

**THE CONSTRUCT VALIDITY OF THE FIRST VIEW™ FOR SELECTION  
PURPOSES IN SOUTH AFRICA**

by

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I, **Gerda van der Merwe**, declare that “**The Construct Validity of the First View™ for Selection Purposes in South Africa**” is my own work. All the resources I used for this study are sited and referred to in the reference list by means of a comprehensive referencing system.

I declare that the content of this thesis/article has never before been used for any qualification at any tertiary institute.

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## ABSTRACT

Through the process of selection the measurement and prediction of behaviour has become an important activity in the field of psychology, especially in the workplace. A dynamic selection process can assist the organisation in identifying individuals who best suite it's needs. Psychometric testing is the most common procedure in the prediction of human behaviour during selection. Seeing that not all instruments are valid and reliable, much controversy still exists on the use of such instruments in South Africa. Only by introducing instruments that apply to these criteria will psychometrics have a future in labour practices.

The purpose of this study was to assess the construct validity of the First View™, an instrument originating in the United States, for selection purposes in South Africa. By incorporating personality and cognitive ability into one instrument, First View™, as a psychometric instrument, can be used in selection to determine job performance. The cognitive scale is based on Guilford's Structure of Intellect and the personal scale on the Big Five Personality factors. The reliability and validity of this instrument have proved to be high in the United States.

In order to investigate validity, First View™ had to be correlated with well established and valid South African instruments. In this study the Differential Aptitude test (DAT) and 16 Personality Factor Questionnaire SA-92 (16 PF) were used. The three tests were administered to a sample of 229 respondents from different race, gender, age and occupation groups, drawn by means of convenient sampling and random selection.

Canonical correlation showed a strong relationship between the independent and dependant variables. From this a conclusion can be drawn that the 16 PF SA-92 and the personal scale of First View™ show a positive interrelationship. The multiple regression indicated a significant relationship between the predictors and the composite criteria, concluding that there is a strong relationship or overlapping between the DAT and cognitive scale of First View™. Thus, results indicate that First View™ can be a valuable instrument in selection. The findings and implications of the study are discussed and recommendations for future studies made.

## OPSOMMING

Die meting en voorspelling van gedrag is 'n belangrike aktiwiteit in die veld van sielkunde. Keuring word gebruik om werksverwante gedrag te voorspel en, indien dinamies, kan dit die organisasie help om individue te identifiseer wat in hulle behoeftes sal voorsien. Psigometriese toetsing is die mees algemene prosedure om gedrag te voorspel tydens keuring. Kontroversie bestaan steeds oor die gebruik van psigometriese toetse, aangesien nie almal geldig en betroubaar is nie. Slegs deur die bekendstelling van instrumente wat aan hierdie kriteria voldoen sal psigometrika 'n toekoms hê in arbeidspraktyke.

Die doel van hierdie studie was om die konstruk geldigheid van First View™, 'n instrument met sy oorsprong in die Vereenigde State van Amerika, vir keuringsdoeleindes in Suid Afrika te bepaal. Deur persoonlikheid en kognitiewe vermoë te inkorporeer in een instrument, kan First View™ gebruik word om werkprestasie te meet. Die kognitieweskaal is gebaseer op Guilford se struktuur van intelligensie en die persoonlikheidskaal op die groot vyf persoonlikheidsfaktore. Die betroubaarheid en geldigheid binne Amerikaanse konteks is reeds bewerkstellig.

Om die geldigheid van First View™ te bestudeer, moes dit gekorrelleer word met reeds gevestigde en geldige Suid Afrikaanse instrumente. Die Differentiële Aanleg Toets (DAT) en 16 Persoonlikheids Faktor Vraelys SA-92 (16 PF), is tydens hierdie studie gebruik. Die drie toetse is afgeneem op 'n steekproef van 229 respondente van verskillende ras, geslag, ouderdom en beroep groepe. Hierdie steekproef is getrek deur middel van vrywillige deelname van respondente en ewekansige steekproeftrekking.

Die kanoniese korrelasie het 'n sterk verwantskap getoon tussen die onafhanklike en afhanklike veranderlikes. Van hierdie resultate kan die afleiding gemaak word dat die 16PF SA-92 en die persoonlikheidskaal van First View™ 'n positiewe verhouding toon. Die meervoudige regressie het 'n betekenisvolle verwantskap getoon tussen die voorspellers en kriteria. Hieruit kan afgelei word dat daar 'n sterk verwantskap of oorvleueling is tussen die DAT en kognitieweskaal van First View™. Die resultate dui dus daarop dat First View™ 'n waardevolle instrument in die keurings proses kan wees. Die bevindinge, implikasies en aanbevelings van hierdie studie word bespreek.

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## CHAPTER 1

### 1.1 Introduction

In the modern world, organisations need the right ingredients to stay ahead of competitors. Because of difficult economic and demographical situations, organisations in South Africa are required to work with fewer personnel, but still function optimally. In an article in *Works Management*, Emma Collins from Aerolaminates agrees, stating that the key priority of a company should be to select the right type of people. She further states that these people must have the ability to absorb and apply knowledge (Anon, 2001). In modern times the link between skills en economic growth is increasing. Kehoe (2002) found that a high productivity growth rate is normally directly driven by skill and knowledge growth.

To overcome this huge problem, organisations must ensure that they have personnel that can take the necessary strain. Positioning the right person in the right position has always been a major issue for organisations. According to Kehoe (2002) recruiting strategies can affect selection results in a variety of ways. If not done properly, individuals can be misplaced and this could have major cost implications (Muller & Schepers, 2003). Replacing personnel is one of the most expensive business activities (Bullard, 2001).

In order to cut costs and simplify the process of selection, it became a necessity to measure the human attributes that formed part of the job. If the variability in physical and psychological characteristics in humans were not so pervasive, there would be no need for selection. Without variability in ability, aptitude, interests and personality amongst individuals, we would forecast identical levels of job performance (Cascio, 1998). The goal of measuring human attributes in the work situation is then, to identify the potential of individuals and to fit them with the right job (Muller & Schepers, 2003).

According to Gatewood and Field (1990), selection can be seen as a process of collecting and evaluating information about individuals in order to extend offers of employment to them. Through the acquisition of a competent and motivated workforce, selection aims to contribute toward organisational goals and lowering labour costs (Muller & Schepers, 2003).

Selection has been part of organisations since the Second World War (Muller & Schepers, 2003). According to Randall (1992) employers only became concerned with the quality of their employees in the 1980's, and the emphasis fell on good selection processes.

According to Raymark, Schmit and Guion (1997) organisations need to make a selection hypotheses that emerges from an understanding of the job and its analyses. One of the most common aids in the process of making decisions regarding the selection of personnel is that of psychometric testing (Muller & Schepers, 2003). Randall (1992) is of opinion that psychometric tests can speed up the process of selection. It helps the employer to identify an individual with skills and abilities that match the job requirements and will in the long run cut hiring and training costs (Randall, 1992).

Psychometric tests can include a variety of instruments. Two of the most common measurements taken are that of personality and cognitive ability. The Centre for Workplace Issues and Trend in the United States of America, found that many organisations implement personality and aptitude tests as part of their selection process (Randall, 1992). When asked, Dr A Savage, director of affirmative action for the University of Connecticut Health Centre at Farmington, commented that psychometric tests should not be the sole basis for hiring. Hiring of personnel must be made based on all available data, and the selection process should include a reference check and interviews (Randall, 1992).

It has been found that when making hiring decisions, managers normally use information gathered from six attributes. These include five personality factors (extraversion, neuroticism, openness to experience, agreeableness, and conscientiousness) and General Cognitive Ability (Dunn, Mount, Barrick & Ones, 1995).

Personality tests attempt to quantify behaviour by taking samples. Until recently, the two main methods of personality assessment were personality questionnaires and projective techniques (Kline, 1976). Personality questionnaires normally ask subjects to report on how they feel and behave in a variety of situations.

Intelligence can be regarded as two distinct but related factors, that of fluid and crystallised ability. Fluid ability is equivalent to innate reasoning power while crystallised ability is the fluid ability as it exists in any individual in any culture (Kline, 1976).

When it comes to actual decision making, little is known. Many will agree that managers do not always know about the validity of cognitive measures and personality predictors and are more likely to make decisions on personal experience (Dunn, Mount, Barrick & Ones, 1995).

During the past three decades the view that psychometrics, especially personality measurements, is a poor predictor of job performance has become established among many psychologists. There has however been improvement, one of which is the development of personality inventories designed to measure qualities among typical individuals instead of psychopathology among the deviant or mentally disordered. Personality tests designed to measure "normal" behavioural traits are likely to improve the development of logical links between job requirements, personality measurement, and performance (Black, 2000).

Much speculation has taken place on the selection process as a whole and specifically on the use of psychometrics in South Africa. Common questions are those about discrimination, fairness and validity. This document begins with a brief discussion on the importance of selection and the measuring of personality and ability as predictors of job performance.

Organisations have realised that the continuance of business will depend on the quality of the human resources they possess and the management thereof (Boerlisjst & Meijboom, 1989). Human resource management is in many ways a concept still in its forming stages in SA. It can be seen as a process that implies conscious and specific directing of human effort in the short and long term (Boerlisjst & Meijboom, 1989).

## **1.2 Problem Statement**

Human behaviour is an integral part of everyday life. Even in the workplace one can never escape one's own and others' behaviour (Cascio, 1998). It has become a common activity for psychologists to predict behaviour in certain situations. Industrial psychologists specialise in the prediction of behaviour in the workplace.

Research has shown that positioning the right person in the right position is one of the crucial issues in organisations today (Muller & Schepers, 2003). If this does not happen, the organisation will not only suffer financial losses, but will also lose its competitive edge.

In modern society, organisations need to keep up with the ever changing environment. The selection process is a dynamic one that will change with the needs of the organisation and according to job analyses (Black, 2000).

As pointed out earlier there is much controversy on selection in the South African context. Arguments vary from importance of selection, to the constructs measured and the instruments used to measure these constructs. In the previous discussion, the importance of selection and certain psychometric instruments were briefly discussed.

The main issue in South Africa, on the use of Psychometric testing during selection, is if this method of selection is fair and open to all in such a diverse country. In being a fair instrument it is important that the test battery is designed to discriminate between candidates with higher and lower abilities on certain criteria, and not according to race, gender or age (Cascio, 1998).

Psychometric measurements deal with constructs that are not directly observable and only inferred the concept of validity is very important (Moser and Shuler, 1989). Before we can use an instrument for selection purposes, it must be fair, and to be fair the test must be valid and of relevance in the selection criterion (Muller & Schepers, 2003). According to Elmes, Kantowitz and Roediger (1999) validity means the soundness of a measurement and whether we measure what we intend to measure.

According to Owen and Vosloo (1999) the validity of an instrument is the extent to which the test actually measures what it is supposed to measure. Validation must be done in relation to the purpose for which the test is used (Muller & Schepers, 2003).

This discussion has shown that selection is not only important for the organisation to keep competitive edge, but also for the applicant. In order to make the selection process fair, we must use reliable and valid tools in our measurements. The need in South Africa for valid and reliable assessment tools is vast. The purpose of this research is to determine validity and reliability of the First View™.

Selection, as stated, is a process by which an organisation tries to identify a person that matches specific job requirements and will be able to perform. Therefore, in practice when trying to indicate whether a selection tool is valid the researcher will try to indicate predictive validity. Predictive validity indicates an instruments ability to predict future job performance.

After much consideration, it was decided to firstly prove that First View™ measures the same constructs as existing selection tools. If construct validity, the property of a test that actually measures the constructs it is designed to measure (McBurney, 1994), can be established, the researcher can continue to prove predictive validity. Thus the purpose of this study is to establish the construct validity of the First View™ for selection purposes in South Africa.

### **1.3 Research Goals and Chapter Outline**

This study's main aim is to determine the construct validity of the First View™ as a selection tool in South Africa.

In achieving this aim it is important to address the following:

- To understand the selection process
- To determine the importance of selection
- To study the value of psychometric testing in selection
- To determine the value of Personality testing as a predictor of job success
- To determine the value of Ability testing as a predictor of job success
- To understand the importance of validity as a statistical concept
- To outline the statistical method and steps that are necessary to validate psychometric instruments
- To evaluate the First View™ as a valid and reliable instrument in selection

All these concepts will be explained and dealt with throughout the document. The following outline will be followed:

- Chapter 2:

This chapter will give an in-depth explanation of selection as a process and will look into the use of psychometrics in selection, focusing specifically on the use of cognitive ability testing and personality measures. It will conclude with a discussion of the measuring instruments used in this study. These instruments are the Differential Aptitude Test (DAT), 16 Personality Factor Questionnaire (16 PF- SA 92) and First View™.

- Chapter 3:

The purpose of the analyses, the steps taken in the research and the research strategy will be explained in this chapter. Statistical techniques will be discussed in detail as well as how sampling was done.

- Article:

The article will include a brief literature discussion similar to chapter two. The statistical analysis will be discussed briefly and the results of the statistical procedures will be given and discussed in detail. The document will conclude with recommendations for further studies. The article will be included in the document as Annexure B.

#### **1.4 Chapter Summary**

This chapter discussed the basic background and need for a good selection process. It captured the need for psychometric testing during selection and the need in South Africa for valid and reliable tools that are cost and time effective. A general introduction and problem statement as well as a brief overview of the remainder of this document were given.

## CHAPTER 2

In this chapter a broad overview will be given on selection as a process and the use of psychometric testing in selecting. Reference will be made specifically to the use of cognitive ability testing and personality measurement and the measuring instruments relevant to this study will be discussed.

### **2.1 Selection as an Organisational Process**

Choosing the right people to fill jobs is one of the most important responsibilities of any manager. Peter Drucker (1964), probably America's most respected management guru, has noted that senior managers in any organisation have only two important responsibilities: (1) to set the strategic course for the organisation; and (2) to put the right people in place to make certain that the course will be followed. According to Guion and Gibson (1988) selection can be seen as a process culminating in a decision to hire one or more applicants for employment and not to hire others.

The process of selection can be complicated if not well planned and structured. Dachler (1989) agrees with researchers that the individuals in an organisation make things happen, and therefore it is important to find the right person for the job. He further mentions that personal attributes and individual behaviour constitutes to the properties of the organisation. Organisational effectiveness is seen as a function of individual qualifications, including skills, abilities and knowledge and the effects of organisational factors like climate and nature of tasks on individual performance (Dachler, 1989).

This implies that the selection process only takes care of one of the preconditions for performance; the individual with optimal skills, where the motivation based aspects will depend on the characteristics of the organisational environment and communication, only after selection has taken place.

This fact makes it important to integrate organisational characteristics into the job analysis and selection process. The selection process will then focus on the prediction of how well a person will perform in a specific post (Dachler, 1989).

Through assessment, a person's behaviour can be influenced and organized to match the direction in which the organisation is going. This process is seen as the collection and processing of relevant information in a systematic and reliable manner in order to maintain an adequate match between the organisation and its sub systems. These sub systems will include future employees (Boerlisjt & Meijboom, 1989).

Thus, selection can be seen as matching a person to a job. Matching can take place in two ways. Firstly in a passive manner, which means matching is simply taking a decision based on a once off assessment in order to reach a goodness of fit between the individual and the organisation. Some researchers see the process of personnel selection as a passive manner of matching (Boerlisjt & Meijboom, 1989). In the active manner, matching can be seen as an intervention to obtain a good fit in the short term but also in the long run. This good fit will then imply that active adjustments are made to the organisation and the individual (Boerlisjt & Meijboom, 1989). It is of opinion then that the selection process must move towards the active approach.

When taking the active route of matching, it is important to keep in mind what characteristics are needed to succeed in the specific post. Understanding of the job is a very critical aspect of selection. This is a process which involves far more than just the normal traditional job description. In order to know the basic requirements of a job, the human resource officer can start with a job description; he can also follow a process which will include observing competent employees performing on the job and discussions with veteran workers and supervisors. These sources can provide diverse information (Goodstein, 2001).

In order to simplify the information gathering, the following questions may be asked:

- What does a person have to do on a regular basis to succeed in this job?
- What skills do the most successful people who hold this job or have held it recently, have?
- What additional competencies will people need to continue to succeed?
- How will a person hired for this job know that he or she is succeeding?
- Why have people failed on this job?
- In what ways have the job responsibilities changed and how might they change in the future?

Additional questions should be added to the list in order to genuinely understand. Goodstein (2001) thinks that it is impossible to evaluate the person job match, without understanding both the person and the job.

When this process is complete, the next step will be to choose the battery with which candidates will be selected. In most cases organisations make use of some kind of psychometric measurement as part of selection to select the person to fill the specific position.

## **2.2 Psychological Testing in Selection**

Moser and Schuler (1989) see measurement as the assignment of numbers to objects, testing hints at the consequences of aims of measurement. It can be seen as a continuation of measurement but includes and adds evaluations, decisions and behavioural consequences.

Measurement of attributes for work can be traced back to pre Grecian times. However, only in the late nineteenth century did Weber and Fechner introduce measurement into psychology. The test theory then evolved through Spearman in the twentieth century (Moser & Schuler, 1989). Psychological testing is concerned with the measurement of mental qualities (Bethell- Fox, 1989).

Smith (1994) states that predictors form the core of the selection process and that the essence of selection is to identify measures which predict job success. He states that measures can gauge three domains of human characteristics. The first is those that are relevant to all work and is named universals, the second, occupationals, are relevant to specific occupations and the third, relationals, are characteristics which are relevant to the way a person relates to a work setting. Because they are relevant for selection, each of these will be discussed in short terms (Smith, 1994).

