Scottish European Tour Professionals experiences of
playing and developing towards the European Tour:
Through the lens of a Constraints-led Approach

A thesis submitted for the degree of Masters by Research

by

Peter Arnott

Division of Sport & Exercise Science,
Abertay University.

October, 2018

Declaration

Candidate's declarations:

I, Peter Arnott, hereby certify that this thesis submitted in partial fulfilment of the requirements for the award of Masters by Research, Abertay University is wholly my own work unless otherwise referenced or acknowledged. This work has not been submitted for any other qualification at any other academic institution.

Signed ███████████

Date 22nd October 2018

Supervisor's declaration:

I, Ross Lorimer, hereby certify that the candidate has fulfilled the conditions of the Resolution and Regulations appropriate for the degree of Masters by Research in Abertay University and that the candidate is qualified to submit this thesis in application for that degree.

Signed

Date 27th April 2017

Certificate of Approval

I certify that this is a true and accurate version of the thesis approved by the examiners, and that all relevant ordinance regulations have been fulfilled.

Supervisor ███████

Date 29th October 2018

Acknowledgements

Dedication

In memory of my Mother and Father.

Abstract

It has been suggested that sports expertise is the ability of skilled athletes to guide their anticipatory responses by using the available predictive information and being mediated by the constraints placed upon them. It is, therefore, important that, during development, the performance constraints experienced are 'representative' of the experiences of competition (see Brunswick, 1956). However, it can be said that the amateur level of golf is not representative of the constraints experienced at the professional level, which creates an issue for golfers transitioning between these levels.

The purpose of this current study was to capture the constraints affecting performance of current and former Scottish European Tour golf professionals (SETP) when developing towards and then playing on the European Tour (ET).

The participants in this study consisted of seven former and current European Tour golf professionals (ETP) (1-10 years tour experience), each of whom took part in an in-depth semi-structured interview. All of the interviews were transcribed and then subjected to line-by-line thematic analysis to identify key themes. These were confirmed with measures of both inter-rater and participant reliability.

Four main themes were identified: (1) *Golf Courses*; (2) *Practice on the European Tour*; (3) *Playing on the European Tour,* and *(4) Sociocultural Constraints*. The major findings of this study suggest that potential European Tour players should seek training and competitive environments that are more representative, in order to facilitate an easy transition from Amateur to Professional Golf, potentially increasing the likelihood of success. It is important to develop these findings and to explore the effectiveness of a representative task design for golfers developing towards or playing on the European Tour.

Contents

List of Figures

List of Tables

Glossary

Carry: A distance the golf ball needs to travel to clear a hazard.

CSETP: Current Scottish European Tour Player, a Scottish professional golfer currently playing on the European Tour.

Driving: The first shot of each hole played on a tee ground, usually with a golf club called a driver.

Driver: Type of golf club hit off the teeing ground.

ET: European Tour**.**

ETGC: European Tour Golf Course.

ETP: European Tour Professional, a professional golfer playing on the European Tour.

Greens in regulation: A green is considered hit in when a golf ball comes to rest on a green in two shots less than the par of the hole i.e. by the second stroke of a Par 4.

Hazard: An area on the golf course, such as water, where a golfer is penalised if their golf ball comes to rest in this area.

Official World Golf Rankings: Ranking system to determine the best professional golfers in the world.

Majors: There are four tournaments in golf per year called majors, which have the highest prestige and Official World Ranking Points. Three are based in America, one in the United Kingdom.

Professional Golfer: A golfer that plays for prize money to earn his/her living.

Putting: A golf shot, played on the green, usually with a putter.

SGC: Scottish Golf Course.

SETP: Scottish European Tour Player.

Short game: A golf shot played near the green.

PGA Tour: Professional golf played predominately in United States of America.

Teeing Ground: The area where a golf hole begins.

Trajectory: Height of the golf ball in the air during a golf shot.

Introduction

For many young and successful male or female amateur golfers in Scotland during their journey towards expertise in golf, the prospect of turning professional and being able to earn a living by competing at golf is very appealing. In Europe, playing on the European Tour (ET) provides the opportunity to gain prestige and monetary rewards (European Tour Rankings, 2018). However, there remains a lack of successful Scottish European Tour Players (SETP) managing to earn a living on the ET.

This topic has been discussed at length in local Scottish Media outlets, with articles such as 'Scotland's top level Slump' by Dempster (2016) highlighting the lack of Scottish success on the ET. Furthermore, when this article was written there was only one Scottish golfer in the top one hundred of the world rankings and this situation remains the same two years on (Official World Golf Rankings (OWGR), 2018). Additionally, Scotland has only eight SETPs with full playing privileges on the ET (out of a potential 125), with only two of them being under thirty years of age, and it is predicted that this number will drop to below six in the 2018/19 season (European Tour Rankings, 2018). Moreover, the last Major win, the biggest tournament in golf (OWGR, 2018), by an SETP was in 1999 (Royal and Ancient (R & A), 2018).

However, despite this lack of recent success in the professional game, Scottish golfers are thriving in an amateur capacity. This is demonstrated through the Scottish amateur achievements in the last fifteen years: seven out of the last fourteen British Amateur Finalists have been Scottish, with two being winners (R & A, 2018). Additionally from a Scottish amateur golf perspective there have been eleven Walker Cup players during the last fifteen years (Walker Cup, 2018), one Eisenhower Trophy winner, success at the World Amateur Team Championships (IGF, 2018) and three European Team Amateur Championship wins and one defeat in the final (EGA, 2018).

There does remain, however, a scarcity of research aimed at providing an understanding of this difference in behaviour. The few studies that have been conducted focussing on either golfers who were currently in a golf talent development system reflecting on how they were developing towards Elite Amateur status (Hayman et al., 2011) or coaches involved in a talent development system regarding their perceptions of what is required to be a successful professional golfer (Stoszkowski, 2011). This current study is unique in golf research, as its main aim is to investigate and understand the constraints of SETP when playing on the ET. The second aim of this study is to investigate the constraints, when possible, SETP's encountered in their development towards the ET.

Through the data collected, this study looks to examine why there currently exists incongruence in success between amateur Scottish golfers and SETPs. The findings could potentially, contribute towards providing a more concise understanding for talent development programmes that have an interest in developing successful SETPs. This study also seeks to gain an understanding of the constraints SETP's behaviour when playing and competing on the ET, as this could, subsequently inform talent development programmes, or even current SETPs, in relation to developing constraints that shape behaviour which are beneficial to the development of expertise on the ET. Hence, for the purposes of this study, current and former SETPs were recruited to participate in retrospective semi-structured interviews, in order to explore, and gain an understanding of the constraints when developing towards, and playing on the ET.

To gain an understanding of how these constraints emerge a theoretical framework, namely a constraints-led approach, was employed in this study. A constraints-led approach indicates that behaviour is shaped by, and emerges through, the interaction of three categories of constraint: organismic, environment and task (Davids et al., 2015). However, it is firstly necessary to understand the key determinants of a successful professional golfer, in order to determine if comparisons can be made between the two environments.

Literature Review

Determinants of a Successful Professional Golfer

Historically, putting and the short game have been identified as being important factors of a professional golfer playing successfully on tour. A statistical analysis by Alexander & Kern (2005) of the key determinants of earning money during the period 1992-2001 on the PGA Tour, which has significant similarities to the European Tour, found that, if the golfers had increased their driving distance by 10 yards, the increase in their earnings would have been a meagre $4,542 per year. However, comparing the coefficients of the putting revealed that, if they had taken one less putt per round, their earnings would have increased by $220,254 per year. Furthermore, Wiseman and Chatterjee (2006), in their longitudinal study of performance on the PGA Tour during the period 1990-2004, found that putting and greens in regulation were of great importance to overall performance on the PGA Tour when compared to driving. The strength of the correlations between the average scoring and the average putting varied from a low of .56 in 1995 to a high of .70 in 1994. Compared to the correlations between the scoring average and the total driving, which ranged from a low of -.24 in 2003 to a high of -.50 in 1990, and there was a noticeable decline in the importance of driving from 1990 to 2004 (Wiseman & Chatterjee, 2006). This, however, is adapting with time, as Baugher et al (2016), by analysing the PGA Tour statistics from 2006 to 2013, revealed that driving performance replaced putting as the key skill determining players' remunerations in 2011, reasoning that this was due to the lengthening of the golf courses and the shortening of the rough. Indeed, an investigation of the average length of the golf courses on the European Tour from 2003 to 2015 indicated an increased length of over 125 yards, with an increase occurring each year (Golf Predictor, 2016).

The golf courses on the tour have also lengthened over the last 20 years relative to the pars, such as reducing the par of some par-5 holes to par-4 (Heiny, 2008). This lengthening of the golf courses is a consequence of driving the ball long distances, with the average driving distance of PGA Tour players increasing over the last 20

years by more than 25 yards (Heiny, 2008). These distance gains can be attributed to the ball and club technology changing during this period (Heiny, 2008) and also to a more professional approach by professional golfers (PG) to athleticism (Smith et al., 2011). A number of studies have also reported that increases in club head velocity allow golfers to better accommodate the increases in course length (Smith et al., 2011). Hence, as both technology and the athleticism of PGs have changed, the length of the golf courses has had to be adapted to cater for how far PGs are driving the ball (Baugher et al., 2016).

Consequently, all of these interacting constraints will influence successful performance of PGs, such as maintaining playing rights every year (remaining in the top 115 on the ET money list) and earning money on the ET. Indeed, Fried et al. (2004) found that functional performance on the PGA Tour, when measured by prize money earned, was significantly affected by how far the PGA Tour players drove the ball off the teeing ground. Therefore, it could be suggested that PGs being able to hit the ball long enough with the driver to meet the task constraints (length) of the golf course is a determinant of functional behaviour on the ET.

The need to hit great distances with the driver on Scottish golf courses (SGC) is rare, due to the age of most of the SGCs, which were designed and built before technological advancement in equipment and changes in physiology of PGs (Campbell & Satterley, 1999). Consequently, most SGCs are very short when compared to the ET golf courses (Scottish golf order of merit schedule, 2018). One example of this is St Andrews golf course, which, despite being redesigned in 2015 (Guadet, 2017), is 6,700 yards in length, being considerably shorter than a typical ET golf course (ETGC), the average length of which in 2018 was 7,223 yards (European Tour Schedule, 2018). Due to the lack of available land when redesigning St Andrews golf course, instead of lengthening the course the designers created more hazards, such as more bunkers (Guadet, 2017). This approach to course design leads the golfers to focus more on accuracy than distance. For example, Tiger Woods had changed his style of play to match the constraints of the golf course when he won the 2000 Open at St Andrews, by rarely hitting with the driver and playing with irons off most of the tees to avoid the hazardous bunkers, hence focussing more on accuracy than length (Guadet, 2017).

Tiger Woods' behaviour can be explained through the lens of Ecological Psychology, as this framework stresses that the information present in the environment and the surrounding energy arrays (e.g. acoustic, optical, proprioceptive) act as information to guide behaviour (Gibson, 1979; Bruineberg & Rietveld, 2014). Whilst this information constrains or controls behaviour, it does not cause behaviour, as not all golfers will be guided in the same way Tiger Woods was.

Functional performance, such as Tiger Woods' at the 2000 Open at St Andrews, from an Ecological Psychology approach to perception, is the ability to obtain the relevant information in the environment and then regulate action around this information (Gibson, 1979). From the example of Tiger Woods at St Andrews, the information from the golf course constraining or controlling his behaviour was narrow fairways with numerous penal bunkers and a golf course lacking in length (Guadet, 2017). Consequently, the functional, emergent behaviour of Tiger Woods was the result of him retrieving this information (i.e. penal bunkers, short golf course, narrow fairways) and regulating his actions around it (i.e. rarely hitting driver) (Fajen et al., 2009).

This process of selecting which sources of information to retrieve by Tiger Woods is called 'attention' in an ecological approach (Gibson, 1966). This approach describes the process of acquiring skilled behaviour as 'education of attention' or 'perceptual attunement', where skilled movement and behaviour is constrained or guided by attending to the most relevant sources of information in the environment (Gibson, 1966, 1979). When exposed to sources of information over time, skilled perceivers (e.g. skilled golfers) learn to attend to the more useful pieces of information in the environment (Fajen et al., 2009). Deciding which sources of information to attend to, and when, is the process of learning to become perceptually attuned, with the practice movements and behaviours of golfers converging on more specific sources of information in the environment (Fajen et al., 2009). In sailing, for example, it was found that the regulation of action of expert sailors was specified more from wind information, as opposed to skilled sailors, who predominately used information about their rival opponents to regulate their action (Araujo et al., 2005).

For a practical example in golf, Phil Mickleson, the 2013 Open winner (R&A, 2018), described how it took him over 20 years to become attuned to the links golf courses predominately seen in Scotland:

> *It took me a while to learn how to get the ball on the ground without spin…I was hitting my two irons just as low, but my ball was kind of hovering, it had way too much spin. It was floating in the air, so the wind was still affecting it…..It took me a long time to figure that out, that's been the biggest challenge.* (CNN, 2018).

Therefore, his perceptual system became increasingly more attuned to the invariants in the environment through exploratory actions in this specific context (i.e. links golf courses found at the Open) (Fajen et al., 2009).

With task specific experience, Phil Mickleson became more attuned to the environmental constraints of links golf courses (i.e. wind, different type of grass) and changed his movement pattern (i.e. hitting it lower with less spin), decision-making (i.e. hitting more irons off teeing ground) and equipment (i.e. carrying more irons in his golf bag) to adapt to this information (CNN, 2018).

It took nearly 20 years for his 'perceptual attunement to become highly functional on the links golf courses he experienced at the Open. However, as less than 10% (European Tour Schedule, 2018) of the golf courses on the ET are links golf courses, with even less on the PGA Tour where Phil Mickleson plays (PGA Tour Schedule, 2018), attunement to links golf courses for PGs may not be a key determinant for successful performance on the ET. One key determinant, as described earlier, of successful professional golf is the ability to hit it long and far and to drive the ball well off the tee. However, the average length of a golf course in Scottish Elite Amateur golf is 6,610 yards and over 50% of the golf courses used in a year are links golf courses (Scottish golf order of merit schedule, 2018) compared to the ET average length in 2018 of 7,223 yards with only 10% being links golf courses (European Tour Schedule, 2018).

Therefore, if Scottish golfers spend an extended period of time on SGCs they may become attuned to the specific information they are exposed to (Davids et al., 2015). As such, successful performance in golf relies on the golfers' ability to attune to the

specific demands of the performance environment (Davids & Araujo, 2010; Davids et al., 2015). Additionally if the information regulating the action on SGCs (i.e. shorter and more links golf courses) differs to European Tour golf courses (ETGC) (i.e. longer, less links style), Scottish golfers may develop behaviour habits that are dissimilar to the behaviours of successful professional golfers.

Representative Learning Environments

Ecological psychologists have been trying for a while to understand how information from the environment affects behaviour. Thus far, many catching, kicking, jumping and hitting activities have mainly been used to develop an insight into the relationship between perception and action (for a thorough discussion see Fajen et al., (2009)). Ecological Psychology advocates that a mutual interdependence between perception and action exists, and then subsequently suggests that, when designing learning environments, perception and action should function together (e.g. Pinder, et al., 2011; Pinder et al., 2013). Therefore, these observations suggest that the practice/development environments in golf need to be tailored to retain the key sources of information regulating the action during practice (Gibson, 1979). The demands of performance in golf can continually change (i.e. wind direction, golf course design, grass conditions, slope conditions) and physical adjustments (i.e. hitting the ball lower, adjusting body to adapt to a slope) can be made in response to these demands. Hence, in all golfing training environments practice tasks should maintain, when possible, the relationship between perception and action. The key sources of information should, therefore, be present (i.e. wind, slope, different grasses, length of golf course) in golf practice to enable a greater transfer to the competitive environment (Davids et al., 2015; Pinder et al., 2013).

This concept was originally introduced by Brunswick (1956) in a representative experimental design. He argued that the design and settings of an experiment should 'represent' the behavioural settings of the population to whom the results are to be generalised. He questioned the validity of the traditional empirical observations from empirical experiments, due to them not being performed in a relevant context. This can be seen in the golfing domain, where most studies have been an indirect

measure of golf performance, such as ball launch characteristics or club head velocity conducted in laboratory conditions (Evans & Tuttle, 2015).

In a laboratory, these studies are much easier to conduct with better environmental control, accuracy from motion analysis systems and ease of standardisation. However, in line with Brunswick's (1956) argument, to perform successfully in golf, golfers must adapt to the multiple, messy, chaotic situations that arise in the environment (Evans & Tuttle, 2015). Concerns have therefore, been raised in golf research, in that indirect measures of performance may provide inadequate information about real golf performance, due to the lack of representativeness, thus jeopardising the generalisability of many golf research findings (Keogh & Hume, 2012; Jenkins, 2014; Evans & Tuttle, 2015). The effects of this are significant, as, when informational constraints are changed, there are changes in movement responses, decision-making and performance outcomes, and there is a body of evidence in sport supporting this (Pinder et al., 2013; Davids et al., 2015; Greenwood et al., 2016). For example, studies investigating the joint co-ordination in dry land and aquatic training environments for elite springboard divers found differences in the amount of board depression, step length and jump height between the two environments (Barris et al., 2013). In golf, Bull's unpublished (2015) study measuring the movement of PGs from the driving range to the golf course found differences in hand and arm movements between the two environments.

The degree of correlation between two referenced situations or two environments (i.e. performance vs. training environment, golf course vs. driving range) is called action fidelity (Pinder et al., 2013). The fidelity is measured in terms of task performance and specifically deals with transfer; therefore, fidelity is realised when the behaviour in one environment (e.g. performance environment) simulates the behaviour in the other (e.g. training environment) (Pinder et al., 2013). In the case of Bull's study (2015) above there is low fidelity between the golf course (i.e. performance environment) and the driving range (i.e. training environment for many golfers), suggesting that the driving range is non-representative of performance. In non-representative practice, when practitioners exclude the key ecological constraints, the fidelity of athletes' behaviour is impacted on negatively in learning tasks (Pinder et al., 2013; Barris et al., 2013; Greenwood et al., 2016; Maloney et al.,

2018). For example, cricket batters' actions resulted in low fidelity when the practice was measured with a ball projection machine rather than a live bowler (Pinder et al., 2011). However, when designing practice tasks that are representative of performance, specifically when athletes sample the informational constraints that converge between the two environments, fidelity is maintained (Pinder et al., 2011; Barris et al., 2013; Greenwood et al., 2016). Therefore, these findings highlight the significance of creating representative learning environments for golfers, allowing the golfers to detect affordances for action within specific settings, situations and contexts that allow them to couple their actions to key information sources.

According to Gibson (1979), specific properties of an event (i.e. wind) or object (i.e. water hazard you can go over or round) afford the golfer action. However, realising the affordance properties of the object, which are unique to each golfer and not intrinsic to the object, requires golfers to regulate their action to the information relating to both the object (i.e. water hazard) and themselves (i.e. skill level and strength to get over water hazard) (Fajen et al., 2009).

Consequently, the various and specific affordances golfers use in their environment, and regulate their action around, involve a substantial amount of practice and learning to be used or perceived (Fajen et al., 2009). Hence, the perceptual information in the environment golfers spend time developing, practicing and learning in will constrain how the golfers regulate their actions. For example, Scottish Amateurs developing, practicing and performing on the short golf courses in Scotland described earlier may constrain them to hitting the driver less often off the teeing ground.

In summary, for a better transfer to the performance environment (i.e. the ET in this study), the development and practice (i.e. SGCs) environments need to be representative of the performance allowing for action fidelity. Therefore, the stakeholders (i.e. coaches) being fully aware of the constraints impinging on PGs will enable them to design practice interventions and tasks that replicate the behaviours of the PGs on the ET. Practical application of this is important for Scottish golfers developing towards the ET and playing on the ET, where these golfers spend most of their development and practice time on SGCs separate from ETGCs.

A constraints-led approach

A theoretical approach that attempts to include many features of Ecological Psychology and Representative Learning Environments is provided by a constraints-led approach (David's et al., 2015). A constraints-led framework to explain how the acquisition of functional behaviours (i.e. movement and decision-making skills) by golfers to meet the demands of the ET can illustrate the influence of the interacting organismic (i.e. cognitive abilities, skill level of golfer), environmental (i.e. wind) and task constraints (i.e. long golf course) (Glazier & Davids, 2009). Constraints are external and internal features that set or limit the boundaries for golfers to develop and perform (Newell, 1986). In complex systems, such as potential or current PGs, behavioural trajectories can be enabled or limited by these interacting constraints (Glazier & Davids, 2009). In order to permit functional forms of behaviour to emerge, such as driving the ball a long distance to meet the demands of the ETGCs on the ET, PGs can make use of the constraints that encircle them to reach a goal-directed behaviour. For example, the constraints that potential SETPs have developed with, such as wind, short golf courses and a physiology lacking in strength, could coalesce to 'determine' a movement pattern that produces a lower trajectory of ball flight that lacks distance. This movement pattern is not prescribed to the golfer, but is 'determined' by the interaction of the constraints impinging on the golfer that eliminate certain configurations. Such as the constraints of the golf course (short length), and windy environmental constraints would eliminate the need for the golfer to hit the ball a great distance with a higher trajectory (Kugler, Kelso & Turvey, 1980).

To help explain how this behaviour emerges during goal directed activities Newell (1986) provided a framework outlined by three distinct categories of constraints: organismic, environment and task (see Figure 1)
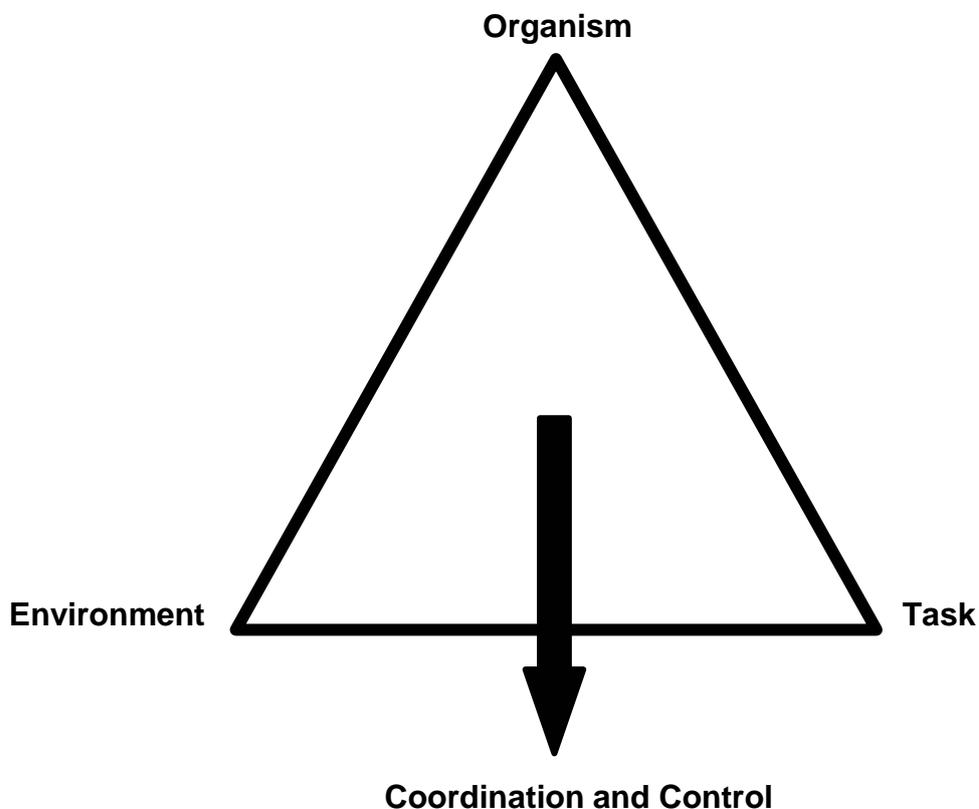
Figure 1: Theoretical model of interacting constraints Newell (1986)

Organismic constraints can be categorised as those that are internal to the golfer's movement system (David's et al., 2015). These can be further sub-divided into functional and physical constraints. Firstly, functional constraints can vary quite significantly over time, such as the skill level of the PG. Accordingly, Stöckl and Lamb (2018) found that the skill level on the PGA tour, measured in a low variability of tee shot performance, was related to better performance.

Other functional constraints could be the psychological characteristics of the PGs, such as anxiety and confidence. In fact, Bois et al. (2009) found that successful professional golfers were more somatically and cognitively anxious and used more frequent relaxation strategies. Perceptual systems, with regard to where a golfer's gaze is, also play a role in functional constraints, and research has suggested that elite athletes select more task relevant cues when scanning the environment and

use these cues to subsequently control the movements required for the task in hand (Davids et al., 2005).

The physical constraints of golfers remain somewhat stable over time after adolescence and contain such features as the golfers' mass, strength, flexibility and height (Glazier & Davids, 2009). However, when Sell and his colleagues (2007) examined elite golfers' physical characteristics, they concluded that golfers with increased power, flexibility and strength demonstrated higher skill levels and proficiency.

Environmental constraints are associated with the physical and sociocultural properties of the environment in which the PGs are performing or have developed. The physical components of the environment include wind, altitude, gravity, temperature, ambient light and surfaces they develop and perform on (such as different types of grasses or sands). Indeed, one only has to look to tennis and Rafael Nadal's record on clay to draw a comparison between the environmental constraint he grew up with, playing on clay courts, and why he has been so successful on these playing surfaces (Kannan, 2018). Regarding the ET, the extraordinary record of South African ET golfers on the South African golf courses on the ET can be compared to Nadal's record on clay, as there have been 13 South African winners in the last 20 years at the South African Golf Open hosted on the ET (European Tour, 2018). With the success rate of South African golfers being relatively low on the ET (European Tour, 2018), this potentially suggests that South African golfers are more 'attuned' to the surface constraints (i.e. grasses) as a result of developing on them. This home field advantage due to surface conditions has also been seen in football, where teams in the 1980's whom played on artificial surfaces (Preston North End, Oldham Athletic, Luton Town and Queens Park Rangers) where found to have a home advantage (Barnett & Hilditch, 1993). Consequently, artificial surfaces are no longer allowed in Scotland and English football leagues.

Sociocultural constraints include family and other support networks, such as caddies. Coate & Tommey (2014) found that professional caddies attributed to achieving one stroke lower on the PGA Tour when compared to local caddies. The study investigated daily scoring averages in two tournaments, The Western Open and The

Masters where in the early 1980's local, unprofessional caddies were mandatory, then compared scoring data when professional caddies were allowed in the same tournaments later in the 1980's and early 1990's. Although this study did not allude to why this might be the case, except for siting better experience, Pilgrim et al (2015) found that 'good' caddies created ways to support golfer's high performance state with a variety of cognitive and attentional strategies. Other sociocultural constraints are the training facilities PGs have access to either at home, on the ET or where they developed their skills. Côté et al. (2006) found that small towns with a population of between 50,000 and 100,000 produced proportionally more PGA tour players when compared to populations over 500,000, which was partially attributed to ease of access to practice facilities and coaching.

Task constraints involve factors associated with task requirements, such as the equipment used to perform the skill (e.g. golf clubs), the task goals and the rules of the task. Firstly, the equipment in golf has changed over the last 20 years to an extent that the average driving distance on the ET in 1998 was 267 yards and by 2017 it was over 290 yards (R&A, 2017). This gain in distance is mainly attributed to the size of the driver heads increasing from 285cc in 1995 to 460cc in 2018, whilst also in conjunction with the introduction of solid-core ball technology, which has replaced wound ball technology (R&A, 2017). Secondly, the task goals relate to the specific aims and intentions of a golfer during the task performance. Task goals tend to not exactly ask how a task should be achieved, but imply it (Renshaw & Davids, 2014). The golf course length implies a task goal; therefore, the short SGCs described earlier may imply accuracy over length and then, contrastingly, the ETGCs imply length as being a key task goal. Interactions with the task goal between the organism, task and environmental constraints and then the emergent movement coordination solutions are only optimal for that specific golfer (David's et al., 2015). For example, the long golf courses on the ET may imply length; however, if the golfer does not have the physiology (i.e. strength) to hit the ball far, then he will be constrained by what he can optimally do. When looking at the task goal of hitting a golf ball Horan et al (2011) found that skilled golfers found many different, unique ways to find consistent ball contact with the golf club (Horan et al., 2011). Such findings are consistent with the key characteristics of expert performers in many

sports who display high degrees of adaptability (Tan, Chow & David's, 2012; Araújo & Davids, 2016; Seifert et al., 2016).

From a coaching perspective, understanding the dynamic relationships that occur between an organism, environment and task, and the influence they have on a golfer's functionality, is a key factor to being able to utilise a constraints-led approach to coaching (Renshaw et al., 2016). With this understanding, coaches can then utilise these constraints to implement golf training environments that are conducive to the performance environment, being the ET in this study (Renshaw et al., 2016).

It is in this setting that this current research sets out a case study of seven SETPs, past and present, who have experience of playing on the ET. To gain a thorough understanding of the constraints impinging on SETPs, the researcher aims to investigate the SETPs' personal experiences. Newell's (1986) constraints model, and, subsequently, the constraints-led approach that has emerged from this (Renshaw & Davids, 2014) provides an excellent framework to gain an understanding of the behaviour of SETPs, as it sufficiently captures the mixture of varied constraints affecting them during their development towards the ET and then playing on the ET. This framework highlights the important interactions between organismic, environmental and task constraints and how they affect behaviour.

For example, Eccles and colleagues (2009) used the framework to describe a variety of constraints that effect performance during and before competition to inform training environments for expert orienteers. To create an accurate overview of behaviour when developing towards, and on the ET, understanding of the performance constraints is required. An approach that often fails to adequately capture the complexity of the interactions between constraints in unpredictable environments is the rationalised, scientific method (Anson et al, 2005). For instance, some theoretical frameworks developed from this approach have been criticised for having simplistic reductionist representations of complex interactions, without an understanding of the relationship between complex interactions (Anson et al, 2005). A theoretical framework that will be utilised in this study is the constraints-led approach because of its ability to encapsulate the relationships between the complex

interactions and environments (Renshaw & Davids, 2014), such as those found on the ET (Fry & Bloyce, 2017).

Methodology

Research Design

The main aim of this study was to explore, and to gain an understanding of, the constraints that have an impact on SETPs competing on the European Tour. The second aim, when possible, of this study aimed to understand the constraints that affect SETPs when developing towards the ET. In aiming to gain insiders' perspectives of ET life, face-to-face interviews were conducted with five current and two former SETPs. The data collected provided a unique insight into the individual experiences of each professional golfer during their progression to, and their experiences whilst on, the ET. In order to gather rich and detailed data of these experiences, an exploratory approach was adopted and, consequently, qualitative methods, specifically semi-structured interviews, were employed within a naturalistic setting.

Qualitative methods, via retrospective semi-structured interviews, have been used as it allows the researcher to take minutes and hours to collect data via retrospective interviews rather than quantitative methods such as longitudinal methods which can take decades and years (Patton, 2002). With a collective experience of 31 years' experience on ET from the seven SETPs (see Table 1) this would be too time consuming and financial expensive compared to retrospective methods (Patton, 2002). Hence, a qualitative method was selected to support, gather and generate new information in this research, as SETPs and the constraints that influence their behaviour when they are developing and playing on the ET remains a heavily under researched area.

Qualitative research covers an expanse of approaches (Sparkes & Smith, 2013); however, its core purpose is to develop new knowledge from people's experiences in the world they live in (Sparkes & Smith, 2013). This allows researchers to be open to observe new ways of thinking and to build new ideas, enclosed around the participants' natural settings (Patton, 2002). The goal of qualitative research is to acquire aspects of the social world (Jones, Brown and Holloway, 2013) and it takes

the interactions the researcher has within this field and with the participants as an explicit measure of knowledge (Flick, 2009).

Therefore to gain SETP's insights of playing and developing towards the ET, the researcher was interested in examining and obtaining information such as experiences, emotions, thoughts and feelings. As these characteristics can be problematic to quantify, non-numerical measures collected from the perspective of the participant and interpreted by the researcher to unearth meaning were therefore necessary and are integral to the qualitative approach adopted (Lunenburg and Irby, 2008). This chapter will outline the methodical approach applied in this current study via four sections: participants, interviews, data collection and data analysis and representation.

Participants

Seven Scottish European Tour players were recruited as the sample for the purpose of this study. Over the last three years (2015-2018) the numbers of SETPs with full playing privileges on the ET were ten (2015-16), eight (2016-2017) and eight (2017-2018); therefore, it could be argued that the sample in this study is fully representative of the SETPs on the ET. Purposeful sampling (Patton, 2002) was utilised in the selection and recruitment of expert professional golfers who had played, or were still playing, on the ET. The inclusion criteria was that the SETPs must have had at least one year of experience playing in the top tier of European/World golf, that being the ET, prior to being interviewed. This minimum requirement was imposed to ensure that the data collected would be rich enough for the area of investigation and to maintain validity, specifically when classifying these golfers as experts.

The definition of expertise in sports research, with regards to the participants, has led to much confusion and inconsistency in sport psychology research (Swann et al., 2015). The use of the framework of Swann et al. (2015) for defining the levels of expertise of the seven SETPs from the analysis of their interviews revealed that two of the participants in this study could be defined as World-class elite, due to them

having experienced sustained success at the highest level (the ET) for a prolonged period of time. Three of the SETPs, by using this framework, could be defined as being successful elites, as they have experienced occasional success at the top level and the remaining two could be defined as competitive elites, as, although they have had limited to no success at this level, they have competed at the highest level (Swann et al., 2015). Table 1 provides the demographics of the participants in this study.

Table 1: Demographics of the participants

Participant	Age	Gender	ET Experience (years)	ET wins	What are they doing now?	Family whilst on ET	Challenge Tour wins (2nd tier of ET)
Robert	35	Male	10	3	ET	No	2
Mitchell	56	Male	10	2	Senior Tour	No	0
William	38	Male	6	0	Coaching	No	3
Noah	40	Male	3	0	Challenge Tour	Yes	1
Liam	34	Male	2	0	ET	No	1
Jacob	37	Male	2	0	Tartan Tour	Yes	2
Harry	53	Male	1	0	Coaching	No	2

Interviews

For the data collection process an informal qualitative semi-structured interview was employed which allowed the researcher to have the flexibility of altering the questions and subjects discussed during the interview, in order to probe for further reasoning and to gain clarification in the areas being discussed (Jones, Brown and

Holloway, 2013). Through this approach, a greater understanding of the research question was achieved, as the interviewer could identify aspects unique to individual participants and adapt the questions accordingly (Sands & Patton, 2002). This developed a balanced relationship between the researcher and the interviewees, creating trust, disclosure and awareness of possible ethical issues (Sands & Patton, 2002). New information related to the topic of study was allowed to emerge by balancing the designation and control of the questions asked through interviews that were reciprocal in nature (Jones, Brown and Holloway, 2013).

In relation to the topic being investigated in this study, predetermined questions delivered through the semi-structured interviews enabled the researcher to explore and gain insights into both the subjective experiences of SETPs on the ET and players' development towards the ET (Dowling Naess, 1996; Goose, 2012). Therefore, when designing the interview, one of the first steps is to specify the aspects that are to be explored (Tuckman, 1978). Consequently, the interview guide was (see Appendix A) specifically created to gain an understanding of the 'constraints' affecting both the participants' performance on the ET and their development towards the ET, for example using such questions as "Can you tell me about some things that come to mind that affect your performance when playing on tour?" and then probing for comparisons in their development by asking "How does this compare to your amateur days?"

The aim was to gain a thorough perspective of the constraints affecting the seven participating SETPs in their development towards and whilst playing on the ET. Similar lines of enquiry have occurred, and have been examined, in studies of elite players' development and performance through qualitative research (e.g. Baker et al., 2005). During the interview process in this study short notes were taken to help in the recapping of pertinent points relevant to the line of enquiry in the study and to help with remembering them at a later stage.

The researcher recognises that it is impossible not to do research via interviews and not influence the process by their own attitudes, characteristics and values. Especially as the researcher is a golf coach based in Scotland, whom has coached two of the participants in the study, and has familiarity with three of the other

participants. Consequently, this can have positive and negative aspects, the negative aspects could be a bias view on the research findings due to the researcher's views on the constraints that affect SETPs, having coached in Scotland for over eight years; this can be problematic when researching others as it affects our subjectivity (Hammersley & Atkinson, 2007). However, a way of helping to alleviate this problem is following the interview guide (see Appendix A). From a positive aspect, it is worth noting that the wealth of knowledge that the researcher has in golf and previous relationships with five of the seven participants allowed for a common ground between the two parties. According to Cohen et al., (2002) for the success of life history research these benefits are pre requisites.

Data Collection

The recruitment process was initiated once the University's ethical board granted full ethical approval (see Appendix B). The participants in this study were all initially contacted by telephone and asked if they would be interested in partaking in the study. Once the potential participants showed willingness to partake in the study a follow up email with the participant information sheet (see Appendix C) was sent. This sheet included the general outline of the nature of the study that the researcher was trying to investigate and that participation in the study was voluntary and that they could leave at any point during the research. Each participant was given time to digest this information and ask any questions regarding the research. A follow up telephone call was made by the researcher to verbally explain the purpose of the study and to arrange a mutually suitable time and location for the interview. Prior to each interview the researcher asked each participant to read and sign the informed consent form (see Appendix D) to satisfy the 'informed' part of the informed consent process (Bryman, 2008). Signature therefore indicated that each participant was satisfied to continue with the interview and that the researcher had written proof to signal this intent (Bryman, 2008).

The interviews took place at the researcher's place of work, a golf club that was familiar to all SETPs and each interview recorded via the use of the IPhone six digital recording software. The interviews began with the researcher trying to create the

right atmosphere from the start (Cohen et al., 2002). To help with this the researcher used a 'superficial' question (see Appendix A) to put the participant at ease and allow the researcher a 'way in' into interview (Grinyer, 2009). Subsequently, the participants were asked throughout the interview to reflect on their experiences on the ET and then to relate these experiences, when possible, to their development towards the ET (see Appendix A). Probing techniques were adopted by the researcher to prompt further discussion should the participants' responses lack depth, due to the openness of the semi-structured interview format (Aronson, 1995). Additionally, further prompting was also performed to achieve clarity and to moderate against ambiguity in the meaning behind the participants' interpretations of their experiences (Delamont, 2016). Furthermore, the questions asked could be personalised to the participants. The conclusion of each interview consisted of asking each participant if he had any further comments he would like to add and a debriefing of each participant. Regarding the sample size, (n=7), the number of participants in this study was relatively small.

Although the initial intention was to recruit ten SETPs, five were firstly interviewed in this study, with similar themes emerging. Subsequently, two further SETPs were recruited and interviewed, in order to confirm data saturation (Saunders et al., 2018). Each interview was recorded and transcribed verbatim, with the interviews lasting for one hour and sixteen minutes to two hours and eleven minutes, with a total of five hundred and forty four minutes over the 7 interviews. Anonymity was also adhered by the researcher, using pseudonyms for participant's names therefore protecting the identity of the participants in this study (Patton, 2002).

Data Analysis and Representation

During the research process, anonymity was assured regarding the participants' details and transcriptions of the data obtained, hence safeguarding the participants' identity and management of the data (Jones, Brown and Holloway, 2013). To help understand the data collected from SETPs on their thoughts on the constraints affecting them on the ET, and development towards the ET, an inductive thematic

analysis was conducted on transcripts of each of the SETPs interviews using a six phase procedure suggested by Braun and Clarke (2006) which is detailed below.

Familiarisation with the data

When all of the data had been collected, verbatim word for word transcription of all the seven interviews conducted was performed, followed by a thematic analysis of the qualitative data obtained via familiarisation with the data. This familiarisation was enhanced by the researcher immersing in the audio recordings and by reading and re-reading the transcripts and vigorously for patterns in the data. Notes were taken throughout this process on initial ideas on potential future coding.

Generating initial codes

Once familiar with the data, coding commenced, the process of finding differences and similarities and then categorising the data commenced via broadly defined initial codes (Jones, Brown and Holloway, 2013). This data set was worked through systematically, with the researcher using a highlighter at first and then onto post it notes to identify areas of potential interest. Post it notes with individual data extracts were placed on large A1 pieces of paper, sometimes the same extract of data in many different potential themes, to provide an overall conceptualization of data patterns.

Searching for themes

Refinement and reduction of the categories found led to categories being formed, coded and triangulated via theme piles, where A1 pieces of paper where given potential theme titles and coded data were stacked on top, if deemed relevant (Kleinsasser, 2000). Codes that seemed to have no 'home' were piled into a 'not sure' theme for future reference. Emerging from this phase all coded data had found a 'home' of initial candidate themes, and sub-themes.

Reviewing the themes

The emergence of themes and subthemes was guided through analysis and their suitability to the research question and theoretical framework (Lunenburg and Irby, 2008). Therefore, in this phase, all the ordered codes in each theme were read to see if they formed a clear outline, using this guiding criterion. When the code fitted the themes, the researcher had more clarity on how the themes fitted together and how to tell a 'story' with the data. Consequently, once this stage of review was concluded the themes were grouped into thematic maps.

Defining and naming themes

Throughout the analysis process the researcher alternated between the entire data, set, the themes identified, and the coded data, coding any further data that may have been unnoticed in previous coding. The 'essence' of the themes was used to define each theme and sub-theme, once themes had been refined (Braun & Clarke, 2006). The master themes were thoroughly checked against the interview transcripts to confirm they sufficiently represented the experience of the participants.

Writing the report

Compelling extracts were selected and related back to the research question to provide 'evidence' of prevalent coded data and to tell an analytical story of the data (Braun & Clarke, 2006).

Producing the report

Inter-rater reliability was employed to assess if there were any biases in the data, confirming that the researcher's conclusions were congruent with another rater, hence increasing the validity of the research findings (Patton, 2002). Additionally, to ensure that the conclusions were not merely a reflection of the author's own biases towards the constraints impinging on SETPs, the final transcripts were compared with the audio recording and notes taken throughout each interview, to uphold the validity. Further validity was also assured and constantly maintained by the author having a good understanding of the research theory underpinning the interviews, a command of the theoretical frameworks supporting a constraints-led approach and a self-reverent position regarding the epistemological issues supporting the theories (Davies & Dodds, 2002; Kuzmanić, 2009). This, subsequently, allowed for representation of the data to be transformed into an interpretable piece of writing, by use of extract examples related to the themes, literature and the research question.

Discussion of Findings

Introduction

The following chapter summarises and investigates, via analysis of the semi-structured interviews, the themes that emerged. Illustration, with the use of direct quotes from the participants, is used to enable the reader to understand where and how the themes emerged. Previous research and theoretical frameworks are related to the SETPs' experiences whilst developing towards and playing on the ET through comparisons with these emergent themes. The table below illustrates the themes and sub-themes that specifically emerged from the research: *Golf Courses, Practice on the European Tour, Playing on the European Tour* and *Sociocultural Constraints.*
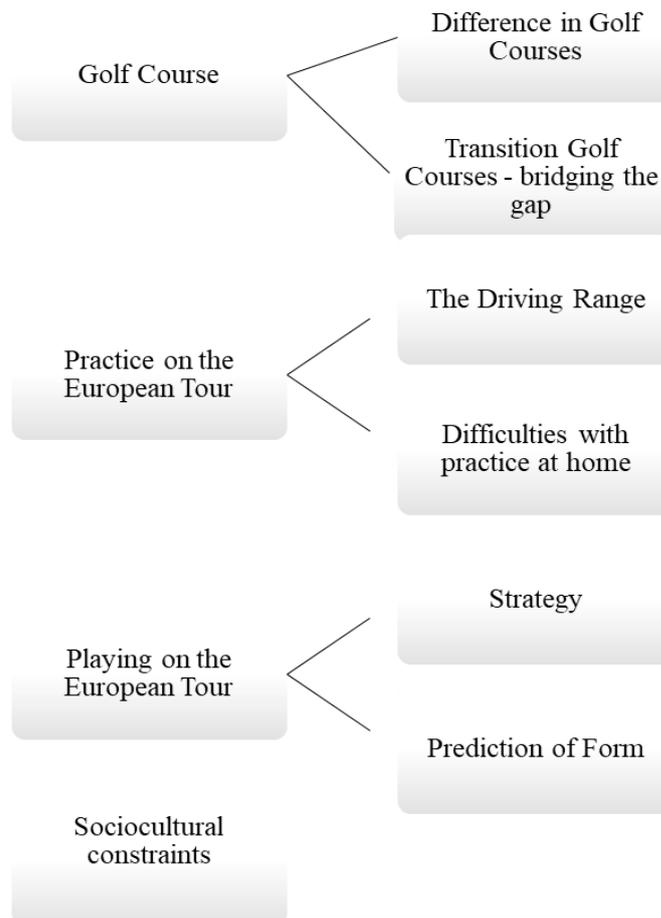
Figure 2 – Emerging themes and sub-themes

Golf Courses

Within the theme of golf courses, two sub-themes emerged: *Difference in golf courses* and *Transition golf courses – bridging the gap.* All of the five current Scottish European Tour players (CSETP) interviewed discussed how their performance on the ET has been influenced by the golf courses they grew up on before they joined the tour, the golf courses that helped them to transition onto the tour courses and the golf courses on the tour. The two former SETPs did not provide as much detail about golf courses, which could possibly be due to the golf courses they grew up playing and competing on being fairly similar to the courses they encountered on the ET, circa 20+ years ago, with regards to length (Olsnes, 2016) and location. In contrast, the five CSETPs highlighted stark differences between the golf courses they played on pre-tour and on tour, as detailed below.

> *20 years ago the level of the physical side of it has become more of an issue now than it was 20 years ago because of the length of the golf courses* (on ET) [Robert]

Golf courses

Differences in golf courses

Transition golf courses - bridging the gap

Figure 3 – Main Theme: Golf Courses

Differences in golf courses

Out of the seven ET players interviewed, all of the five current ET players went into depth regarding the differences between the courses they played, practiced and competed on when developing their game towards the ET and the courses they encountered when playing on the ET. All five described golf courses that were non-representative of tour golf courses, and how the golf courses affected their, or their peers', style of play when they were developing on SGCs. Liam stated that the courses were completely different:

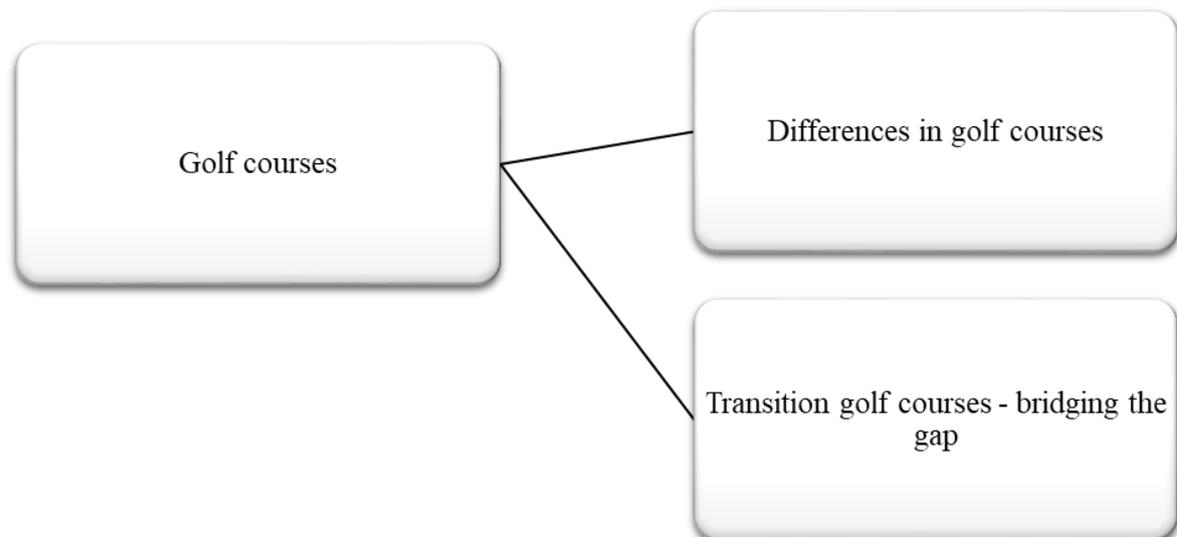*The courses are completely different (on tour)…..just totally different, you don't play on the courses we were brought up on, really they're completely different courses.* [Liam]

With regard to why the golf courses are so different, all of the CSETPs indicated that they were too short in length:

The courses are too short…..I only learned to hit a 5 iron on Tour (ET). [Noah]

Robert added that the courses were too short with boundaries that were restrictive.

In Scotland you play on short tight golf courses in the amateur tournaments. [Robert]

Furthermore, all of the CSETPs went into more depth by stating that hitting the ball low on short narrow golf courses with wind was an important skill in Scotland:

The links courses are quite tight, but you get away with hitting irons… You could chase the ball down there (referring to hitting the ball low on links golf courses). [Jacob]

Additionally, all of the CSETPs reflected how the conditions they developed within in Scotland shaped their own or their peers, style of play. Jacob believed that the golf courses they grew up with had shaped their style of play towards accuracy rather than power:

I think that's maybe one of the reasons we don't (Scotland) produce as many power players…say I was playing the British Amateur and the fairways were reasonably firm, what's the one thing you're going to want as a player in a place like that, accuracy. You're not going to care how far it goes. [Jacob]

It is evident from the SGC's theme that the golf courses players developed on in Scotland were short, with tight boundaries, and they were mainly links golf courses that were played on in the wind. Therefore, the required style of play was accuracy, because of the tight boundaries, with a lower trajectory of ball flight to play in wind.

All of the five current CSETPs described how a different style of play was needed for the Tour golf courses when compared to the SGCs, due to their length and design. Indeed, Robert mentioned that the style of play needed on the ET was completely different to the style of play on the golf courses he grew up with in Scotland:

I think it's the style of golf that's played in Scotland, compared to the type of golf that's played on tour….I think the big thing, in the amateur game, the style of golf is not the same as the style of golf you play as a pro. [Robert]

William emphasised the need to hit the ball low on SGCs; however, this style of play did not transfer well to playing on the tour courses:

I live in Scotland, so of course I kind of hit everything like down and try to keep it under the wind, but that doesn't play out well on tour.[William]

Consequently, the majority of the current ET players stated that being able to hit the ball high was an important skill to have on the ET, with Robert stating:

It's one of the most important things you need on tour (hitting it high). That ability to not only be able to stop it on the green, but also to carry hazards. [Robert]

Liam added:

I don't see anybody hitting it low, next to nobody on tour. [Liam]

Furthermore, and linked to distance and height, the majority of the players mentioned that the greens were firm on tour and the ability to hit it further and higher was an advantage for CSETPs.

Also the greens can get firm……If you hit it further you can stop it quicker. [William]

Therefore, to cope with the course demands (length), many of the ET players stated that distance was also important:

It just limits you to golf courses you can play if you hit that short….. Distance is a big thing…. [Robert]

Jacob highlighted that distance was important, due to there being so few short courses on the ET. When asked how many short courses were on the ET, he replied:

Next to none. You might only find 2 (out of over 30) a year maybe. [Jacob]

Reinforcing the importance of distance on the ET, William reflected that, since he joined the ET (circa 2006), there are now more PGs who hit the ball great distances on the ET, and the golf courses on the ET suit that style of play:

There are more and more beasts (long hitters); it's not an irregular occurrence seeing a guy who's almost 130 miles an hour. Tour golf, that's the way it's going, because it makes sense, the power….You know it's quite a dangerous combination, and the courses suit that sort of style. [William]

Additionally, Robert stated his belief that, if you hit the ball far, you can become successful on the ET:

I would say the sky's the limit (on tour), if you're a long hitter, you can do anything. [Robert]

Specifically, all of the CSETPs mentioned the importance of driving the ball well on ETGCs, as the ETGCs are so long. Liam stated:

I think they're so many times you hit a driver now, especially when the golf courses are really long…You've got to drive the ball well. It's as simple as that. [Liam]

Contrastingly, from the data gathered on SGCs, where the style of play needed was accuracy and a low ball flight, the analysis of the ETGCs revealed that the required style of play for the ET is being able to hit the ball a long distance, with height, and driving the ball successfully.

Transition Golf Courses – Bridging the Gap

Three of the current ET players had spent time in the American Collegiate system before they reached the ET and they described how the golf courses there helped them in their transition from the SGCs to the ETGCs. All of the players agreed that the SGCs did not prepare them for the ET.

When asked if the golf courses in Scotland had prepared him for the ET, Liam stated:

In Scotland no. [Liam]

All of the three players who had attended college in America alluded to how this had aided them in their transition to professional golf, with Jacob:

I don't think I would be a pro if I hadn't went. [Jacob]

When describing how this had aided them, Robert mentioned that he had moved to America to play on golf courses more like the ET to help him to transition from the SGCs quicker, and to play on golf courses that were longer and demanded more height compared to the courses he was developing on, which demanded lower golf shots:

I noticed this in 2004, and I tried to get access to play at Gleneagles. I started realising that the courses we were on (at amateur level) wasn't going to help me to make the transition from amateur to pro quicker. I tried to play longer courses more, longer and softer, which had more run offs (alluding to golf courses he faced in collegiate golf), you hit everything through the air, a bit more one dimensional golf rather than shaping it into a wind, playing it on the ground (low golf shots), like you would on links courses. [Robert]

All of the three players also noted that the courses at college were longer and more challenging than the courses in Scotland and more like the golf courses they faced on the ET, with Liam advising:

They're longer, they're a bit more challenging, the tees a bit longer, which is generally the case on tour. [Liam]

Indeed, Jacob expanded on the similarities between the American collegiate golf courses (ACGC) and the ET golf courses, specifically describing how he had to adapt his style of play for the collegiate golf courses and that this style of play was more suited to the ET.

We don't often play in places where there's water hazards right next to the green, surrounding the green, you've got butterflies, you've got a 2 iron in your hand and suddenly you're like 'I've got to be good' or I'm going to be dropped off my team. You know, so you kind of adapt to your environment in that way, and that environment is the environment you're playing in as a pro. [Jacob]

Additionally, Liam added that he learned how to play more of the golf shots that were required on the ET in America:

You learn how to play more shots we don't have here. [Liam]

It is evident from this theme that the American golf courses aided them in their transition from the SGCs to the ETGCs, due to the American golf courses demanding a similar style of play to the ET golf courses, in terms of length and height. As the ET players had to adapt their style of play for these transition golf courses, this ultimately aided their transition to the ET.

Discussion of Theme: Golf Courses

Summary of Theme

The style of play that five of the CSETPs described had emerged from the SGCs was accuracy and hitting the ball lower to cope with the adverse weather conditions experienced on links golf courses, specifically wind. In contrast, they all claimed that a different style of play was needed for the ETGCs, specifically being able to drive the ball well of the tee, to hit the golf ball long distances to cope with the demands of long golf courses, to hit the ball high enough to avoid hazards and to stop the ball on firm greens. Three of the CSETPs described how the ACGCs had aided them in making the transition from the SGCs to the ETGCs. Specifically, the demands of the ACGCs, such as hitting it high and with distance, closely match those of the ETGCs.

Differences in Golf Courses

The CSETPs described ET golf courses that were longer, had more forced carries, with the need to hit the driver more often when compared to SGCs. Similarly, Baugher et al.'s (2016) study of the predominant skills determining PGA tour earnings found that, as of 2011, driving had overtaken putting as the number one determinant in predicting PGA tour earnings. Baugher et al. (2016) suggested that

the lengthening of the golf courses and shortening of the rough was a key determinant in driving being more predominant.

When analysing the Scottish Elite Amateur circuit golf courses, on which many of the CSETPs developed, and comparing them to the ETGCs there were stark differences in the length and type. Indeed, out of the 13 tournaments and 17 golf courses used in Scotland, the average golf course length was 6,610 yards and, out of these 17 golf courses used, nine were links golf courses (Scottish golf order of merit schedule, 2018). Contrastingly, on the 2018 schedule of the European Tour the average length of the golf courses was 7,223 yards and, out of the 52 golf courses used in 2018, only six were links golf courses (European Tour Schedule, 2018).

Theoretical Explanation

The incongruence existing between golf courses and the emergence of different styles of play when developing in these environments can be depicted by the theoretical framework of Ecological Dynamics (Brymer & Davids, 2013), where behaviour and movement solutions emerge from the various constraints impinging on the PGs. Indeed, Kelso, Fink, DeLaplain and Carson (2001) indicated that external constraints (e.g. wind, grasses, length of golf course) and internal constraints (e.g. intentions of the golfer, the anatomical organisation of the golfer's body) act to channel the movement system towards certain movement patterns. Therefore, when the constraints of the specific golf courses set boundaries for the golfer, only some movement solutions will be afforded to the golfer.

Thus, the constraints of the golf course/s that the golfers have developed on will play an important role in guiding the golfers to certain dysfunctional or functional movement solutions that can develop from the self-organisation process, ultimately shaping their 'style of play'. Indeed, Araújo et al, (2010), when investigating the development history of expert Brazilian footballers, found that the surfaces of the playing surfaces shaped many of the players' 'style of play', such as Garrincha (regarded by some as the best dribbler in football history), whose style of play was unique. Unique, in that the ball looked like it was glued to the side of his foot, and

this skill emerged through dribbling on surfaces in favelas with severe slopes and Garrincha detesting going down the hill to retrieve the ball if he lost control of it. Garrincha's style of play was created by the interplay of environmental, task and organismic constraints and was highly functional in his performance environment.

Contrastingly, many of the SETPs discussed how the style of play that emerged from SGCs had guided them towards functional movement solutions in Scotland, but dysfunctional movement solutions when transferring to ET golf courses. For example, playing in wind consistently on short narrow golf courses afforded them a lower ball flight and accuracy and, over time, led to an engrained style of play that was unsuitable in the performance environment they were striving towards, namely the European Tour. An understanding of this perception of lack of transfer between the two performance environments can be obtained from the studies of Gibson (1979) and Brunswick (1955) in Ecological Psychology.

Ecological psychology stresses the significance of surrounding energy arrays (e.g. acoustic, optical, proprioceptive) acting as information to guide behaviour. Gibson (1979, p. 411) stated that these energy arrays 'do not cause behaviour, but constrain or control it'. Therefore, in this approach, perception is considered to be the functional act of picking up these energy arrays to regulate actions (Gibson, 1979). For example, playing regularly on a windy, narrow and short golf course will regulate the action of playing low golf shots that do not have to travel very far to become functional to the task in hand.

When addressing the lack of transfer from SGCs to the ET we can reference the work originally started by Brunswick (1956) on representative experimental design. Brunswick (1956) argued that the conditions and design of an experiment should represent the behavioural settings of the population the results are to be generalised to. In adapting Brunswick's (1956) work to sport settings Pinder et al. (2011) argued that the transfer of learning could be enhanced if the constraints of the training and practice environments closely simulated those of the performance environment, hence allowing the learners to couple movements with similar information sources.

In using the lens of representative learning environments to analyse the lack of transfer from SGCs to ETGs, the constraints, specifically the environmental and task constraints impinging on SETPs, do not closely resemble each other. Therefore, golfers will not couple and adapt functional movement solutions with similar sources of information, resulting in the lack of perceived transfer suggested by SETPs for themselves and their peers when transferring to the ET from SGCs (Pinder et al., 2011). Indeed, Phil Mickelson, winner of the 2013 Open (British), which is the oldest and believed by some to be the most prestigious tournament in golf (Carter, 2018), noted that it took him 20 years to figure out the style of play that was needed to play, on the links golf courses that all of the Open championships take place on:

> *It took me a while to learn how to get the ball on the ground without spin…That was a real challenge because I played through the air, hitting lob shots and spinning the ball a lot growing up, so winning the Open in* '13 *was my greatest accomplishment.* (CNN, 2018)

Another notable winner of the Open, Rory McIroy, the 2014 winner, described how he would not change his style of play for the Open, as playing on links golf courses with adverse conditions is rare in professional golf:

> *There's no point in changing your game for one week a year. (ESPN, 2011).*

Rory, when reflecting on performing poorly at the 2011 Open in adverse weather conditions, stated:

> *That's the Open. You either deal with the weather or just wait for a year when it's nice (ESPN, 2011).*

Rory concluded that his style of play is suited to most golf courses and conditions encountered on tour:

> *My game is suited for basically every golf course and most conditions, but these conditions I just don't enjoy playing in really (ESPN, 2011).*

However, unlike Rory's style of play suiting ET golf courses, many of the ET golfers interviewed stated that their style of play when developing on SGCs was not conducive to performing well on the ET.

Regarding this gap existing between SGCs and ET golf courses, and the differing styles of play that emerged, the most successful SETP (career earnings & longevity on ET) interviewed in this study had some experience of the ET as an amateur. The

SETP realised that the performance environment he was developing in was maladapted to where he was trying to get to, namely the ET. He, therefore, delayed turning professional and moved to America to compete on golf courses more representative of ET golf courses. The player in question believed that this aided him in 'hitting the ground running' when he did turn professional, as he did not have to learn new skill sets to compete on the ET. Indeed, another two of the CSETPs also cited American Collegiate golf courses as aiding them in their transition from SGCs to ET golf courses. Specifically, these players noted that the golf courses were longer with more forced carries, where hitting with the driver was needed more often, and a higher trajectory of golf shot was needed to thrive on the collegiate golf courses. Consequently, this current study has found that the constraints impinging on these players on collegiate golf courses changed their style of play to a style more congruent with the performance environment they were striving towards, namely the European Tour (Pinder et al., 2011).

Practical Applications

A key challenge, thus, for NGBs, coaches and stakeholders involved in the development of Scottish golfers who are striving to play on the ET is to gain an understanding of the incongruence between the two performance environments and to then design practice/performance environments that can ensure behavioural correspondence between SGCs and ET golf courses. The findings from this study suggest that SGCs and the various environmental constraints (wind, rain & temperature) shape a style of play that does not transfer well to the ET, specifically having the ability to hit the ball high, with a long distance, and where driving the ball well is a premium (Baugher et al., 2016). Therefore, when the goal of Scottish golfers is to develop towards a successful European Tour, the career coaches, NGBs and stakeholders involved should aim to create a development environment that has a closer resemblance to the environment these golfers are striving towards.

Recommendations for coaches would be to manipulate the task constraints in practice to force the developing golfer to hit the driver more often, higher and further. However, a potential drawback of this training could be that, if the player is

developing this skill set and the frequency of playing and competing on the Scottish Elite Amateur circuit is high. The player may either become uncompetitive in this environment, resulting in possible lack of motivation or the frequency of playing and trying to compete in this environment may have a negative effect on the training, due to the two conflicting styles of play.

Therefore, there is a need for the Scottish Golf NGB to schedule more competitive golf events on golf courses that are longer and more similar to the tour golf courses, such as the Duke's golf course in St Andrews, Scotland, which measures 7,512 yards long. Furthermore, all of the stakeholders involved in the development of potential Scottish ET players are advised to try to allocate more time for competing and practising abroad on golf courses and in weather conditions that have a closer resemblance to the conditions on the ET. It is advised that this should be introduced early in their development to negate the need to bridge the gap in the styles of play later in their development.

Practice on the European Tour

Practice and experience of the ET conditions may be a solution to adapt the Scottish style of play. All of the players interviewed shared their experiences of practicing when on the ET. The majority mentioned the amount of practice they carried out on the range and how that has changed with experience regarding the quality of practice. They also reflected on what they observed in relation to other successful and perhaps not as successful golfers' practice habits on the ET.
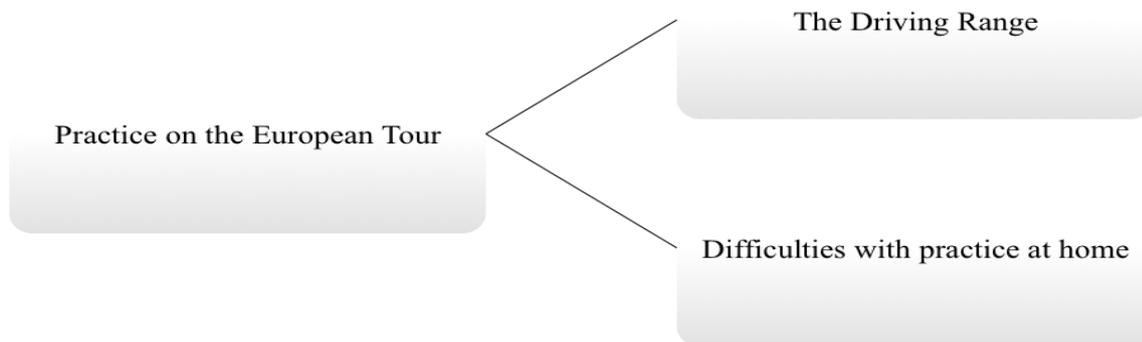
Figure 4 – Main Theme: Practice on the European Tour

Driving Range

All of the SETPs discussed their own or their peers various behaviours and habits on the driving range at ET events. One player mentioned that he tended to practice too much when on the ET and that the better players did not tend to over practice:

I tended to be a hard practiser; my problem was I would quite often over-practice. The good guys never over practiced. [Liam]

Harry echoed these sentiments:

I would definitely over practice, I'd spend too long on the practice area and I'd almost go beyond that time when I was hitting the ball well. [Harry]

Similarly, Mitchell held the belief that the top players never over practiced and the players that were struggling tended to over-practice:

How many guys do you see that rip it, stand there battering balls. Nobody who's leading the tournament will be on that range battering balls, you know, on a Thursday night or a Friday night or when it comes to Saturday night, the guys who are maybe 60th will be on the range battering balls, but the guys who are leading the tournament will hit a couple and go home. [Mitchell]

Indeed, the same player reflected that he had changed his practice habits to a lesser volume, as he may start hitting it good and this may then start to interfere with his golf swing.

These guys who are battering balls are struggling, so you've got to manage your time. I think it is better to hit balls for an hour, an hour and not three, because especially me, if I'm there for three hours, I'll start hitting it good and I will try other things… But what's the point if you are hitting it good….Sometimes a break is better than hitting balls.

All of the SETPs described how their form could fluctuate from the range to the golf course:

But to me the kind of performance of what you do on the range is insignificant. It doesn't matter, like I can go in a bunker, even when I'm struggling at bunker shots. I can go and hot 10 perfect shots right next to the flag and then go out on the course and hit to 10 feet and you're like I've just been hitting perfect shots.
[Jacob]

Similarly, Liam described how he could hit his driver well on the range, but this did not transfer to the golf course:

That's why hitting the driver never works on the course, you get a feel for it (on the range), that's roughly about right, but take it out on the course and it doesn't happen, it doesn't work. [Liam]

The same player also commented on an occasion where he had performed poorly on the driving range, but when he played on the golf course his form was completely different:

I remember I almost lost my tee time on the range trying to find a swing and then I shot 4 or 5 under. It's like where did that come from? The range is different to the golf course. [Liam]

Moreover, Noah described an opposing experience, where his great form on the driving range did not transfer to the golf course:

Two completely different swings. I didn't know at the time, but people there, people were watching me hitting balls on the range, I was hitting them that good. And then on the course I'm going out and shooting 77s. The shots, I couldn't hit the ball. Agitation. [Noah]

Four of the SETPs alluded to trying to practice shots they would need for the golf course they were about to play on:

> …build up the shots that I'll need to be successful on the golf course, whether that be hitting it straight or there'll be a lot of mid irons or there's a lot of wedges or you've got to hit a 3 wood off the tee. Work on the shots I need to be successful that week. [Liam]

Similarly, William described how he practiced the shots he would need for the golf course that week and how he had seen many players practicing shots that would be of no use to them on the particular golf course they would be playing on:

> When I'm on the driving range for whatever tournament, let's say the French Open, I practice what I'm going to do that week….I'll practice hitting a bunch of punch 2iron because you hit a bunch of them off the tees there, or another course you need to be coming in at really high and soft with 4irons, you practice what you need for that week, that's also what I see guys doing wrong on the Challenge Tour, I see guys, why you practicing that? And it's just pointless what they're doing. It's just not a shot you're going to hit on that golf course. [William]

Indeed, Jacob described his practice as getting used to the different environmental factors he faced each week.

> The only thing I do to practice is when I get to a tournament I work on my short game, to get used to the different type of sand, the greens, the rough, the course and stuff, you're more getting used to your area, because we play in so many different environments, grass, humidity, stuff like this, you're constantly jiggling about what you're doing. [Jacob]

Many of the SETPs reflected on how they had historically over-practiced on the driving range at ET events and how this could have a negative effect on their form when playing on the ET. All of the SETPs discussed the inconsistency in the transfer from the driving range to the golf course. Many reported having a good form on the driving range and then performing poorly when competing and also the opposite situation of poor form on the driving range but good form on the golf course when competing.

Furthermore, one SETP specifically mentioned feeling more emotional when playing competitive golf on the ET compared to the driving range. To combat this

inconsistent transfer four of the SETPs described the practice strategies they used on the driving range in trying to alleviate the inconsistency in the transfer. They specifically practiced golf shots on the driving range that they would be using on the golf course at that particular ET event and also tried to get used to the environmental conditions they would be playing under.

Difficulties with practice at home

One issue that SETPs face is the lack of facilities, or lack of access to facilities, being a situation that fully replicates the ET golf course conditions in Scotland. Regarding this, five of the SETPs stated that they preferred to spend time practicing on the golf course at an ET event:

I've always felt that my best practice is when you get out on the course and hit shots; you learn better how to hit shots that way than on the range. [Noah]

Liam advised he needed to see the golf course he would be playing on:

I prefer to be on the golf course, if you haven't seen it then you have to play it....I like to spend time on the course. [Liam]

However, four of the SETPs mentioned the limited access to golf courses in Scotland that replicated ETGCs. When asked if there were any golf courses that were like the ET courses to practice on at home Robert added:

The places I think should be played (like the ETGC's).....is Loch Lomond, Gleneagles, Duke's course (out of over 550 golf courses in Scotland). [Robert]

When probed about using the Duke's course as an example, this player advised that, although it was not his favourite course in St Andrews, it would help him more for playing on the ET, as he would be hitting more drivers.

Yeah, it's an adequate length, it's wet, it's normally decent, so I think it's pretty close. Yeah, far closer. If you said to me 'I'm in St Andrews, Where is the best place for preparation?' I would say 'Well, it's not my favourite course, I'd rather play Kingsbarns or somewhere like that, but I know that it's better to play Dukes course. It's going to help me more. Hit more drivers. [Robert]

This same player went into more detail regarding the difficulties of practicing in Scotland, describing how, when he came back from the ET, he struggled to find greens in Scotland that were similar to those on the ET.

40

But how many indoor putting greens do we have, or access to greens like the one's on tour, we don't. [Robert]

This player also added that he felt like he was not practicing enough, as the practice facilities in Scotland were so different to the surfaces they were playing on during the ET.

Where are you going to practice your putting? Where's the closest place I can find that have greens like on tour?' You have to practice in the same environments totally. Otherwise you have to adapt every time you go out…… Facilities, the biggest thing is, I'll come back to the lack of short game, especially the putting. I'll be honest and say I probably don't practice it enough, just because there's not a facility that I think is adequate. [Robert]

Thus, many of the SETPs described how they liked to practice on the ETGCs to become more comfortable with the golf shots they would need to play. However, many found it difficult to practice in Scotland, due to the scarcity of golf courses and practice facilities, especially putting greens, that were similar to the ETGCs and this, consequently, did not allow them to practice the golf shots they would need to play on the ET.

Discussion of Theme: Practice on the European Tour

Summary of Theme

In terms of development of expertise on the ET, several of the SETPs expressed concern about spending too much time on the practice area at ET events 'battering balls' and how this hindered their performance. All of the SETPs also noted that their form on the practice area did not always transfer, specifically from the driving range to the golf course. To negate this many of the SETPs discussed practicing specific shots on the driving range that they needed for that particular golf course. Five of the SETPs described how they liked to spend time on the golf course at ET events getting 'used to' it. However, many of the SETPs mentioned the difficulty in getting

'used to' ET golf courses when practicing in Scotland, due to there being very few SGCs that are similar to the ET golf courses.

Theoretical Explanation

McHardy et al. (2006) highlighted the potential side effects of over-practice, especially during times of intensive practice sessions; they found that professional golfers reported musculoskeletal and soft tissue injuries through overuse. More pertinent to the attainment of expertise on the ET is the awareness of SETPs and their support network of the overemphasis placed on the volume of practice in motor learning theories and media outlets (David's et al., 2003, Ericsson et al., 1993). Such as the power law of practice (Newell & Rosenbloom, 1981), the deliberate practice framework (Ericsson et al., 1993) and the 10,000 hr. rule (Chase & Simon, 1973), and the potential negative connotations from this overemphasis on volume.

From an applied perspective, these theories have overstated the worth of large amounts of unvaried practice trials, leading to the elimination of representative learning environments and attention to quality of practice (David's et al., 2012). However, Gibson's (1979) insights can guide the principles of representative learning environments and strategies for developing quality practice on the ET, concerning the importance of maintaining the relationship of key sources of information and action between practice and performance. From this perspective of SETPs over-practicing under fixed environmental and task constraints on the driving range (i.e. 'ball bashing' off a flat lie with the same club to a fixed target). The acquisition of expertise on the ET will be hindered by the lack of opportunities to continuously harmonise and develop functional movement patterns with the ever-changing constraints encountered on the golf course (David's et al., 2015). Therefore, in this framework the emphasis becomes less about volume and more about maintaining the constraints encountered in performance when in the practice environment, in order that the functionality between the two environments can be enhanced.

As mentioned previously, all of the SETPs noted that their form in the practice area did not always transfer, specifically from the driving range to the golf course. The

absence of the relevant constraints to specify the actions on the driving range (an open field, no greens to see how the ball reacts, no fairways, water, boundaries, time between shots, no score taking, etc.) may lead the SETPs to use information non-specific to their performance environment, therefore supporting the emergence of different behaviours (David's et al., 2012). Compelling evidence supports this argument demonstrating that, when the informational constraints of a task are different, different forms of behaviour and movement emerge (Dicks, Button, & Davids, 2008: Davids et al., 2015; Pinder et al., 2013).

In a golfing domain Bull's unpublished (2015) biomechanical analysis of 11 European Tour players' movement from the golf range to the golf course and then back to the golf range revealed considerable differences in the movement from range to course; however, there were similar movement patterns when both range sessions were compared. This shows that, when the constraints impinging on SETPs are similar, similar movement patterns emerge, and vice versa. Emotion can also change through different environments. Indeed, one SETP described his form in range sessions as being excellent, but when competing on the ET he performed poorly, as he felt he was far more agitated. This could be due to the increased affective and cognitive demands placed on SETPs when competing on the ET and, consequently, this might have affected the perceptions and actions of this particular SETP (Pijpers et al., 2006; Headrick et al., 2015).

When competing on the ET, SETPs have to adapt to the unique constraints that are rarely encountered on the driving range, such as prizes, crowds, referees, playing partners, unfamiliar golf courses and the consequences (Arajou & Davids, 2015). Similarly, Maloney et al. (2018), in their study of 10 highly skilled Australian Taekwondos, found that there were lower levels of anxiety, arousal and cognitive demands in the practice environment when compared to competitions. They found that in training, when compared to competition, the athletes kicked less and from further away and they described less problem solving, as they were so familiar with their sparring partners.

Despite the different movement and informational constraints between the two environments, the driving range is an integral part of any ET event. All of the SETPs

mentioned not always being able to get out on the course as much as they would like to, with the driving range being the only avenue for their practice when they were at an ET event. Therefore, in trying to bridge the gap between the two environments many of the players spoke about practicing the shots they would need to play on the current tournament or getting used to the various environmental conditions at each tournament (i.e. different grasses, sand, etc.) on the practice area. One SETP even mentioned bemusement when his peers tried to hit shots on the driving range that he perceived they would not play on the golf course for that specific ET event.

Indeed, many of the players said that they preferred to get out on the golf course to practice at ET events, in order that they could see and learn how to hit the shots they would need for that week. Therefore, by learning on the golf course they could attune themselves to the constraints impinging on them and the different movements they afford (Gibson, 1979; Bruineberg & Rietveld, 2014). This attunement 'informs' the attention of the SETPs of the most useful information relative to their own action capabilities, cultivating their 'fit' within the golf course (Michaels & Jacobs, 2007; Bruineberg & Rietveld, 2014).

However, when shining the lens on the practice at home on the ET, Scotland in this case, one player in particular bemoaned the lack of Scottish practice facilities with greens similar to the ET. Consequently stating that he practiced less when he was at home, as he had to adapt each time he transferred from the greens in Scotland to the ET, due to the greens being so different. Similarly, Pinder et al. (2011) found very little transfer when comparing two practice environments where the constraints impinging on them did not converge. Very little correlation of timing and movement was found between the two practice environments, which involved cricket batters batting against a projection machine in one and a human bowler in the other (Pinder et al., 2011). This same player, when asked about what courses in Scotland would be better to practice on, mentioned courses with length, where you had to hit the driver more often, similar to the courses on the ET. However, he, and several other SETPs in the study, stated that there are not many ET standard golf courses in Scotland.

Practical Applications

The advice for coaches, SETPs, potential SETPs and the NGBs involved in nurturing potential PGs would be, when practicing on the European Tour, less volume and more quality practice that gets the SETPs more attuned to the shots they need in that specific ET event. Such as getting used to the grasses, hitting the specific shots required for the golf course they are about to play on and practice that replicates the emotions felt in tournament play, much like Performance Psychologist Dave Alred's work with the 2018 Open champion Francesco Molinari (Costa, 2018). If the golf course is available to practice on, the players should get out on the golf course to become more attuned to the different environmental (grasses, temperature, wind, altitude), and task constraints (bunkers, greens, golf course design).

When practicing at home, specifically if that home is Scotland, players need to be aware of how the constraints impinging on them are affecting their pursuit of expertise on the ET, such as the golf courses discussed earlier, and how they shape movement (playing in wind, etc.). As suggested previously, coaches can manipulate the task constraints in practice at home to negate the lack of drivers and long irons hit on the shorter courses in Scotland. The players could also find golf courses more representative of the tour in Scotland; however, as already mentioned by several of the SETPs in this study, that they are scarce in Scotland. Consequently, players have the option of either seeking out these scarce golf courses to practice on them or training abroad more often on golf courses that have a closer resemblance to the ET golf courses, thus enhancing the transfer between the two.

Playing on the European Tour

Experience of playing on the ET may provide insights into what strategies are required to perform on the ET, consequently informing the style of play needed to play on the ET. Within this theme, Playing on the European Tour, two sub themes emerged from the data analysis: *Strategies* and *Prediction of Form.*
All of the SETPs in this study discussed using different strategies on the ET and altering their strategies depending on form. Many of the SETPs also described how

they felt they could predict their form was going to be effective on the ET, especially on the ETGCs that simulated conditions that were familiar.
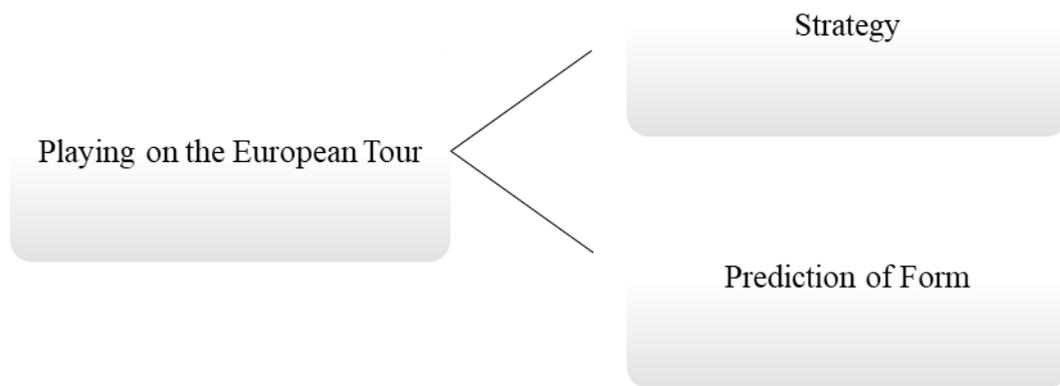
Figure 5 – Main Theme: Playing on the European Tour

Strategy

Regarding performing on the various ETGCs on the ET, all of the golfers mentioned adapting their style of play, specifically changing their strategy on the golf course according to how well they felt they were playing on the day.

Liam stated that he was more confident and played with a bolder style when he felt he was playing well:

Obviously if you're hitting it good, probably the best way to describe it is there's a few holes on golf courses where you probably have options with the driver, if I'm striking it well I'll just take the driver and hit it…..Or, if I'm really feeling my swings good and I feel I can attack, let's say your tactic, you feel if you could swing it good you would go for it. [Liam]

This same SETP emphasised that players should take advantage of playing well:

You're hitting it great and you've got to take advantage….. the days you're playing well and shoot 6 or 7 under, as opposed to maybe just 3 or 4 under…. When I'm in contention I play to make birdies. [Liam]

Robert also expressed the importance of players being bolder when they felt their form was good:

You can attack the golf course more when you're playing better. You take on more aggressive shots from the tee I would say, when you're playing better……Yeah, your course management really changes when you're playing well. [Robert]

Similarly, Mitchell explained that his strategy was more aggressive when playing better:

You can take on a few more shots when you're playing better. [Mitchell]

In contrast, six of the seven players discussed changing the way they hit the golf ball and/or their strategy when they felt they were not playing well. One SETP advised how he had won a Challenge Tour Tournament (one level down from the ET) when his form was average and he consequently changed his strategy to a shot that was more functional, even though he did not particularly like the shot:

The time I won in Spey Valley I wasn't in a great (form), even during the tournament I wasn't that great, but I played functional, you know I knew where I was going and just kind of played to my strength . So there has been that I've won when I'm not playing that great….. so that week I just aimed to the left and I sliced it back in play. And it's a shot I don't particularly like, it's a low slice as well, not a shot I like but it was a shot that worked. Basically it's not going the other way, so that's what I did. [Jacob]

William claimed to be more conservative when his form dipped:

Whereas, if you're not playing great……if you're playing OK, but not great then you've got to manage it. Sometimes in the middle of the green and 2 putts is not a bad thing. [William]

Furthermore, he believed that he could still play functional golf on the ET, despite not playing well, by managing his game:

I think you manage your game when you're not playing well, you can still make cuts and finish under par if you're not playing well. [William]

Robert reiterated the need to play within oneself and to be less aggressive when not on good form:

There's days when you are playing so so…… if I'm not(playing well) then I'll realise I'm not hitting the driver that great and I'll take the percentage play, which is to hit it in the wider area….. If not I'll just pick a target and not hit it, so aggressive, I'll play 20 feet to the left, because I think there will be days where you're not, before a tournament there will be days when you're not playing that great or you're just not striking it that great and that's when you've got to play almost within yourself. [Robert]

All of the seven players in this study spoke about adapting their strategy on the day and perfectly summed up by one of the seven that they adapted their strategies according to how they were playing on the day:

Course management comes down to that, make use of your own strengths and weaknesses and how you are playing on the day. [William]

Hence, all of the players described being fluid with their strategies on the ET, specifically adapting the way they saw or played shots according to their perception of their own form, ultimately changing their style of play to functional golf on the ET.

Prediction of Form

The majority of the SETPs felt they could predict their form on the ET, whilst some felt this was difficult. Many said they could predict when they were going to have a good performance. Noah stated that he knew he would perform well when ET tournaments when held in Scotland, as he was more comfortable with the type of grass on SGCs.

I can predict my form. I always knew I would do well in Scotland…..Well I didn't have any grain to deal with……What you grew up on, you know. I'd rather hit a flop shot of the 17th at St Andrews than the Jo'burg Open. Different types of grasses. I'm used to the solid turf. [Noah]

Similarly, Harry mentioned that there were certain golf courses on the ET that he would play well on, and that these could be linked to the golf courses he grew up with and was used to:

There's certain courses that I would say if I'm playing there this week I could do well……linked to the golf courses I grew up on and the way that my game

shaped, golf courses that I've won on, it's very hard to get up and down on, the greens are really tricky, so hitting greens is, I think, a benefit, you've got to hit it straight, tricky conditions with wind, stuff like that, it comes back to definitely where I was brought up on, knowing your shots. [Harry]

Furthermore, Mitchell linked playing well to what he was used to in Scotland:

The grasses you play back here (in Scotland), the putts are a lot easier, you can get a putt the first time, getting used to the grass around the greens is a lot easier. [Mitchell]

Hence, in terms of predicting their form, the SETPs related this to the conditions they had developed in and were comfortable with, specifically SGCs.

Discussion of theme: Playing on the European Tour

Summary of Theme

All of the SETPs in this study described being more aggressive when they felt they were playing well and they felt they could use bolder strategies. One player mentioned that all he saw was 'birdies' when he was playing well. In contrast, all of the SETPs described how they were more cautious with their strategies when they felt they were hitting the ball poorly, playing more 'within themselves'. However, all of them said they could still functionally perform on the ET, make cuts and get close to winning, and had even won when they felt like this.

The SETPs in this study also described instances where they were highly attuned to their own capabilities, and continually adapted the way they played golf to perform functionally on the ET.

Many of them also stated they could predict when they were going to perform functionally on the ET, again linking this back to the conditions they had developed in and felt comfortable with, specifically the SGCs or conditions similar to the SGCs.

Theoretical Explanation

Accordingly, sports expertise is a constant, dynamically varying bond that emerges continuously amidst the constraints imposed by the environment and the capabilities of the SETPs (Araújo & Davids, 2016).

Gibson's (1979) theory of affordances reasons that the environment is described not in physical terms (e.g. trees, water, length, grasses) for the performer, but in terms of the interactions with the environment that are appropriate for the performer's action capabilities. For example, many of the SETPs in this study described 'seeing' golf shots that were more aggressive when they felt they were hitting the ball 'well', such as employing more aggressive strategies towards the flags on the greens or more aggressive strategies for tee shots. Contrastingly, when they felt they were hitting poorly, more conservative strategies would be 'seen', such as hitting to the wider parts of the green or fairway. Similarly, in a study by Witt and Proffitt (2005) of baseball batters, the batters, when they were hitting it 'well', perceived the ball as being bigger, and smaller when they felt their form was poor. As the former Boston Red Sox baseball batter said:

> *When you're hitting the ball [well], it comes at you looking like a grapefruit. When you're not, it looks like a black-eyed pea* (Jessica & Proffitt, 2005).

All of the SETPs in this study stated that their strategies changed from shot to shot, hole to hole, day to day, and week to week, based on what they had 'seen' on the golf course and how they felt their own action capabilities were in that specific period of time. They all described adapting the way they hit the golf ball when they felt their current strategy was not working. One SETP, on winning a tournament, described playing a shot that he did not want to see in that tournament, but it was a shot that he knew was going to be functional.

This diversity of action described by the SETPs is based on neurobiological degeneracy, which highlights that functional task performance can rely on a diverse array of actions, dependent on environmental, task and organismic constraints

(Edelman & Gally, 2001). Neurobiological degeneracy is the capability to yield the same output, or perform the same function, with structurally different elements (Seifert et al., 2016). This idea may be particularly relevant to the unpredictable environments encountered on the ET by SETP's in this study, as in negotiating these dynamic performance environments may need a variety of movement patterns to perform functionally on the ET (Araújo & Davids, 2016; Seifert et al., 2016).

Therefore, a greater presence of degeneracy becomes important for SETPs to increase their robustness against the perturbations faced on the ET. This greater presence of degeneracy was seen in expert ice climbers when compared to novices in a study conducted by Seifert et al. (2014). The expert climbers displayed more adaptive behaviours (degeneracy) than the novices, in terms of perceiving more opportunities for action in the environment and then adapting their movements and strategies to functionally scale the wall (Seifert et al., 2014). Similarly, Rein et al. (2010), whose study highlighted that skilled basketball players could exploit up to six divergent configurations of coordination when attempting a hook shot to an identical target from varying distances, highlighting the existence of system degeneracy in skilled movement.

When linking their form to these actions many of the players believed they could predict when they were going to play well. Many of the SETPs linked these beliefs to the environmental conditions they developed their expertise under. Specifically, they perceived that they would play well on the golf courses based in Scotland on the ET, or on golf courses that were similar to the ones they developed on, as they felt comfortable with the environmental conditions, such as the grasses and the wind. One described this as 'knowing your shots' in these conditions, and this can be linked to Gibson's belief that, when a skill is learned, it is through a 'process of education of attention' (Gibson, 1966; Jacobs & Michaels, 2001). This is a process of "narrowing down from a vast manifold of information to the minimal, optimal information that specifies the affordances of an event, object or layout" (Gibson & Pick, 2000, pp. 150-151). Therefore, the constraints (grasses, wind, turf, length of golf courses) found on the golf courses the SETPs developed on constrained the SETPs' actions and behaviours and allowed them to become more 'attuned' to these specific variables (Araújo et al., 2017).

