The importance of tactical skills in talent development
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Abstract

In this study, we examined the relationship between tactical skills and competition standard of two youth soccer teams by comparing 18 players (age 18-20 years) from the Dutch and 19 (age 18-23 years) from the Indonesian national youth team. All players completed the declarative and procedural knowledge scales of the Tactical Skills Inventory for Sport (TACSIS). Multivariate analyses of variances (MANOVA) and effect sizes were conducted to assess between- and within-team differences. There was a positive relationship between competitive standard and level of tactical skills: the higher-ranked (FIFA World Ranking 2005-2006) Dutch players outscored their Indonesian counterparts on the TACSIS subscales Knowing about ball actions ($F_{1.36} = 10.58, P<0.01$), Knowing about others ($F_{1.36} = 28.88, P<0.01$), and Positioning and deciding ($F_{1.36} = 10.10, P<0.01$). Multivariate analysis of variance revealed no relationship between tactical skills and playing time ($P>0.05$) in the Dutch team, whereas in the Indonesian team one procedural knowledge factor (Positioning and deciding) did show a positive association (effect size=0.99). In conclusion tactical skills are fundamental to high-level soccer performance. Ample, expert-led training and match experience at a high competitive standard, starting at a young age, and high-quality talent development programmes are suggested as key ingredients for the development of good tactical skills.

Keywords: talent development, competitive level, young athletes, declarative knowledge, procedural knowledge
4.1 Introduction

In team sports, tactical skills refer to the ability of an individual player to perform the right action at the right moment and quickly adapt to new configurations of play and the circulation of the ball (Elferink-Gemser, Visscher, Lemmink, & Mulder, 2004a; Grehaigne & Godbout, 1995). For a player to perform the right action at the right moment, with a successful performance or outcome, a proper understanding of the game is required. Hence, besides well-developed physiological and technical characteristics, elite players also need well-developed tactical skills (French & Thomas, 1987; Helsen & Starkes, 1999; Nougier & Rossi, 1999; Starkes, 1987; Williams, Davids, Burwitz, & Williams, 1993). This applies especially to players of invasion games such as soccer, in which players compete on the same field of action as their opponents. Because the environment in these games changes constantly, decisions must be made quickly and accurately, requiring good tactical skills.

Tactical skills rely on a range of cognitive competencies, including knowledge of the game and its goals and actions, knowledge of monitoring skills, and knowledge of actions within the context of the game (Thomas, French, & Humphries, 1986). These cognitive skills are typically categorized as declarative and procedural knowledge (Anderson, 1982; Thomas & Thomas, 1994; Turner & Martinek, 1999). Declarative knowledge is taken to denote knowledge of the rules and goals of the game, and hence refers to ‘knowing what to do’ (French & Thomas, 1987; McPherson, 1994; Williams & Davids, 1995). Procedural knowledge describes the selection of an appropriate action within the context of the game, in other words ‘doing it’ (McPherson, 1994). Sport is unique in that tactical skills do not only involve the ability to determine what decision is most appropriate in a given situation, but also whether this decision can be successfully executed within the constraints of the required movement. These constraints are physiological as well as technical and limit the tactical options available to the athlete (Janelle & Hillman, 2003).

Research into the relationship between tactical skills and performance or competition standard has mostly been restricted to identifying expert-novice differences – that is, comparisons of experienced athletes with a high degree of domain-specific declarative as well as procedural knowledge and athletes that have a limited amount of domain-specific knowledge (e.g., French et al., 1996; Starkes, 1987: Williams & Davids 1995). These studies all show that expert athletes outscore novice athletes on many aspects of tactical skills: an expert athlete is better able to select the appropriate response for a situation within the context of the game’s goal structure, based on less information, and can do so more quickly than a novice athlete (e.g., Thomas et al., 1986; Williams et al., 1993).

Although valuable, these studies do not tell us anything about how good players can be distinguished from the best, a prerequisite in the field of talent development. Differences in highly experienced players will never be as apparent as differences between experts and novices, while within an elite team the best players will have different performance profiles
from the ‘less able’ players in their team. Soccer teams commonly consist of about 20 players but during matches only 11 players can take the field. The best players play more matches than the players trainer/coach judges will contribute less to the team performance. To further our knowledge of what constitutes a top player and the ultimately foster talent and help improve training and player selection procedures, we assessed promising soccer players of two national youth teams by exploring the relationship between their scope of tactical skills and the level at which they compete successfully.

4.2 Methods

Participants

Participants were 18 players of the Dutch (mean age 19.52 ± 0.67) and 19 player of the Indonesian (mean age 20.86 ± 1.63) national youth soccer team. All players were highly experienced and considered to be the top players of their age category in their respective countries. The two teams differed substantially in terms of competitive standard, with the Dutch team being ranking considerably higher than the Indonesian team (FIFA 2005-2006 world ranking, 3 versus 110; http://www.fifa.com). Moreover, the Dutch players had 14.24 years ($s = 1.30$) of accumulated organized soccer experience, whereas the Indonesian had 11.74 years ($s = 2.47$).

Both teams were assessed in the Netherlands during their preparation for two formal soccer events (see Procedures). For each team, the players were allocated to two subgroups based on the number of playing minutes each player played at the relevant tournament divided by the number of games each team had played, with the Dutch team having played five and the Indonesian team having played three games. Allocation to subgroups was determined by the median of playing time per game; group 1 for the Dutch team comprised players with 22.90 and group 2 with >22.90 playing minutes per game; group 1 for the Indonesian team comprised players with 51.00 and group 2 with > 51.00 playing minutes per game.

Procedures

All players were informed about the procedures used in the study, following which they provided their informed consent. The national soccer federations, trainers, and coaches of the teams gave their permission for the study. All procedures were in accordance with the standards of the ethics committee of the University of Groningen. The data of both teams were collected in the Netherlands: for the Dutch soccer players during their preparation for the Under-20 World Championship (2005) and for the Indonesian players during their 6-month preparation –conducted under the supervision of Dutch trainers and coaches- for the qualification tournament for the Asian Games (2006).
The TACSIS

To assess the players’ tactical skills, we used the Tactical Skills Inventory for Sports (TACSIS; Elferink-Gemser, Visscher, Richart & Lemmink, 2004b), which has four subscales: Knowing about ball action, Knowing about others, Positioning and deciding, and Acting in changing situations. The Dutch team completed the original Dutch inventory, while the Indonesian players completed the Bahasa Indonesian version, which had been translated by an educated native speaker from Indonesia and an expert on soccer. The original TACSIS comprised 34 questions. Principal component analysis with the four factors fixed, followed by varimax rotation, yielded a structure that accounted for 50% of the response variance. Twenty-two items met the criterion of having a factor loading greater than or equal to 0.55 (Elferink-Gemser et al., 2004b). The knowing about ball actions scale contains four items related to declarative knowledge of attacking situations, an example of which reads: ‘I know exactly when to pass the ball to a teammate or when not to’. The five items of Knowing about others address declarative knowledge of defensive situations (e.g., ‘I know quickly how the opponent is playing’). Positioning and deciding has nine items on procedural knowledge of attack situations (e.g. ‘My getting open and choosing positions is’), while the four items of Acting in changing situations gauge procedural knowledge of defensive situations (‘My interception of the opponent’s ball is’). When rating his soccer performance, the respondent was instructed to compare himself with top players in the same age category, scoring the items on a 6-point Likert scale ranging from ‘very poor’ to ‘excellent’ or from ