The relationship between personality and creativity: A psychometric study

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1:
INTRODUCTION

Given the problems associated with the measurement of creativity, there is probably more speculation than there are data for the personality constructs correlating with creativity (Furnham, 1999). According to Smith & Tegano (1992), measuring creativity is a complex and tiring task. A great number of methods have been used, such as the use of autobiographical instruments or biographical reports (i.e. hobbies, creative activities, taking risks, sense of humour, etc.) (Smith & Tegano, 1992). Some of these methods show high levels of reliability and validity, while others fail in this regard.

While several methods and instruments (for example autobiographical instruments and biographical reports) have been applied to investigate creativity, psychometric methods have been the main source of information. This implies the direct measurement of creativity and/or the observed correlates thereof in individuals. Most of the recent research conducted on creativity is thus based on psychometric methods, or methods that have been created in reaction to observed problems in the measurement of creativity (Smith & Tegano, 1992).

Since psychometric methods have been the main source of information during the past few decades, this approach to the study of creativity forms the basis for our understanding of creativity. However, the psychometric approach is significantly more complex and comprehensive than some critics might want us to believe. While problems associated with the psychometric approach are often highlighted, alternatives to the psychometric approach are also drenched with similar problems occurring during the direct measurement of creativity (Sternberg, 1999). According to Sternberg (1999), the wide use of psychometric methods is surprising when one considers the widely accepted belief that creativity is indefinable and immeasurable.

The aim of the current study is threefold: To develop a creativity questionnaire based on the main criteria for creativity as determined by means of a comprehensive literature survey; to administer this questionnaire, in combination with the Abbreviated Torrance Test for Adults (ATTA), and the 16 Personality Questionnaire (16PF) for the purpose of determining respondents' level of creativity in relation to their personality constellation; to determine whether a typical 16PF profile can be obtained for the purpose of identifying a creative individual. The sample consisted of fourth-year Psychology students at the University of Pretoria.

Identified problems that motivated the research, include amongst others a lack of research in this domain, and therefore a need for a reliable and valid measuring instrument for creativity. Creative individuals are often misinterpreted or misunderstood by the community as the result of a lack of knowledge. Various misconceptions exist such as the perception that creative individuals are crazy or as Ochse (1990) pointed out, the misconception that there is a relationship between genius and madness. The purpose of the

research will also be to reduce misconceptions such as these, by informing the reader of creativity and the individuals who have this unique characteristic. These issues will be discussed in more detail in Chapter 4.

Yet, creativity is an extremely broad concept which is very difficult to define. The main criteria for creativity were thus applied in the development of the Creativity Questionnaire. According to Ryhammar & Brolin (1999), creative individuals can be described as motivated, persevering, intellectually inquisitive, having a need for self-actualisation, independent in thought and deed, confident, self-aware, and open to external and internal stimulation. Creative individuals are typically attracted to and stimulated by uncertainties and complexities, and are usually sensitive to and have a great capacity for emotional involvement. Operationalisation of such criteria formed the basis of the creativity questionnaire. For example, divergent thinking can be operationalised as the ability to generate a substantial amount of diverse ideas, as measured by using open-end questions.

The dissertation reports on the development of a Creativity Questionnaire that can be used in a variety of areas, but will need further revision and refinement in terms of items included, validity and reliability. Therefore the current study should be considered as a pilot study for the testing and development of this questionnaire. Concepts within the creativity domain will be discussed, investigated and explained for the purpose of providing a foundation or guidelines for future development of creativity questionnaires.

Creativity questionnaires and assessment instruments are often very expensive and time consuming. If a typical 16PF profile of a creative individual is determined, it can be used as the more economic and efficient option to measure creativity. Since most psychologists already own or make use of the 16PF, this can be used for another purpose as well, the measurement of creativity. Consequently no additional tests have to be purchased. It can be used for the purpose of job selection, university selection, and also by personnel agencies, psychologists, etc. One could also use this to validate creativity constructs already measured.

After collecting the data from all respondents, 16PF factors identified as playing a role in creativity (for example the “M” factor) were investigated in relation to the creativity scores obtained on the two creativity-measuring instruments. For example, the second order factor, independence (iv), is of great importance with regard to creativity: “I want to do my own thing, my own way.” The following factors might play a role here: E (high), L (high), and B (high), while M (high), Q1 (high) and Q2 (low) should definitely play a role. These factors refer to traits that are generally present in creative individuals. This will be discussed in greater detail in the analysis section.

A comprehensive literature study for the purpose of identifying different theories and methods applied in previous research, as well as the most prominent traits of creative individuals forms the basis of the study. This allowed for the identification of areas where research is needed, and where controversy exists within the personality-creativity domain. Creativity and personality will be discussed in terms of previous research

conducted. The different questionnaires used for the purpose of the study will be discussed in greater depth, where after the data gathering procedure and findings will be discussed, concluding with the main findings and shortcomings of the research.

CHAPTER 2:
LITERATURE REVIEW

2.1 CREATIVITY

2.1.1 Background

Creativity research started during the early 1950's. In contrast to earlier studies focussing on the internal determinants of creativity, there was an increase in interest regarding the creative capacity within a social context during the 1980's and 1990's (Ryhammar & Brolin, 1999). Environmental factors were seen to have a great impact on creative potential. Important tasks for future research seem to be the synthesis of results, as well as the development and testing of broad and integrated models (Ryhammar & Brolin, 1999). Because of the immense controversy surrounding creativity, it can be argued that any research in this domain will make a great contribution to the expansion of the social sciences.

According to Garfield, Taylor, Dennis and Satzinger (2001), it is now the time to adjust our research paradigms, and to start from scratch in understanding and investigating the role of individual differences in the design, enhancement and use of information systems. By realizing the role of individual traits in the creative process, systems can be put in place for the broad incorporation of tools for the enhancement of individual characteristics. In a study conducted by De Sanctis and Poole (1994) it was found that individual differences have a significant predictable influence on achievement, while empirical research on individual differences has declined (Garfield et al., 2001).

2.1.2 Factors influencing creativity

Many authors (Amabile, 1996; Gardner, 1993; Sternberg & Lubart, 1995) have recognised the multifaceted nature of creativity. According to them creativity is seen as the result of interactions among a multiplicity of important dimensions or components of creativity. However, according to Isaksen, Puccio and Treffinger (1993), many studies have focussed only on one component of creativity, such as person, process, product or environment, in an effort to group it into manageable areas of investigation. Studies investigating the person have led to the identification of personality characteristics, behavioural or biographical events associated with individual creativity or cognitive abilities. Investigations of creative products have attempted to reveal variables that distinguish less creative products from more creative products. Isaksen, Puccio and Treffinger (1993) also stated that studies in the domain of creative processes have attempted to identify the steps, strategies and stages within the creative process. Investigators have also identified several environmental factors facilitating or inhibiting creative performance (Isaksen, Puccio & Treffinger, 1993).

The potential interaction effects created by other variables influencing creativity cannot be disregarded. Such disregard would imply a reductionist approach. When employing such an approach, one becomes in danger of not adequately reflecting the multi-faceted nature of the phenomenon of creativity. The need exists to study the dynamic interactions among situations (inhibiting or supporting creativity), tasks (what is expected), people (traits), processes (such as flexibility, elaboration, fluency and originality), and outcomes (product) (Isaksen et al., 1993). Torrance (1979) and MacKinnon (1978) also argued that creativity could not be seen as one-dimensional, and that new and emerging research and statistical methodologies could leverage our understanding of this multi-faceted construct. Creativity does not only have one dimension, and is not only a result of what is present within an individual. Creativity is influenced by a multiplicity of variables such as settings, other people, time, and domain- specific knowledge (Torrance, 1979; MacKinnon, 1978; Treffinger, 1991; Harrington 1990).

According to Ryhammar and Brolin (1999), research on the influence of specific social and physical environmental factors on the creative capacity of individuals has been conducted for quite some time. Historic studies have been conducted in an effort to determine the social, political and cultural factors enhancing or inhibiting creativity. The influence of the work climate on creative development has also been investigated. However, this line of research has been minimal until the 1980's (Ryhammar & Brolin, 1999).

As mentioned earlier, the social, physical, cultural and economic environments of individuals have an influence on their self-perception, as well as the perception of others. Some examples of the impact reality tend to have on individuals are stated below:

- Genetic variations lead to inevitable differences. However, the human mind has developed as an organism that is radically influenced by cultural opportunities and environmental demands, which are experienced during the life of the individual (Howe, 2001). Thus, people may differ genetically, but the availability of resources, for example money and socio-economic status, might impact on an individual's development since these provide the opportunity for further education. A lack of education or poverty may not prevent creativity altogether, but such variables will make its appearance more difficult.

- When looking at the biographical information on the development of creative individuals, the facilitating roles of social, emotional and financial support is emphasised (Kinney, 2000). It has often been found that individuals who have developed creative products came out of a supporting and loving family that gave them the necessary support to achieve their creative goals.

- The ordinal position of an individual in the family is empirically and theoretically linked to intellectual giftedness, wonder children, specific talents and accomplishments (Simonton, 2001).

- Regarding personality and intellectual abilities, it has been found that identical twins that have been raised separately show the same number of similarities in characteristics as those who have been raised together. Thus, the behavioural similarity of identical twins can be ascribed to their genetic similarity (Rowe, 2001).

- Individuals that have been introduced to new and paradigm-modifying ideas, tend to generate more paradigm-modifying ideas. Paradigm-preserving ideas can be defined as extending or supporting an existing paradigm, while paradigm- modifying ideas refer to redefining a problem or related elements (Garfield et al, 2001).

- The observed creativity of an individual is dependent on his/her resources, the active application of resources to the task, and the degree to which what the person has to offer corresponds with the recourses needed for a creative task (Lubart & Getz, 1998). In other words, a less creative individual might need more resources to achieve the same goal as a more creative individual.

- The main source of proof for the consistency of a creative personality is the finding that creative individuals of different ages and working in different domains share the same general characteristics (Helson, Agronick & Roberts, 1995). It can therefore be assumed that some creativity characteristics are not bound to age or working environment, while other creativity characteristics might be more sensitive to environmental influences.

Many individuals, who have creative traits, never have any great achievements. This might be due to the fact that environmental factors inhibit their ability, or they possess personality traits that are not conducive to great achievement. Genetic factors may also only account for some proportion of trait creativity (Eysenck, 1993). This illustrates the interdependence of different factors contributing to creative achievement. Some factors may be inhibiting, while others may be enabling and all factors thus need to be taken into account when one is attempting to predict creative achievement.

The influence of social and cultural factors on an individual's creative development is particularly apparent in the notion of creativity offered by the culture, and through the support given to particular individuals in the implementation, development and maintenance of a creative identity. According to Feldhusen (1995), research clearly indicates that external conditions in the work environment inhibit or facilitate creative performance. Creative individuals should have the opportunity to develop, communicate, and advance their ideas and inventions (Simonton, 1984). Acceptance and opportunity in the work environment is therefore critical for such development and creative expression:

> "environmental variables constitute an obvious set of conditions that are necessary in order to allow creativity to bloom" (Eysenck, 1993:153).

Eysenck (1993) also states that creativity depends on three variables, which can be divided into different factors. These variables include cognition, environment and personality. Factors feeding into cognitive abilities include intelligence, acquired knowledge, special talents and technical skills. Environmental variables include socio-economic, cultural, political-religious and educational factors, while personality traits such as confidence, originality and motivation also have an influence on creativity. According to Helson, Agronick & Roberts (1995), strength and endurance of motivation is a major factor in creative accomplishment.

Eysenck (1993) argues that all of these variables are needed (in a greater or lesser degree) for an individual to produce a truly creative achievement, while many of these variables are likely to act in a synergistic manner. For example, an individual's attitude towards an idea is influenced by the production rules that guide the idea's generation. In other words, an individual's perceptions of the subjective norms of others, and his/her attitude towards the contribution of the idea, have an influence on this individual's decision to contribute an idea (Garfield et al., 2001).

2.1.3 Different views on creativity

2.1.3.1 The trilogy-of-mind

According to Lubart and Getz (1998), empirical works (that developed from experimental and correlational theories, as well as case studies) have in many cases not investigated the cognitive, conative and emotional aspects of creativity. Conation can be defined as an aspect of an individual's personality that is characterised by and impulse to act, and purposive behaviour (Lubart & Getz, 1998). Plug, Meyer, Louw and Gouws (1993) define cognition as all processes through which knowledge is gained about an issue or object, or the process of becoming aware of one's environment. Emotion is defined as a complex disposition characterized by the activation of the central autonomous nervous system, internal bodily reactions and feelings such as happiness, anxiety, anger, empathy, etc. (Plug et. al, 1993)

Research on the influence of these aspects (cognition, conation and emotion) has predominantly focussed on the cognitive domain of this trilogy. During the early 1970's, there was an increase in interest regarding the facilitating effect of a positive attitude on different cognitive and creative tasks (Lubart & Getz, 1998). Lubart and Getz (1998) went on by saying that emotions could facilitate the creative thought process, or be the result thereof, for example, happiness can be the result, or the facilitator of a creative discovery or invention. Theory and research have only begun to investigate creativity as a result of the combined influence of cognition, conation and emotion (Lubart & Getz, 1998).

The trilogy-of-mind is mainly a primary effects-model of the mind (Hilgard, 1980). Cognition, emotion and conation are the primary factors that effect creativity. Lubart and Getz (1998) wanted to know: what role does cognition play in creativity, what is the role of emotion, and what is the role of conation? Despite the

primary effects, there is a possibility for interaction. For example, the cognition-conation interaction implies that creativity might be the result of intellectual abilities and personality, including conative traits (Sternberg & Lubart, 1995). In a study conducted by Vosburg and Kaufmann (1998), an interaction between cognition and emotion was found. The effect of mood on creativity was found to be dependent on the nature of cognitive processes invoked by the task. For example, it was found that positive mood has a facilitative effect on remote associations and information searches (Lubart & Getz, 1998). It is therefore evident that researchers investigating creativity need to study the creative mind as a resulting quality of an individual's continuous interactions with specific social and cultural environments (Lubart & Getz, 1998).

2.1.3.2 Cattell's Interactional Approach

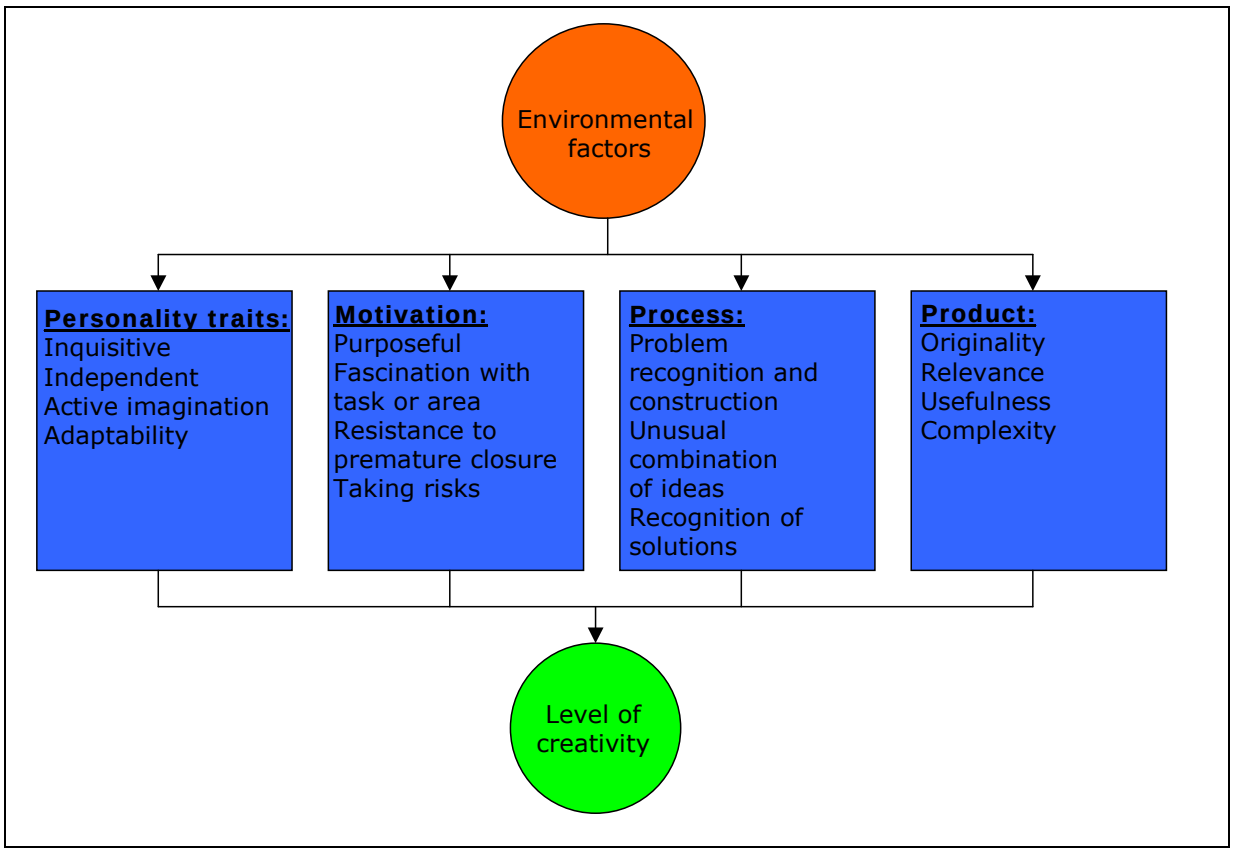
Cattell (1970) introduced a multivariate approach involving factor analysis. This refers to statistical procedures which investigate the relationship between different variables and factors when measuring personality. Through the objective investigation of a person's life record, and the use of personal interviews and data gathered through questionnaires, Cattell (1970) identified and described a variety of characteristics that formed part of the personality. According to Cattell (1970), personality traits are learned and determined through biological and environmental factors.

The method applied in the current study can also be referred to as an Interactional or Ecological approach. This implies the consideration of the interaction between different variables (process, motivation and personality) within a specific context (environment). Many other writers support this approach in the investigation of creativity. Some examples include Rhodes (1961), Treffinger and Poggio (1972) and Stein (1975). Helson et al. also support the use of interactional methods in the study of creativity:

> "The vitality in the field today comes from real-life studies that contextualise, rather than compartmentalize, creative behaviour. The use of historical, developmental, and ecological contexts, in combination with our tools for measuring creativity and personality, should enable us to see more clearly which persons are creative, how, where, and why" (1995:58).

Based on the literature study, the following model (Figure 1) was constructed to illustrate the dynamics of creativity. According to this conceptual model, both environmental factors and genes have an influence on an individual's personality traits, motivation, process and product, which in turn has an influence on an individual's level of creativity. Personality, motivation, process and product are also constantly interacting with each other:

Figure 1: Conceptualising the dynamics of creativity



All approaches contribute to our understanding of the complex concept of creativity as a whole. For the purpose of the current study, creativity will be defined in a multifaceted way as illustrated in the conceptual model (Figure 1). Because of the multifaceted nature of creativity as measured by tests, Davis and Rimm (1998) recommended that assessments should be based on several different tests. Therefore the current study combined different aspects of different creativity tests, as well as findings resulting from making use of these tests for the purpose of developing a creativity questionnaire, and ultimately measuring creativity.

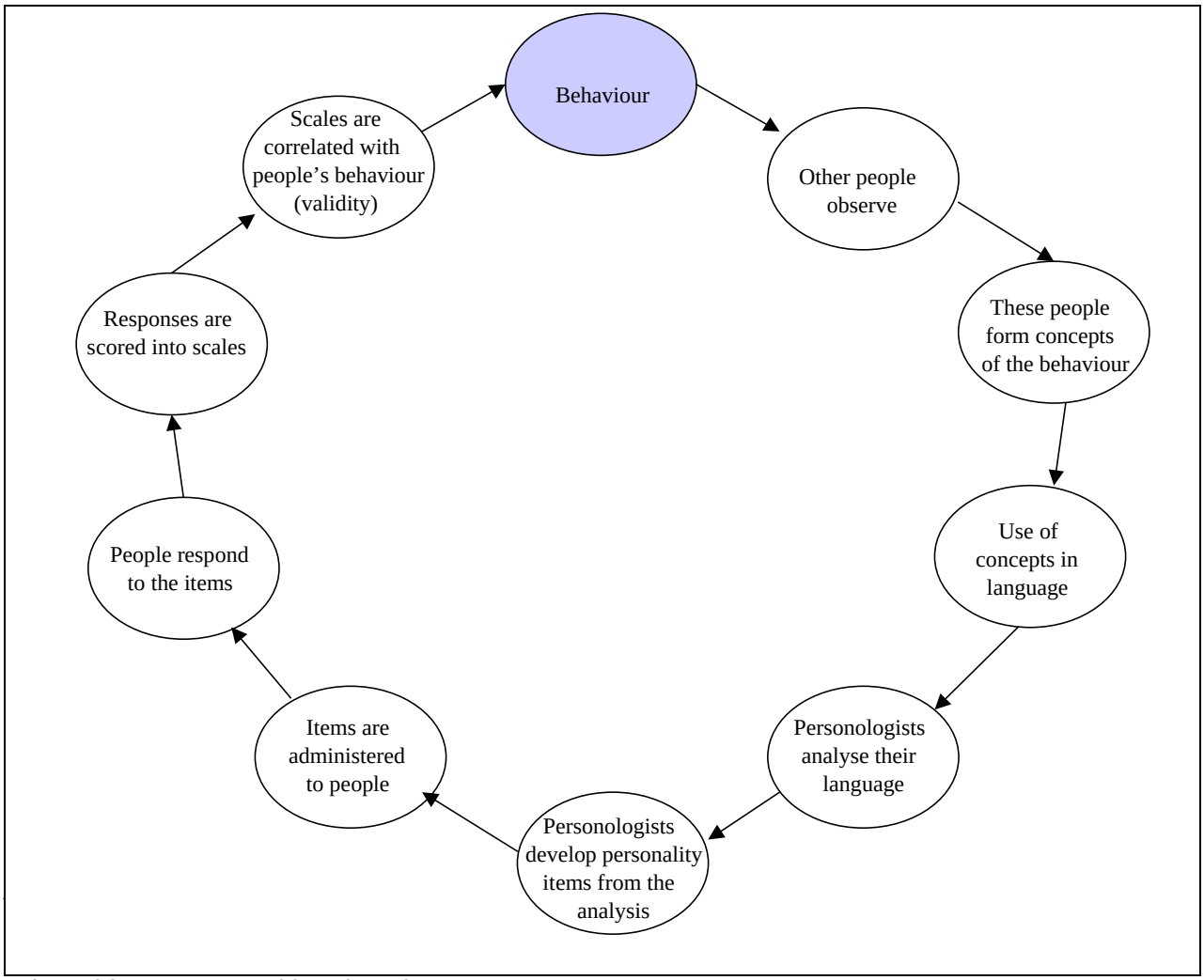
2.1.4 Defining creativity

For the purpose of the current study, creativity is defined as an ability, identified by the observed or self-reported presence of a multiplicity of personality traits such as originality, perseverance, non-conformity et cetera, in combination with motivational traits such as resistance to premature closure, problem resolution processes such as the unusual combination of ideas and the ability to produce original, relevant and useful products.

2.1.5 The role of personality

Personality is often measured by self-reports. This should have the utility of predicting a person's social reputation as it is perceived by others in that person's environment. Within this context, personality can be defined as collections or structures of manifested behaviours, leading others to form certain concepts about a person. Thus, personality traits are concepts inferred from a person's self-reported behaviour under various circumstances. Personality assessment is therefore based on the assumption that reported behaviour is reliably related to actual behaviour. The circular nature of personality measurement is illustrated in the following model (Figure 2) adapted from Most and Zeidner (1995):

Figure 2: The circular nature of personality measurement



Adapted from Most & Zeidner (1995)

Feist's meta-analysis of the literature revealed that creative people tend to be more "autonomous, introverted, open to new experiences, norm-doubting, self-confident, self-accepting, driven, ambitious, dominant, hostile, and impulsive (1998:299). However, Martindale and Daily (1996) discovered a significant correlation between divergent thinking and extraversion. Other researchers have also found a positive relationship between extraversion and divergent thinking (McCrae, 1987; Sen & Hagtvet, 1993; Stavridou & Furnham, 1996) as well as between extraversion and verbal creativity (King, McKee Welker & Broyelse, 1996). To clarify some of the confusion on this issue, Wolfradt and Pretz (1994) suggest that introversion may be a characteristic trait among highly creative individuals. In other words:

> "the relation to this dimension of personality may be discernable at a higher level of creativity only" (1994:299).

Wolfradt and Pretz (2001) found intuition and extraversion to be the best predictors of creativity as measured by the Creative Personality Scale (CPS). Openness to experience was also found to have a positive correlation with all creativity measures (Wofradt & Pretz, 2001). According to Costa and McCrae (1985) openness is characterised by a willingness to try out new ideas, to explore, and to be curious about one's inner ideas and the outside world. McCrae (1993) goes on by saying that openness to experience goes hand-in-hand with an interest in experience for its own sake. Such individuals tend to be tolerant of others, seek out novelty and variety, and have unconventional attitudes. From a theoretical perspective, openness is related to liberal thinking, tender mindedness and a tendency to absorption (Martindale & Dailey, 1996).

Intuitive individuals are usually deeply involved in what they are doing. These people are not afraid of their experiences or of themselves. Challenges are accepted eagerly and these individuals have the ability to handle doubt and uncertainty. They even enjoy risk and seek out instabilities in the world. Intuitive individuals are also willing to be criticised and able to express themselves. They tend to assess themselves in terms of being alert, foresighted, spontaneous, independent and confident (Eysenck, 1993).

2.1.6. The creative individual

According to a study conducted by Houtz, LeBlanc, Butera, Arons, Katz, Orsini-Romano and McQuire (1994), it was found that the ability to postpone judgment, as well as openness to a wider array of external stimulation correlates with the ability to generate more unusual and original ideas. Eysenck (1995) states that creative individuals tend to prefer complexity to simplicity. This is due to an over-inclusive thinking style, where creative individuals increase the opportunity for the appearance of creative or unusual associations. Other traits associated with higher creativity include originality and confidence, while lower creativity is associated with honesty, conservativeness and submissiveness.

It was found that intuitive individuals, who tend to get higher scores on the Torrance Tests of Creative Thinking (TTCT) are accustomed to go beyond direct sensory inputs. Such individuals prefer a more

theoretical or conceptual approach in understanding an idea. Intuitive individuals tend to rely on figurative rather than literal understandings and views, and usually include more ambiguous thoughts. This permits them to consider more possibilities (Houtz et al., 1994). According to Eysenck (1993:154)), intuition can be defined as "a process of reaching a conclusion on the basis of little information which is normally reached on the basis of significantly more information". It should also be noted that high intelligence may be a necessity for an individual to be creative, but is not a sufficient trait in the production of creative results (Isaksen et al., 1993).

Smith and Tegano (1992) and Helson and Agronick (1995) say that personality traits that typically underlie creative behaviour include risk taking, playfulness, sense of humour, openness to new experience, freedom, flexibility and originality. In the study conducted on respondents ranging from age 18 to 23, it was found that the more creative group scored more favourably on self-image, which implies better psychosocial adjustment than less creative individuals. Those individuals who scored higher on creativity seemed to enjoy being with others, felt happier most of the time, felt that they had better mastery and control over their environment, and expressed more confidence in their ability to accomplish the tasks of learning and planning for a vocational future. More creative individuals reported that their feelings were not easily hurt, and that they were less likely to feel inferior. They were also more likely to sustain satisfactory friendship patterns than their less creative peers. In contrast, the less creative respondents indicated more inferiority, anxiety and higher emotional sensitivity. Close-mindedness, conventionality and conscientiousness were negatively related to creativity, while tolerance of ambiguity related positively to creativity (Sternberg, 1995).

Helson, Agronick and Roberts (1995) describe creative people as being independent of judgment, assertive, as well as having consistent high levels of energy in their work. Other traits he ascribes to creative individuals are complexity of outlook, tolerance of ambiguity, unconventionality, and breadth of interest. However, they often experience periods of depression and frustration when blocked in their creative striving. Creative individuals typically have a lot of energy for self-chosen work, persistence, commitment to creative endeavour and career ambition. These people tend to idealise the creative enterprise and also have a sense of identity as a creative person in their field. Creative people are also described as curious, original, imaginative, versatile, clever and complicated. Other personality traits of creative individuals are intellectual autonomy, ambition, openness and effectiveness, interpersonal sensitivity and objectivity, and a sense of well-being.

In a study conducted by Helson, Agronick and Roberts (1995), the three traits that had the highest positive correlations at each age were: having high aspirations for themselves, thinking and associating in unnatural ways (unusual thought processes) and being an interesting, arresting person (expressive vitality). Other positive correlations were found with regards to having wide interests and enjoying aesthetic impressions. Some traits that were found to have a negative correlation with creativity were: being uncomfortable with uncertainty, judging in conventional ways, having conservative values, reluctance to commit themselves, and lack of enthusiasm for their work.

Independence, a questioning attitude, persistence, the ability to work long and hard, and the capacity to work in isolation are some attributes of creative individuals that were identified by Feldhusen (1995). Eysenck (1993) described creative individuals as self-accepting, self-aware, spontaneous, aggressive, self-centred and self-confident. Resistance to premature closure and curiosity are also typical attributes of creative individuals (Eysenck, 1993).

Feldhusen (1995) describes synthesis as the essence of the creative act. This refers to the creation of new and unique configurations of ideas, which in turn, has practical, aesthetic or utilitarian value as well as social acceptance when it is tested in the real world.

> "It is a necessary part of the creative process for creators to be able to advance and gain acceptance of their ideas, solutions, inventions…"
> (Feldhusen, 1995:260).

In a previous study conducted by Feldhusen (1986) creatively productive people where investigated in terms of signs that were apparent from early in their lives. These included:

- High-level intelligence, memory and reasoning ability.
- Early mastery of techniques and/or knowledge in a field.
- A drive to produce, high energy levels and commitment or devotion to study or work.
- An internal locus of control and a sense of creative power.
- Heightened sensitivity to detail.
- Preference for working alone and intense independence.

The last four characteristics could best be described as personality traits. The third characteristic, 'a drive to produce, high energy levels and commitment or devotion to study or work', embraces motivational states and value systems. The sixth characteristic, 'preference for working alone and individualism' may best be thought of as a set of behavioural style factors. 'A sense of creative power and internal locus of control' can be described as a motivating condition that impacts on productivity and creative behaviour. 'Sensitivity to detail' might reflect a tendency to react more creatively and strongly to phenomena, while relating these reactions to internally cognised problem states (Feldhusen, 1995).

Variables associated with creative behaviour can be divided into personality, attitudinal and motivational variables which include:

- depth of feelings,
- enthusiasm,
- perseverance,
- self confidence,
- wide range of interests,

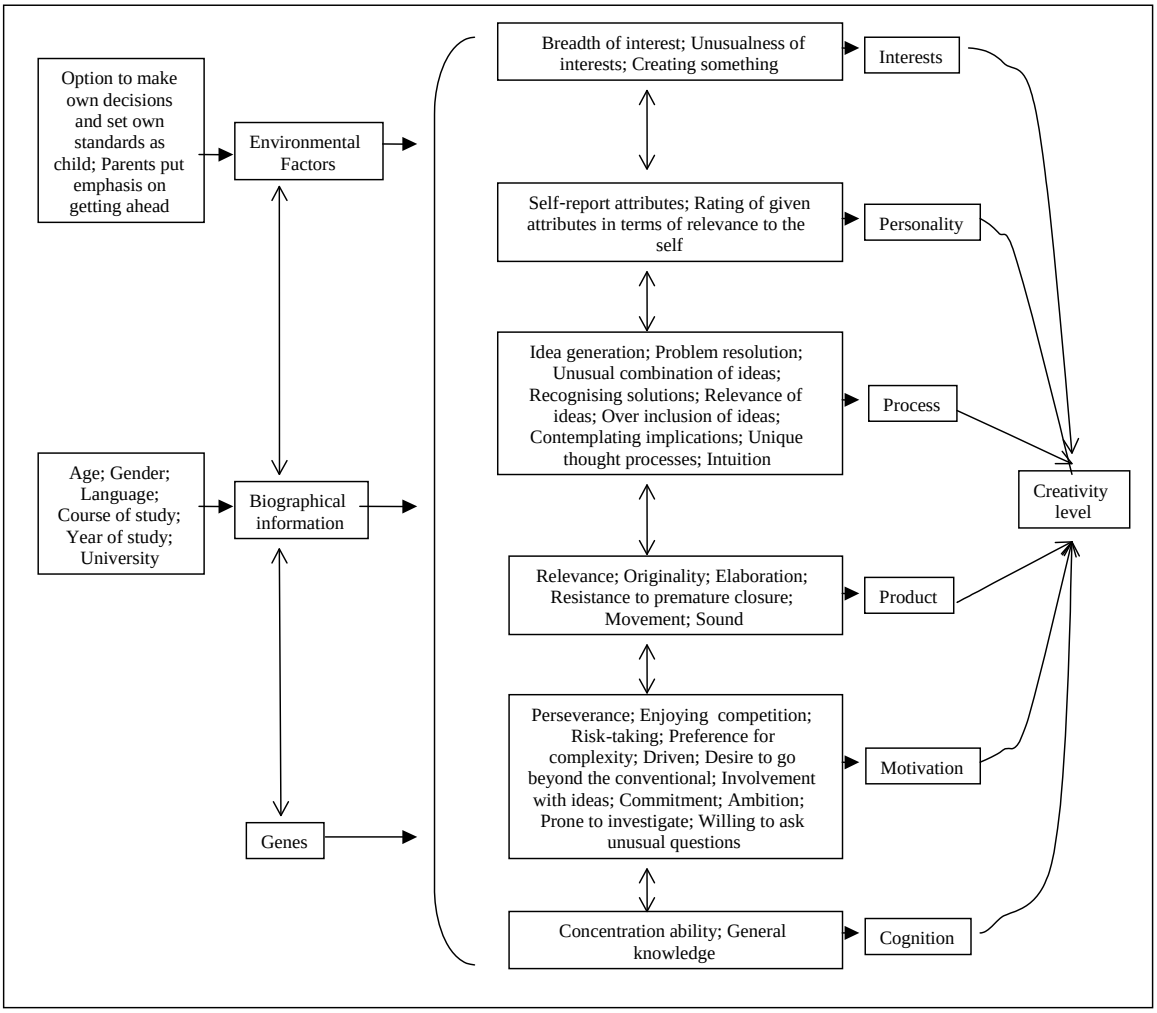
- high energy levels,
- sensitivity to problems,
- preference for complexities, and
- curiosity.

Personality factors such as these constitute a state within which creative behaviour can most readily take place, while some of these factors serve as facilitators or stimulators of cognitive creative processing (Feldhusen, 1995).

2.2 Conceptualisation

The point of departure for the research conducted was based on the following conceptual model (Figure 3) which was constructed on basis of the literature study. According to this conceptualisation an individual's interests, personality, cognitive processes, products, motivation and cognition can determine their level of creativity. Each of these attributes can be subdivided into measurable constructs such as breadth and unusualness of interests, which should in turn be influenced by environmental factors such as the influence of these individual's parents, and biographical information such as age, gender and genes.

Figure 3: Conceptualisation of the research conducted



However, within the scope of the current study all constructs will not allow for the determination of relationships, since many constructs consist of too few sub-constructs or items in the questionnaire (See appendix B). With reference to the creativity questionnaire, measurement of the relevant constructs according to the conceptual model is illustrated in more detail in the following table (Table 1):

Table 1: Conceptual constructs

Construct	Sub-construct	Measurement
Interests	Breadth of interest	Number of hobbies
	Unusualness of interests	Uniqueness in sample
	Creating something	Rated on 5-point scale
	Quality of interest	Quality of 1 or 2
Personality	Self-report	Rated on 5 point scale
	Rating of given attributes including: • Conscientiousness • Individualism • Aggression • Self-acceptance • Positive self-concept • Self-initiative • Acceptance of own responsibilities • Awareness of abilities • Non-conformist • Impulsiveness • Adaptability • Conservativeness • Preference for uncertainties • Openness to subconscious material • Criticising • Social inclusion • Preference for complexities • Belief in own abilities • Sharing own skills • Self-accepting • Self-disciplined • Preference for diversity • Striving for self-improvement • Self-reliant • Intolerance of social ambiguity	Rated on 5-point scale

	• Individualistic • Energetic • Productive • Thorough • Impulsive • Independent in thoughts • Curious • Tolerant of others • Open to experience • Extrovert • Sensitive to detail • Dependable • Hostile towards others • Driven • Dominant • Humble • Competent • Honest • Sensitive to negative feelings • Different • Inventive	
Process	Idea generation	• Fantasises • Fluency of ideas • Originality of ideas • Quality of ideas
	Problem resolution	• Intuitive thinking
	Unusual combination of ideas	• Distant associations • Category combination • Create new ideas by combining existing ones
	Recognising solutions	• Category selections
	Relevance of ideas	
	Over-inclusion of ideas	• Distant associations • Association of unusual concepts
	Contemplating implications	• Thinking before giving

		opinion • Seemingly trivial ideas can have an impact • See how to change objects
	Unique thought processes	• See humour where others don't
	Problem recognition and construction	• Finding problems where others don't
Product	Relevance	• Drawing
	Originality	
	Elaboration	
	Resistance to premature closure	
	Movement/ sound	
Motivation	Rating of given attributes including: • Perseverance • Enjoying competition • Risk-taking • Preference for complexity • Driven • Desire to go beyond the conventional • Involvement with ideas • Commitment • Ambitious • Prone to investigate • Willing to ask unusual questions	• Rated on 5-point scale
Cognition	Rating of given attributes including: • Concentration ability • General knowledge	• Rated on 5-point scale

As stated earlier, these constructs and variables had to be revised and regrouped to provide for meaningful analysis. As a result of such regrouping, a greater focus will be placed on personality and motivational constructs such as perseverance, imagination and self-discipline. These constructs will be discussed in greater detail in paragraph 5.3.

2.3 Summary and conclusion

Because of the immense controversy surrounding creativity, it can be argued that any research in this domain will make a great contribution to the expansion of the social sciences. Creativity is seen as the result of interactions among a multiplicity of important dimensions or components of creativity. However, according to Isaksen, Puccio and Treffinger (1993), many studies have focussed only on one component of creativity, such as person, process, product or environment, in an effort to separate it into manageable areas of investigation. Torrance (1979) and MacKinnon (1978) also argued that creativity could not be seen as one-dimensional, and that new and emerging research and statistical methodologies could leverage our understanding of this multi-faceted construct.

According to Howe (2001), the human mind has developed as an organism that is radically influenced by cultural opportunities and environmental demands, which are experienced during the life of the individual. The facilitating roles of social, emotional and financial support is emphasised (Kinney, 2000). Many individuals, who have creative traits, never experience any great achievements. This might be due to the fact that environmental factors inhibit their ability, or they possess personality traits that are not conducive to great achievement.

There are many views on creativity. According to Eysenck (1993), creativity depends on three variables, which can be divided into different factors. These variables include cognition, environment and personality. Eysenck (1993) argues that all of these variables are needed (in a greater or lesser degree) for an individual to produce a truly creative achievement, while many of these variables are likely to act in a synergistic manner. Lubart and Getz (1998) investigated the cognitive, conative and emotional aspects of creativity. This is referred to as the trilogy-of-mind. The trilogy-of-mind is mainly a primary effects-model of the mind (Hilgard, 1980). Cognition, emotion and conation are the primary effectors with regard to creativity. Cattell (1970) introduced statistical procedures, which investigate the relationship between different variables and factors when measuring personality. This is referred to as the interactional approach to creativity.

Many studies have been conducted to identify personality traits associated with creativity. Such traits include, among others, the tendency to prefer complexity to simplicity, originality and confidence (Eysenck (1995). The study is based on such typical attributes of creative individuals found in literature, and according to the conceptualisation on which the study is based, an individual's interests, personality, cognitive processes, products, motivation and cognition can determine their level of creativity

CHAPTER 3:
OVERVIEW OF TEST CONSTRUCTION CONSIDERATIONS IN CREATIVITY RESEARCH

3.1 THE IMPORTANCE OF RELIABILITY

A measuring instrument can be reliable without being valid, but it cannot be valid unless it is reliable (Graziano & Raulin, 2000). This illustrates the integral role of reliability in psychometric test construction. Establishing measurement reliability is of inarguable importance in both theoretical and applied research, since reliability constitutes a necessary first step toward ensuring construct validity (Anastasi & Urbina, 1996). According to Graziano and Raulin (2000), reliability refers to the ability of a measuring instrument to give the same results every time it is used. However, one can distinguish between three types of reliability: interrater reliability, test-retest reliability, and internal consistency reliability (Graziano & Raulin, 2000).

Interrater reliability refers to the consistency of measurement results between raters (Shaughnessy & Zechmeister, 1994). If the ratings differ consistently, interrater reliability is zero, as opposed to consistent agreement with each other, which is indicative of perfect interrater reliability (Graziano & Raulin, 2000). As for test-retest reliability Graziano and Raulin (2000) say that it refers to the stability or consistency of results over time.

When constructing a measuring instrument, it is important to aim at including items that measure the same construct. This is referred to as internal consistency reliability (Graziano & Raulin, 2000). One construct is therefore measured with several independent items. The more items included determining the score on a construct, the greater the reliability should be of this score (Shaughnessy & Zechmeister, 1994). The integrity and usefulness of data therefore weigh on the internal consistency reliability of a psychometric test.

3.1.1 Factors influencing reliability

One factor contributing to reliability is the clarity and precision of operational definitions of constructs being measured (Graziano & Raulin, 2000). Graziano and Raulin (2000) say that the precision with which we follow the procedures outlined in the operational definition also plays an integral role in this regard. Other factors influencing reliability include:

- the testing conditions,
- time of measurement,
- test-taker affect, the characteristics of the sample, and
- the sampling error.

It is important to note that the more items one include when measuring a construct, the more room there is for error (Shaughnessy & Zechmeister, 1994). However, according to Henson (2000), the central element in determining the reliability of a measuring instrument is the ratio between item and total variance. Thus, if the item included increases the total test variance more than it increases the sum of the item variances, the alpha should increase (Henson, 2000).

Pedhazur and Schmelkin (1991), Thompson (1994) and Vacha-Haase (1998) found that reliability is not a function of a test, but of the scores obtained. Yet, Henson (2000) says that, amongst other, the scores are dependent on the testing conditions as well as the characteristics of the sample being tested, for example homogenous samples will yield lower total variance, and as a result, yield lower reliability estimates. Score reliability should therefore vary according to the characteristics of the sample being tested.

3.2 THE IMPORTANCE OF VALIDITY

A valid measuring instrument measures the concepts actually being investigated, say Graziano and Raulin (2000), although perfect validity cannot be achieved. Validity should therefore always be considered in relative terms. Graziano and Raulin (2000) distinguish between four types of validity. These include statistical validity, construct validity, external validity, as well as internal validity.

The statistical validity of the results indicates whether the results are due to a systematic factor such as the independent variable, or merely due to chance variations (Shaughnessy & Zechmeister, 1994). Construct validity refers to the degree to which a theory on which a study is based, provides the best explanation for the results obtained (Graziano & Raulin, 2000). Graziano and Raulin (2000) say that external validity can be described as the extent to which research findings can be generalised to other conditions, participants, places and times, and in order to achieve this, one should select a sample, which is representative of the general population (Shaughnessy & Zechmeister, 1994). When an independent variable, as opposed to an extraneous variable, is responsible for the observed changes in the dependent variable, it is referred to as internal validity (Graziano & Raulin, 2000).

3.2.1 Threats to validity

The reliability, or unreliability of the measuring instrument used to assess the dependent variable is one threat to statistical validity. The assumptions underlying the statistical test should also not be violated (Graziano & Raulin, 2000). This implies making false assumptions about the nature of the data. According to Shaughnessy and Zechmeister (1994), it is important for one to use clear definitions and well-validated constructs to avoid threats to construct validity. The theoretical basis should therefore be well supported and clearly stated. To avoid threats to external validity, Graziano and Raulin (2000) suggest that one randomly selects a sample across times, places and conditions, and that such a sample should be representative of the

general population. Potential confounding variables should be anticipated and controlled in order to draw valid conclusions about the effects of one variable on another, i.e. internal validity (Graziano & Raulin, 2000)

3.3 WRITING ITEMS

In the construction of the Creativity Questionnaire, ambiguous and vague questions were avoided. Neumann (1997) says that it is important to use clear and specific questions when constructing a questionnaire. Double-barrelled questions, which refer to questions that combine two or more questions (Babbie, 1998), were also avoided.

A substantial number of research studies conducted (Converse & Presser, 1986; Neumann, 1997; Oppenheim, 1992; Schumann & Presser, 1981; Sudman & Bradburn, 1983) indicate that the sequence of questions may affect response rates and accuracy of findings. According to Shaughnessy and Zechmeister (1994), the first few questions are very important in setting the tone of the rest of the questionnaire, and these questions also have an influence on the subjects' willingness to participate in further questions. It is suggested to start with demographic questions to strengthen the subjects' confidence, since they are easy for the respondent to answer (Shaughnessy & Zechmeister, 1994).

Funnel questions can be used in terms of proceeding from more general questions, to more specific questions (Shaughnessy & Zechmeister, 1994). Yet, it should also be considered that an individual's interpretation of a question might be influenced by his/her reaction to a previous question. One method of dealing with the effect of the order of questions is to use the same order of questions for all samples being tested (Shaughnessy & Zechmeister, 1994).

According to Babbie (1998), fictitious constructs and leading questions should also be avoided. Fictitious constructs refer to constructs that do not exist, or matters of which subjects have no knowledge (Mouton, 2001), while leading questions is aimed at influencing a subject to give a certain response (Babbie, 1998; De Vaus, 1986; Oppenheim, 1992). This is achieved by the wording of the question. Negatively phrased questions or double negatives were also minimised in the construction of the Creativity Questionnaire. Babbie (1998) and Neumann (1997) emphasise the importance of avoiding such questions.

The length of a questionnaire often has a negative influence on the quality of the responses, say Dillman (1978) and Sudman and Bradburn (1983). One of the main reasons for this might be subject fatigue. Apart from avoiding negatively phrased questions and double negative questions, sensitive and threatening questions were also avoided in the construction of the Creativity Questionnaire. Oppenheim (1992) states that such questions might lead to non-responses or even refusal to participate.

Converse and Presser (1986) emphasise the need for pre-testing a questionnaire. To minimise and identify potential obstacles during the administration of the test on the planned sample, the Creativity Questionnaire was pre-tested on a sample of five Psychology Masters students.

3.4 PSYCHOMETRIC AIM OF THE STUDY

The motivation for conducting the study can be divided into four categories:

1. The need for a valid and reliable instrument for measuring creativity;
2. Extensive controversy and speculation in this domain;
3. Rectifying misconceptions regarding creative individuals; and
4. The development of hypotheses regarding the motivation for creativity.

The first two issues will be discussed in paragraph 3.4.1 and 3.4.2, while the latter two issues will be discussed in the following section (paragraph 4.1.1 and 4.1.2).

3.4.1 The need for a valid and reliable instrument for measuring creativity

According to Ochse (1990), it has been known for a while that creativity is related to certain personality traits. There is also not as much controversy as to what these personality traits are (Ochse, 1990), although it is said that creativity cannot be predicted by personality traits. Creativity can also not be promoted by developing such personality traits within uncreative individuals and the typical characteristics of productive creators do not necessarily determine their creativity. The characteristics that are related to all effective behaviour still need to be determined (Ochse, 1990).

A general criticism in the study of creativity is the fact that it is extremely difficult to measure creative achievement (Aguilar-Alonso, 1996). Measuring creativity is a complex task. Smith and Tegano (1992) argue that the use of autobiographical instruments as selection apparatuses for creativity as a psychological characteristic is supported. Biographical reports are excellent predictors of creativity and empirical proof exists that self-reporting exceeds the judgment of observers and other assessment procedures (Smith & Tegano, 1992). In other words, when it comes to the measurement of creativity, it has been found that what creative individuals say about themselves, are often more reliable than what others say about them. This might be because these individuals are very aware of and honest about their skills (Cropley, 2000).

In identifying the creative individual, biographical information (e.g. the 'Alpha Biographical Inventory' as indicated on the Creative Learning Web site, 2004), personality characteristics (e.g. the 'Creativity Checklist', 2004) or motivation for creative achievement (e.g. the 'Combined efficacy scale for creative productivity') (2004) is often used. The Creativity Questionnaire that was developed for the purpose of conducting this study, attempted to combine most of these aspects, since every aspect plays a role and is in interaction with every other aspect in every creative individual. Creativity is not only the result of cognitive influences, or only

biographical variables, but is a personality constellation. Every factor that contributes to an individual's personality (environmental factors as well as genes), contributes to the degree of creativity apparent in an individual (Amabile, 1996; Gardner, 1993; Sternberg & Lubart, 1995).

As mentioned, there are some shortcomings concerning existing creativity tests. These include the following:

- It often relies on the judgment of others (e.g. the 'Creativity Checklist", 2004) instead of making use of self-reporting. Creative individuals are aware of their own potential, and are not shy to express this (Cropley, 2000).
- There is not a high correlation between different creativity tests focussing on the creative individual (+ 0.5) (Cropley, 2000). This is probably the case since different tests measure different aspects of the creative individual. Therefore the current study will focus on the most general characteristics of creative individuals, formulated through previous research conducted. These general characteristics were determined by identifying recurring themes in previous research findings regarding creative individuals.

According to Eysenck (1993), a major problem with the measurement and theoretical analysis of creativity has always been that the term creativity has been used in two very different senses. Eysenck also states that creativity can be defined in terms of a finished product, or as a trait characteristic of a person. Theories supporting creativity as a trait (Glover, Ronning & Reynolds, 1989; Magnusson & Bachteman, 1977), define the creative personality as the basis for creative action. This is associated with certain characteristics like risk-taking behaviour and independence. Emphasis on the fact that creativity is determined by the products of individuals is a recent development in creativity research, says Eysenck (1977). These products are evaluated in terms of originality and relevance to one's culture at a certain point in time and where these products are not accepted, their originality might be appreciated by later generations.

The current research will focus on creativity as a trait, combining it with the process through which individuals function creatively. Torrance components such as flexibility, elaboration, fluency and originality will be addressed by using the Abbreviated Torrance Test for Adults. These components will be discussed shortly in paragraph 4.4.1.

3.4.2 Existing controversy and speculation

Although a great extent of research has been done on creativity, there still exists much speculation (Ryhammar & Brolin, 1999) on the subject. When looking at the literature, one often comes across vague definitions of central concepts. This is accompanied by underlying preconceptions, which are not sufficiently described or explained (Ryhammar & Brolin, 1999). Although there are a relative number of research studies done on different levels, using different methods and perspectives, there is still a shortcoming when it comes to comparing different results (Ryhammar & Brolin, 1999).

Studies on creativity are done in such a way that it seems like every aspect of creativity can be understood in isolation from every other aspect, while Amabile (1996) feels results should be integrated. The need exists to develop comprehensive and integrated models, where personality-related, cognitive, societal and cultural factors can be emphasised and combined in different ways (Ryhammar & Brolin, 1999). The current study will not focus on creativity as a characteristic, but as a personality constellation. Different constructs interact to result in an individual being characterised as a creative individual.

An interactionist approach (see paragraph 2.1.3.2) to the investigation of creativity will help us to gain a better understanding of the complex nature and dynamics thereof. Such an approach might result in better definitions and applications, which might improve the clarity and precision of future research. Instead of oversimplifying and under defining creativity, a more comprehensive and meaningful approach should be encouraged for future research purposes (Eysenck, 1993).

A general theory is needed which can be used as a meaningful and practical basis for experimental and other studies. People show different levels of creativity. These differences should be seen as a function of the influential role of historical conditions, cognitive abilities, personality and societal factors in interaction. Only when more knowledge is gained about these factors, and how they interact with each other, will one be able to confidently determine the degree to which creativity can be influenced (Ryhammar & Brolin, 1999). As Eysenck stated:

> ”We must begin by identifying gaps in our knowledge and understanding of creativity; these gaps represent opportunities for development, rather than obstacles to research progress” (1993:59).

3.5 CONCLUSION

It is therefore clear that there are many reliability and validity issues to be taken into consideration when constructing and administering a psychometric test. These issues cannot be taken for granted. In addition to such considerations, the aim of the study also has psychometric components as discussed in the previous paragraphs. Other aims of the study will be discussed in the following chapter.

CHAPTER 4:
METHODOLOGY

4.1 AIM OF THE STUDY

As mentioned in Paragraph 3.4, the motivation for conducting the study can be divided into four categories: the need for a valid and reliable instrument for measuring creativity; existing controversy and speculation in this domain; rectifying misconceptions regarding creative individuals; and the development of hypotheses regarding the motivation for creativity. The latter two issues will now be discussed.

4.1.1 Rectifying misconceptions regarding creative individuals

It is noticeable that the most pertinent and consistent characteristic of a creative individual is enduring, enthusiastic commitment to work (Helson, Agronick & Roberts, 1995; Feldhusen, 1995; Eysenck, 1993; Ochse, 1990). Creative individuals are energetic, persevering, committed, productive and thorough (Ochse, 1990; Cropley, 2000). It is also clear that the intense enthusiasm of creative individuals is not just an undirected hyperactivity or the externalisation of emotional energy, but is aimed at excellence. According to Ochse (1990), creative individuals are not only conscientious, but also typically ambitious. They have high levels of aspiration, are prone to constructive criticism, and are not as easily satisfied as their less creative counterparts (Ochse, 1990).

Eysenck (1993) stated that substantial evidence supported the fact that, geniuses in the arts and the sciences show a great deal of psychopathology. It has also been said that creative individuals and individuals with high psychosis scores, have a broader associative horizon than low “P” and normal subjects (Aguilar-Alonso, 1996). According to Cattell and Butcher (1968), a great number of studies indicate that creative individuals are socially and emotionally deficient, which places them under risk for psychopathology. However, Smith and Tegano (1992) point out that it has been found that creative individuals show better psychosocial functioning on six of the eleven self-concept dimensions that were measured, than less creative individuals. Social competence accompanied their positive self-concept (Smith & Tegano, 1992). These findings stand in contrast to the profile sketched of creative individuals being socially and emotionally deficient.

Eysenck (1993) argues that the cognitive features that link psychosis with creativity include lack of latent inhibition and over inclusiveness. Creative people appear to be more open to incoming stimuli from the surrounding environment, while other people might shut out this same information through a process called "latent inhibition" (1993). Eysenck (1993) defines latent inhibition as the unconscious capacity to ignore

stimuli that experience has shown is irrelevant to one's needs. A lack of latent inhibition thus leads to over-inclusion (1993).

