CHAPTER SIX

TALENT IDENTIFICATION: HISTORICAL AND CURRENT PRACTICES

6.1 INTRODUCTION

In the preceding chapters of this study, the impact of various factors and considerations on talent identification and development were discussed and reviewed. The discussion in chapter three focused on issues such as the continuous evolution of sport and the impact of this evolution on sport in general and rugby specifically. The assumption to be made from this continued evolution of sport is that the demands on talent identification and development may very well increase. It is after all, as Pearson *et al.* (2006) say, a case of there being a greater demand placed on talent identification and development due to the increased prominence of sport from a marketing and commercial perspective.

Chapter four reviewed the physical considerations of elite performance in sport and further dealt with the nature versus nurture argument, with the consensus being that this debate may never be resolved. Also discussed were the issues of maturation and the role that an optimum environment, such as the proper support from significant others, plays in the process of nurturing and developing talent. Specific talent development models and theories were also considered. In chapter five, psychological perspectives and excellence in sport were discussed and the case made (or strengthened) for the inclusion of these aspects into talent identification protocols that are normally dominated by a focus on the physical. What this sixth chapter serves to do is to provide a delineation of what has been, what is, and what is hoped for with regards to talent identification and development.

From the literature it is quite apparent that talent identification and development is currently a prominent concern (Hoare & Warr, 2000; Wolstencroft, 2002; Reilly & Gilbourne, 2003; Abbott *et al.,* 2005; Martindale *et al.,* 2005, 2007; Tranckle & Cushion, 2006). The importance and purpose of talent identification can be summed

up as follows: talent identification aims to find those individuals who have the most promise to succeed in the future, with a further consideration being the subsequent development of these promising youngsters so that they can reach their fullest potential (Williams & Reilly, 2000b; Abbott & Collins, 2002; Pearson *et al.,* 2006; Tranckle & Cushion, 2006; Button & Abbott, 2007; Vaeyens *et al.,* submitted).

Pienaar *et al.* (1998) underscore the importance of talent identification when they say that talent identification is a priority for modern sport. These sentiments are further confirmed by those who refer to talent identification and development as being priorities to sporting bodies, associations and elite programs (Hoare, 1998; Abbott & Collins, 2004; Pearson *et al.,* 2006; Williams & Richardson, 2006; Martindale *et al.,* 2007), and a concern to different countries (du Randt, 1992; Ackland & Bloomfield, 1996; Martindale *et al.,* 2007). Research on talent identification can be found in many sporting codes. The most recent studies include those on rugby (Plotz & Spamer, 2006; Spamer & De la Port, 2006), soccer (Vaeyens *et al.,* 2006), hockey (Elferink-Gemser *et al.,* 2007) and volleyball (Gabbett *et al.,* in press). Recent studies on rugby league (Gabbett, 2006) have also provided norm based information for selection.

An advantage of talent identification and subsequent development is that these can assist sporting organisations to effectively allocate valuable but scarce resources toward the development of those showing the most promise (Morris, 2000; Williams, 2000; Williams & Reilly, 2000b; Abbott & Collins, 2002, 2004; Pearson *et al.,* 2006; Button & Abbott, 2007) with an increase found in the establishment of elite player academies (Williams & Richardson, 2006; Button & Abbott, 2007). This establishment of elite academies also occurs in South Africa, where there are elite sporting academies for rugby and cricket. In fact, one sample group used for this study was from the elite TUKS Rugby Academy at the University of Pretoria.

Further considerations are those raised by Williams (2000), Williams and Reilly (2000b) and Williams and Richardson (2006) who make mention of the costs

involved with the purchase and transfer of players in soccer and the impact that this has on sporting clubs and organisations. Closer to home and specific to rugby; if one looks at the current exodus of experienced provincial and international rugby players from the SANZAR nations to the wealthy European rugby clubs, this is a problem with potentially great repercussions. Talent identification and the subsequent nurturing and development of talented individuals can and must be performed in an attempt to offset the overall effect of these factors

Talent identification is an evolutionary process and practice that greatly contributes to the identification, selection and development of talented (or those showing talent) individuals for the purpose of assisting these individuals in reaching their potential and to furthermore assist sporting organisations to effectively allocate their limited resources in the most productive and beneficial way.

This chapter serves to provide a broad-spectrum view of the historical development of talent identification as well as to highlight the current views, practices and suggested practices for the purpose of providing an as in-depth and up-to-date review of this practice and discipline as possible.

6.1.1 Chapter Outline

Section one: historical development of talent identification

This sub-section consists of two parts. The first part will provide a purely historical discussion of the traditional models that have been in use in talent identification studies worldwide. The most commonly used model and method in talent identification, called the Conceptual Model of Talent Identification (Régnier, 1987 in Régnier *et al.,* 1993) is also highlighted and discussed in this section. The second part will then discuss the historical development of talent identification in South Africa.

Section two: orientation of current study

This sub-section will provide a brief orientation as to the position of this current study with regards to the preceding models, approaches and methods of talent identification.

Section three: current day perspectives on talent identification

Since talent identification is a discipline that is constantly evolving, the current day perspectives and on talent identification will be provided. This takes place by providing a brief analysis of the ongoing critiques pertaining to talent identification as well as the possible solutions to these critiques. A further consideration highlighted in chapter four will also be provided, being the concept of including genetic testing in talent identification and sport.

Section four: SANZAR approaches to talent identification and development

This section provides an up-to-date review of the talent identification and development methods and approaches of the rugby playing countries of South Africa, New Zealand and Australia (SANZAR). In this section the methods of these three countries are discussed and contrasted with one another.

Section five: Summary

This section will provide a summary of the findings and discussions of this chapter.

6.2 HISTORICAL DEVELOPMENT OF TALENT IDENTIFICATION

There are two landmark studies that have focused on the models commonly used in talent identification (detection) over the years worldwide, and these are the studies of du Randt, (1992) and Régnier *et al.* (1993).

Of particular interest to the South African context have been the study of du Randt (1992) that was conducted in conjunction with a team of researchers, as well as the relevant sub-sections (du Randt & Headley, 1992b; 1992d) of this particular study, that have provided guidance and direction for a great deal of research into talent identification and development.

Studies such as Hare (1999), Spamer (1999), Booysen (2002), Van Gent (2003), Van Gent and Spamer (2005), Spamer and De la Port (2006), and others, have relied on the information, findings and recommendations of du Randt and Headley (1992b; 1992d), emphasising the incredible value of this study overall.

Other studies that have also reviewed the specific findings of Régnier *et al.* (1993) are Du Rand-Bush and Salmela (2001) that reviewed the original models in Régnier *et al.* (1993), and Wolstencroft (2002), who evaluated some of these models from the perspective of their efficacy as prediction models and their role within the greater context of talent development.

An associated problem with reviewing these models is the sheer abundance of information, since these studies reviewed twelve models (du Randt & Headley, 1992b) and ten models (Régnier *et al.,* 1993) respectively. As a consequence, guidance has been taken from the subsequent studies of Hare (1999), Spamer (1999) and Booysen (2002) who focused on five specific models. According to this guidance then, the models included in this section are those of Gimbel (1976), Harre (1982), Havlicek *et al.* (1982), Bompa (1985) and Régnier (1987).

Therefore, from the perspective of the talent identification models in this review, the basis and bulk of the discussion will be provided by du Randt and Headley (1992b) and Régnier *et al.* (1993), with further contribution from the other studies mentioned.

As an introduction to the analysis of the models in this section, the first step is to provide a description of the methods used to establish these models. Historically, there are two main methods commonly used by researchers in establishing these models, i.e.: the so-called “top down” approach and the “bottom-up” approach (Régnier *et al.,* 1993; Spamer, 1999; Booysen, 2002).

a) The “top down’” approach (also known as the devertical approach) is reliant on conventional science and accepted scientific methods of empirical data collection

(Régnier *et al.,* 1993; Hare, 1999; Spamer, 1999; Booysen, 2002). Associated with this approach are two of the more common research methods, i.e.: univariate studies (also known as single variable studies) and multivariate studies (also known as multivariable studies) (Régnier *et al.,* 1993; Spamer, 1999; Booysen, 2002).

The obvious disadvantage with univariate or a single variable studies is that only one variable is analysed when comparing talented versus less talented participants, and this approach is clearly insufficient. Multivariable studies eliminate the problems associated with single variable studies by analysing multiple variables and their impact on performance. Through multivariate analysis, the interactions between variables can be examined, as well as the relative impact of these variables on performance. This also allows for a proper statistical analysis of the variables under consideration (Régnier *et al.,* 1993; Spamer, 1999; Booysen, 2002). A common example of this kind of study is where talented and less talented sample groups are chosen and then measured according to variables such as sport-skill, physiology, morphology and others (Spamer, 1999; Booysen, 2002), with a subsequent discriminant analysis performed on the variables to determine if these do in fact distinguish between the more and less able participants (Régnier *et al.,* 1993).

Régnier *et al.* (1993) then further distinguish between unidisciplinary multivariate studies and multidisciplinary multivariate studies. Régnier's *et al.* (1993) motivation and reasoning behind multidisciplinary multivariate studies is most certainly sound; variables from only one discipline (unidisciplinary studies) are not able to explain the full variance in performance encountered in sport performance and research. Talent identification most certainly seems to be adopting a multidisciplinary, multivariate approach. This can be seen from the number of studies employing not only measures of physical and physiological variables, but also psychological variables, as chapter five shows.

In fact some of the studies (Reilly *et al.,* 2000b; Nieuwenhuis *et al.,* 2002; Falk *et al.,* 2004; Elferink-Gemser *et al.,* 2007) provided as examples in this section and

throughout the preceding chapters are not only multivariate in nature, but can also be described as being of a multidisciplinary nature as well, since they include testing for variables from the discipline of psychology, alongside physical and skills variables commonly tested by the sport science disciplines.

b) The "bottom-up" (also known as the evertical approach) has as central to its approach the process of ascertaining from top achievers themselves as to the specific aspects that they feel contribute towards achieving success in sport (Régnier *et al.,* 1993; Hare, 1999; Spamer, 1999; Booysen, 2002). This can be conducted through the use of questionnaires, by interviewing these individuals, or by applying protocol analysis (see chapter five for a description of this method) (Régnier *et al.,* 1993; Hare, 1999; Spamer, 1999; Booysen, 2002).

A potential problem of this approach highlighted by Hare (1999), Spamer (1999) and Booysen (2002), and attributed to the original concerns of Régnier *et al.* (1993), is that the results obtained from such an analysis can be questioned when too many variables are considered simultaneously. It is felt that this approach may be best suited for talent development, although this approach is nevertheless considered a suitable method of determining what principles underpin success.

To follow is a review of some talent identification and detection models. At this point it is important to note that in the literature, some of the models are referred to as talent detection models. These models are however primarily referred to as talent identification models throughout the course of this section, as was the practice in the other reviews of these models. An important note is also that this section is evaluating the *original reviews* of these models. The original models themselves, as contained in this section, *were not acquired* for this study.

6.2.1 Gimbel (1976)

This German model approaches talent identification from three perspectives. These include; 1) trainability (able to be coached); 2) motivational aspects, and; 3)

morphological and physiological considerations. This model emphasises the fact that talent consists of both environmental and genetic components and that these factors play a role in the child's development (du Randt & Headley, 1992b; Régnier *et al.,* 1993; Spamer, 1999; Hare, 1999; Durand-Bush & Salmela, 2001; Booysen, 2002).

In strengthening this view, Gimbel (1976) says that while the genetic make-up of the individual is essential to achieving excellence in sport, if the environment is not optimal for the development of the athlete, then these genetic attributes will be restrained from developing to their fullest potential (du Randt & Headley, 1992b; Régnier *et al.,* 1993; Durand-Bush and Salmela, 2001).

Gimbel (1976) states that peak performance in sport is achieved between the ages of 18 to 20 years, after about a decade of training, and that consequently athletes with promise need to be identified between the ages of eight or nine years of age, before they undergo their growth spurt (du Randt & Headley, 1992b; Régnier *et al.,* 1993; Spamer, 1999; Hare, 1999; Durand-Bush & Salmela, 2001; Booysen, 2002).

He is of the opinion that there are three major reasons why promising youngsters previously identified as talented do not attain success. Firstly, accurate predictions are difficult due to the biological age differences between children of the same age-group. The second reason is that test batteries used for prediction purposes are not objective, valid or reliable enough. His third reason is that he feels that the role that psychology can play in the prediction of talent is not sufficiently considered (du Randt & Headley, 1992b; Régnier *et al.,* 1993; Spamer, 1999; Durand-Bush & Salmela, 2001; Booysen, 2002).

Gimbel (1976) offers a four-stage model for talent identification as a solution to these problems. In the first stage, psychological, physical and morphological factors critical to performance are identified. In the second stage, children are tested according to these variables, with the results of these tests then used to guide or

channel these children towards development programs in the sports to which they are best suited (du Randt & Headley, 1992b; Régnier *et al.,* 1993; Spamer, 1999; Hare, 1999; Booysen, 2002).

