship remained non-significant. By providing participants with practice at the task and by providing information where

participants could see a performance increase from their baseline score, seemed to strengthen the self-efficacy and performance relationship.

One main limitation of the current set of studies is that participants still did not have access to all their trial times, only their baseline performance and previous lap time. They may have used their baseline performance and their previous trial as a reference on which to base their efficacy beliefs upon, but they did not get full performance feedback. Therefore, a study that allows an individual to see every trial score and receive full performance feedback before making efficacy judgements should strengthen the self-efficacy and performance relationship further. That is the purpose of the next study.

Chapter 4

Chapter 4

Investigating the Possible Positive effect of Task Feedback on the Reciprocal Relationship between Self-Efficacy and Performance upon Golf Putting

Introduction

Social– cognitive theory (e.g., Bandura, (1997) suggests that efficacy beliefs facilitate motivation, and numerous empirical studies have found self-efficacy to have positive effects on outcomes such as effort, persistence, and performance (e.g., Bandura & Cervone, 1986; Cervone, Jiwani, & Wood, 1991; Gist, 1987; Stevens & Gist,1997). However, over the last decades, the straight view of self-efficacy has a positive influence on performance has been examined.

According to Bandura (1986), self-efficacy perceptions are dynamic and any new experience or information should be influential on the subsequent acquisition of skills and efficacy expectations. To explain, task feedback assists in the transfer of information required to successfully assess performance levels (Karl, Kelly, & Martocchio, 1993). It stands to reason that the more task feedback one receives, the more accurately one can assess their levels of self-efficacy. Bandura (1997) suggest that efficacy beliefs are likely to become misguided if they are based upon ambiguous feedback. Therefore, the positive relationship between self-efficacy and performance is expected when individuals receive clear and accurate feedback about their performance.

Recently, the use of feedback and its effect on performance seems to be widely examined in sport. Further, in their meta-analysis Kluger and DeNisi (1996) noted that the majority of studies they reviewed, task feedback had a positive effect on performance. Numerous studies have also shown that feedback has a positive relationship with self-efficacy (Escarti and Guzmán, 1999; Fitzsimmons, Landers, Thomas, & van der Mars , 1991; Sinclair and Vealey, 1989; Weinberg, Yukelson, & Jackson, 1981).

Performance feedback seems to be an important aspect of building accurate self-efficacy perceptions. It is hard for an individual to make statements on his/ her actions without knowing his/her actual performance level (Sinclair & Vealey, 1989). According to

Taylor (2006) the received feedback gives individuals sound judgments about the outcome of their work (Bilodeau, & Schumsky, 1959; Trowbridge & Cason, 1932).

In previous empirical chapters of this thesis, performance feedback has either been limited to the previous trial or a baseline performance. Therefore, in order to fully explore the nature of the performance feedbacks role in the self-efficacy and performance relationship, the current study aimed to increase a participant's awareness of previous performance. Therefore, a performance diary was used throughout the current study where participants were given previous performance information regarding all their trials before they completed a self-efficacy questionnaire with relation to their real performance.

The main purpose of this study was to: Firstly, examine the hypothesis predicted that at the between-person level of analysis self-efficacy would have a strong and positive relationship (correlation) with performance. Secondly, with regards to the within-person level of analysis it is predicted that learning (i.e., performance) will significantly improve throughout practice, as will self-efficacy beliefs (as mastery experiences increase efficacy beliefs). Thirdly, previous performance will be a strong positive predictor of subsequent self-efficacy beliefs. Fourth, according to Vancouver et al. (2001, 2002) at the within person level of analysis, self-efficacy will have a negative relationship with performance. However, according to Bandura (1997) and by addressing previous limitations, a positive relationship

The hypotheses were relatively identical to that of Chapter 2 and 3 with a few minor changes. We expected that performance and self-efficacy beliefs would increase over time. Self-efficacy would increase as we were using a baseline measure of performance (as in Chapter 3) upon which participants based their efficacy upon. Further, if limited performance feedback is a main cause of negative self-efficacy effects, then a positive relationship between self-efficacy and subsequent performance will occur (rather than the negative one that Vancouver (2001) would predict).

Method

Participants

Forty- five 45 participants (42 male and 3 female; mean age = 28.22, *SD* = 5.15) volunteered to take part in the study. The age of the participants ranged from 18-38 years of age. A golf putting task was used where all participants had either no or minimum experience of golf putting (i.e., play 1-3 times a year). Informed consent was obtained from all participants before data collection commenced.

Materials and Measures

Self-efficacy magnitude. Self-efficacy magnitude was recorded by asking participants to indicate (*yes*/*no*) if they believed they were able of achieving performance by beating their baseline score (e.g., "I'm confident in my ability to beat my base line score by 1 point"; "I'm confident in my ability to beat my base line score by 2 points" in similar intervals to "I'm confident in my ability to beat my base line score by 40. Therefore, a score of 0-40 was recorded for each performance.

Self-efficacy strength. Self-efficacy strength was recorded by asking participants to rate their confidence in their ability to perform at that particular level on a scale of 0-100% (where 0 = no confidence at all and 100 = completely confident). Participants only responded for each score against a magnitude level answered *yes* to give a total between 0 and 4000.

Design

Participants were shown the apparatus and briefed about the nature of the task. Form consent was obtained and completed by participants before the task began. The experiment consisted of one session containing 10 experimental trials each containing 20 putts (200 putts in total). Putts were made from 4 starting positions with an equal starting distance from the target hole of 210cm. Each putt was made perpendicular to the last at a distance of 30 cm's. Participants had to start from a different starting position at each trial. Participants were given

3 practice trials (of 20 putts) where a baseline measure of performance was taken. After completion of the 3 practices trials, the participant's best baseline performance used as the performance that they were asked to improve upon over the remaining 10 performance trials. After each trial, participant's scores were recorded and before completing the self-efficacy questionnaire with regards to their subsequent trial they were informed of how many points they had achieved on that trial and in all previous trials. To increase the motivation of participation cash prizes were awarded for performance; £50 for the first highest points overall; £30 for the second highest points overall; and £20 for the third highest points total overall.

Performance

Performance was measured by the researcher who recorded the total of points that participants achieved in their current trial. A pre-designed spreadsheet form was used to record participant performance scores (Appendix C).

Apparatus

Golf putts were performed on an Astroturf surface using a standard Prosimmon KT25 putter and a standard Slazenger Raw Distance 432 dimple pattern golf ball. The four starting positions consisted of a 3 cm diameter circle 30cm's apart and all at a distance of 210 cm from the target hole. There are 4 circles around the main target hole were drawn onto the Astroturf (green patch) by different colored chalk circled around the hole (10.8 cm in diameter). The apparatus was identical to that of Chapter 2

Measure

Scoring system involved four circles that were 5cm distant from another one that surrounded the hole. Participants gained 5 points for a successful putt. If they missed the hole by up to 5cm's (i.e., the ball stopped inside the first concentric circle from the hole 0-5 cm) then they were awarded 4 points. They were awarded 3 points if the ball landed within the

second circle but outside the first (i.e., landed within 5-10cm's from the hole) and so on. A maximum score of 100 points (20 successful putts) could be achieved on any one trial.

Results

Table 1 illustrates the means, standard deviations, interclass correlations and bivariate correlations for study's variables. The interclass correlations (ICC1) show that 59.7% of performance variance and 60.9% – 63.5% of efficacy beliefs variance was accounted for at the between person level of analysis. Between person correlations revealed that average self-efficacy and performance across trials were significant for magnitude (r = .232**) and for strength (r = .235**). Thus confirm the first set of hypothesis and supporting Bandura's (1997) self-efficacy theory in that, the higher ones efficacy beliefs was correlated with better performance. The Cronbach's alpha (ICC2) value was considered acceptable at α =0.6 (Robinson et al., 1991). Cronbach's alpha for self-efficacy magnitude, strength and performance was .937, .917 and .949.

Table1 (1) Means, Standard Deviations and Intercorrelations at the Between Person Level of Analysis

Variable	Mean	SD	ICC1	ICC2	1	2
Performance	54.99	11.85	.597	.949	_	
Self-efficacy magnitude	15.10	7.83	.609	.937	.232**	_
Self-efficacy Strength	1370.48	757.27	.635	.917	.235**	.964**

*P<.05, **P<.01, ***P<.001

On a trial by trial basis self-efficacy magnitude and strength were significantly related to subsequent performance only on trial 8 with correlations ranging from (r = .323* to .336*) (see Table 2). Thus, this result failed to fully support self-efficacy theory in that self-efficacy should show a strong, significant and positive correlation with subsequent performance at each trial. But this result seems to support the majority of the thesis findings.

Table 2 shows the means and between person correlations for independent trials for performance and self-efficacy scores. Regarding the second set of hypothesis, results reported that baseline performance scores on trial 1 was 45.44 points while in trial number 10 it had increased to 61.06 points. This was a significant increase across trials ($\gamma_{10=}$ 1.47, p <.001; on average performance increased by 1.47 points per trial). Further, self-efficacy magnitude and strength also significantly increased over time (magnitude $\gamma 10$ = 1.68, p <.001; strength $\gamma 10$ =152.24, p <.001; self-efficacy magnitude beliefs increased by 1.68 points per trial). Trial accounted for 66.95%, 58.30%, and 33.33% of variance in self-efficacy magnitude; strength and performance respectively (see Table 3 and 4). These results confirm the hypothesis that learning (performance) and self-efficacy beliefs would increase with task practice.

Table (2) Means, and Intercorrelations for Independent Trials

Mean	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6	Trial 7	Trial 8	Trial 9
Previous Performance	45.44	48.17	50.22	51.53	53.97	55.75	56.28	56.77	58.06
SE-Magnitude	6.73	9.60	12.00	13.93	16.02	17.48	18.42	18.91	20.91
SE-Strength	577.82	887.22	1094.33	1294.88	1455.66	1595.22	1687.44	1653.22	1915.33
Subsequent Performance	48.17	50.02	51.53	53.97	55.75	56.28	56.77	58.06	61.06
SE-Mag Sub Performance *r*	-.098	-.057	-.118	.213	-.001	.245	.203	.323*	.032
SE-Strength Sub Performance *r*	-.095	-.040	-.130	.183	.021	.244	.194	.336*	.095

**P<.05, **P<.01, ***P<.001*

The third hypothesis predicted previous performance would be a significant predictor of subsequent self-efficacy beliefs. The findings found a significant positive relationship between previous performance and self-efficacy magnitude ($\gamma 20$=.433, p < .001) and strength (γ 20=46.87, p < .001). Furthermore, previous performance predicted 56.11% and 52.62% of

self-efficacy magnitude and strength above that of trial. Full models accounted for 80-85% of self-efficacy variance (Table 3).

Table (3) multilevel Modeling at the within- person Level of Analysis

Self-efficacy magnitude as dependent variable					
Step	**Slope γ**	**SE**	**Df**	**% Var**	**Δ% Var**
1.Trial	1.68***	.131	44	66.95	---
2.Previous performance	.433***	.032	44	85.49	56.11
Self-efficacy strength as dependent variable					
Step	**Slope γ**	**SE**	**Df**	**% Var**	**Δ% Var**
1.Trial	152.24***	13.43	44	58.30	---
2.Previous performance	46.87***	4.011	44	80.24	52.62

*P <.05, **P <.01, ***P<.001

Hypothesis four investigated whether self-efficacy has a positive or a negative effect upon subsequent performance. Results showed that trial (1.47***) and previous performance (-.14**) were significantly related to self-efficacy magnitude and strength. Previous performance also added 6.19% of subsequent performance variance above trial. Furthermore, self-efficacy magnitude ($\gamma 20 = .40$, $p < .01$) and strength ($\gamma 20 = .00$, $p < .001$) significantly predicted performance over and above trial and previous performance. These results offer full support for Bandura (1997) self-efficacy theory. However, self-efficacy magnitude and strength only accounted for 1.88% to 3.84 % of subsequent performance variance when trial and previous performance was accounted for (see Figure 1 & 2).

Table (4) multilevel Modeling at the within- person Level of Analysis

Subsequent performance as dependent variable					
Step	**Slope γ**	**SE**	**DF**	**% Var**	**Δ% Var**
1.Trial	1.47***	.15	44	33.33	---
2.Previous performance	-.14**	.05	44	37.47	6.19
3.Self-efficacy magnitude	.40**	.12	44	38.64	1.88
4. Self-efficacy strength	.00***	.00	44	39.87	3.84

*P <.05, **P <.01, ***P<.001

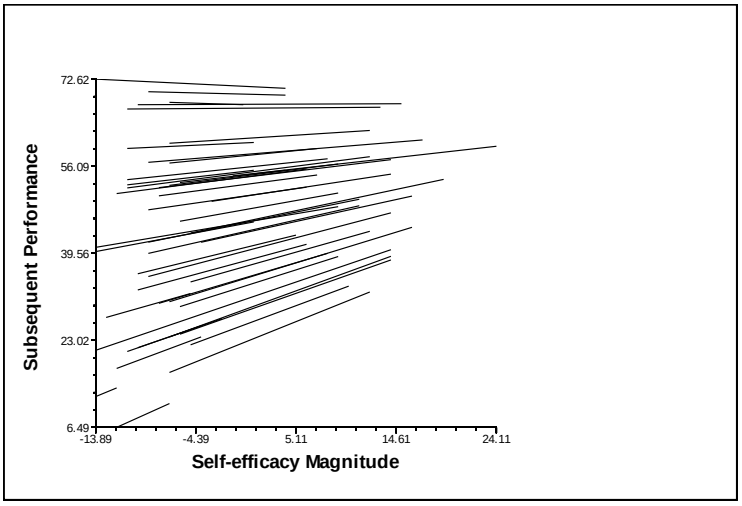

Figure 1. **Individual regression slopes showing the relationship between self-efficacy Magnitude and subsequent performance across time.**

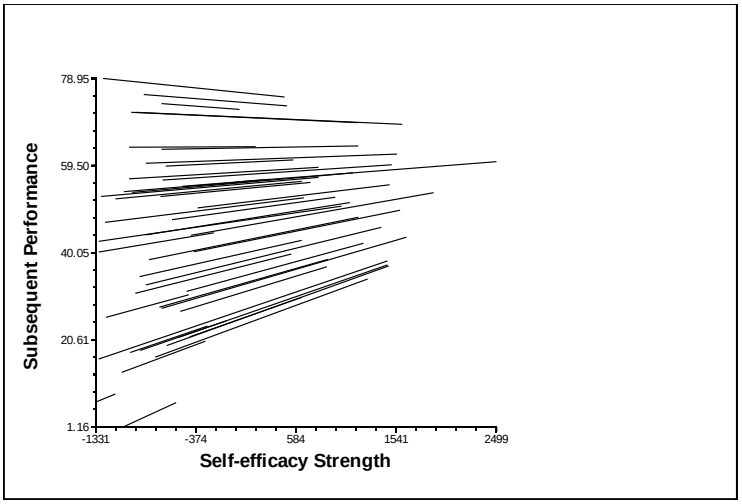

Figure 2. Individual regression slopes showing the relationship between self-efficacy Strength and subsequent performance across time.