This, of course, can be helpful for SETPs, especially on golf courses that do have these specific constraints. Indeed, five of the seven players interviewed had their greatest success, in terms of monetary reward, on an ET tournament golf course based in Scotland, or on a links golf course (based in Ireland). However, as discussed early, this could also potentially be a hindrance, as, if the SETPs' 'education of attention' has been constrained by these specific constraints, and if these constraints are not commonly found on the ET, then the potential for transfer and consequent success on the ET could be greatly reduced.

These insights thus, have important implications for the stakeholders involved in the development of potential ET players. Firstly, regarding the development of decision-making (strategy), the SETPs in this study all described a circular nature of perception and action. They would perceive shots differently based on 'feelings' of their own capabilities at that current moment in time and would adapt their decisions and actions continuously.

Consequently, all of the players described being able to adapt their co-ordination (how they were hitting the ball) based on their perception of the task facing them. They had many ways to solve the various problems arising from playing on ET golf courses, exploiting the presence of system degeneracy. The system degeneracy is increased when developing potential, or current, SETPs, by encouraging experimentation with different movement patterns (i.e. golf swing or golf setup) and adapting individual coordinative structures (i.e. their golf swing or golf setup) to achieve functional movement solutions (Tan et al., 2012). Tiger Woods described this exploration in his development:

> As a junior golfer when I practiced with my Pop – we always played games trying to make the ball do different things from different situations. High shots, low shots, we tried to make the ball bounce left or right after it hit the ground. We did all sorts of things. (Monnard, 2018)

This practice is crucial in the development process, as it empowers the golfer with a diversity of golf shots that may be employed to suit the environmental and task demands. However, for this recruitment (decision making and strategy) to have a functional fit to the task, the environmental and task constraints of development need

to be closely matched to what the golfer is developing towards, in this case the ET (Pinder et al., 2011).

This functional fit was mentioned by many SETPs in this study when they discussed when they could predict form, specifically citing environmental (i.e. grasses and wind) and task constraints (links course design) they felt they would perform well on. Despite five of the seven players interviewed achieving their best performance, in terms of monetary reward, in Scotland or on a links golf course (European Tour, 2018), as discussed in an earlier theme, less than 10% of these golf courses are on the European Tour circuit (European Tour Schedule, 2018). Therefore, if the functional fit between the golfer and the environmental and task constraints faced on ETGCs is flawed, this could potentially lead to behaviours that have no relevance to playing on the ET, hindering the speed of progression, development and success of potential and current SETPs.

Practical Applications

From a practical viewpoint, golf coaches should consider themselves as 'learning designers', by manipulating the constraints, in order that the golfers can explore and discover many effective movement solutions. Instead of imposing ideal 'movement models' the coaches' role changes to allow the golfers to develop an awareness of their own action capabilities through self-discovery (Glazier & David's, 2005), similar to what Jack Nicklaus's coach, Jack Grout, helped him to do.

> *The big thing that Jack tried to do with me is teach to be responsible for my own golf game, teach myself and coach my own mistakes on the golf course. When I was playing I never hesitated at any time, I don't care what position I was in a golf tournament that if I was having problems in the middle of a round I changed it right then. I didn't care if it was the last round of the British Open, if I didn't like what I was doing I would change it* (Jack Nicklaus, 2014).

The golf coach in this paradigm also needs to focus on designing learning spaces that ensure representativeness of the performance environment, therefore establishing information-movement couplings, however, and pertinent to this study,

also being aware that the constraints impinging on developing and current ET golfers in Scotland, specifically by the SGCs, are rarely encountered when playing on the ET. Therefore, the coaches' role is not merely a case of encouraging exploration of movement variability to enhance degeneracy in the pursuit of new functional actions, as these potential new actions need to have a functional fit to the environment, therefore providing the performer with many possible strategies to perform successfully on the ET (Orth et al., 2018). In terms of when coaches need to intervene, that is subjective to the coach; however, the longer the constraints impinging on golfers developing towards the ET are non-representative of the ET, the more 'ingrained' these maladaptive behaviours could potentially become, suggesting a closer coupling of the constraints earlier in the development process.

Sociocultural constraints

All of the seven SETPs interviewed discussed in depth how performance and behaviour on the ET could be influenced by money, caddies and travelling on the ET.

Figure 6 – Main Theme: Sociocultural Constraints

Mitchell summed this theme up by stating:

> *Home life, travel, you know, money problems, you know I think all of those things really can get in the way of good performance…it sometimes makes it difficult to make clear decisions.* [Mitchell]

Harry provided some insight into how money can affect behaviour:

The financial situation got really really tight when I was out there, so, yeah, I was playing with the knowledge that I was losing money….I was getting into debt every week I missed a cut, so, for me that was a big one. I couldn't play free, you know free of the pressure…. the more pressure you were under, you don't need any more pressure when you're trying to retain your tour card. [Harry]

William emphasised how money can affect performance after a spell of poor form on the ET:

I've started to think about it this year [Money], and you realize how much you never really did think about it, and you can't think about it, it just destroys you if you start thinking about it. It makes you depressed. [William]

Several SETPs advised their biggest expense was their caddy on the ET. Jacob stated:

Your biggest expense is the caddy…I mean you're looking at £40,000, something like that for your caddy alone. So it's by far your biggest expense. [Jacob]

Furthermore, 5 of the 7 SETPs mentioned how caddies can influence performance on the ET, with William reflecting:

A good caddy can help. If you've got a good caddy on the bag, as opposed to an average caddie, that helps. [William]

Mitchell elaborated in more detail by stating:

They can pick you up and know the correct words to use at the right time, I think that's highly important. [Mitchell]

Moreover, Harry added that it is not only on-course support that caddies could provide:

Having a good guy on the bag, not just from the point of view of the bag side of things, course management decisions, even just having a friendly face there when you're out there on your own. Somebody who'll encourage you and whose company you quite like. [Harry]

All of the SETPs mentioned how travelling on the ET can affect performance, with Liam advising:

>*The travel is a big thing. The travel and learning how to, people say have a routine, but it doesn't always work like that, because sometimes you have to fly and you don't get there for a couple days.* [Liam]

Jacob went into more detail about traveling on the ET:

>*Travel, you know you've really got to watch what you're doing, like I can get ill quite a lot, like just from the flu or just from eating terrible food…sleep pattern's difficult as well because you're travelling to China, things like that. All those things can kind of affect you.* [Jacob]

Noah highlighted in greater depth how he had to be wary about what he ate after experiencing food poisoning in Kenya:

>*Kenya for instance, in April, I was scared to eat chicken, so all I ate was steak, steak and chips, fried meat and vegetables. The salad's all washed in dirty water, so you just feel bagged up with steak all the time. Or you eat shit, like chocolate and crisps, packaged stuff, because all the fruit was cut open, so you couldn't get, you got bananas and things, but even brushing your teeth, the water. You know sitting here talking about it, there's a lot you have to think about without realising.* [Noah]

The same player when asked to summarise some of the things that affected performance on the ET said:

>*Travel, flights, jetlag. Food, it depends on the country you're in. Heat, even the pillows in the rooms.* [Noah]

Robert added how travel affected sleep patterns and eating habits:

>*Always in a state of flux, you're always, you know in different countries, different foods, different times of playing golf.* [Robert]

William summed up playing and travelling on the ET as:

>*I think when you're out there and you're a full time golfer you become good at adapting, because things aren't the same in golf, the weather's always changing, the country's always changing, the food's always changing.* [William]

It is evident from the sociocultural constraints theme that money, caddies and travel can affect performance and behaviour, both positively and negatively, on the ET. Interestingly, although all players mentioned money, those with less success on the ET went into more depth about how money, especially the lack of money, affected their performance on the ET. What is also evident is that the SETPs consistently had

to adapt when playing on the ET to, not only the golf courses, but also different countries, hotels and temperatures.

Discussion of Theme: Sociocultural constraints

Summary of Theme

All of the seven SETPs spoke in depth about how money, travel and caddies affect performance on the ET. They also advised how a lack of money at some stage in their professional golf career had put more pressure on them to perform. Some described how a good caddy could be of help on the ET by calming them down or when travelling just simply being good company. Regarding travelling, all of the seven SETPs described how consistently travelling to different countries affected their sleep and eating habits, and two SETPs with a family stated their family life could also be affected by the extended periods away from home. Consequently, all of these different factors affecting performance on the ET required the SETPs too constantly adapt to the different conditions presented to them each week on the ET.

Theoretical Explanation

From a constraints-led perspective, it is important to understand how SETPs interact with environmental constraints on the ET, such as money, caddies and travel, how these affect their behaviour on the ET and how SETPs function effectively, or do not in some cases, when faced with these constraints. This would lead to understanding how the development of expertise on the ET is the process of developing behaviours that are consistent with the sociocultural way of life on the ET, such as understanding how the ET has a top heavy structure of prize money and that, for most SETPs, money worries are never far away (Fry & Bloyce, 2017). In reality, for most sport professionals the amount of money accrued is relatively low (Frank & Cook, 2010) and, in considering the necessary expenses on the ET [caddies, travel, etc.], SETPs' earnings need to be significant, especially with the tax on the ET in

certain countries being up to 40% (Fry & Bloyce, 2017). To put this into perspective Jacob stated:

> *You probably need to at least make, I don't know, 150 thousand pounds or Euros, round about that sort of mark.* [Jacob]

However, looking at the 2018 standings on the ET (Race to Dubai, 2018), out of the 324 competitors on the ET in 2018, only 170 earned more than €150,000.
This clearly suggests that many of the golfers playing on the ET that year accrued no money, or may have lost money, which, of course, could potentially have an impact on their health and wellbeing. Indeed, previous research has indicated that financial worries, professional uncertainty (which is often displayed on the ET and linked to financial rewards, or lack of), and an effort-reward imbalance have strong inferences for mental health issues (Leka & Jain, 2010). The significant rewards on the ET can also potentially affect performance, according to research on the PGA Tour that suggests that, for every $50,000 a putt is worth, the likelihood of success decreases by 1% for PGA Tour players (Hickman & Metz, 2015). Although this may seem insignificant, the prize money for winning a tournament on the ET can be upwards of €500,000 in many tournaments.

Money on the ET, and the ability to earn it, is also affected by the pressures of travel on the ET which every increasing due to the globalisation of the ET (Fry et al., 2015). SETPs need to adapt to diverse working conditions week to week, as the country changes nearly every week, with different cultures, golf courses (i.e. terrains), environmental conditions (i.e. heat, altitude), hotels, beds, sleeping hours and food. This places a burden on SETPs, as they are required too consistently adapt to cope with the constraints of a workplace that is constantly changing (Fry et al., 2015). Studies on long haul international travel have suggested that agitation in sleep, physiology and immune systems affect the performance and recovery of athletes from various domains (Duffield & Fowler, 2017). Additionally, travel can make athletes more susceptible to gastrointestinal infections, which are frequent among athletes, as highlighted by three of the seven SETPs in this study (Reilly et al., 2007). Some described interruptions to their normal food consumption resulting in them having either to fly home or perform whilst unwell at ET tournaments.

When travelling on the ET, several of the SETPs described the relevance of having a caddy they liked as a companion. However, a caddy can play an even greater role in performance than companionship. Coate & Toomey's study (2014) on the historical performance of professional caddies on the PGA vs local caddies found that PGA tour players scored one shot better per round when they had a professional tour caddy. Many of the SETPs spoke about the way caddies communicated (informational constraints) and how this could affect their performance, specifically 'negative' communication regarding avoiding areas of the golf course, such as water or hazards, which, in turn, disrupted their 'self-talk', for example:

> *I remember playing in a Pro-Am once and a guy told me for 9 holes where not to hit it.* [Mitchell]

Pilgrim et al (2015) found similar results, arguing that 'good' caddies said less and provided post shot reflection, trigger words and positive re-enforcement during performance to try to maintain the golfer's high performance state. Therefore, when trying to understand SETPs' behaviour, the coalescing of these sociocultural constraints filtered through the lens of Newell's (1986) constraints framework, with money worries and travel stress changing some of the SETPs behaviours when competing on the ET. The caddy can play a role in helping the SETPs cope with these burdens or as some advised add to their stress.

Practical Applications

From a practical viewpoint, instead of trying as a SETP to cope with all these sociocultural constraints when new to the ET. Evidence suggests that, as an athlete moves towards the top of their sport, in this case the ET, they would be better placed to cope with these adversities if coping skills were acquired before they embarked on the ET (Güllich & Emrich, 2006).

For example, Jacob described how he flew early to elite amateur tournaments, in this case from Scotland to Australia. Jacob had time to acclimatise to the golf course, recover from jet lag and get used to the heat. However, he then discussed his first tournament on the ET in Australia, where the flight was delayed by a day, getting him

to the tournament one day before it started. Jacob described being jet lagged and not having any time to play the golf course or get acclimatised to his new settings.

Indeed, using this example, Jacob could have experienced these constraints earlier in his development during training, perhaps sacrificing short-term amateur success for quicker adaptation to the performance environment he was aiming to reach, being the ET. In referring back to the constraints framework, Bowes & Jones (2006) stressed the importance of designing learning environments and manipulating constraints to be poised on the edge of chaos to create adaptations in behaviour. Therefore, using this example, Jacob may have benefited from being have subjected to later flights and playing in tournaments with very little preparation time earlier in his golfing career, hence potentially forcing adaptations and behaviour more conducive to playing on the ET.

Consequently, a recommendation for coaches and players would be to allow potential SETPs to experience as many of these sociocultural constraints as possible early in their golf development, such as experiences of caddies, good and bad, long haul flights, very little time to prepare in tournaments and different types of food. This would provide potential SETPs with more skill sets to cope better with these adversities when they encounter them on the ET, resulting in them adapting quicker to the ET and potentially earning money earlier in their career, possibly alleviating any money concerns in the process.

Conclusion

This study aimed to gain an understanding of the constraints affecting SETPs, both past and present, when developing towards, and then when competing on, the ET. The findings concluded that there are differences between the constraints impinging on SETPs developing in Scotland and the constraints of the ET. Additionally, these differences are also evident when players are living and practicing in Scotland whilst simultaneously competing on the ET.

The most significant findings in this study relate to the disparity in the constraints between the SGCs and the ETGCs and, consequently, the differences in the 'styles of play' that emerge when players are influenced by these constraints. The SGCs are short, with tight boundaries, and predominately have windy conditions that demands a style of play by the golfers of accuracy over power and lower ball flight, in order to perform functionally in a windy condition. In contrast, the ETGCs are long, with forced carries and minimal wind, where the style of play that has a performance advantage is being able to drive the ball well, and hit the ball high and far (Baugher et al., 2016).

Consequently, the findings from this study suggest that these differences in the styles of play negatively affect their performance when the SETPs transfer to the ET and the ETGCs. In terms of bridging this disparity in the styles of play between the SGCs and ETGCs, it is suggested by some of the evidence in this study that experiencing the America Collegiate system and playing on ACGCs aids the SETPs in making a seamless transition to the ET. Specifically due to the constraints impinging on them by the ACGCs demanding a style of play that is similar to what is required on the ET golf courses. These findings are in agreement with the concept of representative learning environments, where the constraints impinging on an individual should be similar when transferring between different learning/performance environments to aid the transfer (Pinder et al., 2011).

In addition, there exists incongruence between the SETPs' form on the driving range and on the golf course when practicing and performing on the ET. This could be

understood through the key concept of ecological psychology (Gibson, 1979) where, without considering their specific environments, comprehension of individuals' behaviour cannot be obtained. Consequently, information existing in the environment helps SETPs to regulate actions and behaviours. Therefore, if the two environments present different information regulating the actions and behaviour, such as the driving range (i.e. flat lie, no boundaries, wind similar direction) and the ETGCs (i.e. water, uneven lies, and wind from different directions), the SETPs could potentially become attuned to the different sources of information. Subsequently this leads to an incongruent set of behaviours and actions between the driving range and the ETGCs, as has been suggested in the findings of this study.

Consequently, to aid the transfer from the driving range to competing on the ETGCs, the SETPs should try to hit the golf shots needed for that particular ETGC on the driving range. Additionally, the SETPs change their practice strategies on the driving range over time, specifically from volume (i.e. hitting lots of balls on the driving range with the same club) to quality (i.e. hitting golf shots that are representative of what they will play on that particular ETGC). As a consequence to the subsequent lack of transfer to ETGCs when putting too much attention on volume of practice, rather than quality.

Also highlighted in this study is the difference in the SETPs' emotional state between competing on the ET (more emotion) and being on the driving range (less emotion), and then, consequently, how there is a decline in performance when transferring from the driving range to the ETGCs. This lack of transfer can be explained through the concept of affective learning environments, which implies that, to successfully develop skill in sport, the part of affect (emotion) must be considered in the design of practice environments to aid the transfer (Headrick et al., 2015).

It was also found that practicing on the ETGCs, when available, on the ET is more beneficial to performance than practicing on the driving range, as this enables the SETPs to become more attuned to the golf course and the golf shots needed to perform well on it. However, when practicing at home, in Scotland, the findings suggested that SETPs have difficulty in finding golf courses similar to the ETGCs. Resulting in them not being able to become attuned, when practising, to the

constraints (i.e. grasses, length of golf course, temperature, weather) faced on the ETGCs, and this potentially hinders them in their development towards expertise on the ET (Araújo et al., 2010).