In the third stage of his model, the children's progress needs to be regularly monitored over the next 12 to 24 months, while they partake in a development program. Lastly, in stage four and at the end of the development program, a prediction is made about the child's chances of being successful in their sport (du Randt & Headley, 1992b; Régnier *et al.,* 1993; Spamer, 1999; Hare, 1999; Booysen, 2002). Depending on the results of this prediction, the child will be directed toward either a recreational program or an intensive training and development program (du Randt & Headley, 1992b; Régnier *et al.,* 1993). A major advantage of this model is that late developers are properly accommodated (du Randt & Headley, 1992b; Régnier *et al.,* 1993; Spamer, 1999; Hare, 1999; Booysen, 2002).

6.2.2 Harre (1982)

Also of German origin, the model of Harre (1982) assumes that the only way a judgment can be made as to whether someone possesses the attributes needed to be successful is through first exposing them to a training program (du Randt & Headley, 1992b; Régnier *et al.,* 1993; Spamer, 1999; Hare, 1999; Durand-Bush & Salmela, 2001; Booysen, 2002). Accordingly, an initial consideration of talent identification is to put large numbers of youngsters through training programs (du Randt & Headley, 1992b; Régnier *et al.,* 1993; Durand-Bush & Salmela, 2001).

Another of Harre's (1982) assumptions was that is the athlete's social environment is an important constituent of talent identification and he therefore sees the role of social support and significant others, such as peers and family, as being of great significance in the identification and development of talent (du Randt & Headley, 1992b; Régnier *et al.,* 1993; Spamer, 1999; Hare, 1999; Booysen, 2002).

Harre (1982) goes on to define specific rules and principles for talent identification.

Rule 1: Talent identification consists of two stages. In the first stage, those youngsters exhibiting promise and general ability are identified. In the second stage, these youngsters are then classified according to the specific skills required by different types of sport (du Randt & Headley, 1992b; Régnier *et al.,* 1993; Spamer, 1999; Hare, 1999; Booysen, 2002; Wolstencroft, 2002). This classification is also carried out by means of tests that objectively measure the child's abilities (du Randt & Headley, 1992b; Régnier *et al.,* 1993; Hare, 1999; Spamer, 1999; Booysen, 2002) and is based on the observations made regarding the child's reaction to the training program, which serves as an indication of their capacity to improve (du Randt & Headley, 1992b; Régnier *et al.,* 1993).

Rule 2: The requirements for talent identification are that it is based on the important aspects that play a role in sport performance. These aspects must be determined primarily by heredity (du Randt & Headley, 1992b; Régnier *et al.,* 1993).

Rule 3: The abilities and characteristics by which these children are evaluated need to be considered with respect to their level of biological development (du Randt & Headley, 1992b; Régnier *et al.,* 1993; Hare, 1999; Spamer, 1999; Booysen, 2002).

Rule 4: Talent identification must further consider social and psychological variables, and not focus solely on physical variables (du Randt & Headley, 1992b; Régnier *et al.,* 1993; Hare, 1999; Spamer, 1999; Booysen, 2002).

Therefore, the two assumptions (i.e.: the social environment and the importance of training) and the four rules combine to form the core of this model. The model consists of two main stages. A general identification of the important components of performance, such as speed, height and others is performed in the first stage (du Randt & Headley, 1992b; Régnier *et al.,* 1993).

The second stage occurs during the junior training programs and is concerned with establishing and confirming the presence of sport capacity in the children. Four

indicators are used to determine the child's aptitude or talent for a sport, with the observations conducted while the child is participating in a sport-specific training program. The factors are; 1) their response to the demands of training; 2) the degree of improvement in their performance; 3) their level of performance that they achieve in the development program, and; 4) their overall stability in performance under different conditions. After the child has completed this program, a prediction is made regarding their chances of success in elite sport (du Randt & Headley, 1992b; Régnier *et al.,* 1993).

This model is regarded all round as probably one of the most conclusive talent identification models (Régnier *et al.,* 1993; Spamer, 1999; Hare, 1999; Booysen, 2002), with Spamer (1999) and Booysen (2002) saying that the only drawback of this model is that it does not allow for talent identification in a team sport setting. Du Randt and Headley (1992b) and Régnier *et al.* (1993) also point out that a great strength of this model is that it underlines the relationship between talent development and identification.

6.2.3 Havlicek *et al.* (1982)

This (then) Czechoslovakian model is also considered to be similar to the model of Harre (1982) and makes proposals and suggestions regarding a number of important principles for talent identification. The first principle that they mention is that the purpose of talent identification is to ensure that those who possess talent for a particular sport must train specifically for that sport. The next principle they propose consists of four steps. The first step of this principle is that gifted children must be identified in physical education classes (Régnier *et al.,* 1993; Spamer, 1999; Hare, 1999; Booysen, 2002). The steps after that entail the need to specialise in one "sports family" depending on the attributes and abilities of the individual, a subsequent specialisation in one sport, and then the prediction of success (Régnier *et al.,* 1993).

In their third principle they insist that while they call for specialisation in a sport, they are in fact against specialisation that is *too early*. In their fourth principle, they note their opinion that the criteria for identification need to be based on factors that have a strong, stable genetic influence. They go on to voice their view that it would be wrong to depend only on genetic factors in predicting performance (Régnier *et al.,* 1993; Spamer, 1999; Hare, 1999; Booysen, 2002), since they feel that through environmental improvements, such as enhanced training and living conditions, individuals can promote further adaptations in their performance and development (Régnier *et al.,* 1993).

Principle five stresses the multidimensional nature of sport and the need for all sports sciences to participate in talent identification, principle seven states that the need for a large pool population of potential participants, while principle ten mentions that talent identification needs to occur within a larger talent development framework (Régnier *et al.,* 1993; Spamer, 1999; Hare, 1999; Booysen, 2002). Another consideration of theirs, included in principle eight, is that talent identification must be performed as humanely as possible (Régnier *et al.,* 1993).

6.2.4 Bompa (1985)

Providing an Eastern European perspective on talent identification, Bompa (1985) lists the advantages of talent identification. These are; 1) that coaches get to instruct sports persons with more talent; 2) an increase in self confidence results if these individuals are chosen; 3) that these individuals take less time to reach top levels of performance, and; 4) that more athletes have the opportunity to reach international competition (Régnier *et al.,* 1993; Hare, 1999; Spamer, 1999; Booysen, 2002). Another advantage is that there are greater levels of homogeneity encountered in the athletes of a specific sport (Régnier *et al.,* 1993).

According to Bompa (1985), success in sport is dependent on three factors, i.e.: 1) physiological capacity; 2) morphological attributes, and; 3) motor capacity, that incorporates strength, power, endurance and perceptual-motor ability (Régnier *et al.,*

1993; Spamer, 1999; Hare, 1999; Booysen, 2002; Wolstencroft, 2002). But, this model does not consider psychological variables (Régnier *et al.,* 1993; Spamer, 1999; Hare, 1999; Booysen, 2002).

In describing the model of Bompa (1985) more in-depth, du Randt and Headley (1992b) include the following description:

Bompa's (1985) model consists of a primary, a secondary and a final phase of talent identification. The primary phase, occurring during the pre-puberty phase (three to eight years of age), consists of an examination by a physician to determine the general physical development and health of the individual. In this phase, only general information about the individual is ascertained (du Randt & Headley, 1992b).

Thereafter, the most important phase of this process to select participants is performed in the secondary phase of talent identification. This phase is conducted during and after puberty and is conducted on teenagers who have already undergone training, with the techniques used in this phase aimed at assessing the functional and biometric parameters of the individual. In this phase the effects of specialised training on the individual's development and growth are considered and sport psychologists are introduced, for the first time, to compile psychological profiles of the athletes (du Randt & Headley, 1992b).

In the final phase of talent identification, the focus shifts to potential candidates for the national team. In this phase, the aspects under consideration are the athlete's; 1) physiological adaptation to competition and training; 2) potential to improve even further in performance; 3) the athlete's health, and; 4) ability to deal and cope with stress. Bompa (1985) also maintains that there are ideal models in each sport, and that by adhering to this notion coaches and sport scientists can compare individual athlete's results with the idea model for that specific sport, with this aiding in the process of selection (du Randt and Headley, 1992b).

In their original review, Régnier *et al.* (1993) make mention of some problems associated with these models. These problems include the environment/heredity interplay, the ability of individuals to compensate their weaknesses in one area with strengths in another, talent surveillance versus detection or identification, and longitudinal studies. These will be briefly addressed with some aspects from earlier in this study provided within this discussion.

1) The issue regarding the interaction or interplay between the environment and heredity is regarded as being very important to talent identification research (Régnier *et al.,* 1993; Spamer, 1999; Booysen, 2002).

In chapter four, this specific issue was addressed at length. The developmental and environmental impact on talent development was evaluated, as was the nature versus nurture debate. This review consisted of providing heritability estimates that provide an overview of the impact of genetics on performance. Rebuttals were provided that presented the nurturist perspective on talent, and this incorporated the influence of practice and significant others on talent development.

The heritability estimates provided by Klissouras (2001), Hohmann and Seidel (2003), Klissouras *et al.* (2007) and others showed broad ranges of heritability for a number of physical performance factors and variables. Further, these studies emphasised the influence of development and the environment on the development of talent and excellence, with others (Simonton, 1999, 2001, 2005, 2006, 2007; Van Rossum & Gagné, 2005; Morgan & Giaccobi, 2006; Starkes, 2007) adopting a specific centrist or interactionist approach that also acknowledges the role of the environment, social support, genetics and others on the development of talent. This review also incorporated the most prominent (Bloom, 1985; Ericsson *et al.,* 1993; Côté, 1999) and recent (Button & Abbott, 2007; Côté *et al.,* 2007) models of talent and expertise development.

If a balanced perspective is to be adopted from the literature presented throughout the course of this study, then the general feeling is that genetics do play a role in talent, but that the development of this genetic endowment depends on adequate and meaningful practice, sufficient social support and psychological factors such as motivation, commitment and others. The overall views of Régnier *et al.* (1993) were also that there is an interaction between genes and the environment in the development of talent.

2) Another issue that demands attention and that is noted by Régnier *et al.* (1993:300) is what they refer to as *"The Compensation Phenomenon."* This concept assumes that success in sport is dependent on different attributes, skills, variables and capacities, and that these are found in individuals in different combinations. As an example of this, short individuals tend to perform better at gymnastics, yet there are gymnasts who are taller than the norm who still do well. It is therefore difficult to make predictions of success based on certain variables or attributes that a person may possess (Régnier *et al.,* 1993; Spamer, 1999; Durand-Bush & Salmela, 2001; Booysen, 2002). This position is further emphasised in that both Régnier *et al.* (1993:300) and Durand-Bush and Salmela (2001:272) cite the findings of Bartmus *et al.* (1987) that *"…no uniform tennis performance ability exists: Deficiencies in one area of performance can be compensated for by a high level in others."*

But, while this compensation phenomenon does promote a certain amount of caution, it is also clear that different sports types have specific requirements for success to be attained. Régnier and Salmela (1987) in Spamer (1999) and Salmela and Regnier (1983) in Booysen proved that gymnasts younger than twelve years of age needed power/strength and speed for successful participation. For their part, Régnier *et al.* (1993) and Durand-Bush and Salmela (2001) also refer to the findings of Régnier and Salmela (1987) who hold that these factors (power, speed, strength) sufficiently predicted performance, accounting for 100% of the performance variance at the age of twelve, but, that at the age of twenty, other variables such as anxiety,

spatial orientation and perceptual awareness were found to differentiate between gymnasts at the highest level of participation.

Régnier *et al.* (1993) and Durand-Bush and Salmela (2001) attributed these findings to the proper implementation of a task analysis that considers both physical as well as mental (psychological) attributes as contributors to performance, implying both a multidimensional and multivariate approach to talent identification. What these examples also emphasise is that while there might be specific performance determinants for successful participation in sport at a certain age, these determinants do change as time progresses, especially throughout adolescence.

3) Another consideration raised is that of talent surveillance. This concept relates to the feeling within research that the focus should shift from talent detection and identification to talent guidance and development (Régnier *et al.,* 1993; Durand-Bush & Salmela, 2001), with Spamer (1999) and Booysen (2002) interpreting this notion as a move toward combining talent identification and development.

Later in this chapter, it is shown that there are modern calls for a shift in emphasis toward talent development; in fact, some feel that development should be the overriding factor. The concession is made by this study that while talent identification and development contribute towards the success of each other, that development should probably be the overarching concern, with intermittent talent identification fulfilling a facilitative role in the process. These sentiments are in agreement with those of Régnier *et al.* (1993) and others later in this chapter. And as can be seen later in this chapter, the processes of identification (selection) and development operate hand-in-hand in the SANZAR nations, including South Africa.

