

**THE APPROPRIATENESS OF HOLLAND'S INTEREST CODE
TYPOLOGY FOR SOUTH AFRICAN FIELD GUIDES**

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SUMMARY

The foundational principles of Holland's (1985b, 1992, 1997) vocational theory state that career choice is an expression of personality, in that individuals with specific personality types seek out work or learning environments that match their personality types. Furthermore, interest inventories such as the Self-Directed Search (Holland, Powell, & Fritzsche, 1994) can be regarded as personality inventories and used to ensure that individuals find themselves in a working environment that is best suited to their interests and personality type.

In addition to instruments that measure interests, Holland also developed dictionaries of occupations coded according to the characteristics and interests of different occupations and working environments, such as the Dictionary of Holland occupational codes (Gottfredson & Holland, 1996). The level of congruence between personality types and occupational types is linked to career satisfaction, stability and achievement. This premise only holds true, however, if the codes for the occupational environment suggested by Holland (1985c) are, in fact, valid. In other words, do the codes suggested by Holland match the personality types of individuals entering or who are already employed in a particular work or learning environment?

There have been many studies conducted with regard to the validity of Holland's prescribed interest typology codes. Spokane, Meier and Catalano (2000) located a large number of empirical studies published since 1985 that relate directly to the validity of Holland's codes, many of which have suggested that the existing codes may not be valid. There is a scarcity of such research in South Africa, especially with regard to vital and growing occupational fields, such as the ecotourism industry, that are so important to the economic well-being of the country. Consequently, the overall aim of the present study was to explore and describe the interest codes of male and female South African student and working field guides in order to discuss the appropriateness of the occupational codes prescribed by Holland for the field guiding profession.

The quantitative design of the study was exploratory-descriptive in nature and made use of the Self-Directed Search Questionnaire (Holland, Fritzsche, & Powell, 1994). The total sample consisted of 100 participants (68 male and 32 female), constituting 40 working field guides and 60 field guide students. Descriptive analyses were conducted with the use of frequency tables, charts, means and standard

deviations. In addition, Independent sample t-tests were computed in order to describe and compare the mean scores of the interests for males and females, and to compare the mean scores of the interests for student and working field guides.

The results of this study suggest that the prescribed occupational code (SRI; Social, Realistic, Investigative) for South African field guides may not be appropriate and that an interest profile such as SREI AC may be more appropriate. These results, in combination with the findings of the research review, suggest the need for a more extensive, cross-cultural study to determine the appropriateness of Holland's occupational codes for South African occupations, which may lead to a revision of the South African Dictionary of Occupations (Taljaard & von Mollendorf, 1987).

Key Words: Holland, interest typology, SDS, ecotourism, field guides, South Africa

CHAPTER 1

INTRODUCTION

According to Lowman (1991), individuals' sense of self is "intricately enmeshed" (p. 5) with their choice of career and plays a vital role in determining their income, status, relationships and personal identity. An individual is faced with observing and experiencing the dilemma of career choice and the consequences of those choices at every developmental stage.

As children we observe how career decisions affect our parents and other adults, and we also experience the financial and emotional effects of those decisions. We increasingly become aware of the ever growing number of career opportunities and choices, as well as the factors that may dictate or limit those choices. PAQ Services online enhanced Dictionary of Occupational Titles (eDOT), the up-to-date software database of job descriptions and job titles, presently lists over 20,000 occupational titles (PAQ Services, 2005), and yet we are still expected, at high school age, to be able to choose school subjects that will open or possibly close the doors to our future tertiary study opportunities.

Tertiary education decisions are complicated by the increasing variety of courses being offered by a growing number of institutions. In addition, there is the concern that even carefully considered career decisions may still not ultimately lead to the desired opening, due to fierce competition and affirmative action. Increasingly, youth are being informed that they should develop entrepreneurial skills and the ability to start their own businesses because even appropriate subject choices, excellent scholastic achievements, good tertiary education decisions and completion of courses with distinction may not guarantee an opening in their desired work field.

These are not the only difficulties we face with regard to our careers. As Lowman (1991) pointed out, career choice is becoming less and less of a "once and forever decision" (p. 7). Presuming that individuals are fortunate enough to overcome the difficulties and potential pitfalls related to acquiring the required secondary and tertiary education necessary for their future career, and even if they manage to secure a promising position in their career field of choice, they may still face potential changes, crises and transitions during their working life.

In this regard, Schlossburg (1984) has identified four types of career transitions that adults may have to face: anticipated, unanticipated, 'chronic hassles',

and events that do not happen. Job searching and retirement are examples of anticipated transitions and, although they are challenging and require the ability to adjust to change, they can be foreseen and prepared for in advance. Unanticipated transitions are by their nature unexpected, unpredictable and often involuntary. They include such events as being fired, transferred, and retrenched or the intimidating return to the world of work after the death or disability of the family's primary breadwinner. Transitional challenges such as tedious commuting, unpleasant work colleagues, deadline pressure, or uncomfortable working conditions all fall into the category of 'chronic hassles' and have either to be endured, adjusted to or become the catalyst for more drastic changes such as resignation. Non-events include the expectation of a promotion that never occurs or the intention to approach an employer for a transfer to another branch being thwarted by lack of confidence. Transitions that are both unanticipated and involuntary are considered to be career crises and can lead to despair, self-doubt and even loss of self-esteem.

In this chapter so far we have briefly looked at the importance of career choice and the difficulties faced during this process. The focus turns now to the role of the career psychologist in facilitating the challenges discussed above. In the light of the many and increasingly difficult decisions that individuals have to make with regard to their careers and the numerous transitions they will face during such careers, the need for effective career psychologists becomes ever more apparent. Career counselling requires general counselling skills as well as information and techniques specific to that field. A successful career counsellor has the ability to use counselling and analytical skills to understand and resolve career issues and requires knowledge in the fields of interests, ability, personality dynamics, as well as the ability to integrate all of these fields to promote personal well-being and growth.

As we can see from the discussion in the beginning of this chapter, success in finding the most appropriate career demands the making of certain choices and decisions. The ability to confidently choose between options and to make good decisions largely depends on the quantity and quality of information that individuals have at their disposal. This includes information about the work options that the individual is considering, the associated educational requirements, salary details, and working conditions. More important, though, is the need for self-information which can best be gained with the assistance of a career psychologist.

Career counselling should involve, amongst other things, the collection of information with regard to the individual's interests, abilities and personality characteristics by means of psycho-diagnostic interviews, biographical questionnaires and the application and interpretation of carefully selected psychometric career tests. Each of these domains is important and should be examined separately and also in combination. The information generated must be sensitively and carefully integrated and linked to the process of career planning, thus forming "a bridge to the world of work" (Garfield & Prediger, 1994, p. 42).

Whilst the research review of this study discusses studies that have focused on abilities and personality characteristics in conjunction with interests, and, whilst the current researcher acknowledges the importance of assessing particular abilities and personality characteristics as part of the career counselling process, this study focuses primarily on interests, (specifically, personality interest types), occupational (or environmental) types and the matching of these two concepts.

Because it is easier to predict the type of occupation that an individual is likely to enter from their interests rather than their aptitudes and characteristics, interests have become the most important trait used in the process of career selection (Sharf, 2006). Interests can be seen as the predictors of the kind of work and leisure activities that people will enjoy and seek out and can also help to identify the type of occupations that will create the most satisfaction and motivation for an individual. Interests are not simple, superficial variables; rather they are a significant source of useful information, as they are interwoven with an individual's abilities and characteristics. Many interest measuring devices exist, such as the Kuder Career Search (KCS; Zytowski, 1999), and the Strong Interest Inventory (SII; Harmon, Hansen, Borgen & Hammer, 1994), but Holland's (1997) theory and interest measures still dominate the field and are widely used in clinical practice.

Holland's interest typology

Holland's theory plays an important role in the concepts of career interests and career decision-making. It has inspired research since 1950 and continues to stimulate more research than any other career guidance concept (Arbona, 2000; Furnham, 2001; Savickas & Gottfredson, G. D., 1999; Whiston & Brecheisen, 2002). It is noticeable that career researchers prefer to use Holland's theory and related concepts and the most recent international reviews of career research confirm that of

all the person-environment theories, Holland's typology theory continues to receive the most research attention (Flores et. al., 2003; Inkson, Furbish, & Parker, 2002; Luzzo & MacGregor, 2001; Prideaux & Creed, 2002). In fact, the usefulness of Holland's theory and typology is so well accepted and respected that it has become the background for other career practice and research, rather than the topic of enquiry itself, and a significant proportion of researchers in the fields of higher education, counselling, and vocational behaviour have built on, incorporated or been influenced by Holland's ideas (Gottfredson, G. D., 1999).

Holland's theory states that individuals will select and be more content in a work environment that corresponds to their personality type. Holland developed various interest inventories based on his theory, such as the Self-Directed Search (Holland, Fritzsche, & Powell, 1994) which was originally developed in 1970. The Self-Directed Search measures interests, perceived abilities, attitudes and occupational daydreams and generates a three-letter coded profile of interests for an individual which reflects occupational types according to Holland's personality typology. In addition to instruments that measure interests, Holland also developed the Occupations Finder (Holland, 1985c) which provides an indication of the characteristics and interests of different careers and working environments. According to Holland, if an individual's Self-Directed Search generated interest code is matched to the code of their chosen occupational type in the Occupations Finder, they should experience more satisfaction, well-being and happiness in that particular occupation. Therefore, Holland's typological system enables the career counsellor and the client to integrate occupational information into the career counselling process, matching the client's interests to the characteristics of the work environment. The degree of match between an individual's interests and a compatible work environment is known as congruence. Theoretically, an increase in the degree of congruence leads to a corresponding increase in job satisfaction, performance and stability.

There is a significant lack of South African research in career psychology and career education (Stead & Watson, 1999). Additionally, because of the lack of career theories developed specifically for South Africa, most researchers in the field of career psychology have focused largely on the use of career theories and instruments that have been developed overseas, particularly in America, which raises questions about their appropriateness to the South African context. As

indicated by Stead and Watson, the South African environment has specific characteristics and career psychology in this country should reflect South Africa's "character and unique perspectives" (p. vii).

The Human Sciences Research Council adapted and standardized the 1985 version of the Self-Directed Search questionnaire for South African use, amending or replacing items that contained unacceptable discrimination values (Bischoff, 1987). In addition, a South African version of Holland's Dictionary of Occupational Codes, known as the South African Dictionary of Occupations was developed in 1987 (Taljaard & von Mollendorf, 1987). Even so, despite the fact that certain career paths continue to change and become more complex over time as a result of new developments in the world of work, South African research on Holland's theory has tended to focus on the interest types rather than the environmental and occupational types.

Purpose of the Study

The lack of research into the appropriateness of Holland's codes in terms of their representation of the occupational types in South Africa has been identified by the current researcher as a reason for concern. Of particular concern are the occupational codes that represent work environments that are characteristic of the South African context, such as field guiding, a career that has changed significantly over the past two decades.

Ecotourism and the field guiding industry constitute an increasingly significant proportion of South Africa's financial structure (Myburgh, 1999). The continuing growth of the ecotourism industry, where high staff turnover leads to unnecessary costs and unpredictable levels of expertise (Myburgh, 1999), relies to a great extent on the presence and professionalism of field guides. With the amount of training, experience and specialisation required for this particular career, it is important for field guides and their employers to achieve the highest possible standards of career satisfaction, stability and achievement.

This study explored the appropriateness of the existing SDS generated code as listed in the South African Dictionary of Occupations (Taljaard & von Mollendorf, 1987) for a particular career field, namely that of the field guide. Not only has the field guiding industry itself changed dramatically over the past ten years, but the

present prescribed code for field guides in South Africa, established in 1985, has not been revised (Taljaard & von Mollendorf, 1987).

Recommendations from this study will be useful to career counsellors and personnel departments specialising in ecotourism in facilitating the recruitment of field guides for the future of the industry. It is hoped that the present study will generate further research into the appropriateness of career theory and its associated measures in the South African context.

Structure of the Study

Chapter Two provides the theoretical background of Holland's theory with some emphasis on trait and factor theory, the original catalyst for Holland's person-environment fit model. The chapter describes the history, relevance and theoretical assumptions of Holland's theory. A review and analysis of Holland based research from 1985 to 2004, both internationally and in South Africa, with references to cross-national, cross-cultural, socio-economic and gender issues where relevant, is included in Chapter Three. The final section of this chapter focuses on research studies that have examined or evaluated the appropriateness and transportability of Holland's interest code typology.

Chapter Four describes the research problem, the specific aims of the study and the methodology used to investigate these aims. Chapter Five includes a presentation and discussion of the results within the context of Holland's theory and relates the findings to the research described in Chapter Three. The final chapter provides implications of the research results, the value of the research, limitations of the research, as well as suggestions for further research and the conclusion.

CHAPTER 2

JOHN HOLLAND'S THEORY

This chapter will explore the theoretical background from which Holland's theory sprung and the contribution made by Holland to the field of career psychology. Emphasis will be placed on the trait and factor theory, the original catalyst for Holland's person-environment fit model. The chapter commences with a look at the theoretical foundations from which his theory evolved. Subsequently, the discussion of Holland's theory begins with his six foundational principles, followed by a detailed exploration of the four theoretical assumptions. The first assumption, which deals with personality types, includes a discussion of the six personality types, details of how the types can be measured, and how Holland developed the codes for specific occupations. The second assumption concerning Holland's environmental models includes descriptions of the six environmental models and how these can be assessed. An explanation of the development of the classification system of occupational and environmental codes is also included at this point. The third and fourth assumptions i.e., people in environments and goodness of fit, have been combined to facilitate the logical flow of information. This section includes the rationale for the development of the hexagonal model and in-depth descriptions of Holland's secondary constructs. This is followed by a discussion and critique of the application of Holland's theory both nationally and internationally and an introduction to the third chapter.

Theoretical origins

There are various theories of career behaviour which consider issues involved in the process of career choice and career satisfaction. A major issue is that of career assessment in which there are considered to be three major domains: vocational interests, human abilities, and personality characteristics (Lowman, 1991). The theory of vocational interests is the most developed of these three major domains and is a cornerstone of career counselling and standardized testing. Vocational interests are used to predict the type of occupations that are most likely to ensure that an individual experiences ongoing career enthusiasm and job satisfaction.

Many sophisticated measures exist to measure vocational interests. However, John Holland's (1997) theory continues to dominate the measurement of vocational interests today. According to Lowman (1991), Holland's theory enjoys widespread clinical utilization, is conceptually elegant and is easy to comprehend. Holland's theory states that in order to make an informed career decision many factors have to be taken into account, such as the individual's unique characteristics, values, interests, skills, and personality. Career satisfaction contributes significantly to the general happiness, stability and well-being of adults. In order to experience career satisfaction, an individual has to first make a fitting or appropriate career choice. Individuals will select, and be more content in a work environment that corresponds to their personality type, attributes, decision making style, and career maturity.

Before examining Holland's foundational principles and assumptions, it is important to explore the theoretical foundations from which his theory evolved. Trait and factor theory was one of the first career theories to be described. Although there are several trait or type theories, they are similar in their intention to match the individual's traits or characteristics with the characteristics or job requirements of work environments. Trait and factory theory evolved from the pioneering views of Frank Parsons (Parsons, 1909). Parsons published his book called *Choosing a Vocation* during the time of America's emergence as an industrial nation, through his career counselling activities with adolescents and immigrants. According to Peterson and Gonzalez (2000), Parsons developed the concept of vocational choice, as opposed to job hunting. Parsons did not consider himself to be a theorist, but as being rather concerned with the practical need to "match" men and jobs (Sharf, 2006).

Other theorists and practitioners extended and developed Parsons' model. According to Schonegevel (1997), Williamson contributed to Parsons' theory and introduced his model into American colleges. He emphasised the importance of a step by step process of career counselling. Peterson and Gonzales (2000) state that, in 1939, Williamson described a six step career counselling process, consisting of: analysis, synthesis, diagnosis, prognosis, counselling, and follow-up. The first three steps are concerned with the synthesising of gathered clinical information in order to establish the strengths and weaknesses of the client.

In order to make the best career choice, individuals should have the following:

- (a) an understanding of themselves, which includes an understanding of their attitudes, abilities, interests, ambitions, resource limitations, and the causes of those limitations;
- (b) a knowledge of the requirements for and conditions of success in a field of work, including an understanding of the advantages and disadvantages, compensation, opportunities, and prospects in different work fields;
- (c) a clear understanding of how both of these relate or, in Parson's (1909) words, a "true reasoning on the relations of these two groups of facts" (p. 5).

According to Watson and Stead (1999) the trait-factor method of career choice advocated the use of three simple steps. The trait step consists of the development of a clear understanding of the characteristics of the individual who is making the career choice. The factor step involves the investigation of the characteristics of the chosen work environment. The third step requires the client and the counsellor's careful consideration of the two sets of characteristics in order to ensure the best possible 'goodness of fit' or match. In short, the better the match the more likely the individual is to adjust to, and thrive in, the chosen field of work. This information is the basis for further conclusions and decisions and helps the counsellor to identify the situations to which the client will be able to adjust successfully.

Whilst Williamson's methods were being developed in response to the employment problems created by the Great Depression, much progress was being made with the development of special aptitude tests, personality inventories, and other devices which expanded and elaborated on Parson's three steps. All of these developments became part of trait-factor theory (Peterson & Gonzales, 2000). During this time vocational guidance focused on the knowledge of occupations as being the most important factor in the choice of a career. Gradually, the need grew to identify characteristics of an individual that could be matched to a vocation, and the emphasis subsequently shifted from the study of occupations to the study of the individual.

Watson, Foxcroft, Horn, and Stead (1997) describe trait and factor theory as not only the oldest but also probably one of the most influential vocational guidance

theories. Sharf (2006) believes it to be “arguably the most widely used of all career development theories” (p. 61). By way of criticism Sharf notes that the trait and factor approach relies heavily on the use of inventories and tests to measure personality, aptitudes, values, interests and achievements. Furthermore, the theory is rather vague on the subject as to which measuring instruments should be used. Lowman (1991) adds that many of the assessment instruments used were not theoretically well-grounded. There was insufficient exploration into the reasons behind differences obtained during assessments and into the manner in which expressed preferences could be integrated according to theory. Factor analysts and vocational interest theorists worked independently of each other and, as a result, trait-factor theory was difficult to measure and the empirical data was hard to interpret. Additionally, counsellors who used the trait-factor approach were criticised for being too directive and forceful in their recommendations.

Over the years the simplicity of the trait-factor approach has been modified to consider other factors that are important in the career choice process. These include abilities, interests, personalities, values, past work and leisure experiences, and total lifestyles (Zunker & Osborn, 2002). In effect, trait-factor theory has provided a fertile background for the evolution of several more recent career theories (Watson & Stead, 1999).

In the late 1960's, Dawis and Lofquist introduced work adjustment theory which involves the specification of an individual's traits and factors, and matching them with the requirements and reinforcers of the working environment (Sharf, 2006). Dawis and Lofquist (1984) focused on the ability to predict adjustment to work environments. They believed that work adjustment and the length of time that an individual is prepared to spend on a specific job can be predicted by knowledge of that individual's abilities and values if the abilities required by the job and the patterns of that job's reinforcement are known. According to Watson and Stead (1999), the principles of work adjustment theory were challenged throughout the 1970s and 1980s which resulted in much revision and expansion of the original concepts. One revision led to the identification of individuals' different personality styles and to the identification of occupational reinforcers in the work environment. Additionally, the relationship between job satisfaction and work adjustment was seen to be significant (Dawis, 1992).

A further revision of work adjustment theory attempted to clarify the differences between personality structure, personality style and adjustment style. Still later, as work environments changed, Dawis (1992) realised that the individual's ability to adjust to various work settings was becoming more important. Individuals should be able to achieve balance and satisfaction by adjusting in a reactive manner by changing their work habits, or in a proactive manner by changing their work environment. As a result of this more holistic approach, the theory evolved into the person-environment-correspondence (PEC) theory. The major criticism of PEC theory is its foundation in learning theories which have come to be regarded as simplistic (Watson & Stead, 1999).

The trait-factor approach evolved over time into various person - environment (PE) fit models, also described as congruence models (Peterson & Gonzales, 2000). Although the early PE fit theories were simplistic, they did stress the importance of the environment in interaction with the individual. The congruence (PE fit) models are based on the assumptions that:

- a. people are capable of making rational decisions which indicate the appropriateness of cognitive interventions,
- b. people and work environments differ across various situations, thus identifying patterns could be helpful in organising people and environments, and
- c. the greater the congruence between personal traits and job requirements, the greater the possibility of achieving job satisfaction.

One of the major career theories to evolve from trait-factor and PE fit theory is that of the theorist, empiricist and psychologist, John L Holland. As Holland's theory is central to the present study, the following section will include a detailed discussion of Holland's foundational principles, theoretical assumptions, typology and constructs.

Holland's theory

John Holland's original theoretical position was closely linked to trait-factor theory. Over the years, in keeping with new empirical findings on vocational interests and in reaction to the perceived limitations of trait-factor theory, Holland adapted and

developed his theory so that it has come to more closely reflect the Person - Environment (PE) Fit approach (Peterson & Gonzales, 2000). One of the major criticisms of early person-environment fit theories was that they failed to emphasize the dynamic interplay between the individual and the work environment. In reaction to this criticism Holland reconstructed the approaches that had gone before into a particular person and environment fit theory, which is considered to be flexible, dynamic and effective as a counselling model. In the most recent edition of Holland's Theory of Vocational Personalities and Work Environments (Holland, 1997), Holland summarizes his revisions and clarifications as those that serve to increase the explanatory power of the typology, and improve the definitions of consistency and the formulations for the types and environmental models.

Holland developed his typology and environmental models from a number of principles that "seemed plausible, or at least hard to imagine as false" (Holland, 1997, p.7). In order to gain a deeper understanding of Holland's theory, it is important to outline these six principles, which form the foundation on which his theory rests and from which the main body of his theory was developed. The six foundational principles can be described as follows:

1. The careers individuals choose can be seen as an expression of their personalities. Holland maintained that personality and career choice are linked, and that knowledge of an individual's career leads to an understanding of the individual's personality. According to Holland et al. (1994), the choice of an occupation is an expressive act which reflects the person's motivation, knowledge, personality and ability. Furthermore, individuals working in a particular career field will usually have similar personalities, causing them to react to the situations and challenges of their career in similar ways. This leads to the establishment of a career field characterised by those personality types.
2. Interest questionnaires are inventories of personality. According to Watson and Stead (1999), this inference follows logically from the first principle and has been confirmed through the validation of the scores of personality inventories. Holland (1997) states that it is useful to interpret vocational interest inventories and personality inventories and that the reliability and validity of the scales provided by the content of vocational interest

inventories approximates that of those obtained for other personality measures.

3. Vocational stereotypes have reliable and important psychological and sociological meanings. Holland (1997) explains that popular perceptions of what people in various careers are like may be inaccurate, but nevertheless they are useful, stable and have some validity. The average person's choice of vocation is largely based on these perceptions and they would have difficulty deciding on a job without them.
4. It is reasonably safe to assume that members of the same vocation should have similar personalities and histories of personal development. People with similar personality types will be attracted to similar types of careers and will form groups with others similar to themselves. Holland cites the following research as supporting this assumption: Chaney and Owens (1964), Eberhardt and Muchinsky (1982), Kuhlberg and Owens (1960), Laurent (1951), Nachmann (1960), and Roe (1956).
5. If there are similar personalities in a particular career group, we could expect the responses of those group members to problems and situations to be similar. In other words, personalities that have common characteristics should logically create environments that mirror those characteristics.
6. If the first five principles are accepted then it follows that vocational satisfaction, achievement and stability are related to the level of congruence between an individual's vocational interests and the interests required in the chosen occupational environment (Holland, 1985b, 1992, 1997). Holland (1997) states that "just as we are more comfortable among friends whose tastes, talents and values are similar to our own, so we are more likely to perform well at a vocation in which we 'fit' psychologically" (p. 11). This principle is an important part of the underlying structure of vocational interest inventories. According to Holland's theory, a congruent or fitting environment includes individuals' preferred activities, requires their special competencies and reinforces their particular worldview, values and personal traits.

As stated previously, the abovementioned foundational principles gave rise to the typological and environmental models which are introduced below as the four primary statements that form the core of Holland's theory.

Assumptions

Holland created four primary assumption statements to further explain the concepts of personality, environment, the interaction between personality and environment, and the behaviour which results from this interaction. For the purposes of this study, the last two assumptions i.e., people in environments and goodness of fit have been combined into a single section. The assumptions are discussed in detail below, starting with Holland's personality types.

Personality types

Holland described six personality types as theoretical models against which real people can be examined; i.e. Realistic, Investigative, Artistic, Social, Enterprising and Conventional Holland explains that individuals develop a certain personality type due to a number of factors (Holland 1985b, 1992, 1997).

The primary influence is the personality types of the parents. For example, Artistic parents will naturally be inclined to engage in creative activities and surround themselves with Artistic friends. They are likely to avoid social activities, people and situations that do not match their personalities and interests, whilst simultaneously creating a creative home environment and providing a range of artistic environmental experiences.

Holland (1997) also stresses the influence of "a particular biological endowment of physical and psychological potentials" (p. 17). Children who inherit artistic potential from their creative parents will therefore experience positive reinforcement, not only from enthusiastic and approving parents, but also from the high success rate and personal satisfaction with their early artistic expressions.

Thus, the individual develops preferences and aversions for certain activities, depending on the level of personal satisfaction and reward which those activities provide. The preferences evolve into well defined interests, preferred activities, and specialized competencies which, in combination with the individual's value system, make up a specific characteristic disposition or personality type. Different personality types are predisposed to develop traits, attitudes and behaviours,

enabling them to form characteristic skills and coping mechanisms which include self-concepts, perceptions of the environment, beliefs and values, achievement and performance, differential reaction to the environment, preferences for occupations and occupational roles, coping styles, personal traits and a repertoire of skills resulting from all of the above (Holland, 1997).

Although Holland recognizes that this is a simplified explanation of personality development, he believes that it is sufficient for the purposes of his theory. Holland (1997) briefly justifies the use of six personality types by stating that they represent six common clusters of personality or behavioural repertoires that occur in society and are assumed to “represent common outcomes of growing up in a particular culture” (p. 21). Most individuals can be matched to combinations of the six model personality types which will be described in more detail below. These descriptions will be followed by a discussion of the means by which the types can be assessed.

Realistic types (R) prefer realistic occupations or situations requiring manual activities and the manipulation of machinery, tools or animals (Holland, 1997). They usually avoid the types of activities demanded by Social occupations or situations and they may have a narrow range of interests. Lowman (1991) describes Realistic individuals as lacking in social skills or as asocial, in that they have difficulty coping with interpersonally demanding situations, preferring to work with other realistic individuals or on their own. They are usually physically robust, enjoy outdoor activities and prefer straightforward, measurable phenomena to abstract and descriptive ideas (Schonegevel, 1997). They tend to approach difficulties in a systematic, problem-solving manner, and to value common sense, ambition, self-control, concrete possessions and tangible personal characteristics.

Investigative types (I) prefer occupations or situations that call for the observational, symbolic, systematic and creative investigation of physical, biological and cultural phenomena in order to understand and control such phenomena (Holland, 1997). They can be described as preferring to use complex and abstract thought in order to solve problems as they have high abstract intelligence. These types are also often indifferent to social relationships, may be perceived as unfriendly and are uncomfortable in emotional situations. They are usually analytical, methodical, inquisitive and precise but often lack leadership and persuasive abilities. Holland (1997) states that they may choose to avoid the activities demanded by Enterprising occupations or situations. The Investigative

type values independence, intellect, logic, ambition and, unlike the Realistic type, is open to new ideas and has a wide range of interests.

Artistic types (A) are creative, preferring to express themselves with ideas and materials. They enjoy free, ambiguous, unsystematic activities and work best in an aesthetically pleasing environment, responding positively to recognition, status and increased creative license. They are often sensitive and emotional, flouting custom and conventional, normatively expected behaviour. According to Holland (1997), Artistic types can be impractical and lacking in structured, clerical and administrative skills and, therefore, they will tend to avoid the activities demanded by Conventional occupations. They value self-expression, equality, imagination, courage, and they are open to new ideas and to the feelings and ideas of others.

Social types (S) typically enjoy working with, nurturing and helping others with their verbal, interpersonal and educational skills (Lowman, 1991). Their behavioural tendencies lead to the acquisition of human relations skills. Social people value social and ethical activities and enjoy helping people to solve problems through discussion and teamwork. They like to inform, train, develop, cure or enlighten others (Watson & Stead, 1999). They avoid working with machines and other activities demanded by realistic occupations and situations (Peterson & Gonzales, 2000) and they have an aversion to explicit, ordered, systematic activities (Holland, 1997).

Enterprising types (E) also enjoy working with others, but in a more organisational or persuasive capacity rather than a helping capacity (Schonegevel, 1997). They prefer activities that require the manipulation of others to obtain organizational or economic goals (Holland, 1997). They appear to be interpersonally distant as a result of their prioritisation of power and control. Emotional intimacy and introspection may only be expressed amongst those that are perceived to be of equal power. Task oriented, assertive, outgoing, ambitious and often domineering, they typically avoid routine, and observational or symbolic tasks. The acquisition of wealth and status is usually important.

Conventional types (C) function well in well-established settings where attention to detail is important. Holland (1997) explains that they prefer activities that entail explicit, ordered, systematic manipulation of data. They are comfortable in settings where they are not subjected to creative or entrepreneurial demands, preferring to address problems in conventional, tried and tested ways. They value

business and economic achievement and see themselves as conforming, orderly, conscientious, efficient, obedient and practical (Lowman, 1991).

According to Holland (1997), a person's personality type can be assessed either by qualitative or quantitative methods. Qualitative information about an individual's personality type can be gained by noting and observing their preferences and choices with regard to school subjects, tertiary education and employment. For example, an individual who volunteers to do a first aid course whilst still at school and pursues a dream of becoming a social worker could be classified as a Social type.

Quantitative methods to assess an individual's resemblance to the personality types include the Realistic, Investigative, Artistic, Social, Enterprising and Conventional scales of the Vocational Preference Inventory or VPI (Holland, 1985d) and a career guidance device derived directly from Holland's theory and the correlates of the VPI, known as the Self-Directed Search (SDS; Holland et al., 1994). Holland (1997) states that the construct of "type" can only be measured by fallible (i.e., unreliable and partially valid) measures and therefore it is advisable to use both qualitative and quantitative methods and whatever information is available to us, such as occupational history data, interest inventory and vocational aspiration information.

Holland realized that individuals cannot be oversimplified by dividing them strictly into only one of the six categories. Each person is likely to match one type to some degree, but also to display characteristics of the other personality types to a lesser extent (Stead & Watson, 1999). Holland describes people therefore by using the three highest or most dominant personality types that emerge during the assessment of an individual. Holland's interest measure, the Self-Directed Search (SDS), generates a three-letter code which can be matched to occupational environments with identical or similar codes. The theoretical ideal is to match an individual's three-letter code to a corresponding three-letter code for a specific work environment.

Holland believed that human behaviour is determined not only by personality, but also by an individual's living and working environment. This brings us to the second assumption of Holland's theory, the environmental model.

Environmental models

Holland (1997) states that information on the different personality types must be supplemented by environmental information. He therefore proposed six different model working environments which correspond to the personality types in that they are situations created by individuals who dominate those environments. The six model working environment types have been described below and these descriptions will be followed by a brief discussion of the means by which environmental types can be assessed.

Realistic environments (R) are usually physically and technically demanding and traditionally characterised as involving masculine tasks (Sharf, 2006). Holland (1997) summarises the Realistic environment as one which requires the utilization of machines and tools, fosters technical competency, and reinforces traditional values and an appreciation of goods, money, power and possessions. Such environments require individuals to view the world practically and often involve working out of doors. The average educational and prestige level of such environments is lower than for the other five occupational types (Gottfredson, L. S., 1980). The 1996 version of The Occupations Finder (Holland, 1997, pp. 267-271) lists 315 realistic occupations, with only 13 percent of these requiring college training or an advanced degree. Typical occupations for realistic types include defence force personnel, artisans, heavy machinery operators, foresters, and wildlife managers (Watson, 1997).

Investigative environments (I) encourage scientific competencies and achievements and involve the observation and investigation of physical, biological or cultural phenomena (Holland, 1997). Such environments require employees who are capable of cautious, critical thought and who are able to use their own discretion, displaying independent thinking and actions. Unlike realistic environments, investigative work environments have high average levels of education and job prestige (Gottfredson, L. S., 1980). The Occupations Finder (Holland, 1997) includes 215 Investigative occupations, of which 93 percent require college training or an advanced degree. Occupations for investigative types include most of the scientific professions, medicine and engineering occupations requiring specialised skills (Watson, et al., 1997). Lowman (1991) points out that modern hospitals are heavily populated by investigative types, such as physicians and researchers.

Artistic environments (A) require the ability to work with ambiguous, unsystematic material and encourage the display of creativity, the ability to approach the world in flexible, unconventional ways and to make intuitive, feelings-based decisions. These environments also require competency in the creation of art forms or products and encourage people to view themselves as expressive, original, intuitive, nonconforming and independent (Holland, 1997). Typical occupations include musicians, actors, designers, journalists, architects, and commercial artists. Gottfredson, L. S., (1980) reported that the educational level of artistic types was the second highest of the six types. This is confirmed by The Occupations Finder (Holland, 1997), in which 65% of the listed Artistic occupations require college or advanced degree training.

Social environments (S) provide opportunities for people to inform, train, develop, cure or enlighten others and emphasise human values such as idealism, kindness, friendship and generosity (Holland, 1997). These values are usually found in the education, social service, and mental health professions and typical occupations include various types of teachers, counsellors, psychologists and therapists (Sharf, 2006). Social environments foster and reward social competence and the ability to be understanding, cooperative, flexible and socially responsible (Schonegevel, 1997). Lowman (1991) reported that the average intellectual levels of social types are not amongst the highest of the six types. However, 64% of the Social occupations listed in The Occupations Finder (Holland, 1997) require college or more advanced training.

Enterprising environments (E) reward and foster qualities such as self-confidence, popularity, leadership skills and the ability to manipulate others in order to obtain personal or organisational gain. Holland (1997) states that in such an environment people are more likely to be open to new ideas and beliefs and enjoy a wider range of interests than Realistic or Conventional types. Typical occupations include sales, marketing, industrial relations, managerial positions and business executives (Watson, 1997). According to Gottfredson, L. S., (1980) and The Occupations Finder (Holland, 1997), the enterprising group ranked fourth in average educational levels.

The *Conventional environment* (C) involves organisation and planning, usually in an office setting where there is a need to keep records, file papers, copy materials and organise reports. The setting may also include bookkeeping and accounting

and the use of processing, calculating, and word processing machines. This environment reinforces conventional attitudes and values (Holland, 1997), and fosters and rewards clerical skills, organisational abilities, dependability, and an ability to follow directions (Sharf, 2006). In 1980 Gottfredson, L. S., found that the conventional group ranked only slightly ahead of the last-ranked realistic group in average educational level and attributed prestige. However, in The Occupations Finder (Holland, 1997), 12% of the listed Conventional occupations require college or degree training as opposed to 13% required by Realistic occupations.

Holland (1997) states that it is the people within the environment who create its psychologically important features and, therefore, the most convenient way of assessing an environment is to assess its population. The Environmental Assessment Technique (EAT; Astin & Holland, 1961) entails taking a census of the occupations, training and educational or vocational preferences of a population. This information is used to create a six-variable profile of that population. Gottfredson, G. D. and Holland developed classification systems known as the DHOC - Dictionary of Holland occupational codes (Gottfredson, G. D. & Holland, 1996) and the Position Classification Inventory (PCI; Gottfredson, G. D. & Holland, 1991) which are useful in the assessment of an occupational environment. The DHOC provides two- and three-letter occupational codes which can be matched to the personality code generated by the administration of the SDS (Self-Directed Search).

The use of a classification system is an integral part of Holland's theory because it facilitates the use of theory to interpret and predict the interaction between people and their environments (Holland, 1997). As it is the appropriateness of an individually assigned code in the classification system that is the subject of this study, some time needs to be spent exploring the manner in which the classification systems were developed.

Classification systems

From 1959 Holland has continued to improve and develop his classification system, with the most recent revision of the DHOC appearing in 1996 (Gottfredson, G. D. & Holland, 1996). The 1959 classification consisted of an a priori classification of six categories (Realistic, Intellectual, Artistic, Social, Enterprising and Conventional), which lacked clarity and the validation of direct testing. In 1966 the major categories, (Realistic, Intellectual, Artistic, Social, Enterprising and

Conventional), were defined in terms of the scales of the Vocational Preference Inventory, which have the same names (Holland, 1985d). The VPI was completed by 12,432 freshmen in 31 colleges who were planning to enter different professions. The VPI requires that the individual indicate whether they “like” or “dislike” each of 160 occupations which are assigned to a category; for example, “social worker” is assigned to the Social category. Each occupation was given a VPI profile by placing their category means in order from highest to lowest. This resulted in a classification of major categories and subcategories, e.g., the occupation of “civil engineer” was placed in major category Realistic (R) and in the Realistic-Intellectual-Enterprising subcategory (RIE).

In 1969 Holland added VPI data from 12,345 male and 7,968 college students in 65 different colleges, as well as data obtained from samples of employed adults. It was during this time that the major categories and subcategories were arranged to form the hexagonal model (see Figure 1 further on). Holland’s next goal was to extend the classification system to include all the common occupations in the United States of America. As it was not practically possible to administer the VPI to vast samples of employed adults in all occupational fields, data from other sources were adapted for inclusion into the six categories and subcategories. These sources included data gained from Campbell’s Strong Vocational Interest Blank (SVIB; Campbell, D. P. & Holland, 1972) and the Purdue data gained from the Position Analysis Questionnaire developed by McCormick, Jeanneret, and Mecham (1972). The SVIB, Purdue and VPI data was integrated in order to arrive at a single profile using various procedures: counting how often a VPI code occurred in first, second or third place in specific profiles from a variety of sources; subjectively weighting and comparing the validity and reliability of data sources; and evaluating any divergent profiles (Holland, 1997).

Code additions and changes were made on an ongoing basis as new SDS or VPI data became available. This information was available in two versions: The Occupations Finder of the Self-Directed Search (Holland, 1985c) and the Dictionary of Holland Occupational Codes (DHOC). In 1989 the DHOC was extended to include 12,860 occupations. The latest revision of the DHOC (Gottfredson, G. D. and Holland, 1996) is a “comprehensive and studied classification” (Holland, 1997 p. 184) which includes new occupations, a translation of the DOT occupational codes into Holland codes, the evaluation of new coding formulas, and the integration of

new codes with the old occupational codes. The personality types and model environments outlined above have been summarised in Table 1 below.

Table 1: **Holland's Typological Model**

Types	Personalities	Environments
Realistic	Enjoy working with machinery, tools or animals. Approach problems in systematic manner. Usually prefer working outdoors and dealing with concrete, measurable phenomena.	Require technical skills and can be physically demanding, often based outdoors. Require a practical and concrete approach to the challenges and problems of the work environment.
Investigative	Analytical, curious, methodical and precise. Values the use of complex/abstract thought to solve problems and to investigate phenomena.	Requires the ability to view the world in original, abstract, complex and independent ways. Values the use of intellect, individual thought and work.
Artistic	Interested and skilled in artistic, creative and expressive activities using words, movement, sound, colour and form. Imaginative, non-conforming, original and introspective.	Requires use of artistic skills and use of unconventional, flexible, original ideas. Characterised by free, ambiguous activities and the need to solve problems with individual and intuitive thought.
Social	Friendly, understanding, helpful, sociable, enthusiastic, curious, competent and trusting. Like to work with people as an instructor, teacher, trainer, counsellor or caregiver.	Requires social values, social competence and the ability to work in training, developing, caring, and informing environments. Provides services which are required by the public.
Enterprising	Also enjoy working with people but usually in a leadership, organisational, managerial and persuasive capacity. Optimistic and ambitious, confident, dominant and status seeking.	Requires the ability to use aggressive social and leadership skills to reach the goals of the organisation. Risk taking may be necessary and requires energy and resourcefulness.
Conventional	Interested and skilled in activities that require attention to detail, accuracy, clerical skills, numerical and verbal data organisation. Usually content, conforming, methodical, neat and practical.	Requires the ability to work in an ordered, systematic environment. Manipulating of data, filing, organising. Values order, organisation, task effectiveness and dependency.

Source: Holland (1997).

The personality types and model environments are the tools to describe and understand what happens when a particular personality type works in a particular type of environment (Holland, 1997). This concept constitutes Holland's third assumption and will be discussed in combination with the fourth assumption under the following heading.

People in Environments and Goodness of Fit.

People search for and are drawn to the environments that allow them to express their personalities, interests and values, and to utilise their skills to face the challenges presented by that environment.

A cursory glance at Holland's assumptions could lead to the conclusion that his theory is nothing more than a Person-environment (PxE) theory, but it is at this point that Holland departs from and expands his original theory by introducing five secondary constructs for describing and characterizing the interaction between the person and the environment (Peterson & Gonzales, 2000). In the 1985 revision of his theoretical model, Holland included the term *calculus* as a secondary construct which refers to the relationship within and between types or environments, which can be ordered according to the hexagonal model where the "distances between the types or environments are inversely proportional to the theoretical relationships between them" (Holland 1985, p. 52). The 1997 revision does not list calculus as a secondary construct, but it does include congruence, consistency, differentiation, identity and level of education. According to Holland (1997), the secondary constructs are vital when applying the theory to practical situations.

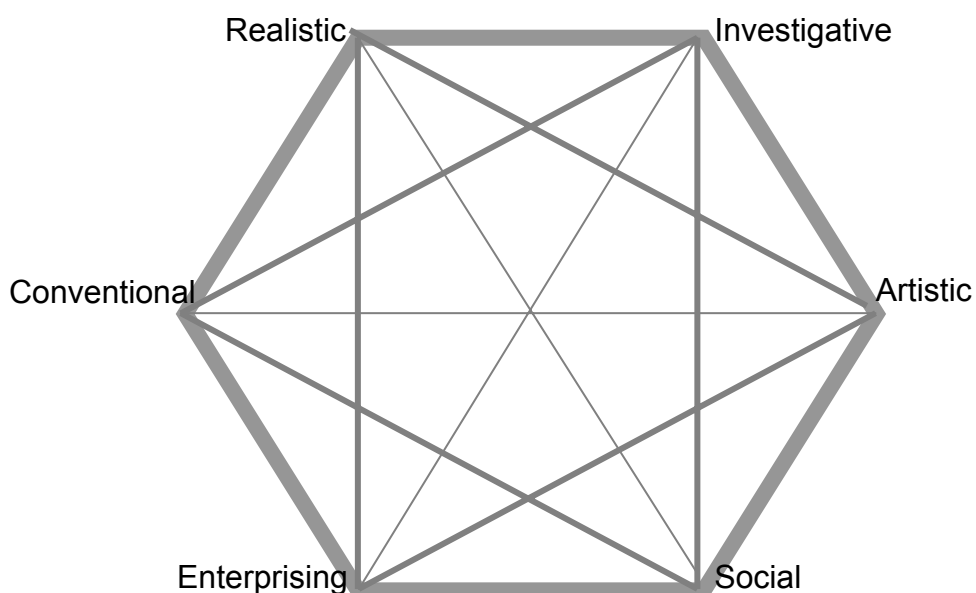
Holland underlines his concern with developing a theory that is "elegant and symmetrical" and states that his "personal preference for symmetry" led to the discovery of the hexagonal model (Holland, 1997 p. 7). The hexagonal model is a visual representation of his theory, and is used to explain the relationship of the six personality and environmental types to each other in terms of the secondary constructs. Therefore an explanation of the hexagonal model should precede the discussion of the secondary constructs.

The six personality types are arranged in the hexagon, which is known as Holland's Hexagonal Model (see Figure 1). The main categories are arranged around the hexagon clockwise and in the following order – Realistic, Investigative, Artistic, Social, Enterprising, and Conventional – so that close relationships are

represented by short distances on the hexagon. For example, the order from most to least alike within the Social category would be SE, SC, SR. Peterson and Gonzales (2000) explain that personality types and work environments that are adjacent to each other on the hexagon are presumed to be most like each other. Types and environments opposite each other on the hexagon are presumed to be the least like each other. This can be visually represented by the model in Figure 1 below. The same arrangement principle can be applied to the subcategories by arranging them so that their second and third code letters appear in order in a clockwise direction, starting from the major category's first code. For example, the order from most to least alike within the Social-Enterprising subcategory would be SEC, SER, SEI, and SEA. The secondary constructs are explained below.

Congruence as defined by the hexagonal model refers to the relationship of the personality to the environment, i.e., the degree to which a person and their working environment lie on, or close to, the same point of the hexagon.

Figure 1. Holland's Hexagonal Model



Source: (Holland, 1997)

For example, social types will experience greater job satisfaction in a social environment. Different types require different environments and congruence

indicates the degree of correspondence between a personality type and an occupational environment. This correspondence can be ascertained once an individual has completed a career measure such as the Self-Directed Search (SDS) questionnaire and obtained a three-letter SDS code which can be compared to a three-letter occupational code. Holland's established codes for occupations are listed in The Occupations Finder (Holland, 1985c). The South African version of these codes can be found in The South African Dictionary of Occupations (Taljaard & von Mollendorf, 1987). According to Gevers et al (1995), the ideal combination occurs when a particular personality type is involved in a directly corresponding occupation. This offers the best opportunity for self-actualization. Congruence decreases as the correspondence between the three-letter code of the person and the three-letter code of the environment decreases.

The ideal degree of congruence is the situation in which a personality type is employed in a completely matching environment, for example, a Social type in a Social environment. The next best degree of congruence would be when a personality type works in an environment that is adjacent to their type on the hexagon, for example, an Artistic type in an Investigative environment. A Social person in an Investigative environment would be an example of a third and lesser degree of congruence. The least degree of congruence would be between a person and a work environment that appear at opposite points of the hexagon, for example a Conventional personality type in an Artistic work environment. Congruence, according to Holland, is an important factor in vocational satisfaction, stability and achievement. Using the hexagon it is possible to obtain four levels of congruence for each of the six personality types. More complex levels of congruence can be obtained if two- or three-letter personality and environment codes are used. The definitions of the personality and environment types mentioned in the previous two assumptions and knowledge of congruency levels are valuable tools in career counselling and decision making.

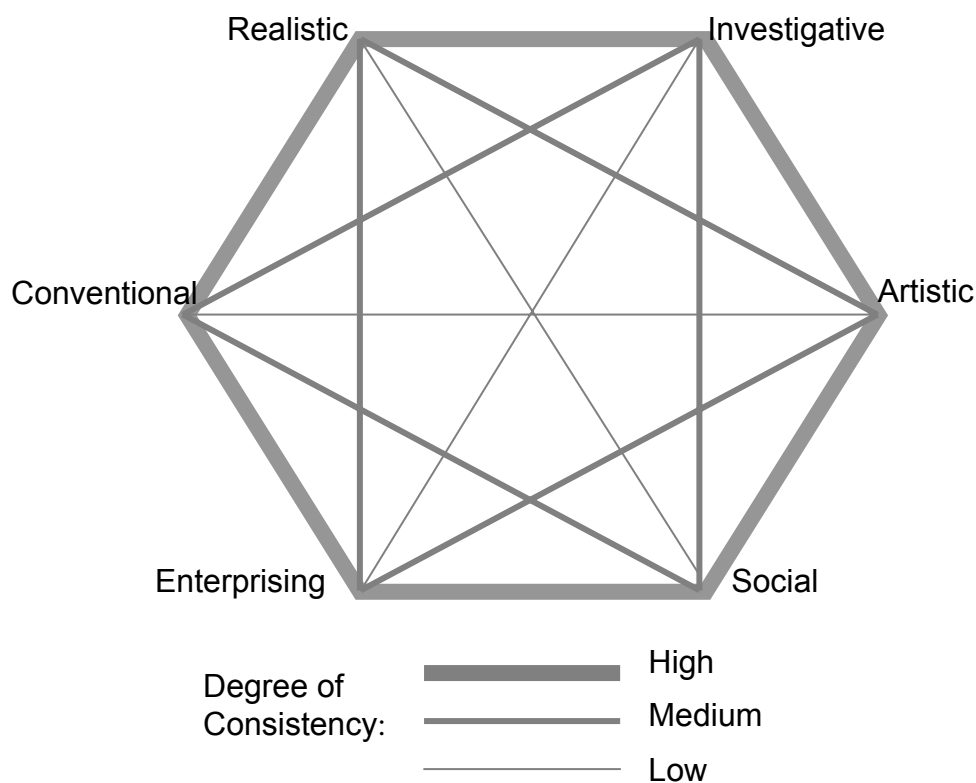
Consistency is the degree of relatedness between the letters on two- or three-letter personality or environmental codes. In other words, consistency refers to the degree of internal agreement (how close the letters are to each other on the hexagon) between a person's most highly endorsed scores on instruments such as the Self-Directed Search (SDS). Watson and Stead (1999) explain that some types or environments share more common ground than others (See Figure 2). For

example, an artistic type such as a musician will be more investigative and social (i.e., the adjacent types on the hexagon) than conventional (the opposite type on the hexagon).

The implication of Holland's construct of consistency is that the more consistent an individual's profile, the more predictable their career choice will be. Therefore, it should be easier to predict the career choice of an individual with an SAE profile code (Social, Artistic and Enterprising) where the first two letters of the code are adjacent, than the career choice of an individual with an SRI profile (Social, Realistic and Investigative) where the first two letters of the code are at opposite ends of the hexagon.

According to Holland (1997), there are three levels of consistency. *High consistency* occurs when types are adjacent on the hexagon and thus have more in common. *Medium consistency* is when two non-adjacent types on the hexagon are separated by a third type and thus have less in common. *Low consistency* occurs when types on the hexagon are opposite and thus have the least in common.

Figure 2. Holland's Hexagonal Model: Consistency

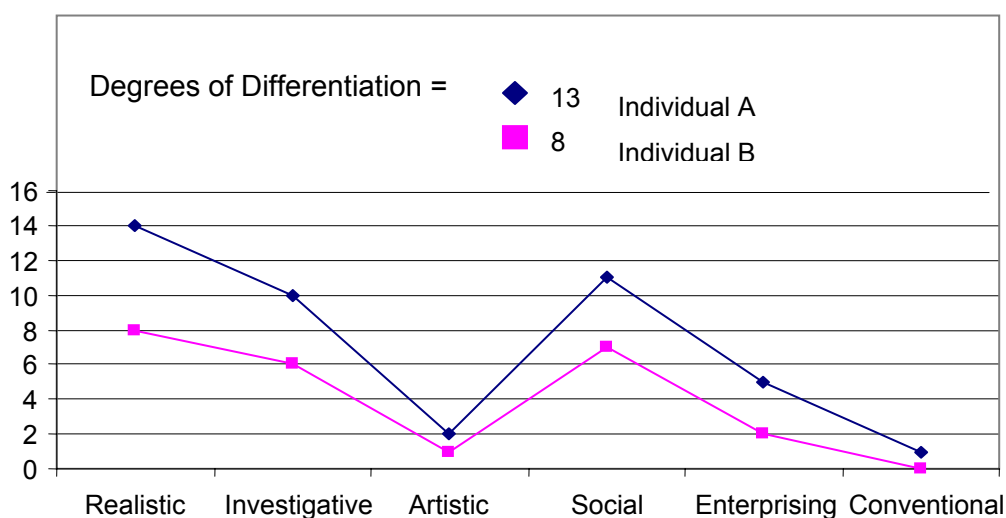


Source: Holland (1997).

Differentiation relates to the degree to which a person or environment resembles a certain type closely, but does not resemble other types, i.e., the degree to which a person or an environment is well defined. Sharf (2006) states that people and environments may differ in terms of how clearly they belong to one, two or three of the six possible types. Some individuals will fit predominantly into one Holland type and this will indicate a high level of differentiation. Other people may be more undifferentiated and have some skills and interests across two or more types. In practice it appears that most people exhibit up to three more dominant types.

Holland (1997) defines differentiation as “the magnitude of the difference between highest and lowest scores on the six variables used to determine a person’s or an environment’s degree of resemblance to a personality type or an environmental model” (p. 57). The degree of differentiation is determined by subtracting the lowest score of any type from the highest score of any type elicited by a measure such as the Self-Directed Search. A high number indicates that the individual’s profile is well differentiated and if represented graphically would show a profile with high peaks and low valleys. A low number indicates that an individual is undifferentiated and the profile would appear relatively flat. This is best illustrated in Figure 3 which portrays two different individuals.

Figure 3: Different Degrees of Differentiation.



Source: (Holland, 1997).

Even though their personality profiles are identical, i.e., RSIEAC, the difference between Individual A's highest and lowest score is 13, whilst the difference between Individual B's highest and lowest score is only 8. This indicates that Individual A's profile is more highly differentiated than Individual B's. Both environments and people vary in terms of their differentiation. A differentiated environment will allow the individual to do only one type of work, such as teaching according to a strictly followed syllabus. This would suit a highly differentiated individual with a high Social score. An undifferentiated teaching environment which allowed for some creativity and individuality in teaching a syllabus would be more pleasing to a teacher with an undifferentiated profile with both a high Social and a high Artistic score. Widely undifferentiated individuals may be multi-talented across many spheres but they will have difficulty in making career decisions and are likely to seek the assistance of a career counsellor.

The concept of *identity* can be described as an estimation of the clarity and stability of a person's or environment's identity. Holland (1985) defines one's identity as "the possession of a clear and stable picture of one's goals, interests and talents" (p. 5). Work environments also have identity if their goals, tasks, requirements and rewards are clearly defined. It is easier to predict the manner in which a person with a well defined sense of identity will interact with an environment that has a limited number of behaviour situations than it is to predict the interaction of a person and an environment with unclear or diffuse identities.

In the 1997 revision of his theoretical model, Holland briefly mentions the importance of taking into account the congruence between an individual's *level of education* and the average level of education in their working environment. A discrepancy between these two levels can lead to job dissatisfaction, either because the individual feels inadequate and under-qualified or frustrated due to being overqualified (Holland, 1997).

Other important factors to consider

The successful application of the simple idea that personality types flourish in a congruent environment must be qualified by additional information with regard to the environment itself and the position held by the person in that environment (Holland, 1997). A large working environment will not be completely homogenous in character, therefore it is important to assess the sub-environment most relevant and influential to an individual. It is also necessary to take into account the individual's

unique perception of their environment, the difference between the influence of the structural elements of the environment (e.g. rules and regulations) and the influence of the personal relationships, the balance of personal power within the environment and the size and complexity of the environment. Holland admits that there is no simple way to resolve these theoretical complexities. However, in the 1985 edition of his theoretical work, Holland supplemented the definition of a particular environment with concepts from work on behaviour settings, manning theory and occupations.

Critique and application

Not only has Holland provided a heuristic theory, he has also generated publications, measures and instruments. Holland's resume includes over forty years of experience in the vocational field, numerous awards and the generation of, and contribution to, over 200 publications. He has published six books, over 136 articles, 11 chapters, and 13 test manuals. The instruments developed by Holland and his colleagues, including The Self-Directed Search, are popularly used by career counsellors world-wide (Schonegevel, 1997). Gottfredson, G. D., (1999) adds that Holland's method of describing occupations based on psychological attributes remains "rather stable and needs only minor revision as the world of work changes" (p. 33), which is why Holland's occupational taxonomy is still used extensively by many career information delivery systems, including the American Department of Defence's ASVAB Career Exploration System and the Department of Labour's O*NET system (Savickas & Gottfredson, G. D, 1999).

Holland's theory remains highly regarded today and the model serves a useful purpose in the field of career psychology. Watson and Stead (1999) state that "Holland's (1997) theory is one of the most influential and respected models in career psychology" (p. 62). His theory is well researched, and refinements and improvements are continually made. Peterson and Gonzales (1999) state that every time any revisions are made, nine empirical studies are conducted to further test aspects of Holland's theoretical hypothesis. According to Reardon and Lentz (1999), Holland's theory has brought "structure, organisation, and simplification to interest measurement" (p. 105).

Gottfredson, L. S. and Richards (1999) state that the major advantage of Holland's theory is that it provides a parallel way of describing people and environments. The development of techniques for assessing and classifying different

vocational environments, principally educational settings and occupations, is one of Holland's major contributions during the past four decades. Additionally, these assessment and classification techniques have allowed Holland and his associates to examine the appropriateness of his environmental formulations.

Campbell, D. P. and Borgen (1999) state that Holland's impact on vocational psychology in the past 30 years is unsurpassed. His hexagon has become an icon and is a useful way of simplifying and interpreting complex occupational contexts. His theory is rich with researchable propositions and his assessment tools are useful and appropriate in the counselling context. Rayman and Atanasoff (1999) credit the success of Holland's theory-based interventions such as the SDS with the fact that it is based in theory and designed as a treatment tool as well as an assessment tool. In addition it is democratic, self-scoring, inexpensive, has scales that are transparent, and results in measurable effects. Reardon and Lenz (1999) state that Holland's RIASEC theory and the SDS have enjoyed considerable success "in pioneering a theory that has proven so useful in career assessment" (p. 112), Borgen (1991) is even more effusive in praise of Holland, stating that "the widespread use of his inventories is huge" (p. 276).

According to Holland (1997) his theory has "implications for organising information; explaining common career, educational and industrial problems; facilitating career development; and remedying career problems" (p. 217). Vocational assistance can be rendered by the application of the theory, classification system, and assessment devices discussed throughout this chapter. The theory provides the tools for explaining and interpreting vocational data and behaviour and for career intervention when vocational development is compromised or problematic. Maladaptive career development would, according to Holland's theory, be caused by an unclear sense of vocational identity or through an incongruent relationship between a personality type and an environmental model.

Holland's theory and diagnostic and treatment ideas can also be applied to all levels of education. Vocational aspirations and SDS profiles are useful for organizing a school's counselling resources, to facilitate subject choices and early identification of potential career difficulties, for example, difficulty in choosing a career path due to undifferentiated interests. The classification system may be extremely beneficial in business and industry situations. High staff turnover and

dissatisfaction can be addressed by matching staff interest profiles with congruent sub-environments, colleagues, supervisors and employees.

Holland's theory, typology and tools also lend themselves to applied and basic research in the social sciences and have been used extensively for research in the United States of America and internationally with diverse cultural populations. The following few examples serve to illustrate the range and diversity of research that has been conducted using Holland's theory. Chapter three of this treatise will include a more expansive exploration of this research.

Dockins (2004) examined person-environment congruence, job stability and job satisfaction in the nursing profession and found RIASEC codes which matched Holland's Dictionary of Occupations' Social-Investigative-Artistic code for nurses. Aranya, Barak and Amernic (1981) tested Holland's theory in a population of accountants in Toronto, finding positive correlations to their American sample. Einarsdottir et al (2002) found support for the validity of Holland's model in Iceland and came to the conclusion that the structure of vocational interests in samples of Icelandic career counselling clients and students is similar to the structure found in American populations. Eindarsdottir et al. (2002) suggest that the fit of Holland's theory in Iceland supports the contention that Holland's personality types may be applicable to other cultures, showing that Holland's theory has some cultural validity. Various studies, which have made extensive use of Holland's theory and the Self-Directed Search in particular, have been conducted in Israel (Gati et al, 1996; Gati & Blumberg, 1991). Their research found that the assessment of person-environment fit can be improved by relying on a wider range of aspects rather than on vocational interests alone. Research has also shown that the concept of Holland's hexagon seems to fit many different groups but that information about Holland's typological system for specific cultural groups is "neither sufficient nor consistent enough to allow generalisations about it's usefulness for specific groups" (Sharf, 2006 p. 114).

More recent cross-cultural research testing Holland's theory has taken place in countries such as South Africa. According to Watson, Stead and Schonegevel (1998), Holland's typology did not provide a good fit with the interests of disadvantaged black South African adolescents. Watson and Stead (1999) draw attention to the importance of questioning if Holland's theory is equally applicable to people of both sexes, or of different ages or different cultural backgrounds. They question the applicability of the SDS codes to the South African context. Citing

studies by Van der Merwe, Le Roux, Meyer and Van Niekerk (1990), Watson and Stead (1999) point out that South African codes corresponded 100% with American occupational codes only if one letter (regardless of position) of the empirically determined South African code was compared to the American codes. Taljaard and von Mollendorf (1987) compiled a South African version of the occupational codes, titled *The South African Dictionary of Occupations*. This dictionary is unfortunately outdated and does not include many new job titles that have developed. Nel (1999) states that according to South African experts American-assigned occupational codes are not always applicable to South African careers and need to be revised and updated.

As can be seen from the above examples there are many positive reactions to and possible applications for Holland's theory. However, some of his constructs have been questioned. Schwartz (1992) states that clear evidence does not exist to link congruence to career achievement and job stability and that occasional positive associations between congruence and job satisfaction may be a result of a common, yet often uninvestigated association between role-choice clarity and both congruence and satisfaction. As a result, Schwartz (1992) questions whether Holland's model is "worthy of so much attention or should vocational psychology move on?" (p. 179).

Stead and Watson (1999) question whether Holland's theory is applicable to both genders or to people from different cultural backgrounds. Holland's model and the SDS have been criticised as being gender biased and they note that the validity for career based predictions tends to be higher for men than for women. According to Sharf (2006) there are times when Holland's theory is not particularly helpful. For example, in the Occupations Finder (Holland, 1985c) there are 53 possible occupations listed matching the RIE code. Holland does not provide the additional information necessary to enable a client to choose fewer options from this large group. Sharf (2006) urges counsellors to remember that helping a client to find a code is not the ultimate point of career counselling. It should rather be viewed as one of many important factors. It may provide a useful starting point for discussions about talents, interests and identity, but factors such as education, ability, location and family responsibilities should not be overlooked.

Lowman (1991) states that, although Holland's theory continues to dominate the measurement of vocational interests, much work still needs to be done to refine

his theory of interests and advance it beyond the clinically limiting nature of a six-factor typology. He adds that the various possible subtypes and the way in which the secondary and tertiary interests interact with the primary ones to predict career choice and satisfaction, need to be explored and understood.

Gottfredson, G. D., (1999) puts the various criticisms of Holland's theory into perspective by saying that criticism is inevitable when a theory becomes widely influential. He praises Holland for coping with the criticism in a constructive and productive manner, and for using the "tension to fuel his research vehicle" (p. 29). Gottfredson, G. D. concludes by saying that "nothing is so practical as Holland's theory" (p. 33), that

by focusing in a persistent way on a few important problems, seeking elegant and parsimonious ways to summarise knowledge, and using evidence in an open and creative way, Holland has transformed the way vocational assistance is rendered. Future developments in vocational psychology will often rest on theoretical and practical foundations laid by John Holland (p. 34).

The following chapter reviews some of the prolific research inspired by Holland's theory and models, most of which corroborates the theory's vitality and validity (Peterson & Gonzales, 1999).

CHAPTER 3

RESEARCH REVIEW

A significant strength of the field of career counselling is its rich background of theoretical history and vast body of literature (Whiston, 2003). Reviews of research in career counselling and development (e.g., Flores, Logan, McCloskey, Scott, Spencer, Wang & Yakushko, 2003) report that the three foundational career theories (i.e., person-environment, developmental, and social cognitive) continue to appeal to a wide range of researchers and scholars, with Holland's (1997) typology theory, Super's (1990) developmental theory and Lent et al.'s (1994) social cognitive theory being the most frequently used theories in research. These theorists have made important and significant theoretical contributions to career psychology. Even recent reviews of literature and research (e.g., Whiston & Brecheisen, 2002) report that Super and Holland continue to dominate research and practice in the field of career development and counselling. The extensive research that has resulted from their theories continues to contribute to our understanding of career development. The following section focuses on research based on Holland's theory in particular, a theory that is considered the most influential of all the career theories (Feller, Honaker, & Zagzebski, 2001.)

Holland's theory (1950 to 2004)

Telling a coherent story about important issues related to career development and career counselling seems more relevant than describing every article that was published (Arbona, 2000, p. 98).

In line with the above statement, the management of the enormous volume of research based on Holland's theory can be a daunting prospect for any researcher. Holland (1985) himself reported in excess of 400 studies directly related to his theory up to 1983 and in 1999 Savickas and Gottfredson, G. D. reported that research on Holland's theory was "continuous and unabating" (p. 1), still inspiring voluminous research in career psychology and playing a major role in the conceptualisation of career interests and career decision making. More recently Arbona (2000), Furnham (2001), and Whiston and Brecheisen (2002) have stated that Holland's ideas have continued to stimulate more research than any other vocational guidance concept. Inkson, Furbish, and Parker (2002) and Prideaux and Creed (2002) both highlight

the preference amongst researchers for Holland's model. Luzzo and MacGregor's (2002) review underlined the research popularity of Holland's theory and related concepts, and Flores et. al. (2003) confirmed that, of all the person-environment theories, Holland's typology theory received the most research attention during 2002.

Gevers et al (1995) state that the research stimulated by Holland's theory has yielded considerable empirical support for his theory, with most research focusing on testing Holland's four basic assumptions and his theoretical constructs. However, Gottfredson, G. D., (1999) has stated that the usefulness of Holland's theory and typology is so well accepted and respected that it has become the background for other career practice and research, rather than the topic of enquiry itself and a significant proportion of researchers in the fields of higher education, counselling, and vocational behaviour have built on, incorporated or been influenced by Holland's ideas. A challenging task falls to the present researcher to acknowledge and review the vast body of research evidence whilst simultaneously ensuring that emphasis is given to research most relevant to the subject at hand. With this in mind, it was decided to divide the research review into three sections.

The first section will include a review and analysis of Holland based international research from 1985 to 2004. This section has produced a body of evidence large enough to necessitate further organisation into subsections and, in doing so, it seemed logical to reflect the layout of the previous chapter on Holland's theory. Therefore this section will be divided into the following topics: personality types (and how they relate to numerous variables), environmental types, and, interactive studies of personality and environment typologies (with particular emphasis on congruence and congruence studies). Each of the above sections and sub-sections will begin with a brief review of earlier research (prior to 1985) before reviewing post-1985 research up to and including 2004. The latter part of each section and sub-section will include references to cross-national, cross-cultural, socio-economic and gender issues where relevant. This will be followed by a summary of the first section. The second section will include a review and analysis of Holland based research in South Africa from 1985 up to 2004 using the same sub-sections as the first section and followed by a summary. The final section of the review of research based on Holland's theory will focus on research studies that are more directly related to the aims and goals of this treatise, i.e. those that have examined or evaluated the appropriateness and transportability of Holland's interest

code typology. Preference will be given to studies that have made use of the Self-Directed Search (Holland, Fritzsche, & Powell, 1994) and the three letter codes that result from its application.

International research (1950 to 2004)

Personality types

According to Holland (1997), most individuals can be categorised as one, or a combination of, six personality types: Realistic, Investigative, Artistic, Social, Enterprising and Conventional. Each type originates from an interaction of a combination of cultural, environmental and personal factors, resulting in preferred activities and interests, and leading to special competencies and particular personal dispositions. This would result in, for example, predominantly Artistic personality types seeking friendships, partnerships, work and play activities that match their special blend of creative interests, aptitudes and values. Holland's theory and hypotheses on personality types has led to the ongoing growth of a vast body of research which will be reviewed in the following section.

Personality types (pre-1985)

Much of the early research on personality types focused on the *existence of distinctly different types*, the *nature of types* and the *origins and development of types*. Studies conducted by Richards (1968) and Gottfredson, G. D., Holland and Ogawa (1982) supported the distinctiveness of the personality types, whilst other studies found that types often overlap with similar types (Holland, 1962, 1963, 1968) or even that closely related types, such as Enterprising and Social, could be combined into one type (Rachman, Amernic, & Aranya, 1981). A study in New Zealand of male and female high school students (Tuck & Keeling, 1980) found that it was difficult to differentiate between the Social and Enterprising types and between the Investigative and Realistic types. Lunnenborg (1980) reported significant differences in interest preferences for males and females, with females scoring higher in Social areas and lower in Realistic and Investigative areas. Holland's descriptions of the types were supported by studies that correlated the Vocational Preference Inventory (Holland, 1985d) or the Self-Directed Search to various personality inventories (Wall, Osipow, & Ashby, 1967; Westbrook & Molla, 1976).

Research studies prior to 1985 also related personality types to variables such as *career achievement and job prestige*. Holland (1973) related career achievement to types and ranked the predicted level of career achievement of the six types as follows: Enterprising, Social, Artistic, Investigative, Conventional and Realistic. Similarly, Holland, Sorenson, Clark, Nafziger, and Blum (1973) reported that typology and job prestige were strongly related, whilst Schneider and Overton (1983) found that they could not predict academic achievement from personality type. In addition, Holland's suggestion that the type and prestige level of an individual's career choice was related to intelligence and self-evaluation was supported (Holland, 1985b).

As far as *population groups* other than white American were concerned, Salomone and Slaney (1978) conducted a study on an adult working sample of African-Americans and found moderate correlations between their personality types as assessed by Holland based instruments and their self-descriptions. Research conducted on African-American university student populations in the early pre-1985 period showed that students tended to limit themselves to largely Social type careers, such as social work and teaching (Littig, 1968). Salomone and Slaney (1978) conducted a study on an adult working sample of African-Americans and found moderate correlations between their personality types as assessed by Holland based instruments and their self descriptions. Gade, Fuqua and Hurlburt (1984) concluded that the Self-Directed Search may not be an appropriate measure to use with Native American Indian high school students.

Prior to 1985, studies conducted on the personality type hypotheses provided mixed support for differentiation and consistency, and little support for the identity construct. Only a few studies on *differentiation* supported Holland's theory. Some of these studies successfully linked differentiation to stability of career choice (Holland, 1968) and stability of career choice and higher levels of self and career knowledge (Taylor, Kelso, Longthorp, & Pattison, 1980), whilst Holland, Gottfredson, G. D. and Nafziger's (1975) study on the link between differentiation and decision-making ability in a sample of working adults, university students and high school students yielded only low correlations. Holland (1985b) responded to criticism of the differentiation construct and agreed that the definition may have been too simplistic, adding that, in many cases, researchers had failed to control for hidden variables

such as socioeconomic status, intelligence and personality type, whilst other investigators had been tempted to revise the differentiation construct (Aul, 1979).

Similarly, in response to non-supportive results produced by studies on the *consistency* construct, Holland maintained that successful studies had adhered to his theory and were well designed. However, a well designed study by Erwin (1982) could not support the consistency construct, and Villwock, Schnitzen, and Carbonari's study (1976) produced no positive link between career stability and consistency. Some studies, on the other hand, found positive relationships between consistency and persistence (Aiken & Johnston, 1973), stability of career choice (Barak & Rabbi, 1981), higher levels of behaviour predictability and career information seeking behaviour (O'Neil & Magoon, 1977) and academic achievement (Wiley & Magoon, 1982).

Whereas the results of recent studies conducted on the construct of *identity* have been positive (Holland, 1997), prior to 1985 little research was conducted on the identity construct, although positive correlations were found between identity and decision-making problems, implementing career plans and adapting to learning institutions (Campbell, R. E. & Cellini, 1981). Finally, studies that have attempted to indicate relationships between *combinations of Holland's constructs* and factors such as occupational satisfaction (Hener & Meir, 1981; Nafziger, Holland, & Gottfredson, G. D., 1973) have proved to be largely unsuccessful (Schonegevel, 1997).

Holland's concept of *calculus* and the ordering of the relationships within and between personality types and environments can be depicted according to the *hexagonal model* which states that "the distances between the types or environments are inversely proportional to the theoretical relationship between them" (Holland, 1985, p.5). There was a significant amount of research conducted with the hexagonal model as focus prior to 1985. Studies that have been most supportive of the hexagon shape have predominantly featured samples of White American males and females, including school pupils, college students and working adults (Cole & Hansen, 1971; Crabtree & Hales, 1974; Edwards & Whitney, 1972; Lunnenborg & Lunnenborg, 1975). Some researchers developed other analysis techniques for use with the hexagon, such as that developed by Wakefield and Doughtie (1973), which were thought to be more precise but the results were less supportive of Holland's theory. Typically females did not fit the hexagonal model as well as the males in the samples (Bobebe, Alston, Wakefield, & Doughtie, 1976; Bobele, Alston, Wakefield, &

Schnitzen, 1975). Some researchers have not found support for the Hexagonal model (Shubsachs & Davison, 1979), whilst others managed at least to produce the hexagonal arrangement in the correct RIASEC order (Rounds, Davison, & Dawis, 1979).

Research samples on other cultures show that African American women fit the hexagonal model more than African American men, but still to a lesser degree than White American males and females (Henry, 1988; Wakefield, Yom, Doughtie, Chang, & Alston, 1975), whilst studies using samples of Spanish American students suggest an acceptable fit (Fouad, Cudeck, & Hansen, 1984; Harrington & O'Shea, 1980).

Personality types (post-1985)

The lengthy review of research on personality types post-1985 necessitates the division of the material into further subsections in order to maximise readability. The review revealed certain trends in personality type research which have been organised into the following subsections: personality types and personality inventories, personality types and abilities or competencies, personality type hypotheses (including differentiation, consistency, identity, and combinations of these), personality type structure and the hexagonal model, personality types and life history and heritability, personality types and occupational and personal outcomes, and personality types and gender and cultural differences.

Personality types and personality inventories

According to Arbona (2000), Holland has linked vocational interests as an expression of personality since "the inception of his theory" (p. 106). Hogan and Blake (1999) refined Holland's belief by stating that interest and personality assessment are linked because, whilst both attempt to predict occupational success, vocational interests indicate the extent to which an individual will appreciate an occupation whilst personality measures can be used to assess the social skills and drive that are necessary for success.

The research trend of studying the relation between interests, personality types and various personality measures began in 1984 when Costa et al. (1984) studied the relation of the Self-Directed Search to an early version of the NEO PI-R (Costa & McCrae, 1992). Since then numerous other studies have examined the

relationship between the six types of the Self-Directed Search (Holland, Fritzsche, & Powell, 1994) or the Vocational Preference Inventory (Holland, 1985d) scales and the *Big-Five personality variables* (i.e. Neuroticism, Conscientiousness, Extroversion, Agreeableness and Openness). Costa and McCrae (1992), as well as Costa et al. (1984), Gottfredson, G. D., et al. (1993), and Holland et al. (1994) have all found that Extroversion was positively correlated to Social and Enterprising interests, Openness was positively correlated to Investigative and Artistic interests and Conscientiousness was positively correlated to Conventional interests. Larson and Borgen (2002) also linked Extraversion to Enterprising and Social interests, and Openness to Artistic and Investigative interests in a sample of gifted adolescents. These findings were replicated in studies by Blake and Sackett (1999), Carless (1999), De Fruyt and Mervielde (1999), Judge, Higgins, Thorese, and Barrick (1999), as well as Holland, Johnston and Asama (1994). The latter study also found a negative correlation between Depression and the Enterprising scale for both men and women.

A substantial meta-analytical study by Larson, Rottinghaus, and Borgen (2002) confirmed the findings of many of the studies mentioned above, finding strong correlations between certain personality patterns and interests as follows: Openness with Artistic and Investigative interests, Extraversion with Enterprising and Social interests, and Agreeableness with Social interests. Blake and Sackett (1993) related the following personality types to specific interest types: Extroversion to Enterprising, Agreeableness to Social, Openness to Artistic, and Conscientiousness to Conventional. Borges and Savickas (2002) found no support for personality patterns as predictors of medical specialty but they did find that personality patterns could predict interests at a more general level. Further support for a link between personality patterns, Holland types and Holland's theoretical constructs has been found by Apostol (1991), Holland, Johnston, Hughe, and Asama (1991), Tokar and Fischer (1998), Carson (1998a) and by numerous researchers during 1999 (Fried, Hollenbeck, Slowik, Tiegs, & Ben-David; Hill & Rojewski; Judge, Thoresen, Pucik, & Welbourne; McManus & Kelly; Pulkkinen, Ohraned, & Tolvanen; Seibert, Crant, & Kraimer; Soldz & Vaillant; and Wooten, Timmerman, & Folger). Tokar and Swanson (1995) found that individuals with more well-defined interest profiles (i.e. a single high-point Self-Directed Search scale exceeding the other five scales by at least one raw score) tended to resemble one personality type more than any other and

therefore produced more positive outcomes. Besides the NEO PI-R (Costa & McCrae, 1992), Holland's typological formulations have been linked to other personality inventories such as the Sixteen Personality Factor Questionnaire (Bolton, 1985). Pietrzak and Page (2001) found little overlap between the Sixteen Personality Factor Questionnaire and the Self-Directed Search and concluded that the Self-Directed Search should rather be used when a Self-Directed Search type code is needed. Millon's Basic Personality Styles (Strack, 1994), and the Self-monitoring and Private Self-Consciousness scales (Carson & Mowesian, 1993) have also been used in Holland based studies.

Some researchers have conducted cross-cultural and international studies to ascertain how applicable Holland's theory is to populations other than the most researched population group, that is, White westernised, middle class, male university students. This includes studies that have looked at the link between interests and personality types in specific non-White and international samples. As far as the Native-American population is concerned, Fouad and Spreda (1995), Hansen (1987), and Hesketh and Rounds (1995), all found that in their Native-American samples, women scored higher on the Realistic scale, and men scored higher on the Conventional scale than their White counterparts.

International studies such as De Fruyt and Mervielde's (1997) investigation of the relationship between the Dutch version of the Self-Directed Search and the NEO PI-R with a sample of 934 university students supported the hexagonal model and the differences between the RIASEC personality types. De Fruyt and Mervielde (1999) found that vocational interests as assessed by the Self-Directed Search and the Big Five personality dimensions predicted job type and employment status in a sample of Belgian college seniors. According to Holland (1997), such studies are generally supportive of the typological formulations but they lacked sufficiently large sample sizes and participant diversity. In Singapore, Chew, Halim, and Matsui (2002) found *gender* differences in levels of self-efficacy for the different RIASEC types, with higher levels for Artistic, Investigative and Social domains for woman and higher levels for Enterprising and Realistic domains in men. A Japanese study by Matsui and Tsukamoto (1991) revealed that with regards to self-efficacy, Japanese men scored higher than women in the Realistic domain, whilst Japanese women scored higher in the Artistic domain. Dagenais' (1987) sample of male Saudi Arabian

technical students had depressed Enterprising, but otherwise similar scores to a sample of adult, male American workers.

International studies have adapted or translated the Self-Directed Search to assess the vocational interests of students in specific countries (De Fruyt & Mervielde, 1997; Jin, 1986; Khan, Alvi, Shaukat, Hussain, & Baig, 1990; and Lokan, 1988;). Farh, Leong, and Law (1998) reported that Holland's model had considerable external validity and internal structure in a sample of Chinese first year university students in Hong Kong, more especially in those students who adhered to more traditional Chinese beliefs. However, another study of Chinese students (Leung & Hou, 2001) raised concerns for the cross-cultural validity of the Self-Directed Search. Barak and Cohen (2002) conducted research on the online version of the Self-Directed Search with a sample of Israeli high school students, finding that it was reliable and valid, and more positively received than the paper-and-pencil version.

Personality types and abilities or competencies

Some researchers such as Lowman (1991) have explored the abilities, skills or competencies that are believed to characterise the different personality types. The Self-Directed Search includes a self-rating of abilities section. The validity of this section has also been the subject of several studies by Lowman and Williams (1987), Lokan (1988), Swanson (1993), Prediger (1987), Prediger and Brandt (1991), Prediger and Swaney (1995), Harrington and Schafer (1996), Randahl (1991) and Gottfredson, L. S., (1986) amongst others, with varying results. In general, low correlations were found between self-ratings and the abilities measured by validated tests, with the noticeable exception of self-ratings performed by Investigative type individuals. Randahl (1991) demonstrated that a strong relationship between interests (as assessed by Holland-based measures) and self-rating of abilities can be shown when the two variables are both rank-ordered implying that, when choosing occupations, individuals consider their outstanding abilities as well as their outstanding interests. A longitudinal study that tracked participants from early childhood to retirement found that career success could be predicted from intelligence and personality dimensions assessed in childhood (Judge et al., 1999).

Personality type hypotheses

Holland developed certain hypotheses or constructs to explain the inter-relationships of personality types. The hypotheses related to differentiation, consistency, and identity have received the most research attention. According to Holland (1997), studies on differentiation and consistency have led to mixed results and support.

Differentiation refers to the degree to which a person or an environment is well defined, i.e. how closely an individual resembles a single type and shows less resemblance to other types. Swanson and Hansen (1986) found that lack of differentiation or flat profiles were less important predictors of grades and college drop out than the height of those flat profiles. Individuals with high flat profiles exhibited higher grades and less college drop out than those with low flat profiles. Alvi, Khan, and Kirkwood (1990) did not find any meaningful correlations between the construct of differentiation and career decision making. Similarly, Gottfredson, G. D. and Holland (1990) reported that they could not support the hypotheses that differentiation acted as a moderator of congruence. Erwin (1987), Gottfredson, G. D. and Jones (1993), and Holland, Johnston, and Asama (1994) all found that positive personal variables, such as autonomy and purpose, are positively related to well differentiated and elevated interest profiles. Differentiation has also been positively correlated to consistency of vocational preferences (Holland et al., 1990). Gottfredson, G. D. and Jones compared two means of measuring differentiation, that is, Holland's original formula and Iachan's indices (1984) and found that the two methods produced widely different levels of elevation correlation. Holland (1997, p. 148) states that "differentiation continues to be a weak construct" which, as research indicates, can not strongly predict vocational preference stability or personal adjustment. However, Holland also implies that certain studies of the differentiation construct have been characterised by samples that are inadequate in size, too homogenous, and often utilising weakly constructed research designs and instrumentation.

Some interesting *international* studies have investigated the link between differentiation and giftedness. Milgram and Hong (1999) hypothesised in their sample of highly intelligent Israeli high school students that the high, flat profile of interests and abilities reflected the fact that the students had reached the highest level measured by the available instruments and not that their interests were

undifferentiated. In a Canadian study, Achter, Lubinski, Benbow, and Eftekhari-Sanjani (1999) found that gifted adolescents do have differentiated vocational preferences. Alvi, Khan and Kirkwood (1990) found no link between levels of differentiation and career decidedness in Pakistani college students.

Consistency refers to the degree of relatedness between the personality types with regard to their relative positions on Holland's hexagonal model. It appears that there are relatively few studies that have focused on the consistency construct and of those almost half have produced negative results (Schonegevel, 1997). Holland (1997) has stated that consistency has been clearly linked to work stability and work history, but that older (i.e., prior to 1985) consistency studies produced more positive findings, especially when these were well designed and adhered to the theory (Holland, 1985b). Latona (1989) found little or no support for the value of consistency, but Holland (1997) suggests that the results of such studies might be clarified if they were reanalysed using a standard measure. A consistency index for three-letter codes and a formula for coping with ties in consistency measures has been developed by Strahan (1987) and Strahan and Severinghaus (1992). Although the value of this index needs to be tested in research, it may be useful in reanalysing the data of older studies.

Identity is defined as an individual's possession of clear and stable goals, interests and talents. Studies conducted on the construct of identity have supported its usefulness and validity. Vondracek (1992) criticized Holland's identity construct as being too simplistic to be useful but Holland, Johnston, and Asama's (1993) review of research on vocational identity provided a comprehensive summary of evidence for its reliability and validity. Holland, Johnston and Asama found a positive relationship between identity and other related factors, such as career decision-making, career beliefs, and job satisfaction. According to Holland (1997), these outcomes have been bolstered by 40 other studies. Poe (1991) positively correlated socioeconomic status with identity, finding that there were gender differences in career identity. Vocational identity has also been explored in relation to other career inventories such as The Careers Transitions Inventory (CTI: Heppner, Multon & Johnston, 1994), the Career Thoughts Inventory (CTI: Sampson, Peterson, Lenz, Reardon & Saunders, 1996) and the Career Factors Inventory (CFI: Chartrand, Robbins, Morrill, & Boggs, 1990). All of these studies, as well as others (Betz & Serling, 1993; Gehlert, Timberlake, & Wagner, 1992; Leung, Conoley, Scheel, &

Sonnenberg, 1992; Lewis & Savickas, 1995), have provided substantial and relatively unambiguous evidence for the validity of the identity construct (Holland, 1997).

Studies that have *combined Holland's constructs* of congruence, consistency, differentiation and/or identity have had various levels of success. A study by Pazy and Zin (1987) suggests that consistency interacts with congruence to produce outcomes of P-E fit. Swaney and Prediger (1985) found that individuals with differentiated and consistent interests also had a strong relationship between congruence and work satisfaction. Similarly, De Fruyt and Mervielde (1997) found that students with highly differentiated and consistent codes also exhibited higher levels of congruence with their choice of college major. On the other hand, Leung, Conoly, Scheel and Sonnenberg (1992) found no significant correlations between the same constructs in a large sample of bright high school students and concluded that the constructs have nothing in common. Furnham and Walsh's (1990) study did not support many of the hypotheses regarding the relationship between Holland's constructs and factors such as stress and job frustration. According to Schonegevel (1997), few cross cultural studies have been conducted on Holland's differentiation, consistency and identity constructs. As a result there is still confusion as to the applicability of Holland's theory to varied cultural groups (Fouad, 1993), although Greenlee et al.'s (1988) hypothesis of less differentiation amongst African-Americans as opposed to their white colleagues did find some support. In response, Holland (1997) cautions researchers to control for type and other variables when studying the constructs in isolation or in combinations.

New research has not added much to the status of the consistency and differentiation constructs. By contrast the more recently introduced identity construct has proved to be a robust, valid and practical research variable (Holland, 1997).

Personality type structure and the Hexagonal model

Holland's RIASEC hexagonal model is the most well-known graphic representation of Holland's constructs, a cognitive structure that individuals may use to organize information about themselves and the world of work (Arbona, 2000). The hexagonal model is a visual representation of Holland's theory and is used to explain the relationship of the six personality and environmental types to each other in terms of the constructs discussed in the previous section. According to Holland (1997), the

relationships within and between personality or environment types can be depicted by means of the hexagonal model in which “the distances among the types or environments are inversely proportional to the theoretical relationships between them” (p. 5).

The hexagonal model has been studied in many different ways, using diverse populations and varying statistical techniques. These studies have yielded mixed findings regarding the *structure* of vocational interests. There are many studies which continue to support Holland’s theory. Other studies have resulted in misshapen polygons (Fouad & Dancer, 1992; Hansen, Collins, Swanson, & Fouad, 1993; Rounds et al., 1979; Swanson, 1992). Overall male polygons seem to approximate the hexagon *shape* more closely than those of females (Edwards & Whitney, 1972; Feldman & Meir, 1976; Ferreira & Hood, 1995; Fouad & Spreda, 1995; Hansen, Collins, Swanson, & Fouad, 1993; Khan & Alvi, 1991; Prediger, 1981). Rounds and Tracey (1996) found that more mature samples, i.e. samples of working adults as opposed to high school student samples, tend to provide better shaped hexagons and more positive results. Day, Rounds, Tracey and Swaney (1996) conducted a study on a large sample of college students representing not only Caucasian but also minority groups. They found Holland’s hexagonal model to be representative of both genders in minority groups and, additionally, that the hexagons were notably similar to those of the Caucasian groups.

Some researchers have investigated the possibility that shapes other than Holland’s hexagonal shape may be more suitable. Hogan (1983) initiated the idea of the use of a circumplex as opposed to a hexagonal model. Trapnell (1989) revised the hexagonal model, suggesting the addition of two extra categories to create a symmetrical octagon. More support for the circumplex model was found in studies of American Caucasian samples than in ethnic or minority groups (Tracey & Rounds, 1993). In 1996, Tracey and Rounds added the dimension of prestige, resulting in a spherical representation of vocational interests known as RIASEC plus two. This spherical model has been evaluated by numerous researchers (Borgen & Donnay, 1996; Gonzales, 1996; Gottfredson, G. D., 1996; Hansen, 1996; Harmon, 1996; Prediger, 1996) who found that its practical application was either insubstantial or did not provide a significant improvement on the hexagonal model. One of the harshest criticisms of the circumplex structure came from Myers (1998) who stated that he did not find any evidence to support it.

Whilst many studies support Holland's hexagonal model and show some similarity of interests across different cultures, there are also specific cultural differences, and therefore the calculus assumption should be applied to other cultures with caution (Hansen, 1992). Chartrand (1992) and Fouad and Dancer (1992) added that the specific nature of the differences and the reasons for them should be taken into account so that new theories of career development in other cultures can be developed. Tracey and Rounds (1993) conducted a meta-analysis, which included American ethnic samples as well as samples from 18 other countries, to examine the suitability of the hexagonal model cross-culturally. In general they found that the hexagonal shape was not a good fit for most of these samples (Hesketh & Rounds, 1995). However, Hansen, Scullard, and Haviland's (2000) study of 176 Native American college students supported the circular order and the two dimensional structure of the RIASEC interest types, with the data of the women's interest typology showing more support than that of the men. The question of the appropriateness of Holland's theory to diverse populations was raised again in 2001 in studies by Toporek and Pope-Davis, Soh and Leong, and Murray and Hall. With regard to cross-cultural studies and gender differences in interest profiles, Fouad and Mohler (2004) found meaningful interest differences based on gender, but minimal differences based on racial/ethnic group membership in the following groups: African American, Asian, Hispanic, American Indian, Alaskan Native and Caucasian individuals. Similar results were found by Fouad (2002). A cross-cultural study by Ryan, Tracey, and Rounds (1996) with a sample of White- and African-Americans of both genders showed differences in the structure of interests when lower socioeconomic status and ethnicity were considered together.

International studies on the structure of interests have yielded mixed results. In a study of Australian plumbers, Boyle and Fabris (1992) found a poor overall fit to the hexagonal model. Similar results found that the hexagonal shape was not a good fit in a study of Bolivian students (Glidden-Tracey & Parraga, 1996). De Fruyt and Mervielde's (1997) conducted an investigation of the Self-Directed Search (Holland, Fritzsche, & Powell, 1994) on a sample of 934 Dutch university students. The findings of this study support the hexagonal model and the differences between the RIASEC personality types. An Indian study (Leong, Austin, Sekaran, & Komarraju, 1998) reported internal validity and a lesser degree of external validity for the hexagonal model. A further study by Khan and Alvi (1991) found that Holland's

hexagonal model did fit their sample of Pakistani men. The data obtained from Tak's (2004) study of Korean college students supported Holland's circular order model. The RIASEC order of the hexagon held for males and females in studies of Taiwanese high school students (Jin, 1986) and Chinese technical secondary school students (Yu & Alvi, 1996).

In reaction to criticism and the findings of many research studies based on the hexagonal model, Holland (1997) reminds us that the importance of the hexagon lies in the order of the types (RIASEC) and the anticipated distances and relationships between the types. For example, we should notice obvious differences between predominantly R and S types, but find differences between R and I types harder to detect because they will have some characteristics in common. The concept of consistency depends on the hexagonal model, as does the classification system and the construct of congruence, and all of these have proven to be valid, useful tools for researchers and practitioners. Although the hexagon model is not a perfect one, it does provide a "way to organise personal and occupational data" (Holland, 1985, p. 119) and is useful for assessment, classification and interpretation of individual profiles.

Personality types and life history and heritability

According to Holland (1985), the varied life histories of different personality types are related to specific life events such as social class, gender, opportunity, and school results. Recent research (Holland, 1997) points to the fact that interest types and the stability of interests are as influenced by heritability or genetic influence as they are by environmental factors. Studies by Betsworth et al. (1994), Lykken, Bouchard, McGue, and Tellegen (1993), Moloney, Bouchard, and Segal (1991), Rowe (1994), and Bouchard (1995) all suggest that heredity has a much larger influence on interest types than was previously thought. Additionally, Muchinsky (1994) reviewed studies related to life history from 1960 to 1994 and found that life history experience influenced an individual's interest in different occupations and in the different job types within those occupations. Similarly, Reichel and Muchinsky (1995) found that life history information was more useful in predicting interest types than sex-role orientation or self-esteem. This ties in with Holland's (1985) emphasis of the important role of family background, i.e., that types produce types. Smart's (1989) study found this to be particularly true for Social types. A more recent study of

365 adolescents (Otto, 2000) revealed that, despite gender or race, adolescents regarded their mothers as being more influential in their career choice and development than any other factor. Finally, an interesting study by Helwig and Myrin (1997) which looked at the stability of Holland codes in families over 10 years concluded that the gradual changes in Holland codes could be attributed to the movement of the family from rural to more urban surroundings.

With regard to vocational interests and *gender* stereotyping of careers, a study in Britain of 8-to-16-year-olds showed that more girls than boys tended to rate a larger number of interests and occupations as being suitable for both males and females (Miller & Budd, 1999). This finding echoes the findings of an Israeli study of high school and university students (Kulik, 1999).

The tendency of children to choose gender stereotyped vocational interests was noted in numerous *international* studies in 1999 (West and East Germany – Vondracek, Silbereisen, Reitle, & Wiesner; Britain – Miller & Budd; United States of America – Sellers, Satcher, & Comas). Tang's (2001) study of Chinese college students found that the interests of Chinese students were similar, but not identical, to their American counterparts. His subsequent study (Tang, 2002) added that career choices of Chinese and Chinese American students were significantly influenced by their parents.

Heritability studies of interest types and structured life histories of individuals in different occupations or study courses have supported the assumption that different types have histories that are to some degree consistent with the personality type that an individual resembles, and suggest that heritability is an important component of interest types.

Personality types and occupational and personal outcomes

Searching behaviour, cognitive styles, training, and work performance can be seen as the outcomes of an individual's life history, inherited traits and interest type. Research in this area of Holland's theory explores the hypothesis that different personality types understand the world of work in different ways, enjoy different life styles, search for different kinds of work, and achieve different levels of success.

Work searching behaviour has been researched by Holland and Gottfredson, G. D., (1994) who found that job dissatisfaction, which is often due to a state of incongruence between personality and environment type, initiated work searching

activity. Schneider (1987), Sergent and Sedlacek (1989), and O'Brien, Sedlacek, and Kendell (1994) found positive correlations between the different personality types and the type of work or activity they actively sought. For example, Social types would be inclined to volunteer to be part of social activities such as peer counselling. These findings are supported by research which shows that the personal characteristics of managers and work groups become more homogenous in personal characteristics (i.e. types) as specific types are drawn to, or actively seek out, the same working situation (Jackson et al, 1991; Schneider, Smith, Fleenor, & Taylor, 1998).

According to Holland (1897), there were few studies on occupational perceptions after 1985, but there has been some research on *cognitive styles*. Alvi, Khan, Hussain, and Baig (1988) found that dependent cognitive styles were associated with Social, Enterprising and Conventional types, whereas independent cognitive styles were associated with Realistic, Investigative and Artistic types. Wampold et al. (1995) reported support for the hypothesis that Social types would be better equipped to cope in socially demanding situations than any of the other types, with social coping skills decreasing in relation to increased distance from the Social scale on the Hexagon. Other studies, such as that conducted by York and Tinsley (1986), support the characteristics of cognitive styles attributed to the types.

Gandy, Dye, and Maclane's (1994) study supports Holland's hypothesis that achievement and *performance at work* is related to a ESAICR interest type profile. Gottfredson's, G. D, (1994) study of the Dictionary of Holland Occupational Codes code for school principals supported these findings but a Canadian study of accountants (Schwartz, Andiappan, & Nelson, 1986) did not support theory, in that it showed a negative relationship between annual income and Conventional type score.

Holland (1997) reports a lack of research which applies his typology to achievement or performance at work. In general, however, the studies conducted on personality types and occupational and personal outcomes are supportive of Holland's theory.

Personality types and gender and cultural differences

An overview of more recent literature (post-1985) reveals that interest typologies have been examined for gender, cultural, and ethnic biases. In large and small sample studies, *gender* appears to be a more significant factor than ethnicity

and culture, with women having more similar interests to women of other cultures than to men in their own cultures (Holland, 1997). Studies of the career interests of high school (Feehan & Johnston, 1999) and middle school (Aviles & Spokane, 1999) students have revealed higher scores for boys in Realistic and Investigative scales, whilst girls scored higher than boys on Social, Conventional and Artistic scales. Similarly, O'Brien, Martinez-Pons, and Kopala (1999) found that minority high school boys' interests were more in line with scientific and engineering careers than those of their female peers. Tokar et al. (1995) found stronger correlations in males than females between certain personality variables and certain vocational interests, (e.g., Openness and Artistic vocational interests, Extraversion and Enterprising/Social interests).

As discussed in the review of pre-1985 research, African American university student populations tended to limit themselves to largely Social type careers, such as social work and teaching (Littig, 1968). More recent studies conducted by Trent (1984) and Miller, Springer, and Wells (1988) indicate the persistence of this trend despite the efforts of programmes to effect change. Additionally, Black workers are most strongly represented in the lowest work levels in Realistic jobs (Arbona, 1989). Those that do work in higher levels usually have Social-type jobs, whilst the category of Enterprising jobs at any level is poorly represented by African-American workers. Fouad (1993) also found that White Americans had lower Conventional and Investigative interest scores than Asian-Americans who traditionally favour Realistic and Investigative careers over Social and Artistic ones. However, in a study of Asian American college students, Tang, Fouad, and Smith (1999) found career choice was not associated with traditionality of interest typologies.

Environmental types

There are different environments dominated by a particular personality type. Each of these environments is defined by the type of challenges, opportunities and rewards they can offer to a personality type.

Environmental types (pre-1985)

Prior to 1985 research on Holland's environmental types was not as extensive as research that focused on his personality types. However, those studies that do exist tended to focus on educational environments and work environments. The

following studies reflect the focus of research during this time. Gottfredson, L. S., (1978) reported that, whilst women are well represented in all levels of Social and Realistic type careers, they are typically over-represented in low-level Enterprising environments and under-represented in high-level Conventional and Enterprising environments. Astin (1965) reported some evidence for the existence of differences between environmental types and the predictability of teacher characteristics in these environments. Rounds et al. (1978) suggested that interests are less strongly related to differences in work environments than rewards and work requirements, and that unknown variables may be responsible for the contradictory findings in work environment studies.

Environmental types (post-1985)

Holland (1997) noted that his environmental models have not been a particularly popular research choice, and Arbona's (2000) review of the previous year's career literature showed that little attention has been directed at the measurement of environments. Smart (1985) found that colleges reinforced those characteristics of their students that corresponded to the colleges' dominant environmental type. Therefore an Artistic type environment, for example, tends to produce students with higher artistic self-esteem scores. Similarly, *cross-cultural* studies have been conducted on environmental types. Using a large sample of traditional Black colleges, Richards (1987) found that these environments seem to perpetuate the likelihood that these students would predominantly choose a Social type career rather than a more technical or managerial type career.

A study conducted by Fitzgerald and Weitzman (1992) reported that the large majority of women already in the working world are in Social and Conventional environments, whilst a minority of women are in Realistic or Investigative work environments. Henry, Bardo, Mauw and Bryson (1987) conducted a study on university students studying medicine and noted that, despite the fact that the students had chosen the same work environment, there were still significant interest differences between males and females on the Realistic and Investigative scales of the Self-Directed Search. No such interest differences were found between the genders when a similar study was conducted in a traditionally female dominated Social work environment (Walsh & Huston, 1988). Hannah and Khan (1989) found that socioeconomic status should be taken into account in studies focusing on

gender differences and interests, as women from higher socio-economic backgrounds are more inclined to choose traditionally male dominated environmental types than women from lower socio-economic backgrounds.

More recent research on work environments has closely examined specific working conditions, such as organizational commitment, organisational support, trust in management, autonomy, kept promises and interpersonal treatment. Behson (2002), Goulet and Singh (2002) and Thompson and Van de Ven (2002) have all found positive links between these factors and job satisfaction and commitment. In similar studies these findings were confirmed by Meyer, Stanley, Herscovitch, and Topolonsky (2002) and Conway and Briner (2002). Some researchers have extended the investigation of congruency beyond the workplace to include other variables. Ton and Hansen (2001) reported that congruence can be used to predict satisfaction in marital roles as well as in work situations.

The present review supports Holland's (1997) statement that the theory on Environmental types has not been as extensively researched as the theory on Personality types. However, the research that has been conducted is generally supportive of Holland's theory.

Interactive studies of personality and environment typologies

According to Holland (1997), personality and environmental types (as reviewed in the previous two sections), provide the tools to describe and understand what happens when particular personality types find themselves living or working in a particular type of environment. Ideally, personality types should match the environment type, i.e., they should be congruent. Congruence refers to a personality type living and working in an environment full of opportunities and potential rewards for their particular preferences, interests and abilities. As a construct "no other aspect of Holland's theory has generated as much empirical data and controversy as has Holland's congruence hypothesis" (Swanson & Gore, 2000, p. 234.).

Interactive studies (pre-1985)

Research on the interaction between personality and environment types and thus the construct of *congruence* was a popular subject for researchers during the pre-1985 period. The congruence hypothesis states that achievement, satisfaction and stability in a work situation are directly related to the level of congruence

between an individual's typology and the actual work environment. Holland and Nichols' (1964) findings suggest that students tend to remain in their field of choice if that field fitted with the characteristics of their personality type. Although many early congruence studies were not supportive of Holland's theory (e.g., Elton, 1971; Holland, 1968; Posthuma & Navran, 1970; Privateer, 1971; Walsh & Barrow, 1971), links between congruence and job satisfaction were found by later researchers such as Gottfredson, G. D., (1981), Mount and Muchinsky (1978), and Wiggins (1976). Holland (1985) reported that the results of studies on congruence were complicated by other factors, such as initial career indecisiveness. A study of congruence and its effect on anxiety and personal integration (Walsh & Lewis, 1972) found that, whilst males exhibited less anxiety and more personal integration when in a congruent environment, the findings for females were ambiguous. Congruence has been linked to clearly defined goals, higher career aspirations and greater satisfaction with the choice of a major (Walsh, Spokane, & Mitchell, 1979), as well as higher stability, increased differentiation and academic orientation (Spokane, Mallet, & Vance, 1978) and better results (Bruch & Krieschok, 1981). Werner (1974) found that high school students tended to aspire to congruent work environments. Helms and William's (1973) study of high school students supported the hypothesis that different types would respond to different jobs in different ways and also found that the degree of perceived congruence was predictable from the hexagonal model.

Interactive studies (post-1985)

Holland (1997) states that there has been an increase in the amount of person-environment interaction, otherwise known as congruence, research since 1985. This research has yielded mixed support for the congruence-job satisfaction hypothesis (Arbona, 2000). The studies include meta-analyses of old and new research data, and studies that are predominantly either career or educational in nature.

Meta-Analyses of congruence studies

Several meta-analytical studies of congruence have been conducted, the results of which have different implications. Spokane's (1985) analysis of 63 studies supports a link between academic performance and other factors such as persistence, job satisfaction, stability of choice, and perceived congruence.

However, Assouline and Meir's (1987) meta-analysis, which included many of the studies used by Spokane, found that the results of congruence studies were strongly influenced by the method used to measure congruence and the manner in which the environment was assessed. Additionally, Holland (1997) warns that the analysis of earlier studies is difficult because of their wide variety of research designs, unsatisfactory sampling techniques and "exotic" variables (p. 161). However, such studies were useful in highlighting the strengths and weaknesses of the congruence construct and indicating where further research was needed. The most recent meta-analysis of Holland's congruence hypothesis (Spokane, Meir, & Catalano, 2000) has confirmed its usefulness whilst also recommending continued research.

Schwartz (1992) has been critical of the congruence concept, reporting that achievement is more strongly related to achievement orientation than it is to congruence. In addition, Tranberg, Slane, and Ekeberg's (1993) meta-analysis did not find a significant relationship between congruence and satisfaction. However, Meir's (1995) reorganised and reinterpreted version of these studies resulted in statistically significant relationships. Furnham (2001) has pointed out that satisfaction does not rely solely on congruence and he has questioned the importance of the congruence concept and its cross-cultural portability. Holland (1997) believes that these conflicting findings are an example of the dangers of ambiguity which are inherent to meta-analyses. However, they are useful in that they lead to directions for future research and theoretical revision that could be more successful.

Career and Educational Studies

Whilst the results of meta-analytical studies on congruence may be ambiguous, there are studies that support its usefulness. Numerous congruence and satisfaction studies conducted in different educational settings, including high school, undergraduate, graduate, and college samples, have produced positive and predictable results (Holland, 1997).

Studies of *work settings* have included samples of bank tellers, customer service representatives, and American army soldiers. Positive correlations between congruence and satisfaction were found in Gottfredson, G. D. and Holland's (1990) and Meir and Narvon's (1992) studies of bank tellers. Fritzsche, Powell, and Hoffman's (1999) study of customer service representatives positively linked congruence with performance ratings and, in their study of United States army

soldiers, Upperman and Church (1995) found serious limitations in the prediction of job satisfaction according to congruence. Young, Tokar, and Subich (1998) reported no significance in 22 correlations between the congruence indices and job satisfaction. Furthermore, they could not relate gender, age, income and year of education to congruence.

Studies in *educational settings* have also been numerous and varied. Wampold, Mondin and Ahn (1999) found that college students showed a preference for congruent tasks and work situations. A study of graduate and undergraduate students suggested higher levels of educational satisfaction in those who were consistent in choosing fields of study that were closely related on the hexagon (Smart, 1987). Ten years later Smart (1997) conducted a longitudinal study focusing on college sub-environments classified as Investigative, Artistic, Social and Enterprising. He found that the different environments had predictable and differential influences on students' perception of their educational growth. However, it is important to note that Mallinckrodt, Gelso and Royalty (1990) found that for some activities, such as student interest in research, personality variables (i.e. Investigative typology and aspirations) were more influential than environmental variables.

Other studies, such as that by Helms and Williams (1973), which was converted and reported by Helms in 1996, support these findings. Meir, Keinan, and Segal (1986) reported that the congruence/satisfaction relationship in workers is influenced by perceptions of the importance of the work environment. A number of studies support a positive link between congruence and well-being, satisfaction, job persistence, productivity, previous job congruence, self-esteem, and lack of mental pathology (Celeste, Walsh, & Raote, 1995; Gade, Fuqua, & Hurlburt, 1988; Hesketh & Gardner, 1993; Hildebrand & Walsh, 1988; Meir, Esformes, & Friedland, 1994; Meir, Melamed, & Abu-Freha, 1990; Meir, Melamed, & Dinur, 1995; Richards, 1993; Schwartz et al., 1986; Smart, Elton, & McLaughlin, 1986; Thompson, Flynn, & Griffith, 1994).

More recent research on the congruence construct has not been as supportive of theory. Gottfredson, G. D. and Holland (1990) modified the congruence hypothesis to state that job satisfaction is more likely in congruent individuals whose interests are more clearly defined. However subsequent research has not supported this amended hypothesis. Some studies of congruence and

satisfaction or stability have yielded unexpected results. Salomone and Sheehan (1985) failed to find any support for the congruence/ stability hypothesis, whilst Carson and Mowesian (1993), Gottfredson, G. D. and Holland (1990), and Holland and Gottfredson, G. D., (1994) found that the correlation between congruence and vocational identity was significant. Assouline and Meir (1987) found less support for the congruence/stability and congruence/achievement hypothesis than for the congruence/satisfaction hypothesis, and Helson, Roberts and Agranick's (1995) study indicated that, even when congruence leads to job stability, change still occurs over time. Hoegland and Hansen's study (1999) found an insignificant relationship between congruence and satisfaction in a group of satisfied and non-satisfied workers.

A *cross-cultural* study of 596 Native American high school students suggested more educational satisfaction in students with Investigative or Social codes than students with Realistic codes (Gade, Fuqua, & Hurlburt, 1988). Whereas most cross-cultural studies on the interaction between personality and environment typologies have been supportive of the congruence construct (e.g., Brown, 1995; Henry, Bardo, Mouw & Bryson, 1987), Greenlee, Damarin and Walsh (1988) found that African-American workers were not as congruent as their White colleagues because of perceived or actual employment barriers. Clark (2002) found that sense of community and a sense of personal control were significant factors in a sample of Native American workers.

Eagan and Walsh's (1995) study on 226 college students highlighted the importance of controlling for *gender* in research studies, as gender and coping strategies were more positively correlated than congruence and coping strategies. The hypothesis that congruence between interests and work environment leads to achievement, job satisfaction and stability is complicated by the fact that women's career choices may be determined by factors other than their own preferences, such as gender role socialization and compromise due to the demands of family and home (Schonegevel, 1997). Srsic and Walsh (2001) found that congruence had no significant effect on the career self-efficacy of female undergraduates. Similarly, studies by Subich and Billingsley (1995), and Mobley and Slaney (1996) indicate that *homosexual* people were also frequently compelled to compromise their interests and adapt to less congruent work environments. Such effects of circumstances on congruence findings are echoed in a study of the disparity between the initial interest

typology of students and their occupations at the beginning of their careers. Athansou (2002) suggested that this disparity could be explained by periods of career exploration and/or an adjustment to the availability of jobs on the *labour market*.

A recent study of the relationship between *congruence and performance* (Mallinckrodt & Gelso, 2002) found that high research productivity was linked to the Investigative type, whilst Fritzsche, McIntire, and Yost (2002) found that this link was more strongly moderated by the type of environment. Johnson and Stokes (2002) examined the relationship between congruence, interests and career stability 30 years after college and found that long term career stability was positively related to increased breadth of vocational interests during college. This finding suggests that students should be encouraged to explore as many interests as possible during their college years. A recent study of engineering students considered interest congruence factors as well as achievement variables in order to understand the choice of major and of student retention on campus (Robbins, Sawyer, & Hovland, 2004). They found that in the fields of science and technology, mathematical achievement was more important in determining student retention on campus than the congruence between interests and engineering major.

International congruence studies

A study of Australian and Scottish vocational teachers reported that *incongruent* teachers suffered more psychological and physical strain than their more congruent peers (Pithers & Soden, 1999). In their study of Israeli military officers, Tziner, Meir, and Segal (2002) found a positive correlation between work performance and congruence. However, Meir and Segal-Halevi's (2001) study of Israeli paratroopers found that group importance had a stronger effect on role satisfaction than environmental congruence. Meir and Green-Eppel (1999) found that they could not relate congruence with environmental satisfaction and emotional being in a sample of Israeli infantry soldiers. In a study of Pakistani university students Khan and Alvi (1990) found congruence between the first letter code on the Self-Directed Search (Holland, Fritzsche, & Powell, 1994) and a chosen field of study, but failed to correlate career readiness and consistency in Self-Directed Search two point codes.

Congruence indices

Most of the studies reviewed do, to a greater or lesser degree, support the idea that congruence is an indicator of satisfaction. However, some studies have shown that personal characteristics, interest types, vocational identity or expectation of satisfaction may be more closely related to job satisfaction than congruence. Holland (1997) suggests that this confusion highlights the need for improved research designs, a revision of theory or the investigation of existing congruence indices leading to the development of better congruence indices. The latter option proved to be the more popular choice in studies by Spokane (1985), Assouline and Meir (1987), Camp and Chartrand (1992), and Brown and Gore (1994). In many cases, the existing indices were found to be skewed or unable to illustrate all possible scores. As a result of their findings, Brown and Gore (1994) developed a new congruence index, known as "C", which is closely related to theory, easier to calculate, and sensitive to code orders. In their study of adult workers, three different methods were used by Lent and Lopez (1996) to calculate congruence, but the authors found each method to be problematic. They suggested that existing measures of congruence and prediction of job satisfaction were inadequate.

Holland (1997) however remains sceptical of the "ability of any index to make a major difference in congruency outcomes" (p. 166) and instead considers good sampling procedures to be the main distinguishing characteristic of successful research. In addition, studies should be controlled for type, socioeconomic status and gender where applicable. Gati, Garty and Fassa (1996) have suggested that the focus on interests in the assessments of congruence was too narrow and that other factors should be taken into account.

Summary of international research

Research on Holland's theory prior to 1985 was predominantly positive, with more emphasis and clearer results on the personality types than on the environmental types. There is some evidence to support that personality types search for congruent working environments, but Holland advised that future research should attempt to control for other influential variables. Before 1985 the research on person-environment fit, differentiation and consistency was ambiguous, which led to criticisms that the definition of person-environment fit was too simplistic. The

construct of identity did not receive much support and, as one of the new newer constructs, was destined to be studied in greater detail in the future.

According to Holland (1997), the main hypotheses of his theory are supported by reviews of recent research conducted between 1985 and 1996. However, Holland states that the amount of research effort and progress made varies greatly from one topic to another. Many studies have been conducted on the links between Holland's *personality type* formulations and one or more of the following; the Big-Five personality factors, heredity, life history, abilities and competencies and cognitive styles. Holland's personality type formulations and his measure, the Self-Directed Search, have been strengthened and supported by the large number of studies that have investigated their link to various personality inventories and to the more robust Big-Five personality variables, i.e., Neuroticism, Extroversion, Openness, Agreeableness, and Conscientiousness. These studies have largely supported Holland's personality typology. Arbona (2000) cautions us to remember that the assignation of a specific Holland type reflects an individual's degree of similarity to hypothetical prototypes which represent complex combinations of personality characteristics. Therefore, the same Holland type would have different meanings for different individuals. Family and life history studies support the assumption that different types have histories that are to some degree consistent with the type that a person resembles. Recent contemporaneous and longitudinal studies consistently relate personality types to career interests and career success (Arbona, 2000).

By comparison, Holland's *environmental models* have not been a popular research choice. Early research was often unclear; whilst researchers found that personality types did in fact search for congruent work environments, they also realised that other variables strongly influenced job search behaviour. More recent research has been largely supportive of Holland's environmental models.

Holland's secondary constructs of *differentiation* and *consistency* still had low research status up to 1996, but Holland has stated that he hopes that certain revisions and clarifications would lead to meaningful future studies. By contrast the construct known as *identity* which was only included in the theory in 1985 has proved to be a robust and valid variable, with significant practical value.

There is a noticeable decline in the number of research studies focusing on the characteristics of the types, in contrast to the increase in studies of person-environment interactions (Holland, 1997). The concept of *congruence* and the

indices used to assess congruence have received considerable research attention and support, as has the organisational and structural benefits of Holland's classification system and his hexagonal model. However, the results from the increasing number of studies conducted on cross-cultural, cross-national, minority and special needs groups seems to indicate that congruence is a concept that can best be applied to those who have the privilege of choice.

General *cross-cultural* studies have looked at the relationship between career interest typology and culture/population group. Luzzo and MacGregor's (2002) research review has highlighted the fact that the career development of American and international students is an increasingly popular research topic. These studies usually focus on how the interests of different population groups differ, the prestige levels of work that they tend to aspire to, as well as the degree to which the congruence, consistency, differentiation and identity constructs apply to other cultures. The differentiation, consistency, congruency and identity constructs have also formed the basis of studies conducted on cross-cultural samples. However, such samples have been adults or university students with insufficient research on adolescents. It is important to be aware of the influence of socio-economic status and education levels on the interest typologies of individuals when reporting on the results of cross-cultural studies. Although there is an increase in the amount of Holland-based research on African-American samples, there are still substantial gaps in cross-cultural research. By exception, Holland's hexagon has been the subject of a wide range of cross-cultural and gender research studies (Schonegevel, 1997). The findings of recent studies underscore the importance of considering factors such as acculturation, family involvement and expectations in career counselling sessions with different cultural groups, rather than simply considering the codes generated by measures such as Holland's (Arbona, 2000). Generally, Holland's theory has been found to be applicable to samples of Native-American high school students (Brown, 1995) and Hispanic-Americans (Arbona, 1990; Fouad, 1993). However, cross-cultural studies conducted in the United States, South Africa and other countries indicated that career counsellors and practitioners should be careful not to assume the cross-cultural validity of Holland's theory and should not limit their assessments to the interest type profiles of their clients (Young & Chen, 1999).