Discussion

The present study examined the effects of increasing the amount of performance feedback on the reciprocal relationship between self-efficacy and performance. It was hypothesized that by improving knowledge of one's skill level (by making knowledge of previous performance more accessible) would reduce performance ambiguity and therefore eliminate negative self-efficacy effects that has been demonstrated in tasks that are high in ambiguity (e.g., Vancouver et al,. 2001, 2002). It appears that by providing participants with

performance feedback on every single trial increased the accuracy of their self-efficacy perception, which in turn showed a positive effect at a within person level of analysis.

With regards to the first hypothesis, self-efficacy showed to be a significant and positive correlate with performance at between person levels of analysis which is compatible with most of self-efficacy research (Bandura, 1997; Bandura & Locke, 2003; Brown, & Lent, 1991; Feltz et al., 2008; Kane, Marks, Zaccaro, & Blair, 1996; Moritz, Feltz, Fahrbach, & Mack, 2000;; Multon,; Vancouver et al., 2001, 2002). It further supports the findings in most of the previous chapters. However, this was not quite the case for every trial. In fact, in most trials (and generally throughout the thesis) self-efficacy was not related to subsequent performance at a between person level.

By addressing Bandura and Lockes' (2003) criticisms, we provided a strong learning environment where performance and self-efficacy beliefs could develop across trials. At the within person level of analysis results revealed that self-efficacy magnitude ($\gamma 10 = 1.68$, $p < .001$), strength ($\gamma 10 = 152.24$, $p < .001$), and performance ($\gamma_{10} = 1.47$, $p < .001$) significantly increased over trials.

Self-efficacy theory (Bandura, 1986) predicts that performance accomplishments should have a strong, positive and significant relationship with subsequent self-efficacy. This was shown at the within person level of analysis. Previous performance accounted for 52-56% of self-efficacy variance above trial alone. This replicates the findings from the second study in the previous chapter where previous performance accounted for a large proportion of self-efficacy. Further, social cognitive theory assumes that self-efficacy can play an essential role in human behavior. That is, perceived success in performance leads individuals to set higher level goals and invest more effort toward achieving those goals, which if accomplished, enhance and produce further efficacy beliefs. It appears that having the knowledge of better previous performance results prompted individuals into accepting more

challenging goals (i.e., to improve upon previous performance) which when accomplished increased their perceptions of self-efficacy. However, personal goals were not assessed in the current study.

With regards to hypothesis four, when full feedback was given to the participants in terms of their current and previous experimental trials, results showed that a significant and positive effect of both self-efficacy magnitude and strength upon subsequent performance occurred. This is fully in line with self-efficacy theory that increased self-efficacy leads to increased effort hence produce higher levels of performance. However, Vancouver et al. (2001, 2002) would suggest the opposite in that efficacy beliefs would have a negative effect upon subsequent performance. It appears that by providing performance feedback with regards to previous trials negates this negative effect. Therefore, in this study efficacy was a positive and significant predictor of subsequent performance.

Feedback has shown in previous research as a positive precursor of building efficacy beliefs (Morres & Chang, 2009; Shantz & Latham 2012). Further, by asking participants to rate their efficacy with regard to the best score they achieved in the practice trials, and to provide performance feedback on every trial thereafter, participants were able to observe progress and mastery experiences building over time. This added to a real sense of efficacy beliefs building up over trials which has been absent in previous research (e.g., Beattie et al., 2011; Vancouver et al., 2001, 2002).

It would be interesting to replicate this study to compare expert and novice differences with regards to performance feedback and task ambiguity. It may be that experts will rely more on past experiences to judge their efficacy with regards to ambiguous tasks and perform just as well when performance feedback is present or not. However, novices who perform ambiguous tasks with ambiguous feedback may be more prone to showing negative self-efficacy effects at a within person level.

Both self-efficacy theory (Bandura, 1986) and control theory (Powers, 1991) support that previous performance should positive affect subsequent self-efficacy. It has been shown in the present thesis that information regarding how one performed previously, needs to be available to the performer in order for them to more accurately infer their own levels of efficacy (e.g., Ackerman, Kanfer, & Goff, 1995; Bandura, 1997; Kozlowski, Gully, Brown, Salas, Smith, & Nason, 2001; Mitchell, Hopper, Daniels, George-Falvy, & James, 1994; Schmidt, & Dolis, 2009).

Providing performance feedback seems to reverse the negative slope seen in session 1 of Chapter 2 into a positive effect. This would support the core of self-efficacy theory (Bandura, 1986) which predicted that individuals with high efficacy beliefs will invest more resources toward meeting and achieve their goal which is consistent with recent research (e,g,. Glison, Chow, & Feltz, 2012; Seo & Llies, 2009).

This study builds upon previous research and might develop a better understanding of why positive self-efficacy affects may come about. Current results suggest that the ambiguity has to be minimized toward reducing the potential for negative self-efficacy effects by providing participants a specific and timely information and feedback about their performance. To conclude, when participants have given much more feedback and information about their performance, if performance ambiguity is low, the mediator of the negative effect of self-efficacy on performance is limited, which in turn lead to reject or remove the negative effect (Schmidt & DeShon, 2010).

Chapter 5

Chapter 5

General Discussion

Summary of Thesis Findings:

The purpose of the final chapter is to revisit the main hypothesis of the thesis and to discuss the findings from the three empirical chapters. The findings will then be discussed in terms of their theoretical implications and how they might be applied. The chapter will conclude with the strengths and main limitations of the thesis's findings, as well as recommendations regarding the future research directions that should be considered in this area.

In this thesis, experimental investigations were carried out in order to verify whether previous research limitations could explain negative self-efficacy and performance relationships (e.g., Vancouver et al., 2001, 2002). Earlier studies have found that self-efficacy and task performance are positively related because individuals with higher self-efficacy are able to perform at a higher level than those with lower self-efficacy (e.g., Moritz et al., 2000). At the between person level of analysis, a moderate-strength relationship of r = .38 has been shown across 45 studies between motor performance and self-efficacy. Hence, self-efficacy has been defined as a "cause and an effect of performance" (Moritz et al., 2000; p. 289).

According to Stajkovic and Luthans (1988) self-efficacy has been shown to have a stronger effect upon performance than others variables such as feedback, and goal setting, they also noted that self-efficacy predicted performance by up to 28%. Further, self-efficacy studies found that more than 93% of the research found positive correlations between self-efficacy and performance (Sitzmann & Ely, 2011). One point to bear in mind (that will be focused upon later) is that the positive correlations noted above were accounted for at the between-person level of analysis.

Bandura (1986) has proposed that there is a reciprocal relationship between self-efficacy and performance. First, self-efficacy theory predicts that successful mastery experiences build and enhance strong self-efficacy beliefs. This seems to be a fairly robust

finding that has a wealth of support across a range of domains (e.g., Bandura, 1997). The picture is less clear when one considers the other half of the relationship, that is, the effect of self-efficacy upon subsequent performance. As stated in the introduction, Vancouver et al. (2001, 2002) highlighted that perceptual control theory (Powers, 1991) predicts that the effect of self-efficacy upon performance might be (in some cases) null or even negative. This argument is not new however, and the direction of self-efficacy causality and whether self-efficacy is a driver of subsequent performance has received previous empirical attention from other researchers (e.g., Heggestad & Kanfer, 2005; George, 1994; Mitchell, 1997).

Vancouver et al. (2001, 2002) noted that the positive relationship observed at the between-persons level may be due to the effect of previous performance effects on self-efficacy rather than independent effects of self-efficacy upon subsequent performance. Vancouver called for research to be conducted at the within person level of analysis (as self-efficacy is an internal belief that influences one's own behavior). He set out a series of studies to measure self-efficacy at a within-person design with the aim of dismantling the relative magnitude and causality of the reciprocal relationship between self-efficacy and performance.

Chapter 1 highlighted Vancouver's research where he explored the reciprocal relationship between self-efficacy and performance at the within person level of analysis. However, the main purpose of the present thesis was to address some of the limitations highlighted by Bandura and Locke (2003) and Beattie et al. (2011). First, Bandura and Locke (2003) highlighted that the task used in Vancouver et al.'s (2001, 2002) studies was inappropriate for testing such effects. According to Bandura and Locke (2003), the use of such guessing games did not allow efficacy beliefs to build up over trials as each trial outcome is independent from the last. Further, Bandura and Locke argued that Vancouver et al. (2001, 2002) failed to accurately measure self-efficacy in that he asked participants to rate

"How likely are you to find a solution?" rather than "how confident are you that you will find the solution?"

In addition, Chapter 1 highlighted two further limitations noted by Beattie et al. (2011). Firstly, the typical use of eight repeated trials in self-efficacy research may limit the amount of mastery experiences that individuals are exposed to, hence limiting self-efficacy's relationship with subsequent performance. Secondly, the performance measure (i.e., successful putts) used by Beattie et al. (2011) may not be a very sensitive measure of performance, because a participant who over-strikes the ball and a participant who strikes the ball perfectly would be reported as performing identically. In fact, the performance measure was a dichotomous measure where a null score was reported regardless of how close a missed putt was from the hole. Consequently, the first empirical chapter extended Beattie et al.'s. (2011) study by increasing the number of experimental trials from 8 to 40 and by using a target zone around the putting hole to assess putting performance. The self-efficacy measure was also designed to ask participants to rate their confidence in terms of their previous trial rather than "how likely they are to find a solution" as used by Vancouver et al. (2001).

The second empirical Chapter (Chapter 3 in the thesis) addressed Bandura and Locke's (2003) criticism that in mundane lab tasks where nothing is to be learned or nothing intrudes on attentional focus, performance quickly stabilizes. A further finding from Chapter 2 was that, due to the nature of the golf putting task, efficacy beliefs decreased across time. That is, as a participant improved at the task, the room for performance improvement decreased (see also Richard et al., 2006). While this finding is nothing new and self-efficacy may not be decreasing in absolute terms, participants may be less motivated to invest effort if they see that their performance improvements are becoming smaller and smaller especially if they have no performance goal to work to. Consequently, Chapter 3 assessed self-efficacy from two standpoints, to beat an immediate previous trial and to beat a baseline score.

Moreover, the golf putting task may be seen as generally mundane and uninteresting that did little to challenge the participants. Indeed, such tasks as noted above have been shown to produce non-significant efficacy effects. Hence, two studies in the form of a more complex race car simulation task (in which participants had to learn to race on a complex track) were presented in Chapter 3.

Typical within-person self-efficacy research asks participants to rate their self-efficacy by only referring to (or without reference to) how they could improve upon a previous performance (e.g., Vancouver et al., 2001, 2002). As self-efficacy beliefs partly build on mastery experiences, vital performance information may be missing when one makes self-efficacy judgments based on their last performance alone (especially if the task is novel in nature). This limitation was also evident in the first two empirical chapters. Consequently, the final empirical chapter (Chapter 4) extended the amount of feedback participants received in Chapter 3, and participants were asked to complete a performance diary in which they could access all previous performances in all trials before they rated their self-efficacy beliefs.

The hypothesis of the current thesis remained relatively constant throughout. That is, the hypothesis did not change but the experimental manipulations did. The next section of the discussion examines each hypothesis in turn and compares the findings across studies.

Hypothesis 1

Self-efficacy will show a strong, significant, and positive correlation with subsequent performance at the between-person level of analysis.

The idea that self-efficacy is positively related to higher performance at the between person level of analysis is widely accepted as empirically and theoretically valid. Therefore, across all studies presented in the thesis, self-efficacy should have a positive and significant correlation with subsequent performance at the between person level of analysis.

Results from Chapter 2 revealed a moderate and significant negative relationship between average self-efficacy and average performance in all four separate sessions and all 4 sessions together. These results seem to be inconsistent with several previous studies of self-efficacy research (e.g., Kane, Marks, Zaccaro, & Blair, 1996; Moritz, Feltz, Fahrbach, & Mack, 2000; Multon, Brown, & Lent, 1991) and with more recent research (Beattie et al., 2011) when self-efficacy and performance was measured between-persons. Perhaps the main reason for the negative direction is that when performance is high, self-efficacy magnitude and strength beliefs are small due to participants having less room to improve on the task. This may be particularly apparent in the final stage of learning where performance standards are high.

The same negative relationship was revealed in Chapter 3 (Study 2) . In this study participants were required to state the degree to which they could beat a baseline performance. That is, good performers (those with low racing times) stated that they could beat their baseline time by a larger number of seconds (self-efficacy magnitude) hence the negative relationship. Nonetheless, the negative direction seen across both chapters does not necessarily mean that self-efficacy was negatively related to performance, it is simply more about how performance is measured and what each performance is compared to (i.e., improving a baseline or a previous performance).

In contrast, the result of the first study of Chapter 3 revealed a positive correlation between self-efficacy and performance at the between person level. Further, in Chapter 4 when participants had judged their efficacy beliefs to the baseline time score and had access to all their performance scores, both self-efficacy magnitude and strength were significantly and positively correlated to performance. This supports most of self-efficacy research at the between-person level (e.g., Kane, Marks, Zaccaro, & Blair, 1996; Multon, Brown, & Lent, 1991; Moritz, Feltz, Fahrbach, & Mack, 2000).

Hypothesis 2

Performance and self-efficacy beliefs will significantly increase across time.