However, according to Smith and Tegano (1992), creative individuals often see themselves as likeable. They enjoy the company of others, have more liberal and objective sexual beliefs and feel happier than less creative people most of the time. They feel that they have better control over their environment, and have more confidence in their ability to learn and plan for their career and future. Smith and Tegano (1992) state that these findings are in line with other studies conducted on the gifted and talented, where academically gifted subjects showed personal and social maturity, and no unnatural tendency to maladjustment.

4.1.2 Development of hypotheses regarding the motivation for creativity

If the typical profile on the 16PF of a creative individual (in the context of the study) hypothetically looks as follows: A:5; B:6; C:3; E:8; F:7; G:5; H:7; I:3; L:7; M:8; N:4; O:8; Q1:7; Q2:8; Q3:7; Q4:5, an analysis of the profile could lead to hypotheses about the motivation for creativity.

Previous studies (Amabile, 1996; Eisenberger & Cameron, 1996) have investigated the impact of intrinsic and extrinsic motivation for creativity. An example of an intrinsic motivation hypothesis is that intrinsic motivation is advantageous for creativity, while extrinsic motivation is only advantageous under specific circumstances (Amabile, 1996). A few theories (Maslow, 1968; Rogers, 1961), have described creativity as being primarily a conative phenomenon (e.g. humanistic perspectives on creativity). According to Lubart and Getz (1998), it has been said that the primary motivation for creativity, is the tendency to activate and express the total capacity of the self.

Recent theories (Amabile, 1996; Gardner, 1993; Sternberg & Lubart, 1995) have proven that a large number of components need to interact in order for a person to be creative. Lubart and Getz (1998) describe creativity as the result of intrinsic motivation, domain- related knowledge and skills, as well as creativity-related skills. Creativity-related skills include a cognitive style in handling complexities, breaking one's own thought patterns during the resolution of problems, heuristics for the generation of new ideas, as well as a working style which is characterised by high energy levels and focussed effort (Lubart & Getz, 1998).

Behaviourists (e.g. Skinner, 1976), who place a lot of emphasis on the significant impact of the environment on an individual's behaviour, says that creativity is learnt. As any other behaviour, creativity can be explained in terms of stimulus, reinforcement and response. According to Ryhammar and Brolin (1999), behaviourists concur that creativity can be enhanced in the presence of sufficient reinforcement mechanisms in the external environment. Every individual can learn to be creative. The rate at which this is achieved can, however, vary from person to person (Ryhammar & Brolin, 1999).

4.2 RESEARCH QUESTIONS

An attempt was made to address the following issues and research questions:

- Constructing a creativity questionnaire based on a conceptual model.
  - This involved assessing the performance of the questionnaire in the sample in terms of psychometric properties such as reliability.
- Determining the relationship between the Creativity Questionnaire and the Abbreviated Torrance Test for Adults (ATTA).
  - This included the assessment of construct validity.
- Determining the Creativity Questionnaire and the 16PF's ability to identify creative individuals:
  - Does the 16PF-profile of a creative individual support theoretical and empirical results found in the literature?
  - If this is the case, it should be indicative of construct validity (especially concurrent validity).
  - Determining the Creativity Questionnaire's ability to differentiate between creative and non-creative individuals.
  - If it does manage to differentiate between the two, it should be indicative of construct validity (especially concurrent validity).

4.3 SAMPLE

A sample of 65 respondents was used. This sample consisted of a mixture of Black, White and Indian, male and female psychology honours students at the University of Pretoria.

4.4 INSTRUMENTS USED

4.4.1 The Abbreviated Torrance Test for Adults

The Torrance Tests of Creative Thinking (TTCT) are widely used and well-known instruments (Kerr & Gagliardi, n.d., p.12). These tests are designed to assess several dimensions of divergent thinking, including originality, fluency and flexibility. Fluency refers to the number of responses generated in response to a question or stimulus. Originality refers to the statistical infrequency of ideas, while flexibility refers to the number of different categories or types of ideas generated (Verhaeghen, Khan & Joormann, 2005). Many other creativity questionnaires, including the TTCT have been criticised for not measuring actual creative accomplishments (Houtz et al., 1994). However, according to Kerr and Gagliardi (n.d., p.12), the use of the TTCT is supported by more evidence of validity than any other creativity tests. Data on the TTCT has been critically reviewed by a multitude of authors (Cooper, 1991; Hovecar & Bachelor, 1989; Torrance, 1988).

The Abbreviated Torrance Test for Adults (ATTA) is a shortened version of the Torrance Tests of Creative Thinking (TTCT) (Goff & Torrance, 2002). Since this version proved to be very successful when used with adults, it became available for general use with the adult population (Goff & Torrance, 2002). According to Goff and Torrance (2002), studies have shown strong evidence of relationships between test behaviour and real-life creative achievement.

Four of the key abilities assessed by the ATTA, are fluency, originality, elaboration and flexibility. These abilities seem to be important in producing creative responses (Verhaeghen et. al, 2005). Both verbal and figural activities are combined. The ATTA consists of three tasks which has a time limit of three minutes each. The shortened administration time is just one of its benefits. Other benefits include the ease of administration as well as its abbreviated format (Goff & Torrance, 2002).

4.4.1.1 Reliability

Reliability refers to the consistency with which a test gives the same results each time it is used, regardless of who conducts the test (Graziano & Raulin, 2000). Test reliability for the raw scores representing composite scores on the ATTA can be evidenced by the KR21 reliability coefficient. The standard error of measurement (SEM) is a valuable addition to the reliability coefficient, since it gives an indication of the extent of the error allowance one must take into account when using test scores. According to Goff and Torrance (2002), a reasonable allowance would be two SEM's in each direction. The following table (Table 2) is adapted from Goff and Torrance (2002), and gives an outline of the KR21 reliability coefficients, as well as the standard error of measurement for the total raw score for the four abilities (originality, elaboration, fluency and flexibility). The total raw score, together with the creativity indicators score, are included:

Table 2: ATTA reliability

Score	Mean	Sigma	KR21	SEM
Total abilities	34.30	11.53	0.84	4.63
Total abilities and indicators	44.14	14.78	0.9	4.76

Adapted from Goff and Torrance (2002)

4.4.1.2 Validity

Validity refers to the ability of a test to measure the concepts that are actually investigated (Graziano & Raulin, 2000). The Torrance Tests of Creative Thinking (TTCT) is the most widely used and most researched

creativity questionnaire. Even though several hundred validity studies have been conducted on the TTCT, the most powerful evidence of its validity comes from two longitudinal studies conducted in 1958 and 1959 (Goff & Torrance, 2002). These studies, with real-life criteria, seem to offer the strongest link to test behaviour of creative achievement. By using the TTCT, Torrance identified four key abilities that seem to be important in producing creative responses. These include fluency, originality, elaboration and flexibility. Torrance also identified 19 indicators. The need for a shortened version led to a lot of transformations, with the most recent version being the Abbreviated Torrance Test for Adults (ATTA) (Goff & Torrance, 2002).

4.4.2 The 16PF SA92

The 16PF SA92 is a pencil and paper instrument, which takes between 30 and 45 minutes to complete. The SA92 version of the 16PF comprises of 160 items, as opposed to the original pool of more than 850 items (Van Eeden & Prinsloo, 1997). According to De Bruin (2001), Form SA 92 was developed in response to dissatisfaction with the low internal consistency reliabilities of Forms A and B. The need for the development of a South African version was recognised and summarised by Abrahams (1996), and Van Eeden and Prinsloo (1997) and stipulated as follows:

- It was not known whether ethnic and gender bias existed with Forms A and B;
- New norms needed to be established;
- Items performing poorly could be eliminated; and
- Reliability coefficients could be improved with the SA92 version.

One other major advantage of the development of the SA92 version was the elimination of bias in terms of ethnicity and gender (De Bruin, 2001).

This instrument measures 16 pairs of different factors, each on a continuum (Prinsloo, 1998). Factors are based on a rating scale, ranging from one to ten. All the traits are bipolar, thus, on the one pole there is a low indication of the trait and on the other pole there is a high indication of the trait (De Bruin, 2001). A score of between four and seven is indicative of an average rating (Bain, n.d., “The factors of the 16PF” section, par.1). The factors are outlined in the following table (Table 3), adapted from Prinsloo (1998):

Table 3: 16PF Factors’ description

First-order factors		
Factor:	**Low score**	**High score**
A	Reserved	Outgoing
B	Concrete-thinking	Abstract-thinking
C	Lower ego strength	Higher ego strength
E	Submissive	Dominant

F	Sober	Carefree
G	Lower superego strength	Higher superego strength
H	Shy	Uninhibited
I	Self-reliant	Dependent
L	Trusting	Suspicious
M	Conventional	Imaginative
N	Forthright	Shrewd
O	Placid	Apprehensive
Q1	Conservative	Experimenting
Q2	Group dependent	Self-sufficient
Q3	Undisciplined	Self-disciplined
Q4	Tranquil	Driven
Second-order factors		
QI	Introversion (inhibited behaviour) vs. extraversion (proficiency in interpersonal relationships)	
QII	Anxiety-dynamism integration (very high anxiety indicates pathology)	
QIII	Tough poise (the higher this score, the less sensitive the person)	
QIV	Independence (the higher the score, the more difficulty the person experiences in relationships)	
QVIII	Compulsivity	

Adapted from Prinsloo (1998)

4.4.2.1 Reliability

Prinsloo (1998) finds the 16PF's reliability to be acceptable and points out that certain population groups, such as the black population, are underrepresented in the normative sample. However, according to Smit (1996), the reliability coefficients of the 16PF are higher than many of the other tests being used. The reliability coefficients indicated in the following table are generally much higher than those of previous versions of the 16PF. Abrahams (1996), and Van Eeden and Prinsloo (1997) states that one of the most important objectives with the adaptation of the 16PF (16PF, SA92) was to improve the reliability coefficients (internal consistency) of the scales. The following table (Table 4) is adapted from Prinsloo (1998), and illustrates K-R8 scores for the combined group:

Table 4: 16PF SA92 reliability coefficients for combined group as determined by K-R8

Kuder-Richardson 8 coefficients (16PF, SA92)	
MD	0.72
A	0.74
B	0.61
C	0.75
E	0.66
F	0.73
G	0.7
H	0.82
I	0.68
L	0.59
M	0.6
N	0.5
O	0.76
Q1	0.62
Q2	0.63
Q3	0.74
Q4	0.73
Reliability coefficients of second order factors: (Mosier's formula)	
QI	0.88
QII	0.9
QIII	0.74
QIV	0.8
QVIII	0.79

- *Reliability ranges from 0 to 1, where 0 indicates no reliability and 1, perfect reliability*

The male subgroup also does not have K-R8 scores of less than 0.5 for any of the factors, while the female subgroup only has a K-R8 score of less than 0.5 for factor N. It is also noteworthy that when comparing these scores to the K-R8 scores of Form A, reliability improved by 18-28% for factors A, B, E, F, H, I, J and MD. Reliability improved by 34% for factors C and N, while factor O improved by 40%, Q3 by 56%, Q1 by 62% and factor M improved by 66% (Bain, n.d., "The original studies published by the HSRC" section, par. 3).

Retest reliability coefficients vary between 0.52 and 0.78 (Prinsloo, 1998), but is expected to be much lower for longer periods between test taking and retaking. The reason for such a prediction might be the dynamic and changing nature of an individual's personality through his/her lifecycle. It could be argued that an

individual's personality at a specific point in time should not be regarded as a given, but should be seen as a moving target within a continually changing context.

Retest reliability was tested on a sample of SAP officers and found to be highly satisfactory. The sample consisted of 124 subjects (mixed gender and race). These scores are indicated in table 5 (adapted from Prinsloo, 1998):

Table 5: 16PF retest reliability coefficients for each of the first- and second-order factors of the SA92 form (as calculated from data obtained from the SAP, 1992)

First-order Factor	Coefficient	Second-order Factor	Coefficient
A	0.65	QI	0.78
B	0.55	QII	0.77
C	0.61	QIII (A,I,M)	0.56
E	0.52	QIII (C,I,M,O,Q3,Q4)	0.77
F	0.74	QIV	0.72
G	0.61	QVIII	0.69
H	0.70		
I	0.59		
L	0.60		
M	0.64		
N	0.60		
O	0.72		
Q1	0.56		
Q2	0.68		
Q3	0.65		
Q4	0.64		
MD	0.68		

Adapted from Prinsloo (1998)

4.4.2.2 Validity

According to Cattell, Tatsuoka and Eber (1970), the 16PF actually measures the concepts it intends to investigate. Other studies (Van Eeden & Prinsloo, 1997; Thompson, 1990) also indicate that the test has predictive validity.

4.4.3 The Creativity Questionnaire

The Creativity Questionnaire was compiled by utilising existing research. Attributes that were found to be typical of creative individuals in previous research conducted were included to be measured in the Creativity Questionnaire. A vast array of literature exist (Helson, Agronick & Roberts, 1995; Martindale & Dailey, 1995; Furnham, 1999; Cropley, 2000; Lubart & Getz, 1998), on the traits of creative individuals, as well as the behaviour that fosters creative behaviour. These traits include, among others, independent thinking, initiative, curiosity, a positive self-concept and an acceptance of responsibility (Houtz, LeBlanc, Butera, Arons, Katz, Orsini-Romano & McGuire, 1994). The construction and scoring of the Creativity Questionnaire will be discussed in detail in paragraph 4.6.

4.5 RESEARCH DESIGN AND PROCESS

The research design for the current study was based on a model adapted from Graziano and Raulin (2000). This model is called *Research: a Process of Inquiry,* and will be discussed in terms of the different phases of the research process:

4.5.1 Idea-generating phase

An area of interest was identified and refined through a comprehensive literature study.

4.5.2 Problem-definition phase

Through the literature review, a good overview was gained on previous research in the domain of creativity and personality. Based on my own ideas and speculations derived from previous research and theory, research questions were developed. As discussed in paragraphs 3.4 and 4.1, the aim of the study is also to address existing controversy and speculation in this domain; the need for a valid and reliable instrument for measuring creativity; development of hypotheses regarding the motivation for creativity; and rectifying misconceptions regarding creative individuals.

4.5.3 Procedures-design phase

This phase involved determining which observations were needed under what conditions. It was decided to conduct the research on male and female psychology honours students at the University of Pretoria. Since the study was considered to be a pilot study from the onset, a sample of 65 was perceived to be sufficient. This sample consisted of a mixture of Black, White and Indian respondents. The method for recording observations and the statistical methods to be used to analyse the data were also determined. It was decided to make use of the 16PF and the Abbreviated Torrance Test of Creativity as well as to develop a Creativity

Questionnaire as discussed in the introduction (Chapter 1). Ethical evaluation was done and approved of by the head of the Psychology department at the University of Pretoria, Prof. M.C. Marchetti-Mercer.

4.5.4 Observation phase

This phase involved carrying out the procedures that were selected in the previous phase and included the following:

4.5.4.1 Administering the tests

The students were informed of the purpose of the study, as well as what the data would be used for. Since the students did poorly in their test (for one of their modules), they were offered an extra 7% as compensation for their participation in the study. They were informed that it was not compulsory and that they could leave at any time.

The students were told what was expected of them, having to fill in two questionnaires. The first questionnaire would test their creativity, which consists of two parts: the ATTA, and the Creativity Questionnaire. The second questionnaire would consist of the 16PF. They were told that the whole procedure would take about an hour and a half.

Attendance forms had to be filled in by each student to assist the lecturer in their compensation. A letter of informed consent also had to be signed by each participant (see Appendix D). These two forms were handed out, signed and collected before the onset of the formal data collection.

Since the questionnaires were completed anonymously, participants were asked to keep all three answering sheets with them until they were handed in. This enabled the test administrator to keep each participant's data together (each participant's completed answering sheets were stapled together and numbered), which would be of great assistance during the coding and analysis phase of the research. When the answering sheets were handed in, each participant was thanked personally for his/her participation.

4.5.4.2 Scoring and capturing the data

The Abbreviated Torrance Test for Adults Manual (Goff & Torrance, 2002) was used to score the ATTA. An assistant appointed by the test administrator did the actual scoring of the ATTA. This assistant had the relevant background education (he was busy completing his Honours degree in Psychology), and received thorough training on the ATTA during two one-hour sessions. Inter-rater reliability was addressed by re-scoring a random sample of the tests already scored by the assistant. This ensured that the same scores were obtained by both individuals.

The Creativity Questionnaire was scored by the test administrator according to the guidelines outlined in section 4.6.2, while the 16PF was scored according to the guidelines set out in the manual for the use of the Sixteen Personality Factor Questionnaire, South African 1992 version (16PF, SA92) (Prinsloo, 1998). Thereafter, data obtained from all three questionnaires were captured onto SPSS 11.0 for Windows.

4.5.5 Data-analysis phase

During this phase, numerical data obtained in the previous phase were organised and analysed. This phase will be discussed in more detail in the following chapter (Chapter 5), along with a discussion of the results.

4.5.6 Interpretation phase

Results were interpreted in terms of how the respondents answered the research questions, and how these answers contribute to the knowledge in the field. This phase will be discussed in the last two chapters (Chapter 6 and 7).

4.5.7 Communication phase

Since science is a public enterprise, the communication of research findings is a critical component of science (Graziano & Raulin, 2000). The purpose of this document is therefore to fulfil this component.

4.6 CONSTRUCTING THE CREATIVITY QUESTIONNAIRE

4.6.1 Motivation for items included

The first measure of creativity was a list of personal hobbies. It is valuable to assess individuals' natural interest in engaging in creative activities in their daily life. Each participant's hobbies were rated on a five-point scale. Hobbies in which persons actively create (e.g. painting, design, playing musical instruments) were judged as more creative than hobbies in which persons participate in given activities (e.g. watching television, reading and sports).

The Alternate Uses subtest of a creativity test developed by Wallach and Kogan (1965) was adapted in the development of the Creativity Questionnaire. This involved asking respondents to give as many unusual uses as they can for various common items (e.g. shoe, watch, etc.). This is scored by counting the number of responses (only if it is practical and relevant to reality), and scoring the originality in terms of the statistical uncommonness within the group being tested. Vosburg (1998) reported inter-rater reliabilities of 0.92 for originality ratings, and an overall alpha (internal consistency) reliability of 0.86 was reported by the same author.

Another item used in the Creativity Questionnaire was adapted from Mednick's (1962) Remote Associates Test (RAT). This is based on the fact that creative individuals are better at finding remote associates to stimulus words. Moon, cheese and Monday were provided as apparently unrelated words. The task was to find a remote fourth word that links these words, for example "blue". The score in this case is the number of correct solutions. Mednick reported internal consistency; coefficients of 0.91 and 0.92 respectively when the test was administered to samples of male and female undergraduates.

Urban and Jellen's (1996) Test of Creative Thinking (Divergent Production) (TCT-DP) rated respondents' image productions according to dimensions derived from a Gestalt-psychology theory of creativity. These dimensions include new elements, boundary breaking and humour. In the Creativity Questionnaire, respondents were presented with an incomplete figure. Their task was to make a drawing containing the fragments, in any way they wished. A number of studies indicate that the test-retest reliability is about 0.70 - 0.75, while inter-rater reliability of the test is above 0.9 (Cropley, 2000).

Category combination was one of the items used in Mumford, Supinski, Baughman, Costanza and Threlfall's (1997) study on creative thinking. In their study they focussed on the problem-solving skills of creative individuals. In the Creativity Questionnaire, a problem was presented that consisted of the following sets of exemplars: "banana, pineapple, orange, peach"; "table, chair, lamp, bed"; and "telephone book, marriage certificate, map of Johannesburg, article". The respondents were asked to identify the categories defined by the exemplars, and to combine these categories to create a new, super-ordinate category. Respondents were then required to label the new super-ordinate category and provide a brief motivation for their choice. In this case the score was calculated on basis of the number of meaningful solutions.

Motivation can be determined by measuring, for example an individual's willingness to skip meals to work on a project. Pervasive and continuing enthusiasm and breadth of interest can be measured in terms of the number of hobbies pursued. Drive towards novelty and diversity might be determined in terms of, for example the level of interest in unusual art forms and the extent of unconventional collections (Cropley, 2000).

Other characteristics of creative individuals were found to be self-improvement or self-striving, which include the display of curiosity, being committed to an area of interest and enjoying competition; social participation and social experience, which include helping other students with their work; parental striving, which include the perceived need to do well in order to satisfy one's parents and a parental emphasis on getting ahead; and independence training, which include being allowed to set ones own standards and being allowed as a child to choose one's own friends. In a study conducted on engineers, where the criterion was based on holding patents or not, a cross-validation study based on real-life achievements provided a validity coefficient of .62. Of those engineers who scored above the cut-off point on the inventory, 83% were indeed creative according to the criterion (Michael & Colson, 1979).

The following items were adapted from Kumar, Kemmler and Holman's (1997) Creativity Styles Questionnaire (CSQ):

- "I create new ideas by combining existing ideas"
- "When I have a new idea, I get totally absorbed in it"

These items were rated on a five-point scale ranging from "never" to "always". The following item was adapted from Colengalo, Kerr, Huesman, Hallowell and Gaeth's (1992) Iowa Inventiveness Inventory:

- "When I look at an object, I see how I can change it".

This inventory distinguished significantly between acknowledged creative individuals and less creative individuals (Cropley, 2000).

The ability to produce unconventional ideas and the motivational dimension of risk-taking are also considered to be typical attributes of creative individuals (Cropley, 2000). Items adapted from Byrd's (1986) Creatrix Inventory include:

- "I see the humour in something when others don't"; and
- "Daydreaming is a useless activity".

In the latter case, reverse coding would be applied since creative individuals don't perceive daydreaming to be a useless activity. These items were scored on a scale from one to five in terms of agreement ("disagree" to "agree").

Innovative individuals have a greater motivation to be creative, have greater self-confidence and higher levels of risk taking, which leads to higher productivity (Kirton, 1989). The Creativity Questionnaire therefore includes items such as:

- "When struggling with something, I will find a solution"; and
- "I tend to do things differently to other people".

Basadur and Hausdorf (1996) emphasised a different aspect of the correlates of creativity, namely attitudes that are favourable to creativity. Items such as: "New ideas usually don't work out", and "I think creative thoughts are bizarre", were included in the Creativity Questionnaire in response to these findings. Other items adapted from Basadur and Hausdorf's (1996) Basadur Preference Scale included:

- "Creative people generally seem to have scrambled minds", and
- "Ideas are only important if they have an impact on big projects".

Hocevar and Bachelor (1989) concluded that self reports of creative achievements and activities are the most defensible methods for assessing creative ability. It is also said that creative people have the ability to use primary process cognition on neutral material. In other words, creative individuals tend to fantasise about things such as prime numbers, in contrast to less creative individuals who use primary process cognition on personally relevant material. Less creative individuals are therefore more likely to fantasise about things like sex and winning the lottery (Martindale & Dailey, 1996). Creative individuals were also found to remember their dreams better, and engage in more fantasy (e.g. daydreaming) than less creative individuals.

An item measuring remote associations was included in the Creativity Questionnaire for the purpose of determining the degree to which individuals could associate apparently distant concepts with each other. The basic assumption is that an individual's type of thought, or state of consciousness should be reflected in language, to enable the measurement of the former by using the latter (Martindale & Dailey, 1996). Respondents were provided with four commonly used words and requested to give the first word that came to mind for each of these. Responses were rated on a scale from one to five in terms of distance of association. However, a high rating could only be given if sufficient motivation for the association was provided.

At the basis of creativity lies a cognitive style, which entails over-inclusive thought processes. This provides the individual with a larger sample of ideas for the search process, and makes the production of novel, unusual and creative ideas possible (Eysenck, 1993). This attribute of creative individuals was measured by using items such as: "Name as many uses you can think of for an arm watch", as well as distant associations.

Where the originality of responses was measured, emphasis was placed on the relevance of these responses, since creativity implies that original responses are relevant. Originality is not sufficient for something to be creative. Originality is an essential ingredient of creativity, but it is not a sufficient cause. Other variables should be taken in consideration, since a psychotic person's responses might also be original (unusual), but they are very seldom creative (Eysenck, 1993). Therefore, responses were only given a score in terms of originality if these responses were relevant and functional.

Less intuitive or creative individuals were found to be less impulsive, cautious, compliant and conservative. They also tend to acknowledge little changes in their lives and are usually well socialised. Such individuals usually see and describe themselves in terms of social virtues, such as modest, kind, confident and cautious (Eysenck, 1993).

4.6.2 Scoring the Creativity Questionnaire

Table 6: Creativity Questionnaire scoring

Question	Construct measured	Score
8	**Frequency**	1 Point for each hobby
	Originality	Percentage of sample who gave the same response
	Creating something	1 Point for each activity involving the creation of something
	Quality	High quality: 2 or Low quality: 1
9	**Sport quantity**	1 Point for each sport

	Originality	Percentage of sample who gave the same response
	Group sport vs. Isolated sport	5 Points if involved in one isolated sport. 0 Points if none.
	Sport quality	High quality: 2 or Low quality: 1
10	**Creative attributes**	1 point for each typical creative attribute
11	**Fantasy**	Rated on a scale from one to 5 where 5 is very unusual
12	**Quantity**	1 Point for each meaningful response
	Originality	Percentage of sample who gave the same response
	Quality	High quality: 2 or Low quality: 1
13	**Quantity**	1 Point for each meaningful response
	Originality	Percentage of sample who gave the same response
	Quality	High quality: 2 or Low quality: 1
14	**Divergent thinking**	5 Points for meaningful answer
15	**Divergent thinking**	5 Points for meaningful answer
16	**Elaboration**	1 Point for every elaboration
	Originality	Percentage of sample who gave the same response
	Premature closure	5 Points if not closed prematurely on both sides. 0 Points if closed prematurely on either side
	Movement and/or sound	5 Points if either appear
17	**Linking diverse ideas**	5 Points if meaningful answer
18	**Linking diverse ideas**	1 Point if meaningful answer
19	**Linking diverse ideas**	1 Point if meaningful answer
20	**Linking diverse ideas**	1 Point if meaningful answer
21	**Linking diverse ideas**	1 Point if meaningful answer
22	**Linking diverse ideas**	1 Point if meaningful answer
22-25	**Distant associations**	Score distance of association of scale from 1 – 5 where 5 is very distant (only give score if association is validated)
26-29	**Validating distant associations**	1 Point for each meaningful explanation

The table in Appendix C was used to score the originality of items. Each response was counted to determine the frequency within the total sample. The frequencies were then rated from least frequent to most frequent

to get an originality score. Each response therefore received an originality score which was then added to get the total originality score for the response. For example, if a response consisted of reading, socialising and watching movies, the respondent would receive a total originality score of 6 (1+2+3).

For the purpose of scoring the quality of the response, originality scores were divided into two, i.e. the top 50% of originality scores, and the lower 50% of originality scores (See Appendix C). The colours yellow and green indicate these divisions. Responses were then counted and divided into two by counting the amount of responses falling within the top 50%, and responses falling within the lower 50%. If the original items were 50% or more of the total of responses, a score of 2 was given. If the original items were less than 50% of the total of responses, a quality score of one was given.