4) There is a recommendation regarding longitudinal studies. Longitudinal talent identification studies are required if objective deductions are to be made. In these studies, the variables need to be regularly monitored over a period of three to ten years. The variables possessing a low hereditary component tend to be

unstable during these longitudinal studies, since environmental factors can influence these variables more readily (Régnier *et al.,* 1993; Spamer, 1999; Booysen, 2002).

There are brilliant examples of longitudinal studies that have been undertaken in talent identification and development, such as those of Pienaar and Spamer (1998), Hare (1999), Falk *et al.* (2004), Vaeyens *et al.* (2006), Elferink-Gemser *et al.* (2007) and Lidor *et al.* (2007). Plotz and Spamer (2006) also make mention of Spamer and Hare (2001) in this regard. And, still other notable studies, such as the studies of Van Gent (2003), Van Gent and Spamer (2005), have established prediction functions for different age-groups throughout the adolescent period. In addition to being a longitudinal study spanning five years, Vaeyens *et al.* (2006) also determined the specific characteristics and variables that discriminate between players at different age-groups throughout adolescence.

Before presenting the model of Régnier (1987), the principles that should guide talent identification models, as proposed by Régnier *et al.* (1993), are briefly listed. These are that; 1) talent identification must provide a long term prediction of success; 2) the determinants of performance need to have a strong hereditary influence, and; 3) talent detection and identification needs to occur within the larger framework of talent development (du Randt & Headley, 1992b; Régnier *et al.,* 1993).

Other principles are that; 4) the demands of different sports vary and therefore, the determinants and criteria for success in each sport need to be established; 5) a multidisciplinary approach must be adopted in talent identification, and; 6) performance determinants and requirements can improve with training and practice, and also change with age (du Randt & Headley, 1992b; Régnier *et al.,* 1993; Spamer, 1999; Booysen, 2002)

Régnier (1987) established these principles and designed his model to address the short comings that he had identified in the preceding models of talent identification

(du Randt & Headley, 1992b; Régnier *et al.,* 1993; Hare, 1999; Spamer, 1999; Booysen, 2002).

6.2.5 Conceptual model for talent identification

6.2.5.1 Régnier (1987)

The model of Régnier (1987) was developed for his doctoral dissertation. He based his model on orthodox/conventional science and incorporated the guiding principles of talent identification listed just prior. It has a broad, multidisciplinary and multivariate design, and is of great value to sport science and all sports disciplines (Régnier *et al.,* 1993). This model also provides a broad talent identification framework that can be applied to any type of sport (du Randt & Headley, 1992b; Régnier *et al.,* 1993; Hare, 1999; Durand-Bush & Salmela, 2001). As a consequence, the model of Régnier (1987) has been used in sports such as gymnastics and baseball (Regnier *et al.,* 1993; Hare, 1999; Spamer, 1999; Durand-Bush & Salmela, 2001; Booysen 2002). An added benefit of this model is that it can successfully be applied to team sports, as noted by Hare (1999), Spamer (1999) and Booysen (2002) who refer to the studies done by Pienaar and Spamer (1997; 1998) on rugby.

There are two main phases to this model. The first phase consists of a task analysis to determine the performance criteria or sport-specific requirements for success. The second phase consists of another task analysis to analyse the determinants of performance (du Randt & Headley, 1992b; Régnier *et al.,* 1993; Hare, 1999; Spamer, 1999; Booysen, 2002).

Each of these phases will now be briefly evaluated:

6.2.5.1.1 Identification of sport-specific requirements

For talent identification to be effective and reliable, it is imperative that all the possible criteria and requirements that play a role in effective performance be

precisely determined. The principle behind this is that if performance is to be accurately predicted, it needs to be accurately identified and measured. The assumption is therefore that sports participants will be successful if they meet and comply with these sport-specific criteria and requirements (du Randt & Headley, 1992b; Régnier *et al.,* 1993; Hare, 1999; Booysen, 2002).

While at face value this approach may seem obvious, this is certainly not always the case. In certain types of single dimensional sports, such as running, swimming, discus or pole vault, where only one objective needs to be met and where the prediction function is one dimensional in terms of height, distance or time, then simplicity is most certainly the case (du Randt & Headley, 1992b; Régnier *et al.,* 1993; Hare, 1999; Booysen 2002).

In multidimensional sports, however, the situation is more complicated, since there are several actions that need to be executed simultaneously to facilitate effective performance or success in this task. In cases such as these, a thorough task analysis of the requirements of this sport and its constituent elements needs to be conducted. In certain cases this can be done by means of observation or through determining the opinion of sport participants themselves. The two main methods that are used for this purpose are the top down (devertical) approach and the bottom up (evertical) approach that that were discussed earlier in this chapter (du Randt & Headley, 1992b; Régnier *et al.,* 1993; Hare, 1999; Booysen 2002).

As highlighted previously, the devertical method makes use of conventional and orthodox scientific methods. This task analysis is conducted from the following two perspectives; 1) how the sport is currently practiced and played, or; 2) that the most effective ways of achieving success in sport are as yet undiscovered and need to be determined by means of conceptual models. The evertical approach, on the other hand, is aimed at ascertaining from top performers what the aspects are that cause or contribute to top performance and excellence. This is done according to the

methods previously identified for this evertical approach (du Randt & Headley, 1992b; Régnier *et al.,* 1993; Hare, 1999; Booysen, 2002).

In a possible solution as to the recommended approach to follow, Régnier *et al.* (1993:304) say that *"The underlying assumptions concerning the actual state of knowledge in a given sport discipline must be considered before developing a detection instrument."* In other words, an analysis of how the sport is currently played is probably the best option to be adopted. But, the knowledge of top performers can certainly be considered valuable in this regard.

After the essential sport-specific requirements or criteria have been determined and the objectives of these requirements and criteria properly defined, then the identification of specific success or performance determinants can be conducted (du Randt & Headley, 1992b; Régnier *et al.,* 1993).

This second phase is referred to as the identification of the determinants of performance.

6.2.5.1.2 Identification of determinants of performance

This task analysis is conducted to determine the essential underlying factors or variables that contribute towards achieving success in a sport. Psychological, morphological, environmental and perceptual-motor variables are considered to be the determinants that most likely contribute toward performance. In this task analysis, experts are consulted and the existing literature in the field or sport concerned is reviewed. To increase the chances of realising talent, it is advised that the selected determinants (also referred to as predictors of talent) have a strong and stable genetic influence (du Randt & Headley, 1992b; Régnier *et al.,* 1993; Hare, 1999; Booysen, 2002).

The model of Régnier (1987) also relies on the so-called "sliding populations" principle (du Randt, 1992b; Régnier *et al.,* 1993; Hare, 1999; Spamer, 1999;

Booysen, 2002). While this concept essentially falls outside the scope of this particular study, a short description will be provided for the sake of clarity.

The sliding populations approach can be used as an alternative to longitudinal studies. Whereas longitudinal studies monitor the same group or population of individuals from pre-pubertal levels through to adulthood, the sliding population approach is the process of testing various age-groups concurrently. A unique test battery is developed for each age group and this battery is designed to identify those individuals from the "pool population" of one age-group that have the potential to reach the "target (elite) population" of the next age-group. It is important during the selection of the pool population to involve as many children as possible, so that those who have potential are not excluded. Another important principle to this approach is that the pool population for a specific age group should not incorporate those youngsters who are used as the target population for the preceding age group's pool population (du Randt & Headley, 1992b; Régnier *et al.,* 1993; Hare, 1999; Spamer, 1999; Booysen 2002).

As a way of preventing those late developers from missing out altogether, it is recommended that those individuals who just missed selection to the target population of the preceding age group should be incorporated into the current age group's pool population. This is done to account of the rapid changes that take place in puberty due to physical growth and development, with these changes having a serious impact on the development of capacities and attributes of youngsters, who can often experience impressive improvements in these capacities and attributes over a short space of time. But, over time it is found that the overall population of successful participants becomes smaller and more similar in terms of their psychological attributes and their ability to acquire new skills (du Randt & Headley, 1992b; Régnier *et al.,* 1993).

Csikszentmihalyi and Robinson (1986) in Régnier *et al.* (1993) say that in the development of talent and excellence, a drop out phenomenon is often encountered,

with this also found in Régnier's (1987) model. They go on to say that those individuals who eventually drop out usually undergo certain major life changes, such as a crisis of identity and others (du Randt & Headley, 1992b; Régnier *et al.,* 1993; Hare, 1999; Spamer, 1999; Booysen, 2002). Jerome *et al.* (1987), also in Régnier *et al.* (1993), confirm these findings of Csikszentmihalyi and Robinson (1986), but in their study they found that those who eventually attain success are characterised by dependence, obedience and submissiveness (Régnier *et al.,* 1993; Hare, 1999; Spamer, 1999; Booysen, 2002).

To conclude this discussion, it can be said that Régnier's (1987) model provides specific guidelines and principles by which talent identification can be conducted. Some of the positive aspects inherent to this model are; 1) the importance of a multidisciplinary approach to talent identification is underscored; 2) through establishing prediction functions for different age groups, the effects of development, maturation and age are accounted for; 3) each step that needs to be taken in the process is comprehensively described; 4) the interactions between the sport-specific requirements and the associated psychological, environmental, morphological and physiological factors are analysed and described through a thorough statistical process, and; 5) this model has been applied to team sport settings (Hare, 1999; Spamer, 1999; Booysen, 2002).

Therefore, due to the advantages of this model of Régnier (1987), it can quite rightly be described as an appropriate method for thorough and rigorous scientific and empirical research and enquiry into talent identification.

6.2.6 Talent identification in South Africa

The readmission of South Africa into international sport provided the major role players in South African sport with new insights as to the requirements of international sport participation (Hare, 1999; Spamer, 1999; Booysen, 2002). At the time of this readmission, du Randt and Headley (1992a:1) said *"…the international*

sporting doors are gradually opening allowing South Africa re-admittance to international competition. All these changes bring about exciting challenges."

Since then, the doors to international sport have swung wide open and remarkable achievements have been made. South Africa became the CAF African Champions in soccer in 1996, IRB World Champions in rugby in 1995 and 2007, have a handful of Olympic and Commonwealth Games gold, silver and bronze medals and have experienced great, albeit often very rocky progress in the world of sport. Furthermore, South Africa is hosting the 2010 World Cup.

When considering the past decade and a half, the exciting challenges referred to by du Randt and Headley (1992a) remain, and have arguable grown. And, since our readmission roughly coincided with the sweeping political changes occurring in this country, it stands to reason that an accompanying consideration in sport is that of politics. The pre-democratic history of South Africa is common knowledge. Reparations are demanded, as is equality, and rightfully so. The question remains; how are these concessions made while maintaining the proud record of South African sport. The answer may very well be proper, sustained and all-encompassing talent identification and development. And in fact, this was realised by the ANC as far back as 1994, who according to Spamer and De la Port (2006) placed great emphasis on sport development in South Africa.

Due to this recent re-exposure to international sport, talent identification in South Africa can therefore also be considered to be a recent pursuit, although studies on this issue predate readmission by almost a decade. The earliest studies on talent identification in this country date to the early and middle 1980's. Hare (1999), Spamer (1999) and Booysen (2002) make mention of the studies of Daehne (1983) in athletics and Pienaar (1987) in gymnastics.

It is however the work of du Randt (1992) that is widely regarded as having the greatest impact on talent identification in this country. Du Randt (1992) (and

colleagues) made an important contribution to research in South Africa in her study concerning talent identification worldwide. In this study, as mentioned earlier, she described the respective talent identification models from a historical perspective, as well as the talent identification and development practices of many countries. Her study examined the contributions of physical, anthropometrical and psychosocial aspects to talent and the identification thereof. She also made guidelines and recommendations for talent identification and development best practice from a uniquely South African perspective (Spamer, 1999; Booysen, 2002).

But, are the findings of du Randt (1992) with regards to the guidelines and recommendations provided still valid, fifteen years later? In the relevant section, compiled by du Randt and Headley (1992d), some of the most prominent issues are:

1) Talent development programs need to adopt an initial generic, all-encompassing approach, followed by a more sport-specific emphasis. These development programs also need to precede and operate concurrently with talent identification initiatives (du Randt & Headley, 1992d).

2) A distinct multidisciplinary focus and approach is required. Furthermore, the test batteries utilised for the initial selection of talented individuals should be scientifically sound, easily administered, and should also be simple and practical (du Randt & Headley, 1992d; Hare, 1999; Spamer, 1999; Booysen, 2002).

3) It is preferable that as large a group as possible be exposed to the talent identification processes. The norms from talent identification are only valid for between two to four years, and therefore, to remain current and relevant, talent identification needs to be an ongoing concern (du Randt & Headley, 1992d; Hare, 1999; Spamer, 1999; Booysen, 2002).

4) General fitness development and testing at schools are to be encouraged at national and regional level (du Randt & Headley, 1992d; Hare, 1999; Spamer, 1999;

Booysen, 2002). There is also a recommendation to adopt an awards based system to reward the achievement of fitness standards (du Randt & Headley, 1992d; Hare, 1999)

5) Coaches should be trained in development and sport national bodies included as part of the talent identification process (du Randt & Headley, 1992d; Hare, 1999; Spamer, 1999; Booysen, 2002). Furthermore, talent identification should not render coaches redundant, but should assist them in their task, with large numbers of qualified coaches ideally assigned to talent development structures (du Randt & Headley, 1992d).

6) Biological age needs to be considered in talent identification (this issue was raised in chapter four and will be reviewed again later in this chapter) and the late maturer needs to be accommodated (du Randt & Headley, 1992d; Hare, 1999; Spamer, 1999; Booysen, 2002).

Other pertinent guidelines for sport scientists originally provided by du Randt and Headley (1992d), and subsequently noted by Hare (1999), Spamer (1999) and Booysen (2002) are that:

7) Population specific norms for South Africa need to be established; 8) the effects of growth and development on inherited traits must be analysed for norm establishment purposes; 9) every sport needs to establish a specific model of talent identification and development, and; 10) quasi-longitudinal studies need to be conducted utilising the sliding population principle of Régnier (1987).

From an objective perspective, it is abundantly clear that a large proportion of these guidelines still stand, and some even more so now than before. Some of the further findings of du Randt (1992), in the sub-section of du Randt and Headley (1992c), will later be contrasted with findings of recent studies and, therein the impact of du Randt (1992) can be fully gauged; her work's legacy and value is certainly enduring.

But, since this tone setting study, a number of subsequent and highly relevant studies have been published.

This study acknowledges the massive contributions of Pienaar and Spamer (1996a, 1996b, 1998), Pienaar *et al.* (1998, 2000), Hare (1999) and Nieuwenhuis *et al.* (2002) toward expanding the field of talent identification in South Africa. Hare (1999), Spamer (1999), Booysen (2002) and Nieuwenhuis *et al.* (2002) in turn acknowledge the work of Pienaar and Spamer (1995; 1997), Pretorius (1996), Hare (1997), Van der Merwe (1997), Badenhorst (1998) and Nieuwenhuis (1999) as studies that have added value to talent identification in this country. This study therefore gratefully acknowledges these researchers and their findings as well.

In conclusion of this section on talent identification in South Africa, a brief analysis of a select sample of these studies is included hereafter. Only those studies consistently cited in this current study were chosen for this analysis:

1) Probably the most prominent talent identification specialists in South Africa are Professors Anita Pienaar and Emmanuel (Manie) Spamer from the North-West University in Potchefstroom. The studies of Pienaar and Spamer (1996a, 1996b) and Pienaar *et al.* (1998, 2000) have made valuable and ground breaking contributions to talent identification in rugby.

As noted in chapter one, Reilly *et al.* (2000b) and Reilly and Gilbourne (2003) refer to the work of Pienaar, Spamer and colleagues, and in particular to their pioneering use of multivariate approaches in identifying talent in team sports such as rugby that was originally performed by these two researchers in conjunction with Steyn in 1998. Other studies, such as Abbott and Collins (2002), Pearson *et al.* (2006), Vaeyens *et al.* (2006), Elferink-Gemser *et al.* (2007) and Vaeyens *et al.* (submitted) are those who have cited, or acknowledged the work of these researchers.

Furthermore, the work of Spamer and Coetzee (2002) on the variables that distinguish between talented and less talented participants has also received the attention of Lidor *et al.* (2005; 2007). And, Professor Spamer was also the second author in the study of Nieuwenhuis *et al.* (2002) that will be discussed shortly.

2) Hare (1997) constructed a prediction function for 16-year old rugby players from psychological, physical and motor, game-specific skills and anthropometric variables (Hare, 1999; Spamer, 1999; Booysen, 2002). Another notable work is that of Hare (1999:iii), a significant longitudinal study with findings that *"…growth and development had a significant influence on the performance of talented rugby players over a period of six years."*

3) Nieuwenhuis *et al.* (2002) has been cited in the studies of Abbott and Collins (2002; 2004), Elferink-Gemser *et al.* (2006; 2007) and Vaeyens *et al.* (submitted). In this study, a prediction function for fourteen to fifteen year old female hockey players was established.

4) In many regards talent identification remains an unexplored field in South Africa. This is gradually changing however, and in the last number of years, definite progress can be seen in this field. By and large, the focus of these older and more recent studies (Pienaar *et al.,* 2000; Krüger *et al.,* 2001; Spamer & Winsley, 2003a; 2003b; Van Gent, 2003; Van Gent & Spamer, 2005; Plotz and Spamer, 2006; Spamer & De la Port, 2006) has been on rugby.

Interestingly, the studies of Plotz and Spamer (2006) and Spamer and Winsley (2003b) focussed on elite U/18 South African rugby players in comparison to elite U/18 English rugby players, with the findings in both studies largely favouring the South African players. But, talent identification studies on other sports in South Africa can be found, such as those on swimming (Myburgh, 1998; Coetzee *et al.,* 2001), hockey (Nieuwenhuis *et al.,* 2002), and even kayaking (Olivier & Coetsee, 2002).

So, while it seems as if the research output in this field is demonstrating an obvious upward track, it is perhaps still not where it could be, or where it should be. This prominent increase in growth is nevertheless encouraging and bodes well for the future of sport in South Africa.

6.3 ORIENTATION OF THIS STUDY

This study is heavily informed upon by the preceding studies discussed in this section (Pienaar & Spamer, 1996a, 1996b, 1998; Pienaar *et al.,* 1998, 2000; Hare, 1999; Krüger *et al.,* 2001; Booysen, 2002; Spamer and Winsley, 2003a, 2003b; Van Gent, 2003; Van Gent & Spamer, 2005; Plotz & Spamer, 2006; Spamer & De la Port, 2006). The broad testing protocols that have been tried and tested over the years have formed the basis of this study, although many of the actual tests used in this study differ from the tests in these afore-mentioned studies. The multi-variate categories of testing, i.e.: anthropometrical, physical-motor and sport-specific skills have remained the same, although an extra sport vision section has been included. Furthermore, testing has taken place within broad positional categories that were determined prior to testing, i.e.: tight forwards, loose-forwards and backs, similar to Van Gent (2003) and Van Gent and Spamer (2005).

The sample groups in this study consisted entirely of elite rugby players from the 2005 Blue Bulls Vodacom Cup Squad consisting almost entirely of the U/21 Currie Cup rugby players, the 2005 South African U/21 rugby squad and the 2005 TUKS Rugby Academy at the University of Pretoria.

The major difference with regards to the choice of the sample groups of this study as opposed to those mentioned before is as a result of the methodology used in the respective studies. No statistical discrimination between more or less successful groups or players was performed in this study, since the sole purpose and main aim of this study was to establish norms and performance scales for future reference. The specific study of Krüger *et al.* (2001), in which physiological and performance

scales were established for junior rugby players, served as motivation and guidance in this regard.

With regards to the age-groups selected; it is the intention of this study that the test protocol that was developed, as well as the norms and standards that have been established, can be used for future reference as both talent identification tool as well as a tool used purely for selection purposes to elite teams and squads. A number of the individuals included in this study have gone on to play provincial Currie Cup rugby, regional Super 12/14 rugby, the emerging Springboks, and one was even called up to Springbok duty. Furthermore, two of the squads used in the sample for this study achieved great success; one went on to become the IRB U/21 World Champions (SA U/21) in 2005 whereas the other went on to become the National Junior Currie Cup Champions and semi-finalists of the Vodacom Cup (Blue Bulls), also in 2005. These results thereby further confirm the elite status of this sample group.

Therefore, to summarise, this study and its findings can be used as a talent identification tool, but possibly lends itself more toward being utilised as a selection tool to determine admission to elite junior rugby squads or initial admission to senior elite rugby squads.

6.4 CURRENT DAY PERSPECTIVES ON TALENT IDENTIFICATION

The success of current talent identification practices has been emphasised throughout this study. The focus on physical/physiological, anthropometrical and skills perspectives in talent identification and assessment have been proven to be highly successful (Aitken & Jenkins, 1998; Hoare, 1998; Pienaar *et al.,* 1998; Nieuwenhuis *et al.,* 2002; Spamer & Winsley, 2003b; Falk *et al.,* 2004; Van Rossum & Gagné, 2005; Gabbett *et al.,* in press). Prediction accuracies in excess of 60% (Falk *et al.,* 2004), 70% (Gabbett *et al.,* in press), 80% (Bompa, 1985 in Aitken & Jenkins, 1998; Pienaar *et al.,* 1998) and 90% (Nieuwenhuis *et al.,* 2002) have been achieved and/or noted.

Furthermore, the specific issue of an increased focus on sport-specific skills in testing has also been repeatedly underscored. This concept is far from a new consideration and was highlighted as far back as 1992 in the pioneering studies of du Randt (1992) and thereafter Pienaar and Spamer (1995) in Pienaar and Spamer (1998). And, included in the testing protocols of most of the talent identification studies on rugby (Pienaar & Spamer, 1996a, 1996b, 1998, Pienaar *et al.,* 1998, 2000; Hare, 1999; Booysen, 2002; Spamer and Winsley, 2003a, 2003b; Van Gent, 2003; Van Gent & Spamer, 2005; Plotz and Spamer, 2006; Spamer & De la Port, 2006), swimming (Coetzee *et al.,* 2001), hockey (Nieuwenhuis *et al.,* 2002; Elferink-Gemser *et al.,* 2007), water-polo (Falk *et al.,* 2004), volleyball (Gabbett & Georgieff, 2006; Gabbett *et al.,* in press) and soccer (Vaeyens *et al.,* 2006), sport-specific skill evaluations can be found. So, the trends in this regard are clear for all to see.

Admittedly, though, current talent identification approaches have their detractors. Issues with current (and older) talent identification approaches and designs continue to be raised in the literature regarding the short-comings and problems with current talent identification designs. Therefore, this sub-section discusses specific problems with talent identification that continue to be raised in the literature, followed by suggested solutions in this self-same literature. Thereafter, the interesting (some would say frightening) concept of genetic testing as an alternative or supplementary practice to talent identification is briefly considered.

6.4.1 Modern day perspectives on talent identification and development

Most of the problems associated with current talent identification practices are not new and have been the topic of discussion on numerous occasions. This is evidenced by the literature that can be found on this topic. A lot of this literature has been incorporated in this very study. Recently, however, two noteworthy documents have come to light that deal pertinently with these traditional and current issues and short-comings in talent identification. These documents also further provide proposed solutions to address these shortcomings.

The first document in question is an invited review of the current trends and models in talent identification and development. This document was recently submitted to the journal "Sports Medicine," wherein the authors Roel Vaeyens, Matthieu Lenoir, A. Mark Williams and Renaat M. Philippaerts present a brilliant and relevant summary and critique of current day talent identification and development practices. They then also provide certain recommendations for future research in this field. This specific article has also been used extensively throughout the course of this thesis.

Similarly, in a report for "**sport**scotland" completed by The University of Edinburgh, the authors Angela Abbott, Dave Collins, Katie Sowerby and Russell Martindale also focus on the limitations of current talent identification approaches, while presenting the findings of an extensive talent development scheme called Developing the Potential of Young People, or DPYPS. This DPYPS approach will then be used to assist in the development of a Long Term Player Development (LTPD) model that will be used by most sport governing bodies. This document has also been incorporated within the preceding chapters of this study.

The format of this discussion will therefore centre on the broad-spectrum discussions and arguments presented by these two documents. But, since a number of their perspectives and ideas have already been considered and incorporated elsewhere in this study, only their broad stroke concepts, critiques and guidelines will be discussed. Pertinent to note, however, that the literature reviews that these studies conducted include many of the other studies and literature that have also been included in this study, and so, these other literature resources (as well as some new resources) will be incorporated only where necessary. As an added exercise, the problems highlighted by du Randt and Headley (1992c) will be referred to in an effort to contrast the progression of these views over the last decade and a half.

The review of Vaeyens *et al.* (submitted) identifies four main problems associated with current talent identification designs applied to adolescent, age-specific samples that incorporate anthropometric, physiological, physical and technical variables in their performance predictions.

6.4.1.1 Problems

1) Unstable physical characteristics in childhood and adolescence

The first problem with talent identification as noted by Vaeyens *et al.* (submitted) is the unstable development of physical characteristics throughout childhood and adolescence. Studies of a cross-sectional design often make the assumption that the characteristics required for achieving success in adult performance and achievement can be used to identify talent in children and adolescents (Morris, 2000; Vaeyens *et al.,* submitted). But, it has been shown that certain beneficial physical characteristics aren't always retained as children and adolescents mature (Ackland & Bloomfield, 1996; Vaeyens *et al.,* submitted).