- Universals

The universals cover characteristics that are applicable to all types of jobs. They normally include cognitive ability, vitality and work importance. Cognitive ability is related to the concept of intelligence, and is the most dominant predictor of job performance found so far. It can be related to simple and more complicated tasks, but was found to be more predictive in complicated tasks. Vitality can be seen as the energy that people use to transform inputs into outputs; it can be related to motivation and is seen as being concerned with energy potential (Smith 1994).

In simple terms it can be said that each person has a reservoir of energy, the size of which is related to his/her ability to do the job. The third component is work importance and refers to work ethics, work centrality and even job involvement. Personality factors can also be seen as part of this component. Where vitality and cognitive ability refers to the ability of a person to understand and perform a task, work importance refers to the will to perform the same task. In the field of industrial psychology work ethics is not a new concept but the use of it in selection was not successful or does not exist (Smith, 1994).

- Occupational

These characteristics can be defined as characteristics which enable a person to perform effectively in a specific post. Occupational will therefore be specific cognitive abilities and personality traits. It is postulated that the relationship between specialized knowledge and performance will increase if the job is more specialized, because those with higher cognitive ability are successful in accumulating knowledge. Personality will play a different role in these traits. Each post has a personality trait linked to it and it is because of this that different traits are important to different posts (Smith, 1994).

- Relations

Occupations vary widely according to their setting. Studies have shown that people, who are interested in their work and have the ability, will perform better than people who only have the ability (Smith, 1994).

Different types of tests are found to use in employment; e.g. cognitive tests and personality questionnaires. Cognitive tests are further divided into achievement and aptitude tests. For the purposes of this document aptitude measurement will concentrate on potential to acquire knowledge or skill rather than levels of prior attainments (Bethell- Fox, 1989).

Measurement of personality differs from cognitive tests, because it requests information regarding typical behaviour, rather than demanding correct answers (Bethell- Fox, 1989).

When using selection tools the most important criteria of those tools are that they are valid and reliable. According to Schmidt and Hunter (1998) the most important property of an assessment method is its predictive validity. This is the ability to predict future job performance.

The validity of a hiring method is a direct determinant of its practical value and variability of job performance. The variability can be at two extremes, one where it is zero and all applicants have the same level of later job performance and the other where variability is very large, and hiring the best performing candidate is important (Schmidt, Hunter, 1998).

General Cognitive ability can easily be measured by using instruments that are already available in the commercial market. Schmidt & Hunter (1998) see cognitive ability measures as the best predictor of performance that can be used in all occupations. But cognitive ability is not the only attribute measured during selection and the other measures will also contribute to the validity of the whole process.

A selection battery may include ability testing, personality testing, structured interviews and job knowledge tests. Schmidt and Hunter (1998) found that there are 19 different selection methods that can be used by an organisation in order to make a hiring decision. Other tools must be selected in such a manner that the total validity of the battery increases.

The increase in validity does not only depend on the tool added, but also on the correlations between the two measures. The smaller the correlation is, the bigger the increase in total validity (Schmidt, Hunter, 1998).

Proper selection will ensure that organisations select people with high abilities for their jobs, maintain high productivity and low staff turnover (Hunter & Hunter, 1984).

Keeping all this in mind, the focus needs to shift from psychometrics in general to specific testing, in this case cognitive ability testing and personality measurement.

### **2.3 Cognitive Ability Testing in Selection**

Intelligence and cognitive ability are concepts with which psychologists are familiar and the measuring of these constructs have been around for years. In this section it is necessary to define cognitive ability and cognitive ability testing.

According to Cook and Hunsaker (2001), a person with high cognitive ability has a keen mind and thinks strategically. They normally reason analytically and exercise good judgement in their decisions and actions. Furthermore they are able to reason deductively and inductively.

Cognitive ability can be subdivided into a variety of sub-constructs including general intelligence, verbal and nonverbal ability, numerical and spatial relation and mechanical knowledge (Cascio, 1998).

According to Hunter (1986) general cognitive ability means cognitive ability as it has been developed in adult workers or job applicants. It is usually measured by summing across tests of several specific aptitudes, including verbal reasoning and quantitative aptitudes.

Thorndike (1986) states that ability testing used to focus on the measuring of general cognitive ability and earlier tests provided only a single score. This score was viewed as a general predictor of academic competence and the ability to function effectively in work and normal life. Only later did ability tests become more specialised and test more limited cognitive functions.

Data on job knowledge shows, that cognitive ability determines how much and how quickly a person learns as well as the ability to react in innovative ways (Hunter, 1986).

Carretta and Ree (2001) found that selection is based on theories on the relationship between ability and performance. There are several issues that may affect the interpretability of the ability- performance relationship. The measurement performance was traditionally done by means of either supervisor ratings or training success. Only later did meta- analysis become a tool for measuring relationships between constructs (Hunter, 1986). Some earlier studies included that civilian jobs had a correlation of 0,8 between job knowledge and performance. This concluded that general cognitive ability is a predictor of who will master a job and perform in it.

When looking at ability testing, it consists of various constructs. A construct can be described as an abstraction about the nature of behaviour that are not directly observable and must be inferred from some measurement scale. If the construct cannot be operationally defined and measured it has no scientific value (Carretta & Ree, 2001).

Extensive research has shown that general intellectual ability is a good method to forecast job success. In 1984, Hunter and Hunter found that the correlation between job success and general intellectual ability was that of 0,53 making general intelligence a powerful predictor. They further found that it has a strong effect on job knowledge and will contribute to the individual being given an opportunity to acquire experience (Cascio, 1998). According to Muller and Schepers (2003) researchers see cognitive ability measures as the primary predictor in the selection process, with other measures such as personality and biographical data as supplements.

Cognitive ability measurements are valid predictors of job performance, across samples, criteria and occupations (Salgado, Anderson, Moscoso, Bertua & De Fruyt, 2003). Researchers believe that cognitive ability measurements produce a greater impact on the final decision than any other measurement, such as personality and bio- data, because it can reach comparable levels of validity (Outtz, 2002). Some researchers believe that they are the single best predictors of performance and likely to correlated with performance in virtually any job (Salgado et al, 2003).

The measuring of general ability has the broadest application, in that they are used in educational, clinical and work settings as aids in making decisions (Murphy & Davidshofer, 2001). There are some specific benefits worth mentioning, but cognitive ability tests also have some drawback that must be mentioned.

### 2.3.1 Benefits of Cognitive Ability Testing

The use of general mental ability tests and cognitive loaded measures was found to be the most predictive procedure in the process of selection and predicting performance. (Kehoe, 2002) Validity of General mental ability tests with regards to measuring performance and job knowledge is at this stage relatively high. Researchers reckon that employees with higher cognitive abilities are more likely to progress to positions with greater importance and avoid workplace problems (Kehoe, 2002).

Kehoe (2002) found that if the applicant pool's ability is higher, selection will be easier and this change can have a significant impact on all organisations' selection strategies. When the passing rate of recruitment is higher, the differences between the group passing rates would automatically be reduced. If it happens that recruitment provides satisfactory levels of cognitive ability it can lead to an organisation deciding to discontinue the use of cognitive measurements in selection altogether (Kehoe, 2002).

Cognitive ability preside performance ratings in all lines of work, although the validity is much higher for complex jobs than simple jobs. The reason for this high prediction is because general cognitive ability predicts learning and job mastery (Muller & Schepers, 2003). Research has shown that the measurement of cognitive ability shows the highest validity when selecting people to be trained after hiring. If general ability alone was used as a predictor the validity score across all jobs shows  $r = 0,54$  for training success and  $r = 0,45$  for job proficiency.

This implies that general cognitive ability should be considered for inclusion in all selection procedures (Muller & Schepers, 2003). There are however cases, for example, when all applicants are graduates, where these tests would be unnecessary.

Researchers have also found that general mental ability correlate positively with life outcomes such as educational level, adult income and positive health related behaviour, and negatively with disciplinary problems, delinquency and crime rates (Viswesvaran & Ones, 2002). It is not only the high validity of cognitive measurement that makes it so useful, their biggest benefit, is that there is a wide variety of tests available on the market and that they are not expensive (Kehoe, 2002).

### 2.3.2 Drawbacks of Cognitive Ability Testing

Great consideration must however go into the decision to make use of general cognitive measurements during selection. The goal of selection is to evaluate and find a person that fits the job, therefore there must a good reason to measure the cognitive ability of a person.

When including the cognitive measurement in selection, the following considerations must be taken into account:

- Does the work require specific knowledge?
- Can other recruiting strategies substitute the measurement?
- Are other tests that contain more job specific content going to be more satisfactory to the process?

(Kehoe, 2002)

Muller and Schepers (2003) found that the use of ability tests in selection has risen from under 50% in 1991 to almost 75% in 1996, making them as popular as curriculum vitae's. Ability measurements are used to measure maximum performance, or in simple terms what the applicant can do. They have shown to contribute the most in selection decisions, but only predict 25% of the variance in performance (Muller & Schepers, 2003).

Kehoe (2002) found that organisations face some dilemmas when using general mental ability tests. They are as predictive as most job specific tests and there are substantial group differences that are not due to bias in measurement. Differences in groups still exist in cognitive measurement today, and it is still a major problem. Outtz (2002) found that the differences in scores of racial groups are fairly large. Typically they will produce a standardised mean difference between African and White candidates of one standard deviation (Outtz, 2002). This problem is addressed in two ways; the one for developers to eliminate components that are culturally bias, such as reading, and the other is to build job content into the measurement (Kehoe, 2002).

The problems are not only limited to differences in groups. It was also found that individuals with a given trait level can answer an item of particular item difficulty with a probability of 0,5. It may however be that the same individual can fail to answer an easier item (Viswesvaran & Ones, 2002). The authors found that the cognitive complexity of environments differ, therefore an individual can handle environments of complexity at or below their cognitive level, or even fail. The conclusion can be made that cognitive ability is a necessity but not a sufficient condition for success (Viswesvaran & Ones, 2002).

Normally ability tests will be speeded and measure more in addition to just cognitive ability. They have their own factor in factor analysis, but studies have shown that they have lower validity and only add to the predictive value of clerical work (Hunter, 1986).

The correlational nature of ability research is another issue that must be mentioned. The interpretation of correlations may look straightforward, but it can be filled with hazards. Carretta and Ree (2001) found that relationship between ability and occupational criteria is best understood with the effect of job experience removed. According to them, Hunter found that job knowledge mediated the relationship between ability and job performance (Carretta & Ree, 2001).

Questions are uttered on a daily basis about bias and cognitive measures with regards to races. But Schmidt, Berner and Hunter (in Hunter & Hunter, 1984) have found that any test that is valid for one racial group is valid for another. If the differences in scores are because of poverty, it would disappear if we could eliminate these factors. However, the differences found in modern tests, are because of real differences in ability and will not change if the tests change (Hunter and Hunter, 1984).

The point that cognitive ability tests are a true and valid predictor of job performance in all occupations has been stated so many times, and proven in hundreds of studies (Hunter, 1986).

It is however necessary to look at some theories that spell out the relationships between ability and job performance. Hunter (1986) mentions the following theories:

- Behaviourist Theory:

Behaviourists believe that all cognitive activity is irrelevant to behaviour and job performance. Some of the less extreme theories admit that cognitive processes may be relevant but that the processes that are elicited by the pen and paper tests are not elicited on the job. They further reject the validity evidence between cognitive ability and job knowledge tests. The behaviourists rely on supervisor ratings for performance measurement. A workers performance is rated according to a behaviourally anchored rating scale (Hunter, 1986).

- Learning and Performance Theory:

These theorists believe that learning does take place on the job, but the parameters are different. Learning in a formal training program means absorbing knowledge which is presented directly with the important features already emphasized. Learning on the job requires two steps: if a relevant event takes place the worker must recognise the event and then be able to formulate a lesson and learn from it. In this instance cognitive ability is necessary and thus learning on the job is more dependant on cognitive ability (Hunter, 1986).

In practice we do not need to know why cognitive ability correlates with performance. All we need to know is how high the validity is so that the instrument can be used in selection. It was found that as the complexity of a job decreases, the validity of the measurements drops. So the more complex a job, the better the cognitive ability measurement will predict performance (Hunter, 1986). Cognitive ability predicts job performance because it predicts job learning and mastering. Ability is highly correlated with job knowledge and job knowledge is correlated with performance (Hunter, 1986).

## **2.4 Personality Measurement in Selection**

The idea of a person's personality relating in a meaningful manner to the kind of career he chose and how they then perform in this career has been part of career psychology for many years (Van Rensburg, Rothmann & Rothmann, 2001). In the past, results obtained with personality measures in forecasting managerial effectiveness have been negative (Cascio, 1998). However, these studies were conducted in the 1980's when there was no well- accepted taxonomy for the classifying of personality traits.

Even though experts have tried to define personality, the individual will always remain the biggest expert. Before progress can be made, some concepts will have to be explained:

As a result of personality being such a commonly used word, confusion arises. In general, personality refers to the different ways in which people behave. Therefore it usually refers to a person's normal behaviour or nature. Psychological terms refer to personality as those characteristics that make it possible to predict a person's behaviour.

Meyer, Moore and Viljoen (1997) define personality as the continuous changing, but relative stable organisation of all physical, mental and spiritual characteristics of the individual, that determines behaviour. These characteristics are interacting in the context in which the individual finds himself. Personality will always remain a difficult and dynamic concept. According to Meyer, Moore and Viljoen (1997) the problem lies in the fact that there is a lack of a clear- cut conception of what is to be studied.

Murphy and Davidshofer (2001) stretch the importance of three things when trying to explain personality:

- Individuals are unique in the sense that no- one is identical in behaviour, preferences or temperament. Temperament refers to inherited, biological aspects of man. (Meyer et al, 1997)
- People do not react the same way in all situations. As situations vary so will behaviour.
- Even though people are unique, there are still similarities in behaviour.

The development of personality instruments is parallel with the development of intelligence instruments. Psychological assessment of personality was first used during World War One (Murphy & Davidshofer, 2001).

According to Goodstein and Lanyon (2002) assessment instruments have been developed for two very different markets. The first is a clinical market consisting of psychologists wanting products with the following characteristics:

- Produce reliable specific information.
- Are generally based on current theories.
- Are very complex and expensive
- Require a lot of time and expert interpretation

The second market is consultants, trainers and counsellors who want products that are:

- Quick and simple
- Require no interpretation
- Cheap

In the seventies it became clear that any company's biggest advantage is the people employed. This is when researchers started to look at assessment information for selection purposes and industrial psychologists became important. It soon became clear that organisations can no longer believe that anyone can do anything if they are motivated and well trained. Ability and personality traits came into play in job performance and the focus shifted to getting the right person in the right job. The issue now is to find these predictors (Goodstein and Lanyon, 2002).

Personality measures could only assess up to a certain level and could not assist organisations in serious decisions. Development continued and still does, to such an extent that originations around the world agree that there are certain personality traits that remain stable throughout a person's life. They form the core of the person's behaviour and even if a person demonstrates behaviour out of this core, it will take large amounts of energy, making the situation more stressful to the person.

The second development of importance was the development of instruments that could accurately measure these personality traits in the population of job seekers. This meant that it was now possible to select the individuals with the traits that most closely correlated with the ones required for success in a particular job.

Murphy and Davidshoffer (2001) wonders how personality can be measured if it is not stable over a variety of situations? The phenomenon of behaviour changing over time is still one of the issues causing conflict under theorists. The conclusion is that individual behaviour is unstable, but that consistency can occur. People show more relatively than absolute stable behaviour.

Normally personality instruments can be classified as projective or objective. Projective measures are usually ambiguous while objective measures are direct (Murphy & Davidshofer, 2001). They identified two important things when compiling a personality instrument:

- Interpretability:

Every personality instrument varies in terms of measurement. Some instruments will measure one dimension, while others will combine a variety of dimensions (Murphy & Davidshofer, 2001). One of the requirements for a personality instrument is that the information on the individual can be used by others in a reliable manner.

- Stability:

Stability can be seen in two ways. Firstly a measurement's score rules must be stable and secondly there must be stability over the situations. Thus there must be a stable and reliable relationship between the individual's behaviour and his scores. Furthermore, this behaviour must be consistent over a variety of situations (Murphy & Davidshofer, 2001).

It is important for us to understand the relationship of personality to job performance, seeing that it is such an important concept in our discipline (Van der Walt, Meiring, Rothmann & Barrick, 2002). In the workplace it is not only personality differences that play a role. Jobs differ to the extent in which the person selects the appropriate behaviour, decides how to order and pace the work and coordinate these activities with other employees (Barrick and Mount, 1993).

It is now a known fact that personality may predict performance better in some situations and jobs than in others. Literature shows that personality traits are more useful in predicting behaviour when autonomy is high. Little research has been done on this subject with regard to the work place. According to Barrick and Mount (1993), personality would be the moderator between autonomy and the measurement of job performance rather than the situations strength.

Day and Silverman (1989) start a research piece with the statement that personality is a poor predictor of job performance and the overall superiority of cognitive ability testing in the same prediction. They argue that each organisation has its own personality, due to the fact that the different people bring a unique quality to work. This makes personality testing more relevant during selection. Not only is it to determine leadership, but also to assess which candidates are likely to fit into the organisation (Day and Silverman, 1989).

Several factors have contributed to the diminution of reported relationships between personality and job performance (Day and Silverman, 1989). Personality traits can however, like cognitive ability, make a significant contribution towards predicting performance. It must be kept in mind that different traits will contribute to different occupations.