Bandura and Locke (2003) stated that when examining the reciprocal effects of self-efficacy "the structure of the on-going activity should permit progressive changes in perceived self-efficacy and performance rather than sequentially disjoined activities" (p. 96). The second set of hypothesis was based around this recommendation. The thesis used tasks where learning would occur across time. At the within-person level of analysis it was predicted that learning (i.e., performance) would significantly increase across trials, as would self-efficacy beliefs (as mastery experiences increase efficacy beliefs). Chapter 2 revealed that performance significantly increased over time in sessions 1, 2, 3, and all 36 trials together, but was non-significant in session 4 where it appears performance had plateaued. Results of both studies 1 and 2 in Chapter 3 showed that race times significantly decreased (improved) over trials. In the final empirical Chapter (Chapter 4), where we investigated the effect of feedback upon the reciprocal relationship between self-efficacy and subsequent performance, the results showed that golf putting performance also significantly increased across trials. Therefore, throughout the thesis (with the exception of study 4 in Chapter 2) a strong learning environment occurred satisfying one of Bandura and Locke's (2003) criticisms of the within person self-efficacy research.

The second part of this set of hypothesis predicted that self-efficacy will significantly increase across trials. In the first empirical Chapter (Chapter 2), self-efficacy magnitude and strength slightly (but non-significant) decreased over trials in sessions 1, 3, and 4. Both self-efficacy magnitude and strength significantly *decreased* over time across all 36 trials. Self-efficacy in session 2 increased but not significantly. Moreover, this was in reflection to task improvements as opposed to participants losing their confidence. In other words, this result

supports Richard et al. (2006) when they also noted that efficacy had decreased across trials (as exam course content became more difficult to deal with).

Chapter 3 examined the reciprocal effects of self-efficacy and performance in a car racing simulator. In Study 1, self-efficacy significantly decreased across time which at first instance seems opposed to our hypothesis. However, as above this reflected the improvement of performance rather than the weakening of efficacy beliefs. When participants got better at the task room for improvement (efficacy magnitude) decreased particularly in the final trials where most learning had occurred. However, after modifying the self-efficacy questionnaire in the second racing study, when self-efficacy was measured by asking the participants to respond with a yes or no response regarding decreasing their baseline performance, the result showed that self-efficacy magnitude and strength were significantly increased over time.

In the final empirical chapter (Chapter 4), self-efficacy magnitude and strength significantly increased over time (self-efficacy magnitude beliefs increased by 1.68 points per trial). This was again a reflection of participants improving on a baseline score. Therefore, the trajectory of self-efficacy beliefs increasing or decreasing across time seems to be dependent on how they (and performance) are measured. In any case, within the HLM analysis, the direction of self-efficacy across time has no bearing on the ensuing direction of the self-efficacy and performance relationship as is takes into consideration the direction of performance.

Hypothesis 3

Previous performance will have a strong and positive effect upon the subsequent self-efficacy.

Mastery experiences are considered to be the most important of all self-efficacy sources (Bandura, Adams, & Beyer, 1977; Biran & Wilson, 1981; Feltz, Landers, & Raeder, 1979; McAuley, 1985; Wise & Trunnell, 2001). According to self-efficacy theory individuals

with previous successful experience develop robust efficacy beliefs and are less likely to doubt their potential for subsequent success. Conversely, past failures can lower one's self-efficacy. The third hypothesis in the thesis predicted that previous performance would have a strong, significant and positive effect upon subsequent self-efficacy beliefs (e.g., Bandura, 1997; Vancouver et al., 2001, 2002; Vancouver & Kendal, 2006).

Results of Chapter 2 (golf putting study) showed that previous performance had a significant negative effect upon self-efficacy magnitude and strength at within-person level in all 4 sessions and across all 36 trials. Although this seems counterintuitive, it is very likely a reflection of the task characteristics. The task used (golf putting) has a maximum performance score of 100 points. As performance increases across trials a learning effect occurs which slows down across time (i.e., a curvilinear relationship occurs). Consequently, the better a participant performed on their previous trial, the less they perceived there was room for further improvement on the subsequent trial. This result is consistent with Richard et al.'s (2006) study where previous performance was negatively related to subsequent self-efficacy, and both self-efficacy and academic performance decreased over trials.

In Chapter 3 (car racing study 1), previous performance also had a significant negative relationship with subsequent self-efficacy beliefs. This reflected the same task characteristics as in Chapter 2, where participants were asked how confident they were in beating their previous performance time. Hence as they improved at the task, their perceived room for improvement (self-efficacy) decreased.

In Chapter 3 (car racing study 2), self-efficacy was measured by asking participants how confident they were in improving upon a baseline time (rather than their previous time). Therefore, as the baseline time remained constant, self-efficacy beliefs increase over time. Further, previous performance emerged as a significant and positive predictor of subsequent self-efficacy beliefs (i.e., better performance leads to increased efficacy beliefs in relation to a

constant baseline score). This result is consistent with previous research (e.g., Vancouver et al., 2001; Beattie et al., 2011). Chapter 4 also used a baseline performance score in which participants rated their self-efficacy beliefs upon and performance again was positively related to subsequent self-efficacy beliefs.

The variance accounted for varied across studies. Magnitude and strength variance respectively varied across studies in terms of how much information the participant got in terms of previous performance. The variance accounted for in self-efficacy by performance in the first session (Chapter 2) was ranged from 41.53- 42.96% of self-efficacy variance. While this proportion was increased gradually to be 63.15-74.29 % in the fourth session. However, compare this result to that of the (Chapter 4) when the variance accounted for 80.24-85.49% of self-efficacy as large amounts of feedback was provided to the participants. That is, the more information participants get about performance standards, the higher the variance accounted for in the self-efficacy scores.

Hypothesis 4

According to Bandura (1997) self-efficacy will have a positive effect upon subsequent performance. According to Vancouver et al. (2001) a negative effect may occur.

The crux of the thesis was to determine whether previous tests of the reciprocal relationship between self-efficacy and performance was partly caused by the methodology used to test for such relationships. The thesis examined whether task issues (e.g., learning and length of time in the learning environment) and measurement issues (e.g., how much information one was exposed to before making an efficacy judgment) influenced the directional effect.

The purpose of Chapter 2 was twofold. First, it was designed to extend the performance trials from 8 (e.g., Beattie et al., 2011; Vancouver et al., 2001, 2002) to 36 to allow more time for learning to occur. By addressing the limitation of previous research (by

expanding the number of putts to 800 and making performance more variable) we hoped to provide a better environment where efficacy beliefs and mastery experience could build over time. Second, we extended the performance measure used by Beattie et al. (2011) by creating a scoring system that allowed for close misses to be counted rather than just successful putts. The results of Chapter 2 revealed that the 3 out 4 golf putting sessions (1, 2 and 4) revealed that self-efficacy had no significant effect upon subsequent performance (supporting Beattie et al., 2011; Richard et al., 2006). However, this is a little surprising, as participants reaching session 4 should have a wealth of knowledge about their putting skills (having completed 600 putts). We expected to see a positive effect between self-efficacy and performance at this stage. Further, a significant negative effect was observed in session 3 (supporting Vancouver et al., 2001, 2002). Based on Vancouver et al.'s work the reason for the negative effect of self-efficacy upon subsequent performance may be that, self-efficacy was inflated by previous performances and therefore individuals are likely to detect a smaller discrepancy between their current and desired states and as a consequence, reduce effort. As the putting task was a relatively easy task that contained 800 putts it may have been interpreted as unchallenging and uninteresting. Again this might lead to reduced motivation where participants become somewhat bored by the task and again decrease their efforts. This finding and potential explanation does support Bandura and Locke's (2003) criticism that, mundane lab tasks may produce non-significant self-efficacy effects because they do not vary or intrude upon attentional focus.

To further address the possibility that dull and mundane tasks may produce null or negative self-efficacy effects, we conducted two studies (Chapter 3) that examined the reciprocal relationship between self-efficacy and performance by using a complex task (a car racing simulation). Participants were required to learn how to race on a difficult racing course

over a series of trials in which performance was assessed in relation to either improving upon immediate previous lap times (Study 1) or in relation to a baseline time (Study 2).

Results in Study 1 showed a slight positive effect of self-efficacy upon subsequent performance. However, this was not a significant effect failing to fully support Bandura's (1997) self-efficacy theory or Vancouver et al.'s (2001, 2002) findings. However, in Study 2 when self-efficacy measures were adapted to measure performance from a baseline score (rather than their from previous trial time), results showed that self-efficacy had a significant and positive effect on subsequent performance which is fully supportive of self-efficacy theory.

It appears that the reciprocal relationship strengthened when more feedback and information about previous performances (e.g., baseline) were given to the participants in Chapter 4 (golf putting). As self-efficacy beliefs in beating one's own baseline scores increased, and information regarding all of one's past performances was available, then the actual performance increased. These results offer full support for Bandura's (1997) self-efficacy theory. This was probably a result of the more information about one's level of ability one has, the stronger and more positive affect self-efficacy will have. It is interesting to note that Chapter 2 and Chapter 4 used the same mundane putting task. However, in Chapter 2 (Session 1) self-efficacy had no effect upon performance. In Chapter 4, although the same task was used, self-efficacy became a positive predictor of subsequent performance. Therefore, it appears that when testing the reciprocal effects of self-efficacy and performance, having a good sound knowledge of previous performances seems to be the precursor in influencing the strength and the direction of the relationship.

According to Taylor (2006) the feedback received gives individuals an idea about the outcome of their work. It is not easy for individuals to make statements about their actions without knowing their actual performance level. Consequently, performance feedback

appears to be an essential aspect of building accurate self-efficacy perceptions (Sinclair & Vealey, 1989). Furthermore, previous research has revealed feedback as a positive precursor of building efficacy beliefs (Morres & Chang, 2009). The thesis results showed that, by asking participants to rate their efficacy with regard to the best score they achieved in the practice trials, they were able to see real progress and mastery experiences build over time. This will add to a real sense of efficacy beliefs building up over trials which has been absent in previous research (e.g., Vancouver et al., 2001, 2002; Beattie et al., 2011).

Moderators of the reciprocal relationship:

The thesis revealed possible moderators of the self-efficacy and performance relationship. For example, the degree to which a task is mundane will influence the degree of learning and may impact upon whether the relationship between self-efficacy and performance is null (mundane task) or positive (engaging task). The measurement of self-efficacy beliefs also seems to be a possible moderator. For example, asking participants to rate their efficacy beliefs in relation to their previous trial appears to yield a negative or non-significant efficacy-performance relationship whereas efficacy beliefs that is in relation to a baseline performance yield a positive efficacy-performance relationship. Further, the amount of feedback that is provided in order for one to base their efficacy beliefs upon also appears to moderate this relationship (increased performance information relates to positive self-efficacy effects).

Recently, Schmidt and DeShon (2010) also examined the moderating effect of performance ambiguity on the relationship between self-efficacy and performance. They manipulated task ambiguity as a moderating factor of the reciprocal relationship between self-efficacy and performance. Task ambiguity was manipulated by not telling the participants how many solutions there were to an anagram task. They found that when the task was high in ambiguity, self-efficacy had a negative effect upon subsequent performance.

When the task was low in ambiguity, self-efficacy had a positive effect upon performance. These results tend to be shown in the current thesis where lack of performance feedback (performance ambiguity) resulted in self-efficacy being unrelated to subsequent performance.

Schmidt & DeShon (2009) also tested relationship between self-efficacy and performance by the degree of prior success or failure on the current task. They reported that self-efficacy has a positive effect upon subsequent performance when participants have to follow a weak performance. In contrast, self-efficacy was negatively related to subsequent performance when participants had followed a more successful prior performance. Therefore, it seems that following good performance effort may be withdrawn. Further, following bad performance effort may be invested.

Task learning also plays important role in moderating the reciprocal relationship between self-efficacy and performance. Bandura and Locke (2003) criticized Vancouver et al's (2001, 2002) studies as they used an analytical task (Mastermind) which is inappropriate for assessing self-efficacy's effects because the activities are disconnected. Consequently each trial was independent from the others which does not allow efficacy believes to build up over time. Therefore, if there is nothing to be learned, then there will likely be no significant relationship between self-efficacy and performance.

Applied implication:

This thesis involved sports tasks, and the findings show that by making tasks more variable where learning can occur, providing detailed performance feedback, and by adjusting the reference points contained within the self-efficacy measure, it is possible to strengthen the relationship between self-efficacy and subsequent performance for a given task. This has some implications for the coaching process. One of the strongest take home messages from the thesis is that if athletes are unsure about their own standard of performance, they will be unable to make accurate judgments of future performance goals,

and the self-efficacy and performance relationship will be weakened as a consequence. This may have a negative effect on what goals they set and the amount of effort they may invest into any given task. Consequently, a coach should refer athletes to all their successful performances rather than referring them to their immediate performance particularly when building efficacy beliefs. This will add to a real sense of efficacy beliefs building up over time which has been absent in previous research (e.g., Beattie et al., 2011; Vancouver et al., 2001, 2002).

However, according to Woodman et al. (2010) reducing ones confidence levels seem to increase performance. Further, high levels of self-efficacy seem to be related to lower levels of study time (Vancouver & Kendall, 2006). Further, following task failure (Schmidt & Deshon, 2009) it appears that self-efficacy has a positive relationship with performance, but the opposite after task success. Therefore, it appears that keeping one on ones toes may not be such a bad thing.

Theoretical issues:

The main aim of this thesis was to extend the generalizability of the Vancouver et al. (2001, 2001) findings in terms of the reciprocal relationship between self-efficacy and performance by using a skill acquisition task in a sports setting (golf putting) and a simulation car racing task. In terms of external validity, all the tasks used in this thesis were based in a laboratory which is different from the real world setting such as golf events or car racing competition. However, in trying to make conditions closer to those found in competitive environments, a cash money prize was offered for the best first three leaders and a league table was designed to compare participants' scores.

The main generalizability issue that all volunteered participants who took part in these empirical studies were novices and therefore they just base their efficacy beliefs on a few mastery experiences. However, further research should examine experienced performers to

determine if the reciprocal relationship between self-efficacy and subsequent performance holds when skills have already been mastered. According to Bandura (1986), fluctuations in performance may have more influence on novices rather than on experienced performers, especially when experienced efficacy beliefs have developed strongly and therefore the occasional failure is unlikely to have much effect on perceptions of efficacy.