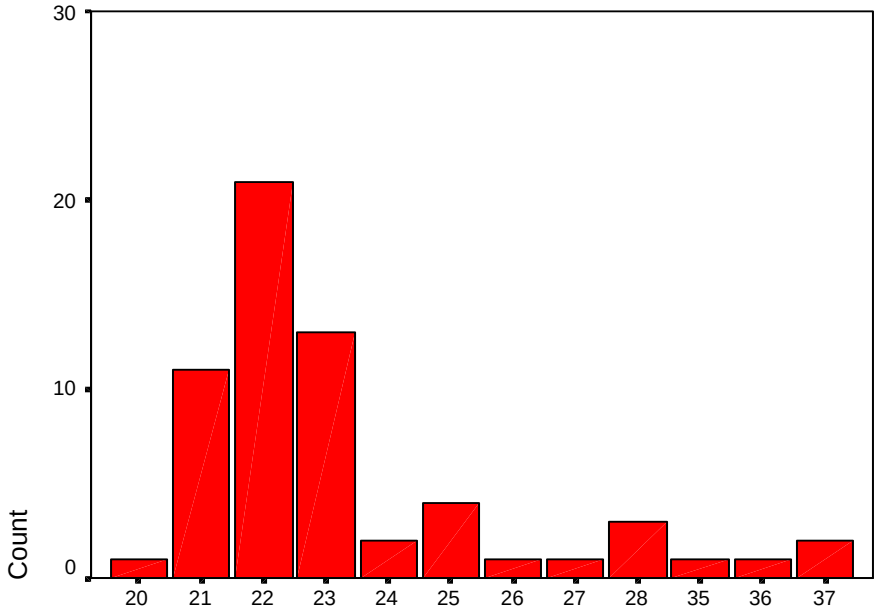
CHAPTER 5:
RESULTS

5.1 SAMPLE

The majority of respondents were White (76.7%), Afrikaans-speaking (60%) females (82%), between the ages 21 and 23, currently in their 4th year of study within the Humanities.

As indicated in Figure 4, the majority of subjects were between the ages 21 and 23, while some respondents also fell within the older age group of between 24 and 37.

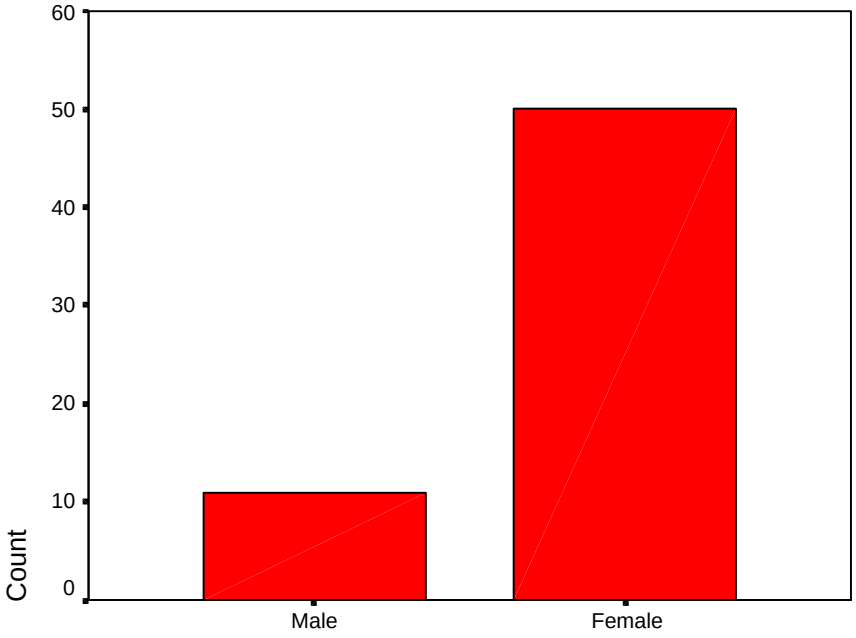
Figure 4: Age



** Std. dev. = 3.81; Mean = 23.6; N = 61*

The following (Figure 5) indicates that subjects were mostly female. Only 18% of subjects were male.

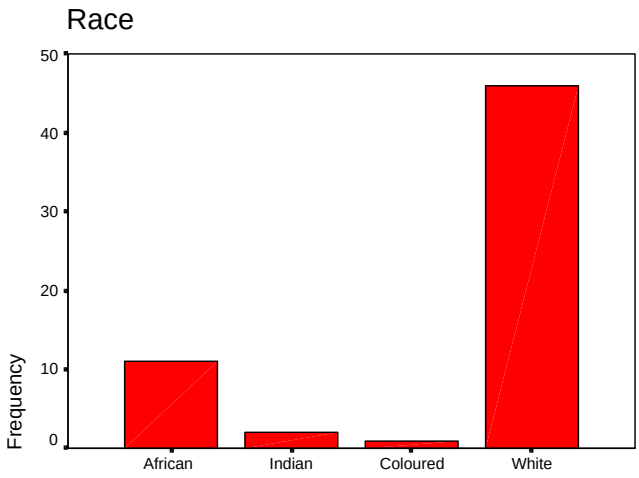
Figure 5: Gender



** Std. Dev. = 0.388; Mean = 1.82; N = 61*

The majority of subjects were White (76.7%), while the rest of the subjects consisted of African (16%), Indian (3%) and Coloured (0.02%) subjects. This is illustrated in the following (Figure 6):

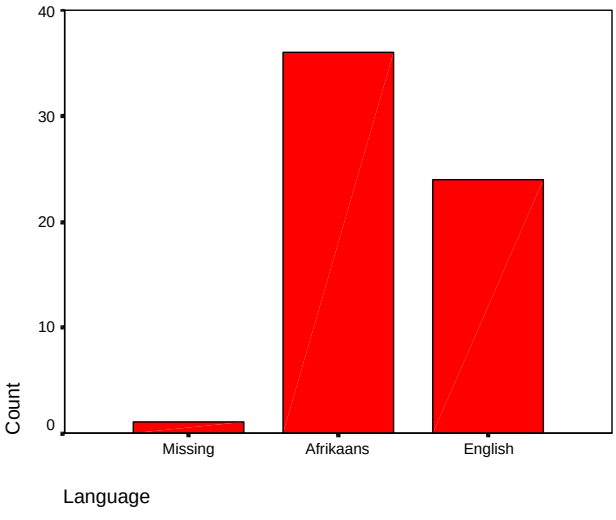
Figure 6: Race



** Std. Dev. = 1.19; Mean = 3.4; N = 60*

The home language selected by most subjects was Afrikaans (60%), while the rest of the subjects indicated English to be their language of preference. One subject did not respond to this question. This is illustrated in Figure 7:

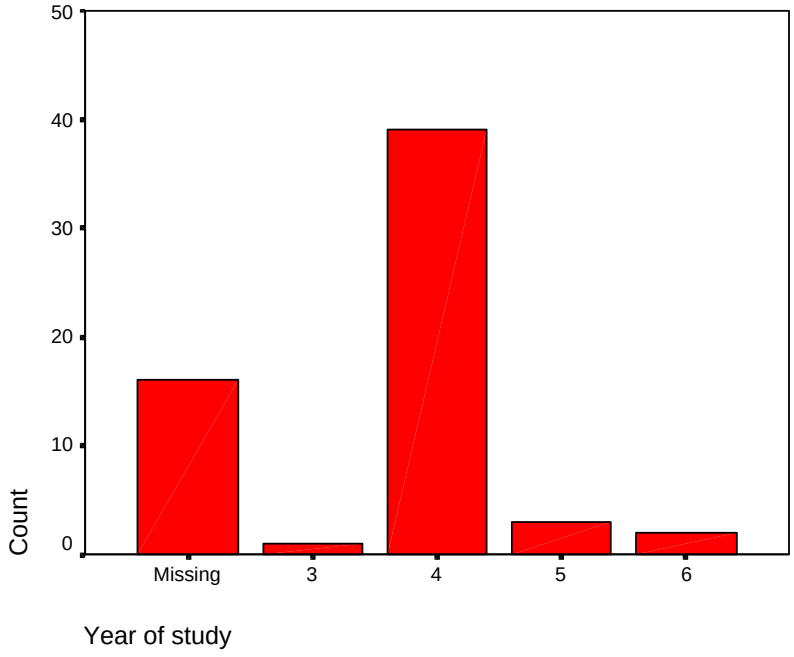
Figure 7: Language



** Std. Dev. = 0.49; Mean = 1.4; N = 60*

The following (Figure 8) illustrates that the majority of subjects were in their fourth year of study, while the rest of the subjects mostly didn't indicate which year of study they were currently in. The reason for the high number of missing scores might be that subjects weren't sure if this question referred to the actual year (i.e. 2002), or the number of years that they have been studying.

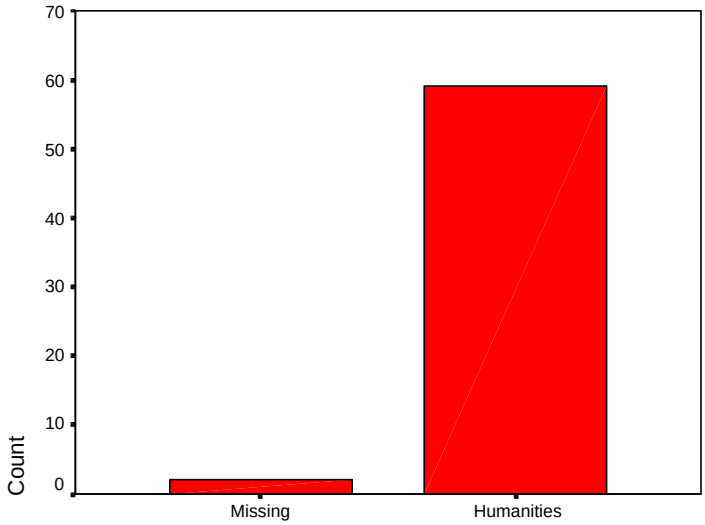
Figure 8: Year of study



** Std. Dev. = 0.505; Mean = 4.13; N = 45*

All subjects that responded to this question indicated that they were studying a course in the Humanities (see Figure 9).

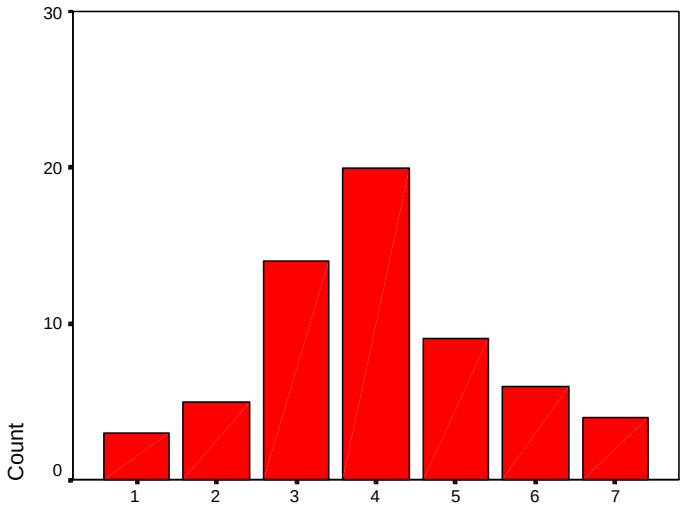
Figure 9: Course of study



**** Std. Dev. = 0.000; Mean = 1; N = 59***

Creativity levels indicated a normal distribution between subjects, with the majority of subjects having an average creativity level of four, according to the ATTA (See figure 10).

Figure 10: Creativity level



** Std. Dev. = 1.472; Mean = 4; N = 61*

5.2 DESCRIPTIVE STATISTICS

The following tables (Tables 7, 8 and 9) provide a summary of the descriptive statistics of scores obtained from the Creativity Questionnaire (Table 9), the 16PF (Table 10) and the Abbreviated Torrance Test for Adults (Table 11).

Table 7: Creativity Questionnaire: Descriptive statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Age	61	20	37	23.64	3.81
Gender	61	1	2	1.82	0.39
Race	60	1	4	3.37	1.19
Language	60	1	2	1.40	0.49
Course	59	1	1	1.00	0.00
Year of study	45	3	6	4.13	0.51
Hobbies quantity	61	1	14	4.64	2.29
Hobbies unique	61	1	111	29.33	20.28
Hobbies creative	61	0	5	0.98	1.34
Hobbies quality	61	1	2	1.51	0.50
Sport quantity	61	0	6	1.38	1.21
Sport unique	61	0	25	6.52	6.08
Sport isolated	61	0	6	0.57	1.01
Sport quality	61	0	2	1.25	0.81
Creative attributes	61	0	5	1.31	1.18
Fantasise	61	0	5	0.39	1.30
Many uses quantity watch	61	0	9	3.74	1.88
Many uses originality watch	61	0	94	26.79	19.78
Many uses quality watch	61	0	2	1.56	0.53
Many uses quantity shoe	61	1	11	4.34	2.34
Many uses originality shoe	61	1	100	31.21	24.03
Many uses quality shoe	61	1	2	1.49	0.50
Lateral/ intuitive thinking egg	61	0	5	1.31	2.22
Lateral/ intuitive thinking 150	61	0	5	0.90	1.94
Drawing elaboration	61	0	35	6.89	6.84
Drawing originality	61	1	5	3.56	1.52
Drawing premature closure	61	0	5	2.54	2.52
Drawing movement/sound	61	0	5	1.23	2.17
Remote associations blue	61	0	5	1.07	2.07
Category development	61	0	5	3.38	1.69
Distant association shoe	61	0	5	0.48	0.99
Distant association button	61	0	5	0.49	1.09
Distant association brick	61	0	5	0.44	1.10
Distant association newspaper	61	0	3	0.70	0.96
Dist ass validation shoe	61	1	1	1.00	0.00
Dist ass validation button	61	0	1	0.95	0.22
Dist ass validation brick	61	1	1	1.00	0.00
Dist ass validation newspaper	61	1	1	1.00	0.00
Giving up when struggling	61	2	5	4.11	0.86
Struggle to concentrate	61	2	5	3.70	0.84
Completion of projects on time	60	2	5	4.20	0.94

Ability to work in isolation	60	1	5	3.87	1.23
Remembering dreams	59	1	5	3.59	1.26
Easily get angry	61	1	5	2.46	1.06
Broad general knowledge	60	1	5	3.63	1.13
Struggle to accept complements	61	2	5	3.97	1.02
Daydream	60	1	5	3.43	1.32
Positive self-concept	61	2	5	3.90	0.87
Self-initiative	61	2	5	3.98	0.90
Accept own responsibilities	61	3	5	4.56	0.56
Notice things others don't	61	1	5	3.97	0.95
Think before giving opinion	61	1	5	4.08	0.99
Easily give up	60	2	5	4.30	0.85
Experience feeling of power	61	1	4	3.00	1.00
Easy to work according to routine	60	2	5	3.43	1.33
Act too quickly in situations	61	1	5	2.75	1.03
Adapt to new situations	61	2	5	3.89	0.99
Like uncertainties	61	1	5	2.38	1.23
Find problems where others don't	61	1	5	2.82	1.26
Agree with others' opinions	60	2	5	3.32	1.00
Need to include others in activities	61	1	5	3.52	1.06
Dislike complexities	61	2	5	3.70	1.07
Associate unusual concepts with each other	59	1	5	3.22	1.13
Complete something started with	61	1	5	4.30	0.88
Fantasise	61	1	5	3.79	1.17
Follow own hunches	61	2	5	4.03	0.95
Feel helpless when solving problems	61	2	5	4.07	0.73
Enjoy competition	60	1	5	3.45	1.17
Like to participate socially	61	2	5	3.25	1.43
Help others with work when struggling	61	2	5	4.07	0.85
Take risks	61	1	5	3.51	1.12
See humour when others don't	61	1	5	3.57	1.20
Do things differently	60	2	5	3.80	0.95
Creative thoughts are bizarre	61	2	5	4.39	0.88
Have self-discipline	61	1	5	4.18	0.83
Like diversity	61	2	5	4.25	0.81
Question the norm	61	1	5	3.75	1.15
Hesitate to try new ideas	59	2	5	3.69	1.95
Feel estranged from self	61	1	5	1.77	1.04
Avoid complex tasks	61	2	5	3.79	0.99
Feel estranged from self	60	1	5	1.85	1.02
Strive for self improvement	61	2	5	4.41	0.78
Create new ideas by combining existing ones	60	1	5	4.03	0.90
Difficulty in completing projects	61	2	5	4.28	0.73
Need to do well to satisfy parents	61	1	5	2.95	1.47
Think before accepting things as is	61	2	5	4.15	0.79
Do more than expected	61	1	5	3.34	1.18
Others' opinion important	61	2	5	2.93	1.20
Wasn't allowed to choose friends as child	61	2	5	4.79	0.55
Creative people have scrambled minds	61	2	5	3.74	1.06
Ideas only important if have impact on big projects	61	2	5	4.39	0.88
Daydreaming is useless activity	61	2	5	4.39	0.78
Will always find solution	61	1	5	3.97	0.93

New ideas don't work out	61	2	5	3.92	0.80
Lack perseverance	61	2	5	4.30	0.80
Allowed to set own standards as child	61	1	5	3.59	1.33
Insecurity when friends don't talk about problems	61	1	5	2.34	1.20
Get absorbed in new ideas	61	1	5	3.48	1.09
See how to change objects	61	1	5	3.16	1.13
Parents emphasis on getting ahead	57	1	5	3.68	1.24
Individualistic	61	1	5	4.05	1.13
Energetic	61	2	5	4.20	0.95
Committed	61	2	5	4.61	0.59
Productive	60	3	5	4.37	0.64
Thorough	61	1	5	4.25	0.91
Impulsive	61	1	5	3.28	1.29
Persevering	60	1	5	4.12	0.90
Critical	61	1	5	3.62	1.13
Independent in thoughts	61	1	5	4.20	1.00
Curious	61	3	5	4.56	0.59
Intuitive	61	1	5	4.33	0.87
Tolerant of others	61	2	5	4.21	0.93
Open to experience	61	1	5	4.26	0.95
Extrovert	61	1	5	3.34	1.29
Conscientious	61	2	5	3.38	1.37
Sensitive to detail	61	1	5	4.00	1.02
Dependable	61	1	5	4.34	1.03
Self-accepting	61	1	5	4.07	1.05
Hostile towards others	60	1	5	1.67	0.84
Driven	61	1	5	3.95	1.09
Ambitious	60	2	5	4.38	0.67
Dominant	61	1	5	2.84	1.24
Prone to investigate	61	2	5	3.93	0.89
Social	61	2	5	4.20	0.77
Willing to ask unusual questions	61	1	5	3.66	1.24
Imaginative	61	1	5	4.21	0.84
Humble	61	2	5	3.28	1.38
Original	61	3	5	4.25	0.68
Competent	60	2	5	4.38	0.67
Conservative	60	2	5	3.58	1.12
Honest	61	2	5	4.25	1.27
Sensitive to negative feelings	61	1	5	3.41	1.24
Willing to miss a meal to finish project	61	1	5	3.16	1.53
Motivated	61	2	5	4.36	0.75
Different	61	1	5	4.05	1.04
Too busy for new ideas	61	2	5	4.18	0.85
Inventive	61	2	5	3.84	0.99
Valid N (list wise)	38				

Table 8: 16PF: Descriptive statistics

	N	Minimum	Maximum	Mean	Std. Deviation
MD Raw	61	0	9	5.44	2.38
A Raw	61	2	16	10.98	3.65
B Raw	61	5	12	8.90	1.78
C Raw	61	2	18	11.64	4.43
E Raw	61	7	20	13.28	3.33
F Raw	61	5	16	10.90	3.13
G Raw	61	2	19	11.33	4.05
H Raw	61	2	16	10.16	4.36
I Raw	61	8	22	15.69	3.48
L Raw	61	2	22	11.07	4.67
M Raw	61	5	24	14.46	4.40
N Raw	61	12	24	16.62	2.75
O Raw	61	0	16	6.77	4.30
Q1 Raw	61	4	19	12.39	3.60
Q2 Raw	61	0	20	9.61	4.39
Q3 Raw	61	1	18	11.34	3.90
Q4 Raw	61	0	17	7.69	4.81
MD Stens	61	1	10	6.51	2.05
A Stens	61	2	10	6.74	2.07
B Stens	61	2	10	5.93	1.84
C Stens	61	1	10	6.34	2.56
E Stens	61	2	10	5.85	1.83
F Stens	61	2	10	5.77	2.09
G Stens	61	1	10	5.00	2.10
H Stens	61	2	10	6.16	2.38
I Stens	61	2	10	6.59	2.25
L Stens	61	1	10	5.28	2.40
M Stens	61	2	10	6.48	2.20
N Stens	61	2	10	5.87	1.82
O Stens	61	1	10	4.56	2.39
Q1 Stens	61	2	10	6.44	1.95
Q2 Stens	61	1	10	5.51	2.28
Q3 Stens	61	1	10	5.67	2.18
Q4 Stens	61	1	10	4.82	2.82
Valid N (list wise)	61				

Table 9: Abbreviated Torrance Test for Adults: Descriptive statistics

	N	Minimum	Maximum	Mean	Std. Deviation
NR Fluency Raw	61	4	21	13.11	3.93
NR Originality Raw	61	1	13	5.87	2.44
NR Elaboration Raw	61	0	44	15.51	9.52
NR Flexibility Raw	61	0	8	3.66	1.62
NR Fluency Scaled	61	11	19	15.72	2.13
NR Originality Scaled	61	11	19	15.54	1.91
NR Elaboration Scaled	61	0	19	14.75	3.60

NR Flexibility Scaled	61	0	19	15.80	2.97
NR scaled total	61	23	74	62.02	8.22
CR richness colourfulness verbal	61	0	2	0.79	0.84
CR emotions verbal	61	0	2	0.39	0.67
CR future verbal	61	0	2	0.56	0.76
CR humour verbal	61	0	2	0.28	0.58
CR provocative questions verbal	61	0	2	0.13	0.43
CR verbal tot	61	0	6	2.10	1.30
CR openness figural	61	0	2	0.93	0.77
CR dif perspective figural	61	0	2	0.38	0.61
CR movement/sound figural	61	0	2	0.92	0.84
CR richness/colourfulness figural	61	0	2	0.31	0.56
CR abstract titles figural	61	0	2	0.39	0.71
CR articulate figural	61	0	2	0.64	0.71
CR comb figures figural	61	0	2	0.39	0.61
CR internal visual figural	61	0	2	0.61	0.71
CR emotions figural	61	0	2	0.56	0.81
CR fantasy	61	0	1	0.13	0.34
CR figural total	61	1	14	5.26	2.88
Creativity index	61	25	93	68.97	10.90
Creativity level	61	1	7	4.00	1.47
Valid N (list wise)	61				

5.3 PSYCHOMETRIC PROPERTIES OF THE CREATIVITY QUESTIONNAIRE

Items used for the measurement of the constructs are outlined underneath (Table 10 and 11) (refer to Appendix A for the Creativity Questionnaire). Questions 30 to 127 consist of two sections based on frequency (“never”, “seldom”, “unsure”, “often” and “always”) and agreement (“disagree”, “tend to disagree”, “unsure”, “tend to agree” and “agree”). For the purpose of analysis, these variables were grouped under specific creativity constructs. This division is illustrated in Table 10 and Table 11.

Table 10: Creativity Questionnaire variable division: Frequency constructs

Construct	**Variables/Items**
Perseverance	V39, V53, V64, V84, V93, V95
Self-discipline	V41, V75, V88
Individualism	V42, V61, V69, V77
Imagination	V43, V47, V65, V79, V81, V92
Impulsiveness	V44, V52, V56
Self-dependence	V49, V50, V60, V66, V86, V55
Over inclusion/Breadth of interest	V45, V51, V59, V72, V99
Preference for unknown	V57, V58, V71, V78, V73
Like complexities	V62, V76, V80, V83, V63

Pride of skills	V68, V70, V74, V90, V97, V91
Motivation	V82, V87, V40, V98, V94
Childhood history	V85, V89, V96, V100
Self-esteem	V46, V48, V54, V67

Table 11: Creativity Questionnaire variable division: Agreement constructs

Construct	**Variables**
Social attitude	V112, V114, V117, V124, V102
Perseverance	V104, V107, V136
Motivation	V103, V120, V121, V134, V133, V115
Focus on detail	V105, V108, V116
Self-dependent	V109, V113, V122, V101, V129
Curious	V110, V123, V125
Self-esteem	V118, V127, V131
Different	V135, V130, V128
Imaginative	V137, V126, V111
No control of emotion	V106, V119, V132

According to Aron & Aron (1997), Cronbach's alpha (α) is the most widely used measure of reliability. Cronbach's alpha should give an indication of how much each item is associated with each other item. This score describes the overall consistency of a test. Aron & Aron (1997) also state that a measure should generally have a reliability of at least 0.70 to be considered useful. Cronbach's alpha was applied to the Creativity Questionnaire to determine the degree of reliability. Based on the constructs outlined in Table 10 and Table 11 above, the following Cronbach alpha scores were obtained.

Table 12: Cronbach Alpha: Creativity Questionnaire (Frequency constructs)

Construct	**Cronbach Alpha**	**Cronbach Alpha: Standardised**
Perseverance	0.63	0.64
Imagination	0.57	0.57
Self-dependence	0.37	0.41
Over inclusion/ Breadth of interest	0.58	0.58
Preference for unknown	0.76	0.76

Like complexities	0.56	0.56
Self-esteem	0.56	0.57
Motivation	0.35	0.35

From the information in Table 12 it is clear that the construct, ”preference for the unknown”, had the highest internal consistency reliability (0.76), and should be considered useful when interpreting the results. ”Motivation” (0.35) and “self-dependence” (0.41) showed low internal consistency reliability and should not be given much consideration in the interpretation of results.

Table 13: Cronbach Alpha: Creativity Questionnaire (Agreement constructs)

Construct	Cronbach Alpha	Cronbach Alpha: Standardised
Social attitude	0.65	0.66
Perseverance	0.63	0.63
Motivation	0.70	0.77
Focus on detail	0.44	0.45
Self-dependent	0.41	0.41
Curious	0.46	0.51
Different	0.40	0.38
Self-esteem	0.37	0.35
Imaginative	0.52	0.52

When looking at the agreement constructs, it is clear that “motivation’” has the highest internal consistency reliability (0.77). ”Self-esteem” (0.35) and “different” (0.38) showed the lowest internal consistency reliability, and should not be given much weight when assessing the results.

5.4 CREATIVITY QUESTIONNAIRE: FREQUENCIES

Since there are seven creativity levels according to the ATTA, creativity levels of subjects where divided into low creativity (level 1, 2 and 3), average creativity (level 4) and high creativity (level 5, 6 & 7). These three groupings are referred to as 1, 2 & 3, indicating the creativity level of subjects according to the ATTA. Frequency tables (see Tables 14 – 21) were constructed for the purpose of identifying trends in terms of scores obtained on items in the Creativity Questionnaire by low, medium, and high creativity groups.

Table 14: Frequency table: ATTA raw scores

ATTA raw scores	Frequency (%)	Collapsed level	Frequency (%)
1	3 (4.92%)	Low	22 (36.07%)
2	5 (8.20%)		
3	14 (22.95%)		
4	20 (32.79%)	Average	20 (32.79%)
5	9 (14.75%)	High	19 (31.15%)
6	6 (9.84%)		
7	4 (6.56%)		
TOTAL	61		61

As indicated in Table 15, the majority of subjects (n=18; 30%) reported 4 hobbies, while this number was spread evenly across all 3 creativity groups. Therefore, there doesn't seem to be a difference in terms of the number of hobbies between low, average and highly creative individuals. However, within the highly creative group of subjects, more subjects indicated high quality hobbies (n=12; 20%), than low quality hobbies (n=7; 11%) (see Table 14).

Table 15: Frequency table: Hobbies (quantity; quality) score (CQ) vs. Creativity Level (ATTA)

HOBBIES (QUANTITY) – V7			
CQ score	**Low creativity**	**Average creativity**	**High creativity**
1	**0**	**1**	**0**
2	**4**	**0**	**1**
3	**6**	**4**	**3**
4	**6**	**6**	**6**
5	**3**	**5**	**0**
6	**1**	**2**	**5**
7	**1**	**1**	**2**
10	**0**	**1**	**1**
11	**1**	**0**	**0**
14	**0**	**0**	**1**
HOBBIES (QUALITY) – V10			
CQ score	**Low creativity**	**Average creativity**	**High creativity**
1	**12**	**11**	**7**
2	**10**	**9**	**12**

The majority of subjects (n=25; 41%) reported playing one sport. Even though the majority of subjects reported participating only in a group sport (n=37; 61%), of those participating in one isolated sport (n=19; 31%), the majority of subjects were highly creative (n=8; 53%) (see Table 16).

Table 16: Frequency table: Sport (quantity; isolated) score (CQ) vs. Creativity Level (ATTA)

SPORT (QUANTITY) – V11			
CQ score	**Low creativity**	**Average creativity**	**High creativity**
0	**5**	**5**	**4**
1	**6**	**10**	**9**
2	**7**	**3**	**2**
3	**3**	**1**	**3**
4	**0**	**1**	**1**
6	**1**	**0**	**0**
SPORT (ISOLATED) – V13			
CQ score	**Low creativity**	**Average creativity**	**High creativity**
0	**15**	**11**	**11**
1	**5**	**6**	**8**
2	**1**	**1**	**0**
3	**1**	**1**	**0**
6	**0**	**1**	**0**

As indicated in Table 17, the number of self-reported creative attributes (between two and five creative attributes) was highest for subjects with high creativity levels. Therefore it seems that creative subjects tend to be more inclined to report their creative attributes.

Table 17: Frequency table: Creative attributes score (CQ) vs. Creativity Level (ATTA)

CREATIVE ATTRIBUTES – V15			
CQ score	**Low creativity**	**Average creativity**	**High creativity**
0	**8**	**5**	**4**
1	**11**	**8**	**3**
2	**2**	**4**	**5**
3	**1**	**3**	**5**
4	**0**	**0**	**1**
5	**0**	**0**	**1**

Even though very few subjects indicated more than five uses for a wristwatch, this small proportion (n=8; 13%) consisted only of highly creative subjects. In terms of the quality of responses for this section, the majority of subjects with high quality responses consisted of highly creative subjects (n=16; 46%), while the majority of subjects with low quality responses consisted of subjects with a low creativity level (n=12; 48%) (see Table 18).

Table 18: Frequency table: Many uses watch (quantity; quality) score (CQ) vs. Creativity Level (ATTA)

MANY USES QUANTITY WATCH – V17			
CQ score	**Low creativity**	**Average creativity**	**High creativity**
0	**1**	**0**	**0**
1	**2**	**3**	**0**
2	**10**	**1**	**0**
3	**4**	**3**	**4**
4	**3**	**8**	**3**
5	**2**	**5**	**4**
6	**0**	**0**	**3**
7	**0**	**0**	**3**
9	**0**	**0**	**2**
MANY USES QUALITY WATCH – V19			
CQ score	**Low creativity**	**Average creativity**	**High creativity**
0	**1**	**0**	**0**
1	**12**	**10**	**3**
2	**9**	**10**	**16**

Even though very few subjects indicated more than four uses for a shoe, this small proportion (n=25; 41%) once again consisted mostly of highly creative subjects (n=15; 60%). Fewer subjects received high scores in terms of the originality of responses on the uses of a shoe. However, the majority of these subjects were average to highly creative individuals. The number of high quality responses was also higher for creative individuals, while the number of low quality responses was substantially higher for individuals with low creativity scores (see Table 19).

Table 19: Frequency table: Many uses shoe (quantity; originality; quality) score (CQ) vs. Creativity Level (ATTA)

MANY USES QUANTITY SHOE – V20			
CQ score	**Low creativity**	**Average creativity**	**High creativity**
1	**2**	**2**	**0**
2	**8**	**3**	**0**
3	**7**	**2**	**2**
4	**3**	**5**	**2**
5	**1**	**2**	**4**
6	**0**	**4**	**4**
7	**0**	**1**	**4**
9	**0**	**1**	**2**
10	**1**	**0**	**0**
11	**0**	**0**	**1**
MANY USES ORIGINALITY SHOE – V21			
CQ score	**Low creativity**	**Average creativity**	**High creativity**
1	**3**	**1**	**0**
3	**1**	**0**	**0**
5	**1**	**0**	**0**
6	**3**	**1**	**0**
7	**0**	**1**	**0**

8	1	0	0
9	1	2	0
11	1	0	0
14	3	0	0
15	2	1	0
18	0	1	0
23	1	1	1
25	1	0	0
26	3	0	0
27	0	1	1
29	0	1	0
30	0	1	1
31	0	1	0
32	0	0	1
33	0	0	1
34	0	1	0
37	0	0	1
43	0	1	2
44	0	1	0
45	0	3	0
46	0	0	1
47	0	0	1
51	0	0	1
53	0	0	1
57	0	0	1
58	0	0	1
59	0	1	1
62	0	0	1
68	0	0	1
84	0	0	1
87	0	1	0
89	1	0	0
100	0	0	1
MANY USES QUALITY SHOE – V22			
CQ score	**Low creativity**	**Average creativity**	**High creativity**
1	18	9	4
2	4	11	15

In terms of lateral thinking, more highly creative subjects indicated a meaningful answer to the question than subjects with low creativity levels, while there were substantially more subjects with low creativity levels than highly creative subjects that didn't indicate a meaningful answer to the question (see Table 20).

Table 20: Frequency table: Lateral/ Intuitive thinking (Egg; 150) score (CQ) vs. Creativity Level (ATTA)

LATERAL/INTUITIVE THINKING (EGG) – V23			
CQ score	**Low creativity**	**Average creativity**	**High creativity**
0	19	13	13
5	3	7	6
LATERAL/INTUITIVE THINKIN (150) – V24			
CQ score	**Low creativity**	**Average creativity**	**High creativity**
0	20	17	13

5	2	3	6

As indicated in Table 21, the highest scores on drawing elaboration were obtained mostly by highly creative subjects, while the same was true in terms of drawing movement or sound.

Table 21: Frequency table: Drawing elaboration and movement/sound score (CQ) vs. Creativity Level (ATTA)

DRAWING ELABORATION – V25			
CQ score	**Low creativity**	**Average creativity**	**High creativity**
0	3	3	0
1	3	1	0
2	4	3	2
3	0	5	2
4	1	1	2
5	1	2	0
6	1	1	0
7	4	0	0
8	2	0	1
9	1	0	2
10	1	1	1
11	1	0	2
12	0	1	0
14	0	0	1
15	0	1	1
16	0	1	0
19	0	0	1
21	0	0	2
24	0	0	1
35	0	0	1
DRAWING MOVEMENT/SOUND – V28			
CQ score	**Low creativity**	**Average creativity**	**High creativity**
0	19	15	12
5	3	5	7

Where the ability to make remote associations was measured, mostly subjects with high creativity levels obtained higher scores, while subjects with low creativity levels mostly obtained the lowest scores. Even though very few subjects obtained a score higher than one for remote associations ("button"), these subjects consisted only of average to highly creative subjects. However, this is only clear for one of the four distant association measurements used in the Creativity Questionnaire (see Table 22).

Table 22: Frequency table: Remote associations (Blue; Button) score (CQ) vs. Creativity Level (ATTA)

REMOTE ASSOCIATIONS (BLUE) – V29			
CQ score	**Low creativity**	**Average creativity**	**High creativity**
0	19	17	12
5	3	3	7

REMOTE ASSOCIATION (BUTTON) – V32			
CQ score	**Low creativity**	**Average creativity**	**High creativity**
0	**21**	**16**	**8**
1	**1**	**3**	**6**
2	**0**	**1**	**1**
3	**0**	**0**	**2**
5	**0**	**0**	**2**

5.5 COMPARISON BETWEEN THE ATTA AND THE CREATIVITY QUESTIONNAIRE

The following table (Table 23) was constructed to identify trends in terms of significant differences between creative groups (low, average and high creativity). An analysis of variance (ANOVA) was conducted to identify significant differences between groups. As mentioned earlier, the statistical validity of the results indicates whether the results are due to a systematic factor such as the independent variable, or merely due to chance factors.

Table 23: Significant differences between creativity groups in terms of CQ constructs

Frequency constructs						
CQ construct	**Low creativity mean (SD)**	**Average creativity mean (SD)**	**High creativity mean (SD)**	**F**	**DF**	**P**
Perseverance	4.20 (0.52)	4.10 (0.60)	4.32 (0.32)	0.98	2;58	0.38
Imagination	2.97 (0.67)	3.15 (0.69)	3.32 (0.43)	1.70	2;58	0.19
Self-dependence	3.76 (0.52)	3.70 (0.56)	3.88 (0.53)	0.58	2;58	0.56
Over inclusion/ Breadth of interest	3.26 (0.83)	3.36 (0.64)	3.71 (0.52)	2.31	2;58	0.12
Preference for unknown	3.51 (0.67)	3.36 (0.87)	3.50 (0.73)	0.24	2;58	0.79
Like complexities	3.73 (0.67)	3.80 (0.47)	3.87 (0.62)	0.31	2;58	0.74
Self-esteem	4.18 (0.60)	3.73 (0.73)	4.00 (0.52)	2.73	2;58	0.07
Motivation	3.86 (0.54)	3.55 (0.43)	3.89 (0.47)	3.08	2;58	0.05
Agreement constructs						
Social attitude	4.18 (0.67)	3.93 (0.61)	3.83 (0.80)	1.43	2;58	0.25
Perseverance	4.26 (0.65)	4.02 (0.69)	4.39 (0.40)	1.92	2;58	0.16
Motivation	4.17 (0.60)	3.75 (0.74)	3.98 (0.61)	2.12	2;58	0.13
Focus on detail	3.92 (0.72)	3.90 (0.68)	4.05 (0.72)	0.26	2;58	0.77
Self-dependence	3.83 (0.59)	3.80 (0.48)	4.24 (0.46)	4.62	2;58	0.01*
Curiosity	4.03 (0.78)	4.00 (0.64)	4.16 (0.53)	0.42	2;58	0.66
Different	4.08 (0.46)	3.73 (0.76)	4.07 (0.66)	1.93	2;58	0.15
Self-esteem	4.11 (0.75)	3.65 (1.00)	3.81 (0.66)	1.70	2;58	0.19
Imagination	4.10 (0.70)	4.12 (0.52)	4.18 (0.72)	0.09	2;58	0.92

No significant differences were found between creativity groups on frequency constructs of the Creativity Questionnaire. In terms of agreement constructs, Scheffe's post-hoc test for differences between groups indicated that there is a significant difference between creativity groups in terms of scores on self-dependence. The significant differences are between the low creativity group and the high creativity group ($F(2,58)=4.62$, $p<0.05$), as well as between the average creativity group and the high creativity group ($F(2,58)=4.62$, $p<0.05$). These findings are illustrated in the following graphs (Figure 11 and 12). A circle indicates the significant difference.

Figure 11: Differences between creativity groups on CQ frequency constructs

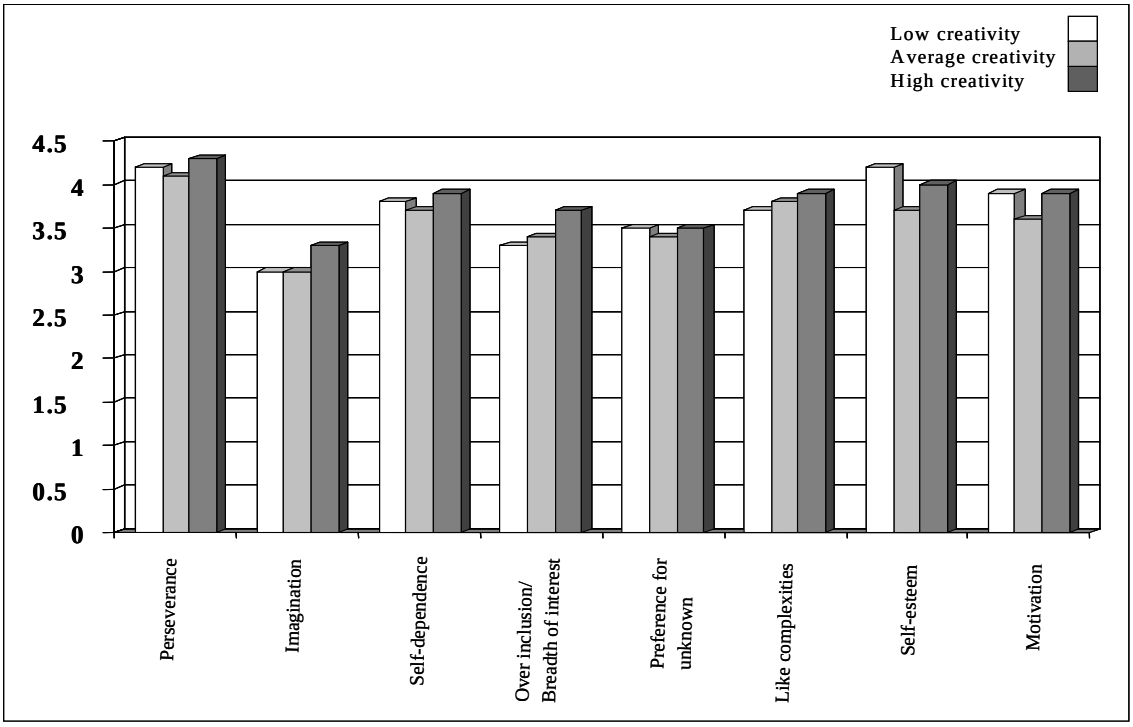
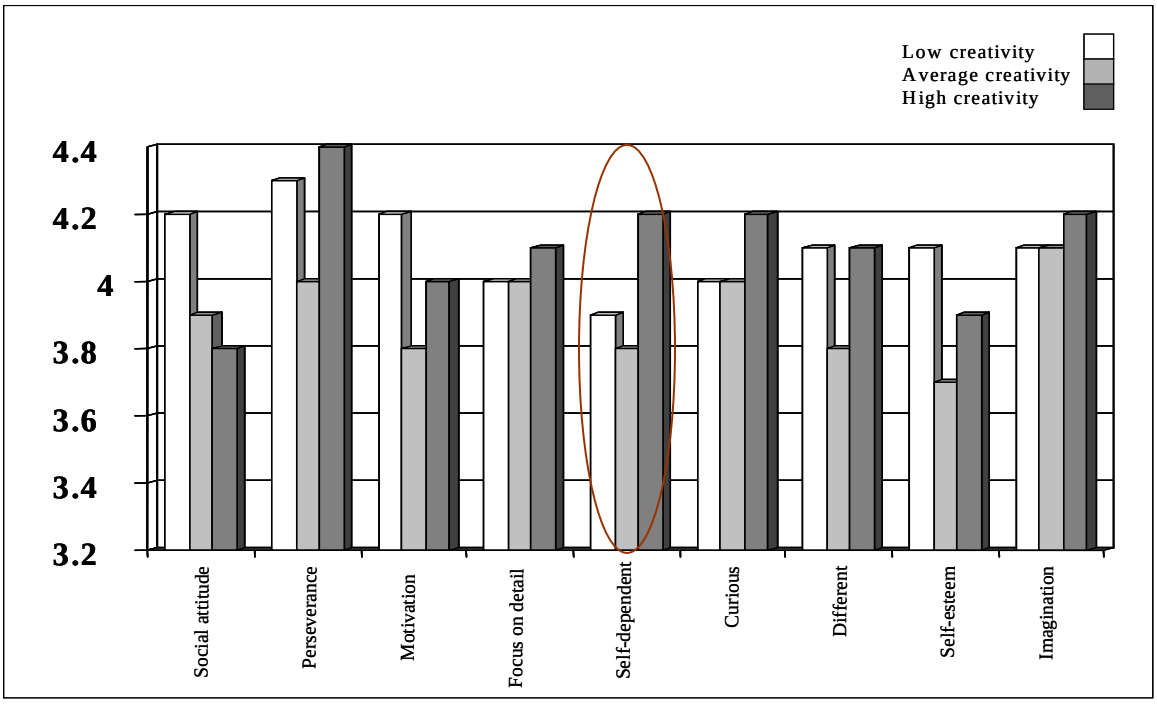


Figure 12: Differences between creativity groups on CQ agreement constructs



5.6 COMPARISON BETWEEN THE ATTA AND THE 16PF SA92

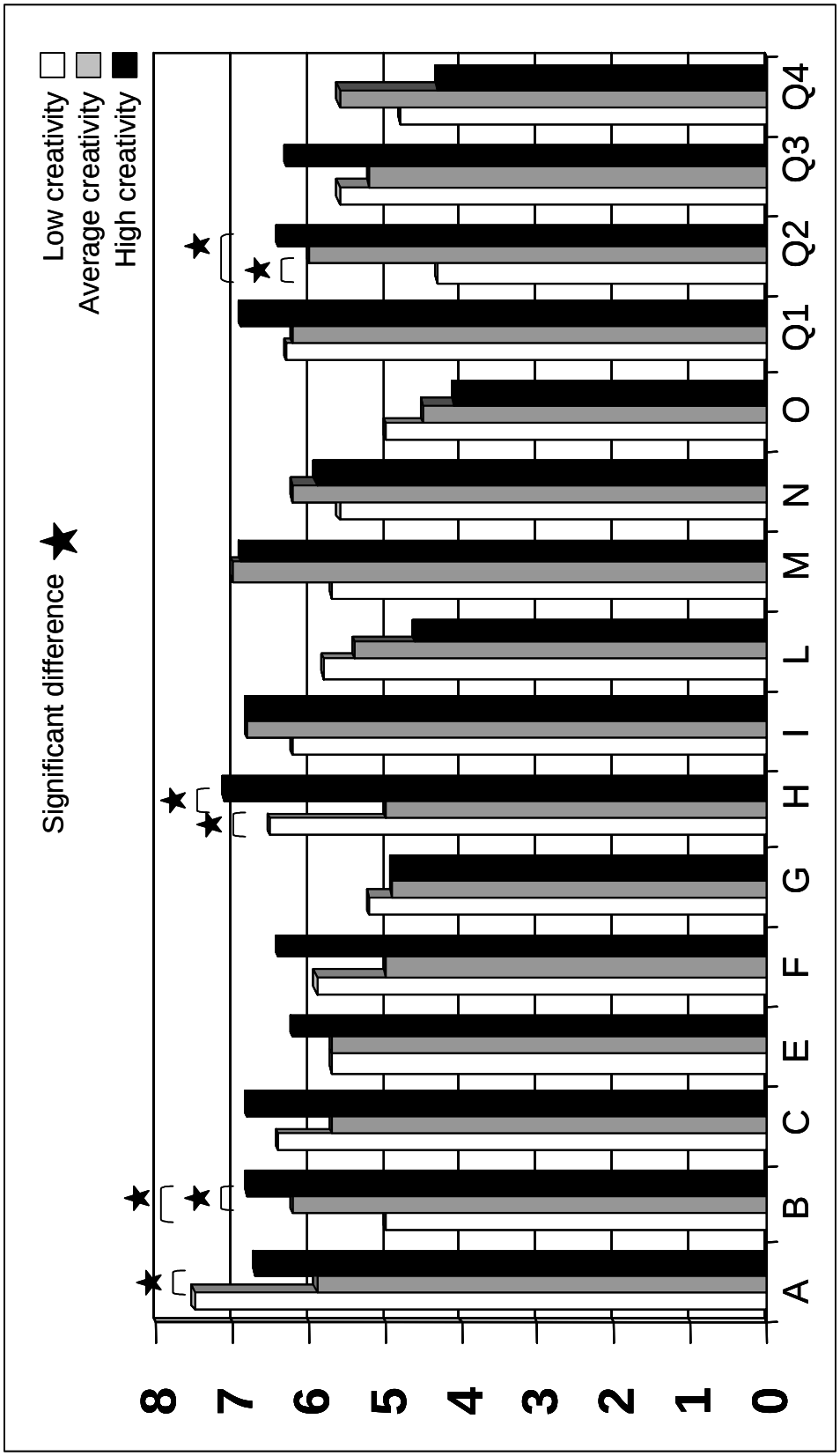
The following table (Table 24) was constructed to identify trends in terms of significant differences between creative groups (low, average and high creativity) in terms of 16PF scores (see paragraph 4.4.2). An analysis of variance (ANOVA) was conducted to determine significant differences between subjects with low, average and high creativity levels in terms of scores on the different 16PF factors. Significant differences are also illustrated in Figure 13. Significant differences are indicated with a star. It was found that factors A, B, H and Q2 play a role in an individual's creativity level. However, the direction of influence is not indicated here. This will be discussed in more detail in paragraph 6.3.

Table 24: Significant differences between creativity groups in terms of 16PF SA92 constructs

16 PF constructs	Low creativity mean (SD)	Average creativity mean (SD)	High creativity mean (SD)	F	DF	P
A Stens (Reserved vs. Outgoing)	7.50 (2.04)	5.90 (2.13)	6.74 (1.76)	3.40	2;58	0.04*
B Stens (Concrete-thinking vs. Abstract-thinking)	4.95 (1.84)	6.20 (1.88)	6.79 (1.27)	6.31	2;58	0.003*
C Stens	6.36 (2.68)	5.65 (2.41)	6.84 (2.48)	1.10	2;58	0.34
E Stens	5.73 (2.10)	5.65 (1.60)	6.21 (1.78)	0.53	2;58	0.59
F Stens	5.86 (2.23)	5.05 (1.76)	6.42 (2.09)	2.23	2;58	0.12
G Stens	5.23 (1.85)	4.85 (2.13)	4.89 (2.40)	0.20	2;58	0.82
H Stens (Restrained, vs. Uninhibited)	6.50 (2.56)	4.95 (1.85)	7.05 (2.22)	4.67	2;58	0.01*
I Stens	6.18 (2.08)	6.80 (2.42)	6.84 (2.32)	0.56	2;58	0.58
L Stens	5.82 (2.17)	5.35 (2.83)	4.58 (2.06)	1.40	2;58	0.26
M Stens	5.68 (2.30)	6.95 (2.19)	6.89 (1.94)	2.34	2;58	0.11
N Stens	5.59 (1.92)	6.15 (1.50)	5.89 (2.05)	0.49	2;58	0.62
O Stens	5.00 (2.40)	4.50 (2.44)	4.11 (2.38)	0.72	2;58	0.49
Q1 Stens	6.32 (1.99)	6.15 (2.13)	6.89 (1.70)	0.78	2;58	0.46
Q2 Stens (Group-dependent vs. Self-sufficient)	4.32 (1.99)	6.00 (2.08)	6.37 (2.31)	5.56	2;58	0.01*
Q3 Stens	5.59 (2.36)	5.20 (2.26)	6.26 (1.82)	1.19	2;58	0.31
Q4 Stens	4.82 (2.81)	5.55 (2.68)	4.26 (2.79)	1.07	2;58	0.35

* *P<0.05 at 95% interval level*

Figure 13: Differences between creativity groups on 16PF SA92 constructs



In the following section (Chapter 6) results will be discussed in more detail. This will be done in terms of the psychometric properties of the Creativity Questionnaire, a comparison between the ATTA and Creativity Questionnaire, a comparison between the ATTA and the 16PF SA92, and the average 16PF-profile of a creative individual as determined by the ATTA in the sample of the current study.

CHAPTER 6:
DISCUSSION OF RESULTS

6.1 PSYCHOMETRIC PROPERTIES OF THE CREATIVITY QUESTIONNAIRE

The performance of the Creativity Questionnaire in terms of reliability did not prove to be very successful in this sample. Reliability scores were average to low, with only two constructs indicating good internal consistency reliability scores. These constructs were: "Preference for the unknown" (0.76), and "Motivation" (0.77). These constructs should be considered useful in the interpretation of scores obtained on the Creativity Questionnaire. However, when considering reliability scores of an accepted and published measuring instrument, the 16PF SA92 as ranging from 0.51 to 0.82, the Creativity Questionnaire's performance in terms of reliability scores ranging from 0.35 up to 0.77, does not seem to be that poor as might be perceived at first glance.

The majority of Cronbach's Alpha scores were above 0.5, with only "self-dependence" and "motivation" performing below this within the frequency constructs. The only agreement constructs performing below a 0.5 score, were "focus on detail", "self-dependence", "different" and "self-esteem".

As mentioned earlier, reliability scores might have been influenced by factors such as the number of items included to measure the construct. If more quality items were to be included for each construct, reliability scores should increase. Other factors that might have influenced internal consistency reliability scores include the testing conditions, and the time of measurement. Sampling error should also be taken into consideration. One also increases the chance for error by increasing the number of items. It should be considered that by adding more items, which increase the total test variance more than it increases the sum of the item variances, the alpha should increase. One-dimensionality of the items for a particular scale could also be problematic.

The characteristics of the sample also have an influence on internal consistency reliability scores. Given the small sample and the large number of items for the Creativity Questionnaire, an exploratory factor analysis could not be done. Such an analysis would have ensured that highly correlated items be clustered in a factor, thus probably increasing internal consistency estimates. A more heterogeneous sample might also have yielded higher reliability scores, since homogenous samples will yield lower total variance, and should therefore yield lower reliability estimates. Since reliability should vary according to the characteristics of the sample being tested, internal consistency reliability scores on the Creativity Questionnaire might improve when this questionnaire is conducted on a different sample.

6.2 COMPARISON BETWEEN THE ATTA AND CREATIVITY QUESTIONNAIRE

In terms of agreement constructs, there is a statistically significant difference in the score on "self-dependence" between subjects with a low creativity level, and subjects with a high creativity level according to the ATTA, as well as between subjects with an average creativity level and subjects with a high creativity level. Subjects with high creativity levels indicated a significantly higher score on self-dependence, than subjects with average and low creativity levels.

Items included on an agreement scale to measure this construct (self-dependence) were:

- "independent in thoughts"
- "open to experience" (i.e. prefer own experience to others' opinions)
- "dominant"
- "individualistic"
- "competent"

It could therefore be argued that creative individuals tend to perceive themselves to be significantly more independent in thought, open to experience, dominant, individualistic and competent, than individuals with average and low ATTA creativity scores. However, it should still be taken into consideration that the interaction between these items resulted in the significant difference between low and high creativity groups.

Creative subjects' indication that they tend to be significantly more "independent in thought" than individuals with low creativity, supports Feist's (1998) meta-analysis of the literature, indicating that creative individuals tend to be more autonomous. According to Eysenck (1993), intuitive individuals tend to assess themselves as independent, while Helson et al. (1995) describe creative individuals as intellectually autonomous. "Independence" and "the capacity to work in isolation" are attributes of creative individuals that were identified by Feldhusen (1995). According to a study conducted by Feldhusen (1986), signs which are apparent from early in the life of creatively productive individuals include an internal locus of control and intense independence. "Independent thinking" was also identified by Houtz et al. (1994) as a typical trait of creative individuals.

"Openness to experience" as a typical trait of creative individuals, is also supported by Feist (1998). Wolfradt and Pretz (2001) found openness to experience to have a positive correlation with all creativity measures. According to McCrae (1993), individuals who are open to experience tend to be tolerant of others, seek out novelty and variety, and have unconventional attitudes. From a theoretical perspective, openness is related to liberal thinking, tender-mindedness, and a tendency to absorb (Martindale & Dailey, 1996). Eysenck (1993) found that intuitive individuals are not afraid of their experiences and that openness to a wider array of external stimulation correlates with the ability to generate more unusual and original ideas. Smith and Tegano (1992), and Helson et al. (1995) also indicate that "openness to new experience" typically underlie creative behaviour.