In the past there has not been much research on *gender* issues in career theories. Gender differences in Holland's typology seem to be due to environmental variables, restrictions and pressures. In recent years research into Holland's theory with a particular emphasis on gender has been more numerous, especially with regard to personality and environment typology, and the interaction of person and environment amongst women. Research on the structure of interests seems to indicate that apart from White Americans of both genders, the next most positive support for the applicability of the hexagon is female African-Americans. There seems to be a lack of research focusing on gender differences within Holland's constructs of differentiation, consistency and identity. More specifically, there is a significant lack of research focusing on the interests and aspirations of adolescent females.

Since the inception of Holland's theory the main hypotheses have been tested in *international* studies in the following countries Austria, New Zealand, Canada, The Netherlands, Switzerland, Italy, Israel, Nigeria, and Guyana (Holland, 1997). From 1985 onwards, Holland's typology and related assessment instruments were tested or used in research projects in Belgium, China, Japan, Greece, Poland, Slovenia, Sweden, Germany, Finland, England, Portugal, South Africa, Peru, and Taiwan (Holland, 1997). Research is predominantly based on Holland's four theoretical assumptions and the consistency, differentiation, identity and congruence constructs, as well as the hexagonal model. Nevertheless, Flores et al. (2003) state that international research on Holland's theory is extremely diverse and they emphasise the particular challenges to career theory and practice posed by historical, cultural and socioeconomic changes, especially in areas such as Australia, the Pacific Islands, New Zealand, East Asia, and South Africa. In general, Holland's theory, his typology, and his classification system have been found to be valid and useful in other nations.

Overall, research since 1985 has served to highlight and emphasise the known strengths and weaknesses of Holland's theory as it continues to be used in research and in practice. The review of career theory and career assessment literature reflects similar trends to those found by earlier reviewers (e.g., Arbona, 2000; Oliver, Lent, & Zack, 1998; Young & Chen, 1999). Holland's interest typology continues to remain prominent and, although his structure of interests has ambivalent support and remains an unresolved issue, there has been an

encouraging increase in research in previously neglected areas such as multi-cultural, minority, special needs and gender studies. More frequently in recent years, factors such as gender and ethnicity have become a particular focus in career research underlining the importance of contextual factors. According to Arbona (2000), there is an increasing trend towards factors such as gender, race, ethnic minorities, persons with disabilities, with many findings indicating that Holland's theoretical ideas apply to these groups as well. In addition, there is a trend towards an increased use of adult and adolescent samples, rather than the previous extensive use of college and university students.

South African research on Holland

South African research on Holland's theory and models has not been prolific. As a result the following section includes research from both the pre- and post-1985 periods and will include the following sub-sections: personality types, environmental types, interactive studies of personality and environment typologies, and a summary.

Personality types

Even though Holland's Self-Directed Search (Holland, Fritzsche, & Powell, 1994) measure was introduced to South Africa in 1977 (Gevers, Du Toit & Harilall, 1995), there has been very little research on the applicability of the RIASEC personality types in the South African context. However, it is encouraging to note that South African studies based on Holland's theory and measures are increasingly more representative of all its cultures.

A study which examined the validity of Holland's theory on an adult sample of English- and Afrikaans-speaking workers showed substantial score variations across the six personality types (Van Der Walt, 1994). This finding supports the hypothesis that specific career preferences exist for the six different personality types. Furthermore, Du Toit (1988) found in a sample of Black adolescents, that academic achievement was linked to Realistic, Investigative and Enterprising personality types. In a study similar to that of Bolton's (1985) discriminant analysis of Holland's occupational types using the 16PF, the link between Holland's typological formulations and the 16PF was studied by Neethling (1987), using a sample of White adolescent males, with similar results. Neethling found higher levels of tough poise in Realistic and Investigative types and lower levels of tough poise in Artistic and Social

types. In addition, Neethling found higher levels of independence and lower levels of anxiety in Investigative types and more extroversion in Social and especially in Enterprising types.

In a study of Black adolescent males (Du Toit, 1988), the Social type was predominantly chosen as the Self-Directed Search high point code. It is interesting to note similar results from Littig's (1968) study of African-American university students, whose interests at that time seemed to be predominantly of the Social type. The similarities between Du Toit's and Littig's studies are intriguing and it would be valuable to repeat these studies in order to compare their results and comment on any differences in the results. Watson, Stead, and Schonegevel (1998) conducted a study with a sample of Black disadvantaged South African students in order to examine the cross-cultural and gender structural equivalence of Holland's theory and did not find an acceptable level of fit to Holland's hexagonal structure.

With regard to Holland's *consistency*, *differentiation* and *identity* constructs, South African research has produced some positive results. Van der Walt's (1994) study on a sample of English- and Afrikaans-speaking adult workers reported a relationship between job satisfaction and consistency, whilst Neethling (1987) found support for a link between differentiation and career maturity and self-knowledge. Holland's consistency construct was strongly supported in Du Toit's (1988) study of Black adolescents, in which 97% of the females and 92% of the males in the sample were found to possess high to medium levels of consistency.

South African research on Holland's structure of interests and his hexagonal model has led to conflicting results. Van der Walt (1994) found that the structure of interests generated by a sample of adult workers conformed generally to Holland's theory. Du Toit's (1988) study of Black adolescents found that, whilst the order of their interest structure conformed to Holland's RIASEC order, their interest structure did not conform to either a hexagonal or a circular shape. This was not the case with Wheeler's (1992) study on Black grade 12 students, whose order of interests was RISEAC. Neethling (1987) also found the structure of interests to be skewed, despite the fact that the sample consisted of White adolescent males who usually tend to fit Holland's model better than other cultural groups.

Neethling's (1987) research supported the applicability of Holland's theory in assisting White South African males in career decision-making. Malan (1987) investigated the use of Holland's theory in a South African career guidance

programme and could not support a link between academic performance and consistency and differentiation. Van der Merwe (1990) looked at a model whereby Self-Directed Search scores could be used to predict occupational codes, which are to be found in the Dictionary of Holland Occupational Codes (Gottfredson, G. D. & Holland, 1996), a comprehensive dictionary characterising the environments of 12,860 different occupations. A number of South African research studies have used Holland's theory to organise personal and environmental data. Holland's typology was used in a training programme to assist high school students in making subject choices (Scheepers, 1996) and to examine the link between personality and management potential (Jacobs, 1982). As most of the positive Holland-based research in South Africa has been on White males, it is worth noting an important study using a sample of Black adolescents in which Du Toit (1988) found that only 15 of the 228 items needed to be revised in order to make the Self-Directed Search (Holland, Fritzsche, & Powell, 1994) relevant and applicable to this sample group.

Environment types

According to Schonegevel (1997), no South African studies have been conducted on the applicability of Holland's theory to *environmental types* and their nature, and to career search behaviour. The present researcher has found that there have been no studies in the eight years following Schonegevel's review on environmental types.

Interactive studies of personality and environment typologies

In South Africa congruence research has tended to focus on samples of employed adults and has been largely unresponsive of Holland's theory (Mare, 1992; Uys, 1987; Van Rooyen, 1990). A study conducted on a sample of adult workers that found support for personality and environment congruence did not include testing for job satisfaction, stability or achievement (Van der Walt, 1994). However, in a study using a sample of White university students, Malan (1987) reported a strong relationship between congruence and academic performance. Positive correlations for White adolescent males were also found between congruence and career knowledge and stability of career choice (Neethling, 1987), whilst Du Toit (1988) reported moderate levels of congruence between interest typology and chosen careers in a sample of male and female Black adolescents.

Further research is needed in South Africa to determine the interest structure of adolescents and adults and the influence of culture, socioeconomic status and gender on such interest structures. More research is also needed on female South African samples (Schonegevel, 1997). In particular, with reference to the current study, there is a lack of research focusing on the applicability of Holland's suggested codes to specific South African occupations.

Summary of South African research

South African research has to a large degree focused on white males. There are signs of increasing studies on black South Africans but still not enough considering the population ratio of black to white South Africans. There is a noticeable need for more research on Black South Africans and studies focusing on females.

According to Schonegevel (1997), not enough research has been conducted on South African university student populations. There is a need to look at the spread across all six of Holland's personality types, to ascertain if the interest structure of certain South African population groups is skewed towards certain typologies as Du Toit's (1988) study suggests. South African research has tended to focus on the practical application of Holland's theory rather than on its theoretical assumptions themselves. Theoretical assumptions should be tested in the South African context and congruence studies on adolescent and adult samples conducted, particularly as there is considerable international research on the personality and environment type interaction. According to Watson and McMahon (2004), there is still a lack research on the use of career theory with samples of children under the age of 14. Research conducted on 883 South African and Australian children aged between 11 and 14 years found that Holland's career theory could not adequately explain the process children use to match personal characteristics to occupational aspirations.

Watson and Stead (2002) encourage both researchers and practitioners to be aware of the applicability of career theory to the South African culture. Most needed would be a large and thorough cross-cultural South African study to determine the validity of Holland's theoretical model and its practical applications. Ideally this study should include gender and socioeconomic variables and their influence on career development and career choice.

Of concern to the present researcher is that little research has been conducted with regard to the appropriateness of the three-letter personality codes in the South African context. This aspect warrants further study, particularly as the occupational codes for South Africa have not been updated since their development (Taljaard & von Mollendorf, 1987), this despite the fact that there have been significant changes in certain fields of work since then. In addition, many of these codes have been derived and developed from codes that are more relevant to American than to our South African context.

Research on Holland's occupational codes

The following section contains a review of Holland-based research focusing on studies more directly related to the aims and goals of this treatise, that is, those studies that have examined or evaluated the appropriateness and transportability of Holland's Interest Code typology. Preference will be given to studies that have made use of the Self-Directed Search (Holland, Fritzsche, & Powell, 1994) and three-letter codes.

While the past forty years has generated extensive research of Holland's theory and typologies, this study concerns itself particularly with the concept of the relevance of Holland's occupational codes in the South African context. Thus, this section of the research review will focus on research that has examined the appropriateness of Holland's theory as it relates to his occupational codes. Holland's Dictionary of Occupational Titles (Gottfredson, G. D. & Holland, 1996) has been the focus of numerous researchers. McDaniel and Snell (1999) highlighted the almost universal acceptance of Holland's occupational codes by career-oriented occupational information systems. Many career resources, including two major career information systems in the United States (i.e., The Department of Defense's ASVAB Career Exploration Program and the Department of Labour's O*NET system) have incorporated the RIASEC model and have been coded according to the Holland classification system.

According to Holland (1997), tests of single occupational codes are valuable in identifying poorly defined categories. Schonegevel (1997) stated that the results of most of these studies support the validity of Holland's occupational category descriptions. Gottfredson, L. S., (1980) found that work requirements were consistent with Holland's occupational descriptions. Reardon, Vernick and Reed

(2004) analysed employment data from the United States census dated between 1969 to 1990 using Holland's classification system and reported relative stability despite apparent shifts in the labour market and the world of work over the decades. Despite research findings that support the long-term stability of Holland's codes (Miller, 2002), some environmental codes appear to be more stable and less susceptible to changes in the workplace than others. For example, a study of medical students (Borges, Savickas, & Jones, 2004) found that 86% of the participants had Investigative as their primary or secondary code letter, whilst 48% had a combination of Investigative and Social (IS or SI) as the first two letters of their RIASEC code. Richards (1977) study of 74 health assistant students resulted in the occupational code of ISA, which is the same code listed for physicians. Celmer and Winer (1990) found that the occupational codes for priests and women aspiring to occupations in the priesthood closely resemble the codes for clergymen as listed in the Dictionary of Holland Occupational Codes (Gottfredson, G. D. & Holland, 1996). In general, such studies support the accuracy of the occupational codes or the need, in some cases, for minor modification (Holland, 1997). Matkin and Bauer (1993) and Matkin, Bauer, and Nickles (1993) conducted studies on 494 rehabilitation counsellors. They found that there were individual variations due to variables such as work site, gender, and occupational satisfaction, but that the overall code for the total sample of men and women was SIA.

Despite such findings, Chartrand and Walsh (1999) highlight the possibility that the changing nature of work could make some occupational codes obsolete. The following studies have raised concerns about the appropriateness of Holland's codes and this review includes those studies that have looked at the codes of specific occupations such as accounting, the armed forces, psychology, and teaching (e.g., Meir, Hadas, & Noyfeld, 1997; Ostroff & Rothhausen, 1997).

Zachar and Leong (1997) found that Holland's codes were more useful in predicting and differentiating amongst psychology specialty areas than measures of preferences. Upperman and Church's (1995) study on soldiers in the United States found that the majority of soldiers were Realistic types (which fits Holland's Dictionary of Occupational Codes), but that Holland's codes could not make predictions about specific divisions and specialisations within the army. Aranya, Barak, and Amernic (1981) conducted a similar study on Canadian chartered accountants and concluded that accountants have not been unequivocally defined in

terms of Holland's personality codes. In a recent study of 228 staff nurses in a hospital setting in Tennessee, Dockins (2004) found that the three-letter Holland personality code obtained from testing nurses (i.e., SIA) agreed with the code prescribed in the Dictionary of Occupational Codes for nursing professionals. However, when the nursing environment was assessed using the Position Classification Inventory (Gottfredson, G. D. & Holland, 1991) the environmental code obtained was Social-Realistic-Conventional (SRC). The Position Classification Inventory is a convenient tool for creating codes for new or unusual occupations or positions and needs a sample of only eight to ten participants to obtain a reliable three-letter occupational code (Holland, 1997). While it can be argued that the change in environmental code is due to staff shortages and the changing world of work, the fact remains that these professionals find themselves in an incongruent environment. It is likely that a significant percentage of these individuals have based their career decisions on their congruence with an environmental code that is no longer relevant.

Schwartz (1992) reported that his research provided clear evidence that Holland's codes were not reliable guides for those individuals in the fields of dentistry and nursing. Holland's code for nurses is SIA, whilst actual studies of the type of work expected of nurses today is more accurately described by including the Realistic typology. Similarly, the order of the code for dentistry (ISR) suggests that Investigative interests are of primary importance for this field of work. Schwartz states that his review of research indicates that Realistic interests are essential to the needs of dentistry, while the "relevance to dentistry of Investigative interests is not very apparent" (Schwartz, 1992, p. 181). As these studies suggest, those occupational contexts which are characterized by significant change may no longer have an appropriate Holland typology code. Calitz, Watson, and de Kock's (1997) study found that the RIASEC code profile of Information Technology students has changed since the 1970's and 1980's from predominantly Realistic and Investigative types of various combinations (RIE, IRE and RIE) to predominantly Investigative and Social types.

Swanson and Parcover (1998) recommend that more attention be paid by researchers to the environment portion of the personality-environment fit. This refers to the measurement of the environment by means of something like the Position Classification Inventory (Gottfredson, G. D. & Holland, 1991) to establish the

environmental code. Rounds and Tracey (1996) cautioned that the RIASEC inventories could not and should not be used in other countries without due consideration of their questionable cross-national and cross-cultural applicability. Fouad (2002) also recommended that career counsellors and researchers should recognise and take into account gender, racial and ethnic group disparities. Chartrand and Walsh (1999) emphasise the importance of the accurate measurement and refinement of work environments. Gottfredson, L. S. and Richards (1999) examined the appropriateness of Holland's occupational codes by examining the findings of various international studies and concluded that the validity, or as this study terms it, the appropriateness of the classification of occupations and environments is an understudied aspect of Holland's theory. Arbona (2000) has stated that few studies have examined the efficacy of career interventions. This statement was echoed by Swanson and Parcover (1998) who reported that too little attention has been paid to the evaluation and appropriateness of counselling interventions. Holland's dictionary of occupational codes is an example of such a counselling intervention tool and its appropriateness to the South African context requires further research. The South African Dictionary of Occupations (Taljaard & von Mollendorf, 1987) contains codes for South African occupations according to Holland's theory.

Stead and Watson (1999) indicate that the focus of local researchers should be on career issues that are pertinent to South Africa. With the results of the above mentioned studies in mind, the present researcher is concerned that potential game guides in South Africa may have their interests assessed with the use of a measure such as the Self-Directed Search (Holland, Fritzsche, & Powell, 1994) and may be told that their code is not congruent with the environmental code which is provided for that occupation in the Dictionary of Occupational Codes. Certain sections of the Dictionary may be outdated and the code may no longer reflect the interest requirements of the current work environment. In countries other than the United States, few research studies have addressed the concurrent validity of Holland codes (Harrington, 1993).

In South Africa, little research has been conducted on the appropriateness of Holland's six personality types, even though the Self-Directed Search measure was introduced into the South African context in 1987 (Gevers, Du Toit, & Harilall, 1995). Van der Walt's (1994) study of a sample of workers from 60 different categories and

sub-categories of occupations suggested that Holland's model was applicable in South African circumstances. The current researcher suspects that in cases where Holland codes have been found to be applicable to certain careers for South African populations, that those occupations are relatively similar to their counterparts in other countries, particularly the United States. The codes have been extended and revised where necessary but in less than one percent of these revisions has it been necessary to change the first letter of a three-letter code (Holland, Powell, & Fritzsche, 1994). However, there are cases where the occupational codes listed in the Dictionary of Holland Occupational Codes (Gottfredson, G. D. & Holland, 1996) and the South African Dictionary of Occupations (Taljaard & von Mollendorf, 1987) do not correspond. For example, the code for draughtsman in the Dictionary of Holland Occupational Codes is RIA, but appears as RIE in the South African Dictionary of Occupations. Holland states that these differences, when they occur, are usually in the second or third letter of a three-letter code. He explains that the differences in these codes are due to the different information applicable to a specific occupation in the country where the dictionary was compiled. However, the current researcher is concerned that some of the prescribed occupational codes listed in the South African Dictionary of Occupations (Taljaard & von Mollendorf, 1987) may still be based predominantly on the code for similar occupations in the United States, and therefore may not be suitable for certain specialised occupations, such as field guiding in South Africa.

In order to demonstrate the significant differences between related fields of work in the United States and South Africa, Table 2 below compares the job description for South African field guides with that of American park naturalists. The term "field guide" does not appear in the Dictionary of Holland Occupational Codes (Gottfredson, G. D. & Holland, 1996) and "park naturalist" is the closest descriptive match the researcher could find to the South African occupation known as field guiding. The table clearly shows that, despite the fact that the occupation known as park naturalist shares the SRI occupational code allocated to South African field guides in the South African Dictionary of Occupations (Taljaard & von Mollendorf, 1987), these careers in the two countries have fundamentally different challenges and expectations. Not only has the South African field guiding industry changed dramatically over the past ten years, but the present prescribed code for field guides in South Africa was established in 1987 and has not been revised (Taljaard & von

Mollendorf, 1987). It is therefore possible that the SRI code for this field of work in South Africa may need to be revised.

Table 2: A comparison of the job descriptions of South African field guides and American park naturalists.

	South African Field Guides	American Park Naturalists
Code	SRI	SRI
Job Definition	Leads and guides people into environments considered to be natural areas, in form of walking trails, game drives, horseback trails or boat and canoe trips in natural areas including game reserves and national parks – encompassing different types of terrain including riverine areas, mountains, savannah and coastline and many vegetation types within South Africa's biomes. A link between natural surroundings and clients, taking an educational role and providing a learning experience.	Develops programs to inform public of historical, natural, and scientific features of national, state or local parks. Conducts tours of these areas. Constructs visitor-centre displays, and develops audiovisual devices for public programs. Presents illustrated lectures and interpretive talks. Explains regulations, answers questions and provides information about park, facilities and surrounding areas.
Knowledge Base	FGASA (Field Guide Association of South Africa) Levels 1 to 3 and SKS (Specialised Knowledge and Skills) for specialist guiding in particular areas (eg. SKS Dangerous Game – guide can conduct walking trails with guests in high risk areas containing predators and “the Big Five”). Development of a broad theoretical and practical knowledge base of ecology, plants and grasses, geology and minerals, wildlife (mammals, reptiles, birds, sea-life, insects etc.), game and game lodge farming and management, astronomy, weather and climate, tracking etc. English and as many other South African and foreign languages as possible.	Biology Education and training English language
Other skills	Communication and client handling skills. Administrative and organizational skills. Interpretive and orientation skills. Culinary and catering skills. Problem handling (e.g. water and electricity supply). First aid and monitoring of client medication. Driving skills (4x4) and vehicle maintenance. Rifle handling skills.	Speaking, critical thinking, active listening, persuasion, reading comprehension, judgement and decision making, complex problem solving, systems evaluation, active learning, and monitoring.

Source: FGASA and O*Net Online website.

As can be seen in the table above, the job descriptions of South African field guides and American Park Naturalists differ widely and there are many more

requirements with regard to general knowledge base and the diversity of other necessary skills for South African field guides than there are for American Park Naturalists. Therefore one would not expect them to have exactly the same codes.

In addition to the concern raised above, there is concern about the suitability of the prescribed code for South African field guides, i.e., SRI, because it is limited to Social, Realistic and Investigative interests. A website document provided by the Field Guide Association of South Africa (FGASA, 2005) describes the skills, abilities, interests, experience and knowledge requirement for field guides working in the South African context, which are extremely diverse. An individual who has all these requirements would need to have knowledge, interests and experience in not only the Social, Realistic, and Investigative arenas, but in the Enterprising, Conventional and Artistic ones as well. A successful guide is likely to have a much wider range of high point interests than Social, Realistic and Investigative and one would expect that his Self-Directed Search generated interest code would reflect a much more complex range of interests and a more complex code than the three-letter SRI code prescribed by the South African Dictionary of Occupations (Taljaard & von Mollendorf, 1987).

Summary of research on Holland's occupational codes

According to Holland (1997), there is extensive and predominantly positive evidence for the usefulness of his occupational codes. The results of a large number of studies support the validity of Holland's occupational category descriptions and report relative stability despite apparent shifts in the labour market and the world of work. However, there is some concern that the changing nature of work could make some occupational codes obsolete and that the occupational contexts which are characterized by significant changes may no longer have an appropriate Holland typology code.

The present research review suggests that the appropriateness of the classification of occupations and environments is an understudied aspect of Holland's theory. Inventories and classifications should not be used in countries other than the one in which they were developed without due consideration of their cross-national and cross-cultural applicability. A code developed for an occupation in one country may not be applicable to that occupation in another country which may differ as far as the details of daily working life are concerned. A South African

version of the occupational codes has been developed but has not been updated since 1987, whilst the work of South African field guides has changed dramatically in recent years. This study, therefore, proposes to describe and explore the Self-Directed Search generated codes for a sample of South African field guides and field guide students in order to discuss the appropriateness of the prescribed code for field guides in South Africa.

Having discussed the body of international and South African research conducted on Holland's theory from 1950 to 2004 in general and on Holland's occupational codes in particular, the following chapter will focus on the methodology used for the study.

CHAPTER 4

METHODOLOGY

In Chapter 3 it was demonstrated that there is a lack of research focusing on the current appropriateness of Holland's occupational codes for populations other than White American males. In addition, the changing nature of work could make some occupational codes obsolete (Chartrand & Walsh, 1999). Gottfredson, L. S. and Richards (1999) have commented on the paucity of research into the appropriateness of the extant occupational and environmental classifications of Holland. Concern has also been raised in a number of countries about the codes of specific occupations (Aranya, Barak, & Amernic, 1981; Dockins, 2004; Meir, Hadas, & Noyfeld, 1997; Ostroff & Rothhausen, 1997; Schwartz, 1992). In general, researchers have cautioned against the use of American career theories in other countries without due consideration of their cross-national and cross-cultural applicability (Rounds & Tracey, 1996), and without taking into account gender, racial and ethnic group disparities (Arbona, 1999; Fouad, 2002; Swanson & Parcover, 1998). More specifically, Stead and Watson (1998) maintain that it is important for South African researchers to focus on career issues that are pertinent to South Africa. Nevertheless, little research has been conducted on the national appropriateness of occupational code typologies such as Holland's Dictionary of Occupational Codes. Additionally, whilst many occupations have changed significantly in the past twenty years, the South African Dictionary of Occupations (Taljaard & von Mollendorf, 1987) has not been updated since it was introduced to and adapted for South Africa.

As a result, the present researcher was concerned about the use of occupational codes that may be outdated or simply not applicable to the South African context. In cases where Holland's occupational codes have been found to be applicable in other countries, it is likely that those occupations are relatively similar to the same occupations in the United States of America. As discussed in Chapter 3, the occupation of field guiding in South Africa cannot be compared to the work undertaken by guides, rangers, and forestry workers in the United States and, therefore, the codes for this career field may differ across nations.

In general, the present researcher aimed to explore and describe the interest codes of South African field guides and field guiding students that were generated by

the Self-Directed Search questionnaire and, further, to reflect on and discuss the appropriateness of Holland's prescribed occupational code for the career field of the guiding profession. This general aim is outlined more specifically in the following section.

Aims

This study made use of aims rather than hypotheses. In order to lessen theoretical bias and maximize the use of descriptive data and exploratory analysis, Philips, Strohmer, Berthaume, and O'Leary (1983) advocate the use of aims rather than hypotheses when conducting descriptive research. The overall aim of the present study was to explore and describe the interest codes of male and female South African field guides and field guiding students in order to discuss the appropriateness of the occupational codes prescribed by Holland for the field guiding profession.

More specifically, this study aimed to:

1. explore and describe the Self-Directed Search generated profile of interest codes of the total sample.
2. explore, describe and compare the generated profile of interest codes of males and females.
3. explore, describe and compare the generated profile of interest codes of the field guide students and the working field guides.

Initially the researcher intended to include an exploration and description of the generated interest codes for different cultural groups. Due to the low numbers of non-White participants (a reflection of the demographics of this occupational field) this was not feasible. Based on the aims outlined above, a description of the research design used for the present study follows.

Research design

The research focus and aims of this study lent themselves to the use of a quantitative, exploratory and descriptive research design. Quantitative research deals with data that is principally numerical in nature (Leedy, 1993). The data for this study was collected by means of a questionnaire and the responses were

transposed into nominal data and dealt with in a quantitative manner (De Vos, 2000). Within the quantitative context, the research method was exploratory-descriptive in nature. Exploratory-descriptive research aims to observe, record and describe the behaviour of interest, a primary and necessary goal for the development of scientific knowledge (Cosby, 1997).

Exploratory-descriptive research increases our understanding of a particular field or construct and assists in the development of theory (Eaton, 2001). The present study was exploratory as there is a paucity of South African research on the appropriateness of the Self-Directed Search interest codes outlined by Holland for particular occupations. Descriptive research involves the collection of information in order to describe the current situation in a particular area. It does not involve the manipulation of an independent variable to establish causality with a dependent variable.

There are disadvantages to exploratory – descriptive research. One of these is the difficulty in controlling extraneous variables, such as gender and culture. Historically, there seems to be a bias towards white male field guides but the industry is diversifying. In an attempt to accommodate potential extraneous variables, the researcher analysed the data for males and females separately so as not to confound the results. Due to the low numbers of non-White participants it was not feasible to analyse the generated interest codes for different cultural groups (AmaXhosa, n = 3; AmaZulu, n = 1; Setswana, n = 1) separately.

Participants

Population

In describing the population for this study the researcher referred to the Field Guides Association of Southern Africa's (2003) description of the professional field guide as someone with an "ethical safety conscious approach to providing the visitor to the African bush with a pleasant experience" (p. 1).

According to the Field Guide Association of Southern Africa (FGASA, 2005), the official nationally recognised Field Guiding Association of South Africa, who showed interest in and supported the concept of this study, a field guide is defined as follows:

a person that leads and guides people into the environment considered to be a natural area. The field guide may operate on foot (walking trails), in vehicles (game drives), on horseback or in a boat or canoe, in natural areas including game lodges and national parks. The field guide acts as a link between the natural surroundings and the clients, taking an educational role (p. 1).

The earliest available reference to game rangers in South Africa and their connection to guests can be found in John Pringle's, "The Conservationists and the Killers" (1982), where he describes trips set up in 1923 by the Railway Administration. Marketed as round-in-nine-day tours, these consisted of a railway trip through the then Eastern Transvaal and into Lourenço Marques (now known as Maputo) and back by a different route. The ranger travelled with the guests, stopping at each station to take passengers on a short guided tour through the bush. These trips became increasingly popular, and the Game Protection Association realised that visitors could play a very important part in promoting wildlife area conservation. They could serve as a political crowbar to protect the infant Kruger National Park and the concept of wildlife conservation. It is interesting to note that a guide/ranger was a direct link between the public and the bush. The term "game ranger" properly describes a land manager, while the term "tour guides" focuses on the cultural and historical aspects of an area, rather than the environment.

As a result of new developments and increasing change in the world of work, certain career paths continue to change and become more complex over time. These changes are mirrored in changes in the nature of the work and the minimal entrance requirements for certain careers. One career that has changed significantly in South Africa in particular over the past two decades is that of the South African field guide. Whereas the minimal entrance requirements of a field guide in the 1980s consisted merely of a non-university matriculation and an interest in nature, today's field guides undergo formalised levels of theoretical and practical training, and are expected to acquire numerous and varied skills. According to the Field Guide Association of South Africa (FGASA, 2005), a typical two-year training course includes theoretical and practical modules on a wide variety of subjects, such as nature conservation techniques, game ranging practice and game farm management, animal studies, plant studies, ecology, geology, climatology,

taxonomy, astronomy, tourism, and small business management. These requirements for field guides are depicted in Table 3 in which the current researcher has linked the requirements to Holland's six personality and environmental interest types. It is interesting to note that the wide diversity of skills, interests and abilities required for success and satisfaction in this field of work are represented in all six of Holland's interest fields, which raises some doubt as to the appropriateness of the prescribed three-letter code representing only the Social, Realistic and Investigative interest typology fields (SRI).

