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Talent Development

From multi-sport to donor sports

Creating Tomorrow

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by

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"I have six years' experience in applying this versatile exercise program in addition to training the youth teams of Ajax Football Club. During this period, I have not witnessed any suffering of "football development" in the short term. Personally, I believe I even saw the opposite! For example, gymnastic training actually strengthened football motor skills."

René Wormhoudt, who worked at Ajax for 25 years.
Currently employed by the Dutch FA.

1 Preface

It must have been around 2003 – although I don't remember exactly – that an article in a supporters magazine from Ajax drew my attention. It described how René Wormhoudt, one of the trainers at Ajax, introduced judo and gymnastics at the football club. Several times a week, development teams would spend some of the available practising time doing sports other than just football. Becoming better at football by not always playing football? Is that contradictory? After all, isn't it true that the more time you invest in a particular sport, the better you will become at that sport?

My purpose with this consideration is to introduce a talent development model to the reader, the Athletic Skills Model (ASM). Building on existing models, not only does this model leave space for practising sports other than the particular sport that is being trained, but it also recommends doing so as a high-quality addition to training sessions. That high-quality injection is provided to both the select group of elite players striving to make it to the absolute top, and athletics at a recreational level. Here the ASM promotes healthy sports for a lifetime. The ASM is shaped by practical experiences in continuous interaction with science to, where possible, substantiate the principles with scientific findings. The ASM has already been described in detail (Wormhoudt, Teunissen, Savelsbergh 2012; Wormhoudt, Savelsbergh, Teunissen & Davids, 2018) and will be the focus of my professorship.

2 Five important facts to be considered

For starters, I will first review some facts that have given rise to the development of the ASM, and which are still guiding it.

1) Time and time again, research shows that children in primary school have lesser motor skills than, say, thirty years ago. Vandorpe e.a. (2011) subjected 2,470 primary school children to a coordination test and compared the results with the outcomes from children who had taken the same test in 1974. The current generation of children scored significantly lower. The conclusion is inescapable: there is a decline in coordination. Some 21% of the current generation of children ended up in the problematic bracket (Vandorpe e.a., 2011).

2) Elite athletes practise many different sports when they are young. For example, the American Olympic Committee studied 800 Olympic athletes, including 283 medallists, to establish general patterns and trends in the development of a child from the moment he or she started playing sport for the first time until the moment they became an adult and performed at the Olympics (Hill e.a., 2002). The main conclusion was that Olympic athletes, as children, were very active and participated in an average of 2.6 to 3.5 different sports until they reached the age of 14. From the age of 15 that number would dwindle but the 2.6 to 2.8 sports they would play was still considered to be high. Most boys would, on average, start specialising in a specific sport at the age of 12, where girls would do so at the age of 11.5. Hill e.a. also report that medallists performing at the Summer and Winter Olympics, on average, practised 3.4 sports at school and 3.1 elsewhere. A more recent study from Vaeyens e.a. (2009) confirmed this observation. They concluded that elite athletes in football, wrestling, field hockey and figure skating were involved in a wide variety of sports in the early days of their sporting development.

3) Studies of children between 6 and 12 show that a combination of fewer training hours in different sports achieves a similar result in a coordination test as when the training hours for one sport is increased. A study by Fransen e.a. (2012) in Ghent (Belgium) highlights the quality of training: children learn more when they practise multiple sports and, perhaps more importantly, it takes them less time! In short, by practising a large variety of different sports, the available practice time can be used more efficiently and, subsequently, will yield better results.

4) Not everything needs to be taught consciously or explicitly – this can sometimes even be considered undesirable. The classical line of thinking is that the path to maximising the mastering of a movement skill goes along the line of an initial verbal-cognitive (conscious) phase, via a second associative phase, to a final autonomous phase, and that training movement skills happens automatically (subconsciously) (Fitts & Posner, 1967). This is accompanied by a shift from explicit, articulated knowledge to implicit knowledge that we are not aware of when performing a movement. This phase model by Fitts and Posner was instrumental in structuring education in such a way that learning to move would go along the lines of verbal-cognitive to automatic. This led, in particular, to an emphasis on explicit instructions at the start of the learning process, in order to make children aware of how best to perform movement skills. However, recent scientific findings show that detailed instructions are not always necessary, and somethings even undesirable. Movement skills can also be learned with minimal or even no instructions. There is no need to always start a learning process in an explicit manner. A movement skill can also be learned in an implicit way. Methods such as error-free learning, analogy learning and differential learning make it possible to minimise the role of explicit knowledge building.

5) A positive relationship exists between children participating in sports and their performance at school (Verburgh, 2015). Colleagues in Groningen show, for example, that a child who does sports delivers a better performance at school, regardless of the school level, than a child who doesn't do sports (Van der Niet, 2015). Although the exact nature of this relationship is still unclear, it does show the importance of sport and exercise.

In relation to the ASM, these five facts not only underline the importance of developing talent in sport and stimulating physical activity in a general sense; they also direct the way in which talent development and exercise stimulation programs should be organised.

3 Talent development models: a brief history[1]

In the past two decades, scientists have increasingly started to appreciate talent development. I adopt the classical age-phase model from Bloom (1985). He limited himself to the select groups that had reached the absolute top in music, science and sports (particularly swimmers) and reviewed the roles that coaches, parents and the social environment had played for them to become elite athletes. Bloom describes three stadia: the young (early), the middle years, and the later (elite) years. In the first phase the child starts more or less coincidentally doing a sport, for example hockey, because one of their parents played hockey. The child is taken along to training sessions and games and, as such, naturally starts playing hockey. These years are characterised by great enthusiasm, regular presence and the giant leap that the child experiences. A competent guardian (trainer, parent) who makes the game fun to play and who stimulates the child is important. In this phase it is not so much the talent that will surface in children, but enjoyment in the game and, as such, they practise for many hours to perform better.

In the next phase the training, and trainers, become more serious. The role that parents play also changes. Their involvement in the training process reduces. The child feels more responsible for their performance and takes responsibility for that. The transition towards elite-level sport can already be made in this phase. During this phase it is not uncommon to practise the sport (or music) for ten to twenty hours a week.

Ultimately, in the third phase, the transition to the top is accomplished by perfecting performance. The trainer and coach focus on supporting, analysing and directing. The talented player becomes a professional in the sense that they now practise the sport for twenty or more hours per week.

Research by Bloom shows that talent development experiences several stages and that different factors are important in the various phases. Bloom emphasises that the stages don't have a clearly defined start or end point, but that talent development is a continuous process in which determining factors change over the course of time. Côté e.a (2007) have used this to formulate a more age-related model, whereby they interpret the stadia from Bloom and translate those to age-specific phases for talent development in sports. Before I am able to discuss these, I first have to discuss work done by Anders Ericsson.

In 1993 Ericsson published a ground-breaking article about acquiring expertise in *Psychological Review*, a leading scientific magazine (Ericsson, Krampe & Tesch-Romer, 1993). In this article he analysed the practice behaviour of professional musicians. He mapped the age they started with playing music, how many hours a week they practised and how the number of hours changed with age. He calculated that the absolute top performers had clocked up 10,000 hours of practice. They often started at the age of 4 or 5 and broke surpassed 10,000 hours of practice by the age of 20. Ericsson concluded that 10,000 dedicated training hours is the determining factor for achieving the absolute top

in the music industry. It appears that this has also become the norm in sports. Ericsson e.a call this *deliberate practice*. Since the publishing of Ericsson's article, many researchers have embraced the 10,000-hour rule. For example, a meta-analysis from 33 studies about 2,765 athletes (performing both team and individual sports) by Macnamara e.a was recently published. This provided a different, more nuanced picture about the contribution that the number of *deliberate practice* hours makes to achieving top performance in sport (Macnamara, Moreay & Hambrick, 2016). The extent to which the achievement can be attributed to the number of training hours (the so-called explained variance) was 18%. However, for the absolute elite among athletes, this is not more than 1%. So, only 1% of the achievement can be attributed to the number of dedicated training hours! That doesn't mean that clocking up training hours is irrelevant. What it says is that the explanation for top achievements should be found in the quality of the training.

The Canadian scientist Jean Côté (1999) has fine-tuned the models for top sport development from Bloom and Ericsson. This resulted in the Developmental Model of Sport Participation (DMSP) which proposes an alternative route to the top. The DMSP also distinguishes three phases: the trial phase (6-12 years: *sampling years*), the specialisation phase (13-15 years) and the investment phase (16+ years). Côté also makes suggestions regarding the quality of the training. He does so by introducing the term *deliberate play*. Play should prevail in young children and is characterised by lots of fun and fairly relaxed rules, often made by the children themselves, while at the same time teaching skills. Côté e.a (2007) hint that practising should be fun and should take place in a structured environment that interfaces with, but is not necessarily identical to, the target sport. This proposal clearly shows interfaces with the Teaching Games for Understanding approach (Butler & Griffin, 2005; Davids, 2010; Thorpe, Bunker & Almond, 1986).

The child will experience the practising as playing while the trainer or coach will shape the environment in such a way that it transforms into a learning environment. The organisational structure applied is then essential. Dedicated playing predominates in the try phase. In the specialisation and investment phases the influence from committed play diminishes and there is an increasing shift towards dedicate practice.

An influential talent development model that was introduced in Canada and adopted in many countries is the Long Term Athlete Development model from Balyi. It is also known as the LTAD model (Balyi, Way & Higgs, 2013) and spans a lifetime. Sports federations in over fifty countries use this model because it provides them with a good basis to distinguish the development phases that children experience. The LTAD model is based on task-oriented rather than performance-oriented training. Therefore, the model provides trainers with guidelines for each age phase in terms of global objectives for designing training environments. The LTAD model uses seven stages with specific characteristics for the phase of the children and adolescents (Balyi, Way & Higgs, 2013) (see Table 1). I have the opinion that it is closely related to the DMSP from Côté and, in fact, further refines the DMSP.

Table 1: The seven stadia from the LTAD model from Balyi

1. Active start (4-6 years).
2. Fundamentals (6-9 years): The children learn the fundamental movement skills.
3. Learn to train (8-12 years): The young athletes are introduced to practice and training forms. The children master the basic techniques for a sport.
4. Train to train (11-16 years): This period coincides with puberty and the associated growth spurt. The duration of the training is extended. In addition, the sport-specific skills that were taught in the 'learning to train' phase are expanded and perfected.
5. Train to compete (15-23 years): The training becomes more performance-orientated through periodisation. A personal training program is drawn up from a multi-year plan.
6. Train to win (>18 years): The start of a (professional) elite sports career.
7. Active for life.

Australia, a country where sport and science have been reinforcing each other since the Australian Institute of Sport (AIS) was founded, relies heavily on the DMSP from Côté and uses an LTAD-like model that has even more stages. This model is called the Foundation, Talent, Elite and Master (FTEM) model. The FTEM model focuses on top sport and distinguishes three levels at the 'foundation' level, four at 'talent', two at 'elite' level and one at the 'master' phase (see Figure 1).

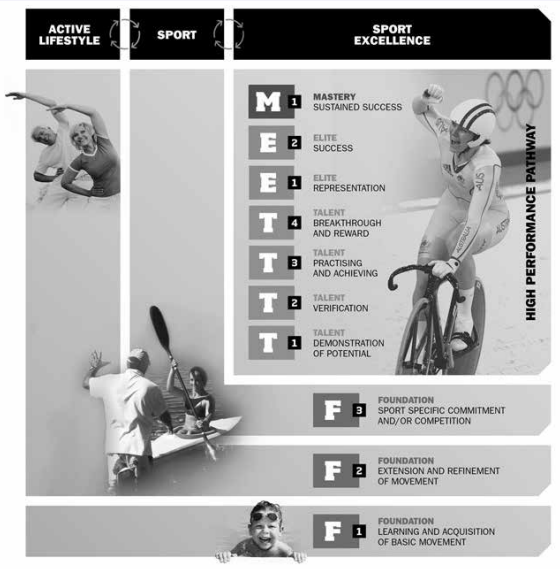

Figure 1: Representation of the Australia-developed FTEM model (See text for further explanation)
Source: www.ausport.gov.au/supporting/top_1-_tipsforparents