Extensive research has shown that cognitive ability is a good predictor of technical competence. Would personality then, not be a good predictor of the people requirements of the job (Day and Silverman, 1989). They conclude that personality measures can be beneficial in predicting performance and therefore selection, but it does require a careful match to the job. This match can be established by a good job analysis, which has been discussed previously (Day and Silverman, 1989).

For psychologists it is difficult to accept and advocate the use of personality testing for selection purposes, seeing that there is no real reason to exclude a person on the basis of his personality. Reviews have shown that personality plays a big role in the explanation and prediction of behaviour (Tett, Jackson & Rothstein, 1991). Personality encompasses a more diverse array of traits that are less intercorrelated than intellectual abilities. Thus it is unreasonable to expect that the validity of personality tools must generalize across different occupations. This uniqueness requires that certain personality traits are selected according to the requirements of the job (Tett, Jackson & Rothstein, 1991).

The use of personality measurement in selection is not so clean cut. One of the problems with personality measurement is that they are transparent and easily faked. This causes concern about the effect of distortion on the prediction of performance. If it is indeed being done to such a huge extent it can influence the selection and make the whole process negative. Hough, Eaton, Dunnette, Kamp and McCloy (1990) found that the intentional distortion in an overly desirable way does not appear to be a serious problem. In their studies the candidate's did not appear to try and distort the self description. The correlations with job performance were not attenuated by such a distortion, but careless responding reduced the criterion related validity.

Distortion can take place in two ways. Self deception is a response style that is characterized by an unconscious tendency to see oneself in a favourable light. Impression management can be seen as the conscious presentation of a false front and deliberately trying to make one seem more favourable (Schmit & Ryan, 1993). Bolton (In Ones, Viswesvaren & Reiss, 1996) states that distortion is a function of cognitive ability. Therefore a person with a higher cognitive ability and experience will have more test- taking skills and be better equipped to distort answers.

Ones, Viswesvaren and Reiss (1996) found that the criterion related validities of personality scales are not destroyed even when individuals are responding in a manner that is overly desirable. These findings conclude that personality scales can be used in selection.

But, there is still a need to have defences against response distortion. The administrator of the battery can persuade candidates that it is not in their best interest to distort their responses. They can warn candidates against distortion, use empirically keyed subtle questions, make use of correcting scores or implement a social desirability scale.

This is the defence that is being used in most personality measurements and has been around for sixty years. Great controversy still exist around this concept seeing that psychologists still treat the desirability scale as a response bias and evidence of faking, which it is not (Ones et al, 1996).

Industrial psychologists have questioned the use of personality questionnaires in selection because of the possibilities of faking. Studies have now shown that personality measures are a valid predictor of diverse job- related criteria, they do not have an adverse impact on disadvantaged applicants, like cognitive measurements, and thus enhance the fairness of selection (Rothmann & Coetzer, 2003).

Studies into the ability of personnel assessment tools in the prediction of job performance have taken place since the 1920's and many differences occurred. In the 1970's it was Hunter and Schmidt who found that these differences were because of statistical and measurement artefacts. This led to the development of quantitative techniques that combine validity estimates across studies. Techniques such as Meta analysis provide more accurate estimates of validity and show real levels of variability.

When put to practice, it showed that the variability of validity was not only small across setting for the same type of job, but also small across different kinds of jobs. These results made it possible to select the most valid personnel selection tools and compare the validity of different tools (Schmidt & Hunter, 1998).

Most researchers and psychologists want a framework to work within when working with personality. According to Briggs (1992) there are three reasons for wanting this:

- A consensual model will allow researchers to locate new constructs and measure them within a known configuration
- Knowledge that accrues about constructs and measures located in a specific region of the domain aids in the understanding of related constructs and measures and
- A framework will facilitate hypotheses about how constructs and measures are related and how personality variables are related to important non test criteria.

Like Guion and Gibson (1988) most psychologists see personality as more useful if it is narrowed to consistencies in behavioural patterns that are relevant to the work that needs to be done. This is also the reason for using a framework like the Big Five Personality Factors.

The usefulness of personality and its division into five factors have been discussed since early times, such as 1932 when McDougall (In Digman, 1990) said that personality may be broadly analysed into five distinguishable but separable factors called intellect, character, temperament, disposition and temper.

According to Goldberg (1990), Thurstone was one of the first investigators into the development of factor analysis on personality. He reported that out of the sixty adjectives given to 1300 raters only five factors were found to be sufficient in a factor analysis.

Later the developer of the 16 PF, Raymond B Cattell, found that the generality of the Big Five represent more than the English train lexicon ever included in a study (Goldberg, 1990).

Barrick and Mount (1991) believe that personality can broadly be analyzed into five distinguishable but separate factors. These factors may then be used to the advantage of organisations in selection. They also indicate that other researchers, ex Hogan, suggest that there are more than five factors, even six, consisting of Sociability, ambition, adjustment, likeability, prudence and intellectance.

These researchers seem to split the dimension of extraversion into sociability and ambition.

According to Schmit and Ryan (1993) some researchers argue that the failures in personality research are related to the lack of a classification of personality measures. Some argue that the big five is still too broad a concept to have predictive usefulness. Schmit and Ryan (1993) report that researchers such as Hough have shown that a nine factor taxonomy is more useful and others like Saville found that specific facets of the factors were more useful than the broad factor itself.

In his studies, Goldberg, (In Wiggins and Pincus, 1992) found a clear five factor structure that was virtually invariant under different methods of factor extraction, rotation and different numbers of factors rotated. This five factor structure emerged in both peer and self ratings. The big five factors have been the basis for the development of personality questionnaires, and have shown consistent factor structure in multiple investigations (Schmit & Ryan, 1993). In order to continue, it is necessary to give a brief description of the factors.

Goodstein (2001) states that the Big Five factors are normally distributed like all biological and psychological variables. Most people cluster around the average with only a few individuals at the extremes. When the factors are explained it is mostly a description of the extremes to make the dimension as clear as possible, very little jobs require people to function in this extreme manner. Keeping this in mind, the five factors can be looked at in detail:

- Factor One: Extraversion

Extraversion as the one side of the scale, can be seen as the degree to which a person is energized by others, is active, gregarious, sociable, and talkative. At the other end of the scale, we find people who prefer solitude to the company of others, who tend to be isolated, shy, reserved, and reluctant to engage others, and quiet. This would be referred to as introversion (Goodstein, 2001).

Some jobs require high levels of extroversion while others are best suited for introverts. These jobs do not necessarily need to be filled by extraverts/introverts, the theories of Jung believe that a person can be both extraverted and introverted, but will prefer a certain way to act and fall back on the preference when in a stressful situation (Van Rooyen, de Beer & Proctor, 1999).

- Factor Two: Neuroticism

Normally neuroticism refers to how a person responds to stress. A person with low neuroticism levels can be seen as emotionally stable and is able to maintain a mature, problem-solving attitude while dealing with a wide range of stress conditions such as interpersonal conflict, hazardous conditions, personal rejection, hostility and time pressures. Neurotic or emotionally unstable people break down under even modestly stressful circumstances, becoming distraught, tearful, anxious, self-doubting, and unable to handle the ordinary task demands (Goodstein, 2001).

All jobs differ in the degree of stress regularly experienced on a daily basis. Some jobs can be boring and stress free for the major part of the day, and then instantly the individual can experience a moment of terror. According to Goodstein (2001) maintaining composure during such a moment is essential to be successful in the job. It is also important for jobs to have levels of stress where people need to manage it in order for them to keep their level of neuroticism stable. According to Rothmann and Coetzer, (2003) neuroticism is the second most important characteristic that affect the employability of candidates and that it is inversely related to job performance.

- Factor Three: Openness to Experience

This factor describes people who are curious, interested in new things, broad minded, creative, spontaneous, original, and have a high tolerance for ambiguity. At the opposite end of the scale we find people who are dogmatic in their thinking, unimaginative, concrete, set in their ways, narrow-minded, overly realistic and closed (Goodstein, 2001).

Some jobs, for example marketing, will expect a person to be more open minded than others. Research has shown that openness to experience can be related to success in consulting, training and adapting to change. Researchers however differ in opinion on this factor. Other researchers found that openness to experience is not a valid predictor. This difference can be explained by the fact that different jobs have different requirements (Rothmann & Coetzer, 2003). Matching this level with the requirements of the job is very important and necessary for job success.

- Factor Four: Agreeableness

Agreeableness is the degree, to which an individual is likeable, co-operative, good-natured, forgiving, readiness to accommodate others, caring, trusting and tolerant. Disagreeable individuals are seen as thorny, prickly, intolerant, unpleasant, tough, abrasive, critical and cynical. Agreeable people see the interpersonal glass as half full, while disagreeable people see the glass as half empty, or less (Goodstein, 2001).

Salgado, Anderson, Moscoso, Bertua and De Fruyt (2003) have shown that agreeableness is a significant predictor of job performance, because it is related to training success.

- Factor Five: Conscientiousness

This last factor can be seen as the degree to which a person is organized, planful, meticulous, responsible, careful, hard-working, persevering, achievement-oriented, and thorough. Highly conscientious persons have a well-developed sense of ethics and integrity; they are able to develop realistic action plans that are sensitive to time constraints and resource availability.

At its extreme levels conscientious persons can be experienced as strong-willed, zealous people who are driven, puritanical and moralistic especially about work. At very low levels of conscientiousness, we find carefree and casual individuals who tend to live in the here and now. They are the free spirits of our society (Goodstein, 2001).

Different jobs require different levels of conscientiousness, but research tends to demonstrate that conscientiousness is significantly related to successful job performance, almost regardless of the nature of the job (Goodstein, 2001). Rothmann and Coetzer (2003) found that the correlation between conscientiousness and job performance can be attributed to the relationship between conscientiousness and integrity.

Much research has taken place on the Big Five to show the usefulness of it in selection. Most studies show that emotional stability and conscientiousness are valid predictors of job performance (Van der Walt, Meiring, Rothmann & Barrick, 2002). These researchers also found that the five traits predicted better in samples that require more education.

Barrick and Mount (1991) did an investigation into the validity of the Big Five Factors of Personality in five occupational groups and three job performance criteria. The occupational groups included professionals, police, managers, sales and semi skilled and the performance criteria was job proficiency, training proficiency and personnel data (Barrick and Mount, 1991).

The hypothesis made before the study was that only conscientiousness and emotional stability would be valid predictors of job performance. They focused specifically on conscientiousness because it assesses personal characteristics such as responsibility, persistency and carefulness and these attributes can be seen as important for accomplishing tasks in all jobs (Barrick and Mount, 1991). The other factors may be related to job performance, but not in all occupations.

They further expected extraversion and agreeableness to be valid predictors in occupations where frequent interaction is expected of personnel, like managers and sales. Openness to experience was expected to be a valid predictor of training proficiency because it can be linked to characteristics such as curiosity, intelligence, and broadmindedness (Barrick and Mount, 1991).

The results of the study indicated that conscientiousness is indeed a valid predictor of job performance in all occupational groups. Thus, a person who is responsible, dependable, persistent and achievement orientated will perform better than individuals who are not (Barrick and Mount, 1993). According to Rothman and Coetzer (2003) it is because of this correlation that organisations can make use of personality measures during recruitment, selection and career planning.

Digman (In Wiggins & Pincus, 1992) states that the even though the Big Five Personality Factors are one of the most noteworthy topics in personality psychology and serves as an excellent model, it is not without critics.

Waller and Ben-Porath (In Wiggins and Pincus, 1992) have specific reservations about the big five:

- Many of the studies were based on Cattell's variants and are therefore only replicates and not conceptual validations of the big five.
- Claims for the comprehensiveness of the model are premature, seeing that there are still other models that have to be incorporated into the five factor model.

Other researchers argue that the relationship between personality and behaviour is moderated by the situation. This means the extent to which a persons personality predicts their behaviour, depends on the degree to which the external environment inhibits the persons freedom to behave. They further distinguish between strong situations that are those where there are considerable amounts of demands to conform and weak situations where the demands are few. In strong situations the person will be restricted in behaviour, while in weak situations the person will have to make use of their own discretion. It can therefore be concluded that differences in personality will have an influence on the behaviour a person adopts (Barrick and Mount, 1993).

Still, Wiggins and Pincus (1992) see the five factor model as one which provides comprehensive super ordinate taxonomy of individual differences that includes simple structure representation of interpersonal dimensions. McCrae and Costa (1989) is of opinion that the big five are not there to replace personality measures but rather to serve as framework for interpretation.

These constructs make it possible for industrial psychologists to determine whether a meaningful relationship exist between particular personality constructs and job performance. Briggs (1992) has stated that consensus has finally emerged, regarding the usefulness of the big five. Researchers over the world see it is a comprehensive model of personality description.

## **2.5 Technical aspects of Validity**

All psychometric tests are developed to make inferences about people. According to Murphy and Davidshofer (2001) validity can be seen as the correctness of these inferences and this is one of the most important aspects and concerns when it comes to psychometric evaluation.

When making inferences, there are two types. The first is regarding the attribute being measured by the instrument and the second will affect decisions made about the test taker. Here one must remember that tests are not only developed to make inferences about individuals, they are also used to make decisions (Murphy & Davidshofer, 2001). According to the results of a test, the individual may or may not be appointed in a specific position.

Validity has been present in psychological evaluation since the early 1950's. The American Psychological Association was one of the big contributors in 1954 with their recommendations for psychological tests.

These recommendations identified four ways of defining validity:

- Content validity
- Construct validity
- Predictive validity
- Concurrent validity

(Murphy & Davidshofer, 2001)

According to Murphy and Davidshofer (2001) the four types of validity or four faces of validity, were used for different purposes, however with time it has now been recognized that the types represent different strategies for the validation of inferences made by psychological instruments. All four strategies are designed to understand the meaning and implication of test scores. Murphy and Davidshofer (2001) underline the fact that validity is not a property of tests, but rather a function of what the test scores mean.

When talking about psychological testing it is important to understand the methods for psychological measurement. In the field of psychology, many of the construct to be measured has no universal standard. This poses to be a problem for psychologists and according to Murphy and Davidshofer (2001) rather than validating an instrument to external standard, psychologists must employ a more indirect method in determining the validity of the test. There is no definitive way of proving that a test is a measure of a construct. A short discussion will now follow on the four different types of validity and the situation they are used in.

- Concurrent Validity

In order to have concurrent validity, an indicator must be associated with a pre-existing indicator that is judged to be valid (Neuman, 2000). It may happen that the two measures are not perfectly associated, but if they measure the same or similar constructs, it is logical for them to yield similar results.

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### Predictive Validity

According to Neuman (2000), criterion validity whereby an indicator predicts future events that are logically related to a construct is called predictive validity. It can however not be used for all measures. The measure and the action predicted must be distinct from but indicate the same construct.

- Content Validity:

One way to gather evidence of the validity of a measurement is to examine the content of that instrument. Content validity is established by showing that the behaviors sampled by the tests are a representative sample of the attribute being measured. This means, content validity depends on the test itself and the processes involved in responding to the test (Murphy & Davidshofer, 2001).

According to Murphy and Davidshofer (2001) a detailed description of the content domain of a test provides the foundation for assessing the content validity. In order to understand content validity, it is important to understand content. Content has boundaries and the domain is always structured. The contents of a content domain can normally be classified into several categories. Content validity is very difficult to statistically assess, because it represents a judgment regarding the degree to which a test provides an adequate sample of a particular content domain (Murphy & Davidshofer, 2001).

From the abovementioned it is clear that content validity is very important in order to understand test scores. Some researchers still do not believe it can be used to establish the validity of prediction based on test scores (Murphy & Davidshofer, 2001). Others have suggested that it might be useful in determining whether specific tests could be used in application and personnel selection (Neuman, 2000).

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### Construct Validity

One of the most interesting tasks in psychology is measuring abstract attributes. According to Barrett (1992), a construct is an observed consistency in behaviour to which psychologists have attached a label. Murphy and Davidshofer (2001) believe that all constructs have two essential properties, they are abstract summaries of some regularity in nature and they are related to or connected with concrete, observable entities or events.

These constructs are essential to science because they represent departures from our sensory experience that are necessary to form scientific laws and they allow us to generalize from an experiment involving falling apples to situations involving a variety of falling objects. Constructs are not restricted to unseen forces or processes, rather any group of similar things or events may serve to define a construct. (Murphy & Davidshofer, 2001)

According to Murphy and Davidshofer (2001) psychological measurement is a process based on concrete, observable behaviours. The process of construct explication consists of three steps:

- Identify the behaviours that relate to the construct to be measured
- Identify other constructs and decide whether they are related or unrelated to the construct to be measured
- Identify behaviours that are related to each of these additional constructs, and on the basis of the relation among constructs, determine whether the various behaviours are related to the construct to be measured.

(Murphy & Davidshofer, 2001)

The goal of construct validation is to determine whether test scores provide a good measure of a specific construct (Murphy & Davidshofer, 2001).

Construct validation can then be described as a process where evidence of inferring a measures' meaning is obtained. McBurney (1994) states that construct validity research takes on the form of relevant empirical data that supports the inference where a response consistently has a particular meaning.

When using construct validity it is important to remember that it is for measures with multiple indicators. The question it addresses is if the measure is valid, do the various indicators operate in a consistent manner? Construct validity requires a definition with clearly specified conceptual boundaries (Neuman, 2000).

The evaluation of abstract constructs to make inference about people is not an easy one; therefore psychologists must make sure that they use tools that are reliable and valid. Anastasi (In Van Vuuren & Fourie, 2002), underlines the fact that validation begins with psychological theory, prior to any research of observation and analysis of the relevant behaviour domain. Without the theory of validation the process will be meaningless and useless, therefore the above discussion.