Field guides are expected to have certain personal attributes such as punctuality, compassion, flexibility, assertiveness, resourcefulness, integrity, self-confidence, and a sense of humour (FGASA, 2005). They are expected to develop many additional skills, such as communication, orientation, catering, camp organisation, vehicle maintenance, client handling, problem solving, and first aid (FGASA, 2005). Ecotourism, and the field guiding industry in particular, is highly sensitive to and reliant on the professionalism of field guides. High staff turnover in the tourism industry leads to high costs and unpredictable levels of expertise. With the amount of training, experience and specialisation required for this particular career, it is important for field guides and their employers to achieve the highest possible standards of career satisfaction, stability and achievement.

When assisting individuals to choose a career, career guidance counsellors make use of various tools, including Holland's Self-Directed Search and the Dictionary of Occupations. It is important to ensure, therefore, that the existing prescribed occupational codes do continue to adequately describe the interest profile of individuals seeking to enter a particular career. The South African Dictionary of Occupations (Taljaard & von Mollendorf, 1987) suggests the code of SRI (Social, Realistic and Investigative) for a variety of "field guide type" careers, including Forest Ranger, Game Ranger, Game Warden, Ranger, Tour Guide, Zoo Keeper, and Zoologist. However, as can be seen in Table 3, the competencies required of field guides in the South African context encompass all of Holland's interest typology fields. The terms 'game ranger', 'game warden' and 'ranger' all encompass career activities that a field guide would be involved in. Thus, for the sake of clarity, only the nationally recognised term of "field guide" will be used in this study.

Table 3: Career requirements for South African field guides and Holland's six interest types.

	Holland's personality and environment types	Career requirements for field guides
Realistic	<p>R types enjoy working with machinery, tools or animals. Systematic problem solvers. Prefer working outdoors and dealing with concrete, measurable phenomena.</p> <p>R jobs require technical skills, a practical, concrete approach to challenges of the work environment - often based outdoors and can be physically demanding.</p>	<p>Should be healthy in body, spirit and mind. Should have skills in orientation, first aid, vehicle handling and maintenance of vehicles. Able to cope with problems pertaining to water and electricity supply. Sound driving skills, especially under difficult circumstances and ability to work in all weathers.</p>
Investigative	<p>I types are analytical, curious, methodical. Value use of complex/abstract thought to investigate phenomena and solve problems.</p> <p>I jobs require ability to view world in original, abstract, complex and independent ways and require the use of intellect, individual thought and independent work.</p>	<p>Should have knowledge and interpretive skills encompassing nature conservation, animal and plant studies, ecology, geology, climatology, taxonomy, astronomy.</p>
Artistic	<p>A types are interested and skilled in creative and expressive activities using words, sound, movement, colour and form. Imaginative, non-conforming, original and introspective.</p> <p>A jobs require use of artistic skills and use of unconventional, flexible, original ideas and the ability to solve problems with individual and intuitive thought.</p>	<p>Should be flexible, tolerant, and resourceful, able to solve problems creatively and independently. Have the opportunity to be creative by means of photography, art or writing to express their appreciation of animals and the environment.</p>
Social	<p>S types are friendly, understanding, helpful, sociable, enthusiastic, curious, competent and trusting. Like working with people as instructors, teachers, trainers, counsellors or caregivers.</p> <p>S jobs provide services required by public and require social values, social competence and the ability to work in training, developing, caring, and informing environments.</p>	<p>Should be friendly, compassionate, open, honest, helpful, and understanding. Have a sense of humour. Skilled in communication, client handling, training in tourism, and culinary skills. Should be able to take an educational role acting as a link between natural surroundings and the clients.</p>
Enterprising	<p>E types enjoy working with people but in a leadership, organisational, managerial and persuasive capacity. Optimistic and ambitious, confident, and status seeking.</p> <p>E jobs require ability to use aggressive social and leadership skills to reach the goals of the organisation. Requires risk taking, energy and resourcefulness.</p>	<p>Should be assertive and have self-confidence and have skills in small business management. Need to be in control of guests and their safety at all times. Should understand animal behaviour to ensure the safety of guests. Ambassadors for the country, the province and the reserve.</p>
Conventional	<p>C types are skilled in activities requiring attention to detail, accuracy, clerical skills, numerical and verbal data organisation and are conforming, methodical, neat and practical.</p> <p>C jobs require ability to work in ordered, systematic environments, manipulating data, filing, organising, and value order, dependency organisation, and task effectiveness.</p>	<p>Should be neat, tidy, and punctual, have a professional image and be well-informed of procedure and changes. Should always act in accordance with national legislation with regard to conservation and guiding. Should be able to perform administrative duties.</p>

Source: Holland (1997) and FGASA (2005)

In addition to the examinations written to qualify for the Damelin Diploma in Field Guiding and Game Lodge Management, field guides are obliged to write examinations which are compiled and controlled by FGASA. As the official association for field guiding in South Africa, the qualifications obtained through writing FGASA exams result in nationally recognised standard levels of expertise, from level one up to level three with SKS (Specialised Knowledge and Skills). FGASA level one guides are developing guides who can conduct a limited guided nature experience. Level two guides have at least one year of experience and can conduct a guided nature experience. Level three guides are professional guides with at least two years of experience who can conduct an advanced guided nature experience. Level three guides with SKS are professional guides with specialised knowledge and skills in a particular area of guided interest, such as SKS Dangerous Animals which indicates that the guide is qualified to conduct a guided nature experience with guests in areas containing dangerous animal species (FGASA, 2005). For the purposes of this study, level three guides with SKS are referred to as Level four guides.

Students can apply to write exams to obtain higher FGASA levels at their own pace, depending on the level of expertise they wish to obtain. Thus 'year of study' refers to number of years of study completed at Damelin, and often differs from the level of expertise as determined by the FGASA exams. There are approximately 7000 field guides and field guide students in South Africa at present. Of these, 5308 are registered with FGASA and this figure is growing on a monthly basis as registration with FGASA is becoming a requirement when applying for work in more and more game lodges (Hine, 2005). The 5308 registered individuals are made up of: 2058 new applicants, 2343 level one guides, 662 level two guides, 135 level three guides, and 111 level three guides with SKS (Special Skills) (Hine, 2005).

The population consists predominantly of white males. As FGASA have only just started recording race and gender on their data base, they are at present unable to provide exact figures of the number of different cultural groups and females in the industry. However, a FGASA spokesperson estimated that even though the numbers of non-White registered guides are increasing they still only constitute about four percent of the total. This does not take into account individuals that may be operating as trackers for different game lodges but are not registered with FGASA. The

numbers of registered female guides are increasing and females currently constitute approximately 25% of working guides and 30% of field guide students (Hine, 2005).

Sampling Technique

Non-probability purposive sampling was used in this study. Non-probability sampling is not based on randomization but rather on the judgment of the researcher (De Vos, 2000). A purposive sample contains those individuals who are typically characteristic of the attributes of a population. The disadvantage of purposive sampling is that not every individual in the population has the same probability of being selected. However, in order to minimize this disadvantage, once the decision was made to approach, firstly, two Damelin Colleges that were accessible and offered Field Guiding and Game Lodge Management courses, and, secondly, two Eastern Cape game lodges as a source of participants, all the individuals from these locations that fulfilled the sampling criteria were included in the sample for this study to obtain as large a sample as possible. As these participants are not representative of the general population of field guides and field guide students, the findings are not necessarily generalizable to the wider population of South African field guides and field guide students.

Sample

The participants in this study were limited to those who met specific criteria. The participants' ages ranged from 18 to 45 and included field guiding students, as well as qualified field guides employed in the field guiding industry. This was to ensure that the generated Self-Directed Search codes reflected not only individuals who are established in their chosen career, but also the codes of individuals who are studying towards this career. It was not possible for the current researcher to travel to all of the Damelin campuses in South Africa that offer the course in Field Guiding and Game Lodge Management, as well as to all of the game lodges in South Africa. Therefore, the total sample (N = 100) and gender sub-samples as depicted in Table 4 consisted of qualified field guides (n = 40) working in two easily accessible Game Lodges in the Eastern Cape, and students (n = 60) currently studying towards their Diploma in Game Ranging and Game Lodge Management at Damelin campuses in Port Elizabeth in the Eastern Cape and in Bramley in Gauteng.

Table 4: Characteristics of Total Sample

Total sample		Field Guide Students		Working Field Guides	
	n	n	%	n	%
Male	68	38	63%	30	75%
Female	32	22	37%	10	25%
Total	100	60		40	

As can be seen in Table 4, one quarter of the working field guide sample consisted of females. This gender distribution is typical of the gender distribution of registered working field guides nationally (Hine, 2005). The higher percentage of females in the student group (37%) is representative of the national trend of increasing numbers of females seeking a career as a field guide. The total sample therefore is reflective of the broader population with regard to gender distribution. As mentioned previously, the total number of non-White individuals ($n = 5$), was too low to constitute a separate and representative group and were thus excluded from the present study. The home languages of the remaining participants consisted of 61 English-speaking and 39 Afrikaans-speaking individuals, whose ages ranged from 18 to 45 years, with a mean age of 23 years. The age of the student group ranged from 18 to 26 years with a mean age of 21 years, whilst the working field guide group's ages ranged from 21 to 45 years, with a mean age of 27 years.

The *student field guide group* ($n = 60$) (refer to Table 5) was sourced from Damelin Colleges as described above, where the student participants were studying field guiding and game lodge management. All students were in possession of at least a Level 1 FGASA qualification.

Table 5: Characteristics of the Student Field Guide Group

Field Guide Students	n	Year of study completed		FGASA level attained	
			n		n
Male	38	One	21	First	35
		Two	17	Second	3
Female	22	One	8	First	19
		Two	12	Second	1
		Three	2	Third	2

The *working field guide group* members (n = 40) (refer to Table 6) were all registered FGASA members and in possession of at least the minimum (i.e., Level I) FGASA qualification. The working field guides were employed in the field guiding industry and were working as a field guide on a game lodge, national park or nature reserve in the Eastern Cape.

Table 6: Characteristics of the Working Field Guide Group

Working Field Guides	n	Year of study completed		FGASA level attained	
			n		n
Male	30	One	11	First	13
		Two	9	Second Third	7
		Three	2	Fourth	2
		Four	8		8
Female	10	One	4	First	2
		Two	4	Second Third	6
		Three	2	Fourth	2
		Four	0		0

Having examined the details of the total sample and the sub-samples, the following section focuses on the measures used.

Measures

The measures used in the present research include the Self-Directed Search Questionnaire (Holland, Fritzsche, & Powell, 1994) and a biographical questionnaire.

The Self-Directed Search

According to Reardon and Lenz (1999), the Self-Directed Search is the principal embodiment of Holland's theory with respect to career assessment. It is considered to be both an assessment and an intervention tool and is one of Holland's most direct translations of his theory to practice (Rayman & Atanasoff, 1999). The Self-Directed Search (Holland, Fritzsche, & Powell, 1994), which is to be used in this study, is based on the theoretical model of Holland (1992, 1997) and was originally developed in the United States of America in 1970 by Holland (1985a) in order to provide a questionnaire which would operationalize the structure of his theory of career choice and which could also be used in career guidance practice.

Description

Holland developed various interest inventories based on his theory, such as the Self-Directed Search (Holland et al., 1994), which was originally developed in 1970. The Self-Directed Search was developed as an inventory that could explicitly relate interests to occupations and has been subsequently revised several times, the latest revision being in 1994. These revisions included the rewriting of approximately one quarter of the items which resulted in increased scale validity and the reduction of age and gender biases. The Self-Directed Search measures perceived abilities, attitudes and occupational daydreams and generates a three-letter coded profile of interests for an individual which reflects occupational types according to Holland's personality typology. It follows that if an individual's three-letter interest code is matched to their chosen occupational type, they should experience more satisfaction, well-being and happiness in that occupation. The Occupations Finder (Holland, 1994) and the Holland Dictionary of Occupational Codes (Gottfredson, G. D. & Holland, 1996) are tools that were developed to identify the occupations that match the interest code generated by the completion of the Self-Directed Search.

The Self-Directed Search forms a valuable part of career planning, providing important information about a person's occupational interest. In addition, it facilitates the establishment of a correlation between personal and career information. The Self-Directed Search items take into account the activities preferred by the test taker, the skills they already have (or have knowledge of), the occupations they are interested in, and the test taker's own assessment of his abilities. With this information test takers can access information about a wide spectrum of possible occupations via an occupational classification system. The related explanatory booklets can be used to provide comprehensive assessment and intervention programs to help clients plan for their education and career without much assistance from a career counsellor (Arbona, 2000). According to Lumsden et al. (2002), the Self-Directed Search is one of the most widely used interest inventories, and it is one of a few instruments that is available in multiple formats, including paper-pencil, personal computer, Internet, mail-in scoring and kit form. For the purpose of this study, the paper-pencil format of the Self-Directed Search was used.

The Self-Directed Search is comprised of four sections, each of which involves the six interest fields of R (Realistic), I (Investigative), A (Artistic), S (Social),

E (Enterprising) and C (Conventional). These four sections of the Self-Directed Search are as follows:

- Activities - The 66 items in this section include 11 items for each of the interest fields. The items list activities in the occupational world and allow test takers to indicate if they are interested in this activity.
- Competencies - This section also contains 66 items, i.e., 11 for each of the interest fields. The items deal with competence, working knowledge of the activity or an ability to competently carry out activities in that interest field.
- Occupations - The 84 items in this section include 14 items for each of the interest fields. Feelings and attitudes of the test takers towards various occupations are dealt with, as test takers indicate which occupations they find interesting or dislike.
- Self-rating of abilities or skills - In this section there are two groups comprising six abilities or skills which correlate with the six interest fields. Test takers rate their mechanical, scientific, artistic, teaching, sales and clerical abilities, as well as manual skills, mathematical and musical abilities, friendliness and general managerial and office skills.

For the first three sections of the questionnaire, participants are required to answer 'yes' or 'no' to a series of questions by shading the appropriate oval shape. The self-rating of abilities or skills section requires participants to rate themselves on a scale from 1 to 6. Subtotals are formed by adding together all of the 'yes' answers for each interest field in the first three sections. These subtotals, as well as the score obtained for each interest field on the self-rating section, are transferred to the table on the reverse side of the protocol sheet and totalled to form an accumulative score for each interest field. This results in an interest profile, such as SCRAEI, where the letters are arranged according to their obtained score from highest to lowest. A three-letter SDS code is recorded for the participant by entering the RIASEC letter with the first, second and third highest scores in the appropriate space, such as SCR. The SDS code is a summary of the activities that individuals prefer, the occupations that they are interested in pursuing, the skills they already have, and a self-assessment of their abilities. The resulting three-letter code can be used for counselling purposes by matching the individual's interest code to

numerous possible occupations listed under a matching prescribed occupational code.

The code can be matched to actual working environments with identical or similar codes by using one of the occupational dictionaries that were developed by translating job analysis data into Holland codes, such as the Dictionary of Holland Occupational Codes (Gottfredson, G. D., Holland, & Ogawa, 1982) which is used internationally, or The South African Dictionary of Occupations in which Taljaard and von Mollendorf (1987) used occupational information as it applies to the South African situation to allocate Holland codes to South African occupations.

Holland expanded on his original theory by introducing secondary constructs for describing and characterizing the interaction between the person and the environment (Peterson & Gonzales, 2000). According to Holland (1997), the secondary constructs are vital when applying the theory to practical situations.

Holland's differentiation construct provides a practical way of deciding when a difference between two summary code scores is large enough to be meaningful. Holland (1985) has advised the use of the 'standard error of difference' (p. 13) in which differences of less than 8 between the total scores for each interest should be regarded as trivial because they are within the limits of measurement error. That is, in looking at an SDS profile, the scorer should assume that scores are the same unless they differ by at least 8 points. Ideally, the three highest scores, separated in value from each other by a minimum of eight points result in a three-letter interest code.

The Self-Directed Search questionnaire also includes a section for "planned occupations" which is not taken into account when establishing the code or profile that is generated by the testee, but which is useful for counsellor-guided interpretation of the generated code. The testee is required to write down, in order of preference, three occupations they would like to follow in the future. This section, otherwise known as Occupational Daydreams, is derived from a study which showed that the planned occupations provided a moderate to efficient predictor of future occupations (Holland, 1963). The occupational daydreams also provide a crude check on the validity of the generated code. Additionally, Holland (1985d) has stated that the more congruent the codes for the testee's three occupational daydreams are, the easier it is to predict their future occupations. A more comprehensive interpretation of the SDS code can be obtained by applying Holland's secondary

constructs of differentiation, consistency and congruency which were described in greater detail in Chapter Two and reviewed in relation to research in Chapter Three.

Adaptation

The Human Sciences Research Council adapted and standardized the 1985 version of the Self-Directed Search questionnaire for South African use and amended or replaced the items from the 1985 American edition that contained unacceptable discrimination values (Bisschoff, 1987). This amended version will be the version used in this study as it is suitable for use on adults. The Self-Directed Search was part of the Discover computerized career guidance system which was adapted by the Human Sciences Research Council for South African use and was therefore included in the adaptations which were conducted under the licence of Psychological Assessment Resources in Odessa, Florida. The South African version of the Manual for the Self-Directed Search Questionnaire (Gevers, Du Toit, & Harilall, 1995) states that 14 items were modified to increase their suitability for conditions in South Africa.

An individual's self-perceived interests and competencies as represented by six vocational types or orientations is directly linked by means of the generated interest profile or three-letter code to the working world through the Holland Dictionary of Occupational Codes (Gottfredson, G. D. & Holland, 1996). In 1987 a South African version of this dictionary, known as the South African Dictionary of Occupations (Taljaard & von Mollendorf, 1987) was developed.

Research and theoretical issues

Savickas, Taber and Spokane (2002) and Burkard, Boticki, and Madson (2002) found that the Self-Directed Search (SDS) was as equally effective in interest assessment as many other interest measures but that a broader understanding of the client could be obtained by using more than one inventory. However, Tracey and Darcy (2002) found that students were more decisive about their careers if they used Holland based instruments to categorise their interests. Their 2002 annual review led Flores et al. (2003) to emphasise the long-term predictive validity of Self-Directed Search scores and to conclude that "counselors can feel confident planning career interventions and experiences according to a student's Holland code that has been derived from the Self-Directed Search" (p. 130).

The reputation of the Self-Directed Search internationally as a reliable and valid measure is reflected in its use by researchers to test the validity of more recent counselling tools (Bikos, Krieshok, & O'Brien, 1998; Carson, 1998b; Miller & Cowger, 1998). The Self-Directed Search has been used successfully with high school students and with adults, and can be useful in determining a person's occupational interests during career counselling, selection and placement in business or industry, occupational or job classification, investigating alternative career possibilities via occupational codes, and determining an individual's personal development by re-administering the questionnaire after a period of time (Gevers, Du Toit, & Harilall, 1995).

Lumsden et al (2002) found that the administration method of the Self-Directed Search does not affect the score results obtained and that, despite the method of administration, its psychometric properties remain sound. According to Zunker and Osborn (2002), one of the main criticisms of the Self-Directed Search centres on a need for monitoring the self-scoring of the instrument. Additionally, individuals often need assistance in using The Dictionary of Holland's Occupational Codes (Gottfredson, G. D. & Holland, 1996). Peterson and Gonzalez (2000) state that gender differences in interest inventories such as the Self-Directed Search have been noted by many scholars and can be problematic when uninformed practitioners use interest inventory results to reinforce gender stratification in the working world. They note that subcultures with collectivist values do not encourage the introspection required by a client completing an interest inventory.

Reliability

Test reliability is established if a test measures consistently under varying conditions that can produce measurement error (Aiken, 1985). Holland (1985a) has reported high internal consistency reliabilities (>0.80) for the SDS. These high reliability coefficients have been echoed in two studies using the South African version of the SDS (Bischoff, 1987). According to Nel (1999), Holland's model and the SDS have been criticised for gender bias. However, Holland argues (1992) that the tendency of women to generate high Social, Conventional and Artistic scores and men to generate high Realistic, Investigative and Enterprising scores is a reflection of the choices made by men and women in the real world.

Validity

Test validity is defined as the degree to which a test or questionnaire actually measures what it is supposed to measure (Cosby, 1997). According to Holland (1997), there is continuous, positive evidence for the concurrent and predictive construct validity of the Self-Directed Search. In the studies quoted in the South African version of the Manual for the Self-Directed Search Questionnaire, Gevers, Du Toit, and Harillal (1995) state that the structure of the American version of the Self-Directed Search was retained, with only a few items being amended or replaced. As a result, support for the content validity of the questionnaire was obtained by calculations of the intercorrelations of the Self-Directed Search fields, the result of item analysis and the judgement of a panel of experts who examined the questionnaire's content. The applicability of the SDS codes in the South African context was undertaken by Van der Merwe, Le Roux, and Van Niekerk (1990), who compared the career codes of 60 South African occupations with the assigned American occupational code. They found that only 12% of the codes corresponded when all three letters in the assigned sequence were taken into account. The South African Dictionary of Occupations (Taljaard & von Mollendorf, 1987) needs to be "seriously reworked and upgraded" (Nel, 1999, p. 63), as American-assigned occupational codes are not always applicable to South African careers. Additionally, many new occupational titles are not mentioned in the dictionary, and many that are mentioned are now outdated.

Biographical Questionnaire

Biographical information such as age, gender, year of training, FGASA level attained, race group, home language, and student or working field guide was obtained by means of a biographical questionnaire which the participants completed along with a consent form prior to filling in the Self-Directed Search questionnaire. A copy of the biographical questionnaire and consent form for participants can be found in Appendix B and Appendix C of the treatise respectively.

Ethical considerations

The proposal for this treatise was forwarded to the Ethics Committee of the formerly named University of Port Elizabeth. Permission from the Field Guides Association of South Africa (FGASA) and Damelin was also obtained. Permission

from lodges whose field guides participated in the study was also obtained. Copies of these three documents can be found Appendices C, D, and E. All participants were informed of the nature and purpose of the research, as well as the voluntary, anonymous and confidential nature of the study. Informed consent was obtained from each of the participants before completing the questionnaire. Participants were asked to sign the consent form recommended by the Ethics Committee of the University of Port Elizabeth. Participants were not required to put their names on the questionnaire, but other biographical information as described above was obtained by means of the biographical questionnaire. Scoring and data analysis was checked by a registered psychometrist. Feedback in the form of written reports on the findings of the study were posted to each institution to enable them to pass the information on to the participants.

Procedure

The Field Guide Association of South Africa (FGASA) was contacted to inform them of the study and to obtain their support and compliance. A letter of support for the study (see Appendix C) was obtained from the Field Guide Association of South Africa to be distributed with the research material. The Deans and subject Head of Departments of one Damelin campus in Port Elizabeth (Eastern Cape) and another Damelin campus in Bramley (Gauteng) were provided with all the necessary information regarding the purpose of the study and the potential benefits for the participants and the field guiding industry. These campuses were targeted because they offer Field Guiding and Game Lodge Management courses. Game lodges in the Eastern Cape (see Appendix E) were contacted and provided with all the necessary information regarding the purpose of the study and the potential benefits for the participants and the field guiding industry in general.

The testing was conducted in group settings under supervision at each venue. The researcher explained the aim of the research study and how to correctly enter the required information on the answer sheet and biographical questionnaire. All participants were required to sign their informed consent (see Appendix B) before completing the Self-Directed Search. The purpose of completion of the Self-Directed Search was to generate interest codes for field guide students and for working field guides as a whole and for gender groups separately which could be explored and described in terms of the treatise. The biographical and Self-Directed Search questionnaires were completed and collected by the researcher for interpretation.

The researcher scored and interpreted the questionnaires according to the method outlined in the description of the Self-Directed Search questionnaire above.

However, as the completed questionnaires were scored it became apparent that the majority of the present sample was generating profiles that could not easily be expressed as a three-letter code due to tied or very close scores. The differences between these close scores were often not meaningful according to the 'standard error of difference' principle described previously. The current data revealed that the sample was not generating a sufficient number of simple three-letter codes and that 73% of the sample generated more complex codes with more than one interest qualifying for placement in one or all of the first, second or third positions. For example, in the case of a participant whose SDS interest scores were R = 45, I = 43, A = 40, S = 30, E = 28, C = 9 the first three scores should be regarded as more or less equal and all should be in first place in the individual's three-letter code. Use of the standard error of difference principle would result in a code of R/I/A (in first place), S/E (in second place), and C (in third place) for this example. As a result of the high quantities of complex codes and the lack of simple three-point codes, it was necessary to consider the entire interest profiles of each of the participants rather than just the usual first three highest letters which make up a three-letter code.

Various means of establishing the differentiation between the interests of each participant's profile were considered and rejected before it was decided to use Holland's 'standard error of difference' principle. The process of this decision is described below. Also included in this section is an explanation as to why the Iachan Agreement Index was not used for the purpose of data analysis in this study.

Available data analysis techniques

As explained previously, whilst recording the generated codes, it was noted that low differentiation was a dominant feature of the sample (i.e., a straightforward three-letter code was not generated for 73% of the sample). The majority of codes reflected the respondents' tendency towards high scores in more than one area of interest. Some participants' codes demonstrated up to four interest codes in the first place position, (e.g., R/E/C/S – I – A). It was evident that further steps were necessary to establish levels of differentiation between the groups of codes.

Differentiation, which refers to the level of definition, or distinctiveness, of a personality profile, is one of the key concepts of Holland's theory.

There are various methods to calculate differentiation. The simplest method is to subtract the lowest score of an individual's profile from their highest score. According to Holland, Powell, and Fritzsche (1994), this simple technique is the usual manner of calculating differentiation and correlates .88 with the more elaborate Iachan Differentiation Index developed by Iachan (1994). However, the researcher felt that using only the highest and the lowest scores disguised the fact that the typical field guide profile is poorly differentiated when it comes to the first two to four letters of the code but well differentiated in the lower scoring interest typology codes.

Holland, Powell, and Fritzsche (1994) also recommend the Iachan Differentiation Index (Iachan, 1984) as a method of calculating differentiation. As can be seen from the formula below, this index uses only the first, second and fourth place letters to calculate differentiation (x_1 , x_2 , and x_4 represent first, second and fourth letters of an interest profile).

$$L1 = \frac{1}{2} [x_1 - \frac{x_2 + x_4}{2}]$$

As mentioned previously, the current sample's codes tended to be poorly differentiated in initial first to fourth places of their interest profiles but well differentiated thereafter. Use of the Iachan Differentiation Index would lead to non-representation of the well-differentiated section of the participants' interest profile.

According to Gevers, du Toit, and Harilall, (1995), the most appropriate method of computing differentiation is by implementing Holland's 'standard error of difference' principle, whereby score differences of less than 8 should be regarded as trivial because they are within the limits of measurement error. The researcher decided to use this method as it was the method that would demonstrate the different areas of differentiation in the samples' codes. Using the 'standard error of difference' principle, all six letters representing the RIASEC interests and their values for each participant were captured in an Excel spreadsheet. This data was used for the purposes of the data analysis, which will be described in the section on the Data Analysis.

The lachan Agreement Index

The current researcher also intended using the lachan Agreement Index (Holland, Powell, & Fritzsche, 1994), to explore the level of match between the interest codes generated by the sample and the prescribed interest code for field guides which is SRI (Social, Realistic, Investigative). However, the table for calculating the lachan Agreement Index makes use of only the three highest scoring interests and makes no provision for interest codes that are more complex such as those generated by the current sample as discussed above.

In the case of a field guide with an interest profile of A/I/R/S E/C only the first three letters of the code would be used to determine the level of match between this code and the prescribed occupational code. Using only the letters A, I, and R, to calculate the lachan Agreement Index, this participant's level of match would score only four out of 28 and be described as a poor match. However, when applying Holland's 'standard error of difference' principle the difference between the scores of the first four letters are to be regarded as trivial, and therefore the same profile could be depicted in a number of different ways including R/I/S/A C/E and S/R/I/A E/C. The first variant would result in an lachan score of 16 (interpreted as 'no close match'), whilst the second variant would result in the highest possible lachan score of 28 (interpreted as a 'very close match'). As a result, the current researcher felt that the lachan Agreement Index would not have been a suitable analysis technique for the present study, considering that the sample generated 74 different interest profiles, 73% of which were complex codes with up to four RIASEC letters qualifying for equal position in first place and each of which could be rearranged in numerous different ways. The previous two sections have dealt with the process involved in deciding not to use certain data analysis techniques. The following section details the data analysis techniques that were considered in order to fulfil the requirements of the stated aims.

Data analysis

The data was analysed according to the stated aims. In order to fulfil the requirements of the **first aim**, which was to explore and describe the Self-Directed Search generated interest codes of the total sample, frequency tables and charts were created and the means and standard deviations of each of the six letters of the total sample were computed.