Abbott *et al.* (2007) are found to agree with the preceding sentiments in this regard; they are of the opinion that while it is possible that the current performance of a young athlete may be helpful in identifying the potential for this athlete to develop into a top performer in the future, it is by no means a concrete guarantee of future success.

Another aspect to be considered is that many characteristics required for success in adult sport participation may not even visible until late adolescence (Vaeyens *et al.,* submitted). In saying this, Vaeyens *et al.* (submitted) refer specifically to the work of Bloom (1985) and Simonton (1999). While the findings of Bloom (1985) were discussed in chapter four, a brief elaboration of Simonton (1999) is merited at this time. Simonton (1999), and his subsequent work (Simonton, 2001; 2005; 2006), propose an emergenic/epigenetic nature of talent, i.e.: that one can inherit traits or components that contribute to the development of talent, but, that these traits develop or come to the fore at their own genetically predetermined rate.

According to epigenesis, talent is not always even apparent at young ages, and, talent can even be lost as these traits further develop or decline. But, a significant factor of the epigenetic development is the influence of the environment. And environmental influence, along with certain individual aspects, is something that Vaeyens *et al.* (submitted) and others (Ericsson *et al.,* 1993; Gould *et al.,* 2002) say is needed to develop talent and expertise, although by now it is obvious that Ericsson *et al.* (1993) and other studies of the first author for the most part reject a genetic explanation of talent in favour of practice and training.

Therefore, the unstable character of physical variables in childhood and adolescence impacts heavily upon talent identification.

2) Maturation

The second problem mentioned by Vaeyens *et al.* (submitted) is the problem of maturity related development, with this issue impacting on talent identification and development. The advantage that early maturers enjoy in performance characteristics such as strength, aerobic power and motor skill (Malina *et al.,* 2004b; 2007; Vaeyens *et al.,* 2005b; Vaeyens *et al.,* submitted) is evident, along with the need to compare children and adolescents to norms based on biological age as opposed to chronological age (Hahn & Gross, 1990). The relative disadvantage that late maturers are subjected to if chronological-based norms are used for comparison is further emphasised by Vaeyens *et al.* (submitted). It has been shown that early maturing individuals are usually classified as talented (Williams & Reilly, 2000b; Sherar *et al.,* 2007) and that later maturing individuals are consequently overlooked. Early maturation is also a problem that was emphasised in 1992 in the study of du Randt and Headley (1992c), indicating that this issue of early maturation is certainly not a new consideration.

The relative-age effect and its impact on elite representation in sport (Musch & Grondin, 2001; Vaeyens *et al.,* 2005a; Côté *et al.,* 2007; Medic *et al.,* in press) has been proven and is said by Vaeyens *et al.* (submitted) to have an impact on talent

identification and further development. The views of Vaeyens *et al.* (submitted) and others on maturation and related factors were represented extensively in chapter four, with every aspect raised under this point described rather extensively. Therefore, any further elaboration can be found in that chapter.

One aspect of maturation not fully considered is the level of development of the mental abilities of the individual. Some mental abilities, like the ability to focus, can take years to develop (Gould *et al.,* 2002; Abbott *et al.,* 2007) and the current lack of these attributes may contribute toward athletes with talent potential to be overlooked. Maturation can consequently be seen as presenting a problem to talent identification.

3) Talent as a dynamic concept

The third aspect under consideration is that of talent being a dynamic concept. Often, predictions of future performance are based on variables that are (mistakenly) regarded as static and unchanging in nature. These predictions do not take the unstable, ever-changing and evolving nature of these variables and attributes into account and this makes for inaccurate long-term predictions (Régnier *et al.,* 1993; Abbot & Collins, 2004; Vaeyens *et al.,* submitted).

Training, development and growth often have a significant impact on the physical variables of performance. This impact can cause an unpredictable development of these variables and attributes, and this makes the predictions of future performance based on current achievement a risky prospect, especially when these predictions are made before puberty (Abbott & Collins, 2002; Vaeyens *et al.,* 2006; Vaeyens *et al.,* submitted). Vaeyens *et al.* (submitted) also say that the practice histories of the individuals also have an effect on these variables of performance.

In illustrating their point, Vaeyens *et al.* (submitted) refer to research (Pienaar & Spamer, 1998; Nieuwenhuis *et al.,* 2002) that has shown that the kinanthropometrical variables that discriminate at ten years of age are not as

discriminating in the later years of adolescence. Of course, other studies (Pienaar & Spamer, 1996a; Abbott & Collins, 2002) can also be added to those that have encountered the same phenomenon or made mention thereof. The opinion of Vaeyens *et al.* (submitted), and others in this regard have also been mentioned in earlier chapters.

Abbott *et al.* (2007), for their part concur with most of these sentiments and go further by saying that due to the changing and evolving nature of talent, the chances of identifying talented athletes and sportspersons increases over time. This is because the closer these performance variables and attributes get to their mature state, the easier it is to judge as to whether they are in fact present within the individual. A faulty or incorrect assumption as to the stability of talent in childhood and adolescence is certainly a major complicating factor for effective talent identification.

4) Use of limited variables

The final problem highlighted by these researchers is that most talent identification considers only limited variables in their designs. Innate capacity and talent consists of many components (Simonton, 1999; Abbott & Collins, 2004; Vaeyens *et al.,* submitted). Yet, one still finds that most studies have adopted a single-dimensional approach or a design that includes only physical, physiological and anthropometric variables. Vaeyens *et al.* (submitted) refer to a host of studies as examples of this approach, with the studies of Aitken and Jenkins (1998) and Gabbett (2002a) the ones that apply to this study.

It must be noted at this juncture, though, that du Randt and Headley (1992b) do mention the fact that certain variables are more applicable to certain age phases than others, while other variables in turn become more important at later ages. Du Randt and Headley (1992b) therefore suggest that testing criteria are to be designed to cater for these age-related differences in performance variables. So, while testing limited variables in talent identification on a single-dimensional basis is certainly a

problem on the whole, it could be implied by du Randt and Headley's (1992b) sentiments that designing testing criteria to address limited variables may in fact be acceptable when age related performance variables and criteria are considered.

Vaeyens *et al.* (submitted) then go on to make mention of the compensation phenomenon whereby those who may be lacking in certain areas still make up for it in other areas to perform optimally at tasks and in sports (Williams & Ericsson, 2005; Vaeyens *et al.,* submitted). Earlier, it was Regnier *et al.* (1993) who also noted this finding. Others who mention this specific issue are Tranckle and Cushion (2006). The problem with this phenomenon is that some individuals who may be highly able in a sport might still not be selected, because in some of the variables that are measured, they may not have the requisite score, with the opposite also being true (Vaeyens *et al.,* submitted).

A final consideration is that psychological variables are often not considered in talent identification (Morris, 2000; Abbott & Collins, 2004; Vaeyens *et al.,* submitted). Since individuals become more similar in terms of physiology and physical ability, it is postulated by some that psychological variables can be viewed as the *only significant predictors* of success in sport when compared to other variables (Vaeyens *et al.* submitted). Chapter five made the case for the inclusion of psychological variables in talent identification protocols and batteries.

As can be seen from this problem analysis, Vaeyens *et al.* (submitted) and Abbott *et al.* (2007) have provided an in-depth analysis of the inherent problems associated with current talent identification and development models. From the comparison provided with du Randt and Headley (1992c), it is clear that some of these problems are not new, and that solutions to these issues are still being sought.

What follows now are the recommendations of Vaeyens *et al.* (submitted) for research that could provide possible solutions to these problems. These

recommendations come in response to the criticisms that emanate from literature and the research field.

6.4.1.2 Solutions and recommendations

1) Emphasis on development over the long-term

The first recommendation from Vaeyens *et al.* (submitted) concerns development. There are growing calls from many corners for the emphasis to shift from talent identification to the provision of development opportunities for as many youngsters as possible (Morris, 2000; Abbott & Collins, 2002, 2004; Martindale *et al.,* 2005; Vaeyens *et al.* submitted). In this way, those with promise can receive the fullest opportunity (training, practice and support) to develop to their fullest potential, with a conducive environment playing the major facilitating role in this process (Morris, 2000; Abbott & Collins, 2004; Vaeyens *et al.,* submitted).

The authors once again cite the prominent work of Bloom (1985) who advocated the support of parents and coaches in the development of talent, and Ericsson *et al.* (1993) who proposed their Theory of Deliberate Practice as being the solution to develop expertise and ability. These and others (Côté, 1999; Button & Abbott, 2007; Côté *et al.,* 2007) were analysed in chapter four. Vaeyens *et al.* (submitted) in fact do make recommendations regarding the model of Côté *et al.* (2007) (for further elaboration see chapter four) that provides for deliberate play and deliberate practice as the individual advances in their career, and these recommendations receive a resounding endorsement by this study.

A specific, real-world talent development program that is mentioned by Vaeyens *et al.* (submitted) is that of the Long Term Athlete Development model (LTAD). Upon closer investigation of this specific model, the following could be determined: this model is being implemented by the Canadian Sports Centres/Canadian Sport for Life. They focus on “ten key factors” that direct and influence this athlete development model. These factors are listed, in no particular order, hereafter; 1) consideration for the developmental (biological) age in relation to the chronological

age of the child; 2) the ten year rule to attain elite status; 3) the trainability of the child; 4) the "FUNdamentals", implying fun and participation over strenuous or systematic training; 5) specialisation (early versus late); 6) periodisation and time management; 7) the development and adaptation of mental, physical, emotional and cognitive abilities and attributes; 8) system integration and alignment, dictating the overall implementation of the developmental program; 9) calendar planning for competition, and; 10) continuous improvement and adaptation to the evolving demands of sport as sport-specific and scientific innovations dictate (Unknown Author, 2007a).

The LTAD further is made up of seven stages, including; 1) an Active Start; 2) the FUNdamentals; 3) Learning to Train; 4) Training to Train; 5) Training to Compete; 6) Training to Win, and; 7) Active for Life. The first three stages focus on overall physical literacy and mass sport participation, the next three stages focus on developing excellence, with the last stage focusing on lifelong sport participation and physical activity (Unknown Author, 2007b).

A further search for other developmental programs within literature came upon the work of Martindale *et al.* (2007) who provide specific guidelines for talent development. These guidelines for talent development programs are; 1) these programs need to communicate a message that emphasises support for the youngster and that is understandable to all involved; 2) the focus must be long-term and this focus must inform the purpose and vision of the program; 3) a developmental emphasis is critical and early selection must be strongly discouraged; 4) sport-specific skills need to be integrated into development in a systematic manner, and; 5) development must be ongoing allowing for progress at an individual pace. These same findings were made by Martindale *et al.* (2005), who were cited by Vaeyens *et al.* (submitted) earlier.

This search also uncovered the work of Bailey and Morley (2006). These authors listed a couple of factors that they considered before developing their model of talent

development in a physical education setting. Their considerations included; 1) that a distinction should be made between performance and potential; 2) an acknowledgement that abilities are multidimensional in nature; 3) a specific physical education focus, as opposed to a sport focus, and; 4) an understanding of the fact that many factors can influences the development of ability in an individual.

And then, there is the DPYPS proposal contained in the other prominent document in this review, i.e.: Abbott *et al.* (2007). Recently, **sport**scotland implemented the DPYPS to address two major aims. These are the development of, 1) psychomotor and, 2) psycho-behavioural abilities in children. This was conducted by providing all children with a curriculum to adequately address these abilities. This curriculum was implemented at primary school level in physical education as well as classroom settings. The philosophy of this program is to assist children in reaching their fullest potential and to stimulate the life-long participation in sport and physical activity. The initial program ran for almost two years from beginning 2002 till end 2003, but the initial findings were positive. The authors also state that the findings of this initial implementation of DPYPS will then be used to develop a Long Term Player Development (LTPD) model that will be implemented by most governing bodies to further develop sport in the country. But, quite prominent is that the focus of this program was the overall development of many, and not early identification or selection, or lack thereof.

And, the final talent development approach encountered in this search was the strategy adopted by Sport and Recreation New Zealand (SPARC). This strategy focuses on and prioritises the establishment of a long-term developmental process that incorporates a specific talent identification function within this developmental process. The main aim of the talent identification application is to identify “indicators of potential” that provide them with an idea of the chances or probability of an individual to attain eventual success (Mahon, 2004).

From these very recent models and reviews that have been presented, it can certainly be seen that the sentiments of Vaeyens *et al.* (submitted) have tapped into the pulse of the general feeling and approach toward talent identification and development. It is now abundantly clear that the focus seems to be shifting. And, while talent identification as such may not be halted, it seems as if its role is now becoming one of monitoring or facilitating the development of talent in general. The specific selection or identification function that distinguishes between more and less able individuals seems to be falling out of favour, if the evidence is anything to go by.