Another finding is that, when playing on the ET, SETPs use many strategies to perform functionally. Additionally, two of the SETPs described winning a tournament despite feeling that their form was 'average', and they adapted their strategies and motor patterns as a result. With regard to this adaptability when playing on the ET, the findings from this study are consistent with the findings in a study of expert performers, in that they are degenerate (Seifert et al., 2016) and highly attuned to their own action capabilities (Michaels & Jacobs, 2007; Bruineberg & Rietveld, 2014).

Furthermore, it is evident from this study that some of the SETPs believe that they can predict when their form is going to be good on the ET. This finding suggests that the basis of this prediction is familiarity with the environment, specifically an environment that has constraints similar to those they encountered when developing and practicing on SGCs (i.e. grasses, weather conditions, shorter golf courses).

Lastly, when trying to understand SETP's behaviours on the ET, the sociocultural constraints of money worries and travel stresses changed some of the SETP's behaviours when competing on the ET. The caddy also plays an important role in adding to, or relieving, SETP's stresses when playing on the ET.

In summary, these findings suggest there are a variety of constraints impinging on SETPs when playing and developing towards the ET. However, what seems to be evident is that, when SETPs are developing towards, playing on and practicing on the ET, the constraints impinging on them when they are in Scotland are starkly different to those encountered on the ET. Moreover, the findings suggest that SETPs need to be highly adaptable to perform successfully on the ET.

Implications for potential, and current, Scottish European Tour Players

Despite the small sample size of SETPs interviewed, the findings in this study may have important implications for the development of future SETPs, as well as for informing current SETPs. This study could serve as being a valuable resource for those seeking to understand the existing lack of transfer from Scottish Amateur success to the ET. Additionally, it could also be used to inform and guide the stakeholders involved in the development and support of future SETPs, such as the Scottish Golf Association, golf coaches and parents. As well as those involved in supporting current SETPs, specifically enabling these stakeholders to understand the differences between the two environments, how they affect performance and what can be done to counteract this.

Additionally, pertinent to the stakeholders involved in the development of potential, or current, SETPs is the ability to manipulate the constraints by using a constraints-led approach to coaching, in order to create greater congruence in the constraints between the two environments, potentially enabling a smoother transfer to the ET. Stakeholders, such as coaches, could also help them to understand how the constraints impinging on them shape their behaviour and then educate the golfers on how to create their own learning environments to aid their progress towards expertise on the ET. For example, when setting up an environment for players to develop in coaches should ensure the players understand the environment with regard to how it affects their development and performance, as they will predominately be playing and practicing without the presence of their coach. Consequently, when playing on the ET, they will have a greater understanding of why they perform well in certain environments.

However, in terms of successfully coaching using a principled framework for learning, such as a constraints-led approach, earlier research has recommended that coaches have a firm understanding of the learning process, analytical skills and highly developed observational skills (Renshaw et al., 2016). Yet, in the UK, most

coach education programmes focus on the technical, descriptive, biosocial and tactical aspects of sport, rather than the principles of learning (Piggott, 2012).

Consequently, there are concerns in the UK that the coaching workforce is theoretically illiterate, due to the delivery of coach education programmes that are 'one size fits all' (Cushion et al., 2003; Piggott, 2015). To counter this Glazier (2014) called for the largest governing body for golf coaches, the Professional Golf Association, to implement an education programme that integrates the various sub-disciplines of sport science (i.e. performance analysis, biomechanics, skill acquisition) via a constraints based model (Newell, 1986), thus providing a more comprehensive understanding of golf performance.

Recommendations for Future Research

This current study has highlighted several other avenues for further research into golf performance in the future. There exists an opportunity to conduct a longitudinal study of how the constraints impinging on developing golfers, such as those in this study, affect the kinematic and kinetic sequences of their golf swing. There also remains a lack of golf research in a representative environment, specifically on the golf course and consequently how the various constraints on the golf course affect emotions and movement. Additionally, in terms of what the SETPs in this study described regarding what they see and feel when competing on the ET on ETGCs, there is also an opportunity to conduct a study using eye-tracking technology to understand these perceptions quantifiably (i.e. does where they look on the golf course change when their perception of their form is different?).

Limitations of the Study

It should be noted that this study does have limitations that require consideration. The number of participants interviewed in this study was small, with only seven past and present SETPs recruited as the sample. Although the intention was to have a sample of 10 SETPs, the data became saturated after the seventh.

Furthermore, two of the participants in this study had been coached at one point by the researcher; therefore, a further limitation of the research could be potential bias. Consequently, ethical protocols were followed to guard against this and to ensure consistency with all of the seven participants. This was conducted through informed consent, a participant's information sheet and distribution of the transcribed interviews, which were signed by the SETPs.

It should also be noted that two out of the five CETP's did not transition through the American collegiate system to the ET. However there was not enough data in this study to explore this further, therefore the different pathways of SETPs to the ET could be an avenue for future research. Finally, the researcher is a golf coach based in Scotland and, as a result, researcher bias might be considered as being restrictive to this research. However, this may also lead to a greater degree of trust between the researcher and the participants through familiarity with the topic researched and the researcher knowing some of the participants (Patton, 2002), resulting in the data being enriched.

Concluding Remarks

The major aim of this study was to gain understand of the constraints impinging on SETPs when playing on the ET. The second aim was to investigate the constraints encountered by SETP's when developing towards the ET. In considering the research aim, the experiences of SETPs were examined through qualitative, semi-structured interviews, resulting in four major themes being identified: *Golf Courses, Practice on the European Tour, Playing on the European Tour* and *Sociocultural constraints.*

The major findings of this study revealed considerable differences between the constraints impinging on SETPs when developing and practicing in Scotland and those encountered when playing on the ET. It emerged from the interviews with the SETPs that their style of play when developing in Scotland is not beneficial to their performance when playing on the ET. Furthermore, when practicing in Scotland whilst playing on the ET there is little opportunity for the SETPs to become 'attuned'

to similar constraints encountered on the ETGCs on the ET, therefore potentially limiting the transfer to the ET and slowing down their development of expertise whilst on the ET. However, SETPs are also highly adaptable and have an increased awareness of their own capabilities, and they, consequently, adapt their movement and decision-making strategies when functionally performing on the ET.

These findings have significant implications for the stakeholders, mainly golf coaches, involved in the development of potential, and current, SETP's, specifically providing an understanding of the differences in the constraints impinging on these golfers and how these shape behaviour.

Consequently, this research advocates the utilisation of a constraints-led approach to design, and educate these golfers through, representative learning environments. In this approach the coaches adopt a more facilitating role, rather than direct instruction, allowing the players to explore the 'perceptual motor landscape' through exploratory behaviour that seeks to establish functional strategies and movement solutions, with the end goal being to meet the demands of the constraints encountered on the ET. This approach may encourage potential and current SETPs to find performance solutions within both motor and perceptual systems that are adaptable and inventive, consistent with the findings in this study, when playing on the ET.

References

Alexander, D.L. and Kern, W., 2005. Drive for show and putt for dough? An analysis of the earnings of PGA Tour golfers. *Journal of Sports Economics*, *6*(1), pp.46-60.

Anson, G., Elliott, D. and Davids, K., 2005. Information processing and constraints-based views of skill acquisition: divergent or complementary?. *Motor Control*, *9*(3), pp.217-241.

Araújo, D., Fonseca, C., Davids, K.W., Garganta, J., Volossovitch, A., Brandão, R. and Krebs, R., 2010. The role of ecological constraints on expertise development. *Talent Development & Excellence*, 2(2), pp.165-179.

Araújo, D. and Davids, K., 2016. Towards a theoretically-driven model of correspondence between behaviours in one context to another: implications for studying sport performance. *International Journal of Sport Psychology*, *47*(1), pp.745-757.

Araújo, D., Hristovski, R., Seifert, L., Carvalho, J., & Davids, K., 2017. Ecological cognition: expert decision-making behaviour in sport. *International Review of Sport and Exercise Psychology*, (July), pp. 1–25.

Aronson, J., 1995. A pragmatic view of thematic analysis. *The Qualitative Report*, *2*(1), pp.1-3.

Baker, J., Côté, J. and Deakin, J., 2005. Expertise in ultra-endurance triathletes early sport involvement, training structure, and the theory of deliberate practice. *Journal of Applied Sport Psychology*, *17*(1), pp.64-78.

Barnett, V. and Hilditch, S., 1993. The effect of an artificial pitch surface on home team performance in football (soccer). *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, *156*(1), pp.39-50.

Barris, S., Davids, K. and Farrow, D., 2013. Representative learning design in springboard diving: Is dry-land training representative of a pool dive?. *European Journal of Sport Science, 13*(6), pp.638-645.

Baugher, C.D., Day, J.P. and Burford Jr, E.W., 2016. Drive for show and putt for dough? Not anymore. *Journal of Sports Economics, 17*(2), pp.207-215.

Bois, J.E., Sarrazin, P.G., Southon, J. and Boiché, J.C., 2009. Psychological characteristics and their relation to performance in professional golfers. *The Sport Psychologist, 23*(2), pp.252-270.

Bowes, I. and Jones, R.L., 2006. Working at the edge of chaos: Understanding coaching as a complex, interpersonal system. *The Sport Psychologist, 20*(2), pp.235-245.

Braun, V. and Clarke, V., 2006. Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), pp.77-101.

Bruineberg, J. and Rietveld, E., 2014. Self-organization, free energy minimization, and optimal grip on a field of affordances. *Frontiers in Human Neuroscience, 8*, p.599.

Brunswik, E., 1956. *Perception and the representative design of psychological experiments* (2nd ed.). Berkeley, CA, US: University of California Press.

Bryman, A., 2008. *Social Research Methods.* (3rd ed.). Oxford: Oxford University Press.

Brymer, E. and Davids, K., 2013. Ecological dynamics as a theoretical framework for development of sustainable behaviours towards the environment. *Environmental Education Research, 19*(1), pp.45-63.

Bull, M., 2015. *Range vs Course – How do players move?* Available at:

http://bull3d.co.uk/Bull3DSocial/file/view/983/range-vs-course-how-do-players-move (Accessed 7 September 2018)

Campbell, M. and Satterley, G., 1999. *The Scottish golf book.* Great Britain: Lomond Books.

Carter, I., 2018. *Masters, The Open, US Open, US PGA Championship - which is the biggest major?* Available at: https://www.bbc.co.uk/sport/golf/44031594 (Accessed 10 August 2018)

Chase, W.G. and Simon, H.A., 1973. Perception in chess. *Cognitive Psychology*, *4*(1), pp.55-81.

CNN., 2018. *Phil Mickelson: How 'Lefty' grew to love links.* Available at: https://edition.cnn.com/2018/07/18/sport/phil-mickelson-links-golf-living-golf-spt-intl/index.html (Accessed 10 August 2018)

Coate, D. and Toomey, M., 2014. Do professional golf tour caddies improve player scoring?. *Journal of Sports Economics*, *15*(3), pp.303-312.

Cohen, L., Manion, L. and Morrison, K., 2002. *Research methods in education.* London: Routledge.

Costa, B., 2018. *The uncomfortable practice habits of a champion.* Wall Street Journal. Available at: https://www.wsj.com/articles/the-uncomfortable-practice-habits-of-a-champion-1532689201?redirect=amp#click=https://t.co/YH7kafTB6i (Accessed 10 October 2018)

Côté, J., Macdonald, D.J., Baker, J. and Abernethy, B., 2006. When "where" is more important than "when": Birthplace and birthdate effects on the achievement of sporting expertise. *Journal of Sports Sciences*, *24*(10), pp.1065-1073.

Cushion, C.J., Armour, K.M. and Jones, R.L., 2003. Coach education and continuing professional development: Experience and learning to coach. *Quest*, *55*(3), pp.215-230.

Cushion, C., Ford, P.R. and Williams, A.M., 2012. Coach behaviours and practice structures in youth soccer: Implications for talent development. *Journal of Sports Sciences*, *30*(15), pp.1631-1641.

Davids, K., Glazier, P., Araujo, D. and Bartlett, R., 2003. Movement systems as dynamical systems. *Sports Medicine*, *33*(4), pp.245-260.

Davids, K., Williams, A.M. and Williams, J.G., 2005. *Visual Perception and Action in Sport*. London: Routledge.

Davids, K., Renshaw, I., Pinder, R.A., Araújo, D. and Vilar, L., 2012. Principles of motor learning in ecological dynamics: A comment on functions of learning and the acquisition of motor skills (with reference to sport). *The Open Sports Sciences Journal*, *5*, pp.113-117.

Davids, K., Headrick, J., Renshaw, I. and Pinder, R.A., 2013. Skill acquisition and representative task design. In *Complex Systems in Sport* (pp. 345-359). London: Routledge.

Davids, K., Araújo, D., Seifert, L. and Orth, D., 2015. Expert performance in sport: An ecological dynamics perspective. In *Routledge Handbook of Sport Expertise* (pp. 156-170). London: Routledge.

Davies, D. and Dodd, J., 2002. Qualitative research and the question of rigor. *Qualitative Health Research*, *12*(2), pp.279-289.

Delamont, S., 2016. *Fieldwork in educational settings: Methods, pitfalls and perspectives*. London: Routledge.

Dempster, M., 2016. *Scotland's Top Level Slump.* Available at:
https://www.scotsman.com/sport/golf/martin-dempster-scotland-s-top-level-slump-1-
4163902 (Accessed 6 September 2018).

Dias, G., Mendes, R., Couceiro, M.S., Figueiredo, C.M. and Luz, J.M.A., 2013. On a
Ball's trajectory model for putting's evaluation. In *Computational Intelligence and
Decision Making* (pp. 81-88). Dordrecht: Springer.

Dias, G., Couceiro, M.S., Barreiros, J., Clemente, F.M., Mendes, R. and Martins,
F.M., 2014. Distance and slope constraints: adaptation and variability in golf putting.
Motor control, *18*(3), pp.221-243.

Dicks, M, Davids, K & Araujo, D 2008. Ecological psychology and task
representativeness: implications for the design of perceptual-motor training
programmes in sport. in Y Hong & R Bartlett (eds), *Routledge handbook of
biomechanics and human movement science* (pp. 129-139).London: Routledge.

Duffield, R. and Fowler, P.M., 2017. Domestic and international travel: implications
for performance and recovery in team-sport athletes. In *Sport, Recovery, and
Performance* (pp. 197-212). London: Routledge.

Eccles, D.W., Ward, P. and Woodman, T., 2009. Competition-specific preparation
and expert performance. *Psychology of Sport and Exercise*, *10*(1), pp.96-107.

Edelman, G.M. and Gally, J.A., 2001. Degeneracy and complexity in biological
systems. *Proceedings of the National Academy of Sciences*, *98*(24), pp.13763-
13768.

EGA., 2018. *European Team Amateur Championships*. Available at: http://www.ega-
golf.ch/page/european-amateur-team-championship (Accessed 6 September 2018)

Ericsson, K.A., Krampe, R.T. and Tesch-Römer, C., 1993. The role of deliberate
practice in the acquisition of expert performance. *Psychological Review*, *100*(3),
p.363.

ESPN., 2011. *Rory won't change his style for the Open*. Available at: http://en.espn.co.uk/golf/sport/story/101513.html (Accessed 10 August 2018)

European Tour., 2018. Available at: http://www.europeantour.com/ (Accessed 21 July 2018)

European Tour Schedule., 2018. Available at: http://www.europeantour.com/europeantour/tournament/Season=2018/index_full.html (Accessed 21 July 2018)

European Tour., 2018. *South African Open tournament history*. Available at: http://www.europeantour.com/europeantour/season=2018/tournamentid=2018004/history/index.html (Accessed 14 October 2018)

European Tour., 2018. *Race to Dubai.* Available at: http://www.europeantour.com/europeantour/racetodubai/rankings/index.html 4/4/2019 (Accessed 4 April 2019)

Evans, K. and Tuttle, N., 2015. Improving performance in golf: current research and implications from a clinical perspective. *Brazilian Journal of Physical Therapy*, 19: pp.381-9.

Fajen, B.R., Riley, M.A. and Turvey, M.T., 2009. Information, affordances, and the control of action in sport. *International Journal of Sport Psychology*, *40*(1), p.79.

Flick, U., 2002. Qualitative research-state of the art. *Social Science Information*, *41*(1), pp.5-24.

Fried, H.O., Lambrinos, J. and Tyner, J., 2004. Evaluating the performance of professional golfers on the PGA, LPGA and SPGA tours. *European Journal of Operational Research*, *154*(2), pp.548-561.

Fry, J. and Bloyce, D., 2017. 'Life in the Travelling Circus': A Study of Loneliness, Work Stress, and Money Issues in Touring Professional Golf. *Sociology of Sport Journal*, *34*(2), pp.148-159.

Fry, J., Davies, T., Smith, A.G., Barron, D.J. and Yiannaki, C., 2015. A global game with global players: Diminishing contrasts and increasing varieties in the working lives of professional golfers. *International Journal of Golf Science*, *4*(1), pp.15-32.

Gaudet, C.E., 2017. A 'New'Old Course? An Assessment of the Effects of Alterations to the Old Course at St. Andrews on the 2015 Open Championship. *Journal of Sports Analytics*, *3*(1), pp.55-66.

Gibson, J.J., 1966. *The senses considered as perceptual systems.* London: George Allen & Unwin Ltd.

Gibson, J.J., 1979. *The ecological approach to visual perception.* Boston, MA: Houghton Mifflin.

Gibson, E.J. and Pick, A.D., 2000. *An ecological approach to perceptual learning and development.* USA: Oxford University Press.

Glazier, P.S. and Davids, K., 2005. Is there such a thing as a 'perfect' golf swing. In: *International Society of Biomechanics in Sports Coaches Information Service Congress.* Cleveland, USA, 31 July-5 August 2005.

Glazier, P.S. and Davids, K., 2009. Constraints on the complete optimization of human motion. *Sports Medicine*, *39*(1), pp.15-28.

Glazier, P., 2014. Professionalism, Golf Coaching and a Master of Science Degree: A Commentary. *International Journal of Sports Science & Coaching*, *9*(4), pp.851-856.