An important way in which the FTEM model builds on the LTAD model is the elaboration of the stages 'Train to compete' and 'Train to win'. This distinguishes two levels within the 'elite' phase: the lowest level is the potential for participating in the Olympics, the highest the potential for winning a medal at the Olympics or a World Cup, while the 'master' phase indicates that a medal at a big tournament is a certainty. At the base of the FTEM model, like at the 'foundation', participation in multiple sports is strongly advocated. The *sampling* idea from Côté is clearly reflected here[2], like it is in the ASM.

4 The Athletic Skills Model: From multi-sport to donor sports

The ASM builds on the ideas from Côté which include the five important facts as described in paragraph 2. The ASM covers the talent development from children and adolescents to adults but also includes health and wellbeing. Practical experiences, combined with scientific insights, form the basis of the model. The ASM is based on the unity of body and mind and sees the development of elite athletes as follows:

– The person has fun in moving.
– The person becomes a versatile and good mover.
– The all-round mover becomes an athlete.
– The athlete starts to specialise.
– The specialist is an athlete.

In principle, these development stages are not linked to age. An athlete, after having started exercising in a versatile way, may very well end up in community sports and remain active just because a diverse foundation was laid down. The time it takes to lay this foundation is not necessarily linked to an age, but more depends on the physical capacity of the athlete and the opportunities that the environment offers. It is especially during this period that the principle of multi-sport applies. An athlete learns the fundamental movement skills through different movements that occur in a range of sports, hence the prefix 'multi'. Multi-sport means than an athlete, through a combination of different sports, can acquire a wider range of basic movement skills. Furthermore, he will also master several variations of this movement within the performance from a fundamental movement. In other words: you don't learn just one form of balance but many different forms of balance. Sometimes this is possible within a sport, like athletics or gymnastics, which allow for various disciplines to be practised. The aforementioned research from Fransen e.a. (2012) supports this proposition: an athlete sports-

player learns more from doing a combination of different sports because this will cover the entire scope of fundamental movement skills. However, learning a complete palette can take time, meaning this can be a disadvantage (less time is invested per sport) compared to when all time is invested in a specific skill within a sport. It is mainly the latter that is promoted by coaches who advance early specialisation.

A second, core principle within the ASM is the donor sport. A donor sport is a sport that has aspects that help an athlete get better at his or her target or main sport. The donor sport is often practised outside regular training hours. The required standardised movement skills in the target sport reappear in a donor sport in the form a variation on this movement skill. It not only prevents one-sidedness in the practise and execution of movement skills (and thus possible overload and injuries), but it also trains adaptive ability; it comes as if it were for free. In fact, in an implicit way (thus without the standardised movement skill being explicitly trained) various situations with various requirements are being trained. This has the added advantage of making training sessions less monotonous. We know from scientific findings that variation in training leads to better and more robust movement skills (e.g. Schollhorn, 2005; Savelsbergh e.a., 2010), while implicit learning better guarantees performance under pressure and fatigue (Masters, Van der Kamp & Capio, 2015). It appears that many (upcoming) athletes subconsciously use donor sports. A web search for 342 professional athletes in North America and Australia (e.g. Australian football, athletics, American football, baseball, basketball, bobsleigh, bowling, football, cricket, golf, cycling, hockey, lacrosse, motorsports, netball, rugby, sailing, snowboarding, tennis, swimming and water polo) showed that 247 athletes practise a second sport, 64 practise two other sports, 21 practised three other sports, 2 practised five extra sports (cricketer C.B. Fry, 1872-1956 and hockey player Lionel Conacher, 1900-1954), and one Babe Zaharias (1911-1956) practised seven extra

sports in addition to golf. Apparently, people are already using other sports to get better in their main sport.