Further difficulties were encountered with the establishment of frequency tables. As explained in the previous section, the results demonstrated that the majority of the sample generated scores that could not easily be expressed as a three-letter code due to tied or very close scores, leading the researcher to focus on interest profiles rather than three-letter codes. The resulting frequency table would have 74 different interest profiles with frequency counts of only one to four. Whilst such a frequency table would accentuate the tendency of the sample to display very diverse interests, it would be cumbersome and difficult to interpret, as can be seen from Table 7, which represents 5 of the 74 different interest profiles generated and the frequency with which each profile occurred. The full version of this table will be included in Chapter 5.

Table 7 : An example of interest profiles and frequencies

Interest profile	Frequency
A R//S E C	1
A//R/S E/C	4
A/R/I S/E C	1
A/S I/E/R C	2
A/S C/E/I R	2

Please note that letters joined by diagonal lines share a position in the overall interest profile. For example, in the first interest profile of R//S (Realistic, Investigative and Social) all share second place as there are less than eight points separating them. Because the second place interests of R//S have less than eight points difference between them, they are considered equal in value and therefore another profile with the same three letters in second place arranged in different order would be added to the frequency of this group. In other words, other profiles that would have been added to the frequency count of the first interest profile could have been: A R/S/I E C, or A S/R/I E C, or A I/S/R E C. In this case only one participant in the present sample of 100 would generate this interest profile.

Additionally, the listing of the generated interest profiles without taking Holland's 'standard error of difference' principle into account would lead to a total of only 27 (out of a possible 100) profiles with S (Social) in first place, which conflicts with Holland, Powell, and Fritzsche's (1994) description of the reliability of the first letter of an occupational code.

Due to the difficulties with establishing frequency tables detailed above, it was apparent that the results would have to be expressed in a different way in order to make them more meaningful. In order to do so the researcher counted not only the number of times that an interest letter obtained the highest value (first place), but also the number of times an interest letter obtained a score that was less than 8 points lower than the interest letter that obtained the highest score. For example, in the following interest profiles the letter R (Realistic) either has the highest interest score or has a score that is less than 8 points lower than the highest scoring interest. Therefore each of the following interest profiles contains an R in first place: E/R/S I/A C; **R** I/S/A E/C; I/S/R E/C/A; A/R/I S/E C; A/I/R/S E/C. The frequency table derived by this process was much more manageable and facilitated the creation of a descriptive graph.

As mentioned previously, the first aim was to explore and describe the Self-Directed Search generated interest codes of the total sample. Besides the frequency tables and charts developed according to the method described above, the means and standard deviations of the total sample were also computed for the total sample.

The **second aim** was to explore and describe the generated interest codes of the males and females in the sample separately and to compare the interest codes of these two sub-groups. To achieve this, frequency tables and charts, were generated and means and standard deviations were computed for males and females separately. In addition, independent sample t-tests were computed in order to describe and compare the means of the interests for males and females.

The **third aim** called for the exploration and description of the generated interest codes of the field guide students and working field guides, followed by a comparison of these sub-groups. To achieve this, frequency tables and charts were created and means and standard deviations were computed for these sub-groups. Furthermore, independent sample t-tests were computed in order to describe and compare the means of the interests for field guide students and working field guides.

Based on the explorations and descriptions of aims one, two and three, the following chapter will report on the findings and discuss the appropriateness of Holland's prescribed occupational code as suggested in the South African Dictionary of Occupations (Taljaard & von Mollendorf, 1987) for the field guiding profession in South Africa.

CHAPTER 5

RESULTS and DISCUSSION

The general aim of the present study was to explore and describe the measured vocational interests of South African field guides and to compare to, and discuss the appropriateness of, Holland's current prescribed occupational code for the field guiding profession. The results have been organized according to the stated aims, that is, according to the various sample groups under investigation, namely, the total sample, the male and female sub-samples, and the working and student field guide sub-samples. For each of these groups, descriptive statistics have been presented, which include frequency counts, percentages and comparisons, as well as a discussion of the means. In order to control for a possible Type 1 error rate which could occur because of the numerous comparisons being made, the Bonferroni correction was used. This resulted in a more stringent level of significance ($p \leq 0.008$) being used in determining the significance of the results at the 0.05 level. As a result, when t-test results are reported the actual p value will be stated accompanied by an asterisk to denote if the result is significant after the application of the Bonferroni correction. As the Bonferroni correction is stringent, it is often useful to report on uncorrected results. Thus, the researcher will comment on certain results before and after the application of the Bonferroni correction. A discussion of the findings will follow the reporting of all the results.

Results

In this section the results pertaining to the three specific aims of the study will be described. The results are presented according to the directions for scoring and interpretation as laid out in the Self-Directed Search Questionnaire Manual (Gevers, du Toit, & Harillal, 1992) and outlined in Chapter 4.

Total sample

In order to comply with the first aim, that is, to explore and describe the Self-Directed Search generated interest codes of the total sample of field guides, this section makes use of frequency tables and charts, as well as providing the means and standard deviations for the total sample. The first step of the scoring procedure results in an SDS code which is a summation of the activities that individuals prefer,

the occupations that they are interested in pursuing, the skills they already have, and a self-assessment of their abilities, all of which can be matched to possible occupations. The frequency tables and figures for the total sample were computed from the SDS codes generated by the 68 male and 32 female participants.

The first frequency table (see Table 8) reports on the types and frequencies of the three-letter codes that were generated by the total sample.

Table 8: Frequency of three-letter codes for Total Sample

SDS code	Frequency	SDS code	Frequency	SDS code	Frequency	SDS code	Frequency
RSE	9	ARI	2	SIC	2	IRA	1
RES	6	ASI	2	SRE	2	RAE	1
ERS	5	EIS	2	SRI	2	RSI	1
RIS	5	ESI	2	AIR	1	SAE	1
ISA	4	IAE	2	ASC	1	SAI	1
RIA	4	IAS	2	ASE	1	SAR	1
SIA	4	IEA	2	CES	1	SER	1
ISR	3	ISE	2	EAS	1	SIE	1
REA	3	REC	2	ESA	1	SRC	1
SAC	3	REI	2	ESR	1		
SEA	3	RSA	2	IAR	1		
SEC	3	SEI	2	IEC	1		

This frequency table highlights the tendency of the sample to display diverse interests with 45 different codes being generated and only 27 out of the 100 profiles with S (Social) in first place (refer to the blue highlighted sections of the frequency table).

The next stage of the scoring and interpretation process is to establish whether or not the differences between the letters of an SDS code are large enough to be meaningful. As explained in the previous chapter's discussion on differentiation methods, Holland (1985) advised the use of the 'standard error of difference', also known as the 'rule of eight' (Gevers, du Toit, & Harilall, 1995), in which differences of less than eight between the total scores for each interest should be regarded as trivial. Once the 'rule of eight' was applied the sample demonstrated a tendency to generate undifferentiated profiles of interest codes with up to five RIASEC letters in first place, as can be seen in the following table.

Table 9: Frequency of total code profiles generated by Total Sample

Codes with 1 letter in first position	f	Codes with 2 letters in first position	f	Codes with 3 letters in first position	f	Codes with 4 letters in first position	f	Codes with 5 letters in first position	f
A R/I/S E C	1	A/S I/E/R C	2	A/R/I S/E C	1	A/I/R/S E/C	4	R/I/A/S/E C	1
E R/S/C I/A	1	A/S C/E/I R	2	A/S/E R/I C	1	A/S/I/E R/C	1	R/S/I/E/C A	1
E R/S/I/C A	1	E/A S I/C R	1	C/E/S I/R A	1	E/R/S/A I/C	1		
E I S/C R/A	1	E/S I/R/C A	1	E/I/S C/R/A	2	I/E/A/S C R	2		
E R/S/A I/C	1	I/A R/S/C/E	1	E/R/S I/A C	2	R/E/C/S I A	3		
E S I/R/C/A	1	I/A S/C/R E	1	E/S/A R/C/I	1	S/E/C/A I/R	1		
I S/E/C RA	1	I/E C/S/R A	1	E/S/R I/A/C	3				
I S/A/C E R	1	I/R A/S E/C	2	I/E/A S/C R	1				
I A/E/S CR	1	I/S A/R C/E	1	I/S/E A/R C	1				
I A/E S C/R	1	I/S A/E/C R	2	I/S/R E/C/A	3				
I A/S/C/R E	1	I/S R/C/A/E	2	R/A/E S/I C	2				
R S/E/I A/C	1	R/E A/S/I C	2	R/E/I S C/A	1				
R I/S/A E/C	1	R/E I/S C/A	2	R/S/E I/C A	1				
R I/A/E/S C	1	R/I S/E/A C	3	S/A/C E/R/I	1				
R E S/I/C/A	1	R/I S/A/E/C	1	S/E/C A/I R	1				
R S/E I/A/C	3	R/S E/A/I C	1	S/E/I A/C R	1				
R E/C/S I/A	1	R/S A/E/I/C	1	S/I/C A/I C	1				
R E/S C/I A	1	R/S E/A I/C	1						
R S/A/E I/C	1	S/A C/E/R I	2						
S E/C/I/A/R	1	S/A I/E/R/C	1						
S E A/R/I/C	2	S/E I/A/C/R	1						
S R/E I A/C	1	S/E A/I R/C	1						
S I/C/A/E C	1	S/I A/C E/R	1						
S I/A/C E R	1	S/R C/E I A	1						
		S/R E/I A/C	1						
Total	27		35		24		12		2

Using Table 9, it is possible to calculate how many times each of the RIASEC codes occurs within the first place profiles of interest codes generated by the total sample: S (Social interests) occurs 60 times, followed by R (Realistic interests) 48 times. E (Enterprising interests) occurs in first place 43 times, followed by I (Investigative interests) 40 times, A (Artistic interests) 27 times, and C (Conventional interests) only 9 times. The frequency of first place occurrence of all six RIASEC letters is depicted in Figure 4.

Figure 4: Frequency of RIASEC codes in First Place

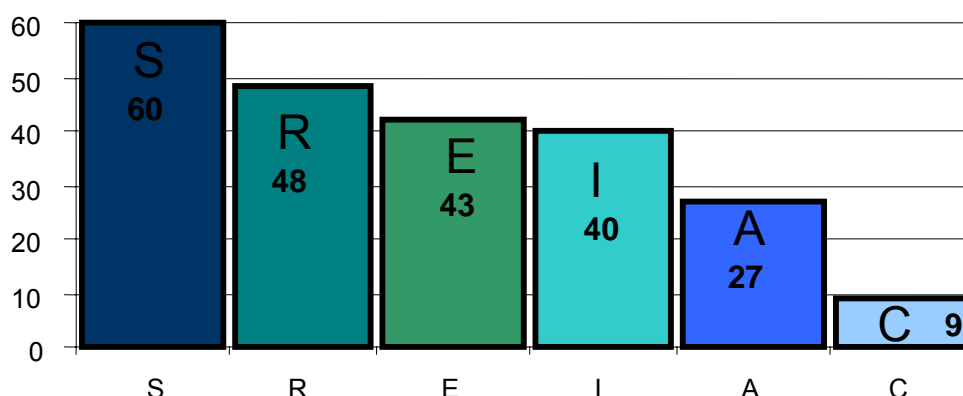


Table 10 contains the mean scores obtained by the total sample for each of Holland's Realistic, Investigative, Artistic, Social, Enterprising and Conventional interest types.

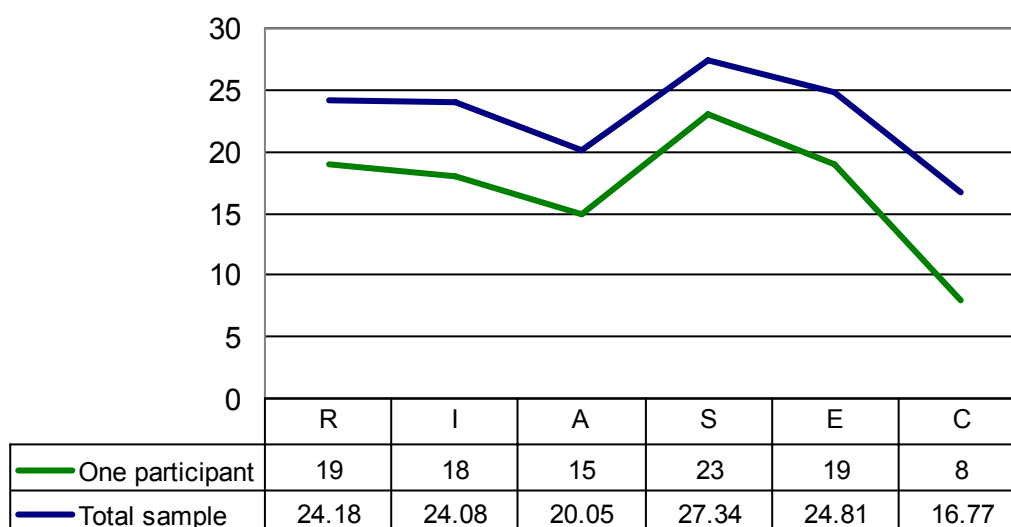
Table 10: Mean Scores per Holland type for Total Sample

	Mean scores	Minimum	Maximum	SD
R	24.18	3	46	10.93
I	24.08	8	45	8.46
A	20.05	4	42	9.62
S	27.34	9	46	7.36
E	24.81	5	46	9.02
C	16.77	5	45	7.65

The mean scores of the total sample ($N = 100$) for each of the interest types echo the findings detailed in Table 9 and Figure 4. The mean for Social interests is higher than any of the means for the other interest types. The means for Realistic, Enterprising, and Investigative interests are close to each other but lower than the mean for Social interests. The mean for Artistic interests is somewhat lower, whilst the mean for Conventional interests is considerably lower.

The tendency for the sample to generate higher undifferentiated scores across the Social, Realistic, Enterprising and Investigate interest codes, with lower scores for Artistic and Conventional interest codes is demonstrated in Figure 5, in which the mean scores for the total sample are depicted in addition to an illustrative interest profile of one participant.

Figure 5: Comparison of individual RIASEC Profile and Total Sample Means



The profile of the randomly selected participant depicted in Figure 5 echoes the profile generated from the mean scores of the total sample, in which Social, Realistic, Enterprising and Investigative interests are higher and undifferentiated, whilst Artistic and Conventional interests are lower and more differentiated.

Gender

The results in this section focus on firstly the female sub-group and, secondly, the male sub-group. This is followed by a comparison of the means of the female and male samples using Independent sample t-tests.

Females

The results for the female sub-group are presented with caution because of the small sample size ($n = 32$). This problem is compounded when this gender group is divided into field guide students ($n = 22$) and working field guides ($n = 10$). Consequently, the data was not analysed for female students and working field guides separately. The descriptive results for all female participants ($n = 32$) are presented below.

Table 11: Mean Scores per Holland type for Females

	Mean scores	Minimum	Maximum	SD
R	16.72	3	46	10.15
I	23.84	8	43	9.18
A	21.28	6	35	8.81
S	27.22	9	42	8.31
E	21.75	5	40	8.07
C	15.91	7	32	6.31

Table 11 indicates that Social interests were highest of the interest fields for the females in the present sample, whilst Conventional interests were lowest and Realistic interests were almost as low as Conventional interests. The order of interests for females was SIEA RC (Social, Investigative, Enterprising, Artistic, Realistic and Conventional). This order of interests is also demonstrated in Figure 6, in which the mean scores for the total sample are compared with the mean scores of the female sub-group and an illustrative profile of one randomly selected female participant.

Figure 6: Comparison scores of Individual, Female and Total Sample

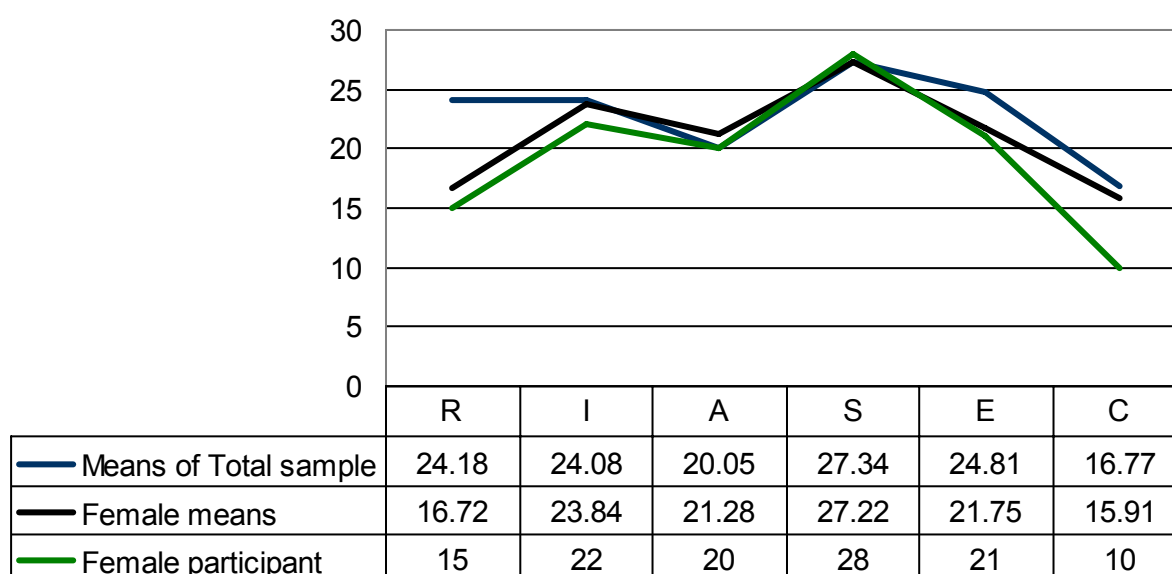


Figure 6 demonstrates that Realistic interests are much lower in the female group than they are in the total sample. Enterprising interests are slightly lower, whilst the rest of the interest scales are fairly similar between the female and total samples.

Males

The male sub-group was larger than the female sub-group and consisted of 68 participants, 38 of these being student and 30 being working field guides. Table 12 indicates that Realistic interests were highest for the males, closely followed by Social and Enterprising interests, whilst Conventional interests were lowest. In general, the trends in the interest scale order for males seem more firmly established, with Realistic, Social and Enterprising interests in a higher ranking

group than Investigative, Artistic and Conventional interests (RSE IAC). This tendency is demonstrated in Figure 7, in which the mean scores for the total sample are compared with the mean scores of the male sub-group and an illustrative interest profile of one randomly selected male participant.

Table 12: Mean Scores per Holland type for Males

	Mean scores	Minimum	Maximum	SD
R	27.69	6	45	9.48
I	24.19	9	45	8.17
A	19.47	4	42	9.99
S	27.40	13	46	6.93
E	26.25	8	46	9.14
C	17.18	5	45	8.22

Figure 7: Comparison scores of Individual, Male and Total Sample

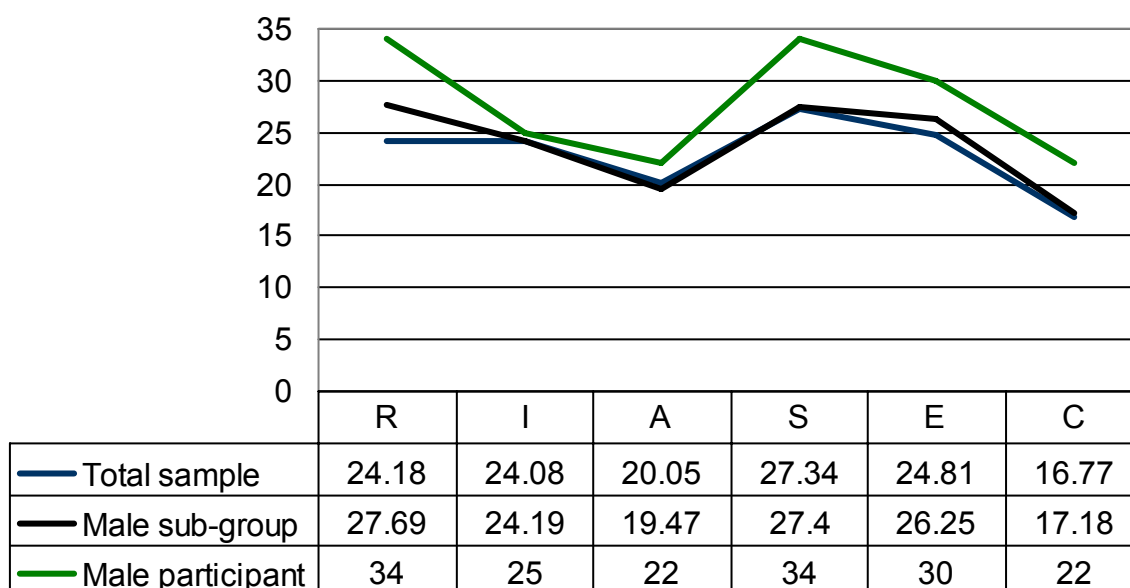


Figure 7 shows that the interests for the total sample were fairly similar to the interests of the male sub-group, with the exception of Realistic and Enterprising interests which were higher for males than for the total sample.

Comparison of females and males

The previous two sections have described the pattern of interests for females and males separately. Table 13 compares the means of females ($n = 32$) and males ($n = 68$) by means of Independent sample t-tests in order to identify any significant differences between them.

Table 13: Independent Sample t-test for Females and Males

	Mean M	Mean F	t	df	p
R	27.69	16.72	5.28	98	<0.001*
I	24.19	23.84	0.19	98	0.85
A	19.47	21.28	-0.88	98	0.38
S	27.40	27.22	0.11	98	0.91
E	26.25	21.75	2.38	98	0.02
C	17.18	15.91	0.77	98	0.4

* = Statistically significant difference

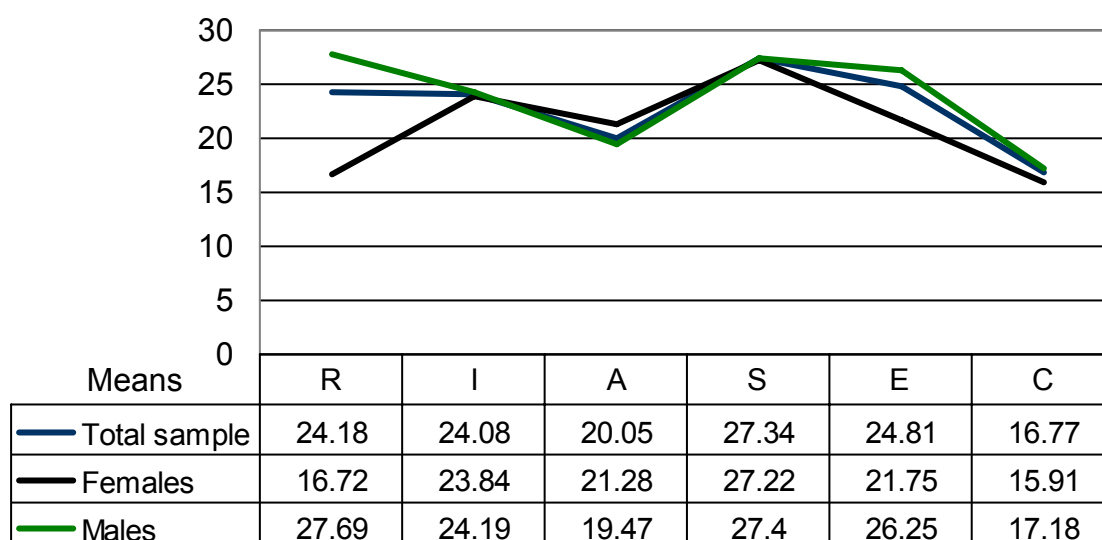
According to Table 13, males obtained a significantly higher mean Realistic score than females, $t(98) = 5.28$, $p < 0.001^*$. This is a significant difference even when the Bonferroni correction is applied.

The same table demonstrates that males obtained a higher mean Enterprising score than females. While this difference was not significant after the Bonferroni correction was applied, the difference was significant at the 0.05 level before correction. The RIASEC profile differences between females and males are demonstrated in Figure 8, in which the mean scores for the total sample can be compared with the mean scores for females and males.

Figure 8 demonstrates that males generally obtained higher mean scores than females. In addition, differences in the mean Realistic scores between males and females, as well as the smaller non-significant differences between the Enterprising scores of males and females, are apparent.

The highest scoring interest code for males was Realistic, but this was closely followed by Social interests. By contrast, Social interests were highest for females and Realistic interests were much lower. The most significant finding in comparing males and females was that the males' mean score for Realistic interests was significantly higher than that of the females. Both gender groups had lowest scores for Conventional interests. The difference in Enterprising interests between males and females was not statistically significant.

Figure 8: Mean scores for Total Sample and Gender



Having reported the results for the second aim of the present study, i.e., to explore and compare the Self-Directed Search generated interest codes for males and females separately, the following section presents the results for the third aim.

Student and Working field guides

The third aim was to explore, describe, and compare the generated interest codes of student and working field guides.

Student field guides

Table 14 reports the results for the student field guides (n = 60).

Table 14: Mean Scores for Student Field Guides

	Mean scores	Minimum	Maximum	SD
R	23.07	3	46	10.82
I	23.43	8	45	8.31
A	19.63	4	41	9.02
S	26.42	9	42	7.13
E	23.65	5	44	9.15
C	15.32	6	32	6.12

The means depicted in Table 14 provide an indication of the order of interests for the student field guides. The mean for the Social interest code was highest, with the mean for Enterprising, Investigative and Realistic interests being slightly lower.

The means for the Artistic scale is fifth highest, with the mean for the Conventional scale in lowest position.

Working field guides

Table 15 reports the results for the working field guides (n = 40).

Table 15: Mean Scores for Working Field Guides

	Mean scores	Minimum	Maximum	SD
R	25.85	5	45	11.02
I	25.05	11	42	8.69
A	20.68	4	42	10.55
S	28.73	16	46	7.56
E	26.55	8	46	8.64
C	18.95	5	45	9.15

The means depicted in Table 15 provide an indication of the order of interests for the working field guides. The mean for the Social interest code was highest, followed by Enterprising, Realistic, Investigative, Artistic and, lastly, the Conventional scale.

Comparison of student and working field guides

The previous two sections have described the pattern of interests for student and working field guides separately. Table 16 reports on a comparison between the means of the student and working field guides. Independent sample t-tests were computed in order to identify any significant differences between the two groups.

Table 16: Independent Sample t-test for Student and Working Field Guides

	Working Guides Mean	Student Guides Mean	t	Df	p
R	25.85	23.07	1.25	98	0.21
I	25.05	23.43	0.94	98	0.35
A	20.68	19.63	0.53	98	0.60
S	28.73	26.42	1.55	98	0.12
E	26.55	23.65	1.59	98	0.12
C	18.95	15.32	2.38	98	0.02

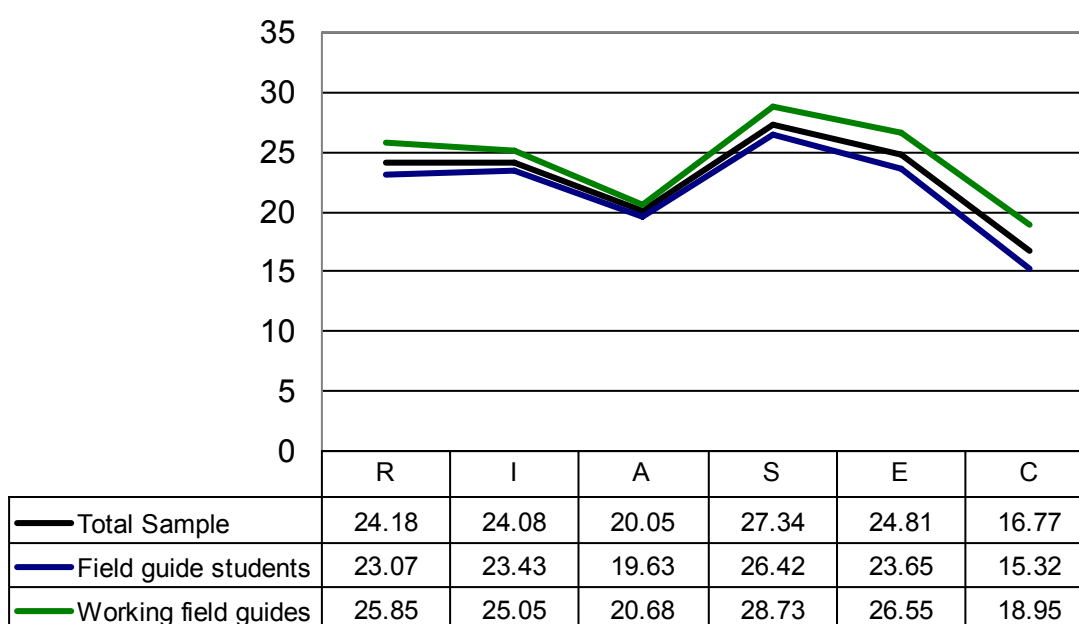
According to Table 16, the student and working field guides did not differ significantly for any of the comparisons. The difference between the two groups' mean scores on the Conventional scale approach significance ($p = 0.02$), but not when the Bonferroni correction is applied. As far as trends in the means were concerned, the means for working guides was higher than those for students in all instances. For both groups the lowest mean was for Conventional interests, whilst the highest was for Social interest codes. Table 17 shows the six code pattern of interests generated by the student and working field guides.