A lack of motivation may have deterred participants from maintaining a high level of performance despite the fact that a prize was offered to the participant who performed the best. Along the same lines, Rothman, Baldwin and Hertel (2004) reported that "the decision to maintain behaviour is thought to have less to do with the variability in people's perception of their ability to perform the behaviour, and more to do with their willingness or desire to sustain the behaviour" (p. 141). Therefore, motivation to invest effort in such lab tasks in future studies should at least be controlled for.

Thesis Strengths

One of the strengths of the thesis is that the four experiments in the present thesis were conducted in controlled laboratory conditions. Complex motor tasks are usually carried out in an external environment where other variables affect the process. The current experimental setting requires a strong control in order to remove all external variables that may affect the conclusions drawn from the study. Of course, the converse argument is that ecological validity may be somewhat lacking from the thesis.

Limitations:

The questionnaire contains a limitation that should be addressed. The self-efficacy questionnaire that participants complete after each trial may seem boring to the participants. As a result, these participants may not state their true perceptions of efficacy as they may not pay full attention when completing them. Maurer and Andrews (2000) noted that using a Likert scale to measure self-efficacy might reduce un-true responses and perceptions of

efficacy. However, Bandura (2012) argues against the use of Likert scales when assessing self-efficacy beliefs and there may not be any quick solution.

An additional limitation of thesis findings is that effort was not measured. According to Bandura (2012) effort plays an important role in mediating the relationship between self - efficacy and subsequent performance. It is unclear whether any of the effects in the current thesis was down to an increase in effort or a decrease in effort due to self-efficacy levels.

The final limitation of this thesis that the personal goals were not measured. Personal goals serve as reference points by which behaviour is directed and evaluated. When goal progress is insufficient individuals will invest extra effort. When one is exceeding their expected goal progress, effort may be withdrawn (Schmidt & DeShon, 2009)

To conclude, toward expand a deeper understanding of the complex reciprocal relationship between self-efficacy and performance, all the limitations should be taken into account in the future research.

Future Direction

In the future, research should be conducted in order to understand how self-efficacy may be able to enhance performance and persistence. For example, Vancouver et al. (2001, 2002) notes that the effort may be withdrawn when self-efficacy levels are high and that more effort may be invested when self-efficacy levels are moderate. However, Bandura (1997) argues that individuals with higher levels of self-efficacy will invest extra effort in the tasks. Future research examining the reciprocal relationship between self-efficacy and performance should include measurements of effort to examine this hypothesis.

Self-efficacy theory (Bandura, 1986) and Perceptual Control Theory (Powers, 1973) agree that high self-efficacy results in setting more challenging goals and, thus, higher performance as a function of discrepancy creation (Bandura, 1986; Vancouver, More, & Yoder 2008). According to Perceptual Control Theory (Powers, 1973) the negative self-

efficacy effects might occur during the goal striving phase; when discrepancy reduction processes are active, high self-efficacy may result in the current state being perceived as closer to the goal and less effort being invested toward goal achievement rather than when self-efficacy is lower.

Vancouver et al. (2008) demonstrated that self-efficacy was negatively related to resource allocation during goal striving. In contrast, self-efficacy was positively related to the decision to allocate resources during goal setting. Consequently, researchers must ensure that individuals are holding their goal level constant when examining goal striving, which may be challenging because there is some uncertainty regarding whether individuals are really striving for goals that are set for research purposes.

Finally, to determine the relationship between self-efficacy and performance, there are important steps that must be taken when investigating this reciprocal relationship. Schmidt and DeShon, (2009, 2010) and Beck and Schmidt (2012) report that researchers should continue to collectively develop an integrated framework of the mediating and moderating mechanisms that affect the reciprocal relationship between self-efficacy and performance by further considering the moderating effects of performance ambiguity, previous performance and goal difficulty.

Conclusion

In the contemporary world, research projects show many contradictions regarding sports and mainstream psychology. The purpose of this thesis is to address these contradictory findings and to provide an explanation for the limitations presented in the research conclusions above. A reciprocal relationship exists between performance and self-efficacy. This relationship holds true over a variety of tasks with various levels of difficulty.

Self-efficacy efficacy might produce positive, negative, or null effects on subsequent performance. However, as efficacy is changing over time individuals create their goals,

assess their own confidence for accomplishing their goals, exert effort and consequently modify their regulatory processes (Carver & Scheier, 2000; Kanfer & Ackerman, 1989; Sitzmann & Ely, 2011). Findings across thesis chapters presented that the mixed directional effect may be due to contrasting theoretical arguments and mixed methodologies. When the task was a mundane task (Chapter 2) results showed that self-efficacy had a flat and null effect on subsequent performance due to a low level of task complexity self-efficacy only being based upon the predeceasing trial. While in Chapter (4) when participants had to play a complex car racing simulation task which did increase the strength of the self-efficacy and performance relationship as Bandura and Locke (2003) would suggest. However, by changing to a complex task but not changing the efficacy measure, the efficacy and performance relationship remained non-significant (Study 1). By providing participants with practice at the task and by providing information where participants could see a performance increase from their baseline score, seemed to strengthen the self-efficacy and performance relationship which was the case of the results of (Study 2) when both of self-efficacy magnitude and strength were positively and significantly related to subsequent performance.

In the final empirical Chapter (4) when participants were allowed to see every trial score and receiving full performance feedback before making efficacy judgments, results showed that a significant and strong positive effect of both self-efficacy magnitude and strength upon subsequent performance occurred which is the opposite direction of that first session of (chapter 2) . However, this is fully in line with self-efficacy theory that increased self-efficacy leads to increased effort hence produce higher levels of performance.

Extensive research should be conducted in the future in order to thoroughly understand the nature of the relationship between self-efficacy and performance. Research into the long-term effects of heightened self-efficacy expectations may be conducted, highlighting the present conclusions regarding the relationship between performance and self-

efficacy. The present thesis is able to provide a concrete foundation for future research projects, which may provide further in-depth knowledge.

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Appendices

Appendix (A)

Bangor University

SCHOOL OF SPORT, HEALTH AND EXERCISE SCIENCES

1	Title of project	Self-efficacy and Performance
2	Name and e-mail address(es) of all researcher(s)	Dr Stuart Beattie (pes204@bangor.ac.uk) Dr Tim Woodman (t.woodman@bangor.ac.uk) Mohammed Fakehy (pep824@bangor.ac.uk)

Please tick boxes

1 I confirm that I have read and understand the Information Sheet dated ……. for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐

2 I understand that my participation is voluntary and that I am free to withdraw at any time without giving a reason, without my medical care or legal rights being affected. ☐

3 I understand that my participation is voluntary and that I am free to withdraw at any time without giving a reason. If I do decide to withdraw I understand that it will have no influence on the marks I receive, the outcome of my period of study, or my standing with my supervisor, other staff members of with the School. ☐

4 I understand that I may register any complaint I might have about this experiment with the Head of the School of Sport, Health and Exercise Sciences, and that I will be offered the opportunity of providing feedback on the experiment using the standard report forms. ☐

5 I agree to take part in the above study. ☐

Name of Participant …….

Signature ……. Date ……..

Name of Person taking consent…Mohammed, F…….

Signature ……. Date ……..

WHEN COMPLETED – ONE COPY TO PARTICIPANT, ONE COPY TO RESEARCHER FILE

Appendix (B)

Session No ( )
Name: Gender M/F Age:

How often do you play golf a year?
1. **Don't play at all ……**
2. **1-3 times a year ……**
3. **4-6 times a year ……**

Self-efficacy Questionnaire

0 - %100

No confidence at all **Moderate amount of confidence** **Completely confident**

Your previous score from trial 1 was _____

	Can do (Y/N)	Confidence %(0 to 100)
I have the skills and resources to beat my previous score by 1 point		
I have the skills and resources to beat my previous score by 2 point		
I have the skills and resources to beat my previous score by 3 point		
I have the skills and resources to beat my previous score by 4 point		
I have the skills and resources to beat my previous score by 5 point		
I have the skills and resources to beat my previous score by 6 point		
I have the skills and resources to beat my previous score by 7 point		
I have the skills and resources to beat my previous score by 8 point		
I have the skills and resources to beat my previous score by 9 point		
I have the skills and resources to beat my previous score by 10 point		
I have the skills and resources to beat my previous score above 10 scores (how many scores?) _____		

Performance in trial 2 is _____

Your previous score from trial 2 was _____

	Can do (Y/N)	Confidence %(0 to 100)
I have the skills and resources to beat my previous score by 1 point		
I have the skills and resources to beat my previous score by 2 point		
I have the skills and resources to beat my previous score by 3 point		
I have the skills and resources to beat my previous score by 4 point		
I have the skills and resources to beat my previous score by 5 point		
I have the skills and resources to beat my previous score by 6 point		
I have the skills and resources to beat my previous score by 7 point		
I have the skills and resources to beat my previous score by 8 point		
I have the skills and resources to beat my previous score by 9 point		
I have the skills and resources to beat my previous score by 10 point		
I have the skills and resources to beat my previous score above 10 scores (how many scores?) _____		

Performance in trial 3 is _____

Your previous score from trial 3 was _____

	Can do (Y/N)	Confidence %(0 to 100)
I have the skills and resources to beat my previous score by 1 point		
I have the skills and resources to beat my previous score by 2 point		
I have the skills and resources to beat my previous score by 3 point		
I have the skills and resources to beat my previous score by 4 point		
I have the skills and resources to beat my previous score by 5 point		
I have the skills and resources to beat my previous score by 6 point		
I have the skills and resources to beat my previous score by 7 point		
I have the skills and resources to beat my previous score by 8 point		
I have the skills and resources to beat my previous score by 9 point		
I have the skills and resources to beat my previous score by 10 point		
I have the skills and resources to beat my previous score above 10 scores (how many scores?) _____		

Performance in trial 4 is _____

Your previous score from trial 4 was _____

	Can do (Y/N)	Confidence %(0 to 100)
I have the skills and resources to beat my previous score by 1 point		
I have the skills and resources to beat my previous score by 2 point		
I have the skills and resources to beat my previous score by 3 point		
I have the skills and resources to beat my previous score by 4 point		
I have the skills and resources to beat my previous score by 5 point		
I have the skills and resources to beat my previous score by 6 point		
I have the skills and resources to beat my previous score by 7 point		
I have the skills and resources to beat my previous score by 8 point		
I have the skills and resources to beat my previous score by 9 point		
I have the skills and resources to beat my previous score by 10 point		
I have the skills and resources to beat my previous score above 10 scores (how many scores?) _____		

Performance in trial 5 is _____

_____

Your previous score from trial 5 was _____

	Can do (Y/N)	Confidence %(0 to 100)
I have the skills and resources to beat my previous score by 1 point		
I have the skills and resources to beat my previous score by 2 point		
I have the skills and resources to beat my previous score by 3 point		
I have the skills and resources to beat my previous score by 4 point		
I have the skills and resources to beat my previous score by 5 point		
I have the skills and resources to beat my previous score by 6 point		
I have the skills and resources to beat my previous score by 7 point		
I have the skills and resources to beat my previous score by 8 point		
I have the skills and resources to beat my previous score by 9 point		
I have the skills and resources to beat my previous score by 10 point		
I have the skills and resources to beat my previous score above 10 scores (how many scores?) _____		

Performance in trial 6 is _____

Your previous score from trial 6was _____

	Can do (Y/N)	Confidence %(0 to 100)
I have the skills and resources to beat my previous score by 1 point		
I have the skills and resources to beat my previous score by 2 point		
I have the skills and resources to beat my previous score by 3 point		
I have the skills and resources to beat my previous score by 4 point		
I have the skills and resources to beat my previous score by 5 point		
I have the skills and resources to beat my previous score by 6 point		
I have the skills and resources to beat my previous score by 7 point		
I have the skills and resources to beat my previous score by 8 point		
I have the skills and resources to beat my previous score by 9 point		
I have the skills and resources to beat my previous score by 10 point		
I have the skills and resources to beat my previous score above 10 scores (how many scores?) _____		

Performance in trial 7 is _____

Your previous score from trial 7was _____

	Can do (Y/N)	Confidence %(0 to 100)
I have the skills and resources to beat my previous score by 1 point		
I have the skills and resources to beat my previous score by 2 point		
I have the skills and resources to beat my previous score by 3 point		
I have the skills and resources to beat my previous score by 4 point		
I have the skills and resources to beat my previous score by 5 point		
I have the skills and resources to beat my previous score by 6 point		
I have the skills and resources to beat my previous score by 7 point		
I have the skills and resources to beat my previous score by 8 point		
I have the skills and resources to beat my previous score by 9 point		
I have the skills and resources to beat my previous score by 10 point		
I have the skills and resources to beat my previous score above 10 scores (how many scores?) _____		

Performance in trial 8 is _____

Your previous score from trial 8was _____

	Can do (Y/N)	Confidence %(0 to 100)
I have the skills and resources to beat my previous score by 1 point		
I have the skills and resources to beat my previous score by 2 point		
I have the skills and resources to beat my previous score by 3 point		
I have the skills and resources to beat my previous score by 4 point		
I have the skills and resources to beat my previous score by 5 point		
I have the skills and resources to beat my previous score by 6 point		
I have the skills and resources to beat my previous score by 7 point		
I have the skills and resources to beat my previous score by 8 point		
I have the skills and resources to beat my previous score by 9 point		
I have the skills and resources to beat my previous score by 10 point		
I have the skills and resources to beat my previous score above 10 scores (how many scores?) _____		

Performance in trial 9 is _____

_____

Your previous score from trial 9was ____

	Can do (Y/N)	Confidence %(0 to 100)
I have the skills and resources to beat my previous score by 1 point		
I have the skills and resources to beat my previous score by 2 point		
I have the skills and resources to beat my previous score by 3 point		
I have the skills and resources to beat my previous score by 4 point		
I have the skills and resources to beat my previous score by 5 point		
I have the skills and resources to beat my previous score by 6 point		
I have the skills and resources to beat my previous score by 7 point		
I have the skills and resources to beat my previous score by 8 point		
I have the skills and resources to beat my previous score by 9 point		
I have the skills and resources to beat my previous score by 10 point		
I have the skills and resources to beat my previous score above 10 scores (how many scores?) _____		

Performance in trial 10 is _____

Appendix (C)

Name: **Date:** **Session: ( )**

Trial	1	2	3	4	5	Total	6	7	8	9	10	Total	11	12	13	14	15	Total	16	17	18	19	20	Total
1																								
2																								
3																								
4																								
5																								
6																								
7																								
8																								
9																								
10																								
Trial	1	2	3	4	5	Total	6	7	8	9	10	Total	11	12	13	14	15	Total	16	17	18	19	20	Total
1																								
2																								
3																								
4																								
5																								
6																								
7																								
8																								
9																								
10																								

Appendix (D)

Name: **Gender M/F** **Age:**

Self-efficacy Questionnaire (Car Racing 1)

Please write down how confident you are in your ability to reduce your previous time.

1. Can do (yes/no) Please state yes or no if you think you can achieve each performance level
2. Confidence %(0-100) Please state your degree of confidence in being able to achieve this goal

0 10 20 30 40 50 60 70 80 90 100

No confidence at all **Moderate amount of confidence** **Completely confident**

Practice Trial 1 Overall time _____	**Can do (yes/no)**	**Confidence% (0to100)**
I'm confident in my ability to reduce the above time by One second	_____	_____
I'm confident in my ability to reduce the above time by Two seconds	_____	_____
I'm confident in my ability to reduce the above time by Three seconds	_____	_____
I'm confident in my ability to reduce the above time by Four seconds	_____	_____
I'm confident in my ability to reduce the above time by Five seconds	_____	_____
I'm confident in my ability to reduce the above time by Six seconds	_____	_____
I'm confident in my ability to reduce the above time by Seven seconds	_____	_____
I'm confident in my ability to reduce the above time by Eight seconds	_____	_____
I'm confident in my ability to reduce the above time by Nine seconds	_____	_____
I'm confident in my ability to reduce the above time by Ten seconds	_____	_____

***How hard were you trying to stay in control to the car while going as fast as possible?**

0 1 2 3 4 5 6 7 8 9 10
(Not at all) (Extremely hard)

***How difficult was it for you to stay in control to the car while going as fast as possible?**

0 1 2 3 4 5 6 7 8 9 10
(Not at all) (Extremely difficult)

We are also interested in your personal goal for the next trial. What time in minutes and seconds are you aiming for in the next trial _____

Practice Trial 2 Overall time _____	**Can do (yes/no)**	**Confidence% (0to100)**
I'm confident in my ability to reduce the above time by One second	_____	_____
I'm confident in my ability to reduce the above time by Two seconds	_____	_____
I'm confident in my ability to reduce the above time by Three seconds	_____	_____
I'm confident in my ability to reduce the above time by Four seconds	_____	_____
I'm confident in my ability to reduce the above time by Five seconds	_____	_____
I'm confident in my ability to reduce the above time by Six seconds	_____	_____
I'm confident in my ability to reduce the above time by Seven seconds	_____	_____
I'm confident in my ability to reduce the above time by Eight seconds	_____	_____
I'm confident in my ability to reduce the above time by Nine seconds	_____	_____
I'm confident in my ability to reduce the above time by Ten seconds	_____	_____

***How hard were you trying to stay in control to the car while going as fast as possible?**

0 1 2 3 4 5 6 7 8 9 10
(Not at all) (Extremely hard)

***How difficult was it for you to stay in control to the car while going as fast as possible?**
0 1 2 3 4 5 6 7 8 9 10
(Not at all) (Extremely difficult)

We are also interested in your personal goal for the next trial. What time in minutes and seconds are you aiming for in the next trial **_____**

Performance Trial 3 Overall time _____	**Can do (yes/no)**	**Confidence% (0to100)**
I'm confident in my ability to reduce the above time by One second	_____	_____
I'm confident in my ability to reduce the above time by Two seconds	_____	_____
I'm confident in my ability to reduce the above time by Three seconds	_____	_____
I'm confident in my ability to reduce the above time by Four seconds	_____	_____
I'm confident in my ability to reduce the above time by Five seconds	_____	_____
I'm confident in my ability to reduce the above time by Six seconds	_____	_____
I'm confident in my ability to reduce the above time by Seven seconds	_____	_____
I'm confident in my ability to reduce the above time by Eight seconds	_____	_____
I'm confident in my ability to reduce the above time by Nine seconds	_____	_____
I'm confident in my ability to reduce the above time by Ten seconds	_____	_____

***How hard were you trying to stay in control to the car while going as fast as possible?**

0 1 2 3 4 5 6 7 8 9 10
(Not at all) (Extremely hard)

***How difficult was it for you to stay in control to the car while going as fast as possible?**
0 1 2 3 4 5 6 7 8 9 10
(Not at all) (Extremely difficult)

We are also interested in your personal goal for the next trial. What time in minutes and seconds are you aiming for in the next trial **_____**

Performance Trial 4 Overall time _____	**Can do (yes/no)**	**Confidence% (0to100)**
I'm confident in my ability to reduce the above time by One second	_____	_____
I'm confident in my ability to reduce the above time by Two seconds	_____	_____
I'm confident in my ability to reduce the above time by Three seconds	_____	_____
I'm confident in my ability to reduce the above time by Four seconds	_____	_____
I'm confident in my ability to reduce the above time by Five seconds	_____	_____
I'm confident in my ability to reduce the above time by Six seconds	_____	_____
I'm confident in my ability to reduce the above time by Seven seconds	_____	_____
I'm confident in my ability to reduce the above time by Eight seconds	_____	_____
I'm confident in my ability to reduce the above time by Nine seconds	_____	_____
I'm confident in my ability to reduce the above time by Ten seconds	_____	_____

***How hard were you trying to stay in control to the car while going as fast as possible?**

0 1 2 3 4 5 6 7 8 9 10
(Not at all) (Extremely hard)

***How difficult was it for you to stay in control to the car while going as fast as possible?**
0 1 2 3 4 5 6 7 8 9 10
(Not at all) (Extremely difficult)

We are also interested in your personal goal for the next trial. What time in minutes and seconds are you aiming for in the next trial **_____**

Performance Trial 5 Overall time _____	**Can do (yes/no)**	**Confidence% (0to100)**
I'm confident in my ability to reduce the above time by One second	_____	_____
I'm confident in my ability to reduce the above time by Two seconds	_____	_____
I'm confident in my ability to reduce the above time by Three seconds	_____	_____
I'm confident in my ability to reduce the above time by Four seconds	_____	_____
I'm confident in my ability to reduce the above time by Five seconds	_____	_____
I'm confident in my ability to reduce the above time by Six seconds	_____	_____
I'm confident in my ability to reduce the above time by Seven seconds	_____	_____
I'm confident in my ability to reduce the above time by Eight seconds	_____	_____
I'm confident in my ability to reduce the above time by Nine seconds	_____	_____
I'm confident in my ability to reduce the above time by Ten seconds	_____	_____

***How hard were you trying to stay in control to the car while going as fast as possible?**

0 1 2 3 4 5 6 7 8 9 10
(Not at all) (Extremely hard)

***How difficult was it for you to stay in control to the car while going as fast as possible?**
0 1 2 3 4 5 6 7 8 9 10
(Not at all) (Extremely difficult)

We are also interested in your personal goal for the next trial. What time in minutes and seconds are you aiming for in the next trial **_____**

Performance Trial 6 Overall time _____	**Can do (yes/no)**	**Confidence% (0to100)**
I'm confident in my ability to reduce the above time by One second	_____	_____
I'm confident in my ability to reduce the above time by Two seconds	_____	_____
I'm confident in my ability to reduce the above time by Three seconds	_____	_____
I'm confident in my ability to reduce the above time by Four seconds	_____	_____
I'm confident in my ability to reduce the above time by Five seconds	_____	_____
I'm confident in my ability to reduce the above time by Six seconds	_____	_____
I'm confident in my ability to reduce the above time by Seven seconds	_____	_____
I'm confident in my ability to reduce the above time by Eight seconds	_____	_____
I'm confident in my ability to reduce the above time by Nine seconds	_____	_____
I'm confident in my ability to reduce the above time by Ten seconds	_____	_____

***How hard were you trying to stay in control to the car while going as fast as possible?**

0 1 2 3 4 5 6 7 8 9 10
(Not at all) (Extremely hard)

***How difficult was it for you to stay in control to the car while going as fast as possible?**

0 1 2 3 4 5 6 7 8 9 10
(Not at all) (Extremely difficult)

We are also interested in your personal goal for the next trial. What time in minutes and seconds are you aiming for in the next trial **_____**

Performance Trial 7 Overall time _____	**Can do (yes/no)**	**Confidence% (0to100)**
I'm confident in my ability to reduce the above time by One second	_____	_____
I'm confident in my ability to reduce the above time by Two seconds	_____	_____
I'm confident in my ability to reduce the above time by Three seconds	_____	_____
I'm confident in my ability to reduce the above time by Four seconds	_____	_____
I'm confident in my ability to reduce the above time by Five seconds	_____	_____
I'm confident in my ability to reduce the above time by Six seconds	_____	_____
I'm confident in my ability to reduce the above time by Seven seconds	_____	_____
I'm confident in my ability to reduce the above time by Eight seconds	_____	_____
I'm confident in my ability to reduce the above time by Nine seconds	_____	_____
I'm confident in my ability to reduce the above time by Ten seconds	_____	_____

***How hard were you trying to stay in control to the car while going as fast as possible?**

0 1 2 3 4 5 6 7 8 9 10
(Not at all) (Extremely hard)

***How difficult was it for you to stay in control to the car while going as fast as possible?**

0 1 2 3 4 5 6 7 8 9 10
(Not at all) (Extremely difficult)

We are also interested in your personal goal for the next trial. What time in minutes and seconds are you aiming for in the next trial **_____**

Performance Trial 8 Overall time _____	**Can do (yes/no)**	**Confidence% (0to100)**
I'm confident in my ability to reduce the above time by One second	_____	_____
I'm confident in my ability to reduce the above time by Two seconds	_____	_____
I'm confident in my ability to reduce the above time by Three seconds	_____	_____
I'm confident in my ability to reduce the above time by Four seconds	_____	_____
I'm confident in my ability to reduce the above time by Five seconds	_____	_____
I'm confident in my ability to reduce the above time by Six seconds	_____	_____
I'm confident in my ability to reduce the above time by Seven seconds	_____	_____
I'm confident in my ability to reduce the above time by Eight seconds	_____	_____
I'm confident in my ability to reduce the above time by Nine seconds	_____	_____
I'm confident in my ability to reduce the above time by Ten seconds	_____	_____

***How hard were you trying to stay in control to the car while going as fast as possible?**

0 1 2 3 4 5 6 7 8 9 10
(Not at all) (Extremely hard)

***How difficult was it for you to stay in control to the car while going as fast as possible?**
0 1 2 3 4 5 6 7 8 9 10
(Not at all) (Extremely difficult)

We are also interested in your personal goal for the next trial. What time in minutes and seconds are you aiming for in the next trial **_____**

Performance Trial 9 Overall time _____	**Can do (yes/no)**	**Confidence% (0to100)**
I'm confident in my ability to reduce the above time by One second	_____	_____
I'm confident in my ability to reduce the above time by Two seconds	_____	_____
I'm confident in my ability to reduce the above time by Three seconds	_____	_____
I'm confident in my ability to reduce the above time by Four seconds	_____	_____
I'm confident in my ability to reduce the above time by Five seconds	_____	_____
I'm confident in my ability to reduce the above time by Six seconds	_____	_____
I'm confident in my ability to reduce the above time by Seven seconds	_____	_____
I'm confident in my ability to reduce the above time by Eight seconds	_____	_____
I'm confident in my ability to reduce the above time by Nine seconds	_____	_____
I'm confident in my ability to reduce the above time by Ten seconds	_____	_____

***How hard were you trying to stay in control to the car while going as fast as possible?**

0 1 2 3 4 5 6 7 8 9 10
(Not at all) (Extremely hard)

***How difficult was it for you to stay in control to the car while going as fast as possible?**
0 1 2 3 4 5 6 7 8 9 10
(Not at all) (Extremely difficult)

We are also interested in your personal goal for the next trial. What time in minutes and seconds are you aiming for in the next trial **_____**

Performance Trial 10 Overall time _____

***How hard were you trying to stay in control to the car while going as fast as possible?**

0 1 2 3 4 5 6 7 8 9 10
(Not at all) (Extremely hard)

***How difficult was it for you to stay in control to the car while going as fast as possible?**

0 1 2 3 4 5 6 7 8 9 10
(Not at all) (Extremely difficult)

Appendix (E)

Self-efficacy Questionnaire

Car Racing (2)

Name: **Gender M/F** **Age:**

How often do you play video games (i.e. play station, X box) a week?

Don't play at all…

1-3 times……..

4-6…….

More…….

How many hours do you spend a week in race cars simulation?

1-5 hours weekly…….

6-10 hours weekly……

11-15 hours weekly…..

More……..

Have you had experience with bucket seat?
Yes….
No…..

Practice Trial 1 _____

Please write down how confident you are in your ability to beat your best score.

1. Can do (yes/no) Please state yes or no if you think you can achieve each performance level
2. Confidence %(0-100) Please state your degree of confidence in being able to achieve this goal

0 10 20 30 40 50 60 70 80 90 100

No confidence at all **Moderate amount of confidence** **Completely confident**

	Can do (Y/N)	**Confidence %(0 to 100)**
I'm confident in my ability to reduce the above time by (1) second		
I'm confident in my ability to reduce the above time by (2) seconds		
I'm confident in my ability to reduce the above time by (3) seconds		
I'm confident in my ability to reduce the above time by (4) seconds		
I'm confident in my ability to reduce the above time by (5) seconds		
I'm confident in my ability to reduce the above time by (6) seconds		
I'm confident in my ability to reduce the above time by (7) seconds		
I'm confident in my ability to reduce the above time by (8) seconds		
I'm confident in my ability to reduce the above time by (9) seconds		
I'm confident in my ability to reduce the above time by (10) seconds		
I'm confident in my ability to reduce the above time by (11) seconds		
I'm confident in my ability to reduce the above time by (12) seconds		
I'm confident in my ability to reduce the above time by (13) seconds		
I'm confident in my ability to reduce the above time by (14) seconds		
I'm confident in my ability to reduce the above time by (15) seconds		
I'm confident in my ability to reduce the above time by (16) seconds		
I'm confident in my ability to reduce the above time by (17) seconds		
I'm confident in my ability to reduce the above time by (18) seconds		
I'm confident in my ability to reduce the above time by (19) seconds		
I'm confident in my ability to reduce the above time by (20) seconds		
I'm confident in my ability to reduce the above time by (21) seconds		
I'm confident in my ability to reduce the above time by (22) seconds		
I'm confident in my ability to reduce the above time by (23) seconds		
I'm confident in my ability to reduce the above time by (24) seconds		
I'm confident in my ability to reduce the above time by (25) seconds		
I'm confident in my ability to reduce the above time by (26) seconds		
I'm confident in my ability to reduce the above time by (27) seconds		
I'm confident in my ability to reduce the above time by (28) seconds		
I'm confident in my ability to reduce the above time by (29) seconds		
I'm confident in my ability to reduce the above time by (30) seconds		

Practice Trial 2 _____

	Can do (Y/N)	Confidence %(0 to 100)
I'm confident in my ability to reduce the above time by (1) second		
I'm confident in my ability to reduce the above time by (2) seconds		
I'm confident in my ability to reduce the above time by (3) seconds		
I'm confident in my ability to reduce the above time by (4) seconds		
I'm confident in my ability to reduce the above time by (5) seconds		
I'm confident in my ability to reduce the above time by (6) seconds		
I'm confident in my ability to reduce the above time by (7) seconds		
I'm confident in my ability to reduce the above time by (8) seconds		
I'm confident in my ability to reduce the above time by (9) seconds		
I'm confident in my ability to reduce the above time by (10) seconds		
I'm confident in my ability to reduce the above time by (11) seconds		
I'm confident in my ability to reduce the above time by (12) seconds		
I'm confident in my ability to reduce the above time by (13) seconds		
I'm confident in my ability to reduce the above time by (14) seconds		
I'm confident in my ability to reduce the above time by (15) seconds		
I'm confident in my ability to reduce the above time by (16) seconds		
I'm confident in my ability to reduce the above time by (17) seconds		
I'm confident in my ability to reduce the above time by (18) seconds		
I'm confident in my ability to reduce the above time by (19) seconds		
I'm confident in my ability to reduce the above time by (20) seconds		
I'm confident in my ability to reduce the above time by (21) seconds		
I'm confident in my ability to reduce the above time by (22) seconds		
I'm confident in my ability to reduce the above time by (23) seconds		
I'm confident in my ability to reduce the above time by (24) seconds		
I'm confident in my ability to reduce the above time by (25) seconds		
I'm confident in my ability to reduce the above time by (26) seconds		
I'm confident in my ability to reduce the above time by (27) seconds		
I'm confident in my ability to reduce the above time by (28) seconds		
I'm confident in my ability to reduce the above time by (29) seconds		
I'm confident in my ability to reduce the above time by (30) seconds		

Practice Trial 3 _____

Performance Trial 1, your best time from the practices was _____

	Can do (Y/N)	**Confidence %(0 to 100)**
I'm confident in my ability to reduce the above time by (1) second		
I'm confident in my ability to reduce the above time by (2) seconds		
I'm confident in my ability to reduce the above time by (3) seconds		
I'm confident in my ability to reduce the above time by (4) seconds		
I'm confident in my ability to reduce the above time by (5) seconds		
I'm confident in my ability to reduce the above time by (6) seconds		
I'm confident in my ability to reduce the above time by (7) seconds		
I'm confident in my ability to reduce the above time by (8) seconds		
I'm confident in my ability to reduce the above time by (9) seconds		
I'm confident in my ability to reduce the above time by (10) seconds		
I'm confident in my ability to reduce the above time by (11) seconds		
I'm confident in my ability to reduce the above time by (12) seconds		
I'm confident in my ability to reduce the above time by (13) seconds		
I'm confident in my ability to reduce the above time by (14) seconds		
I'm confident in my ability to reduce the above time by (15) seconds		
I'm confident in my ability to reduce the above time by (16) seconds		
I'm confident in my ability to reduce the above time by (17) seconds		
I'm confident in my ability to reduce the above time by (18) seconds		
I'm confident in my ability to reduce the above time by (19) seconds		
I'm confident in my ability to reduce the above time by (20) seconds		
I'm confident in my ability to reduce the above time by (21) seconds		
I'm confident in my ability to reduce the above time by (22) seconds		
I'm confident in my ability to reduce the above time by (23) seconds		
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I'm confident in my ability to reduce the above time by (25) seconds		
I'm confident in my ability to reduce the above time by (26) seconds		
I'm confident in my ability to reduce the above time by (27) seconds		
I'm confident in my ability to reduce the above time by (28) seconds		
I'm confident in my ability to reduce the above time by (29) seconds		
I'm confident in my ability to reduce the above time by (30) seconds		

How hard were you trying to stay in control of the car while going as fast as possible?

0 1 2 3 4 5 6 7 8 9 10
(Not at all) (Extremely hard)

How difficult was it for you to stay in control of the car while going as fast as possible?

0 1 2 3 4 5 6 7 8 9 10
(Not at all) (Extremely difficult)

We are also interested in your personal goal for the next trial. What time in minutes and seconds are you aiming for in the next trial? _____

Performance Trial 2, your best time from the practices was _____

	Can do (Y/N)	**Confidence %(0 to 100)**
I'm confident in my ability to reduce the above time by (1) second		
I'm confident in my ability to reduce the above time by (2) seconds		
I'm confident in my ability to reduce the above time by (3) seconds		
I'm confident in my ability to reduce the above time by (4) seconds		
I'm confident in my ability to reduce the above time by (5) seconds		
I'm confident in my ability to reduce the above time by (6) seconds		
I'm confident in my ability to reduce the above time by (7) seconds		
I'm confident in my ability to reduce the above time by (8) seconds		
I'm confident in my ability to reduce the above time by (9) seconds		
I'm confident in my ability to reduce the above time by (10) seconds		
I'm confident in my ability to reduce the above time by (11) seconds		
I'm confident in my ability to reduce the above time by (12) seconds		
I'm confident in my ability to reduce the above time by (13) seconds		
I'm confident in my ability to reduce the above time by (14) seconds		
I'm confident in my ability to reduce the above time by (15) seconds		
I'm confident in my ability to reduce the above time by (16) seconds		
I'm confident in my ability to reduce the above time by (17) seconds		
I'm confident in my ability to reduce the above time by (18) seconds		
I'm confident in my ability to reduce the above time by (19) seconds		
I'm confident in my ability to reduce the above time by (20) seconds		
I'm confident in my ability to reduce the above time by (21) seconds		
I'm confident in my ability to reduce the above time by (22) seconds		
I'm confident in my ability to reduce the above time by (23) seconds		
I'm confident in my ability to reduce the above time by (24) seconds		
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I'm confident in my ability to reduce the above time by (26) seconds		
I'm confident in my ability to reduce the above time by (27) seconds		
I'm confident in my ability to reduce the above time by (28) seconds		
I'm confident in my ability to reduce the above time by (29) seconds		
I'm confident in my ability to reduce the above time by (30) seconds		

How hard were you trying to stay in control of the car while going as fast as possible?

0 1 2 3 4 5 6 7 8 9 10
(Not at all) (Extremely hard)

How difficult was it for you to stay in control of the car while going as fast as possible?

0 1 2 3 4 5 6 7 8 9 10
(Not at all) (Extremely difficult)

We are also interested in your personal goal for the next trial. What time in minutes and seconds are you aiming for in the next trial? _____

Performance Trial 3, your best time from the practices was _____

	Can do (Y/N)	Confidence %(0 to 100)
I'm confident in my ability to reduce the above time by (1) second		
I'm confident in my ability to reduce the above time by (2) seconds		
I'm confident in my ability to reduce the above time by (3) seconds		
I'm confident in my ability to reduce the above time by (4) seconds		
I'm confident in my ability to reduce the above time by (5) seconds		
I'm confident in my ability to reduce the above time by (6) seconds		
I'm confident in my ability to reduce the above time by (7) seconds		
I'm confident in my ability to reduce the above time by (8) seconds		
I'm confident in my ability to reduce the above time by (9) seconds		
I'm confident in my ability to reduce the above time by (10) seconds		
I'm confident in my ability to reduce the above time by (11) seconds		
I'm confident in my ability to reduce the above time by (12) seconds		
I'm confident in my ability to reduce the above time by (13) seconds		
I'm confident in my ability to reduce the above time by (14) seconds		
I'm confident in my ability to reduce the above time by (15) seconds		
I'm confident in my ability to reduce the above time by (16) seconds		
I'm confident in my ability to reduce the above time by (17) seconds		
I'm confident in my ability to reduce the above time by (18) seconds		
I'm confident in my ability to reduce the above time by (19) seconds		
I'm confident in my ability to reduce the above time by (20) seconds		
I'm confident in my ability to reduce the above time by (21) seconds		
I'm confident in my ability to reduce the above time by (22) seconds		
I'm confident in my ability to reduce the above time by (23) seconds		
I'm confident in my ability to reduce the above time by (24) seconds		
I'm confident in my ability to reduce the above time by (25) seconds		
I'm confident in my ability to reduce the above time by (26) seconds		
I'm confident in my ability to reduce the above time by (27) seconds		
I'm confident in my ability to reduce the above time by (28) seconds		
I'm confident in my ability to reduce the above time by (29) seconds		
I'm confident in my ability to reduce the above time by (30) seconds		

How hard were you trying to stay in control of the car while going as fast as possible?

0 1 2 3 4 5 6 7 8 9 10
(Not at all) (Extremely hard)

How difficult was it for you to stay in control of the car while going as fast as possible?

0 1 2 3 4 5 6 7 8 9 10
(Not at all) (Extremely difficult)

We are also interested in your personal goal for the next trial. What time in minutes and seconds are you aiming for in the next trial? _____

Performance Trial 4, your best time from the practices was _____

	Can do (Y/N)	**Confidence %(0 to 100)**
I'm confident in my ability to reduce the above time by (1) second		
I'm confident in my ability to reduce the above time by (2) seconds		
I'm confident in my ability to reduce the above time by (3) seconds		
I'm confident in my ability to reduce the above time by (4) seconds		
I'm confident in my ability to reduce the above time by (5) seconds		
I'm confident in my ability to reduce the above time by (6) seconds		
I'm confident in my ability to reduce the above time by (7) seconds		
I'm confident in my ability to reduce the above time by (8) seconds		
I'm confident in my ability to reduce the above time by (9) seconds		
I'm confident in my ability to reduce the above time by (10) seconds		
I'm confident in my ability to reduce the above time by (11) seconds		
I'm confident in my ability to reduce the above time by (12) seconds		
I'm confident in my ability to reduce the above time by (13) seconds		
I'm confident in my ability to reduce the above time by (14) seconds		
I'm confident in my ability to reduce the above time by (15) seconds		
I'm confident in my ability to reduce the above time by (16) seconds		
I'm confident in my ability to reduce the above time by (17) seconds		
I'm confident in my ability to reduce the above time by (18) seconds		
I'm confident in my ability to reduce the above time by (19) seconds		
I'm confident in my ability to reduce the above time by (20) seconds		
I'm confident in my ability to reduce the above time by (21) seconds		
I'm confident in my ability to reduce the above time by (22) seconds		
I'm confident in my ability to reduce the above time by (23) seconds		
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I'm confident in my ability to reduce the above time by (25) seconds		
I'm confident in my ability to reduce the above time by (26) seconds		
I'm confident in my ability to reduce the above time by (27) seconds		
I'm confident in my ability to reduce the above time by (28) seconds		
I'm confident in my ability to reduce the above time by (29) seconds		
I'm confident in my ability to reduce the above time by (30) seconds		

How hard were you trying to stay in control of the car while going as fast as possible?

0 1 2 3 4 5 6 7 8 9 10
(Not at all) (Extremely hard)

How difficult was it for you to stay in control of the car while going as fast as possible?

0 1 2 3 4 5 6 7 8 9 10
(Not at all) (Extremely difficult)

We are also interested in your personal goal for the next trial. What time in minutes and seconds are you aiming for in the next trial? _____

Performance Trial 5, your best time from the practices was _____

	Can do (Y/N)	**Confidence %(0 to 100)**
I'm confident in my ability to reduce the above time by (1) second		
I'm confident in my ability to reduce the above time by (2) seconds		
I'm confident in my ability to reduce the above time by (3) seconds		
I'm confident in my ability to reduce the above time by (4) seconds		
I'm confident in my ability to reduce the above time by (5) seconds		
I'm confident in my ability to reduce the above time by (6) seconds		
I'm confident in my ability to reduce the above time by (7) seconds		
I'm confident in my ability to reduce the above time by (8) seconds		
I'm confident in my ability to reduce the above time by (9) seconds		
I'm confident in my ability to reduce the above time by (10) seconds		
I'm confident in my ability to reduce the above time by (11) seconds		
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I'm confident in my ability to reduce the above time by (15) seconds		
I'm confident in my ability to reduce the above time by (16) seconds		
I'm confident in my ability to reduce the above time by (17) seconds		
I'm confident in my ability to reduce the above time by (18) seconds		
I'm confident in my ability to reduce the above time by (19) seconds		
I'm confident in my ability to reduce the above time by (20) seconds		
I'm confident in my ability to reduce the above time by (21) seconds		
I'm confident in my ability to reduce the above time by (22) seconds		
I'm confident in my ability to reduce the above time by (23) seconds		
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I'm confident in my ability to reduce the above time by (25) seconds		
I'm confident in my ability to reduce the above time by (26) seconds		
I'm confident in my ability to reduce the above time by (27) seconds		
I'm confident in my ability to reduce the above time by (28) seconds		
I'm confident in my ability to reduce the above time by (29) seconds		
I'm confident in my ability to reduce the above time by (30) seconds		

How hard were you trying to stay in control of the car while going as fast as possible?

0 1 2 3 4 5 6 7 8 9 10
(Not at all) (Extremely hard)

How difficult was it for you to stay in control of the car while going as fast as possible?

0 1 2 3 4 5 6 7 8 9 10
(Not at all) (Extremely difficult)

We are also interested in your personal goal for the next trial. What time in minutes and seconds are you aiming for in the next trial? _____

Performance Trial 6, your best time from the practices was _____

	Can do (Y/N)	**Confidence %(0 to 100)**
I'm confident in my ability to reduce the above time by (1) second		
I'm confident in my ability to reduce the above time by (2) seconds		
I'm confident in my ability to reduce the above time by (3) seconds		
I'm confident in my ability to reduce the above time by (4) seconds		
I'm confident in my ability to reduce the above time by (5) seconds		
I'm confident in my ability to reduce the above time by (6) seconds		
I'm confident in my ability to reduce the above time by (7) seconds		
I'm confident in my ability to reduce the above time by (8) seconds		
I'm confident in my ability to reduce the above time by (9) seconds		
I'm confident in my ability to reduce the above time by (10) seconds		
I'm confident in my ability to reduce the above time by (11) seconds		
I'm confident in my ability to reduce the above time by (12) seconds		
I'm confident in my ability to reduce the above time by (13) seconds		
I'm confident in my ability to reduce the above time by (14) seconds		
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I'm confident in my ability to reduce the above time by (24) seconds		
I'm confident in my ability to reduce the above time by (25) seconds		
I'm confident in my ability to reduce the above time by (26) seconds		
I'm confident in my ability to reduce the above time by (27) seconds		
I'm confident in my ability to reduce the above time by (28) seconds		
I'm confident in my ability to reduce the above time by (29) seconds		
I'm confident in my ability to reduce the above time by (30) seconds		

How hard were you trying to stay in control of the car while going as fast as possible?

0 1 2 3 4 5 6 7 8 9 10
(Not at all) (Extremely hard)

How difficult was it for you to stay in control of the car while going as fast as possible?

0 1 2 3 4 5 6 7 8 9 10
(Not at all) (Extremely difficult)

We are also interested in your personal goal for the next trial. What time in minutes and seconds are you aiming for in the next trial? _____

Performance Trial 7, your best time from the practices was _____

	Can do (Y/N)	**Confidence %(0 to 100)**
I'm confident in my ability to reduce the above time by (1) second		
I'm confident in my ability to reduce the above time by (2) seconds		
I'm confident in my ability to reduce the above time by (3) seconds		
I'm confident in my ability to reduce the above time by (4) seconds		
I'm confident in my ability to reduce the above time by (5) seconds		
I'm confident in my ability to reduce the above time by (6) seconds		
I'm confident in my ability to reduce the above time by (7) seconds		
I'm confident in my ability to reduce the above time by (8) seconds		
I'm confident in my ability to reduce the above time by (9) seconds		
I'm confident in my ability to reduce the above time by (10) seconds		
I'm confident in my ability to reduce the above time by (11) seconds		
I'm confident in my ability to reduce the above time by (12) seconds		
I'm confident in my ability to reduce the above time by (13) seconds		
I'm confident in my ability to reduce the above time by (14) seconds		
I'm confident in my ability to reduce the above time by (15) seconds		
I'm confident in my ability to reduce the above time by (16) seconds		
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I'm confident in my ability to reduce the above time by (22) seconds		
I'm confident in my ability to reduce the above time by (23) seconds		
I'm confident in my ability to reduce the above time by (24) seconds		
I'm confident in my ability to reduce the above time by (25) seconds		
I'm confident in my ability to reduce the above time by (26) seconds		
I'm confident in my ability to reduce the above time by (27) seconds		
I'm confident in my ability to reduce the above time by (28) seconds		
I'm confident in my ability to reduce the above time by (29) seconds		
I'm confident in my ability to reduce the above time by (30) seconds		

How hard were you trying to stay in control of the car while going as fast as possible?

0 1 2 3 4 5 6 7 8 9 10
(Not at all) (Extremely hard)

How difficult was it for you to stay in control of the car while going as fast as possible?

0 1 2 3 4 5 6 7 8 9 10
(Not at all) (Extremely difficult)

We are also interested in your personal goal for the next trial. What time in minutes and seconds are you aiming for in the next trial? _____

Appendix (E)

Self-efficacy Questionnaire
Golf Putting Experiment

Name: **Gender: M/F**

Age:

Bangor University
SCHOOL OF SPORT, HEALTH AND EXERCISE SCIENCES

1	**Title of project**	**Examining the reciprocal relationship between self-efficacy and subsequent Performance upon Golf Putting**
2	Name and e-mail address(es) of all researcher(s)	Dr, Stuart Beattie (pes204@bangor.ac.uk) Dr, Tim Woodman (t.woodman@bangor.ac.uk) Mohammed Fakehy (pep824@bangor.ac.uk)

Please tick boxes

I confirm that I have read and understand the Information Sheet dated ……. for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐

I understand that my participation is voluntary and that I am free to withdraw at any time without giving a reason, without my medical care or legal rights being affected. ☐

I understand that my participation is voluntary and that I am free to withdraw at any time without giving a reason. If I do decide to withdraw I understand that it will have no influence on the marks I receive, the outcome of my period of study, or my standing with my supervisor, other staff members of with the School. ☐

I understand that I may register any complaint I might have about this experiment with the Head of the School of Sport, Health and Exercise Sciences, and that I will be offered the opportunity of providing feedback on the experiment using the standard report forms. ☐

I agree to take part in the above study. ☐

Name of Participant …….

Signature ……. Date ……..

Name of Person taking consent…Mohammed Fakehy

Signature ……. Date ……..

WHEN COMPLETED – ONE COPY TO PARTICIPANT, ONE COPY TO RESEARCHER FILE

Practice Trial 1 _____

Please write down how confident you are in your ability to beat your best score.

1. Can do (yes/no) please state yes or no if you think you can achieve each performance level
2. Confidence %(0-100) Please state your degree of confidence in being able to achieve this goal

0 10 20 30 40 50 60 70 80 90 100

No confidence at all **Moderate amount of confidence** **Completely confident**

	Can do (Y/N)	Confidence %(0 to 100)
I'm confident in my ability to beat my base line score by (1) point		
I'm confident in my ability to beat my base line score by (2) points		
I'm confident in my ability to beat my base line score by (3) points		
I'm confident in my ability to beat my base line score by (4) points		
I'm confident in my ability to beat my base line score by (5) points		
I'm confident in my ability to beat my base line score by (6) points		
I'm confident in my ability to beat my base line score by (7) points		
I'm confident in my ability to beat my base line score by (8) points		
I'm confident in my ability to beat my base line score by (9) points		
I'm confident in my ability to beat my base line score by (10) points		
I'm confident in my ability to beat my base line score by (11) points		
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I'm confident in my ability to beat my base line score by (15) points		
I'm confident in my ability to beat my base line score by (16) points		
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I'm confident in my ability to beat my base line score by (36) points		
I'm confident in my ability to beat my base line score by (37) points		
I'm confident in my ability to beat my base line score by (38) points		
I'm confident in my ability to beat my base line score by (39) points		
I'm confident in my ability to beat my base line score by (40) points		

Practice Trial 2 _____

	Can do (Y/N)	Confidence %(0 to 100)
I'm confident in my ability to beat my base line score by (1) point		
I'm confident in my ability to beat my base line score by (2) points		
I'm confident in my ability to beat my base line score by (3) points		
I'm confident in my ability to beat my base line score by (4) points		
I'm confident in my ability to beat my base line score by (5) points		
I'm confident in my ability to beat my base line score by (6) points		
I'm confident in my ability to beat my base line score by (7) points		
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I'm confident in my ability to beat my base line score by (29) points		
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I'm confident in my ability to beat my base line score by (31) points		
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I'm confident in my ability to beat my base line score by (33) points		
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I'm confident in my ability to beat my base line score by (35) points		
I'm confident in my ability to beat my base line score by (36) points		
I'm confident in my ability to beat my base line score by (37) points		
I'm confident in my ability to beat my base line score by (38) points		
I'm confident in my ability to beat my base line score by (39) points		
I'm confident in my ability to beat my base line score by (40) points		

Practice Trial 3 _____

Performance Trial 1, your best score from the practices was _____

	Can do (Y/N)	**Confidence %(0 to 100)**
I'm confident in my ability to beat my base line score by (1) point		
I'm confident in my ability to beat my base line score by (2) points		
I'm confident in my ability to beat my base line score by (3) points		
I'm confident in my ability to beat my base line score by (4) points		
I'm confident in my ability to beat my base line score by (5) points		
I'm confident in my ability to beat my base line score by (6) points		
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I'm confident in my ability to beat my base line score by (37) points		
I'm confident in my ability to beat my base line score by (38) points		
I'm confident in my ability to beat my base line score by (39) points		
I'm confident in my ability to beat my base line score by (40) points		

T 1	T 2	T 3	T 4	T 5	T 6	T 7	T8	T 9	T 10

Performance Trial 2, your best score from the practices was _____

	Can do (Y/N)	Confidence %(0 to 100)
I'm confident in my ability to beat my base line score by (1) point		
I'm confident in my ability to beat my base line score by (2) points		
I'm confident in my ability to beat my base line score by (3) points		
I'm confident in my ability to beat my base line score by (4) points		
I'm confident in my ability to beat my base line score by (5) points		
I'm confident in my ability to beat my base line score by (6) points		
I'm confident in my ability to beat my base line score by (7) points		
I'm confident in my ability to beat my base line score by (8) points		
I'm confident in my ability to beat my base line score by (9) points		
I'm confident in my ability to beat my base line score by (10) points		
I'm confident in my ability to beat my base line score by (11) points		
I'm confident in my ability to beat my base line score by (12) points		
I'm confident in my ability to beat my base line score by (13) points		
I'm confident in my ability to beat my base line score by (14) points		
I'm confident in my ability to beat my base line score by (15) points		
I'm confident in my ability to beat my base line score by (16) points		
I'm confident in my ability to beat my base line score by (17) points		
I'm confident in my ability to beat my base line score by (18) points		
I'm confident in my ability to beat my base line score by (19) points		
I'm confident in my ability to beat my base line score by (20) points		
I'm confident in my ability to beat my base line score by (21) points		
I'm confident in my ability to beat my base line score by (22) points		
I'm confident in my ability to beat my base line score by (23) points		
I'm confident in my ability to beat my base line score by (24) points		
I'm confident in my ability to beat my base line score by (25) points		
I'm confident in my ability to beat my base line score by (26) points		
I'm confident in my ability to beat my base line score by (27) points		
I'm confident in my ability to beat my base line score by (28) points		
I'm confident in my ability to beat my base line score by (29) points		
I'm confident in my ability to beat my base line score by (30) points		
I'm confident in my ability to beat my base line score by (31) points		
I'm confident in my ability to beat my base line score by (32) points		
I'm confident in my ability to beat my base line score by (33) points		
I'm confident in my ability to beat my base line score by (34) points		
I'm confident in my ability to beat my base line score by (35) points		
I'm confident in my ability to beat my base line score by (36) points		
I'm confident in my ability to beat my base line score by (37) points		
I'm confident in my ability to beat my base line score by (38) points		
I'm confident in my ability to beat my base line score by (39) points		
I'm confident in my ability to beat my base line score by (40) points		

T 1	**T 2**	T 3	T 4	T 5	T 6	T 7	T8	T 9	T 10

Performance Trial 3, your best score from the practices was _____

	Can do (Y/N)	Confidence %(0 to 100)
I'm confident in my ability to beat my base line score by (1) point		
I'm confident in my ability to beat my base line score by (2) points		
I'm confident in my ability to beat my base line score by (3) points		
I'm confident in my ability to beat my base line score by (4) points		
I'm confident in my ability to beat my base line score by (5) points		
I'm confident in my ability to beat my base line score by (6) points		
I'm confident in my ability to beat my base line score by (7) points		
I'm confident in my ability to beat my base line score by (8) points		
I'm confident in my ability to beat my base line score by (9) points		
I'm confident in my ability to beat my base line score by (10) points		
I'm confident in my ability to beat my base line score by (11) points		
I'm confident in my ability to beat my base line score by (12) points		
I'm confident in my ability to beat my base line score by (13) points		
I'm confident in my ability to beat my base line score by (14) points		
I'm confident in my ability to beat my base line score by (15) points		
I'm confident in my ability to beat my base line score by (16) points		
I'm confident in my ability to beat my base line score by (17) points		
I'm confident in my ability to beat my base line score by (18) points		
I'm confident in my ability to beat my base line score by (19) points		
I'm confident in my ability to beat my base line score by (20) points		
I'm confident in my ability to beat my base line score by (21) points		
I'm confident in my ability to beat my base line score by (22) points		
I'm confident in my ability to beat my base line score by (23) points		
I'm confident in my ability to beat my base line score by (24) points		
I'm confident in my ability to beat my base line score by (25) points		
I'm confident in my ability to beat my base line score by (26) points		
I'm confident in my ability to beat my base line score by (27) points		
I'm confident in my ability to beat my base line score by (28) points		
I'm confident in my ability to beat my base line score by (29) points		
I'm confident in my ability to beat my base line score by (30) points		
I'm confident in my ability to beat my base line score by (31) points		
I'm confident in my ability to beat my base line score by (32) points		
I'm confident in my ability to beat my base line score by (33) points		
I'm confident in my ability to beat my base line score by (34) points		
I'm confident in my ability to beat my base line score by (35) points		
I'm confident in my ability to beat my base line score by (36) points		
I'm confident in my ability to beat my base line score by (37) points		
I'm confident in my ability to beat my base line score by (38) points		
I'm confident in my ability to beat my base line score by (39) points		
I'm confident in my ability to beat my base line score by (40) points		

T 1	T 2	**T 3**	T 4	T 5	T 6	T 7	T8	T 9	T 10

Performance Trial 4, your best score from the practices was _____

	Can do (Y/N)	Confidence %(0 to 100)
I'm confident in my ability to beat my base line score by (1) point		
I'm confident in my ability to beat my base line score by (2) points		
I'm confident in my ability to beat my base line score by (3) points		
I'm confident in my ability to beat my base line score by (4) points		
I'm confident in my ability to beat my base line score by (5) points		
I'm confident in my ability to beat my base line score by (6) points		
I'm confident in my ability to beat my base line score by (7) points		
I'm confident in my ability to beat my base line score by (8) points		
I'm confident in my ability to beat my base line score by (9) points		
I'm confident in my ability to beat my base line score by (10) points		
I'm confident in my ability to beat my base line score by (11) points		
I'm confident in my ability to beat my base line score by (12) points		
I'm confident in my ability to beat my base line score by (13) points		
I'm confident in my ability to beat my base line score by (14) points		
I'm confident in my ability to beat my base line score by (15) points		
I'm confident in my ability to beat my base line score by (16) points		
I'm confident in my ability to beat my base line score by (17) points		
I'm confident in my ability to beat my base line score by (18) points		
I'm confident in my ability to beat my base line score by (19) points		
I'm confident in my ability to beat my base line score by (20) points		
I'm confident in my ability to beat my base line score by (21) points		
I'm confident in my ability to beat my base line score by (22) points		
I'm confident in my ability to beat my base line score by (23) points		
I'm confident in my ability to beat my base line score by (24) points		
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I'm confident in my ability to beat my base line score by (26) points		
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I'm confident in my ability to beat my base line score by (30) points		
I'm confident in my ability to beat my base line score by (31) points		
I'm confident in my ability to beat my base line score by (32) points		
I'm confident in my ability to beat my base line score by (33) points		
I'm confident in my ability to beat my base line score by (34) points		
I'm confident in my ability to beat my base line score by (35) points		
I'm confident in my ability to beat my base line score by (36) points		
I'm confident in my ability to beat my base line score by (37) points		
I'm confident in my ability to beat my base line score by (38) points		
I'm confident in my ability to beat my base line score by (39) points		
I'm confident in my ability to beat my base line score by (40) points		