2) Monitor progress, not performance

An aspect underscored by Vaeyens *et al.* (submitted) is that of current ability versus future performance. They say that a vital aspect of talent identification models is that they need to distinguish between current adolescent performance and their ability to improve. It is unfortunate however that not many talent identification models recognise this distinction and that talent and ability is still made according to current ability only (Abbott & Collins, 2002; Vaeyens *et al.,* submitted). They also note the sentiments of Gimbel (1976), Harre (1982) and Havlicek *et al.* (1982), who advocate for exposure to training and practice before making predictions on future performance. The specific aspects of these models were underscored at the beginning of this chapter.

Once again, there is a call for longitudinal studies on talent identification by Vaeyens *et al.* (submitted), and once again reference can be made to the original problems that Régnier *et al.* (1993) encountered in their review of the models of talent identification, as well as their recommendations for longitudinal studies in talent identification. Furthermore, du Randt and Headley (1992c) bemoaned the lack of these long-term studies many years ago, and therefore the point can be emphatically made that this is a matter in need of some serious attention. Some (Pienaar & Spamer 1998; Hare, 1999; Falk *et al.,* 2004; Vaeyens *et al.,* 2006; Elferink-Gemser *et al.,* 2007; Lidor *et al.,* 2007) have tried, but more needs to be done.

Vaeyens *et al.* (submitted) make mention of a "talent validation" process recently incorporated into UK Sport that consists of a three to six month training program in which those individuals identified as talented are subsequently exposed to the requirements of elite sport. This talent validation serves as a confirmation of the initial judgement, and is not a bad idea to implement. But, the need for longitudinal studies remains.

3) Biological maturation

Vaeyens *et al.* (submitted) then return to the issue of maturation. The impact of the relative-age effect is noted by the authors once again (please see the "problem" section of this review for reference, along with chapter four). Vaeyens *et al.* (submitted) do make mention of new methods of determining maturity status that are non-invasive in nature and design, but they specifically recommend that comparisons in ability be made according to biological age based norms as opposed to norms based on chronological age.

4) Accurate representation of tasks and multidimensionality in approach

Another recommendation of Vaeyens *et al.* (submitted) has to do with the need to design representative tasks that allow for reliable identification, as well as the need for a multidimensional approach to talent identification. The authors, in referring to the first stage of Ericsson and Smith's (1991) expert performance approach, recommend that talent identification try to more accurately define and determine the skill required in superior task performance within a sport. This would then allow for the creation of tasks that more reliably identify and measure the superior performance exhibited in successfully completing these tasks.

This study proposes that the best possible solution for this would be to conduct a thorough task analysis of the game at hand, as recommended by the conceptual model of Régnier (1987) in Régnier *et al.* (1993) discussed earlier in this section.

Vaeyens *et al.* (submitted) say that multidimensionality needs to be highly prized, and they point to a recent increase in prominence of this approach, with them noting ever more studies (Reilly *et al.,* 2000b; Nieuwenhuis *et al.,* 2002; Elferink-Gemser *et al.,* 2004; Falk *et al.,* 2004; Vaeyens *et al.,* 2006) that are adopting a multidimensional design. In adopting the same methodology as these preceding studies, discriminant analysis has revealed that technical and perceptual-cognitive skills distinguish more between skilled and less skilled individuals than anthropometry or physiology, with the studies of Williams and Reilly (2000b) and Elferink-Gemser *et al.* (2004) proffered by the authors as proof thereof. This is also the opinion of Williams and Ward (2007), as chapter five pointed out earlier.

And, while Vaeyens *et al.* (submitted) make the point that these skills not only enable effective, multi-domain performance (Williams & Ward, 2007), but are also reliable discriminators of skill and ability (Reilly *et al.,* 2000b; Vaeyens *et al.,* 2007), this issue was extensively underscored in chapter five of this study, as was the possibility of including tests for these skills within talent identification protocols, although the conclusion was made that rugby is a highly complicated sport and that this would be difficult. The relative dearth of technical and psychological considerations in talent identification is rather apparent however (Morris, 2000; Abbott & Collins, 2004; Vaeyens *et al.,* submitted). Vaeyens *et al.* (submitted) go on to echo the point raised earlier in this study, namely that researchers need to focus more on developing measures of performance that more accurately mimic the demands of real performance tasks with a move toward test protocols that more reflect real-world demands.

According to this present study, as the realisation continues to grow that it is the perceptual-cognitive and technical (skill) levels that tend to discriminate the performance abilities of individuals, it is hoped that ever more focus on these factors will come to light. It is as a result of this realisation that this specific study has attempted to focus more on these aspects, as chapter seven hereafter shows.

Vaeyens *et al.* (submitted) do make some final observations of the inherent limitations of talent identification. For their part they also acknowledge the limited resources that sport organisations have and the increased focus on talent identification and development as a result. They further point out that certain sports such as soccer require early specialisation, whereas others such as rowing don't. They go on to say that in single skilled sports it is easier to predict future success than in multi-skilled sports, in agreement with the original observations of Régnier *et al.* (1993), with the same applying for closed versus open skilled sports.

Their final recommendations based on these observations are that talent identification assist coaches and talent scouts in their respective duties, and that the testing of athletes be used to evaluate these athletes with regards to their specific areas of weakness so that this can further assist in their development. They also recommend that each sport has a specific talent identification model, along much the same lines as the original proposals of du Randt and Headley (1992d).

Therefore, in conclusion of this sub-section; the problems associated with current talent identification models are, for the most, not new concerns. The realisation of the need to address these issues can be described as the same. The recommendations provided in this section are certainly significant, as they are practical. The recommendations are therefore not only endorsed by this study, but, have also been attempted to some extent.

New tests were designed, and old tests modified in striving after this ideal. Furthermore, a perceptual-motor/cognitive test was added to the protocol. While the testing for this study was conducted before this review article came to light, the very content of this article confirms in a positive sense the initial initiatives behind the protocol adopted and adapted. It is hoped that while these steps are tentative at first, this study can continue in the rich tradition of its forbears, namely the work of Pienaar, Spamer and others.

6.4.2 Genetic doping and testing

Another trend that is increasingly evident in recent times is that of gene doping and modifications (McCrory, 2003; Sheridan *et al.,* 2006; Trent & Alexander, 2006; Klissouras *et al.,* 2007) as well as genetic testing for talent identification and sport guidance purposes (McCrory, 2003; Reilly & Gilbourne, 2003; Sellenger, 2003; MacArthur & North, 2005, 2007; McCrory, 2005; Savulescu & Foddy, 2005; Miah & Rich, 2006; Paul *et al.,* 2006; Sheridan *et al.,* 2006).

Klissouras *et al.* (2007) clearly indicate their uneasiness with the spectre of gene doping and modification and state their fear that progress in the area of genetic technology may enable athletes to improve oxygen transport and circulation within the body. According to them, the possibility of athletes being able to genetically alter their muscle strength and size quite considerably is also a real one. When it is considered, as McCrory (2003) note, that the International Olympic Committee has placed genetic doping on its 2003 list of banned practices, it seems as if the practice of genetic doping and gene transfer are already serious considerations in professional sport worldwide.

By using an adenovirus to deliver the EPO gene in monkeys and mice, Leiden *et al.* (1997) in McCrory (2003) found that the effect lasted for twelve weeks in the monkeys and almost a year in mice. Their specific findings were that this almost doubled the haematocrit levels in both the monkeys and the mice. McCrory (2003) are of the opinion, though, that detecting gene doping will be difficult.

The risks concerning gene doping are relatively unknown (Trent & Alexander, 2006) while Sheridan *et al.* (2006), in raising their safety concerns regarding this practice, also conceptualise the anti-gene-doping and anti-genetic-selection stance based on athletic tradition and morality.

And, while safety is admittedly a problem with gene doping, the option of genetic testing for performance and talent identification seems to be an option that is

attracting quite a bit of interest (Savulescu & Foddy, 2005; Miah & Rich, 2006). The technology has now advanced to such a level that a mere cheek swab (Savulescu & Foddy, 2005) can test for the *ACTN* R577X allele. This gene, in various formats, has been found to play a role in the number of fast twitch fibres an individual has, and therefore a greater propensity and ability in power and speed based events (Yang *et al.,* 2003; MacArthur & North, 2005, 2007; Savulescu & Foddy, 2005).

The perspective of MacArthur and North (2005; 2007) with regards to genetic testing for talent identification can be seen as being *cautious*. MacArthur and North (2005) do go on to make the point, however, that while genetic testing might not yet be used to determine the potential of young athletes to attain elite status in sport, it could perhaps still be used to determine the sports and event types these youngsters would be best suited to. This position of the authors could probably be described as talent guidance.

In other related and certainly interesting findings, the ratio of the length of the index finger (2d) to the ring finger (4d) has been found to provide an indication of potential ability in sporting endeavours, in men (Manning & Taylor, 2001), and women (Paul *et al.,* 2006). These (and other) researchers have found that a low index finger to ring finger ratio (in other words, the shorter the index finger is in relation to the ring finger, the better) is indicative of higher foetal (prenatal) as well as adult testosterone levels, with these testosterone levels contributing to higher levels or potential levels of performance in sport. Other studies mentioning this finding include Reilly and Gilbourne (2003) who refer to work of Manning *et al.* (2003) in this regard.

Paul *et al.* (2006) even go as far as to say that these findings might even be helpful in predicting one's potential in a sport, although Reilly and Gilbourne (2003) seem to be of the opinion that the efficacy of this approach and finding and the value of these to talent identification would be limited.

The general feeling toward genetic modification in sport can be summed up in a series of letters to the editor of the British Journal of Sports Medicine in 2000. This rather amusing exchange of ideas and opinions starts with a less than endearing letter from Lavin (2000) in response to the statement of Montgomery and Woods (1999) in Lavin (2000) in which they express their concern that genetic technology and know-how may be abused in a sport setting. Lavin's (2000) opinion is that the chance is great that sport, that has a history of the misuse of science, will almost certainly proceed to misuse this genetic science too, and then proceeds to describe all elite athletes as freaks and out of touch with reality. In response to Lavin (2000), Montgomery (2000) continues his fretting about the potential to misuse of this genetic technology but also justifies their (Montgomery & Woods, 1999 in Lavin, 2000) original stance. At this stage Sharp (2000) enters the debate with a sharp rebuke of Lavin (2000) while offering a glowing tribute to the virtues of sports stars everywhere.

While the afore-mentioned findings and debates have the potential to excite or amuse, there are some very serious implications to genetic testing in sport and talent identification. Hoberman (2007) notes that there seems to be an ongoing process whereby ethical considerations within sport are becoming less and less considered in favour of better and improved performances (and ways of improving these performances), and that on the whole, self-restraint seems to be diminishing. Sellenger (2003) in turn is of the opinion that in applying genetic testing to the sporting environment, certain economic, ethical and legal issues are certain to arise. Discrimination on the grounds of genetic makeup and the removal of personal freedoms are some of the concerns raised by him.

Sellenger (2003) goes on to briefly discuss the *ACE* I/D and the *ACTN3* R577X findings, along with other genetic influences on performance, and throughout the text thoughtfully considers the potential legal and ethical impact that genetic testing can have on the sport industry and participants. It is recommended that anyone

interested in these issues from an ethical, moral and legal perspective, read Sellenger (2003) for an intuitive insight into these matters.

In sum, there are serious concerns that need to be considered by those contemplating the advancement of this alternative form of talent identification or performance enhancement. The chances of either practice "just stopping there" are small when economic considerations are brought to the table. The stance of this study with regards to genetic testing in talent identification is cautious yet optimistic while still holding to the views of Miah and Rich (2006:259) who *"…argue that genetic tests for performance might violate the child's right to an open future and that this concern should be taken into account when considering how and whether such tests should be used."*

6.5 SANZAR APPROACHES TO TALENT IDENTIFICATION AND DEVELOPMENT

In this section the talent identification and development approaches of South Africa, New Zealand and Australia are summarised and presented. The information was obtained directly from the South African Rugby Union, the New Zealand Rugby Union and the Australian Rugby Union.

A questionnaire was developed and sent via electronic mail (e-mail) to the relative contact persons at the New Zealand Rugby Union and the Australian Rugby Union. This questionnaire was completed by the relevant parties and then subsequently returned. In the case of the South African Rugby Union, the information was obtained by completing the questionnaire through telephonic interviews.

The contact person at the South African Ruby Union was Mr. Herman Masimla who is the manager of High Performance at the union. Further information was obtained from Mr. Justin Durandt, manager of High Performance at the Sport Science Institute of South Africa (SSISA), and Mr. Nico Serfontein of the Blue Bulls Rugby Union. The contact person at the New Zealand Rugby Union was initially Mr. Mark

Robinson and then subsequently Mr. Andrew Hore who assisted with this questionnaire on behalf of the union. The contact person at the Australian Rugby Union was Mr. Ben Whitaker who is the National Teams and Programs Manager for the union.