Validating inferences about a construct requires a demonstration that a test measures a specific construct that has shown to be critical for job performance (Cascio, 1998). The process of construct validation begins with the formulation of hypotheses about the characteristics of those with high scores on a particular measurement procedure, in contrast to those with low scores (Cascio, 1998).

According to Cascio (1998), information relevant to a construct can be gathered or proved in a variety of ways. These ways include:

- Analysis of the internal consistency of the measurement procedures
- Correlation of new procedures with established measures of the same construct
- Factor Analysis of a group of procedures demonstrating which of them share common variance and thus measure the same construct
- Covariance structure modelling
- Convergent and discriminant validation

In order to provide clarity on the process of proving construct validity, some of these methods will be discussed.

- Factor Analysis

According to Neuman (2000), factor analysis assists the researcher to construct indexes, test the unidimensionality of scales, assign weights to items in an index and statistically reduce a large number of indicators to a smaller set. He continues to mention that factor analysis is based on the idea that it is statistically possible to manipulate the empirical relationships among several indicators to reveal a common unobserved factor or construct.

When conducting factor analysis, the researcher should measure at least five indicators at the ordinal, interval or ratio level. The results will indicate how well the items relate to an underlying factor or construct. When conducting a validation study, the factor analysis will indicate whether the items all load with one or more factors (Neuman, 2000).

- Correlations

Neuman (2000) is of opinion that the purpose of a correlation coefficient is to show how much two variables covary. Ideally the variables have a ration level of measurement. The correlation coefficient is the product of a set of z-scores added together, and then divided by the number of cases. According to Murphy and Davidshofer (2001), correlations show the relationship between scores. This relation can be positive or negative, indicating the degree in which the variables relate to one another.

When the relationship is positive the one variable is associated with an increase in the other variable, while in a negative relationship an increase in the one variable is associated with a decrease in the other (Murphy & Davidshofer, 2001).

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### Multitrait-Multimethod Approach

The multitrait-multimethod approach provides the researcher with a great deal of data that can be useful when assessing construct validity (Murphy & Davidshofer, 2001). During this approach, each construct is measured using a number of different methods, making it possible to determine whether the different methods produce comparable sources (Murphy & Davidshofer, 2001). In a case where the correlation between various methods of measurement is high, one can conclude that there is convergent validity. According to Murphy and Davidshofer (2001) the convergence of different methods serves to increase confidence that the research is measuring the constructs it is aimed to measure. Convergent validity can then be seen as the first link in establishing construct validity.

During research, the researcher will normally select a group of constructs that are, in theory, not strongly related. The hypotheses will be made that the correlations between these constructs will be smaller. This correlation between measures of different constructs serves to indicate discriminant validity (Murphy & Davidshofer, 2001). Discriminant validity is an indicator of construct validity because it provides proof that the correlations between measures of constructs that are in theory unrelated to one another are low.

Validity is not an easy concept to understand and it is important that the researcher has a clear understanding of the concept, the different types of validity and the ways in which to measure validity. In a study such as this, it is important to not only understand the above but have knowledge on the existing validity scores of the instrument being assessed.

One might question the reason for the strong emphasis on construct validity during this study. Clearly a project such as this should focus on predictive validity, seeing that selection is about making prediction on job performance. Great thought went into this project and it was decided to determine construct validity first. Construct validity (McBurney, 1994) is the property of a test that actually measures if the constructs used is designed to measure only those constructs and no others.

Bagozzi, Youjae and Phillips (1991) are of opinion that without assessing construct validity, one cannot estimate the confounding influences of random error and method variance. This may lead to ambiguous results of the theory testing and the hypotheses might be rejected. According to Neuman (2000), criterion validity whereby an indicator predicts future events that are logically related to a construct is called predictive validity. When evaluating the above statements one can understand the necessity of proving the construct validity of the instrument before proving predictive validity.

## **2.6 Measuring Instruments**

### **2.6.1 Differential Aptitude Test**

Cognitive Ability and its use in selection have been discussed in the previous sections of this document. For the purposes of this study the Differential Aptitude Test (DAT) was used. According to the Human Science Research Council (HSRC), previous provider of the DAT, aptitude can be seen as the potential a person has which will enable them to achieve a certain level of ability with a given amount of training and practice (Owen & Vosloo, 1999).

The DAT is an aptitude or ability test. “The aim of this test is to provide information on adults who want to undergo tertiary training or gain entry to particular high-level occupations, especially with a view to selection for tertiary training and specific occupations, (Owen & Vosloo, 1999).

The test is aimed at measuring specific intellectual abilities and not general cognitive ability. This instrument does not indicate a specific occupation, but candidate’s strong and weak aptitudes (Owen & Vosloo, 1999). It was developed to measure specific abilities and to make specific predictions about employment or educational success. Sets of test scores would be differentially selected or weighted for each situation.

This development led to the compensation of substitution of general ability tests (Ree, Earles, Teachout, 1994). Fouche and Verwey (1998) found that general mental ability can be measured by means of measuring verbal and non-verbal reasoning, arithmetical ability and three-dimensional spatial perceptual ability.

The reason for developing the DAT was to revise the Senior Aptitude Test in order to ensure that all users in South Africa had access to an indicator of ability and potential.

In practice it has been found that the test does not necessarily need to be administered as a whole. Subtests can be used individually as part of a selection battery. All subtests are time limited and times are of such a nature that some learners will not be able to finish. The time is however enough for candidates to indicate their capabilities (Owen & Vosloo, 1999).

As said previously, general cognitive ability can be measured through verbal reasoning, non-verbal reasoning, numerical ability and 3D spatial reasoning. This means for the purposes of this study, only four subtests were used. They are:

- Test 2: Verbal Reasoning

The aim is to measure an aspect of general reasoning on the basis of verbal material. It rests on the assumption that the ability to determine relationships to solve general problems as well as vocabulary background is a valid indication of an aspect of general reasoning. Verbal Reasoning consists of 25 items and candidates are allowed 15 minutes to complete (Owen & Vosloo, 1999).

- Test 3: Non Verbal Reasoning: Figures

The aim of this test is to measure an aspect of general reasoning on the basis of non verbal reasoning. The assumption is made that to see the relationships between figures, identify an appropriate missing figure and following the changes a figure undergoes to deduce the work principle and apply it again, is a valid indication of an aspect of non verbal reasoning ability. This test consists of 25 items and candidates are allowed 11 minutes to complete (Owen & Vosloo, 1999).

- Test 4: Calculations

Measures the arithmetical ability of the candidate and rests on the assumption that the learner's ability to do mechanical calculations and to solve arithmetical problems with the help of four basic operations provides a valid indication of their ability. The test consists of 25 items and candidates are allowed 20 minutes to complete (Owen & Vosloo, 1999).

- Test 8: Spatial Visualization 3-D

The aim of this test is to measure the 3D spatial perceptual ability of the candidate. It is based on the assumption that the ability of a person to manipulate a cube whose sides are marked in a certain way mentally, is a valid criterion for spatial visualization. The test consists of three sections where different things are expected of them. The total test consists of 30 items and candidates are allowed 12 minutes to complete (Owen & Vosloo, 1999).

Reliability and validity always play a role in all psychometric instruments. Reliability refers to the consistency of the measures of behaviour (Elmes, Kantowitz & Roediger, 1999). The reliability of the DAT was determined with the Kuder Richardson Formula. Scores on the four tests that were used for this study, vary from 0,79 to 0,85. This means that the degree of accuracy and consistency of the DAT is very good (Coetzee & Vosloo, 2000).

According to Elmes, Kantowitz and Roediger (1999) validity means the soundness of a measurement and to whether we measure what we intend. It is the extent to which the test actually measures what it is supposed to measure.

Construct validity (McBurney, 1994) is the property of a test that actually measures the constructs it is designed to measure and no others. Validity of the DAT was established by making use of the inter-test method. The correlations are calculated between the scores of the different tests of the battery and then between the mentioned scores and those of an external test.

In order to measure the construct validity, a factor analysis was done and two factors were extracted. Factor one referred to verbal reasoning and scores varied from 0,38 to 0,66. The second factor referred to non-verbal reasoning and scores of the four tests varied from 0,48 to 0,65 (Coetzee & Vosloo, 2000). The authors do however mention that the two factors correlate 0,74 to each other and therefore we conclude that the battery measures an individuals ability to reason inductively as well as deductively (Coetzee & Vosloo, 2000).

#### 2.6.2 Sixteen Personality Factor Questionnaire (SA 92)

Various reasons for the use of cognitive ability tests have been mentioned. Mention has also been made of the use of personality measures. These measures must however increase the overall validity of the battery. There are many personality measures available on the market, one of which is the 16 Personality Factor Questionnaire (16 PF). This instrument is widely used in the South African context and was therefore chosen for the purposes of this study.

From these typologies, Bolton (1985) believes that the choice of occupation is an expression of personality.

The 16 PF is a well used, self report personality questionnaire that is used across the world and provides a comprehensive measurement of the domain of normal personality functioning (Bolton, 1985).

Raymond Cattell, developer of the 16 PF, believed that a good personality instrument should measure the most fundamental dimensions of personality, while summarising all characteristics of adults. He published the 16 Personality Factor Questionnaire in 1949 (Murphy & Davidshofer, 2001).

In setting up his questionnaire, he extracted all the words in the English Dictionary that portray personal characteristics. After various factor analyses the four thousand words were grouped into 45 groups. Another factor analysis took place on these groups and 15 factors were extracted. These factors were placed in order of importance from A to O (Murphy & Davidshofer, 2001).

Cattell found that some of the factors were not consistent in adult behaviour, but rather in child behaviour. These factors were excluded from the instrument and thus the reason for no factors D, J and K. Over time he identified the factors Q1- Q4, and these formed the 16 Primary factors (Murphy & Davidshofer, 2001).

As a point of reference, the 16 PF- SA 92 will now be discussed. The questionnaire consists of 185 items, which is measured on a three point Likert Scale. These items make up the 16 Primary Factors identified by Cattell. Interdependent relations exist between the items but there is no overlapping. The scores are bipolar meaning that significance can be connected to high and low scores. After further research, Cattell identified five secondary factors that explain the broad aspects of personality. These factors are included in the Big Five Personality Factors, which was discussed earlier. See Annexure A for a detailed description of the Primary and Secondary Order Factors of the 16 PF.

A study done on the 16 PF reported that the 15 correlated primary scales, predicted criteria more highly than markers for the five factor model, even after the number of predictors were corrected (Briggs, 1992). Zuckerman (In Digman, 1990) obtained a five factor solution for the 16 PF correlations. An analysis pointed to three meaningful clusters of scales (Digman, 1990).

Research has shown that the 16 PF is one of the best instruments and that validity and reliability is very high. According to Prinsloo (1992) during the standardisation process of the 16 PF, factor reliability increased by between 10% and 20%. Some factors now have a coefficient of 0,7. He further comments on the validity by saying that factor analysis provided the same structure as in the past. Critique that arose on Forms A and B was that they could possibly be discriminatory. The result is the 16 PF- SA 92. This version of Cattell's 16 Personality Factor Questionnaire is standardised for South African conditions (Cattell, Eber & Tatsuoke, 1992).

When looking at this instrument, its development and the extensive research that was done on it, one can agree that Cattell will be remembered as the pioneer geometer of the personality realm. (Digman, 1990)

People chosen for a position on cognitive ability would differ from people chosen on personality, because of a difference in attribute profile. The personality employees will achieve in overall performance by being more dependable, attentive, and helpful, while the cognitive employees might achieve in performance by being more accurate, faster, and effective problem solvers (Kehoe, 2002).

The goal is to find some one who fits the job not only on a cognitive level but whose personality will fit into the organisation. The problem is that, even with all the benefits of personality and cognitive measurements, combining the two for selection becomes time consuming and expensive.

## 2.7 The First View™ as a Selection Tool

For the purpose of this section, it is a necessity to understand exactly what First View™ is. First View™ is a psychometric instrument that can be used in selection procedures to determine job performance. In core, the instrument measures fundamental interpersonal competencies that are directly related to job success. These competencies are based upon a construct derived from accepted psychological theories (Goodstein & Lanyon, 2002).

In this section, there will be an in-depth discussion of First View™. The discussion will include the development of the scales, the benefits the instrument provides as well as reliability and validity proven in the USA.

### 2.7.1 Development of First View™

First View™ is the first psychometric instrument to be developed through an integrated process where a team of specialists and professionals worked in a cross functional manner throughout the whole development. This team did not only consist of industrial and research psychologists, but also of business consultants, information architects and software designers (Goodstein and Lanyon, 2002).

Mention was made that First View™ measures the fundamental interpersonal competencies related to job success. During development, the team also focused on the following aspects:

- Obstacles as well as potential interventions will be clearly identified and noted.
- Reports will be computer generated
- Reports will be customised for special applications
- Behavioural interview questions will be generated for each individual candidate.
- Coaching and management suggestions will be included in reports.
- There will be a single page summarising the three elements of hiring (attitude, skills, experience and interpersonal competencies).

(Goodstein and Lanyon, 2002)

The above mentioned makes First View™ a unique tool. What makes it exceptionally unique is the fact that First View™ incorporates two constructs into one instrument. The cognitive and personal scale can provide the manager with a holistic view on the individual, enabling him to make a more informed and correct decision.

### 2.7.2 Development of the Cognitive Scale

According to Goodstein (2001) the cognitive scale is based on Guilford's Structure of Intellect. This model assumes that cognitive ability is best understood as a composite of several separate abilities. However, not all the abilities seem to have an impact on work performance (Goodstein, 2001).

After extensive research, only two out of the nine abilities stated in Guilford's model, were selected. The first, being Fluid Intelligence/reasoning and the second Quantitative reasoning (Goodstein, 2001).

In order to minimize cultural bias, Vocabulary was left out of the battery. Goodstein (2001), states that the importance of vocabulary or crystallized intelligence was taken into account, but left out in order to minimize cultural bias.

For Fluid Reasoning ability, the team included three sub areas:

- General sequential reasoning (ability to start with stated rules and engage in one or more steps to reach a solution to a problem)
- Induction (ability to discover underlying characteristics that govern a problem)
- Speed of reasoning (ability to solve problems quickly)

(Goodstein, 2001)

Two sub areas were included in Quantitative reasoning:

- Quantitative reasoning (ability to inductively and deductively reason with concepts involving mathematical concepts and properties)
- Mathematical knowledge (ability to solve mathematical problems)

(Goodstein, 2001)

In easier terms, it seems as if these two abilities can be called, Verbal and Non verbal reasoning. Items were developed to tap the two abilities, and caution was taken throughout to exclude culturally biased items. During the process of field testing, items that were unclear, too easy or too hard were discarded. When 80% or more of respondents could or could not answer the question it was regarded as too easy and too hard (Goodstein, 2001).

The Final version of First View™'s cognitive scale consists of 25 items. This scale is broken down in the following sub- areas:

- General sequential reasoning, 10 items
- Induction, 8 items
- Quantitative reasoning, 3 items
- Mathematical knowledge, 4 items

(Goodstein, 2001)

The heavy loadings on sequential reasoning and induction provide an indication that the developers of First View™ see them as very important for success in the workplace.

Goodstein (2001) mentions that none of the items are intended as speeded measurements for reasoning but, the cognitive scale is a measure of reasoning speed. Only six minutes are allowed to complete the 25 items, this comes down to less than 15 seconds per item (Goodstein, 2001).

### 2.7.3 Development of the Personal Scale

Personality and the use of personality testing have already been discussed in the previous section of this document. Mention has also been made of the Big Five Personality Factors.

Developers of First View™ loosely based the personality scale on the Big Five Factors of Personality. It does however have a sharper focus on job- related behaviour. The developers saw extraversion as the most important aspect of On-the-job success, and thus separated it into two facets, extraversion and assertiveness. Each of the other factors was relabelled to be more business oriented (Goodstein, 2001).

**Table 2.1: Constructs of First View™**

<b>Construct Name</b>	<b>Definition</b>	<b>Related to Big Five</b>
Extroversion	The need to work with others, communications of enthusiasm and ability to talk and listen	Extroversion
Rules	Consistency, ability to deal with change, need for structure, ability to follow rules and policies	Openness to Experience
Assertiveness	Decision making, selling and closing ability, ability to handle confrontation, willingness to take direction from others	Extroversion
Teaming	Teamwork, collaboration with others, competitiveness	Agreeableness
Organisation	Planning, spontaneity, time management attitudes, ability to handle details	Contentiousness
Sensitivity	Emotional stability, handling of criticism and feedback, dealing with stress	Neuroticism

(Goodstein, 2001)

These constructs will now be called ERATOS.

It is however necessary to provide a more in-depth explanation of each of the constructs.

- **Extraversion**

Extraversion is one of the most well known personality constructs used in personnel selection. An extraverted person would typically be gregarious, outgoing, engaging and have a tendency to act risky. They will have a greater desire to talk than listen and will prefer interaction with other above being alone. People who are less extraverted or introverts tend to work alone, avoid risk and are usually reserved (Goodstein and Lanyon, 2002).

- Rules

This construct is used to measure a person's tendency to observe and comply with rules, policies and procedures. Developers hypothesise that a person who obtains a high rules score will exhibit a conventional manner of behaviour. They normally tend to be amendable and prefer an ordered environment to work in. Individuals whose orientation to rules is low seem to be innovative, with a tendency to take shortcuts, they also have the ability to work with few guidelines and prefer this (Goodstein and Lanyon, 2002).

- Assertiveness

Assertiveness is also a well known psychological construct. The high end of the scale refers to people who are forthright, willing to speak their minds, face conflict and controversy and will take charge of things. A low score will indicate behaviour such as submissiveness, a following nature and avoidance of conflict (Goodstein and Lanyon, 2002).

- Team

This construct makes the hypothesis that the high end of the scale will describe persons who are co-operative, put others before their own needs, value harmony and are more team orientated. The low end of the scale will then include people who are competitive, put their own needs first, prefer individual recognition and view team members either as an audience or as competitors (Goodstein and Lanyon, 2002).

- Organisation

Organisation's high end will include people who like to plan things, tend to be precise, orderly and punctual and like detail. Low end behaviour includes spontaneity; little planning and focussing on the bigger picture (Goodstein and Lanyon, 2002).

- Sensitivity

Sensitivity measures the traits which reflect immaturity, worry, anxiety, and tendencies to have inconsistent moods. The high end of the scale will indicate a person whose emotions are subject to external influences, while the low end indicates stable moods, freedom from worry, lack of anxiety and a positive outlook (Goodstein and Lanyon, 2002).

These constructs are all well known in psychological circles and were not picked for any reason. Each of these traits has significant meaning when it comes to performance in the workplace. The development of these constructs was based on well established foundations of previous research.

Many psychometric instruments in circulation have a social desirability scale in order to prevent the manipulation of instruments by candidates. By analysing the intent of questions, a candidate could choose the phrases that would provide a favourable description of themselves (Goodstein and Lanyon, 2002).

The social desirability scale will indicate whether the individual is faking good or bad. First View™ also includes a social desirability scale in order to ensure the persons report is reliable. It also allows the user of the assessment system to be confident that a true reflection of the candidate is given.

When starting the process, 300 items were written, a total of 50 items for each of the six ERATOS factors. The items were field tested with volunteers, till a group of 48 items, 8 for each items were retained. An additional 8 items were included to constitute a validity scale which intended to tap the tendency to present an overly positive or negative self image (Goodstein, 2001).

Through the process of editing, misunderstanding and confusion were eliminated to a point where the response pattern was approximately equal. One third yes responses, one third no responses and the other sometimes responses. Distribution was then developed for the six scales, which were essentially normal (Goodstein, 2001).

The next step was to develop computer based automated interpretations for this inventory. Normally one will look at statements that describe job behaviour to be expected from individuals at various levels of the six scales.

Developers ensured that the report, as a whole, is couched in a positive light and attempts to be inclusionary rather than exclusionary. The report goes on to identify the stresses, management time and effort, compromises and other costs that probably would be associated with obtaining an acceptable level of performance from this person. It is important to remember that all the end user ever sees is the final narrative report, no test scores or profiles are ever reported and the final decision is always left in the hands of the end user (Goodstein, 2001).

#### 2.7.4 Benefits of First View™

The initial development of First View™ was intended to help management cut time and costs of selection. Development was directed at the end user, the employer, which meant that no experts would be required to administer and interpret this assessment tool (Goodstein, 2001).

In order to achieve this aim, the following consideration needed to be taken into account:

- The instrument must be brief and take no longer than 20 minutes to administer
- The instrument can be scored and interpreted by a computer
- The process includes an evaluation of the applicants' cognitive skills and personal competencies
- The instrument produces a series of interview questions, which enables the employer to obtain additional information.

(Goodstein, 2001)

When looking at First View™, one can see that the aim was definitely achieved. Even though the instrument is very short, the psychometric quality is achieved.

Another huge advantage, not only of First View™ but most tests, is that, unlike interviewers, it is incapable of being influenced by an applicant's race, gender, religion, age or disability (Goodstein and Lanyon, 2002).

Other advantages include that First View™ aids and helps organisations to avoid putting the right person in the wrong job or the wrong person in the right job. In the long run, the company does not have to enter into expensive learning curves. It also benefits the employee in the sense that no time and energy is wasted in a job that is unlikely to reward them (Goodstein and Lanyon, 2002).

Organisations may also experience that the cost per hire decreases, which all will agree is a benefit. Unsuitable candidates are screened out at an early stage, before the more expensive elements of selection come into play. (Goodstein and Lanyon, 2002)

Goodstein (2001) made mention of the fact that personal competencies differ from job to job and therefore researchers designed the instrument to provide multiple reports. These reports include the following fields:

- Sales
- Management
- Customer Service
- Administrative
- Financial
- Information Technology
- Engineering
- Healthcare
- Food Service
- Hospitality
- Production

According to Goodstein and Lanyon (2002) these positions were chosen because they represent the majority of categories used by employers.

Developers further decided that, rather than to produce a series of scores that require interpretation for each of these competencies, this instrument produces a report that discusses:

- Potential strengths of the individual for being successful in the job
- Obstacles that may interfere with performance
- Actions to be taken by management if such obstacles do exist

It is this positive approach that makes First View™ even more unique than any other psychometric instrument (Goodstein, 2001).

#### 2.7.5 Other Aspects of First View™

First View™ is not just a psychometric instrument with no meaning to people without psychology knowledge. This instrument is aimed at management. It will provide them with sufficient information to make a decision. This however is not all (Goodstein, 2001). First View™ also facilitates the role of management in selection through the interview process. Apart from the individual report that it produces, First View™ also produces a series of behaviourally based questions. These questions are based on issues raised in the individual reports. Now the interviewer will not only have psychometric results in easy report form, but also the applicant's responses (Goodstein, 2001).

We, as psychologists, know the basics of interviewing because soft skills form part of our basic training. Not all managers know these techniques which are important and essential for interviewing. When using First View™ as a selection tool, it will become a necessity in organisations for managers to learn basic skills.

These skills will include:

- establishing rapport,
- providing a reasonable degree of comfort for the person being interviewed,
- asking open-ended questions,
- using follow-up probes

#### 2.7.6 Current Reliability and Validity studies on First View™

In previous sections we have made mention of the concepts of validity and reliability. It is a necessity for any instrument to have adequate validity and reliability scores.

Because First View™ is being used in the USA, scores have already been established. In each of the following sections, the cognitive and personal skills will be discussed separately.

##### 2.7.6.1 Reliability

A reliable instrument will provide a constant measure over time (Goodstein, 2001). When assessing human characteristics, the task becomes more difficult because these characteristics change over time. The problem that arises in measuring is whether the person has changed or is the instrument unreliable. It is therefore important to know the reliability of an instrument beforehand. Doing this is the only way in which we will know if the person has changed or if the battery is unreliable (Goodstein, 2001).

##### *Cognitive Scale*

The developers of First View™ made use of the most widely used approach to measure reliability, Cronbachs' Alpha. This method is an analysis of the statistical properties of the instrument and measures its internal consistency (Goodstein, 2001).

For the cognitive scale the obtained Cronbach *alpha* was 0,749 for a sample of 73 subjects, indicating a high degree of internal consistency or good reliability. The 73 subjects were volunteers recruited from a variety of employee and social groups, 30 of whom were males (41%) and 43 female (59%); 70 were Caucasian (96%), 2 (3%) were of mixed race, and 1(1.4%) were Afro-American. The ages ranged from 16 to 71 with a mean of 45,5 and a standard deviation of 11,7.

The educational level ranged from 2 years of high school through graduate degrees with a median educational level of 13 years. The job titles ranged from call centre operators and office support workers at one end to professionals and business executives at the other. All in all, the sample appeared representative of the work population in general and the applicant population in particular (Goodstein, 2001).

These scores support the fact that the cognitive scale of First View™ does provide a consistent measure of intelligence (Goodstein, 2001). Previous research on First View™ showed the same results. In this research a factor analysis was done which revealed one primary factor and three minor factors. All 25 items tapped for the same domain of behaviour and the three minor factors reflected the difficulty level of the items rather than differences in item content (Goodstein, 2001).

*Personal scale*

Because of the separate scales in First View™ a Cronbach alpha was computed for each of the six ERATOS scales from the sample of 73.

**Table 2.2: Reliability Scores for ERATOS**

Construct	Reliability Score
Extraversion	0,73
Rules	0,7
Assertiveness	0,75
Teamwork	0,68
Organised	0,73
Sensitivity	0,83

These scores support the conclusion that the ERATOS scale provides a consistent measure of personality characteristics (Goodstein, 2001).

#### 2.7.6.2 Validity

As previously discussed, psychometric tests are developed to make inferences about people. According to Murphy and Davidshofer (2001) validity can be seen as the correctness of these inferences. According to (Owen & Vosloo, 1999) and Vosloo (1999) the validity of an instrument is the extent to which the test actually measures what it is supposed to measure.

##### *Cognitive scale*

Developers of First View™ made use of content and construct validity. The focus of the cognitive scale provided enough support for content validity (Goodstein, 2001).

The First View™ was then correlated with the Form I of the Wonderlic Personnel Test. This instrument is an American instrument designed for the employer. It contains 50 items and has a 12 minute time limit. According to Goodstein (2001), First View™ measures an individual's ability to learn, adapt, solve problems and understand instructions. The correlation obtained from 64 respondents was 0,62.

##### *Personality scale*

From previous sections there is a clear understanding of what is meant by validity and the different types of validity an instrument needs to adhere to. The following was found on First View:

When developing the personality scales, a clear definition for each of the ERATOS constructs was provided, with the eight items for each scale. This was enough to be a representative sample of the construct and reasonable grounds to establish content validity (Goodstein, 2001).

The construct validity can be proven from the correlations found between each of the constructs and the corresponding scales of Total View™ an instrument developed by Dr D Bartram that is being used widely in the USA. According to Bartram, Total View™ is an assessment system that can match work related characteristics of people and the requirements of a position by measuring an individual's interests, ability and personality. He is of opinion that most human resource decisions can be made with the assistance of Total View™.

**Table 2.3: Correlation scores between First View™ and Total View™**

<b>First View Scale</b>	<b>Total View Scale</b>	<b>Correlation</b>
Extraversion	Outgoing	0,642
	Group	0,550
	Assertive	0,390
	Poised	0,359
Rules	Organised	0,585
	Conventional	0,413
	Outgoing	0,238
Assertiveness	Assertiveness	0,599
	Competitiveness	0,394
	Outgoing	0,322
Sensitivity	Poised	0,696
	Relaxed	0,619
Teaming	Cooperative	0,431
	Competitive	-0,434
	Assertive	-0,323
Organisation	Organised	0,604
	Assertive	-0,323
	Conventional	0,329
	Outgoing	0,292

(Goodstein, 2001)

Out of these abovementioned scores, we can conclude, that First View is a reliable and valid tool to use in the USA. The question now is, is it valid and reliable in South Africa?

## **2.8 Chapter Summary**

This chapter covered an in-depth discussion on selection as an organisational process, the use of psychometric tools within this process, specifically cognitive and personality measured. It provided background on the three measuring instruments used in this project, the DAT, 16 PF- SA92 and First View™. In conclusion, selection is one of the most important processes in any organisation. It is very important to select the right person for the job. This will ensure that the company stays competitive and performs to full potential.

## CHAPTER 3

### 3.1 Introduction

The purpose of this chapter is to explain the method of investigation. The main goal of this study is to determine the construct validity of the First View™ for selection purposes in South Africa.

According to Moser and Shuler (1989) when developing or validating a test, there is normally two questions to be asked:

- How precisely can an object be measured (Reliability)
- Which conclusions are possible or allowed. (Validity)?

Reliability can be defined as the proportion of true variance at observed variance. The true score cannot be directly observed because of errors of measurement. Inter item consistency is where we compute the mean correlation between all items of a scale or otherwise referred to as Cronbachs alpha coefficient (Moser and Shuler, 1989).

According to Gatewood and Field (In Muller & Scheepers, 2003), validity refers to the degree to which available evidence supports inferences made from scores on selection measures. This means we want to know how well predictors are related to job criteria. Validity studies attempt to develop theories of performance that explain how individuals can meet the demands of a specific position (Muller & Scheepers, 2003). Validity can be related to construct, content and criterion referenced validity. In this study the focus will fall on proving construct validity. McBurney (1994) describes construct validity as the property of a test that actually measures the constructs it is designed to measure and no others.

### 3.2 Research Design

Experimental design can be seen as a plan or outline for conceptualizing the relations among the variables of a research study. It also implies how to control the research situation and how to analyze the data (Cascio, 1998).

According to Cascio (1998), researchers can use experimental designs with internal and external criteria in order to make casual inferences. This means the researcher rules out alternative, plausible explanations for the observed changes. In other words, experimental designs are useful for researchers because it enables them to indicate that the changes are because of a specific construct of factor. Very few studies do however allow for these casual inferences and are contaminated by various factors within research. These factors can include:

- Differential selection
- Interaction of pre-test with the experimental variable
- Reactive effects of the research situation
- Multiple treatment interference
- Interaction of differential selection

(Cascio, 1998)

Neuman (2000) is of opinion that all designs are variations of the classical experimental design explained above. Cascio (1998) shares this opinion and states that many alternatives have been found for the problems and threats of experimental design, one of which is the quasi experimental design. This is the design used in this study.

According to Cascio (1998) a number of quasi- experimental designs are offered for the investigation of constructs. A design such as this normally has the rationale that the central purpose of any experiment is to eliminate alternative hypotheses that might lead to the same result. If a quasi- experimental design can eliminate some of these other hypotheses, then it was worth the effort.

Neuman (2000) describes the quasi- experimental design as a tool that assists researchers in the test for casual relationships in a variety of situations where the classical design is inappropriate. The quasi- experimental design used in this study is that of factorial design. In this type of design, attention was given to the simultaneous effects of more than one independent variable (Neuman, 2000). During such a study, two or more independent variables are combined and every combination is examined (Neuman, 2000).

According to Neuman (2000) the treatments in a factorial design can have two kinds of effects on dependent variables, that of main and interaction effects. Only main effects are present in single treatment designs, while interaction effects will be present in designs with multiple treatments.

The main problem with quasi- experimental designs is that the researcher has less control over the independent variable than in the normal classical design. When making use of the quasi- experimental design it is important to know which of the variables are uncontrolled seeing that full control is lacking and researchers should try and design the best experiment possible given the situation (Cascio, 1998).

The quasi- experimental design will be applied in this study, for the simple reason that more than one variable will be combined to form factors. These factors will be correlated with one another and conclusions will be drawn from the results obtained.

### **3.3 Sampling and Data Gathering**

In order to do valid and reliable research a sufficient sample is necessary. For this project a sample of 229 respondents in total was included. The sample was drawn in two ways. Firstly a convenient sample was drawn from different members of different organisations participating in Assessment Centres conducted by a local consultancy firm. The sample included people from different ages, race and industries.

To find enough African respondents posed to be a problem. The main sample for African respondents was pulled from The Mnambithi Further Education and Training College in Ladysmith, Kwa- Zulu Natal. By making use of the random selection method, a sample of 50 respondents was selected. A list of students was drawn and from that respondents were selected.

The respondents participated in the research by completing three questionnaires. The first is the Differential Aptitude Test (DAT), which is an aptitude test standardised for South African purposes. Its purpose according to Owen and Vosloo (1999) is to provide information on adults who want to undergo tertiary training or gain entry to particular high- level occupations, especially with a view to selection for tertiary training and specific occupations. The participants completed four subtests of the DAT in order to measure cognitive ability. The subtests included, verbal reasoning, non- verbal reasoning, calculations and 3D spatial reasoning.

The second instrument respondents needed to complete was the 16 Personality Factor Questionnaire (16 PF- SA92). The 16 PF is a self report personality questionnaire that is used across the world and provides a comprehensive measurement of the domain of normal personality functioning (Bolton, 1985). It consists of 16 primary order factors and 5 secondary order factors of personality. These secondary order factors can be linked to the Big Five Personality Factors, as explained in chapter two.

Finally it was expected of respondents to complete the First View™. First View™ as explained in the previous chapter is an instrument that consists of two parts, cognitive ability and personality. It is aimed to provide managers with a holistic view on the individual, enabling him to make the most informed and correct decision during selection.

### **3.4 Statistical Analysis**

Statistical analysis consists of different parts during research. One of the first steps to take is to give a brief description of the population representing the data that was collected. The researcher will then decide on how to measure the research variables. Following this, one needs to decide how the research variables will be measured and data needs to be analysed statistically. The procedure of descriptive statistics will be used where data is simplified and organized (Graziano & Raulin, 2000).

There are different ways in which to use descriptive statistics. In this document it will be used to provide the reader with summary statistics. Summary statistics serves two purposes, it will describe the data with one or two numbers which make it easier to compare and will provide a basis for later analysis (Graziano & Raulin, 2000).

In order to establish construct validity, further statistical analysis needs to be performed. The research will take on a correlational form. Correlational research allows the researcher to determine simultaneously the degree and direction of a relationship with a single statistic (Elmes, Kantowitz & Roediger, 1999).

The goal of correlational research is to determine the relationship between two variables and to determine if the direction is positive or negative. Thus, the main goal is to show that there is a positive correlation between First View™, DAT and 16 PF- SA 92. This process will be separated into three parts:

- Canonical Correlations between 16 PF- SA 92 and First View™
- Multiple Regression between DAT and First View™

#### 3.4.1 Canonical Correlation

Firstly a canonical correlation will be drawn up between the extracted factors of the 16 PF- SA 92 and the seven personality factors of the First View™. In simple terms the canonical correlation refers to the analysis of the relationship between two sets of variables (Tabachnick & Fidell, 1996).