The principles for multi-sport and donor sports are naturally in line with each other. In order to make optimal use of a donor sport in the 'later' athletic life, the donor sport has to be form of multi-sport. In other words, the athlete should have mastered the fundamental movement skills that are part of the donor sport to be able to practise the donor sport at a reasonable level. At the same time, the improvement of the fundamental movement skills (by practising the donor sport) also contributes to performance in the target sport. Donor sports allow for the training program to become *tailor-made*. It allows improvements to the training quality to improve the player without a unilateral overload, which would be a clear injury risk.

The goal of ASM is to form a more stable and broad foundation for the development of motor intelligence (e.g. physical literacy) which, among other things, enables a sporting career. Based on the models from Bloom (1985), Côté e.a. (2003, 2007, 2011), Balyi e.a. (2004, 2013) and Ford e.a. (2009) the ASM defines five phases:

	Boys	Girls
Basic athletic skills	age 4- 9	age 4-7
Advanced athletic skills (P1)	age 10-12	age 8-10
Transition athletic skills (P2, P3)	age 13-14	age 11-12
Performance athletic skills (P3)	age 15-18	age 13-18
Elite athletic skills	age 19+	age 18+

Ages are indicative. The start and end of a phase are closely related to the person's biological development (Mirwald e.a., 2002; Moore e.a., 2014). This has to be considered particularly in the advanced and

transitional phases, and so this is elaborated in three sub-phases: pre, during and after the growth spurt. A clear yardstick is provided here, namely the 'Age *Peak Height Velocity*' (APHV) determination. A simple measurement allows for the making of a reliable estimate of the age at which an athlete will experience his or her maximum growth and where he or she will be in relation to the moment of maximum growth. Understanding the number of months prior to, or after, the athlete experiences maximum growth – or perhaps almost in the middle of this experience – is important for adjusting the training load to minimise "loss" from injuries.

It is claimed that the ASM program achieves more skilled athletes who have a longer and more sustainable life with less risk of an injury and more prospect for growth. Fun and diversity are fundamental and, apart from improving one's health and wellbeing, also stimulate the development of motor skills. ASM has the following three core values to this end.

Core value 1: Ensure moving includes fun and diversity
Fun and diversity form the foundation of sport, and stimulate human good health and wellbeing. The ASM stimulates fun and diversity by introducing new forms of learning to the traditional motor learning method. These methods ensure that, apart from variation in participating in various sports, variation in exercising is also increased. This becomes evident from the following quote:

'When asked to name a typical ASM game, "cleaning one's feet" is often mentioned as an example. This is a game used in physical education that draws on elements that can be found in many games and that are often essential for this game.
Obviously, the one versus one option is the easiest. However, even this option has lots to offer. In my view, the two versus two option is the one that best meets the diverse goals. This game contains many

different directional changes, turning, estimating and taking risks, *split-vision*, predicting the running lines of the opponent and the speed of both fellow teammates, and opponents taking position. The nice thing about games is that it allows you to train a lot whilst having fun. I believe it is important to have fun whilst training players' development. These players often experience pressure and are always expected to deliver. When we ensure that training skills is combined with a large quantity of fun, they will complete the training with much more motivation. Nothing beats watching children playing with a smile on their faces.'
Ronald Mijzen, teacher Reformed Lyceum Amsterdam-South and Ajax development team; quoted from Wormhoudt, Teunissen & Savelsbergh (2012)

An important alternative for traditional explicit learning methods (see point 4, paragraph 2) is implicit learning. The ASM program has various methods for implicit learning like analogue, flawless and differential learning (Schollhorn, 2005) which are linked to various phases. Some methods apply better to a certain phase than to other phases. For example, analogue learning and flawless learning perfectly suit the 'basic' and 'advanced' phases (Savelsbergh, Canal-Bruland & Van der Kamp, 2012) while imitation learning via observational learning better suits the 4-12 age category. Furthermore, by structuring the environment and playing sport in a competitive format (game) many fundamental movement skills can be covered in a warm-up. This can also be applied to periods in which the trainer emphasises the structural approach of the training. The child will experience this as a game with much variety. This can easily be implemented all the way up to the 'elite' level.