Golf Predictor., 2016. Average Course Length on the US/European PGA Tours 2003-2015. Available at: http://blog.golfpredictor.com/2016/05/average-course-length-on-useuropean-pga.html (Accessed 7 September 2018).

Greenwood, D., Davids, K. and Renshaw, I., 2016. The role of a vertical reference point in changing gait regulation in cricket run-ups. *European Journal of Sport Science*, *16*(7), pp.794-800.

Grinyer, A., 2009. The anonymity of research participants: Assumptions, ethics, and practicalities. *Pan-Pacific Management Review*, *12*(1), pp.49-58.

Güllich, A. and Emrich, E., 2006. Evaluation of the support of young athletes in the elite sports system. *European Journal for Sport and Society*, *3*(2), pp.85-108.

Hammersley, M. and Atkinson, P., 2007. *Ethnography: Principles in practice*. London: Routledge.

Hayman, R., Polman, R., Taylor, J., Hemmings, B. and Borkoles, E., 2011. Development of elite adolescent golfers. *Talent Development and Excellence*, *3*(2), pp.249-261.

Headrick, J., Renshaw, I., Davids, K., Pinder, R.A. and Araújo, D., 2015. The dynamics of expertise acquisition in sport: The role of affective learning design. *Psychology of Sport and Exercise*, *16*, pp.83-90.

Heiny, E.L., 2008. Today's PGA Tour pro: Long but not so straight. *Chance*, *21*(1), pp.10-21.

Hickman, D.C. and Metz, N.E., 2015. The impact of pressure on performance: Evidence from the PGA Tour. *Journal of Economic Behavior & Organization*, *116*, pp.319-330.

Hickman, D.C. and Metz, N.E., 2018. Peer effects in a competitive environment: Evidence from the PGA Tour. *Economic Inquiry, 56*(1), pp.208-225.

IGF., 2018. *Men's Record. World Amateur Team Championships.* Available at: https://www.igfgolf.org/watc/mens-records/ (Accessed 6 September 2018).

Jack Nicklaus., 2014. *Sky Sports Golf.* https://www.youtube.com/watch?v=7-Mefnh9A9s (Accessed 2 September 2018).

Jacobs, D.M., Runeson, S. and Michaels, C.F., 2001. Learning to visually perceive the relative mass of colliding balls in globally and locally constrained task ecologies. *Journal of Experimental Psychology: Human Perception and Performance*, *27*(5), p.1019.

Jenkins, S., 2014. Professionalism, golf coaching and a master of science degree. *International Journal of Sports Science & Coaching*, *9*(4), pp.693-715.

Kannan, K.. 2015. *Why Nadal is the king of clay.* Available at: https://www.essentiallysports.com/reasons-nadal-king-clay/ (Accessed 11 September 2018).

Keogh, J.W. and Hume, P.A., 2012. Evidence for biomechanics and motor learning research improving golf performance. *Sports Biomechanics*, *11*(2), pp.288-309.

Kleinsasser, A.M., 2000. Researchers, reflexivity, and good data: Writing to unlearn. *Theory into Practice*, *39*(3), pp.155-162.

Kugler, N. P., Kelso, J. A. S., & Turvey, M. T., 1980. On the concept of coordinative structures as dissipative structures: I. Theoretical lines of convergence. *Tutorials in Motor Behavior*. G. E. Stelmach and J. Requin (eds.). Amsterdam: North-Holland Publications.

Kuzmanić, M., 2009. Validity in qualitative research: Interview and the appearance of truth through dialogue. *Horizons of Psychology*, *18*(2), pp.39-50.

Lee, C., Linkenauger, S.A., Bakdash, J.Z., Joy-Gaba, J.A. and Profitt, D.R., 2011. Putting like a pro: The role of positive contagion in golf performance and perception. *PLoS One*, *6*(10), pp.16-26.

Leka, S., & Jain, A. (2010). *Health impact of psychosocial hazards at work: an overview*. Available at: http://apps.who.int/iris/bitstream/10665/44428/1/9789241500272_eng.pdf. (Accessed 9 February 2019).

Lunenburg, F.C. and Irby, B.J., 2008. *Writing a successful thesis or dissertation: Tips and strategies for students in the social and behavioral sciences*. Thousand Oaks, California: Corwin press.

Maloney, M.A., Renshaw, I., Headrick, J., Martin, D.T. and Farrow, D., 2018. Taekwondo fighting in training does not simulate the affective and cognitive demands of competition: Implications for behavior and transfer. *Frontiers in Psychology*, *9*, p.25.

McHardy, A., Pollard, H. and Luo, K., 2006. Golf injuries. *Sports Medicine*, *36*(2), pp.171-187.

Jacobs, D.M. and Michaels, C.F., 2007. Direct learning. *Ecological Psychology*, *19*(4), pp.321-349.

Monnard, M., 2018. *The best quotes of Tiger Woods.* Available at: http://majorcagolf.com/the-best-quotes-of-tiger-woods/ (Accessed 14 October 2018).

Newell, A. and Rosenbloom, P.S., 1981. Mechanisms of skill acquisition and the law of practice. *Cognitive Skills and Their Acquisition*, *1*(1981), pp.1-55.

Newell, K.M., 1986. Constraints on the development of coordination. In M. Wade & H.T. Whiting (Eds.), *Motor development in children: Aspects of Coordination and Control* (pp. 341–360). Dordrecht: Martinus Nijhoff.

Olsnes, S., 2016. *Are longer courses the only golf course design solution to modern technology and long-hitters?* Available at: https://www.eigca.org/Articles/22154/Are-longer-courses-the-only-golf-course-design-solution-to-modern-technology-and-long-hitters (Accessed 5 May 2018).

Orth, D., Davids, K., Chow, J.Y., Brymer, E. and Seifert, L., 2018. Behavioural repertoire influences the rate and nature of learning in climbing: implications for individualised learning design in preparation for extreme sports participation. *Frontiers in Psychology*, *9*, p.949.

OWGR., 2018. *Official World Golf Ranking*. Available at: http://www.owgr.com/ (Accessed 7 September 2018.)

Patton, M., 2002. *Qualitative research and evaluation methods*. London: Sage Publications.

Piggott, D., 2012. Coaches' experiences of formal coach education: a critical sociological investigation. *Sport, Education and Society*, *17*(4), pp.535-554.

Piggott, D., 2015. The open society and coach education: A philosophical agenda for policy reform and future sociological research. *Physical Education and Sport Pedagogy*, *20*(3), pp.283-298.

Pijpers, J.R., Oudejans, R.R., Bakker, F.C. and Beek, P.J., 2006. The role of anxiety in perceiving and realizing affordances. *Ecological Psychology*, *18*(3), pp.131-161.

Pinder, R.A., Davids, K., Renshaw, I. and Araújo, D., 2011. Representative learning design and functionality of research and practice in sport. *Journal of Sport and Exercise Psychology*, *33*(1), pp.146-155.

R&A., 2018. *Past Winners, The Amateur Championship.* Available at: https://www.randa.org/Championships/TheAmateurChampionship/Past-Winners (Accessed 6 September 2018).

R&A., 2018. *The Champion Golfers.* Available at:
https://www.theopen.com/OpenChampions (Accessed 7 September 2018).

R&A., 2017. *A review of Driving Distance - 2017.* Available at:
https://www.randa.org/theranda/distance-insights (Accessed 7 October 2018).

Rein, R., Davids, K. and Button, C., 2010. Adaptive and phase transition behavior in performance of discrete multi-articular actions by degenerate neurobiological systems. *Experimental Brain Research*, *201*(2), pp.307-322.

Renshaw, I., Araújo, D., Button, C., Chow, J.Y., Davids, K. and Moy, B., 2016. Why the constraints-led approach is not teaching games for understanding: A clarification. *Physical Education and Sport Pedagogy*, *21*(5), pp.459-480.

Reuters., 2011. *Former caddie hails "People's Champion" Seve*. Available at: https://uk.reuters.com/article/golf-ballesteros-caddie/rpt-interview-golf-former-caddie-hails-peoples-champion-seve-idUKLDE74606A20110507 (Accessed 14 October 2018).

Saunders, B., Sim, J., Kingstone, T., Baker, S., Waterfield, J., Bartlam, B., Burroughs, H. and Jinks, C., 2018. Saturation in qualitative research: exploring its conceptualization and operationalization. *Quality & Quantity*, *52*(4), pp.1893-1907.

Scottish Golf Order of merit Schedule., 2018. Available at:
https://www.scottishgolf.org/championships/#/customer/10/schedule/2018/3533 (Accessed 21 July 2018).

Seifert, L., Wattebled, L., Herault, R., Poizat, G., Adé, D., Gal-Petitfaux, N. and Davids, K., 2014. Neurobiological degeneracy and affordance perception support functional intra-individual variability of inter-limb coordination during ice climbing. *PloS one*, *9*(2), pp. 86-89.

Seifert, L., Komar, J., Araújo, D. and Davids, K., 2016. Neurobiological degeneracy: a key property for functional adaptations of perception and action to constraints. *Neuroscience & Biobehavioral Reviews*, *69*, pp.159-165.

Sell, T.C., Tsai, Y.S., Smoliga, J.M., Myers, J.B. and Lephart, S.M., 2007. Strength, flexibility, and balance characteristics of highly proficient golfers. *The Journal of Strength & Conditioning Research*, *21*(4), pp.1166-1171.

Smith, C.J., Callister, R. and Lubans, D.R., 2011. A systematic review of strength and conditioning programmes designed to improve fitness characteristics in golfers. *Journal of Sports Sciences*, *29*(9), pp.933-943.

Sparkes, A.C. and Smith, B., 2013. *Qualitative research methods in sport, exercise and health: From process to product*. London: Routledge.

Stöckl, M. and Lamb, P.F., 2018. The variable and chaotic nature of professional golf performance. *Journal of sports sciences*, *36*(9), pp.978-984.

Stoszkowski, R. J., 2011. 'An Investigation of the Mediators of Talent Development in Golf'. Unpublished MPhil Thesis, University of Birmingham, Birmingham.

Swann, C., Moran, A. and Piggott, D., 2015. Defining elite athletes: Issues in the study of expert performance in sport psychology. *Psychology of Sport and Exercise*, *16*, pp.3-14.

Tan, C.W.K., Chow, J.Y. and Davids, K., 2012. 'How does TGfU work?': examining the relationship between learning design in TGfU and a nonlinear pedagogy. *Physical Education and Sport Pedagogy*, *17*(4), pp.331-348.

Reilly, T., Waterhouse, J., Burke, L.M. and Alonso, J.M., 2007. Nutrition for travel. *Journal of Sports Sciences*, *25*(S1), pp.S125-S134.

Tuckman, B.W., 1978. *Conducting Educational Research*. New York: Harcourt Bruce Javansvick Inc.

Walker Cup., 2018. *Previous Matches.* Available at: https://walkercup.co.uk/previous-matches/ (Accessed 6 September 2018)

Wiseman, F. and Chatterjee, S., 2006. Comprehensive analysis of golf performance on the PGA Tour: 1990–2004. *Perceptual and Motor Skills, 102*(1), pp.109-117.

Witt, J.K., and Proffitt, D.R., 2005. See the ball, hit the ball: Apparent ball size is correlated with batting average. *Psychological Science, 16*(12), p.937938.

Appendices

Appendix A: Interview Guide

1. Of all the things you have seen on tour what is the funniest/strangest story?

2. Tell me about some things that come to mind that effect performance when playing on tour? Probe – How does this compare to your amateur days?

3. Tell me about some of the thing that you feel allowed/helped you to perform well on tour?
    Probe – How does this compare to your amateur days?

4. Tell me about some of the things that hindered your performance on tour?
    Probe – How does this compare to your amateur days?

5. Tell me about what you would describe as ideal preparation before a European Tour event?
    b) How often does this ideal preparation occur?

    c) Tell me about the different reasons why ideal preparation does not occur every tournament?

    d) How has the preparation changed over the course of your time on tour?
     Probe – (for example your rookie year/years to now)

    e) How do you adapt when preparation isn't ideal?

    f) What effect do you think preparation has on your form?

6. How do you think the preparation we have just discussed compares to your amateur days?

7. How often can you predict your form when you are playing on tour?

    Probe – Why do you think that is? (As in can't/can predict form)
            Tell me more about that?

8. Tell me more about how your form affects your strategy when playing.
    Probes – how has this changed over time playing on the tour?

How many rounds a year would you rate your long game as being your A game?

How much of your practice time to you spend on the range?
What do you do when you are there?

9. From your experiences on tour, what qualities do you need to stay on tour/be successful on tour?
Probes

10. 'Practice is everything. Consistently competitive practice results in players performing in the absence of fear' John Wooden
What do you think about this statement by John Wooden?
How often do you feel your practice aligns to this statement by John Wooden when playing on tour?

11. Describe the tournaments that you feel more comfortable attending and playing?

Probes – why does these tournaments make you feel more comfortable?

Can you expand on that please?

What situations, if any, make you uncomfortable playing any of these tournaments?

Can you give more examples please?

12. Describe the tournaments that you feel uncomfortable attending and playing?
Probes – why does that make you feel more uncomfortable?

What situations, if any, make you comfortable playing any of these tournaments?

Can you expand on that please?

13. When playing what things do you feel help performance for you?

14. When playing what things do you feel hinder performance for you?

15. When do you ever feel uncomfortable playing on tour?

Probes - How does this affect your performance?
How have these feelings changed overtime on tour, for example what made you uncomfortable as a rookie compared to now?
Why do you think this has changed (if it has at all)?

16. All that we have discussed (quick summary by you), what do you think about your amateur's career and how it prepared you for Tour life?
    What prepared you for Tour in your amateur career?
    What didn't prepare you for tour in your amateur career?

Appendix B: Ethical Approval

Project Reference Number: SHS_R_2015-16_1
Project Title: The task, environmental and organismic constraints impinging on the performance elite professional golfers

Proposer: Peter Arnott
Matriculation number: █████████
Programme: MSc/MBA/MTech/LLM By Research (SHS), Stage 1
Supervisor: Ross Lorimer
The above project has been granted full ethical approval.

Additional Conditions:
Please remove your personal email address/ mobile telephone number from participant information sheet and VIC forms and replace with your university email address only.

NB: you are not required to resubmit your application if you have been given Additional Conditions.
Standard Conditions:
These apply to all Research Ethics applications
i   The Proposer must remain in regular contact with the project supervisor. ii The Supervisor must see a copy of all materials and procedures prior to commencing the data collection.
iii   If any substantive changes to the proposed project are made, a new ethical approval application must be submitted to the Committee. Completed forms should be resubmitted through the Research Ethics Blackboard course.
iv   Any changes to the agreed procedures must be negotiated with the project supervisor.
Failure to comply with these conditions will result in ethical approval being revoked by the Ethics Committee.

SHS Research Ethics Committee 20.03.15

Appendix C: Participant Information Sheet

The task, environmental and organismic constraints impinging on the performance of Scottish European Tour golfers.

1. Invitation

You are being invited to take part in this research study. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information sheet carefully, and discuss it with others if you wish.

2. What is the purpose of the study?

The purpose of this study is to investigate all the varying factors constraining elite professional golfers when they are playing professional golf, being environmental (i.e. monetary, caddies, crowd noise), task (i.e. course difficulty, rules of the game) and organismic (i.e. emotional intelligence, resilience), therefore potentially informing golf talent development programmes, coaches and golfers aspiring to play at an elite golf professional level to design learning environments that are representative of the level that they aspire to.

3. Do I have to take part?
No. It is up to you to decide whether or not to take part. If you decide to take part you will be given this information sheet to keep and be asked to sign a consent form to confirm that you understand what is involved when taking part in this study. If you decide to take part you are free to leave the study at any time and without giving a reason.

4. What will happen to me if I take part?

A tape-recorded interview would be partaken in for approximately an hour at a location most suitable to you.

5.   What are other possible disadvantages and risks of taking part?

All procedures have been risk assessed to minimise the risk of injury during the testing, and there are no reported cases of injury subsequent to completing this type of research-based exercise.

6.   What happens when the research study stops?

When the interview is completed information will be transcribed verbatim. You will be given a copy of this and given the opportunity to alter anything you feel is necessary to ensure an accurate representation of your views and opinions is given.

7.   Will my taking part be kept confidential?

All the information about your participation in this study will be kept confidential. Only the investigators will have access to your name and contact details, which will be kept on a password-protected computer for 5 years to comply with legislation. The information you provide will be anonymous and audio recordings and transcripts will be either kept on password-protected computers or in locked filing cabinets.

8.   What will happen if I do not want to carry on with the study?

You are free to leave the study at any time and without giving a reason. If you have a concern about any aspect of this study, you should ask to speak with the researchers who will do their best to answer your question.

9.   What will happen to the results of this study?

The results of the study will be available after it finishes. They may be published in a scientific journal or presented at a scientific conference. The data will be anonymous and you will not be identified in any report or publication. Should you wish to see the results of the study, or the publication, please let us know and we will arrange to provide you with these.

10.   Who is organising and funding this study?

This is a University of Abertay, Dundee led study.

11.   Contact for further information

You are encouraged to ask any questions you wish, before, during or after the study.

Should you have any queries or concerns at any time please contact:

Appendix D: Informed Consent Form

The purpose and details of this study have been explained to me. I understand that this study is designed to further scientific knowledge and that the University of Abertay Dundee has approved all procedures.

☐   I have read and understood all information provided and this consent form.

☐   I have had an opportunity to ask questions about my participation.

☐   I understand that I am under no obligation to take part in the study.

☐   I understand that I have the right to withdraw from this study at any stage for any reason, and that I will not be required to explain my reasons for withdrawing.

☐   I understand that all the information I provide will be treated in strict confidence.

☐   I agree to participate in this study.

Your name

_____

Your signature

_____

Signature of investigator

_____

Date

_____