Canonical correlation can be seen as an extension of multiple regression. It adds more than one dependent variable to the multiple regression. In other words it handles the relations between sets of independent variables and sets of dependant variables (Kerlinger, 1986). According to Tabachnick & Fidell (1996) there are several variables on both sides of the equation in a canonical correlation. Sets of variables are combined to produce, for each side, a predicted value that has the highest correlation with the predictive value on the other side of the equation.

Tabachnick and Fidell (1996) state that there are several ways to assess the importance of canonical variates. Firstly one would ask how strongly the variate on one side relates to the variate on the other side. How strongly one variate relates to the variables on its own side of the equation and how strongly the variate relates to the variables on the other side of the equation are also issues that need to be addressed. However, canonical correlations have limitations that can become pitfalls for research if the researcher is not aware of them. One of the biggest limitations is interpretability. The procedure of canonical correlation is used because it maximizes correlation, but it does not maximise interpretation of the variates (Tabachnick & Fidell, 1996).

Sensitivity of the solution is another issue. In a canonical analysis, the solution depends on the correlation among variables in each set, as well as on the correlation among variables between sets. If changes in the variables occur, one would expect an alteration in the composition of the canonical variates in the other set. (Tabachnick & Fidell, 1996)

#### 3.4.2 Multiple Regression

Regression is a technique which allows one to assess the relationship between one independent variable and several dependant variables (Tabachnick & Fidell: 1996).

According to Kerlinger (1986) multiple regression is the single most useful form of multivariate methods. It analyses the common and separate influences of two or more dependent variables on an independent variable.

When using regression one can correlate the independent variables with one another and with the dependant variables, which will make the research more experiential. Multiple regression is an extension of regression and the result will be an equation that represents the best prediction (Tabachnick & Fidell, 1996).

The goal of regression is to arrive at the best set of regression coefficients for the independent variables that bring the “y” values predicted as close as possible to the “y” values obtained by measurement.

The regression coefficients accomplish the following:

- They minimize deviations between predicted and obtained y values
- They optimize the correlation between the predicted and obtained y values

(Tabachnick & Fidell, 1996).

In simple terms, regression refers to the analysis of a relationship where there is a single variable on the one side and several on the other. The multiple regression will tell us two things. First it will tell how well a set of variables explain a dependant variable, it will also show the effect of each variable on the dependant variable. (Neuman, 2000)

These statistical calculations will be performed by using the Statistical Package for Social Science (SPSS). Conclusions will be drawn from the results and recommendations will be made.

### **3.5 Chapter Summary**

Chapter 3 started with defining reliability and validity of instruments. It described the research design, sample of the study, the techniques to draw the sample and concluded with a discussion on the statistical methods that will be used to analyse data.

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## Annexure A

Primary & Secondary Order Factors of the 16 Personality Factor  
Questionnaire

**Primary Order Factors of the 16 Personality Factor Questionnaire**

<b>Warmth (A)</b>	
<b>Low A:</b> Reserved, impersonal, distant, formal. They tend to be reserved and cautious about involvement and attachment. They tend to like solitude, often focusing attention on intellectual, mechanical, or artistic pursuits, where they can be quite effective. Low scorers can be uncomfortable in situations that call for emotional closeness or extensive interaction.	<b>High A:</b> Warm, caring, soft-hearted, and generous. They tend to have an intrinsic interest in people and they often seek situations that call for closeness with other people. Their friends describe them as sympathetic and comforting. Extreme scorers may be seen as gullible, and may be uncomfortable in situations where close relationships are inaccessible.
<b>Reasoning (B)</b>	
<b>Low B:</b> They are less able to solve verbal and numerical problems of an academic nature. This can indicate lower intellectual ability, but it is also related to educational level. Low scores can also result from a range of problems affecting concentration and motivation.	<b>High B:</b> They are more able to solve verbal and numerical problems of an academic nature. This is often indicative of intellectual ability, but is also related to educational level. This index should not replace full-length measures of cognitive ability.
<b>Emotional Stability (C)</b>	
<b>Low C:</b> Reactive, easily upset, temperamental. They tend to feel a lack of control over life's challenges and to react to life rather than making adaptive or proactive choices. For some test takers, reactivity can reflect current life stressors; for others, it may characterize their way of life.	<b>High C:</b> Calm, stable, mature, unruffled. They tend to take life in stride and to cope with day-to-day life and its challenges in a calm, balanced, adaptive way. They tolerate frustration well, can delay gratification, and don't let emotions obscure realities. Extreme scorers may tend to avoid "negative" feelings or use strong defences like denial.
<b>Dominance (E)</b>	
<b>Low E:</b> Deferential, modest, submissive. They tend to accommodate others' wishes, and are cooperative and agreeable. They are likely to avoid conflict by acquiescing to the wishes of others, and they are willing to set aside their own wishes and feelings. Extreme deference can disappoint those who wish for a more forceful or participating response from them.	<b>High E:</b> Assertive, forceful, competitive. They tend to be vocal in expressing their opinions and wishes. While dominance can create a commanding, take-charge social presence, at times it can be seen as overbearing, stubborn or argumentative. For example, dominant people who are also Warm (A) may be more thoughtful than reserved people.
<b>Liveliness (F)</b>	
<b>Low F:</b> Serious, quiet, reflective, cautious. Though they may not be the life of the party or the most entertaining person in a group, their quiet attentiveness can make them reliable and mature. At the extreme, they can inhibit their spontaneity, sometimes to the point of appearing constricted.	<b>High F:</b> Carefree, enthusiastic, spontaneous, energetic. They are high spirited and stimulating and drawn to lively social situations. Extreme scores may reflect an impulsive or unreliable quality. They may find it hard to rein in their enthusiasm in situations that call for restraint or decorum.
<b>Rule-Consciousness (G)</b>	
<b>Low G:</b> Expedient, non-conforming. They may not worry about conventions, obligations, or following rules and regulations. This may be because they lack internalized standards or simply because they follow unconventional values.	<b>High G:</b> Rule-conscious, dutiful, scrupulous. They tend to be proper and conscientious, and conform to conventional cultural standards. At the extreme, they can be perceived as inflexible, moralistic, or self-righteous.
<b>Social Boldness (H)</b>	
<b>Low H:</b> Shy, socially timid, threat-sensitive, easily embarrassed. They find speaking in front of groups to be difficult, and may feel intimidated when facing stressful situations of an interpersonal nature. However, they may be sensitive listeners, who are more aware of risks in situations.	<b>High H:</b> Socially bold, outgoing, gregarious, and adventuresome. They tend to boldly initiate social contacts, be fearless in the face of new or intimidating social settings, and to be risk-takers seeking adventure. Extreme scorers may be thick-skinned or attention seeking.
<b>Sensitivity (I)</b>	
<b>Low I:</b> Tough, realistic, logical, unsentimental. They focus more on how things work than on aesthetics or refined sensibilities, and may be so concerned with utility and objectivity that they exclude emotions from consideration. Because they don't tend to allow vulnerability, extreme low scorers may have trouble in situations that demand awareness of feelings.	<b>High I:</b> Emotionally sensitive, intuitive, cultured, and sentimental. High scorers are attuned to sensitive feelings, and thus are empathetic, sympathetic, and tender-minded. They tend to be artistic and refined in their interests and tastes. Extreme scorers may be so focused on subjective aspects of situations that they overlook more functional aspects.
<b>Vigilance (L)</b>	
<b>Low L:</b> Trusting, unsuspecting and accepting. They tend to be easy-going and expect fair treatment and good intentions and trusting relationships from others. However, extremely low scorers may be taken advantage of because they do not give enough thought to others' motivations.	<b>High L:</b> Vigilant, suspicious, distrustful, wary. They tend to be attentive to others' motives and intentions and sensitive to being misunderstood or taken advantage of. They may be unable to relax their vigilance, and at the extreme their mistrust may have an aspect of animosity.

<b>Abstractedness (M)</b>	
<b>Low M:</b> Grounded, practical, concrete. They tend to focus on practical, observable realities of their environment and may be better at working on a specific solution than at imagining possible solutions. Extreme scorers may be so concrete in their focus, unimaginative, or literal that they "miss the forest for the trees."	<b>High M:</b> Abstracted, imaginative, idea-oriented, contemplative. They are more oriented to abstract ideas than to external facts and practicalities. Being focused on thinking, imagination and fantasy, high scorers generate many ideas and theories and are often creative. Extreme scorers can be so absorbed in thought that they can be absentminded and impractical.
<b>Privateness (N)</b>	
<b>Low N:</b> Forthright, self-revealing, transparent. They tend to be open, artless, and transparent. They are willing to talk about themselves readily, even about fairly personal matters. They tend to "put all their cards on the table", and to be genuine and unguarded. At the extreme, they may be forthright in situations where it might be more astute to be circumspect or tactful.	<b>High N:</b> Private, discreet, non-disclosing. They tend to be guarded, and reluctant to disclose personal information, and "play their hand close to their chest." They may be tactful, diplomatic and calculating regarding others' motives. At the extreme, they maintain their privacy at the expense of developing few close relationships.
<b>Apprehension (O)</b>	
<b>Low O:</b> Self-assured, unworried, and complacent. They tend to be self-confident and untroubled by self-doubt. While this may make them more resilient in stressful situations, at the extreme, the person's confidence may be unshaken, even in situations that call for self-evaluation and self-improvement. The extreme low score may reflect an avoidance of anything negative about the self.	<b>High O:</b> Apprehensive, self-doubting, guilt-prone. They tend to worry about things and to feel anxious and insecure. These feelings may be in response to current life events or they may be characteristic. While worrying can help the person anticipate dangers, be sensitive to others' reactions, and anticipate consequences of actions, it can also be painful and make a poor social impression on others.
<b>Openness to Change (Q1)</b>	
<b>Low Q1:</b> Traditional, attached to familiar, resistant to change. They tend to stick to traditional ways of doing things. They prefer what's predictable and routine, and so they don't tend to challenge the status quo. At the extreme, they may not initiate or be open to change, even when the situation calls for it.	<b>High Q1:</b> Open-to change, experimenting, freethinking. They tend to be open-minded and innovative, and seek ways to improve the status quo. They enjoy experimenting, and tend to think critically or question authority. Extreme scorers may find it hard to "leave well enough alone."
<b>Self-Reliance (Q2)</b>	
<b>Low Q2:</b> Group-oriented, affiliate. They tend to prefer being around other people, and enjoy social groups and working in teams. At the extreme, they may not be effective in situations where they need to function independently or where others are giving poor direction or advice.	<b>High Q2:</b> Self-reliant, solitary, individualistic. They enjoy spending time alone and prefer to rely on their own thinking and judgment. While self-reliant people are autonomous in their thoughts and actions, extreme scorers may be uncomfortable working collaboratively or neglect interpersonal consequences of their actions.
<b>Perfectionism (Q3)</b>	
<b>Low Q3:</b> Tolerates disorder, unexacting, casual, lax. They tend to be comfortable leaving things to chance, tending to be spontaneous rather than planful, organized, and structured. Extreme scorers may seem flexible and spontaneous, but they may also seem unorganized, unprepared, or undisciplined.	<b>High Q3:</b> Perfectionist, self-disciplined, goal-oriented. They tend to be organized, plan ahead, persevere, and work conscientiously. They are most effective in organized and structured situations, and may find it hard to deal with unpredictability. At the extreme, they may be seen as inflexible or preoccupied with tasks.
<b>Tension (Q4)</b>	
<b>Low Q4:</b> Relaxed, placid, tranquil, patient. They are laid back, easy-going, and composed. They are not easily upset or aroused, and frustrations rarely bother them. At the extreme, their low level of arousal can make them unmotivated. That is, because they are comfortable, they may be disinclined to change or push themselves.	<b>High Q4:</b> Tense, driven, high energy, impatient. They tend to have a lot of drive, to be high strung, and to be fidgety when made to wait. A certain amount of tension is necessary to focus effectively and can motivate action. However, extremely high tension can lead to impatience and irritability. The source of tension should be explored when scores are extremely high.

(Russell & Cattell, 2001)

**Secondary Order Factors of the 16 Personality Factor Questionnaire**

<b>Extraversion (EX)</b>	
<b>Introversion</b>	<b>Extraversion</b>
Low Scorers tend to value time spent alone or in solitary pursuits, being generally less inclined to seek out interaction with others. The introvert can have one or more of these qualities: personal aloofness and a tendency to make few close connections; caution, restraint and a tendency to take life seriously; an inclination to be shy or fearful about reaching out to others; discomfort about revealing personal information; and/or a preference for working alone and functioning autonomously.	High Scorers tend to be people oriented, to seek interaction with other and to value time spent with others, in social pursuits. The extravert can have one or more of these qualities: warm and a wish to feel close connections with people; a lively, stimulating social energy; comfort in the company of others; bold gregariousness; and/or a tendency to be forthright and self disclosing. A high EX score, however doesn't guarantee the relationship quality.
<b>Anxiety (AX)</b>	
<b>Low Anxiety</b>	<b>High Anxiety</b>
Low Scorers tend to be unperturbed by most events and less easily upset than most people. They can be: emotionally stable, facing life's challenges with calm and stability; trusting of others; unworried and self-assured; and/or relaxed and placid. Extremely low scorers may minimize the ways that life or personal limitations can pose stress or challenges, or may be so comfortable that they are not motivated to change.	High Scorers tend to be more easily upset by events; they are more perturbed, both by internal thoughts feelings as well as by external event: This may be characteristic or may be due to current life stress. Anxious people can experience one or more of the following: feeling overwhelmed unable to cope with day-to-day living; being suspicious or doubting of others worrying and self-doubting; and/or feeling tense, driven, or frustrated.
<b>Tough-Mindedness (TM)</b>	
<b>Receptivity</b>	<b>Tough-Mindedness</b>
Low Scorers tend to be open to feelings, imagination, people, and new ideas. Their approach may focus on: emotional and aesthetic sensibilities; ideas and thoughts, especially imaginative ones; caring connections with people; or experimenting and trying new approaches. They may overlook the need to be practical, objective, or realistic in dealing with the world.	High Scorers tend to prefer logical, realistic solutions. They may focus on objectivity (as opposed to sentimentality); practical, concrete things rather than abstract ideas or theories; keeping things on an impersonal level; and valuing methods that are traditional and proven. Extreme tough-mindedness may result in resolute entrenchment and avoidance of new or imaginative approaches.
<b>Independence (IN)</b>	
<b>Accommodation</b>	<b>Independence</b>
Low Scorers tend to be agreeable and accommodating to other people and external influences rather than being self-determining. They may be uncomfortable in situations that call for independence or assertiveness. Low scorers have varying degrees of deference, cooperation, shyness, trust, and adherence to the status quo. Their ability to accommodate others' wishes often comes at their own expense, and may frustrate others who desire more active participation from them.	High Scorers tend to take charge of situations and to influence others rather than be influenced. Their active stand on life can include one or more of the elements: dominance and an unwillingness to acquiesce; social boldness and fearlessness; skepticism of others, especially about being controlled; and willingness to question and improve on the status quo. High scorers can be seen as disagreeable by others who feel challenged or controlled. They may find it hard to accommodate others when it is important to do so.
<b>Self-Control (SC)</b>	
<b>Lack of Restraint</b>	<b>Self-Control</b>
Low Scorers are unrestrained and tend to have fewer resources for controlling their behavior. They may find it hard to place limits on their own urges or to focus their attention. They may be: spontaneous, carefree or impulsive; non-conforming, or inattentive to rules and regulations; so caught up in internal thoughts that they don't focus on practicalities; or so undisciplined and casual that they do not plan, organize, or persevere. While perceived as flexible, playful and casual, low scorers can also be seen as unreliable, expedient, or careless.	High Scorers are conscientious and have substantial resources for controlling their behavior and meeting their responsibilities. These resources may include one or more of these qualities: being cautious, restrained, conforming, or inattentive to rules and taking matters seriously; placing regulations; so caught up in internal importance on following rules and meeting expectations; being practically focused, and realistic; being self-disciplined, goal-oriented, and organized. While they tend to be seen as conscientious, responsible, and reliable, high scorers can also be seen as over-controlled -- that is, too serious.

(Russell & Cattell, 2001)

## Annexure B

Article:

The Construct Validity of the First View™ for Selection Purposes in  
South Africa

**THE CONSTRUCT VALIDITY OF THE FIRST VIEW™ FOR SELECTION  
PURPOSES IN SOUTH AFRICA**

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**ABSTRACT**

The purpose of this study was to assess the construct validity of the First View™ for selection purposes in South Africa. The 16 Personality Factor Questionnaire, Differential Aptitude Test and First View™ were administered to a sample of 229 respondents and compared with each other. First View™ showed construct validity and usefulness as a selection tool. The results also indicate high reliability scores. The findings and implications of the study are discussed.

**OPSOMMING**

Die doel van hierdie studie was om die konstruktiviteit van First View™ vir keuringsdoeleindes in Suid Afrika te bepaal. Die 16 Persoonlikheidsfaktor Vraelys, Differentiële Aanleg Toets en First View™ is op 'n steekproef van 229 repondente afgeneem. Die toetstellings is met mekaar vergelyk. Daar is bevind dat First View™ hoë konstruktiviteit toon sowel as bruikbaarheid as 'n keuringsinstrument. Die resultate toon ook hoë betroubaarheidstellings. Die bevindinge en die implikasies van die studie word bespreek.

In the modern world, organisations need the correct ingredients to stay ahead of competitors. Because of difficult economic and demographical situations, organisations in South Africa are required to work with fewer personnel, but still function optimally. In an article in Works Management, Emma Collins from Aerolaminates states that the key priority of a company should be to select the right type of people (Anon, 2001).