Table 17: Order of interests for Student and Working Field Guides

Field Guides	Interest Order
Students	SEIR AC
Working field guides	SERI AC

Table 17 indicates that the order of interests in both groups was almost identical. Both groups have SEIR codes (Social, Enterprising, Investigative and Realistic) in first place and AC codes (Artistic and Conventional) as their lowest interests. These trends are illustrated in Figure 9 which demonstrates that, whereas the order of interests for student and working field guides is similar, in all instances the mean scores of the working field guides are marginally higher.

Figure 9. Means for Total Sample and Student and Working Field Guides



In the following section, the results will be discussed according to the three aims of the present study. The findings will be related to Holland's theory and to previous international and national research on Holland's occupational codes.

Discussion

The results of the present research regarding the appropriateness of Holland's prescribed occupational code for the field guiding profession were presented in the first part of this chapter. In this second half of the chapter the findings arising from the three aims of the study will be addressed within the context of Holland's theory as well as in relation to previous research on Holland's occupational codes.

Total sample

The first aim of the study was to explore and describe the Self-Directed Search generated interest codes of the total sample of field guides. In spite of the fact that the prescribed code for field guides is SRI (Social, Realistic, Investigative), the sample generated 45 different codes, with only two of the participants producing the prescribed SRI code. In general, there was a tendency in the total sample for the Social, Enterprising, Investigative, and Realistic interest codes to cluster in the higher positions of the RIASEC profile. Social interests were strongest for this sample, followed by Realistic, Enterprising, and Investigative interests, which were fairly equal. Artistic interests seem to be less important for field guides, although there were some exceptions. There was a larger difference between the first four interests and Conventional interests, which generally did not feature strongly in this sample.

These findings suggest that an interest profile such as SREI AC may be more appropriate for South African field guides than the three-letter SRI code even though the three-letter code generated by the Self-Directed Search questionnaire is considered to be "an explicit implementation" of the core assumptions of Holland's typology (Holland, Powell, & Fritzsche, 1994, p. 5). This discrepancy questions the usefulness of the principal elements of Holland's theory. If the three-letter code is central to Holland's theory, the findings of the present study and various national and international studies that do not support Holland's theory, raise questions regarding the appropriateness of the prescribed code, as well as the theory itself. The following

section will examine the implication of the findings in relation to Holland's secondary constructs of Congruence, Consistency and Differentiation, which are inextricably linked to the SDS generated three-letter code.

Congruence refers to the relationship or amount of agreement between any two Holland personality and/or environmental codes. The ideal degree of congruence is the situation in which a personality type is employed in a completely matching environment, for example, a Social type in a Social environment. This correspondence can be ascertained by comparing the three-letter code generated by completion of the Self-Directed Search questionnaire to Holland's occupational codes. A directly corresponding occupation offers the best opportunity for self-actualization (Gevers et al, 1995). Congruence decreases as the correspondence between the three-letter code of the person and the three-letter code of the environment decreases. Holland states that the least degree of congruence would be between a person and a work environment that appears at opposite points of the hexagon. Congruence between the prescribed code (SRI) and the interest profile generated by the participants in the present study (SREI AC) cannot be calculated because the established methods and formulae used to calculate congruence assume that the interest codes are arranged in order of importance. As we have seen from the results of the present study the first four interest codes of the profile (SREI) are all equally significant. Therefore, congruence, which is one of Holland's constructs for explaining and conceptualising his theory in a counselling situation, cannot be applied to the findings of the present study. The findings of this study and other national and international research that does not support Holland's theory (e.g., Elton, 1971; Holland, 1968; Mare, 1992; Posthuma & Navran, 1970; Privateer, 1971; Uys, 1987; Van Rooyen, 1990; Walsh & Barrow, 1971) lead to uncertainty with regard to Holland's congruency construct.

Holland's *consistency* construct, which is related to the structure of interests, refers to the similarity between the types represented by a Holland code, as determined by the position of those types on the RIASEC Hexagon. According to Schonegevel (1997), relatively few studies have focused on the consistency construct and of those almost half have produced negative results. Holland (1997) has stated that older (i.e., prior to 1985) consistency studies produced more positive findings. However, Latona (1989) found little or no support for the value of consistency, and South African research on Holland's structure of interests and his

hexagonal model has led to conflicting results. The consistency construct is based on the relative positions of the first two letters of a Holland code and states that consistency is high if the first two letters of a code are adjacent on the hexagon. However, if the first two letters are alternate (i.e., separated by one letter of the hexagon), consistency is moderate, whilst interest codes on opposite sides of the hexagon have low consistency. The consistency construct cannot be usefully applied to the results of the present sample who generated an interest profile in which four of the interest codes are equally important and can be arranged in any order (SREI; Social, Realistic, Enterprising and Investigative). Selecting just two out of the four interest codes to compare leads to conflicting results depending on which two interest codes are used. Social and Realistic interests are at opposite ends of the hexagon, as are Investigative and Enterprising interests, which leads to the conclusion that the generated code has low consistency. On the other hand, use of the combination of Realistic/Investigative or Social/Enterprising interest codes leads to the conclusion that the generated code is highly consistent. Therefore the findings do not consistently support the usefulness of Holland's consistency construct. Furthermore, similar to Boyle and Fabris' (1992) study of Australian plumbers, the findings of the present study suggest that the structure of interests for field guides constitutes a poor overall fit to Holland's hexagonal structure of interest model.

"Differentiation refers to the level of distinctiveness of a personality or occupational profile" (Holland, Powell, & Fritzsche, 1994, p. 17). In other words, *differentiation* explains how closely an individual resembles a single type and shows less resemblance to other types. As explained in Chapter Four the present researcher decided to use Holland's 'standard error of difference' principle as it was the method that would demonstrate the different areas of differentiation between all of the samples' interest codes. Whilst previous researchers have reported conflicting results and variable support for the differentiation construct (De Fruyt & Mervielde, 1997; Neethling, 1987; Swaney & Prediger, 1985; Swanson & Hansen, 1986; Van der Walt, 1994), the current researcher found that 73% of the sample's occupational codes had undifferentiated interest profiles with between two to five interest code letters sharing first position.

Holland's theory states that individuals with undifferentiated profiles usually have less predictable and less stable career choices than individuals with well differentiated profiles (Holland, Powell, & Fritzsche, 1994). However, this statement

must be questioned when the occupational environment that the individual is seeking is in itself so varied in its requirements that it too can be described as undifferentiated. It could be argued that in the case of the present sample high mean scores across several interests and the consequent high flat profile could be expected, given that all six of Holland's interest types can be linked to the divergent interests, skills and abilities required of individuals in the field guiding profession as explained in the following paragraphs.

Field guides have high Social interest scores because they need to be skilled in communication and client handling (FGASA, 2005). They need to be able to educate and act as a link between the natural surroundings and the clients and will be best able to enjoy this line of work if they are friendly, compassionate, open, honest, helpful, understanding, and have a sense of humour. Their high Realistic interests reflect the fact that field guides need skills in orientation, first aid, and vehicle maintenance. They should also be able to cope with problems pertaining to water and electricity supply, and be able to handle four-wheel-drive vehicles, especially under difficult circumstances and be content to work in all weathers.

Despite Holland's prescribed SRI (Social, Realistic, Investigative) code's exclusion of Enterprising interests, in the present study Enterprising interests were rated almost as high as the Realistic interests and somewhat higher than the Investigative interests. This can be attributed to the Field guides' need to be confident, energetic, resourceful and not afraid to take risks. Successful field guides who manage to deal with all the challenges posed by their Social and Realistic working environments, are often promoted to head ranger positions, and potentially to management positions in game lodges. The high Enterprising score is also linked to the fact that in completing the Planned Occupations section of the SDS (as described in Chapter Four) many of the participants expressed a desire to manage or own game lodges and game farms.

Investigative interests are also important to Field guides because they are required to have in-depth knowledge and interpretive skills encompassing nature conservation, animal and plant studies, ecology, geology, climatology, taxonomy and astronomy. These fields of study fit with Holland's description of Investigative types who are analytical, curious, and methodical and able to use intellect, individual thought and independent work to view the world in original, abstract, and complex ways. As explained in Chapter Four, in the Planned Occupations (Occupational

Daydreams) section of the Self-Directed Search the participants were asked to list, in order of preference, three occupations they would like to follow in the future. Many of the field guides in the present study listed scientific fields such as ecology, geology, and zoology as alternative career choices, which also accounts for the Investigative score being high for this sample.

Although Artistic scores were lower for this group than Social, Realistic, Enterprising and Investigative scores, Artistic type characteristics that could be useful to a field guide would be flexibility, tolerance, and resourcefulness, as well as a tendency towards unconventional, original ideas and the ability to solve problems with individual and intuitive thought. In addition, a number of participants expressed an interest in occupations through which they could express their love of nature, such as painting, photography and writing.

The lowest interest expressed by the participants in this sample was for Conventional type working environments. This is not surprising when one considers that Conventional environments require conforming, methodical types who enjoy working in an ordered, systematic environment, a description which does not describe the unpredictable nature of the African bush. Consequently one of the most consistent findings of this study was that Conventional interests were rated lowest throughout, irrespective of gender and whether the participant was a student or a working field guide. However, the Field Guiding Association of South Africa (FGASA) stipulates that neatness, punctuality, the ability to perform administrative duties, and a professional image are necessary requirements. They add that the successful field guide should be well-informed of procedure and changes, and always act in accordance with national legislation with regard to conservation and guiding. Therefore even this lowest rated interest has value to the career of a field guide.

The current research suggests that, contrary to Holland's theory and Gevers, du Toit, and Harilall's (1995) assertion that individuals with widely divergent interests have difficulty choosing an occupation, there may be other occupations besides field guiding where a high, flat undifferentiated profile is not only beneficial but necessary.

According to Holland (1997), tests of single occupational codes are valuable in identifying poorly defined categories. Additionally, Gottfredson, L. S. and Richards (1999) examined the findings of various international studies and concluded that there was a lack of research attention with regard to the validity of Holland's occupational codes. Accordingly, having discussed the findings in relation to the

broader theoretical assumptions of Holland's theory, the focus of this discussion must turn to the specific aim of the present study, which was to discuss the appropriateness of the SRI (Social, Realistic, Investigative) occupational code prescribed by Holland for the field guiding profession.

Despite the fact that the Professional User's Guide to the Self-Directed Search (Holland, Powell, & Fritzsche, 1994) considers the first letter of an occupational code to be "the most important, most descriptive, and most reliable" (p. 22), and that changes to the first letter of a code in The Occupations Finder (Holland, 1985c) have been necessary in less than one percent of successive revisions of the Self-Directed Search, the present study found that only 27% of all elicited three-letter codes had S (Social interests) in first position. In addition, the results showed that Realistic, Enterprising and Investigative interests shared first position with Social interests. Other researchers have also reported findings that question the long-term stability of Holland's codes (Miller, 2002; Schonegevel, 1997). Chartrand and Walsh (1999) highlight the possibility that the changing nature of work could render some occupational codes obsolete. Furthermore, the research review in Chapter Three revealed that some environmental codes are less stable and more susceptible to changes in the workplace than others, and the need for further research on the validity or appropriateness of the classification of occupations and environments has been identified by various researchers as described below.

Aranya, Barak, and Amernic's (1981) study of Canadian chartered accountants revealed that accountants have not been unequivocally defined in terms of Holland's personality codes. Schwartz (1992) reported that his research provided clear evidence that Holland's codes were not reliable guides for those individuals in the fields of dentistry and nursing. Holland's code for nurses is SIA, whilst actual studies of the type of work expected of nurses today suggest that the Realistic typology should be included (Schwartz, 1992). Whereas the prescribed occupational code for dentistry, (ISR), suggests that Investigative interests are of primary importance for this field of work, Schwartz (1992) found that Realistic interests are essential to the needs of dentistry, while the "relevance to dentistry of Investigative interests is not very apparent" (p. 181). Studies conducted by Meir, Hadas, and Noyfeld (1997) and Ostroff and Rothhausen (1997) with regard to specific occupations such as accounting, the armed forces, psychology, and teaching have also raised concerns about the appropriateness of Holland's codes. A review of the

research has revealed little research with regard to the appropriateness of the three-letter personality codes in the South African context. However, Calitz, Watson, and de Kock's (1997) study found that the RIASEC code profile of Information Technology students has changed since the 1970's and 1980's from predominantly Realistic and Investigative types of various combinations (RIE, IRE and RIE) to predominantly Investigative and Social types. As these studies suggest, those occupational contexts which are characterized by significant change may no longer have an appropriate Holland typology code. Just as the profile for the Information Technology professional has changed from RIE to include a Social component, the present study suggests that the SRI code for field guides should be expanded to a combination of the codes of SREI.

Having completed the discussion of the first specific aim of the study, the following section focuses on the discussion of females and males in order to fulfil the requirements of the second aim.

Comparison of females and males

In the earlier discussion of the total sample, Social interests were rated highest, followed by Enterprising, Realistic and Investigative in descending but undifferentiated order, whilst Artistic and Conventional interests were rated lowest. In the female sub-group Social interests are also generally the highest interest code but there are differences worth noting. The females' mean score for Realistic interests is lower than that of the males. The Investigative, Enterprising and Artistic scales form the next highest group of interests, with the mean for Investigative interests being slightly higher in the female sub-group.

As explained in Chapter Four, the final section of the Self-Directed Search questionnaire requires participants to list, in order of preference, three occupations they would like to follow in the future. Besides field guiding, some of the female participants listed careers that are associated with strong Investigative interests such as, Conservationist (IRE), Animal Researcher (IRE), Biologist (IRE), Zoologist (IRS), Veterinary Surgeon (IRS), Doctor (ISE) and Lawyer (IES). These participants may have been drawn to field guiding because of the more practical and immediate contact it offers for their interest in animals and nature, despite their being equally suited to and capable of tertiary study in a university environment.

For the males Realistic interests were rated highest, followed closely by Social interests. Enterprising and Investigative interests also received higher scores. Scores for Artistic interests were low and Conventional interests received the lowest rating overall. The males obtained a significantly higher mean Realistic score than the females. This is in accordance with Holland, Powell, and Fritzsche (1994) who affirm that the Realistic scale is strongly related to gender, in that Realistic environments have traditionally been considered the domain of males as they often require physical strength and agility. In the course of the work conducted by field guides a certain amount of realistic ability is required as they are expected to be able to maintain their vehicles (usually large game viewing vehicles), and to solve minor plumbing, electrical and technical problems that may occur in more remote camps and lodges where there is no easy access to professionals who would deal with these problems.

It may be that the lower Realistic score for females in the sample is a result of the fact that women are often discouraged from (or simply not encouraged to attempt) Realistic tasks. Sharf (2006) also states that women, in general, have less interest in occupations requiring technical expertise. Nevertheless, despite the fact that field guiding calls for high Realistic interests, many women are being drawn to this career. Perhaps the differences for the Realistic interest code are largely due to the fact that women have not been encouraged to realise and develop their Realistic interests. Other researchers have also found significant Realistic interest code differences between males and females despite students having chosen the same work environment. For example, in their study of university students studying medicine, Henry, Bardo, Mauw and Bryson (1987) found that male students had higher Realistic and Investigative interest scores than female students. The male students also obtained a higher mean Enterprising score than females, although this difference was not significant. In addition, Holland (1985b) found that, whereas men are more likely to show high scores on Realistic, Investigative, or Enterprising scales, women are more likely to score higher on Social, Artistic, and Conventional scales.

As in the current study, one of the most common themes in the research reviewed in Chapter Three is that females generate lower Realistic scores than males (Aviles & Spokane, 1999; Chew, Halim, & Matsui, 2002; Matsui & Tsukamoto, 1991; O'Brien, Martinez-Pons, & Kopala, 1999). Lunnenborg (1980) found significant

differences in interest preferences for males and females, with females scoring lower in Realistic and Investigative areas and higher in Social areas. Studies of the career interests of middle school (Aviles & Spokane, 1999) and high school (Feehan & Johnston, 1999) students have also revealed higher scores for girls on the Social, Conventional and Artistic scales, whilst boys achieved higher scores on the Realistic and Investigative scales. Finally, a study conducted by Fitzgerald and Weitzman (1992) reported that the large majority of women already in the working world are in Social and Conventional environments, whilst a minority of women are in Realistic or Investigative work environments.

Gender differences in Holland's typology seem to be attributable to environmental variables, restrictions and pressures. The lower Realistic scores for females in the present study seem to support the findings of other researchers who found that women's career choices are often determined by factors other than their own preferences, such as gender role socialization and compromise due to the demands of family and home (Schonegevel, 1997).

Comparisons of the student and working field guides

In the student field guide sub-group, Social interests received the highest scores, with Enterprising, Investigative and Realistic interests slightly lower but still close in value. The Artistic scale is ranked fifth, with the Conventional scale in the lowest position. The order of interests for the working field guide sub-group from highest to lowest was as follows: Social, Enterprising, Realistic, Investigative, Artistic and Conventional.

The student and working field guide sub-groups did not differ significantly on any of the comparisons. The difference between the sub-groups' mean scores on the Conventional scale approached significance ($p = 0.02$), but this was not significant when the Bonferroni correction was applied. For both sub-groups the lowest mean was for Conventional interests, whilst the highest was for Social interests.

As far as the trends in the means were concerned, the means for working guides was higher than those for students in all instances. Any difference that may be detected between these two groups may be due to the fact that "people become clearer about themselves with age" (Holland, 1997, p. 64). The age of the student group ranged from 18 to 26 years with an average age of 21 years, whilst the working field guide group's ages ranged from 21 to 45 years, with an average age of

27 years. Neethling (1987) found support for a link between well established interests and career maturity and self-knowledge. Similarly, one can speculate that the more qualified and generally older field guides have a slightly higher Conventional mean score because they have a more mature appreciation of the benefits of Conventional interests, where administrative and organizational skills are rewarded in a working environment.

Summary

The findings of the present study in relation to theory and previous national and international research questions the appropriateness of Holland's three-letter prescribed code for field guides and the assertion that the first letter of an occupational code is the most reliable. Given that the three-letter code generated by the Self-Directed Search questionnaire is considered to be "an explicit implementation" of the core assumptions of Holland's typology (Holland, Powell, & Fritzsche, 1994, p. 5), this discrepancy brings into question the usefulness of some of the principal elements of Holland's theory.

The results raised questions as to the usefulness of Holland's congruence and consistency constructs, and suggested that the structure of interests for field guides constitutes a poor overall fit to Holland's hexagonal structure of interests model. In addition, in some instances undifferentiated interest profiles could be attributed to the undifferentiated nature of the occupational environment. Therefore, undifferentiated profiles do not necessarily mean that an individual will struggle to settle on a field of study or occupation, or that they may be lacking in autonomy, purpose and consistency of vocational preference.

The results supported the findings of previous researchers who found that women's career choices are often determined by factors other than their own preferences, such as gender role socialization and compromise due to the demands of family and home and usually have lower Realistic and higher Social scores than their male counterparts.

Finally, the findings must be brought to focus on the overall aim of the study, which questioned the appropriateness of the prescribed code for South African field guides. The results of the present study in relation to Holland's theory and an extensive research review, suggest that the prescribed SRI (Social, Realistic, Investigative) occupational code may not be appropriate for South African field

guides and that a profile of interest codes such as S/R/E/I A/C (Social, Realistic, Enterprising, Investigative, Artistic, and Conventional) would be more appropriate.

The focus of this chapter has been, firstly, to report on the results in respect of the three aims of the present study and, secondly, to discuss the findings in relation to Holland's theory and to previous research which was reviewed in Chapter Three. The final chapter highlights the value, recommendations and limitations of the present study, suggestions for further research, and provides concluding remarks.

CHAPTER 6

Conclusion

Chapter Six discusses the implications of the current research, its value and limitations, as well as suggestions for future research. The final part of the chapter summarizes the findings of the study with regard to the appropriateness of Holland's prescribed occupational code as suggested in the South African Dictionary of Occupations (Taljaard & von Mollendorf, 1987) for the field guiding profession in South Africa, as well as concluding statements about the study.

Implications of the research

This study explored the three-letter prescribed occupational code for field guides (SRI; Social, Realistic, Investigative) and found that it was not appropriate for the present sample of field guides. The results of the present study suggest that a more appropriate profile of interest codes for the field guiding profession in South Africa may be S/R/E/I A/C or S/R/E//A C (Social, Realistic, Enterprising, Investigative Artistic, and Conventional), where letters separated by a backslash can be presented in any order and gaps between the letters indicate differentiation between the two groups of interest codes.

In addition, because only 27% of the sample elicited three-letter codes with Social interests in first position, the results do not seem to support Holland, Powell, and Fritzsche's (1994) statement in the Professional User's Guide to the Self-Directed Search that the first letter of an occupational code is reliable and that changes to the first letter of a code in The Occupations Finder (Holland, 1985c), are rarely necessary.

Value of the research

De Vos (2000) states that the results of a study should be of local and/or national interest to others and should respond to relevant problems in order to provide answers which contribute to the increase of "generalisable knowledge" (p. 19). By exploring the appropriateness of the occupational code for South African field guides this study has responded to problems identified by various researchers and by Holland (1997) himself, who recommended that tests of single occupational codes should be conducted in order to identify poorly defined categories. Gottfredson, L. S.

and Richards (1999) have demonstrated that there is a lack of research on the appropriateness of the classification of occupational interest types and environments. This study has also responded to the research review which revealed uncertainty as to the validity, or appropriateness of the classification of occupations due to the possibility that environmental codes may be unstable and susceptible to changes. Examples of previous research studies that have raised concerns about the appropriateness of a Holland occupational typology code include Meir, Hadas, and Noyfeld (1997), Ostroff and Rothhausen (1997), and Schwartz (1992), whilst Chartrand and Walsh (1999) raised the possibility that some occupational codes could not only be changing but may become obsolete due to the changing nature of work. The results of the present study and the findings of previous research suggest that in a career counselling situation there is a need for caution when interpreting an individual's Self-Directed Search generated interest code and when attempting to fit that code to a matching occupational code. Finally, the results, in relation to theory and the research review, imply that a revision of the South African Dictionary of Occupations (Taljaard & von Mollendorf, 1987) may be necessary.

This study is also valuable in that it responded to the established lack of research that has been conducted with regard to the appropriateness of the three-letter occupational interest codes in the South African context. The current research could stimulate further research on other South African occupational codes, possibly leading to the revision and updating of the South African Dictionary of Occupations.

It is not enough for research to be motivated by "mere inquisitiveness" (De Vos, 2000, p. 55). The researcher should consider the usefulness of the results that will be generated by the study. The Field Guide Association of South Africa who expressed interest in and support for the current research will be able to disseminate the information to relevant parties such as career counsellors and personnel departments specialising in the recruitment of field guides for the ecotourism for their consideration. In addition, on a practical and national level, the current researcher intends to make use of the findings when counselling individuals who are interested in becoming field guides, and in an advisory capacity to trainers and game lodges recruiting trained field guides.

Limitations of the research

Having discussed the research findings and their value, certain limitations of the study must be acknowledged. Firstly, at the outset the researcher intended to have a much larger sample. Unfortunately, accessibility to the nationwide training facilities and game lodges was confounded by time constraints and travelling costs. Consequently, the female sub-group was relatively small and when this sub-group was further divided into student and working field guides, sample sizes were too small to allow for meaningful analysis and discussion. Secondly, the lack of differentiated profiles curtailed the variety of statistics that could be applied to the codes that were generated by the sample, such as the IACHAN Agreement Index and the IACHAN Differentiation Index.

The cultural diversity in student and working field guide populations is slowly increasing as a result of an increased awareness of conservation issues in urban populations and social upliftment and job creation programmes in the rural populations adjacent to game lodges. However, a further limitation to the current research was the lack of participants who represented groups other than White, English- or Afrikaans-speaking South Africans. Consequently the present researcher was unable to build socio-economic status into the present research design. The lack of statistical control for socio-economic status and other extraneous variables such as age and home language leaves the results susceptible to the potentially confounding effects of these variables.

Suggestions for further research

There are several suggestions for further research that could be generated from this study. Further research on the appropriateness of Holland codes for South African field guides should make use of larger national sample sizes that are more representative of gender, socio-economic status and all cultural groups.

One possibility for future study would be to introduce qualitative research in order to enrich the quantitative results by selecting participants from the current research study to be representative of the various sub-groups and to conduct interviews in order to clarify some of the issues discussed above. For example, selected female participants could be asked to comment on the reasons for their low scores for Realistic interests and how they feel this would impact on their level of job satisfaction and their ability to cope with the demands of a strongly Realistic

occupational environment. Further, selected working field guides could be asked to elaborate on the way in which their daily activities encompass Holland's descriptions of the six environment types.

Another focus of future research, as suggested by Swanson and Parcover (1998), could be to focus on the environment aspect of the personality-environment fit paradigm by means of a measure such as the Position Classification Inventory (PSI; Gottfredson, G. D. & Holland, 1991). The latter is a convenient tool for creating codes for new or unusual occupations or positions and needs a sample of only eight to ten participants to obtain a reliable three-letter occupational code (Holland, 1997). This would be especially useful in the game lodge industry, where the size, location and operational needs of each lodge may result in specific PSI codes which would influence the job requirements as to the personality, skills, interests, experience and knowledge base of potential employees.

The results of the current research findings as well as the research review suggest the need for an extensive, thorough cross-cultural South African study to determine the appropriateness of Holland's occupational codes in order to update the South African Dictionary of Occupations (Taljaard & von Mollendorf, 1987). Ideally this study should include gender and socioeconomic variables to explore their influence on career development and career choice.

Finally, it is hoped that the study will generate further research into the prescribed codes for other career fields and the appropriateness of Holland's career theory and its associated measures for use in the South African context.

Conclusion

The overall aim of the present study was to explore and describe the interest codes of male and female South African student and working field guides in order to explore the appropriateness of the occupational codes prescribed by Holland for the field guiding profession. The total sample tended to display a wide diversity of interests with only 27% of the participants generating an interest profile with Social interests in first place, even though the prescribed code for field guides is SRI (Social, Realistic, Investigative). Once the differentiating 'rule of 8' was applied, the total sample generated highly undifferentiated profiles that could not be represented as simple three-letter codes, with up to five of the RIASEC interest letters in first place. The general trend of the total sample was to generate profiles with high

scores for Social, Enterprising, Realistic, and Investigative interests in that order, whilst Artistic and Conventional interests were considerably lower.

The female sub-group generated profiles with high Social interests and low Conventional interests. The most significant finding in the comparison of the male and female sub-groups was that the males' mean score for Realistic interests was significantly higher than that of the females. The difference in Enterprising interests between males and females was not considered to be significant. The student and working field guides both generated profiles where Social interests were highest and Conventional interests were lowest. There were no significant differences between these two sub-groups but it was noted that in all instances the interest means for working field guides were higher than for student field guides.

The results of the study (as reported in Chapter Five) suggest that an interest profile such as SREI AC may be more appropriate for South African field guides than the presently prescribed three-letter SRI (Social, Realistic, Investigative) interest code. In general, the codes were largely undifferentiated, with 75% of the participants presenting more complex and inclusive codes with up to five interest fields represented in the first position. A further implication is that other codes may be outdated or inappropriate and that a revision of the South African Dictionary of Occupations (Taljaard & von Mollendorf, 1987) may be necessary.

Finally, a valuable contribution was made by this study in responding to problems identified by various researchers, such as the lack of research into the appropriateness of the classification of occupations and environments and the appropriateness of three-letter interest codes in the South African context.

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APPENDICES

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APPENDIX C LETTER FROM FGASA**THE FIELD GUIDES ASSOCIATION OF SOUTHERN AFRICA**

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**To whom it may concern**

The Field Guides Association of Southern Africa (FGASA) is in full support of the research carried out by Mrs Lynda Allen of the Psychology department of the University of Port Elizabeth.

The benefit of the research into the profiles of Game Rangers, Field Guides, Nature guides and Trackers in relation to careers in the guiding industry are immense. FGASA is in full support and endorse this research project.

Yours sincerely

Grant Hine
Chief Executive Officer
FGASA

APPENDIX D LETTER FROM DAMELIN

Damelin

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June 01, 2004

To Whom It May Concern:

Reference: Treatise study - LJ Allen.

This letter is to confirm that Damelin Education Group is willing to participate in the testing performed by LJ Allen for the purpose of her Masters treatise.

The only stipulation being that the names Damelin, Damelin Education Group and Educor are not used in any open publication, article or other form of communication without prior consent and input from this faculty.

Yours truly,


SJF Allen

Academic Dean
Faculty of Lifestyle and Leisure
Damelin Education Group
Port Elizabeth Walmer Campus

APPENDIX E LETTER FROM SHAMWARI

This letter serves to confirm that Shamwari Game Reserve field guides underwent a psychological profile test on the property of Shamwari Game Reserve. The results of that profile may be used for any relevant research/case studies or scientific journal publications. The name "Shamwari Game Reserve" may not be used in any publication. The results of the above mentioned profiles may not be used for media publication or any other such publications.

John Ellis
RANGER MANAGER

Andrew Kearney
TRAINING MANAGER