The finding that creative individuals are significantly more dominant than individuals with low creativity is supported by Feist (1998). While dominant individuals tend to be vocal in expressing their opinions, Eysenck (1993), states that intuitive individuals are also able to express themselves.

In terms of "individualism", creative people are described as original by Helson et al (1995), which is very closely associated with individualism. However, according to Eysenck (1993), originality is an essential ingredient of creativity, although it is not a sufficient cause. Other variables should be taken in consideration, since a psychotic person's responses might also be original (unusual), but they are very seldom creative (Eysenck, 1993). With reference to creative individuals indicating that they perceive themselves to be significantly more "confident" than individuals with low creativity, Smith and Tegano (1992) found that individuals who scored higher on creativity seemed to express more confidence in their ability to accomplish the tasks of learning and planning for a career.

A general trend detected in the scores is that individuals with high creativity scores, as measured by the ATTA, indicated the highest scores on most of the constructs (indicating high creativity) measured by the Creativity Questionnaire. This might indicate a level of similarity between the two measuring instruments, also indicating the relationship between the two.

The only construct where highly creative individuals obtained the lowest score between the three creativity groups was "social attitude". Thus, creative individuals in the sample indicated that they are less energetic, tolerant of others, extroverted, social, motivated and dependable than average and low creativity groups. However, this difference was not significant. This finding is in contrast with Marindale and Daily's (1996) discovery of a significant positive correlation between divergent thinking and extraversion. Wolfradt and Pretz (2001) also found extraversion to be one of the best predictors of creativity. However, the current research finding is supported by Feist's (1998) finding that creative individuals are typically more introverted. Petz (1994) attempts to clarify this discrepancy by stating that the relation introversion may be discernable at a much higher level of creativity. Yet, a study conducted by Smith and Tegano (1992) on respondents ranging from age 18-23, found that individuals who scored higher on creativity seemed to enjoy being with others.

In terms of the agreement construct, perseverance (Items included: "productive"; "persevering"; and "too busy for new ideas"), highly creative individuals once again scored higher than individuals with low creativity, and even higher than average creative individuals. Even though this difference was not significant, the finding is supported by Helson, Agronick and Roberts (1995), who stated that creative individuals typically have a lot of energy for self-chosen work, are persistence, show commitment to creative endeavour and have career ambition. Feldhusen (1995) identified persistence, and the ability to work long and hard as typical attributes of creative individuals. He also identified perseverance as a variable associated with creative behaviour.

Individuals with low creativity scored higher on the agreement construct motivation than highly creative individuals and even higher than average creative individuals (Items included: “committed”; “driven”; “ambitious”; “motivated”; “willing to miss a meal in order to finish a project”; and “conscientious”). This is in contrast to previous research findings, where motivational variables such as a drive to produce, and commitment or devotion to study or work were found to be signs that are apparent early in the lives of creatively productive people (Feldhusen, 1986). Helson, Agronick and Roberts (1995) also describe creative people as ambitious, while Sternberg (1995) found a negative relation between conscientiousness and creativity.

Highly creative individuals scored higher on the agreement constructs: “imagination”; “focus on detail”; and “curiosity” than individuals with low and average creativity. Helson, Agronick and Roberts (1995), and Eysenck (1993) also identified curiosity as a typical attribute of creative individuals. This finding is in line with Helson, Agronick and Roberts’ (1995) description of creative individuals as being imaginative.

In terms of the agreement construct “different”, low and high creative groups scored the same, yet higher than average creative individuals. It could therefore be argued that both low and highly creative individuals perceive themselves to be original and different from other people, but being different is not necessarily an indicator of creativity. It could therefore be argued that the perception of being different or original might not be directly related to creativity. Its relationship to other predictors of creativity, such as “self-dependence” may be facilitative of a creatively- oriented thinking style even though they comprise only one of the many factors that jointly determine creative performance.

Highly creative individuals did not perform as expected in terms of the agreement construct “self-esteem”. This group scored lower on this construct than individuals with low creativity. This finding might be a result of very few items (only three) included for the construct. This finding should trigger further investigation.

6.3 COMPARISON BETWEEN THE ATTA AND THE 16PF SA92

Scheffe’s post-hoc test for differences between groups was conducted to determine all differences in scores on 16PF factors between creativity groups. This test indicated that statistically there is a significant difference in the score on factor A (reserved vs. outgoing) between subjects with a low creativity level and subjects with an average creativity level according to the ATTA ($F(2,58)=3.4$, $p<0.05$). Subjects with low creativity levels indicated a higher score on factor A, which indicated that they tend to be more outgoing, participating, warm-hearted and easy-going than subjects with an average creativity level. The latter group tends to be more critical, detached and reserved.

There is a statistically significant difference in the score on factor B (concrete thinking vs. abstract thinking) between subjects with a low creativity level and subjects with an average creativity level according to the

ATTA ($F(2,58)=6.31$, $p<0.05$), as well as between subjects with a low creativity level and subjects with a high creativity level ($F(2,58)=6.31$, $p<0.05$). Subjects with low creativity levels indicated a lower score on factor B, which indicated that they tend to be more concrete thinking and less intelligent, than subjects with average and high creativity levels. The latter tends to be more abstract thinking and bright.

It should be taken into consideration that this construct is also related to educational level. According to Isaksen et al. (1993), high intelligence may be a necessity for an individual to be creative, but is not a sufficient trait in the production of creative results. Helson et al. (1995) describe creative individuals as being clever and complicated. A study conducted by Feldhusen (1986) showed that signs apparent early in the life of creatively productive individuals include high-level intelligence, memory and reasoning ability, early mastery of techniques and knowledge in a field. Creativity-related skills include a cognitive style in handling complexities (Lubart & Getz, 1998). It is therefore clear that the literature supports this finding.

There is a statistically significant difference in the score on factor H (restrained vs. uninhibited) between subjects with a low creativity level and subjects with an average creativity level according to the ATTA ($F(2,58)=4.67$, $p<0.05$), as well as between subjects with an average creativity level and subjects with a high creativity level ($F(2,58)=4.67$, $p<0.05$). Both subject groups with low creativity levels and subjects with high creativity levels tend to score higher on factor H, which indicated that they tend to be more spontaneous, socially bold, uninhibited and venturesome than subjects with average creativity levels. The latter tends to be more restrained, sensitive to threats, timid and shy.

While it might seem contradictory that individuals with high and low creativity levels received significantly higher scores on factor H than individuals with average creativity, this phenomenon might be explained by Oche's (1990) claim that intense enthusiasm of creative individuals is not just an undirected hyperactivity or the externalisation of emotional energy, but is aimed, and it is aimed at excellence. It could be argued that such undirected hyperactivity or externalisation of emotional energy as indicated by a high H score is the case with individuals indicating low creativity levels. In terms of individuals with high creative abilities, Feist (1998) once again supports this finding by stating that creative individuals tend to be more impulsive. On the other hand, Eysenck (1993) indicated that less intuitive or creative individuals were found to be less impulsive and cautious. According to Eysenck (1993), intuitive individuals tend to assess themselves as being spontaneous.

According to Feldhusen (1995), a personality factor, such as self-confidence constitutes a state within which creative behaviour can most readily take place, while it might even serve as a facilitator or stimulator of cognitive creative processing. Their positive self-concept is accompanied by social competence (Smith & Tegano, 1992). These findings stand in contrast to the profile sketched of creative individuals as being socially and emotionally deficient. Smith and Tegano (1992) state that creative individuals often see themselves as likeable, and they enjoy the company of others. A positive self-concept was also identified by

Houtz et al. (1994) as a typical trait of creative individuals. The motivational dimension of risk-taking is also considered to be a typical attribute of creative individuals (Cropley, 2000).

Innovative individuals have greater self-confidence and higher levels of risk taking. This leads to higher productivity (Kirton, 1989). Helson et al. (1995) describe creative individuals as having broad interests and being curious and versatile, while individuals with low creativity levels also scored high on the construct H. This is in contrast to Eysenck (1995) who stated that conservativeness and submissiveness are associated with low levels of creativity.

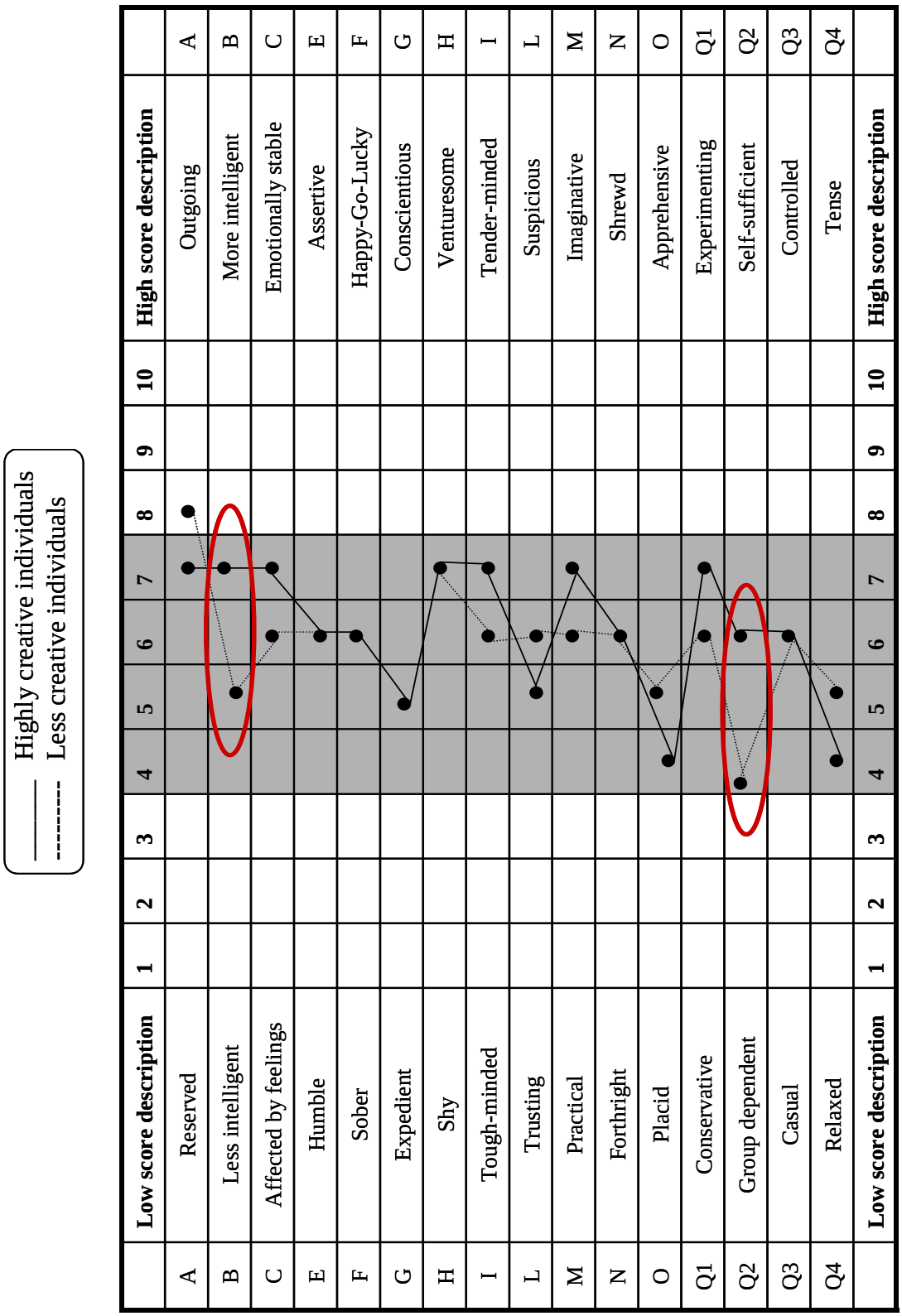
There is a statistically significant difference in the score on factor Q2 (group dependent vs. self sufficient) between individuals with a low creativity level and individuals with an average creativity level according to the ATTA ($F(2,58)=5.56$, $p<0.05$), as well as between subjects with a low creativity level and subjects with a high creativity level ($F(2,58)=5.56$, $p<0.05$). Both subjects with average and high creativity levels scored significantly higher on factor Q2, which indicated that they tend to be more resourceful, self-sufficient, and prefer to make their own decisions. In contrast, subjects with low creativity levels seem to be 'joiners', sound followers and group-dependent.

While a high score is indicative of self-sufficiency, resourcefulness and a preference to make own decisions, Feist's (1998) meta analysis of the literature indicated that creative individuals tend to be more autonomous. They have high levels of aspiration, are prone to constructive criticism and are not as easily satisfied as their less creative counterparts (Ochse, 1990). Less creative individuals are perceived to be more compliant and conservative (Eysenck, 1993). This also supports the low score on factor Q2 which is indicative of group dependence and being a follower or joiner.

According to Eysenck (1993), intuitive individuals tend to assess themselves as independent. Independence and a preference to work alone are also attributes of creative individuals that were identified by Feldhusen (1995). Helson et al. (1995) describe creative individuals as being independent of judgement. Houtz et al. (1994) identified initiative and acceptance of responsibilities as typical traits of creative individuals. It could be argued that these traits are conducive, or closely related to the preference of making one's own decisions.

Results are illustrated on a 16PF result chart (see Figure 14) to visually illustrate the difference in profile for low and highly creative individuals. Significant differences are highlighted with a circle. The table (Table 23) indicates the average 16PF scores of highly creative subjects as measured by the ATTA, as well as the average 16PF scores of subjects with low creativity scores. The only significant difference between these two subject groupings is in terms of scores on factor B and Q2. This finding is in line with previous research findings in this domain indicating that highly creative individuals are usually more intelligent and self-sufficient than their less creative counterparts.

Figure 14: An average profile of a creative individual vs. an individual with low creativity as measured by the ATTA



6.3.1 An average 16PF profile of a creative individual as measured in the current study

The 16PF profile of creative individuals, as measured by the ATTA shows a low score on both Q4 (4) and O (4). A low score on Q4 is indicative of a relaxed individual. Such individuals are usually less frustrated, resulting in more effective defence mechanisms. The low O score is usually a prognostic indication of a "healthy" individual in terms of adaptability. These individuals have a high self-esteem, are serene and have a strong internal locus of control.

High scores include A (7), B (7), C (7), H(7), I (7), M(7), Q1(7). A high A-score is indicative of an individual who is more outgoing, relaxed in the presence of others, likes the presence of others and likes to participate in activities. It might also seem that these individuals don't have any problems. This is evident in the high score on the A scale. However, it should also be taken into consideration that the majority of respondents were female. Females tend to score higher on this factor.

A high score on B might be indicative of fluid intelligence (Cattell, Eber & Tatsuoka, 1970). This implies a genetic predisposition. Individuals in occupations such as engineering and architecture usually score high on this factor. The high C-score is evident of control over one's emotions. Such individuals are usually less influenced by external variables, although these individuals also tend to be more sensitive to the self and others in problem situations, while at the same time having better impulse control. A high score on H is indicative of an investigative personality in terms of interpersonal relationships in the environment. Tender mindedness (I), which implies sensitivity, dependence and over protectiveness, might be a result of the large percentage of female subjects in the sample.

High scores on M imply a greater focus on the imagination. This includes seeing things from a different point of view, and not necessarily the practical way of doing things. A high Q1 score also supports this. Such individuals are more critical, liberal and analytical. Such individuals tend to get into conflict with authority and use intellect to solve problems. This is often referred to as an intellectualised form of aggression.

When one looks at the 16PF profile of less creative individuals in the sample, it is clear that these individuals seem to be group dependent (Q2), venturesome (H) and outgoing (A). Even though high scores on H and A overlap with the scores of creative individuals, these scores are combined with a low Q2 score. Thus, even though less creative individuals seem to be outgoing, relaxed and venturesome, this is coupled with group dependence. Therefore, in contrast with creative individuals, these individuals have a need to belong somewhere. They typically feel that they need to put their own needs behind those of others. They are followers.

6.4 CONCLUSION

When comparing the results to literature of previous findings in this domain of research, it is clear that the majority of findings are supported by the literature. The main findings of the research will now be summarised. Shortcomings of the research and recommendations for further research will then be outlined.

CHAPTER 7:
CONCLUSION AND RECOMMENDATIONS

The results of this investigation confirm and extend previous research in demonstrating a close association between creativity and specific personality traits. Creative subjects (as measured by the ATTA) indicated that they perceive themselves to be significantly more independent in thought, open to experience, dominant, individualistic and competent, than less creative subjects. Both subjects with average and high creativity levels indicated that they tend to be more resourceful, self-sufficient, and prefer to make their own decisions. These subjects tend to be more abstract thinking and bright. Both subjects with low creativity levels and subjects with high creativity levels indicated that they tend to be more spontaneous, socially bold, uninhibited and venturesome than subjects with average creativity levels. The latter group of subjects tends to be more restrained, sensitive to threats, timid and shy.

Subjects with low creativity levels on the other hand, indicated that they tend to be more outgoing, participating, warm-hearted and easy-going than subjects with an average creativity level. The latter subjects tend to be more critical, detached and reserved. Subjects with low creativity levels also seem to be joiners, sound followers and group-dependent. These subjects also indicated that they tend to be more concrete thinking and less intelligent than subjects with average and high creativity levels.

Even though the majority of variables have been discussed separately, it should be considered that the relationship between creativity levels as measured by the ATTA, and variables measured by the CQ is dependent on the interaction between the variables mentioned.

The results clearly indicate the multifaceted nature of creativity. Creativity is a result of interactions among a multiplicity of important dimensions of creativity. However, even though most of the constructs related to high creativity, as indicated by the literature, were included in the Creativity Questionnaire, the reliability of such constructs was undermined by including too few items for each construct. It should also be considered to select a much larger, more heterogeneous sample which is more representative of the population. A heterogeneous sample should yield higher total variance, and should therefore yield higher reliability estimates. It is therefore suggested that the Creativity Questionnaire should be adapted and improved, with this study as a basis for further development. The possibility of re-piloting the instrument in future should therefore be considered.

This study contributes to the expansion of knowledge in the domain of creativity research, and should trigger further research in an attempt to clarify the multifaceted nature of creativity in terms of all constructs that need to be present for an individual to be creative. As Eysenck stated:

”We must begin by identifying gaps in our knowledge and understanding of creativity; these gaps represent opportunities for development, rather than obstacles to research progress” (1993:159).

LIST OF REFERENCES

Abrahams, F. (1996). Cross-cultural comparability of the 16PF**.** *Unpublished PhD thesis*. University of the Western Cape.

Aguilar-Alonso, A. (1996). Personality and creativity. *Personality and Individual Differences, 21***,** (6), 959-969.

Aron & Aron (1997). *Statistics for the behavioural and social sciences.* New York: Prentice Hall.

Altemeyer, B. (1998). Authoritarian Personality. *Advances in Experimental Social Psychology, 30,* 48-90.

Amabile, T.M. (1996). *Creativity in context***.** Boulder, Colorado: Westview Press.

Anastasi, A., & Urbina, S. (1996). *Psychological testing (7th ed.).* New York: Prentice Hall.

Babbie, E. (1998). *The practice of social research, 8th ed*. Belmont: Wadsworth.

Bain, P. (n.d.) *Research on the use of the 16PF in South Africa*. Retrieved October 3, 2005, from http://www.pai.org.za/16pf.htm

Basadur, M. & Hausdorf, P.A. (1996). Measuring divergent thinking attitudes related to creative problem solving and innovation management. *Creativity Research Journal,* 9, 21-32.

Boden, M.A. (1994). *Dimensions of creativity.* Cambridge, Mass: MIT Press.

Byrd, R.E. (1986). *Creativity and risk-taking.* San Diego, CA: Pfeiffer International Publishers.

Caplan, H.I. & Sadock, B.J. (1998). *Synopsis of psychiatry: Behavioural sciences/Clinical psychiatry.* Baltimore: Lippincott Williams & Wilkins.

Cattell, R.B. & Butcher, H.J. (1968). *The prediction of achievement and creativity.* Indianapolis, IN: Bobbs-Merrill.

Cattell, R.B., Eber, H.W. & Tatsuoka, M.M. (1970). *Handbook for the sixteen personality factor questionnaire (16PF).* Illinois: Institute for personality and ability testing.

Colangelo, N., Kerr, B., Huesman, R., Hallowell, N. & Gaeth, J. (1992). The Iowa Inventiveness Inventory: Toward a measure of mechanical inventiveness. *Creativity Research Journal, 5,* 157-164.

Centre for Creative Learning. *Alpha-biographical Inventory.* Retrieved October 10, 2005, from http://www.creativelearning.com/Assess/test6

Converse, J.M & Presser, S. (1986). *Survey questions: Handcrafting the standardised questionnaire.* London: Sage

Coon, H., Care, G., & Fulker, D.W. (1992). Community Influences on Cognitive Ability. *Intelligence, 16,* (2), 169-189.

Cooper, E. (1991). A critique of six measures for assessing creativity. *The Journal of Creative Behaviour, 25,* 194-217.

Costa, P.T. & McCrae, R.R. (1985). *The NEO personality Inventory Manual.* Odessa, FL: Psychological Assessment Resources.

Cropley, A.J. (2000). Defining and measuring creativity. *Roeper Review, 23***,** (2), 72-79.

Davis, G.A., & Rimm, S.B. (1998). *Education of the gifted and talented*. Needham Heights, MA: Allyn and Bacon.

De Bruin, G.P. (2001). *An introduction to psychological assessment in the South African context.* UK: Oxford Universtiy Press.

De Sanctis, G. & Poole, M.S. (1994). Capturing the complexity in advanced technology use: Adaptive structuration theory. *Organisational Science, 5,* (2), 121-147.

De Vaus, D.A. (1986). *Surveys in social research.* London: George Allen & Unwin.

Dillman, D.A. (1978). *Mail and telephone surveys: The total design method*. New York: Wiley.

Eysenberger, R. & Cameron, J. (1996). Detrimental effects of reward: Reality or myth? *American Psychologist, 51,* 1153-1166

Eysenck, H.J. (1993). The psychophysiology of creativity and genius. *Guest lecture in 21st Annual Meeting of the British Psychophysiology Society for Clinical Neurophysiology,* Nottingham.

Eysenck, H.J. (1995). *Genius: The natural history of creativity*. Cambridge: Cambridge University Press.

Feist, G.J. (1998). A meta-analysis of personality in scientific and artistic creativity. *Personality and Social Psychology Review, 2,* 290-309.

Feldhusen, J.F. (1995). Creativity: A knowledge base, metacognitive skills, and Personality Factors. *The Journal of Creative Behaviour, 29,* (4), 255-268.

Feldman, D.H., Csikszentmihalyi, M. & Gardner, H. (1994). *Changing the World: A Framework for the Study of Creativity.* London: Praeger.

Furnham, A. (1999). Personality and creativity. *Perceptual and Motor Skills, 88,* 407-408.

Gardner, H. (1993). *Creating minds.* New York: Basic Books.

Garfield, M.J., Taylor, N.J., Dennis, A.R. & Satzinger, J.W. (2001). Research report: Modifying paradigms – individual differences, creativity techniques, and exposure to ideas in group idea generation. *Information Systems Research, 12,* (3), 322-333.

Glover, J.A., Ronning, R.R., & Reynolds, C.R. (1989*). Handbook of creativity.* New York: Plenum.

Goff, K. & Torrance, E.P. (2002). *Abbreviated Torrance Test for Adults Manual.* Illinois: Scholastic Testing Service, Inc.

Graziano, A.M. & Raulin, M.L. (2000). *Research Methods.* Needham Heights: Allyn & Bacon.

Gregory, R.J. (1996*). Psychological Testing (2nd ed.).* Boston: Allyn and Bacon.

Harrington, D.M. (1990). *Theories of creativity.* Beverly Hills, CA: Sage.

Helson, R. (1988). *Innovation: a cross-disciplinary perspective.* Oslo: Norwegian University Press.

Helson, R., Agronick, G. & Roberts, B. (1995). Enduringness and change in creative personality and the prediction of occupational creativity. *Journal of Personality and Social Psychology, 69,* (6), 1173-1183.

Henson, R.K. (2000). *Sacrificing reliability and exalting sampling error at the altar of parsimony: Some cautions concerning short-from test development.* Manuscript. University of North Texas.

Hilgard, E.R. (1980). The trilogy of mind: Cognition, affection, and conation. *Journal of the history of the behavioural sciences, 16,* 107-117.

Hocevar, D. & Bachelor, P. (1989). *Handbook of creativity.* New York: Plenum Press.

Houtz, J.C., LeBlanc, E., Butera, T., Arons, M.F., Katz, S., Orsini-Romano, C. & McQuire, A. (1994). Personality Type, Creativity, and Classroom Teaching Style in Student Teachers. *Journal of Classroom Interaction, 26,* (2), 21-26.

Howe, M.J.A. (2001). Understanding abilities. *Contemporary Psychology: APA review of Books, 46,*(1),31.

Isaksen, S.G., Puccio, G.J. & Treffinger, D.J. (1993). An ecological approach to creativity research: Profiling for creative problem solving. *The journal of creative behaviour, 21,* (3), 149-170.

Kerr, B & Gagliardi, C. (n.d.) *Measuring creativity in research and practice.* Retrieved October 2005 from http://courses.ed.asu.edu/kerr/measuring_creativity.rtf

King, L.A. McKee Walker, I. & Broyles, S.J. (1996). Creativity and the five-factor model. *Journal of Research in Personality, 30,* 189-203.

Kinney, D.K. (2000). Nurturing creative genius to solve the problems that threaten human survival. *Contemporary Psychology: APA Review of Books, 46,* (1),31.

Kirton, M.J. (1989). *Adaptors and innovators: styles of creativity and problem solving.* London: Routledge.

Kumar, V.K., Kemmler, D. & Holman, E.R. (1997). The Creativity Styles Questionnaire – Revised. *Creativity Research Journal, 10,* 51-58.

Lubart, T.I. & Getz, I. (1998). The influence of heuristics on psychological science: A case study of research on creativity. *Journal for the Theory of Social Behaviour, 28,* (4), 435-457.

MacKinnon, D.W. (1978). *In search of human effectiveness: Identifying and developing creativity.* Buffalo, NY: Bearly Limited.

Magnusson, D. & Bachteman, G. (1977). *Longitudinal stability of person characteristics: Intelligence and creativity.* Stockholm: University Press.

Marek, T. (1993). *Psychological mechanisms of human creativity: The temptation for reassessment.* Delft: Eburon.

Martindale, C. & Dailey, A. (1996). Creativity, primary process cognition and personality. *Personality and Individual Differences, 20,* 409-414.

Maslow, A. (1968). *Toward a Psychology of Being.* New York: Van Nostrand.

McCrae, R.R. (1987). Creativity, divergent thinking, and openness to experience. *Journal of Personality and Social Psychology, 52,* 1258-1265.

McCrae, R.R. (1993). Openness to experience as a basic dimension of personality**.** *Imagination, Cognition, and Personality, 13,* 39-55.

Mednick, S.A. (1962). The associative basis of the creative process*. Psychological Review, 69,* 220-232.

Michael, W.B. & Colson, K.R. (1979). The development and validation of a life experience inventory for the identification of creative electrical engineers. *Educational and Psychological Measurement, 39,* 463-470.

Mouton, J. (2001). *How to succeed in your Master's & Doctoral studies: A South African guide and resource book.* Pretoria: Van Schaik publishers.

Mumford, M.D., Supinski, E.P., Baughman, W.A., Costanza, D.P. & Threlfall, K.V. (1997). Process-based measures of creative problem-solving skills: Overall prediction. *Creativity Research Journal, 10,* 73-85.