T 1	T 2	T 3	**T 4**	T 5	T 6	T 7	T8	T 9	T 10

Performance Trial 5, your best score from the practices was _____

	Can do (Y/N)	Confidence %(0 to 100)
I'm confident in my ability to beat my base line score by (1) point		
I'm confident in my ability to beat my base line score by (2) points		
I'm confident in my ability to beat my base line score by (3) points		
I'm confident in my ability to beat my base line score by (4) points		
I'm confident in my ability to beat my base line score by (5) points		
I'm confident in my ability to beat my base line score by (6) points		
I'm confident in my ability to beat my base line score by (7) points		
I'm confident in my ability to beat my base line score by (8) points		
I'm confident in my ability to beat my base line score by (9) points		
I'm confident in my ability to beat my base line score by (10) points		
I'm confident in my ability to beat my base line score by (11) points		
I'm confident in my ability to beat my base line score by (12) points		
I'm confident in my ability to beat my base line score by (13) points		
I'm confident in my ability to beat my base line score by (14) points		
I'm confident in my ability to beat my base line score by (15) points		
I'm confident in my ability to beat my base line score by (16) points		
I'm confident in my ability to beat my base line score by (17) points		
I'm confident in my ability to beat my base line score by (18) points		
I'm confident in my ability to beat my base line score by (19) points		
I'm confident in my ability to beat my base line score by (20) points		
I'm confident in my ability to beat my base line score by (21) points		
I'm confident in my ability to beat my base line score by (22) points		
I'm confident in my ability to beat my base line score by (23) points		
I'm confident in my ability to beat my base line score by (24) points		
I'm confident in my ability to beat my base line score by (25) points		
I'm confident in my ability to beat my base line score by (26) points		
I'm confident in my ability to beat my base line score by (27) points		
I'm confident in my ability to beat my base line score by (28) points		
I'm confident in my ability to beat my base line score by (29) points		
I'm confident in my ability to beat my base line score by (30) points		
I'm confident in my ability to beat my base line score by (31) points		
I'm confident in my ability to beat my base line score by (32) points		
I'm confident in my ability to beat my base line score by (33) points		
I'm confident in my ability to beat my base line score by (34) points		
I'm confident in my ability to beat my base line score by (35) points		
I'm confident in my ability to beat my base line score by (36) points		
I'm confident in my ability to beat my base line score by (37) points		
I'm confident in my ability to beat my base line score by (38) points		
I'm confident in my ability to beat my base line score by (39) points		
I'm confident in my ability to beat my base line score by (40) points		

T 1	T 2	T 3	T 4	**T 5**	T 6	T 7	T8	T 9	T 10

Performance Trial 6, your best score from the practices was _____

	Can do (Y/N)	Confidence %(0 to 100)
I'm confident in my ability to beat my base line score by (1) point		
I'm confident in my ability to beat my base line score by (2) points		
I'm confident in my ability to beat my base line score by (3) points		
I'm confident in my ability to beat my base line score by (4) points		
I'm confident in my ability to beat my base line score by (5) points		
I'm confident in my ability to beat my base line score by (6) points		
I'm confident in my ability to beat my base line score by (7) points		
I'm confident in my ability to beat my base line score by (8) points		
I'm confident in my ability to beat my base line score by (9) points		
I'm confident in my ability to beat my base line score by (10) points		
I'm confident in my ability to beat my base line score by (11) points		
I'm confident in my ability to beat my base line score by (12) points		
I'm confident in my ability to beat my base line score by (13) points		
I'm confident in my ability to beat my base line score by (14) points		
I'm confident in my ability to beat my base line score by (15) points		
I'm confident in my ability to beat my base line score by (16) points		
I'm confident in my ability to beat my base line score by (17) points		
I'm confident in my ability to beat my base line score by (18) points		
I'm confident in my ability to beat my base line score by (19) points		
I'm confident in my ability to beat my base line score by (20) points		
I'm confident in my ability to beat my base line score by (21) points		
I'm confident in my ability to beat my base line score by (22) points		
I'm confident in my ability to beat my base line score by (23) points		
I'm confident in my ability to beat my base line score by (24) points		
I'm confident in my ability to beat my base line score by (25) points		
I'm confident in my ability to beat my base line score by (26) points		
I'm confident in my ability to beat my base line score by (27) points		
I'm confident in my ability to beat my base line score by (28) points		
I'm confident in my ability to beat my base line score by (29) points		
I'm confident in my ability to beat my base line score by (30) points		
I'm confident in my ability to beat my base line score by (31) points		
I'm confident in my ability to beat my base line score by (32) points		
I'm confident in my ability to beat my base line score by (33) points		
I'm confident in my ability to beat my base line score by (34) points		
I'm confident in my ability to beat my base line score by (35) points		
I'm confident in my ability to beat my base line score by (36) points		
I'm confident in my ability to beat my base line score by (37) points		
I'm confident in my ability to beat my base line score by (38) points		
I'm confident in my ability to beat my base line score by (39) points		
I'm confident in my ability to beat my base line score by (40) points		

T 1	T 2	T 3	T 4	T 5	**T 6**	T 7	T8	T 9	T 10

Performance Trial 7, your best score from the practices was _____

	Can do (Y/N)	Confidence %(0 to 100)
I'm confident in my ability to beat my base line score by (1) point		
I'm confident in my ability to beat my base line score by (2) points		
I'm confident in my ability to beat my base line score by (3) points		
I'm confident in my ability to beat my base line score by (4) points		
I'm confident in my ability to beat my base line score by (5) points		
I'm confident in my ability to beat my base line score by (6) points		
I'm confident in my ability to beat my base line score by (7) points		
I'm confident in my ability to beat my base line score by (8) points		
I'm confident in my ability to beat my base line score by (9) points		
I'm confident in my ability to beat my base line score by (10) points		
I'm confident in my ability to beat my base line score by (11) points		
I'm confident in my ability to beat my base line score by (12) points		
I'm confident in my ability to beat my base line score by (13) points		
I'm confident in my ability to beat my base line score by (14) points		
I'm confident in my ability to beat my base line score by (15) points		
I'm confident in my ability to beat my base line score by (16) points		
I'm confident in my ability to beat my base line score by (17) points		
I'm confident in my ability to beat my base line score by (18) points		
I'm confident in my ability to beat my base line score by (19) points		
I'm confident in my ability to beat my base line score by (20) points		
I'm confident in my ability to beat my base line score by (21) points		
I'm confident in my ability to beat my base line score by (22) points		
I'm confident in my ability to beat my base line score by (23) points		
I'm confident in my ability to beat my base line score by (24) points		
I'm confident in my ability to beat my base line score by (25) points		
I'm confident in my ability to beat my base line score by (26) points		
I'm confident in my ability to beat my base line score by (27) points		
I'm confident in my ability to beat my base line score by (28) points		
I'm confident in my ability to beat my base line score by (29) points		
I'm confident in my ability to beat my base line score by (30) points		
I'm confident in my ability to beat my base line score by (31) points		
I'm confident in my ability to beat my base line score by (32) points		
I'm confident in my ability to beat my base line score by (33) points		
I'm confident in my ability to beat my base line score by (34) points		
I'm confident in my ability to beat my base line score by (35) points		
I'm confident in my ability to beat my base line score by (36) points		
I'm confident in my ability to beat my base line score by (37) points		
I'm confident in my ability to beat my base line score by (38) points		
I'm confident in my ability to beat my base line score by (39) points		
I'm confident in my ability to beat my base line score by (40) points		

T 1	T 2	T 3	T 4	T 5	T 6	**T 7**	T8	T 9	T 10

Performance Trial 8, your best score from the practices was _____

	Can do (Y/N)	**Confidence %(0 to 100)**
I'm confident in my ability to beat my base line score by (1) point		
I'm confident in my ability to beat my base line score by (2) points		
I'm confident in my ability to beat my base line score by (3) points		
I'm confident in my ability to beat my base line score by (4) points		
I'm confident in my ability to beat my base line score by (5) points		
I'm confident in my ability to beat my base line score by (6) points		
I'm confident in my ability to beat my base line score by (7) points		
I'm confident in my ability to beat my base line score by (8) points		
I'm confident in my ability to beat my base line score by (9) points		
I'm confident in my ability to beat my base line score by (10) points		
I'm confident in my ability to beat my base line score by (11) points		
I'm confident in my ability to beat my base line score by (12) points		
I'm confident in my ability to beat my base line score by (13) points		
I'm confident in my ability to beat my base line score by (14) points		
I'm confident in my ability to beat my base line score by (15) points		
I'm confident in my ability to beat my base line score by (16) points		
I'm confident in my ability to beat my base line score by (17) points		
I'm confident in my ability to beat my base line score by (18) points		
I'm confident in my ability to beat my base line score by (19) points		
I'm confident in my ability to beat my base line score by (20) points		
I'm confident in my ability to beat my base line score by (21) points		
I'm confident in my ability to beat my base line score by (22) points		
I'm confident in my ability to beat my base line score by (23) points		
I'm confident in my ability to beat my base line score by (24) points		
I'm confident in my ability to beat my base line score by (25) points		
I'm confident in my ability to beat my base line score by (26) points		
I'm confident in my ability to beat my base line score by (27) points		
I'm confident in my ability to beat my base line score by (28) points		
I'm confident in my ability to beat my base line score by (29) points		
I'm confident in my ability to beat my base line score by (30) points		
I'm confident in my ability to beat my base line score by (31) points		
I'm confident in my ability to beat my base line score by (32) points		
I'm confident in my ability to beat my base line score by (33) points		
I'm confident in my ability to beat my base line score by (34) points		
I'm confident in my ability to beat my base line score by (35) points		
I'm confident in my ability to beat my base line score by (36) points		
I'm confident in my ability to beat my base line score by (37) points		
I'm confident in my ability to beat my base line score by (38) points		
I'm confident in my ability to beat my base line score by (39) points		
I'm confident in my ability to beat my base line score by (40) points		

T 1	T 2	T 3	T 4	T 5	T 6	T 7	**T 8**	T 9	T 10

Performance Trial 9, your best score from the practices was _____

	Can do (Y/N)	**Confidence %(0 to 100)**
I'm confident in my ability to beat my base line score by (1) point		
I'm confident in my ability to beat my base line score by (2) points		
I'm confident in my ability to beat my base line score by (3) points		
I'm confident in my ability to beat my base line score by (4) points		
I'm confident in my ability to beat my base line score by (5) points		
I'm confident in my ability to beat my base line score by (6) points		
I'm confident in my ability to beat my base line score by (7) points		
I'm confident in my ability to beat my base line score by (8) points		
I'm confident in my ability to beat my base line score by (9) points		
I'm confident in my ability to beat my base line score by (10) points		
I'm confident in my ability to beat my base line score by (11) points		
I'm confident in my ability to beat my base line score by (12) points		
I'm confident in my ability to beat my base line score by (13) points		
I'm confident in my ability to beat my base line score by (14) points		
I'm confident in my ability to beat my base line score by (15) points		
I'm confident in my ability to beat my base line score by (16) points		
I'm confident in my ability to beat my base line score by (17) points		
I'm confident in my ability to beat my base line score by (18) points		
I'm confident in my ability to beat my base line score by (19) points		
I'm confident in my ability to beat my base line score by (20) points		
I'm confident in my ability to beat my base line score by (21) points		
I'm confident in my ability to beat my base line score by (22) points		
I'm confident in my ability to beat my base line score by (23) points		
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I'm confident in my ability to beat my base line score by (26) points		
I'm confident in my ability to beat my base line score by (27) points		
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I'm confident in my ability to beat my base line score by (31) points		
I'm confident in my ability to beat my base line score by (32) points		
I'm confident in my ability to beat my base line score by (33) points		
I'm confident in my ability to beat my base line score by (34) points		
I'm confident in my ability to beat my base line score by (35) points		
I'm confident in my ability to beat my base line score by (36) points		
I'm confident in my ability to beat my base line score by (37) points		
I'm confident in my ability to beat my base line score by (38) points		
I'm confident in my ability to beat my base line score by (39) points		
I'm confident in my ability to beat my base line score by (40) points		

T 1	T 2	T 3	T 4	T 5	T 6	T 7	T8	**T 9**	T 10

Performance Trial 10, your best score from the practices was _____

	Can do (Y/N)	Confidence %(0 to 100)
I'm confident in my ability to beat my base line score by (1) point		
I'm confident in my ability to beat my base line score by (2) points		
I'm confident in my ability to beat my base line score by (3) points		
I'm confident in my ability to beat my base line score by (4) points		
I'm confident in my ability to beat my base line score by (5) points		
I'm confident in my ability to beat my base line score by (6) points		
I'm confident in my ability to beat my base line score by (7) points		
I'm confident in my ability to beat my base line score by (8) points		
I'm confident in my ability to beat my base line score by (9) points		
I'm confident in my ability to beat my base line score by (10) points		
I'm confident in my ability to beat my base line score by (11) points		
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I'm confident in my ability to beat my base line score by (37) points		
I'm confident in my ability to beat my base line score by (38) points		
I'm confident in my ability to beat my base line score by (39) points		
I'm confident in my ability to beat my base line score by (40) points		

T 1	T 2	T 3	T 4	T 5	T 6	T 7	T8	T 9	**T 10**