Positioning the right kind of person in the right position has always been a major issue for organizations. If not done properly individuals can be misplaced and this will have major cost implications (Muller & Schepers, 2003). Replacing personnel is one of the most expensive business activities (Bullard, 2001).

According to Gatewood and Field (1990) selection can be seen as a process of collecting and evaluating information about individuals in order to extend offers of employment to them. Choosing the right people to fill jobs is one of the most important responsibilities of any manager. Organisational effectiveness is seen as a function of individual qualifications, including skills, abilities and knowledge and the effects of organisational factors like climate and nature of tasks on individual performance (Dachler, 1989).

Boerlisjst and Meijboom (1989) see selection as matching a person to a job. Active matching is an intervention to obtain a good fit in both the short and long term. This good fit will imply that active adjustments are made to the organization and the individual (Boerlisjst & Meijboom, 1989).

Goodstein (2001) is of opinion that it is impossible to evaluate the person job match, without understanding both the person and the job. Activities to better understand the job will include job analysis while psychometric testing, which is concerned with the measurement of mental qualities (Bethell- Fox, 1989), will be included in the matching activity in order to understand the person better.

We find different types of tests to use in selection; the first is cognitive tests and the second personality. If used correctly, selection will be successful and ensure that organizations have personnel with high abilities and maintain high productivity and low turnover (Hunter & Hunter, 1984).

### Cognitive Ability Testing in Selection

Intelligence and cognitive ability are concepts with which psychologists are familiar with and the measuring of these constructs have been around for years. Cognitive ability can be subdivided into a variety of sub-constructs including general intelligence, verbal and nonverbal ability, numerical and spatial relation and mechanical knowledge (Cascio, 1998).

Extensive research has shown that general intellectual ability is a good method to forecast job success because it has a strong effect on job knowledge and contributes to the individual being given an opportunity to acquire experience (Cascio, 1998). Salgado, Anderson, Moscoso, Bertua and De Fruyt (2003), state that cognitive ability is a valid predictor across criteria, samples and occupations. Ability is highly correlated with job knowledge and job knowledge is correlated with performance (Hunter, 1986).

According to Muller and Schepers (2003) researchers see cognitive ability measures as the primary predictor in the selection process, with other measures such as personality and biographical data as supplements. Outtz (2002) agrees with this, according to him the reason for this is the comparable levels of validity of ability measures.

Great consideration must however go into the decision to make use of general cognitive measurements during selection. The goal of selection is to evaluate and find a person that fits the job; therefore there must be a good reason to measure the cognitive ability of a person.

### Personality Measurement in Selection

The idea of a person's personality relating in a meaningful manner to the kind of career he chooses and how he then performs in this career has been part of career psychology for many years (Van Rensburg, Rothmann & Rothmann, 2001).

Meyer, Moore and Viljoen (1997) define personality as the continuous changing, but relatively stable organisation of all physical, mental and spiritual characteristics of the individual, that determines behaviour. These characteristics are interacting in the context in which the individual finds himself.

The development of personality instruments is parallel with the development of intelligence instruments. The first psychological assessment of personality was used during the First World War (Murphy & Davidshofer, 2001). However, measures could only assess up unto a certain level. Development continued to such an extent that organisations around the world agreed that there were certain personality traits that remain stable throughout a person's life. Instruments that could accurately measure these personality traits in the population of job seekers were designed, making it possible to select the individuals with the traits that most closely correlated with the ones required for success in a particular job.

Personality traits can, like cognitive ability, make a significant contribution towards predicting performance. It must be kept in mind that different traits will contribute to different occupations. While cognitive ability is a good predictor of technical competence, personality would add meaning to the measurement of people requirements. The biggest problem researchers experience with personality is not that it adds value, but that it is extremely difficult to measure (Day and Silverman, 1989).

Like Guion and Gibson (1988) most psychologists see personality as more useful if it is narrowed to consistencies in behavioural patterns that are relevant to the work that needs to be done. This is also the reason for using a framework like the Big Five Personality Factors. The big five factors (extraversion, neuroticism, openness to experience, agreeableness and conscientiousness) have been the basis for the development of personality questionnaires, and have shown consistent factor structure in multiple investigations (Schmit & Ryan, 1993).

The Big Five Personality Factors has made it possible for industrial psychologists to determine whether a meaningful relationship exist between particular personality constructs and job performance. Extensive research has been done on all of the Big Five Factors, but three of the factors have shown to be relevant in selection. These are neuroticism, extraversion and conscientiousness.

Conscientiousness is the one factor that has proved to be related to successful job performance, regardless the nature of the job (Goodstein, 2001). In their research, Barrick and Mount (1991) proved that conscientiousness can be related to job performance because it assess personal characteristics such as persistency and carefulness that is important in accomplishing tasks in all jobs.

Rothmann and Coetzer, (2003) see neuroticism as the second most important characteristics that affect the employability of candidates as it can be directly linked to job performance. Agreeableness was found to be a significant predictor of job performance, because it is related to training success (Salgado et al, 2003).

Barrick and Mount (1991) is of opinion that for the same reason, that of training proficiency, openness to experience can be a valid predictor. Some researchers differ from Barrick and Mount in that they say openness to experience is not a valid predictor. Extraversion and agreeableness will be valid predictors in occupations where frequent interaction is expected of personnel, like managers and sales (Barrick and Mount, 1991).

The Big Five is very important in selection and its usefulness has been established. It is however important to remember that some factors will predict job performance better in some occupations than in others (Barrick & Mount, 1991). Van der Walt, Meiring, Rothmann and Barrick (2002) found that these factors will predict better for samples that require more education. Any user of the Big Five should be cautious not to replace the personality measures with it, but as McCrae and Costa (1989), use it to serve as framework for interpretation.

People chosen for a position on cognitive ability would differ from people chosen on personality, because of a difference in attribute profile. The personality employees will achieve in overall performance by being more dependable, attentive, and helpful, while the cognitive employees might achieve in performance by being more accurate, faster, and effective problem solvers (Kehoe, 2002). The goal is to find some one who fits the job not only on a cognitive level but whose personality will fit into the organisation.

Even with all the benefits of personality and cognitive measurements, when combining the two for selection, it becomes time consuming and expensive. The main issue in South Africa on the use of Psychometric testing during selection is that the method of selection must be fair and open to all in such a diverse country. In being a fair instrument, it is important that the test battery is designed to discriminate between candidates with higher and lower abilities on certain criteria, and not according to race, gender or age (Cascio, 1998).

In most countries, applicants are protected against unfair discrimination. The labour law of South Africa makes it difficult to dismiss unsuitable employees (Bullard, 2001). Before we can use an instrument for selection purposes, it must be fair, and to be fair, the test must be valid, reliable and of relevance in the selection criterion (Muller & Schepers, 2003).

To find such a product one must understand the meaning and importance of the abovementioned concepts. Reliability can be defined as the proportion of true variance at observed variance. The true score cannot be directly observed because of errors of measurement (Moser and Shuler, 1989).

According to Owen (2000) the validity of an instrument is the extent to which the test actually measures what it is supposed to measure. Validation must be done in relation to the purpose for which the test is used (Muller & Schepers, 2003). Validation can be measured through various methods and can be categorised into four types, content, construct, predictive and concurrent validity. (Murphy & Davidshofer, 2001).

One might question the reason for the strong emphasis placed on construct validity in this study, when clearly a project such as this should focus on predictive validity, seeing that selection is a process by which an organisation tries to identify a person that matches specific job requirements and will be able to perform. Predictive validity will indicate whether an instrument has the ability to predict future job performance and is therefore more useful during selection.

After much consideration, it was decided to firstly prove that First View™ measures the same constructs as existing selection tools, thus aiming to prove construct validity. Construct validation is a process where evidence of inferring a measures meaning is obtained, with its goal to determine whether test scores provide a good measure of a specific construct (Murphy & Davidshofer, 2001).

The process of construct validation begins with the formulation of hypotheses about the characteristics of those with high scores on a particular measurement procedure, in contrast to those with low scores (Cascio, 1998). In this case the hypothesis was whether a correlation would exist between First View™ and existing selection tools.

Bagozzi, Youjae and Phillips (1991) are of opinion that without assessing construct validity, one cannot estimate the confounding influences of random error and method variance. This may lead to ambiguous results of the theory testing and the hypotheses might be rejected. According to Neuman (2000), predictive validity is whereby an indicator predicts future events that are logically related to a construct. When evaluating the above statements one can understand the purpose of this study to establish the construct validity of the First View™ for selection purposes in South Africa.

## **METHOD**

### **Research Design**

Experimental Design can be seen as a plan or outline for conceptualizing the relations among the variables of a research study. It also implies how to control the research situation and how to analyze the data (Cascio, 1998).

Various designs exist in research and they vary in many ways. Neuman (2000) is of opinion that all designs are variations of the classical experimental design including quasi- experimental designs.

According to Cascio (1998) a number of quasi- experimental designs are offered. A design such as this normally has the rationale that the central purpose of any experiment is to eliminate alternative hypotheses that might lead to the same result. If a quasi- experimental design can eliminate some of these other hypotheses, then it is worth the effort. Neuman (2000) describes the quasi- experimental designs as a tool that assists researchers in the test for casual relationships in a variety of situations where the classical design is inappropriate.

The quasi- experimental design- factorial design, will be applied in this study, for the simple reason that more than one variable will be combined to form factors. According to Neuman (2000) attention will be given to the simultaneous effect of more than one independent variable.

### **Sample**

Two hundred and twenty nine (N=229) respondents (117 male and 111 female) were included in the study. The sample was drawn in two ways; firstly a convenient sample was drawn from different members of different organisations participating in Assessment Centres conducted by a local consultancy firm. Secondly the main sample for African respondents was drawn from The Mnambithi Further Education and Training College in Ladysmith, Kwa- Zulu Natal by means of random selection.

Statistics for the sample group are set out in Table 1. In total 220 respondents indicated their management level. Of these, 80,3% were junior managers, 13,5% middle managers, 0,9% senior managers and 3% is unknown. The sample predominantly consisted of white respondents (116); other respondents included Africans (88), Asians (6), Coloureds (9) and Indians (8).

In terms of language the sample consisted mostly out of Afrikaans speaking respondents (51,1%), other languages included English (12,7%), North Sotho (2,2%), South Sotho (1,7%), Swazi (0,4%), Tsonga (0,9%), Tswana (6,1%), Venda (0,4%), Xhosa (2,2%), Zulu (21,4%), and other languages (0,9%). 5,7% of respondents indicated an educational level of Grade 10 and below, 40,2% had Grade 12. 14,4% had a Post Matric Certificate, 30,1% had degree or three year diploma and 7,9% had post graduate training. In terms of job category the distribution was Healthcare (9), Customer Service (9), Engineers (19), Management (56), IT (25), Hospital (26), Finances (3), Admin (42), Other (1) and Personal Sales (39).

**Table 1**  
**Sample Statistics**

		Frequency	Percent	Valid Percent	Cumulative Percent
<b>Management Level</b>					
Valid	Junior	184	80,3	83,6	83,6
	Middle	31	13,5	14,1	97,7
	Senior	2	0,9	0,9	98,6
	Unknown	3	1,3	1,4	100,00
	Total	220	96,1	100,0	
Missing values		9	3,9		
Total		229	100,00		
<b>Gender</b>					
Valid	Male	117	51,1	51,1	51,1
	Female	111	48,5	48,5	99,6
Missing Values		1	0,4	0,4	100,0
Total		229	100,0	100,0	
<b>Race</b>					
Valid	African	88	38,4	38,4	38,4
	Asian	6	2,6	2,6	41,0
	Coloured	9	3,9	3,9	45,0
	Indian	8	3,5	3,5	48,5
	White	116	50,7	50,7	99,1
	Other	1	0,4	0,4	99,6
	Unknown	1	0,4	0,4	100,0
Total		229	100,0	100,0	

<b>Language</b>					
Valid	Afrikaans	117	51,1	51,1	51,1
	English	29	12,7	12,7	63,8
	North Sotho	5	2,2	2,2	65,9
	South Sotho	4	1,7	1,7	67,7
	Swazi	1	0,4	0,4	68,1
	Tsonga	2	0,9	0,9	69,0
	Tswana	14	6,1	6,1	75,1
	Venda	1	0,4	0,4	75,5
	Xhosa	5	2,2	2,2	77,7
	Zulu	49	21,4	21,4	99,1
	Other	2	0,9	0,9	100,0
Total		229	100,0	100,0	
<b>Education Level</b>					
Valid	Healthcare	9	3,9	3,9	3,9
	Customer Service	9	3,9	3,9	7,9
	Engineer	19	8,3	8,3	16,2
	Management	56	24,5	24,5	40,6
	IT	25	10,9	10,9	51,5
	Hospital	26	11,4	11,4	62,9
	Finances	3	1,3	1,3	64,2
	Administration	42	18,3	18,3	82,5
	Other	1	0,4	0,4	83,0
	Personal sales	39	17,0	17,0	100,0
	Total		229	100,0	100,0

### **Data Analysis**

The statistical techniques used included descriptive statistics, where the means and standard deviations were calculated. Pearson correlations and canonical correlations were calculated to analyse the simultaneous relationship between the multiple independent and dependent variables that formed part of the study. Multiple regression analysis was used to determine the significance of the relationship between the multiple independent variables and the composite dependent variable which was used.

The main difference between multiple regression and canonical correlation is that in multiple regression there is only one combination of variables, because there is only a single variable to predict on the other side of the equation. In canonical correlation, however, there may be several variables on both sides and there may be several ways to recombine the variables on both sides to relate to each other (Tabachnick & Fidell, 1998).

## **Measuring Instruments**

### Differential Aptitude Test

The Differential Aptitude Test (DAT) is an aptitude or ability test. According to the Human Science Research Council (HSRC), previous provider of the DAT, aptitude can be seen as the potential a person has which will enable them to achieve a certain level of ability with a given amount of training and practice (Owen & Vosloo, 1999). Thus the aim of DAT is “to provide information on adults who want to undergo tertiary training or gain entry to particular high- level occupations, especially with a view to selection for tertiary training and specific occupations.”(Owen & Vosloo, 1999)

DAT is aimed at measuring specific intellectual abilities and not general cognitive ability. Fouché and Verwey (1998) found that general mental ability can be measured by means of measuring verbal and nonverbal reasoning, arithmetical ability and three- dimensional spatial perceptual ability. Thus, in practice it has been found that the test does not necessarily need to be administered as a whole, subtests can be used individually. For the purpose of this study only these four sub tests were used:

#### *Test 2: Verbal Reasoning*

Aimed at measuring an aspect of general reasoning on the basis of verbal material, this test rests on the assumption that vocabulary background and the ability to determine relationships and solve general problems is an indication of general reasoning. Test 2 consists of 25 items and a 15 minutes time limit (Owen & Vosloo, 1999).

*Test 3: Non Verbal Reasoning: Figures*

The aim of test 3 is to measure an aspect of general reasoning on the basis of non verbal reasoning. It assumes that being able to see the relationships between figures, identify an appropriate missing figure and following the changes a figure undergoes is a valid indication of non verbal reasoning ability. This test consists of 25 items and has a time limit of 11 minutes (Owen & Vosloo, 1999).

*Test 4: Calculations*

Test 4 measures the arithmetical ability of the candidate and rests on the assumption that the learner's ability to do mechanical calculations and to solve arithmetical problems provides a valid indication of their ability. The test consists of 25 items and has a 20 minute time limit (Owen & Vosloo, 1999).

*Test 8: Spatial Visualization 3-D*

The aim of test 8 is to measure the 3D spatial perceptual ability of the candidate. It is based on the assumption that the ability of a person to manipulate a cube mentally is a valid criterion for spatial visualization. Test 8 consists of 30 items that are divided into three sections and has a 12 minute time limit (Owen & Vosloo, 1999).

The reliability of the DAT was determined with the Kuder Richardson Formula. Scores on the four tests that were used for this study, vary from 0,79 to 0,85. This means that the degree of accuracy and consistency of the DAT is very good (Coetzee & Vosloo, 2000).

Validity of the DAT was established by making use of the inter-test method. The correlations are calculated between the scores of the different tests of the battery and then between the mentioned scores and those of an external test. From a factor analysis two factors were extracted. Factor one referred to verbal reasoning and scores varied from 0,38 to 0,66. The second factor referred to non- verbal reasoning and scores of the four tests varied from 0, 48 to 0,65. (Coetzee & Vosloo, 2000) The authors do however mention that the two factors correlate 0,74 to each other and therefore we can say that the battery measures an individuals ability to reason inductively as well as deductively. (Coetzee & Vosloo, 2000)

### 16 Personality Factor Questionnaire

Raymond Cattell, developer of the 16 PF, believed a good personality instrument should measure the most fundamental dimensions of personality. The 16 Personality Factor Questionnaire was first published in 1949 (Murphy et al, 2001). Today it is a well used, self report personality questionnaire that is used across the world and provides a comprehensive measurement of the domain of normal personality functioning (Bolton, 1985).

The 16 PF- SA 92 consists of 185 items, which are measured on a three point Likert Scale, making up the 16 Primary Factors (warmth, reasoning, emotional stability, dominance, liveliness, rule-consciousness, social boldness, sensitivity, vigilance, abstractedness, privateness, apprehension, openness to change, self-reliance, perfectionism and tension).

Interdependent relations exist between the items but there is no overlapping. Scores are bipolar, meaning that significance can be connected to both high and low scores. Cattell also identified five secondary factors that explain the broad aspects of personality. They are Extraversion, Anxiety, Tough Mindedness, Independence and Self Control. These factors are directly related to the Big Five Personality Factors and suitable to be used in this research.