Neumann, W.L. (1997). *Social research methods: Qualitative and quantitative approaches, 3rd ed*. Boston, MA: Allyn & Bacon.

Nicol, J. (1998). *Die differensiële waarde van die 19-Veld-Belangstellingsvraelys.* Ongepubliseerde MA-Verhandeling. Pretoria: U.P.

Ochse, R. (1990). *Before the gates of excellence.* New York: Cambridge University Press.

Oppenheim, A.N. (1992). *Questionnaire design, interviewing and attitude measurement.* London: Pinter.

Pedhazer, E.J., & Schmelkin, L.P. (1991). *Measurement, design, and analysis: An integrated approach.* Hillsdale, JN: Lawrence Erlbaum.

Prinsloo, C.H. (1998). *Manual for the use of the Sixteen Personality Factor Questionnaire, South African 1992 version (16PF, SA92).* Pretoria: Human Sciences Research Council.

Rhodes, M. (1961). An analysis of creativity. *Phi Delta Kappa, 42,* 305-310.

Rogers, C.R. (1961). *On Becoming a Person.* Boston: Houghton Mifflin.

Rowe, D.C. (2001). Less blame for failures, less credit for triumphs. *Contemporary Psychology: APA Review of Books, 46,* (2), 31.

Runco, M.A. (1991). *Divergent thinking.* New Jersey: Ablex Publishing.

Ryhammar, L. & Brolin, C. (1999). Creativity research: Historical considerations and main lines of development. *Scandinavian Journal of Educational Research, 43,* (3), 259-273.

Schuman, H & Presser, C. (1981). *Questions and answers in attitude surveys: Experiments on question form, wording and context.* New York: Academic.

Sen, A.K. & Hagtvet, K.A. (1993). Correlations among creativity, intelligence, personality, and academic achievement. *Perceptual and Motor Skills, 77,* 497-498.

Simonton, D.K. (1984). *Genius, creativity and leadership.* Cambridge: Harvard University Press.

Shaughnessy, J.J. & Zechmeister, E.B. (1994). *Research methods in Psychology.* Singapore: McGraw-Hill, Inc.

Simonton, D.K. (2001). Totally made, not at all born. *Contemporary Psychology: APA Review of Books, 46,* (2), 176-178.

Smit, G.J. (1979). *Die verband tussen die belangstellingsvelde van die 19-VBV en bepaalde persoonlikheidsdimensies soos gemeet deur die 16PF.* Ongepubliseerde Navorsing. Pretoria: U.P.

Smith, D.E. & Tegano, D.W. (1992). Relationship of scores on two personality measures: Creativity and self-image. *Psychological Reports, 71,* 43-49.

Smit, G.J. (1996). *Psychometrics, aspects of measurement.* Pretoria: Kagiso.

Stavridou, A. & Furnham, A. (1996). The relationship between psychoticism, trait-creativity and the attentional mechanism of cognitive inhibition. *Personality and Individual Differences, 21,* 143-153.

Stein, M.I. (1975). *Stimulating creativity: Group procedures-Vol. II.* New York: Academic Press.

Sternberg, R.J. (1995). *The nature of creativity.* Cambridge: Cambridge University Press.

Sternberg, R.J. (1998). *In search of the human mind*. Fort Worth: Harcourt Brace.

Sternberg, R.J. (1999). *Handbook of creativity.* U.K.: Cambridge University Press.

Sternberg, R.J. & Lubart, T.I. (1995). *Defying the crowd: Cultivating creativity in a culture of conformity.* New York: Free Press.

Sudman, S. & Bradburn N.M. (1983). *Asking questions: A practical guide to questionnaire design.* London: Jossey-Bass.

Thompson, B. (1994). Guidelines for authors. *Educational and Psychological Measurement, 45,* 837-847.

Thompson, E. (1990). A comparison between the achievement motivation of male and female school children in the Pretoria and Witwatersrand area. *South African Journal of Psychology, 20(*2), 63-69

Torrance, E.P. (1979). *The search for satori and creativity.* Buffalo, NY: Creative Education Foundation.

Torrance, E.P. (1994). *Creativity: Just wanting to know.* Pretoria: Benedic Boeke.

Treffinger, D.J. & Poggio, J.P. (1972). Needed research on the measurement of creativity. *Journal of Creative Behavior, 6,* 253-267.

Urban, K.K. & Jellen, H.G. (1996). *Test for Creative Thinking – Drawing Production (TCT-DP).* Lisse, Netherlands: Swets and Zeitlinger.

Vacha-Haase, T. (1998). Reliability generalization: Exploring variance in measurement error affecting score reliability across studies. *Educational and Psychological Measurement, 58,* 6-20.

Van Eeden, R. & Prinsloo, C.H. (1997). Using the South African version of the 16PF in a multicultural context. *South African Journal of Psychology, 27*(3), 151-159.

Verhaeghen, P., Khan, R. & Joormann, J. (2005). Why we sing the blues: The relation between self-reflective rumination, mood and creativity. *Emotion, 5,* (2), 226-232.

Vermeulen, L.P. (1977). *Die validering van sielkundige veranderlikes vir die voorspelling van aanpassing by antarktiese toestande.* Unpublished doctoral dissertation. Pretoria: University of Pretoria.

Vosburg, S.K. (1998). Mood and quantity and quality of ideas. *Creativity Research Journal, 11,* 315-324.

Vosburg, S.K. & Kaufmann, G. (1998). *Affect, creative experience, and psychological adjustment.* Philadelphia: Brunner/Mazel

Wallach, M.A. & Kogan, N. (1965). *Modes of thinking in young children.* New York: Holt, Rinehart and Winston.

Weisberg, R.W. (1993). *Creativity: Beyond the myth of genius.* New York: W.H. Freeman.

Wolfradt, U. & Pretz, J.E. (2001). Individual Differences in Creativity: Personality, Story Writing, and Hobbies. *European Journal of Personality, 15,* 297-310.

APPENDIX A

CREATIVITY QUESTIONNAIRE

CREATIVITY QUESTIONNAIRE

Instructions

Please complete the questionnaire and hand it in to the person distributing the questionnaires. The information will be treated confidentially.

For office use

1. Respondent number				
Please tick the appropriate option or provide an answer. **Example:** Hair colour: Brown 1; Blonde 2 (X)				
2. Age:		V1	☐☐	1-2
3. Gender:				
Male	1			
Female	2	V2	☐	3
4. Race:				
African	1			
Indian	2			
Coloured	3			
White	4			
Other (Please specify):		V3	☐	4
5. Preferred language:				
Afrikaans	1			
English	2			
Other (Please specify):		V4	☐	5
6. Course of study:				
Humanities	1			
Natural and agricultural sciences	2			
Law	3			
Theology	4			
Economic and management scienses	5			
Veterinary science	6			
Education	7			
Health sciences	8			
Engineering, built environment and information technology	9	V5	☐	6
7. Year of study:		V6	☐☐	7-8

	For office use		
8. What do you do in your spare time? (Hobbies)			
.....			
.....			
.....	V7	☐☐	9-10
.....	V8	☐☐	11-12
.....	V9	☐	13
.....	V10	☐	14
9. Which sport do you participate in?			
.....			
.....	V11	☐☐	15-16
.....	V12	☐☐	17-18
.....	V13	☐	19
.....	V14	☐	20
10. Name your five best attributes. (Use only single words, eg. *beautiful*)			
-.....			
-.....			
-.....			
-.....			
-.....	V15	☐	21
11. What do you often fantasize about?			
.....			
.....			
.....	V16	☐	22
Try to be as creative and original as possible in answering the following questions:			
12. Name as many uses you can think of for an arm watch.			
.....			
.....			
.....			
.....	V17	☐☐	23-24
.....	V18	☐☐	25-26
.....	V19	☐	27
13. Name as many uses you can think of for a shoe.			
.....			
.....			
.....			
.....	V20	☐☐	28-29
.....	V21	☐☐	30-31
.....	V22	☐	32

For office use

14a. How is it possible to let a chicken egg fall for two meters without it breaking?

.....

.....

..... V23 ☐ 33

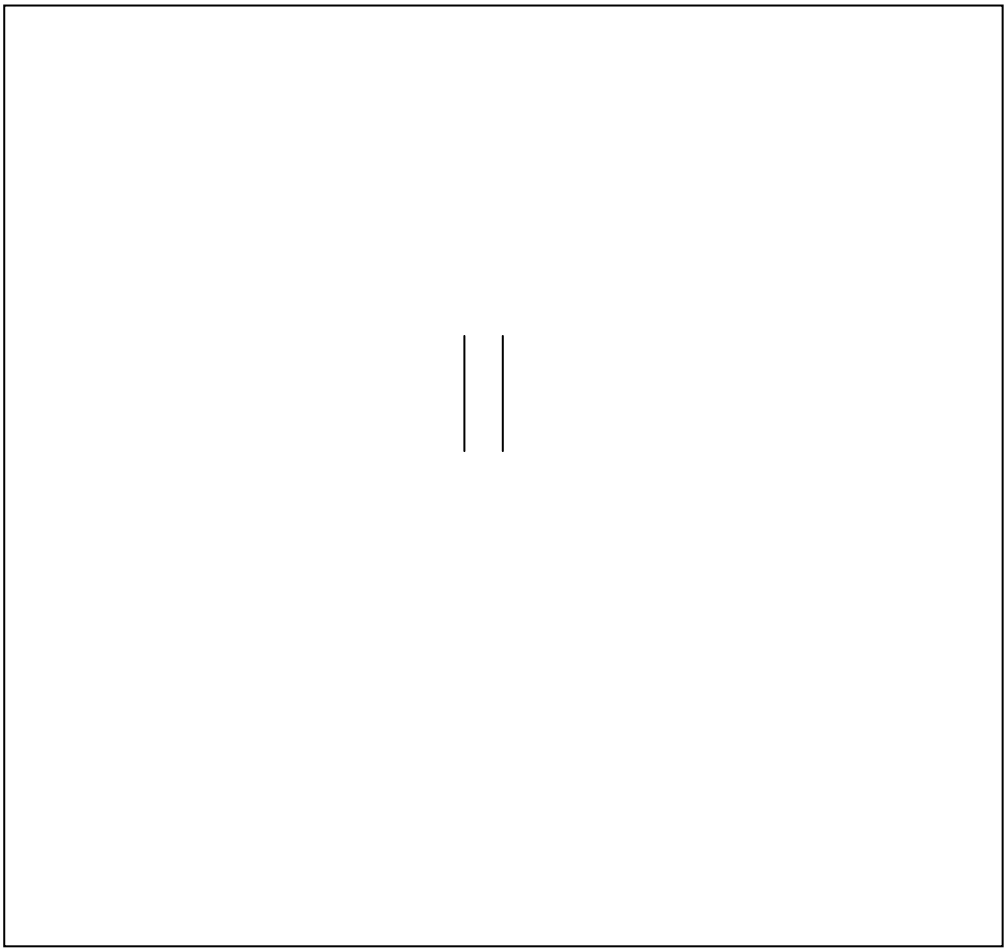
14b. A woman was putting some finishing touches on her house and realized she needed something she did not have. She went to the hardware store and asked the clerk, "How much will 150 cost me?" The clerk in the hardware store answered: "They are 75 cents apiece, so 150 will cost you R2,50." What did the woman buy?

.....

.....

..... V24 ☐ 34

15.



V25 ☐ 35
V26 ☐ 36
V27 ☐ 37
V28 ☐ 38

16. Find a fourth word which would combine the following three words: moon; cheese; Monday.

..... V29 ☐ 39

	For office use		
Which word would group the following words together? 17. Table; chair; lamp; bed. ..... 18. Banana; pineapple; orange; peach. ..... 19. Telephone book; marriage certificate; map of Johannesburg; article. ..... 20. Which word would group together the above mentioned three words (answers to questions 21,22 & 23)? ..... 21. Explain why this word is appropriate …… …… ……	V30	☐	40
With what word would you associate the following words? (Give the first word that comes to mind.)			
22. Shoe:	V31	☐	41
23. Button:	V32	☐	42
24. Brick:	V33	☐	43
25. Newspaper:	V34	☐	44
Why do you associate it with this? (Give a reason next to the word.)			
26. Shoe:	V35	☐	45
27. Button:	V36	☐	46
28. Brick:	V37	☐	47
29. Newspaper:	V38	☐	48

The following sections and questions focus on the evaluation of statements on a 5-point scale ranging from Never, Seldom, Unsure, Often, to Always. Please tick the most appropriate option reflecting your response to the statements.

Example:

	Never	**Seldom**	**Unsure**	**Often**	**Always**
I make my bed	**1**	**2**	**3**	**4**	**5**

	Never	Seldom	Unsure	Often	Always	**For office use**		
30. I easily give up hope when struggling with something.	1	2	3	4	5	**V39**		**49**
31. I struggle to concentrate.	1	2	3	4	5	**V40**		**50**
32. I struggle to complete projects on time.	1	2	3	4	5	**V41**		**51**
32. I have the ability to work alone/in isolation.	1	2	3	4	5	**V42**		**52**
33. I remember my dreams.	1	2	3	4	5	**V43**		**53**
34. I easily get angry.	1	2	3	4	5	**V44**		**54**
35. I have a broad general knowledge.	1	2	3	4	5	**V45**		**55**
36. I struggle to accept compliments.	1	2	3	4	5	**V46**		**56**
37. I daydream.	1	2	3	4	5	**V47**		**57**
38. I have a positive self-concept.	1	2	3	4	5	**V48**		**58**
39. I show self-initiative.	1	2	3	4	5	**V49**		**59**
40. I accept my responsibilities.	1	2	3	4	5	**V50**		**60**
41. I notice things which others don't.	1	2	3	4	5	**V51**		**61**
42. I think about a situation before giving my opinion about it.	1	2	3	4	5	**V52**		**62**
43. I easily give up.	1	2	3	4	5	**V53**		**63**
44. I experience a feeling of power.	1	2	3	4	5	**V54**		**64**
45. I find it easy to work according to a routine.	1	2	3	4	5	**V55**		**65**
46. I feel that I act too quickly in situations.	1	2	3	4	5	**V56**		**66**
47. I easily adapt to new situations.	1	2	3	4	5	**V57**		**67**
48. I like uncertainties.	1	2	3	4	5	**V58**		**68**
49. I find problems where others don't see any.	1	2	3	4	5	**V59**		**69**
50. I easily agree with others' opinions.	1	2	3	4	5	**V60**		**70**
51. I have the need to include others in activities.	1	2	3	4	5	**V61**		**71**
52. I dislike complexities.	1	2	3	4	5	**V62**		**72**
53. I associate unusual concepts with each other.	1	2	3	4	5	**V63**		**73**
54. I complete something I started with.	1	2	3	4	5	**V64**		**74**
55. I fantasize.	1	2	3	4	5	**V65**		**75**

Please tick the most appropriate option reflecting your response to the statements.	Never	Seldom	Unsure	Often	Always	**For office use**		
56. I believe in it to follow my hunches.	1	2	3	4	5	**V66**		**76**
57. I feel helpless when it comes to solving problems.	1	2	3	4	5	**V67**		**77**
58. I enjoy competition.	1	2	3	4	5	**V68**		**78**
59. I like to participate socially.	1	2	3	4	5	**V69**		**79**
60. I help others with their work when they are struggling.	1	2	3	4	5	**V70**		**80**
61. I take risks.	1	2	3	4	5	**V71**		**81**
62. I see the humor in something when others don't.	1	2	3	4	5	**V72**		**82**
63. I tend to do things differently to other people.	1	2	3	4	5	**V73**		**83**
64. I think creative thoughts are bizarre.	1	2	3	4	5	**V74**		**84**
65. I have self discipline.	1	2	3	4	5	**V75**		**85**
66. I like diversity.	1	2	3	4	5	**V76**		**86**
67. I question the norm.	1	2	3	4	5	**V77**		**87**
68. I hesitate to try out new ideas.	1	2	3	4	5	**V78**		**88**
69. I feel detached/estranged from myself.	1	2	3	4	5	**V79**		**89**
70. I avoid complex tasks.	1	2	3	4	5	**V80**		**90**
71. I feel detached from myself.	1	2	3	4	5	**V81**		**91**
72. I strive for self improvement.	1	2	3	4	5	**V82**		**92**
73. I create new ideas by combining existing ideas.	1	2	3	4	5	**V83**		**93**
74. I have difficulty in completing projects.	1	2	3	4	5	**V84**		**94**
75. I have a need to do well in order to satisfy my parents.	1	2	3	4	5	**V85**		**95**
76. I think about something before accepting it as it is.	1	2	3	4	5	**V86**		**96**
77. When I do an assignment, I do more than what is expected of me (instead of just enough).	1	2	3	4	5	**V87**		**97**
78. Others' opinions are very important to me.	1	2	3	4	5	**V88**		**98**
79. As a child I wasn't allowed to choose my own friends.	1	2	3	4	5	**V89**		**99**
80. Creative people generally seem to have scrambled minds.	1	2	3	4	5	**V90**		**100**
81. Ideas are only important if they have an impact on big projects.	1	2	3	4	5	**V91**		**101**
82. Daydreaming is a useless activity.	1	2	3	4	5	**V92**		**102**
83. When struggling with something, I will find a solution.	1	2	3	4	5	**V93**		**103**
84. New ideas usually don't work out.	1	2	3	4	5	**V94**		**104**
85. I lack perseverance.	1	2	3	4	5	**V95**		**105**
86. As a child I was allowed to set my own standards.	1	2	3	4	5	**V96**		**106**
87. When my friends have problems, and don't want to speak to me about it, I feel very insecure.	1	2	3	4	5	**V97**		**107**
88. When I have a new idea, I get totally absorbed in it.	1	2	3	4	5	**V98**		**108**
89. When I look at an object, I see how I can change it.	1	2	3	4	5	**V99**		**109**
90. My parents put emphasis on getting ahead.	1	2	3	4	5	**V100**		**110**

Indicate to which degree the following characteristics would describe you the best.

Example:

	Disagree	**Tend to disagree**	**Unsure**	**Tend to agree**	**Agree**
Beautiful				X	

	Disagree	Tend to disagree	Unsure	Tend to agree	Agree	**For office use**		
91. Individualistic	1	2	3	4	5	**V101**		**111**
92. Energetic	1	2	3	4	5	**V102**		**112**
93. Committed	1	2	3	4	5	**V103**		**113**
94. Productive	1	2	3	4	5	**V104**		**114**
95. Thorough	1	2	3	4	5	**V105**		**115**
96. Impulsive	1	2	3	4	5	**V106**		**116**
97. Persevering	1	2	3	4	5	**V107**		**117**
98. Critical	1	2	3	4	5	**V108**		**118**
99. Independent in thoughts	1	2	3	4	5	**V109**		**119**
100. Curious	1	2	3	4	5	**V110**		**120**
101. Intuitive	1	2	3	4	5	**V111**		**121**
102. Tolerant of others	1	2	3	4	5	**V112**		**123**
103. Open to experience (i.e. prefer own experience to others' opinions.	1	2	3	4	5	**V113**		**124**
104. Extrovert	1	2	3	4	5	**V114**		**125**
105. Conscientious	1	2	3	4	5	**V115**		**126**
106. Sensitive to detail	1	2	3	4	5	**V116**		**127**
107. Dependable	1	2	3	4	5	**V117**		**128**
108. Self-accepting	1	2	3	4	5	**V118**		**129**
109. Hostile towards others	1	2	3	4	5	**V119**		**130**
110. Driven	1	2	3	4	5	**V120**		**131**
111. Ambitious	1	2	3	4	5	**V121**		**132**
112. Dominant	1	2	3	4	5	**V122**		**133**
113. Prone to investigate	1	2	3	4	5	**V123**		**134**
114. Social	1	2	3	4	5	**V124**		**135**
115. Willing to ask unusual questions	1	2	3	4	5	**V125**		**135**
116. Imaginative	1	2	3	4	5	**V126**		**137**
117. Humble	1	2	3	4	5	**V127**		**138**
118. Original	1	2	3	4	5	**V128**		**139**

	Disagree	Tend to disagree	Unsure	Tend to agree	Agree	For office use		
119. Competent	1	2	3	4	5	**V129**		**140**
120. Conservative	1	2	3	4	5	**V130**		**141**
121. Honest	1	2	3	4	5	**V131**		**142**
122. Sensitive to negative feelings (i.e. am easily influenced by it)	1	2	3	4	5	**V132**		**143**
123. Willing to miss a meal in order to finish a project	1	2	3	4	5	**V133**		**144**
124. Motivated	1	2	3	4	5	**V134**		**145**
125. Different	1	2	3	4	5	**V135**		**146**
126. Too busy for new ideas	1	2	3	4	5	**V136**		**147**
127. Inventive	1	2	3	4	5	**V137**		**148**

Thank you for your time

APPENDIX B

ORIGINAL GROUPING OF CONSTRUCTS

Below the constructs are indicated with the items on the questionnaire (v1, v2 etc.) as discussed in paragraph 2.2.

Entire questionnaire:

- **Process constructs**
  v16+v17+v18+v19+v20+v21+v22v23+v24+v29+v30+v31+v32+v33+v34+v35+v36+v37+v38+v43+v47+v51+v52+v59+v63+v65+v72+v83+v86+v91+v99+v111
- **Personality constructs**
  v15+v101+v102+v106+v108+v109+v110+v112+v113+v114+v115+v116+v117+v118+v119+v120+v122+v124+v127+v129+v130+v131+v132+v135+v137+v41+v42+v44+v46+v48+v49+v50+v54+v55+v56+v57+v58+v60+v61+v62+v66+v69+v70+v74+v75+v76+v79+v81+v82+v88+v90+v92+v97+v104+v105+v106+v126
- **Motivation constructs**
  v39+v43+v64+v67+v68+v71+v77+v78+v84+v85+v80+v87+v93+v95+v94+v98+v103+v121+v123+v125+v133+v134+v136
- **Cognition**
  v40+v45
- **Product**
  v25+v26+v27+v28+v128
- **Environmental factors**
  v89+v96+v100
- **Biographical factors**
  v1+v2+v3+v4+v5+v6
- **Interests**
  v7+v8+v9+v10+v11+v12+v13+v14

Frequency:

- **Process constructs**
  v43+v47+v51+v52+v59+v63+v65+v72+v83+v86+v91+v99
- **Personality constructs**
  v41+v42+v44+v46+v48+v49+v50+v54+v55+v56+v57+v58+v60+v61+v62+v66+v69+v70+v74+v75+v76+v79+v81+v82+v88+v90+v92+v97
- **Motivation constructs**
  v39+v43+v64+v67+v68+v71+v77+v78+v84+v85+v80+v87+v93+v95+v94+v98

- **Cognition**
  v40+v45
- **Environmental factors**
  v89+v96+v100

Agreement:

- **Process constructs**
  v111
- **Personality constructs**
  v101+v102+v106+v108+v109+v110+v112+v113+v114+v115+v116+v117+v118+v119+v120+v122+v124+v127+v129+v130+v131+v132+v135+v137+v104+
  v105+v106+v126
- **Motivation constructs**
  v103+v121+v123+v125+v133+v134+v136
- **Product**
  v128

APPENDIX C
ORIGINALITY SCORES

Hobbies originality		
Item	**Frequency**	**Score**
Reading	38	1
Socialising (Clubs, friends, telephone, spending time with fiancé etc.)	32	2
Watch movies (videos)	24	3
Watch TV	16	4
Swimming	12	5
Listen to music	12	5
Painting	9	6
Gym	9	6
Sleep	6	7
Gardening	6	7
Walking	6	7
Playing guitar	5	8
Computer (games)	5	8
Writing	5	8
Jogging	4	9
Yoga	4	9
Cooking	3	10
Writing poems	3	10
Drawing	3	10
Playing tennis	3	10
Dancing	2	11
Walking the dogs	2	11
Playing squash	2	11
Playing board games	2	11
Riding bicycle	2	11
Crossword puzzles	2	11
Jigsaw puzzles	2	11
Athletics	2	11
Sport	2	11
Hockey	2	11
Playing piano	2	11
Collecting antiques	2	11

Drinking	2	11
Think	2	11
Sewing	2	11
Latin American Dancing	2	11
Golf	2	11
Water-ski	1	12
Photography	1	12
Diving	1	12
Play with dogs	1	12
Ice skating	1	12
Horse back riding	1	12
Work at radio station	1	12
Play Jembe	1	12
Go to theatre	1	12
Meditate	1	12
“Tuimel”	1	12
Clean room	1	12
Make bangles	1	12
Drumming	1	12
Rock climbing	1	12
Skiing	1	12
Touch rugby	1	12
High ropes	1	12
Taibo	1	12
Volunteer work at social organizations	1	12
Dog caretaker	1	12
Babysitting	1	12
Braai	1	12
Shopping	1	12
Learn to play musical instruments	1	12
Plan activities to collect money for underprivileged	1	12
Decoupage	1	12
Spinning	1	12
Collecting poetry	1	12
Collecting articles about soccer	1	12
Travelling	1	12

Repairing things	1	12
Camping	1	12
Singing	1	12
Mosaic	1	12
Organize dinner parties	1	12
Playing soccer	1	12
Bird watching	1	12
Playing volleyball	1	12
Eating	1	12
Playing	1	12
Work in jewellery store	1	12
Sport originality		
Item	**Frequency**	**Score**
Swimming	10	1
Gym	8	2
Hockey	7	3
Tennis	7	3
Jogging	5	4
Netball	5	4
Yoga	4	5
Volleyball	3	6
Athletics	3	6
Latin American Dancing	3	6
Riding bicycle	2	7
Squash	2	7
Walking	2	7
Soccer	2	7
Aerobics	2	7
Horse back riding	1	8
Backpacking	1	8
“Tuimel”	1	8
“Korfbal”	1	8
Table tennis	1	8
Sex	1	8
Cricket	1	8
Rock climbing	1	8

Skiing	1	8
Touch rugby	1	8
Taibo	1	8
Rugby	1	8
Golf	1	8
Ballroom dancing	1	8
Ice skating	1	8
Jet ski	1	8
Spinning	1	8
Basketball	1	8
Wrist watch originality		
Item	**Frequency**	**Score**
Time	37	1
Accessory (bracelet, arm decoration)	19	2
Stop watch (timer)	18	3
Status symbol (pride, class, dignity, fashion)	13	4
Weapon (hit, hurt, defend, through at)	9	5
Wall hanging (collection, miniature wall clock)	8	6
Tying hair back	7	7
Part of sculpture (abstract art work)	6	8
Reflect light	6	8
Paperweight	6	8
Gift	5	9
Ruler (strap)	4	10
Start fire (magnifying glass)	4	10
Alarm clock	4	10
Draw circles	3	11
Date	2	12
Necklace	2	12
Hypnosis	2	12
Christmas tree decoration	2	12
Keep poster rolled up	2	12
Clock in time machine	2	12
Stop blood circulation when wounded	2	12
Linking device	2	12
Use light to see in dark	2	12

Sell	2	12
Trade	2	12
Deposit	2	12
Toy for baby/child	2	12
Miniature phone	2	12
Tie something together	2	12
Doorstop	1	13
Paint	1	13
Measure pulse	1	13
Keep flowers together	1	13
Keep bandages tied on arm	1	13
Non-meaningful where no time	1	13
Arms: Gears & throttles for miniature vehicle	1	13
Earring	1	13
Rear-view mirror hanging	1	13
Napkin holder	1	13
Hide mark on arm	1	13
Put under unstable table	1	13
Egg holder	1	13
Key ring	1	13
Teach child to read time	1	13
Show that in hurry (looking at watch)	1	13
Making holes (with pin)	1	13
Crush things (garlic)	1	13
Bribe	1	13
Stare at when bored	1	13
Control	1	13
Discipline	1	13
Magnet finder	1	13
Pick up line (Throw in swimming pool for cutest guy to fetch)	1	13
Ring for finger (Frame)	1	13
Belt for small doll (Frame)	1	13
Hand cuff	1	13
Cool tan	1	13
Hidden camera	1	13
Hidden laser	1	13