The information contained in this next section can therefore be regarded as reflecting the most contemporary and recent practices of the respective rugby unions, although it must be stressed that the information originates totally from the sources mentioned above. This feedback will be reported along the same structure and a copy of the questionnaire can be found in Appendix A of this study.

6.5.1 Talent identification and development at the South African Rugby Union

The information contained in this section is a summary of the feedback from both Mr. Herman Masimla and Mr. Justin Durandt. Therefore, the reporting of their feedback in this section is represented as a combined view. Extra information from Mr. Nico Serfontein, of the Blue Bulls Rugby Union, is also included in this section. Mr. Serfontein is in charge of high performance at the Blue Bulls Rugby Union. All the information in this section was obtained via telephonic interviews with these individuals based on the questionnaire.

6.5.1.1 Talent identification

At national level, talent identification is incorporated into the overall South African Elite Squad System. This elite squad system in its current format was introduced at the beginning of 2007 by the South African Rugby Union. It must therefore be stressed that this is a new process that is undergoing a certain level of development and refinement as the process progresses. This new approach blends certain existing practices with new practices. In other words, some of the approaches described in this section have been implemented before and some are in the process of being implemented for the first time (J. Durandt, personal communication, 2007; H. Masimla, personal communication, 2007).

Furthermore, at the beginning of 2007 the fourteen provinces in South Africa signed agreements to adhere to the testing protocol of SA Rugby as well as to use the full testing kit that they purchase from SA Rugby. The provinces also contract full-time Biokineticists to perform this testing and monitoring. As a result, all testing and subsequent conditioning of these players selected to the South African Elite Squad occurs at provincial level. An important note in this regard is that the specific testing and subsequent conditioning, while performed at provincial level, is supported by SSISA, who are involved in the actual roll out process. SSISA are also involved in training the unions with regards to the testing and conditioning (J. Durandt, personal communication, 2007; H. Masimla, personal communication, 2007).

This elite squad system operates as follows:
At national level, talent identification occurs at U/16 level where eighty players are identified by the selectors to be included into the South African Elite Squad at the U/16 Grant Khomo week. The selectors involved in this process are the national Springbok selectors, the South African U/19 coach and selector as well as two South African School team selectors. The eighty selected players are then returned to their home unions where they are then tested by their home unions according to the testing protocol (included hereafter) of SA Rugby (J. Durandt, personal communication, 2007; H. Masimla, personal communication, 2007).

The next step in this process is that these players are subsequently included in a provincial U/16 elite squad consisting of thirty players. These thirty players consist of the players selected at national level (members of the SA Elite Squad) and other promising players from the province who are added to the squad to round out the numbers. This provincial elite squad is primarily supported by the home union, while the nationally selected players (members of the national elite squad) within this provincial elite squad receive extra support from SARU and High Performance in the form of supplements and further (specialist) support if needed (J. Durandt, personal communication, 2007; H. Masimla, personal communication, 2007).

These nationally selected players then stay in the system for a year and progress on to form the U/17 national elite squad for SARU and the respective home provinces. At the end of their second year they exit the system unless they are re-selected for the U/18 South African Elite Squad at the U/18 Craven Week. An inherent quality control mechanism for this identification, selection and development process of the elite squad system of South African rugby and the respective provinces is that those individuals (or as many of them as possible) selected to the South African Elite Squad at U/16 level and subsequently developed at provincial level should ideally be included in the South African Elite Squad at U/18 level, selected at Craven Week. These players would then still be monitored by SARU and would receive further development. These players should preferably progress on to the provincial U/19 and U/21 rugby teams and hopefully the corresponding national age-group teams (J. Durandt, personal communication, 2007; H. Masimla, personal communication, 2007).

Each province also employs talent scouts who inform SARU about talented players at U/16 and U/18 levels and also give feedback to SARU regarding player performance at U/19 and U21 level with the eye on the IRB U/20 World Championships to be played next year. As noted, the age formats are changing with the IRB U/20 World Championship being played for the first time at this age-group in 2008. This will also impact the junior professional ranks of rugby players with SARU and the provincial unions reverting to a U/20 format as of next year (J. Durandt, personal communication, 2007; H. Masimla, personal communication, 2007).

At time of writing, testing is performed at all levels in SA Rugby, but is unfortunately still not standardised at all levels. One example of this is at Super 14 level. Some franchises choose to make use SA Rugby protocols, whereas others choose not to. At the current moment the U/16, U/17 and U/18 elite squads, as well as the South African U/19 squad and the Senior Springbok team all make use the same protocol, with the data from U/16-U/19 centrally stored. The central SARU database is currently in the process of being redone. But, in spite of this fact, the data from the

age-groups U/16 to U/19 can be objectively compared with one another (J. Durandt, personal communication, 2007; H. Masimla, personal communication, 2007).

Since this new elite squad program was only started in 2007, there are, however, cases where the approach is not followed in the way as just described. An example of this difference in approach to the elite squad is at the Blue Bulls Rugby Union. This union only has one school elite squad consisting of 45 players ranging from U/14 to U/17(U/18) level. Those individuals chosen at the Grant Khomo week to be part of the National Elite Squad of SARU are incorporated into this provincial elite squad system and are monitored, tested and developed in accordance to the requirements of SARU. This difference in approach is however done in full consultation with SARU who are kept abreast of developments and progress at all times (N. Serfontein, personal communication, 2007).

A final consideration regarding this whole approach is that there are two junior rugby systems operating within rugby in South Africa. These are the following:

1) The schools elite squad system ranging from U/14 to U/18. It is in this system that the National Elite Squad System for SARU (U/16, U/17, U/18) and the corresponding elite squads for the respective provincial unions operate.

2) The junior professional ranks incorporating the U/19 and U/21 (this will be changing to U/20) age groups of SA Rugby, and the respective provincial unions.

It can then be said that the ideal scenario should be that those who have progressed through the national and provincial elite squad (schools) system should move on to the junior professional ranks, with this being an indication of the success of the talent identification and development initiatives of SARU and the respective provincial rugby unions (N. Serfontein, personal communication, 2007).

6.5.1.1.1 Testing protocol SARU

The testing protocol that is used to test and profile the elite squad members has many specific tests that can be assigned to the broad categories of anthropometry, physical-motor and flexibility. The protocol is included hereafter:

Table 6.1: Testing protocol of South African Rugby Union *

Anthropometric	Flexibility	Physical-Motor
1) Height (cm) 2) Weight (kg) 3) Body composition (7 skin-folds) • Biceps • Triceps • Sub-scapular • Supra-iliac • Abdominal • Mid-thigh • Calf 4) Girths (cm) • Mid-thigh • Calf • Forearm	1) Sit and reach (cm) 2) Straight leg raise (degrees) 3) Modified Thomas Test • Hip flexion (degrees) • Quadriceps (degrees)	1) Vertical jump (cm) 2) Standing broad jump (cm) 3) 10/40m sprint (sec) 4) Illinois agility test (sec) 5) Strength • Bench press (kg) • Pull-ups underhand (max) • Push ups (max in 60 sec) 6) Multi-stage shuttle run (bleep test) (shuttles) 7) 5m shuttle run (m)

** Rugby-specific skills tests were initially utilised but these have subsequently been phased out. SARU are currently reviewing this matter.*

As noted in this sub-section, rugby-specific skills tests are no longer incorporated into the SARU testing protocol. This is currently under review, but remains a concern that should be addressed as a matter of importance, since it is not in keeping with the recommendations from older and more recent literature, or even general practice.

6.5.1.2 Talent development

Each province has someone specially appointed to be in charge of the high performance initiatives at that province. This individual coordinates the process of development and monitoring of these elite players who are part of the national elite squad, although they also monitor those members who are only part of the provincial elite squads too. As stated earlier, the players previously selected to be part of the national elite squad are sent back to their provinces and subsequently incorporated into the provincial elite squad. These elite squads undergo intensive physical development and conditioning as well as skill development (J. Durandt, personal communication, 2007; H. Masimla, personal communication, 2007).

This high performance manager, often in conjunction with the provincial U/19 or U/21 coach then assesses the players' rugby-specific skills. If they encounter any short-comings with their skills, they then arrange specialist coaching for these individuals in this area of their short-coming. This is done in conjunction with SARU who provide financially for this specialist coaching. As an example of this, an individual might be found to have a short-coming in their kicking technique or ability and be in need of specialist coaching in this area. It must be noted however, that this support received from SARU for this specialist coaching in most cases only applies to those members of the provincial elite squad who are also members of the national elite squad (J. Durandt, personal communication, 2007; H. Masimla, personal communication, 2007).

Another important requirement is that the provinces provide SARU with a monthly feedback report on the progress of the national elite squad members within the provincial elite squads (J. Durandt, personal communication, 2007; H. Masimla, personal communication, 2007).

Further development initiatives of SARU and SA Rugby are the junior and the senior squads of the High Performance Program. The junior squad of the High Performance Program consists of those players identified at the SASSU Tertiary

Institution Week, Currie Cup U/19 players, some of the U/18 Elite Squad players as well as players selected by the provincial talent scouts. The players in this squad are profiled according to their personal information in the form of conditioning and medical reports. Furthermore, a technical review is performed on these players and they then receive an action plan for further development. The specific aim of this process is to develop these players for the U/20 World Cup. As noted earlier, the first World Cup of this new age-group format will occur in 2008. A position-specific training camp will take place at the end of the 2007 national U/19 Currie Cup competition to prepare the players for the World Cup. Trials will be played (North and South) to select specific players for inclusion in the team that goes to the World Cup (J. Durandt, personal communication, 2007; H. Masimla, personal communication, 2007).

The senior squad of the national High Performance Program has been established to develop the Emerging Springbok team. Fringe players from outside the National Springbok squad as well as Super 14 players and those selected by the national selectors are included in this senior high performance squad. These players are also profiled according to their personal information (conditioning and medical status, as well as technical review) and action plans for further development are drawn up for these individuals (J. Durandt, personal communication, 2007; H. Masimla, personal communication, 2007).

In summarising the talent identification and development approach of SARU:

It is evident that the initial identification and selection of players is performed by selectors and occurs at the age of sixteen years. These selected players then form the South African Elite Squad. They are sent to their unions to form part of the provincial elite squads where they are physically profiled and tested as well as monitored for skills deficiencies. There they receive conditioning and skill-specific (if needed) training. These players are monitored through the ranks and hopefully progress to the U/18 Craven Week, the junior professional ranks and beyond. There

are also junior and senior squads of the High Performance Program of SARU. The junior squad's focus is on the IRB U/20 Rugby World Cup and the senior squad's main focus is on the Emerging Springbok Team.

6.5.2 Talent identification and development at the New Zealand Rugby Union

Initial correspondence was with Mr. Mark Robinson. Thereafter, Mr. Andrew Hore assisted with the information in this section and is referred to throughout. Correspondence was in the form of electronic mail.

6.5.2.1 Talent identification

Historically, talent identification in the New Zealand Rugby Union (NZRU) has been performed on a largely informal basis. Age-grade provincial selectors and coaches normally form the basis of this network and, the national coaches and selectors choose their teams based on the competitions at provincial level. There are no structured reporting systems or formal lines of communication in talent identification in rugby in New Zealand (A. Hore, personal communication, 2007).

Talent identification is conducted at U/16 level by means of regional tournaments (North/Central/South) (these are the competitions mentioned in the previous paragraph) between provincial unions and this forms the basis of talent identification in New Zealand. The National U/17 selectors choose an elite squad of fifty players who are invited to attend ongoing national development camps the following year. It is at these camps where the strengths and weaknesses of the players are assessed and where their physical conditioning is measured. These identified players usually progress through the national age-grade system, get to play in international matches and also attend further development camps, but this is conditional on them maintaining their high standards of play (A. Hore, personal communication, 2007).

Furthermore, in attempting to improve the overall approach to talent identification in the NZRU, they recently appointed a Talent Identification Manager. It is this person's

role to perform a coordinating role that includes the establishment and implementation of official talent identification and development structures and systems within the NZRU. This person also reviews current practices. The NZRU currently has approximately seventeen selectors who are applied across the U/17, Secondary School, U/19 and U/21 teams. These are unpaid positions, although the NZRU does cover their costs. These selectors in turn have a network of teachers, selectors and coaches in the provincial unions on whom they can rely. These structures also fulfil a talent identification role throughout the country, and once a talented player is identified through these structures, they are tested by the Super Rugby Franchises (A. Hore, personal communication, 2007).

The physical testing protocols in use in New Zealand Rugby Union are consistent from age-grade level through to the elite professional levels. The NZRU currently use a central database called the Performance Profiler that holds all the information around the athlete's testing, conditioning and nutrition (A. Hore, personal communication, 2007).