Core value 2: Use 'transfers'
Donor sports play an essential role in the *transfer of learning*, or benefitting from previous learning experiences when learning something new. Transfer takes place in the following ways:

a) Transfer from movements: This is transfer as a result of a movement technique; footwork associated with badminton can help improve goalkeepers in football and hockey. Learning to throw or aim a frisbee will help to improve the backhand in tennis.

b) Perceptual transfer: Learning to recognise game patterns is a good example of perceptual transfer. An athlete can learn to use relevant information to identify game patterns in videoclips and use this experience of identifying game patterns on the field. Players can use game insight into a 3-a-side basketball game to position themselves in small spaces on a field by anticipating based on compatible information from the environment (for example, the relative positioning of players).

c) Conceptual transfer: This type of transfer relates to the common rules in various types of games (like Teaching Games for Understanding benefit from this type of transfer).

d) Physical transfer: This is transfer from improvements in stamina, core stability or use of force when moving from one form of movement to another (See quote below).

e) Competition transfer: This transfer is an integrated combination of knowledge and insight, attitudes and skills learnt through other sports and cultures.

Transfers also occur in combinations of A to E.

'When I was the strength and endurance trainer for the Ajax main team, I often would go to the nearby woods to do numerous versatility exercises. There you could run on flat and hilly terrain, use the jogging track for exercises like slalom between the trees, box jumping over tree stumps, stair training, climbing forms, jumping forms, walking on horse

trails and all other exercises I wanted to do with the team. This was more or less the source of inspiration for the AST (Athletic Skills Track): a facility that enables anything that is relevant within the vision of the Athletic Skills Model. I have linked these experiences to the much-needed basic forms of movement, testing, measuring and monitoring of physical skills, enabling playing games and other sports as well as the very important power-oriented running and power forms.'
René Wormhoudt, quote from Wormhoudt, Teunissen & Savelsbergh (2012)

It appears that, as stated before, athletes gain some benefit from a transfer from the same (basic forms of) moving or movement skills from one sport to the other, or within a sport (Côté, Baker & Abernethy, 2007; Wolstencroft, 2002)[3]. The systematic use of donor sports is actually exploiting the possibilities of transfer. This increases the training quality, because it also prevents one-sided loading.

Core value 3: Stimulate adaptability and creativity
By applying implicit learning methods to all kinds of game variations in combination with donor sports, a higher quality repertoire of movement will be created in the target sport (Savelsbergh & Wormhoudt, 2019). The ASM predicts that this will increase both adaptability and the ability to find creative solutions. Scientific proof is still lacking although research from Memmert, Baker and Bertsch (2010) points in this direction. These researchers interviewed trainers from national basketball, football, hockey and handball teams to select their three most creative attackers and their three least creative defenders. Subsequently, these selected players were asked about the amount and type of sporting experiences in a questionnaire. In this questionnaire, a distinction was made between experiences gained during training hours with elements from deliberate practice (Ericsson, Krampe & Tesch-Romer, 1993) and training hours with elements from *deliberate play* (Côté, 1999). The most striking finding was that the most creative players had experienced in their career more situations from

play than the less creative players. The difference becomes visible when the entire career is being considered but also when only the experiences that were gained before the age of 14 are counted. This emphasises the importance of *play*, and is precisely what the ASM predicts and pursues.

5 In summary

Talent doesn't develop on a linear trajectory with equally sized steps. Gulbin e.a (2013) studied the development path of 256 elite players. Only 16% of the athletes joined all selection squads all the way to the top. The vast majority only reached the top via all kinds of side paths. Interestingly, 57% experienced some form of lapse one or more times during the quest to the top, like being placed back in a lower team or being removed from the national squad (Gulbin e.a., 2013). This study teaches us that, by far, most athletes don't progress to the top step by step (in other words, linearly). However, most selection approaches rely heavily on this idea.