Wrapping present	1	13
Explain angles in maths	1	13
Mirror (Shiny strap)	1	13
Cleaning nails (Clasp)	1	13
Measure blood pressure	1	13
Keep rings on strap	1	13
Identification	1	13
Close wound	1	13
Ball sport	1	13
Cheat in exam (hidden notes)	1	13
Scratch back	1	13
Ankle bracelet	1	13
Build bomb	1	13
Compass	1	13
Build frame (for photos, pictures)	1	13
Dog collar	1	13
Shoe originality		
Item	**Frequency**	**Score**
Protecting feet (warm, clean, dry, comfort, walking, running, sports, industrial protection, convenience, stability)	42	1
Weapon (murder instrument, defence, hit someone, throw at someone, kick someone)	36	2
Store things (socks, cutlery, tissues, pens/pencils, wine holder, tooth)	16	3
Doorstop	15	4
Accessory (fashion, style, decoration, neatness)	14	5
Kill bugs	9	6
Pot plant	8	7
Hide things in (money, drugs, jewels, smuggling, safe)	8	7
Hammer	7	8
Status symbol (Brag, dignity, brand, prove that have money)	7	8
Water container (cup, glass	6	9
To give hiding	6	9
Dog toy	6	9
Boat	6	9

Smell (narcotics, sleep, chase unwelcome guests/people away)	5	10
Paper weight (keep house plan open)	4	11
Scoop water/sand	4	11
Throw at cats/dogs	3	12
Flower pot	3	12
Part of sculpture/artwork	3	12
Nest for hamster/mouse	3	12
Make fire	3	12
Laces for rope	3	12
Mould for statue	2	13
Hand puppets	2	13
Ornament	2	13
Musical instrument (make noise, banging)	2	13
Serving spoon (“paplepel”)	2	13
Ball sports	2	13
Make prints on sand (stamp)	2	13
Missile	1	14
Model for drawing	1	14
Measuring instrument	1	14
“Drukblokwerk”	1	14
To mix paint	1	14
To keep curtain open	1	14
Put on box to keep something (e.g. cat) inside	1	14
Short put competitions	1	14
Wind chime (on string with bells)	1	14
To extinguish fire	1	14
Bicycle brakes	1	14
Key ring (cut up)	1	14
Show direction	1	14
Base for glass (stiletto heels)	1	14
Scare someone with spanking	1	14
Goal posts	1	14
Pillow	1	14
Collection	1	14
Encasing broken ankle	1	14
Pick up something that doesn’t want to touch	1	14

Sell (make money)	1	14
Compress dirt in dustbin	1	14
Pick up line	1	14
Bird bath	1	14
Watering can	1	14
Fish bowl	1	14
Tennis racket	1	14
Food bowl	1	14
Irritating students writing exam (walking up and down passage with high heels)	1	14
Water bowl	1	14
Toy for baby	1	14
To put rugby ball on for kick off	1	14
Dough beater	1	14
Meat tenderiser	1	14
Spade (high heels)	1	14
Giving additional height	1	14
Fishing lures (cut up)	1	14
To carry something	1	14
To crush something (e.g. garlic)	1	14
Use leather to patch something else	1	14
To even out surfaces	1	14
Put behind car wheel for brakes	1	14
Book stand	1	14
Identification	1	14
Bed for doll	1	14
Teach child to tie a bow	1	14
Picture completion originality		
Item	**Frequency**	**Score**
Tree trunk	9	1
Road	5	2
Flower pot	5	2
Neck of person	3	3
Body of butterfly	3	3
Martini glass base	2	4
Lines on road	2	4
Abstract design	2	4

Nose of face	2	4
Body of person	2	4
Candle on cake	1	5
Burette	1	5
Back of book	1	5
Road sign pole	1	5
Apple core	1	5
Door in 3D hallway	1	5
“Rainbow muffin”	1	5
Giraffe neck	1	5
Boat mast	1	5
Atom bomb	1	5
Lamp post	1	5
Side of house	1	5
Between windows	1	5
Funnel	1	5
Flower stem	1	5
Graduation hat	1	5
Sweet	1	5
House	1	5
Between train compartments	1	5
Mushroom stem	1	5
Between eyes	1	5
Tennis racket handle	1	5
Between buildings	1	5
Part of fence	1	5
Part of fireplace	1	5

APPENDIX D
INFORMED CONSENT

8 October 2003

Queries: Mej. T. Lotz
Tel: (012) 654 2046

TO WHOM IT MAY CONCERN

PERMISSION TO PARTICIPATE IN A RESEARCH PROJECT:

The purpose of this project is to study the interaction between personality and creativity. For this purpose, a personality questionnaire (16-PF) and creativity questionnaire has to be completed by participants.

The procedure is simple and will be as follows: One session of approximately two hours will be given to participants to complete above mentioned questionnaires. After this, the data that has been collected will be analyzed, and thus be part of the research project.

No risk or discomfort is predicted for respondents. Participation is voluntary. Respondents are free to withdraw from the study at any time, without having to give a reason for withdrawing and without negative consequences. Should a respondent decide to withdraw, his data would be destroyed. All information will be treated confidentially, and respondents will stay anonymous.

Data will be stored for research purposes for approximately 5 years.

If there are ny doubts or uncertainties, you can contact me at 9012) 654 2046 during office hours.

Thank you

Talana Lotz Prof. D.J.F. Maree
STUDY LEADER

……

I hereby declare that all the information in this letter is clear to me and that I am willing to participate in the research project.

Signature…….. Date:…… Place:……

SUMMARY

The aim of the current study is threefold: to develop a creativity questionnaire based on the main criteria for creativity as determined by means of a comprehensive literature survey; to administer this questionnaire, in combination with the Abbreviated Torrance Test for Adults (ATTA) and the 16PF for the purpose of determining respondents' level of creativity in relation to their personality constellation; to determine whether a typical 16PF profile can be obtained for the purpose of identifying a creative individual. The sample consisted of fourth-year Psychology students at the University of Pretoria.

Identified problems that motivated the research include, amongst others, a lack of research in this domain, and therefore a need for a reliable and valid measuring instrument for creativity. Creative individuals are often misinterpreted or misunderstood by the community as the result of a lack of knowledge. The purpose of the research will also be to reduce misconceptions such as these, by informing the reader about creativity as well as the individuals who possess this unique characteristic.

Creativity is, however, an extremely broad concept which is very difficult to define, and only the main criteria for creativity were applied in the development of the Creativity Questionnaire. According to Ryhammar & Brolin (1999), creative individuals can be described as being motivated, persevering, intellectually inquisitive, having a need for self-actualisation, independent in thought and deed, confident, self-aware, and open to external and internal stimulation. Operationalisation of such criteria formed the basis of the Creativity Questionnaire.

The dissertation reports on the development of a Creativity Questionnaire which can be used in a variety of areas, but will need further revision and refinement in terms of items included, validity and reliability. Therefore the current study should be considered as a pilot study for the testing and development of this questionnaire.

The results of this investigation confirm and extend previous research in demonstrating a close association between creativity and specific personality traits. Creative subjects (as measured by the ATTA) indicated that they perceive themselves to be significantly more independent in thought, open to experience, dominant, individualistic and competent, than less creative subjects. Both subjects with average and high creativity levels indicated that they tend to be more resourceful, self-sufficient, and prefer to make their own decisions. These subjects tend to be more abstract thinking and bright. Both subjects with low creativity levels and subjects with high creativity levels indicated that they tend to be more spontaneous, socially bold, uninhibited and venturesome than subjects with average creativity levels. The latter subjects tend to be more restrained, sensitive to threats, timid and shy.

Subjects with low creativity levels on the other hand, indicated that they tend to be more outgoing, participating, warm-hearted and easy-going than subjects with an average creativity level. The latter subject group tends to be more critical, detached and reserved. Subjects with low creativity levels also seem to be joiners, sound followers and group-dependent. These subjects also indicated that they tend to be more concrete thinking and less intelligent, than subjects with average and high creativity levels.

Key terms:
Creativity; Personality; Psychometric properties; Reliability; Validity; Test construction; Abbreviated Torrance Test for Adults; 16PF; Creativity Questionnaire; Traits

OPSOMMING

Die doel van hierdie studie is drievoudig: om ‘n kreatiwiteitsvraelys te ontwikkel wat gebaseer is op die hoof kriteria vir kreatiwiteit, soos vasgestel deur ‘n uitvoerige literatuurstudie; om hierdie vraelys, gekombineer met die *Abbreviated Torrance Test for Adults (ATTA)* en die 16PF toe te pas om sodoende die respondente se vlak van kreatiwiteit, in verhouding tot hulle persoonlikheidsamestelling te bepaal; om te bepaal of die 16PF-profiel bepaal kan word vir die identifisering van ‘n kreatiewe individu. Die steekproef het bestaan uit vierdejaar Sielkunde studente aan die Universiteit van Pretoria.

Probleme wat as motivering gedien het vir hierdie navorsing sluit onder andere die volgende in: daar is ‘n tekort aan navorsing in hierdie betrokke veld, wat daartoe lei dat daar ook ‘n behoefte is aan ‘n betroubare en geldige instrument om kreatiwiteit te meet. Verder word kreatiewe individue dikwels wanvertolk en misverstaan deur die samelewing, weens ‘n gebrek aan kennis. Daar sal dan verder deur hierdie studie ook gepoog word om betrokke mispersepsies uit die weg te ruim deur die leser in te lig oor kreatiwiteit as sodanig, sowel as oor individue wat beskik oor hierdie unieke karaktereienskap.

Tog is kreatiwiteit ‘n baie breë konsep, wat baie moeilik is om te definieer. As gevolg hiervan is slegs die hoof kriteria van kreatiwiteit toegepas in die ontwerp van die Kreatiwiteitsvraelys. Volgens Ryhammar & Brolin (1999) kan kreatiewe individue bes beskryf word as gemotiveerd, volhardend, intellektueel ondersoekend, en wat beskik oor ‘n behoefte na selfaktualisering, onafhanklik is in denke en dade, selfversekerd, selfbewus, en toeganklik vir interne en externe stimulasie. Bewerking van hierdie kriteria het die basis gevorm vir die Kreatiwiteitsvraelys.

Die verhandeling doen verslag oor die ontwikkeling van ‘n Kreatiwiteitsvraelys wat in verskeie areas toegepas kan word, alhoewel dit steeds verder nagesien en verfyn moet word in terme van items wat ingesluit word in die toets, sowel as geldigheid en betroubaarheid. Die huidige studie moet dus beskou word as ‘n proefstudie vir die toets en ontwikkel van hierdie vraelys.

Die bevindinge van hierdie navorsing bevestig vorige navorsing en neem dit ‘n stap verder in sover dit ‘n baie noue verband uitwys tussen kreatiwiteit en spesifieke persoonlikheidseienskappe. Kreatiewe proefpersone (soos gemeet deur die ATTA) het aangedui dat hulle hulself beskou as individue wat beduidend meer onafhanklik is in hulle denke, toeganklik vir ervaringe, dominant, individualisties en bevoeg is as minder kreatiewe proefpersone. Beide proefgroepe met gemiddelde en hoë kreatiwiteitsvlakke het aangedui dat hulle geneig is om vindingryker en meer selfonderhoudend te wees, en ook dat hulle verkies om hulle eie besluite te neem. Groepe met lae, sowel as hoë kreatiwietesvlakke het aangedui dat hulle geneig is om meer spontaan, sosiaal selfversekerd, ongebonde en avontuurlustig te wees as die met gemiddelde kreatiwiteitsvlakke. Laasgenoemde is weer geneig om meer gereserveerd te wees, sensitief vir enige bedryging, asook bedees en skaam.

Hierteenoor dui proefpersone met lae kreatiwiteitsvlakke aan dat hulle geneig is om meer spontaan, deelnemend, toegeneë en sorgeloos te wees as diegene met ‘n gemiddelde vlak van kreatiwiteit. Laasgenoemde groep toon ook ‘n geneigdheid om krities, onbevooroordeeld en gereserveerd te wees. Proefpersone met ‘n lae kreatiwiteitsvlak blyk ook joiners, gedugte navolgers en groepafhanklik te wees. Hierdie individue het verder aangedui dat hulle meer konkreetdenkend en minder intelligent is as diegene met gemiddelde en lae kreatiwiteitsvlakke.

Sleutelterme:
Kreatiwiteit; Persoonlikheid; Psigometriese eienskappe; Geldigheid; Betroubaarheid; Toets konstruksie; *Abbreviated Torrance Test for Adults*; *16PF*; Kreatiwiteitsvraelys; Karaktereienskappe

CREATIVITY QUESTIONNAIRE

Instructions

Please complete the questionnaire and hand it in to the person distributing the questionnaires. The information will be treated confidentially.

For office use

1. Respondent number				
Please tick the appropriate option or provide an answer.				
Example: Hair colour:	Brown	1		
	Blonde	X 2		
2. Age:			V1	☐☐ 1-2
3. Gender:				
Male		1		
Female		2	V2	☐ 3
4. Race:				
African		1		
Indian		2		
Coloured		3		
White		4		
Other (Please specify):			V3	☐ 4
5. Preferred language:				
Afrikaans		1		
English		2		
Other (Please specify):			V4	☐ 5
6. Course of study:				
Humanities		1		
Natural and agricultural sciences		2		
Law		3		
Theology		4		
Economic and management scienses		5		
Veterinary science		6		
Education		7		
Health sciences		8		
Engineering, built environment and information technology		9	V5	☐ 6
7. Year of study:			V6	☐☐ 7-8

		For office use	
8. What do you do in your spare time? (Hobbies)			
.....			
.....			
.....	V7		9-10
.....	V8		11-12
.....	V9		13
.....	V10		14
9. Which sport do you participate in?			
.....			
.....	V11		15-16
.....	V12		17-18
.....	V13		19
.....	V14		20
10. Name your five best attributes. (Use only single words, eg. *beautiful*)			
-.....			
-.....			
-.....			
-.....			
-.....	V15		21
11. What do you often fantasize about?			
.....			
.....			
.....	V16		22
Try to be as creative and original as possible in answering the following questions:			
12. Name as many uses you can think of for an arm watch.			
.....			
.....			
.....			
.....	V17		23-24
.....	V18		25-26
.....	V19		27
13. Name as many uses you can think of for a shoe.			
.....			
.....			
.....			
.....	V20		28-29
.....	V21		30-31
.....	V22		32

For office use

14a. How is it possible to let a chicken egg fall for two meters without it breaking?

.....

.....

..... V23 ☐ 33

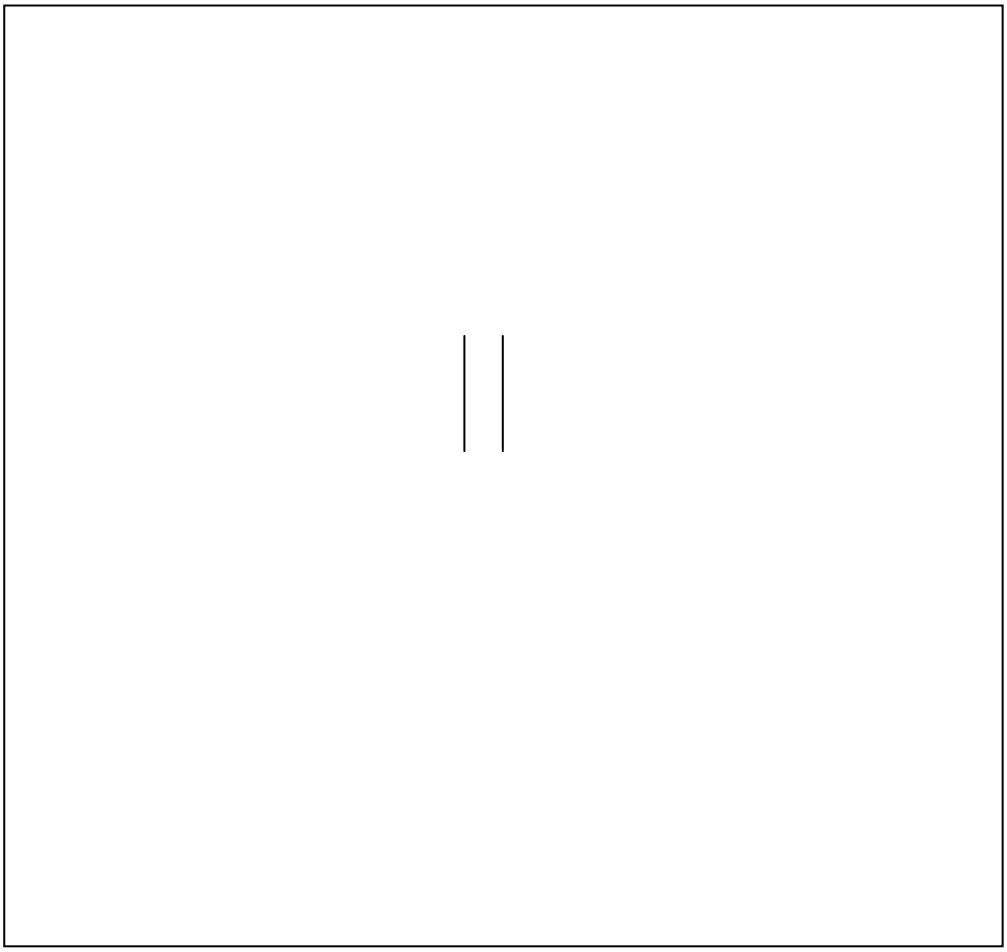
14b. A woman was putting some finishing touches on her house and realized she needed something she did not have. She went to the hardware store and asked the clerk, "How much will 150 cost me?" The clerk in the hardware store answered: "They are 75 cents apiece, so 150 will cost you R2,50." What did the woman buy?

.....

.....

..... V24 ☐ 34

15.



V25 ☐ 35
V26 ☐ 36
V27 ☐ 37
V28 ☐ 38

16. Find a fourth word which would combine the following three words: moon; cheese; Monday.

..... V29 ☐ 39

For office use

Which word would group the following words together?

17. Table; chair; lamp; bed.
.....

18. Banana; pineapple; orange; peach.
.....

19. Telephone book; marriage certificate; map of Johannesburg; article.
.....

20. Which word would group together the above mentioned three words (answers to questions 21,22 & 23)?
.....

21. Explain why this word is appropriate
……
……
…… V30 ☐ 40

With what word would you associate the following words?
(Give the first word that comes to mind.)

22. Shoe: ..... V31 ☐ 41
23. Button: ..... V32 ☐ 42
24. Brick: ..... V33 ☐ 43
25. Newspaper: ..... V34 ☐ 44

Why do you associate it with this? (Give a reason next to the word.)

26. Shoe: ..... V35 ☐ 45
27. Button: ..... V36 ☐ 46
28. Brick: ..... V37 ☐ 47
29. Newspaper: ..... V38 ☐ 48

The following sections and questions focus on the evaluation of statements on a 5-point scale ranging from Never, Seldom, Unsure, Often, to Always. Please tick the most appropriate option reflecting your response to the statements.

Example:

	Never	**Seldom**	**Unsure**	**Often**	**Always**
I make my bed	**1**	**2**	**3**	**4**	**5**

	Never	Seldom	Unsure	Often	Always	**For office use**		
30. I easily give up hope when struggling with something.	1	2	3	4	5	**V39**		**49**
31. I struggle to concentrate.	1	2	3	4	5	**V40**		**50**
32. I struggle to complete projects on time.	1	2	3	4	5	**V41**		**51**
32. I have the ability to work alone/in isolation.	1	2	3	4	5	**V42**		**52**
33. I remember my dreams.	1	2	3	4	5	**V43**		**53**
34. I easily get angry.	1	2	3	4	5	**V44**		**54**
35. I have a broad general knowledge.	1	2	3	4	5	**V45**		**55**
36. I struggle to accept compliments.	1	2	3	4	5	**V46**		**56**
37. I daydream.	1	2	3	4	5	**V47**		**57**
38. I have a positive self-concept.	1	2	3	4	5	**V48**		**58**
39. I show self-initiative.	1	2	3	4	5	**V49**		**59**
40. I accept my responsibilities.	1	2	3	4	5	**V50**		**60**
41. I notice things which others don't.	1	2	3	4	5	**V51**		**61**
42. I think about a situation before giving my opinion about it.	1	2	3	4	5	**V52**		**62**
43. I easily give up.	1	2	3	4	5	**V53**		**63**
44. I experience a feeling of power.	1	2	3	4	5	**V54**		**64**
45. I find it easy to work according to a routine.	1	2	3	4	5	**V55**		**65**
46. I feel that I act too quickly in situations.	1	2	3	4	5	**V56**		**66**
47. I easily adapt to new situations.	1	2	3	4	5	**V57**		**67**
48. I like uncertainties.	1	2	3	4	5	**V58**		**68**
49. I find problems where others don't see any.	1	2	3	4	5	**V59**		**69**
50. I easily agree with others' opinions.	1	2	3	4	5	**V60**		**70**
51. I have the need to include others in activities.	1	2	3	4	5	**V61**		**71**
52. I dislike complexities.	1	2	3	4	5	**V62**		**72**
53. I associate unusual concepts with each other.	1	2	3	4	5	**V63**		**73**
54. I complete something I started with.	1	2	3	4	5	**V64**		**74**
55. I fantasize.	1	2	3	4	5	**V65**		**75**

Please tick the most appropriate option reflecting your response to the statements.	Never	Seldom	Unsure	Often	Always	**For office use**		
56. I believe in it to follow my hunches.	1	2	3	4	5	**V66**		**76**
57. I feel helpless when it comes to solving problems.	1	2	3	4	5	**V67**		**77**
58. I enjoy competition.	1	2	3	4	5	**V68**		**78**
59. I like to participate socially.	1	2	3	4	5	**V69**		**79**
60. I help others with their work when they are struggling.	1	2	3	4	5	**V70**		**80**
61. I take risks.	1	2	3	4	5	**V71**		**81**
62. I see the humor in something when others don't.	1	2	3	4	5	**V72**		**82**
63. I tend to do things differently to other people.	1	2	3	4	5	**V73**		**83**
64. I think creative thoughts are bizarre.	1	2	3	4	5	**V74**		**84**
65. I have self discipline.	1	2	3	4	5	**V75**		**85**
66. I like diversity.	1	2	3	4	5	**V76**		**86**
67. I question the norm.	1	2	3	4	5	**V77**		**87**
68. I hesitate to try out new ideas.	1	2	3	4	5	**V78**		**88**
69. I feel detached/estranged from myself.	1	2	3	4	5	**V79**		**89**
70. I avoid complex tasks.	1	2	3	4	5	**V80**		**90**
71. I feel detached from myself.	1	2	3	4	5	**V81**		**91**
72. I strive for self improvement.	1	2	3	4	5	**V82**		**92**
73. I create new ideas by combining existing ideas.	1	2	3	4	5	**V83**		**93**
74. I have difficulty in completing projects.	1	2	3	4	5	**V84**		**94**
75. I have a need to do well in order to satisfy my parents.	1	2	3	4	5	**V85**		**95**
76. I think about something before accepting it as it is.	1	2	3	4	5	**V86**		**96**
77. When I do an assignment, I do more than what is expected of me (instead of just enough).	1	2	3	4	5	**V87**		**97**
78. Others' opinions are very important to me.	1	2	3	4	5	**V88**		**98**
79. As a child I wasn't allowed to choose my own friends.	1	2	3	4	5	**V89**		**99**
80. Creative people generally seem to have scrambled minds.	1	2	3	4	5	**V90**		**100**
81. Ideas are only important if they have an impact on big projects.	1	2	3	4	5	**V91**		**101**
82. Daydreaming is a useless activity.	1	2	3	4	5	**V92**		**102**
83. When struggling with something, I will find a solution.	1	2	3	4	5	**V93**		**103**
84. New ideas usually don't work out.	1	2	3	4	5	**V94**		**104**
85. I lack perseverance.	1	2	3	4	5	**V95**		**105**
86. As a child I was allowed to set my own standards.	1	2	3	4	5	**V96**		**106**
87. When my friends have problems, and don't want to speak to me about it, I feel very insecure.	1	2	3	4	5	**V97**		**107**
88. When I have a new idea, I get totally absorbed in it.	1	2	3	4	5	**V98**		**108**
89. When I look at an object, I see how I can change it.	1	2	3	4	5	**V99**		**109**
90. My parents put emphasis on getting ahead.	1	2	3	4	5	**V100**		**110**

Indicate to which degree the following characteristics would describe you the best.

Example:

	Disagree	Tend to disagree	Unsure	Tend to agree	Agree
Beautiful				X	

	Disagree	Tend to disagree	Unsure	Tend to agree	Agree	For office use		
91. Individualistic	1	2	3	4	5	**V101**		**111**
92. Energetic	1	2	3	4	5	**V102**		**112**
93. Committed	1	2	3	4	5	**V103**		**113**
94. Productive	1	2	3	4	5	**V104**		**114**
95. Thorough	1	2	3	4	5	**V105**		**115**
96. Impulsive	1	2	3	4	5	**V106**		**116**
97. Persevering	1	2	3	4	5	**V107**		**117**
98. Critical	1	2	3	4	5	**V108**		**118**
99. Independent in thoughts	1	2	3	4	5	**V109**		**119**
100. Curious	1	2	3	4	5	**V110**		**120**
101. Intuitive	1	2	3	4	5	**V111**		**121**
102. Tolerant of others	1	2	3	4	5	**V112**		**123**
103. Open to experience (i.e. prefer own experience to others' opinions.	1	2	3	4	5	**V113**		**124**
104. Extrovert	1	2	3	4	5	**V114**		**125**
105. Conscientious	1	2	3	4	5	**V115**		**126**
106. Sensitive to detail	1	2	3	4	5	**V116**		**127**
107. Dependable	1	2	3	4	5	**V117**		**128**
108. Self-accepting	1	2	3	4	5	**V118**		**129**
109. Hostile towards others	1	2	3	4	5	**V119**		**130**
110. Driven	1	2	3	4	5	**V120**		**131**
111. Ambitious	1	2	3	4	5	**V121**		**132**
112. Dominant	1	2	3	4	5	**V122**		**133**
113. Prone to investigate	1	2	3	4	5	**V123**		**134**
114. Social	1	2	3	4	5	**V124**		**135**
115. Willing to ask unusual questions	1	2	3	4	5	**V125**		**135**
116. Imaginative	1	2	3	4	5	**V126**		**137**
117. Humble	1	2	3	4	5	**V127**		**138**
118. Original	1	2	3	4	5	**V128**		**139**

	Disagree	Tend to disagree	Unsure	Tend to agree	Agree	For office use		
119. Competent	1	2	3	4	5	**V129**		**140**
120. Conservative	1	2	3	4	5	**V130**		**141**
121. Honest	1	2	3	4	5	**V131**		**142**
122. Sensitive to negative feelings (i.e. am easily influenced by it)	1	2	3	4	5	**V132**		**143**
123. Willing to miss a meal in order to finish a project	1	2	3	4	5	**V133**		**144**
124. Motivated	1	2	3	4	5	**V134**		**145**
125. Different	1	2	3	4	5	**V135**		**146**
126. Too busy for new ideas	1	2	3	4	5	**V136**		**147**
127. Inventive	1	2	3	4	5	**V137**		**148**

Thank you for your time