6.5.2.1.1 Testing protocol NZRU

The testing protocol that is used to test and profile those athletes identified by the selectors is divided into anthropometric and physical-motor variables. Furthermore, as with SARU, NZRU do not employ rugby-specific skills components in their testing. They are currently in the process of developing a skills assessment that will focus on core skills such as tackling, passing, running and catching skills which in turn are centred on three rotations of running lines, tackle technique and catch/pass skills (A. Hore, personal communication, 2007).

These skills will be scored on a qualitative, ranking system as opposed to a quantitative approach since the assigning of scores is a subjective practice that often varies between different assessors. The NZRU feel that a qualitative approach allows for the specific targeting of skill deficiencies without being overly concerned

with scores that might not sketch the proper scenario as to overall and specific performance of a skill (A. Hore, personal communication, 2007).

The protocol is included hereafter:

Table 6.2: Testing Protocol of New Zealand Rugby Union

Anthropometric	Physical-Motor
1) Height (cm) 2) Weight (kg) 3) Body composition (8 skin-folds) • Biceps • Triceps • Sub-scapular • Supra-iliac • Supra-spinal • Abdomen • Mid-thigh • Proximal calf	1) MFITS * • 60m (sec) (to measure acceleration, the backs are timed at 10m and 30m and the forwards and halfbacks at 10m and 20m) • 400m (sec) • 1500m (sec) 2) RS² Test ** 3) Strength and power (1-5RM) • Power clean (kg) • Deadlift (kg • Back squat (kg) • Bench press (kg) • Flat dumbbell press (kg) • Weighted reverse grip chin (kg) • Bent over row (kg)

** MFITS=Multi Energy System Assessment.*

*** RS²=Rugby Specific Repeated Speed Test-this test incorporates an agility component to the testing.*

6.5.2.2 Talent development

The development of talent in New Zealand rugby is, as with SARU, particularly well managed. Each provincial union has an academy structure for player development. Often these players can spend as much as three years in this development program.

The NZRU has also introduced an elite academy program into the provincial union academy program. This allows them to more closely monitor the elite squad (and other) players who they think will perform at the highest level in the future (A. Hore, personal communication, 2007).

At national level, the NZRU use their national age-grade camps, which in the past have traditionally been trials to select national teams, to further develop those players selected for national-age grade representation. At these camps there is however now more of a focus on the further development of the athlete and less of a focus on trial games. Issues that are focused on include such diverse yet critical factors such as leadership, nutrition, conditioning, game and positional awareness, review systems, self and social awareness and self-management. All of these are believed to be crucial to the success of the athlete. Through these camps the NZRU aims to provide the latest knowledge and expertise by introducing the most recent techniques and developments that are available to rugby (A. Hore, personal communication, 2007). Do note that these age-grade camps are *not* the same camps as those used to develop the players selected at U/16 level by the national U/17 selectors.

The managers of the provincial union academies are invited to the national age-grade camps mentioned earlier, and with the knowledge that they gain at these camps, they then go back to their respective provincial academies to so improve the functioning and offering that they provide on a provincial basis. (A. Hore, personal communication, 2007).

In summarising the talent identification and development approaches of the NZRU, the following can be said:

The NZRU also identify players at U/16 level. They then get invited to national elite training camps for further development in the following year where their strengths and weaknesses and their physical profiles are established. It is these players that

usually progress through the elite representative ranks but are required to maintain their standards. The NZRU also employ national age-grade camps to further develop the players selected to represent New Zealand at age-grade level. Development in NZRU appears to be based at provincial academy level where players are developed. An elite academy program has been introduced at these provincial academies where the elite group initially selected (and other players) are monitored and further developed. It certainly seems as if a lot of effort goes into the provincial and national academy setup.

6.5.3 Talent identification and development at the Australian Rugby Union

All correspondence in this section was with Mr. Ben Whitaker of the Australian Rugby Union. Correspondence was in the form of electronic mail.

6.5.3.1 Talent identification

The ARU performs talent identification country-wide and have talent identification coordinators in the four Super-14 provinces with further talent identification networks extending from these coordinators into the larger metropolitan and country areas. Talented players are first identified and recruited from the ages of 14 to 15 years. Pertinent to note, however, is that while the ARU also uses age-group tournaments to identify talented youngsters, these tournaments are more often than not used in conjunction with the well established talent identification networks country-wide (B. Whitaker, personal communication, 2007).

Over the past four years the ARU have used a consistent battery of physical tests that have been used as objective measures of the player's ability to succeed. Furthermore, the results from these tests provide the ARU with an indication of what is needed to assist these individuals in reaching the higher levels of the game as well as succeeding therein once at these levels (B. Whitaker, personal communication, 2007).

The ARU use the same battery of tests all representative teams, from the youngest age-group programs (14-17 years) through to Super 14 and Wallaby level. Over the past four years they have implemented standard testing to collect data that can be used to assess standards throughout these various years. The ARU have acknowledged the need to build on this data over the next five years in order to facilitate comprehensive analysis of the data obtained. Also, while it is possible for the ARU to compare intra and inter-group test results, there is a hesitance to do so. They rightly consider the need to appreciate the intra and inter-group differences that occur during physical development and maturation (B. Whitaker, personal communication, 2007).

The ARU have sufficient strength and conditioning positions to allow for 'in house' talent identification and testing. They do make use of the Australian Institute of Sport as external counsel to challenge and question the test their approaches and practices. Furthermore, to ensure that they retain the requisite levels of non-bias and objectivity, the ARU make use of external groups to perform their testing (B. Whitaker, personal communication, 2007).

So, the ARU has identified two key areas that need to be in place for effective talent identification; 1) established positions to ensure sufficient and adequate coverage across Australia to facilitate the identification of the best talent, and; 2) a standard process that ensures that all the individuals and groups involved understand what they are looking for and how the information is channelled through to the right people (B. Whitaker, personal communication, 2007).

One of the major challenges faced by the ARU is the fact that rugby league, and to an extent Australian Football are looking for players that fit the same profile as those needed by rugby union (ARU). They are therefore constantly under pressure to ensure that their systems and ability to recruit and retain talent are the best that they can be (B. Whitaker, personal communication, 2007).

6.5.3.1.1 Testing protocol ARU

Table 6.3: Testing protocol of Australian Rugby Union

Anthropometric	Physical-Motor
1) Height (cm)	1) 10/20/40m sprint (sec)
2) Weight (kg)	2) Vertical jump (cm)
3) Body composition (7 skin-folds)	3) Beep test (shuttles)
• Biceps	4) Strength*
• Triceps	
• Sub-scapular	
• Supra-spinal	
• Abdominal	
• Front-thigh	
• Medial-calf	

** Duthie (2006) recommends squats (kg) and bench press (kg) as strength tests for elite rugby. It could not be ascertained whether the ARU actually incorporates these specific strength tests within their protocols.*

The ARU strive to provide an indication of the learning preferences of each player. This will aid in the coaching approach to be used on the players. Furthermore, they are also looking into conducting mental toughness reviews on each player to establish mental toughness profiles for these players (B. Whitaker, personal communication, 2007).

Skill testing is performed by the ARU. They divide rugby skills into core skills and position specific skills. Core skills are contact/breakdown, catching and passing as well as tackle/defence skills. They further classify individual or position specific skills to include those of scrumming, kicking (various types), lineout support, lineout throwing and lineout jumping. These skills are not tested as such in testing protocols but are rather analysed and qualitatively rated from the game

performances of the individuals under review (B. Whitaker, personal communication, 2007).

This “best practice” skill/performance rating for each position was developed primarily in conjunction with the Super 14 and Wallaby coaches. According to this list of skills and the rating provided, if the player is able to perform each of these skills at the highest level or rating, then this would result in the player being the worlds best in that position. The ARU acknowledge, however, that it is not possible for a player to perform all the skills listed per position at the highest level or rating. They therefore regard this rating to be of as much value to players as it is to coaches and others. By using this rating, players’ strengths and weaknesses are discovered and they can use this rating to assist them in developing their areas of need (B. Whitaker, personal communication, 2007).

The rugby-specific skills performance rating of the ARU is included hereafter:

Table 6.4: Performance rating scale of the ARU for rugby-specific skills (Provided by Ben Whitaker, ARU)

1	2	3	4	5	6
Able to perform the skill @ training with no opposition	Able to perform the skill @ training – (1 v 1)	Able to perform the skill @ training in game situation (eg 5 v 5)	Able to perform the skill in a game – *Schoolboy Club*	Able to perform the skill in a game @ national level – *Aust Schools* *Aust U19s* *Aust U21s* *Aust 7s* *S14 'A'*	Able to perform the skill in a game @ international level – *S14* *Aust 'A'* *Wallabies*
Training	**Training**	**Training**	**Game**	**National level game**	**International level game**

6.5.3.2 Talent development

Once a talented or gifted individual is identified, they are channelled into the National Talent Squad Program for 14-18 year old school players where they are appropriately developed over the long term. This program is conducted out of the four Super 14 provinces as well as out of Melbourne. Here, professionally staffed training centres provide the necessary development and included on the staff of these centres are full time coaches as well as strength and conditioning specialists. Thereafter, if these players are considered to be good enough, they then proceed to post school academies where their long term development is further continued (B. Whitaker, personal communication, 2007).

In summarising the talent identification and development approaches of the ARU, the following is apparent:

Talent identification is conducted at an earlier age by the ARU as opposed to SARU and NZRU. Further, their talent identification network is advanced and well developed in that they do not rely as much on age-group tournaments. Their test protocol for physical profiling is consistent throughout all representative age-groups and they also provide for skills testing in a qualitative manner. They are also considering mental toughness as a measure. Development then occurs in national school-age development programs country-wide, and if deemed good enough, these individuals proceed to post-school academy environments.

6.6 SUMMARY

From the preceding discussion it is clear that talent identification is constantly evolving. It is however quite apparent that talent identification is far from a perfect science and that more research and investigation is necessary before a complete and satisfactory multi-sport, multidisciplinary approach that adequately addresses all the inherent requirements of sport and the identification thereof is to be developed.

Talent is dynamic and is constantly changing. It is virtually impossible to assign a stable progression pathway to the concept of talent, especially in sport, since there are so many variables and attributes that play a role in successful participation, often with each of these attributes or variables developing at different rates (Vaeyens *et al.,* submitted). A possible solution to minimise or counteract this changing nature of talent (as especially found during childhood and adolescence) is to monitor longitudinally those players who initially show promise and then to use the data obtained from those who eventually achieve ultimate success for future comparison and measurement.

The challenges inherent to talent identification are not insurmountable however, and the relative short-comings as well as recommendations provided by Vaeyens *et al.* (submitted) as well as Abbott *et al.* (2007) really need serious consideration and implementation. When looking as far back as du Randt and Headley (1992c), Régnier *et al.* (1993) and others, with their emphasis of some of the problems, it is quite notable that little has been or can be done to address the issues concerned, although noteworthy attempts and progress have been made. It is also important that the guidelines and recommendations of du Randt and Headley (1992d), Régnier *et al.* (1993) and Vaeyens *et al.* (submitted) be heeded. South Africa is a worthy participant in the international sporting arena and world beaters in many sports. For South Africa to consistently be and beat the best, a scientific approach to talent identification and development is critical.

The SANZAR review contained in this chapter was meant to analyse current talent identification and development trends and practices only. The information was gathered from the officials (and one sport scientist) actively involved in these processes at the respective home unions. Consequently, it must be said that scientific deductions were not made from this data and that this review did not serve as a scientific basis for this study.

Nonetheless, valuable and insightful information was garnered from this review and analysis of the talent identification and development approaches of the SANZAR nations. It is quite clear that proper developmental programs are currently in place in rugby. This bodes well for the future of the game internationally and locally. The question remains, however, as to how many potential Springboks and representative players are slipping through the cracks due to talent identification and development programs that may not yet be as effective as they should be.

In summary, the issues raised by the analysis of the models of talent identification and the subsequent proposals are significant. The critiques and possible solutions pertaining to talent identification provided by Vaeyens *et al.* (submitted), Abbott *et al.* (2007) and others are regarded by this study as having merit. The specific issues of; 1) maturation and related factors; 2) the dynamic and unstable nature of talent and its development, and; 3) a focus on talent development over identification and others are all further reinforced by this study. As is the multidisciplinary approach to talent identification that has been so resolutely championed by so many. It is only obvious that focusing only on physical variables is far from adequate, and an incorporation of sport-specific skill measures and psychological attributes and skills in overall talent identification protocols is not only important, but of absolute necessity.

The overriding emphasis of this study, however, is that when all things are considered, talent development be seen as the overarching concern, with talent identification functioning as a measure of accuracy and progress. Once overall movement, physical, perceptual and mental skills of players are stimulated and developed, and only once they have been exposed to a wide range of sports, then the selection of current ability and the identification of potential ability within a specific sport can and should be conducted.