Research has shown that the 16 PF- SA 92 is one of the best instruments and that validity and reliability is very high. According to Prinsloo (1992) during the standardisation process of the 16 PF- SA 92, factor reliability increased dramatically. Fouche and Rothmann (2000) indicate increases from 0,58 to 0,88. He further comments on the validity by saying that factor analysis provided the same structure as in the past. The 16 PF- SA 92, is the standardised form for South African conditions (Cattell, Eber & Tatsuoke, 1992).

### First View™

First View™ is a psychometric instrument that can be used in selection procedures to determine job performance. In core, the instrument measures fundamental interpersonal competencies that are directly related to job success (Goodstein & Lanyon, 2002). The instrument was developed through an integrated process where a team of specialists and professionals worked in a cross functional manner.

First View™ is an exceptional tool in the sense that it incorporates two constructs into one instrument. The cognitive and personal scale can provide the manager with a holistic view of the individual, enabling him to make the most informed and correct decision (Goodstein & Lanyon, 2002).

According to Goodstein (2001) the cognitive scale is based on Guilford's Structure of Intellect that assumes that cognitive ability is best understood as a composite of several separate abilities. Only two abilities were selected out of the nine, stated in Guilford's model. The first, being fluid intelligence/reasoning, the second, quantitative reasoning (Goodstein, 2001).

Fluid Reasoning can be further sub- divided into general sequential reasoning, induction and speed of reasoning. Quantitative reasoning is divided into quantitative reasoning and mathematical reasoning. The Final version of the cognitive scale consists of 25 items with a time limit of 6 minutes.

Developers of First View™ loosely based the personality scale on the Big Five. It does however have a sharper focus on job-related behaviour. Because both First View™ and 16 PF are based on the Big Five the 16 PF- SA 92 secondary order factors proved to be ideal for the research. Extraversion was separated into two facets, extraversion and assertiveness and the other factors were relabelled to be more business oriented as seen in Table 2 (Goodstein, 2001).

**Table 2**  
**Constructs of Personal Scale**

<b>Construct Name</b>	<b>Definition</b>	<b>Related to Big Five</b>
Extroversion	The need to work with others, communications of enthusiasm and ability to talk and listen	Extroversion
Rules	Consistency, ability to deal with change, need for structure, ability to follow rules and policies	Openness to Experience
Assertiveness	Decision making, selling and closing ability, ability to handle confrontation, willingness to take direction from others	Extroversion
Teaming	Teamwork, collaboration with others, competitiveness	Agreeableness
Organisation	Planning, spontaneity, time management attitudes, ability to handle details	Conscientiousness
Sensitivity	Emotional stability, handling of criticism and feedback, dealing with stress	Neuroticism

(Goodstein, 2001)

These constructs, that will now be called ERATOS, are all well known in psychological circles and were not picked for any specific reason. Each of these traits has significant meaning when it comes to performance in the workplace. The development of these constructs was based on well established foundations of previous research.

The test consists of 48 items- 8 items for each construct. An additional 8 items were included to constitute a validity scale which intended to tap the tendency to present an overly positive or negative self image (Goodstein, 2001).

For the cognitive scale the obtained Cronbach *alpha*, a measurement of reliability was 0,749 for a sample of 73 subjects, indicating a high degree of internal consistency (Goodstein, 2001). A Cronbach *alpha* was computed for each of the six ERATOS scales from the same sample. This indicated scores between 0,68 and 0,83, showing that the personal scale has acceptable reliability (Goodstein, 2001).

For the measurement of validity, developers made use of both content and construct validity. The focus of the cognitive scale provided enough support for content validity. First View™ cognitive scale was then correlated with the Form I of the Wonderlic Personnel Test. This instrument is an American instrument designed for the employer. It contains 50 items and has a 12 minute time limit. The instrument measures an individual's ability to learn, adapt, solve problems and understand instructions. The correlation obtained from 64 respondents was 0,62 (Goodstein, 2001).

The clear definitions provided with the ERATOS construct in the personal scale with the eight items measuring for each scale was enough to be a representative sample of the construct and reasonable grounds to establish content validity (Goodstein, 2001). Construct validity was established by correlating the constructs with their corresponding scales of Total View™ an instrument developed by Dr D Bartram that is being used widely in the US. According to Bartram, Total View™ is an assessment system that can match work related characteristics of people and the requirements of a position, by measuring an individual's interests, ability and personality. Scores varied between -0,323 and 0,696 (Goodstein, 2001). This shows the personal scale as a valid measure.

### **Procedure**

The three psychometric tests were administered to two groups. The first were members from all management levels from different organisations and the second students from grade 12 and above in different study fields from one college in Kwa-Zulu Natal. Persons qualified in the field of Industrial Psychology administered the battery as per standardised method suggested by the different suppliers of the instruments.

The battery was administered by starting with the DAT tests 2-4 and test 8, the cognitive test of First View™ and then 16 PF- SA 92 and First View™ personality component, in no particular order. Instructions for all the tests were read from the manuals provided by suppliers.

Examples for all tests were presented before each test for respondents to practise in order to ensure that they had understood the instructions and therefore can perform optimally in the test. Biographical details such as management level, gender, race, and language and education level were recorded and data from all tests were available for a final sample of 229.

## Results

Cronbach's Alpha was used to calculate the reliability scores of First View™. As seen in Table 3, scores were calculated for each construct and then calculated for the cognitive scale as a whole. In the personal scale reliability scores varied from 0,73 for sensitivity to 0,26 for teaming. This means that the degree of accuracy for teaming is very low and unacceptable; one can therefore never determine an accurate level of team cooperation with this instrument. The rest of the constructs are low but can be considered as acceptable. The cognitive scale showed relatively low scores, excluding sequential reasoning (0,677). The cognitive scale is however used as a combined scale of these four components. This combined score shows high reliability of 0,805.

**Table 3**  
**Cronbach's Alpha for First View™ Constructs**

Construct	N	Number of Items	Cronbach's Alpha
Assertiveness	229	8	0,580
Extraversion	229	8	0,608
Organisation	229	8	0,631
Rules	229	8	0,588
Sensitivity	229	8	0,723
Teaming	229	8	0,264
Inductive Reasoning	229	8	0,405
Quantitative Reasoning	229	3	0,325
Sequential Reasoning	229	10	0,677
Mathematical Reasoning	229	4	0,492
Cognitive Scale	229	25	0,805

The results of the canonical correlation analysis are set out in Table 4. From the six variants four were statistically significant and the last two variants were not significant (0,052 and 0,498).

Variant 1 was clearly interpretable with the positive loadings on the independent variable, extraversion (0,790) and the high loadings on the dependent variables assertiveness (0,785) and extroversion (0,722). A correlation between extraversion and assertiveness could be expected seeing that extroverts are prone to be being assertive. It is clear that variant 1 is related to extroversion, thus the negative loading on anxiety (-0,789), sensitivity (-0,733) and emotional sensitivity (-0,684). Extraverts will not be prone to experience high levels of anxiety.

The results of variant 2 and 3 could be expected. Variant 2 loaded positive on compulsivity (0,645) and tough poise (0,680). Negative loadings were found on the independent variables, anxiety (-0,533), emotional sensitivity (-0,638) and the dependent variable sensitivity (-0,596). Thus variant 2 cannot be related to feelings of anxiety and sensitivity, but would rather give an indication of more compulsive behaviour. Variant 3 did not show any significantly positive loadings on the independent variables, it did however load high on the dependent variable organisation (0,834) and rules (0,819). A negative loading was found on the independent variables with independent (-0,533). Variant 3 can be related to people who are prone to like a structured environment and functioning independently would pose to be a problem.

The results of variant 4 indicated a negative loading on the dependent variable teaming (-0,805) while the loading on the independent variable, independent (0,476) was expected. The other high loading was on the dependent variable assertiveness (0,475). Variant 4 then clearly relates to independent people who will dislike a situation where teamwork is expected of them. If a person scores high on independence, it can be expected that team functioning will not be good.

The independent variables explained on average 31,56% and 34,13% of the X component of variants 1 and 2 respectively. The dependant variables explained on average, 16,75% of the Y component of the first variant. The canonical correlation between the X and Y components was  $r = 0,760$ . Furthermore it seems that the independent variables explained, on average 28,98% of the Y component. The dependant variables explained 18,24% of the X component.

**TABLE 4**  
**CANONICAL CORRELATION OF THE PREDICTOR (TESTS) WITH THE CRITERIA**

		Correlations of original measure with Canonical Correlation						
		Variant 1	Variant 2	Variant 3	Variant 4	Variant 5	Variant 6	
<b>Independent Variables (X – component)</b>								
1	Extraversion	0,790	-0,500	0,351	0,049	-0,005	0,009	
2	Anxiety	-0,789	-0,533	0,213	0,165	-0,135	0,045	
3	Emotional Sensitivity	-0,684	-0,638	0,146	0,067	0,096	-0,301	
4	Independent	0,111	-0,478	-0,533	0,476	-0,271	-0,418	
5	Compulsivity	0,408	0,645	0,483	0,339	-0,033	-0,262	
6	Tough poise	0,013	0,680	-0,167	0,353	0,064	0,617	
	<b>Average percentage variance</b>	31,56%	34,13%	12,25%	8,34%	1,76%	11,93%	<b>Total 99,97%</b>
	<b>Average percentage residue</b>	18,24%	14,81%	3,76%	0,71%	0,86%	0,75%	<b>Total 39,13%</b>
<b>Dependent Variables (Y – component)</b>								
6	Assertiveness	0,785	0,043	0,012	0,475	-0,035	-0,248	
7	Extroversion	0,722	-0,608	0,121	-0,078	-0,166	0,109	
8	Organization	-0,022	0,278	0,834	0,040	-0,472	0,007	
9	Rules	-0,081	0,097	0,819	0,040	0,406	0,381	
10	Sensitivity	-0,733	-0,596	0,151	0,074	0,064	-0,250	
11	Social Desirability	-0,583	-0,289	0,027	0,032	-0,297	0,460	
12	Teaming	0,083	0,043	0,191	-0,805	0,310	-0,201	
	<b>Average percentage variance reported</b>	28,98%	12,83%	20,57%	12,7%	8,63%	7,61%	<b>Total 91,32%</b>
	<b>Average percentage residue</b>	16,75%	5,57%	6,31%	1,08%	0,42%	0,04%	<b>Total 30,17%</b>
	<b>Canonical Correlation</b>	0,760	0,659	0,554	0,292	0,221	0,079	
	<b>Significance of F-value F-value ≤ 0.05</b>	0,000	0,000	0,000	0,001	0,052	0,498	

Pearson's Coefficient was calculated between the Secondary order factors or X components, and the ERATOS constructs or Y components. Statistically significant results were found between assertiveness and extraversion, confirming the results of variant 1 on the canonical correlation. The negative correlation between anxiety and assertiveness was expected as well as the low correlation with assertiveness and emotional sensitivity. As stated before, an extroverted person will be prone to higher levels of assertiveness and definitive lower levels of anxiety and sensitivity. Interesting correlation was the high positive correlation between sensitivity and anxiety, this correlation implies that sensitive people will be more prone to experience anxiety. The results, as shown in Table 5, indicate a similar pattern in the correlations as the canonical correlation, these results point toward possible construct validity.

**TABLE 5**  
**PEARSON CORRELATION BETWEEN X AND Y VARIANTS**

	<b>Extraversion</b>	<b>Anxiety</b>	<b>Emotional Sensitivity</b>	<b>Independent</b>	<b>Compulsivity</b>	<b>Tough poise</b>
Assertiveness	0,466**	-0,462**	-0,411**	0,125**	0,317**	0,062*
Extroversion	0,657**	-0,204**	-0,118**	0,212**	-0,011	-0,282**
Organisation	0,058*	0,030	-0,047	-0,302**	0,342**	0,045
Rules	0,079*	0,103**	0,068*	-0,310**	0,228**	-0,005
Sensitivity	-0,214**	0,668**	0,653**	0,096*	-0,428**	-0,292**
Teaming	0,061*	-0,091*	-0,050*	-0,187**	0,018	-0,086*

\*p≤ 0,05

\*\*p≤ 0,01

In order to analyse the relationship between the DAT subtests and the cognitive scale of First View™ the multiple regression technique was used. In a multiple regression analysis, several independent variables (instead of just one) are combined to predict a value on a dependent variable for each subject (Tabachnick & Fidell, 1989).

Table 6 is a reflection of the results obtained from the multiple regression. The results indicate that independent variable (the cognitive scale of First View™) loaded high on the DAT 2, DAT 3 and DAT 4. The loading on DAT 8 was not statistically significant.

Developers of First View™ claim that the cognitive scale measures general cognitive ability. From the results one can conclude that DAT 2, DAT 3 and DAT 4 measure cognitive ability and that DAT 8 being 3D spatial reasoning is not a necessity when measuring cognitive ability.

Further results indicated that the multiple correlation between the predictor (the independent variable) and the criteria (the dependent variables) was  $r = 0,717$ . This correlation has is statistically significant ( $F = 59,407$ ;  $p \leq 0,000$ ) and explains 51,5% of the variance of the total performance score.

**TABLE 6**  
**MULTIPLE REGRESSION ANALYSIS: ABILITY TEST BATTERY**

Variance Analysis: Predictor							
		Source of Variation	Sum of Squares	D.f.	Mean Square	F	P
Multiple R:	0,717	Regression	240,881	4	60,220	59,407	0,000
Multiple R Square	0,515						
Adjusted R Square	0,506	Residual	227,068	224	1,014		
Standard Error of the Estimate	1,006						
		Total	467,950				
Variables in the Regression Equation							
Independent Variable	Unstandardised Coefficient Beta	Standard Error	Standardised Coefficient Beta	T	P		
(Constant)	-0,084	0,198		-0,427	0,670		
DAT 2	0,068	0,022	0,226	3,065	0,002		
DAT 3	0,077	0,022	0,255	3,560	0,000		
DAT 4	0,070	0,019	0,274	3,711	0,000		
DAT 8	0,022	0,019	0,075	1,119	0,264		

## DISCUSSION

The aim of this study was to determine the construct validity of the First View™ in order to use it for selection purposes in South Africa. The sample of 229 respondents can be seen as small, but statistically significant and useful results that point toward construct validity were reported.

The results of this study point toward both construct validity and reliability of the instrument and one can conclude that it would serve as a valid measure of personality and cognitive ability and add value during selection.

The canonical correlation as well as the Pearson correlation showed a strong relationship between the independent and dependant variables. Specific correlations were found between extraversion and assertiveness, organisation and rules, and negative correlations between extraversion, assertiveness and anxiety. From the obtained results one can conclude that the 16PF SA-92 and the personal scale of First View™ show a positive interrelationship.

The multiple regression that analysed the relationship between the DAT and cognitive scale of First View™ indicated a significant relationship between the predictors and the composite criteria. The results indicated statistically significant results between three of the four DAT subtests, providing proof that verbal and non-verbal reasoning and calculations are a necessity when measuring general cognitive ability and that 3D spatial reasoning is not a necessity.

Organisations have realized that the continuance of business will depend on the quality of the human resources they possess and the management thereof (Boerlisjst & Meijboom, 1989). In many ways the concept of human resource management is still in its forming stages. It can be seen as a process that implies conscious and specific directing of human effort in the short and long term (Boerlisjst & Meijboom, 1989).

According to Dachler (1989) organisation's effectiveness is seen as a function of its human resources. In providing an organisation with effective, high functioning individuals, selection is one of the most important processes. It must however be a fair process that will discriminate between candidates with higher and lower abilities (Cascio, 1998). If this is indeed the case, the goal of selection, finding a person that will fit the job both cognitively and personally will be achieved. The results of this study show that First View™ can be a solution for organisations in order to reach this goal on a more cost effective way.

### **LIMITATIONS AND RECOMMENDATIONS**

It has been indicated that the number of African respondents that took part in the study made up less than half of the sample of 229 respondents. African respondents in this case include the races, African, Indian, Asian and Coloured. The sample size of African respondents made it impossible to draw inferences on the impact of culture and whether differences exist between the various cultural groups.

In a study such as this, one could make the inference that black woman would fail managerial selections more often because they would score higher on teaming and less on independence and assertiveness. Results such as these could be linked to the African culture, while white males would score less on teaming, more on assertiveness and organisation due to cultural influences. These inferences could not be drawn because of the small sample of African respondents.

The abovementioned has a definite impact on whether First View™ can be seen as culture fair and its usefulness in South African Labour conditions. According to the Employment Equity Act, a psychometric instrument must be valid for respondents from different cultures. It is therefore recommended that further studies take place in order to determine if this instrument can really be used as a valid selection tool.

In the second sample drawn for this study, the language of First View™ became a problem. Some of the black respondents had difficulty understanding some of the words in the personality scale; this made it difficult for them to respond to the questions. The effect of language could have a direct impact on the reliability of scores obtained in the statistical analysis. It would be good to include future studies specifically on the lack of understanding of language and concepts.

The use of construct validity instead of predictive validity may be seen by some as a limitation of this study. In practice, when validating an instrument for selection purposes, the researcher will make use of predictive validity. Predictive validity will provide the researcher with information on whether the instrument is able to predict job performance.

For this study it was necessary to show that First View™ measures the same constructs as South African instruments commonly used during selection before one can establish its predictive validity. Therefore the use of construct validity in this study is not a limitation, but it is recommended that the predictive validity of First View™ is calculated.

First View™ is an instrument that, from a first study, may be useful in the South African context. However, more in-depth study is recommended before it is applied in selection and developmental purposes.

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