The goal of the ASM is to develop everybody's movement talent in a structured, versatile way. This can serve as a springboard for a sports career with better results and above all for a healthier life with fewer injuries, fewer retirements and more fun in sport. The ASM integrates the latest motor learning methods that use multisport and donor sports. By developing talent, recognising talent will become much easier. After all, the talent will emerge naturally by the practice of many basic forms of movement in different sports (the principle of the multi-sport), while the principle of donor sports also facilitates the relocation of talent. Relocating talent means that an athlete who has invested in a target sport for many years and considers quitting (for example because of a lapse), can be 'rediscovered' through a donor sport, thereby easily switching to a new, related, target sport. This way,

the training investments made earlier can still (or again) capitalised on. Obviously, this is not the main goal when practising a donor sport but it certainly is a side effect that should not be underestimated.

Finally, multisport and donor sport are complementary to each other and will only settle in once there is a target sport.[4] In general, the ASM not only focuses on what children learn, but also on how trainers and teachers should teach. The ASM will provide guidance when organising training courses.

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7 Curriculum vitae

Prof. Dr. Geert J.P. Savelsbergh occupies the Desmond Tutu-Chair in Sport and Youth, and is head of the Motor Learning & Performance section of the Amsterdam Movement Sciences & Institute for Brain and Behaviour at the VU University. From 1991-1996 Geert Savelsbergh was a research fellow at the Royal Dutch Academy of Science and he received an honorary doctorate from the Medical Faculty of the University of Ghent, Belgium, in 2008. From 2010-2015 he was Academic Director of the VU International Office for South Africa.

Savelsbergh's research interest lies in the field of visual regulation from human movement. He has published over 200 peer-reviewed scientific articles, 13 books and 74 book chapters. He was the chief editor of *Infant Behavior & Development* and editor of the *International Journal of Sport Psychology*. He co-supervised 30 PhD projects (including in Australia, Belgium, Brazil, Spain and the UK), and currently supervises 15 PhD projects in both the Netherlands, Australia and South Africa. Since 2014 he has been the Scientific Director of Performance for the Amsterdam Institute for Sport Science (AISS). On 1 June 2015 he accepted a position as part-time lecturer of Perceptual-Motor Talent Development at the Hogeschool van Amsterdam (University of Applied Science).

Savelsbergh conducts fundamental and applied research of perceptual and motor development and learning. The role of visual information in the regulation of human movement is central to this. From this perception-action paradigm, fundamental concepts like anticipation and pattern recognition are applied in the sports context in order to contribute to talent recognition and development (particularly in cricket, golf, hockey, tennis, rugby, football and sailing). Together with René Wormhoudt, Savelsbergh is the founder of the Athletic Skills Model for optimal talent development (ASM). ASM collaborates at

national level with the cities of Amsterdam and Almere, various sports associations including KNVB, KNHB and the KNGU, and with various football clubs in the Dutch Premier League. In the international field, several ASM partnerships have been started in Brazil, England, Japan and Singapore.

NOTES

1 For a much more elaborate description, see Chapter 2 in Wormhoudt, Teunissen & Savelsbergh (2012) and Wormhoudt, Savelsbergh, Teunissen & Davids (2018).

2 This multi-skill idea was also witnessed in the former DDR and Russia. See Chapter 1 in Wormhoudt, e.a. (2012, 2018).

3 However, transfer from movement techniques between limbs (Camus e.a., 2009) and between the right and left side of a body also exists (Stöckel & Weigelt, 2012; Stöckel, Weigelt & Krug, 2011).

4 Only after an analysis of the basic forms of movement that occur in the target sport do the correct multi-sport and donor sports emerge. When there is no target sport, playing multiple sports or early diversification are great ideas for playing until a specialisation is chosen. In the specialisation, new possibilities arise for the interpretation of multi-sport and donor sports, related to the specialisation sports. In other words, the easy way of performing many different sports does not necessarily have the same effect as what is being envisioned with multi-sport and donor sports, namely a stimulus for the target sport.

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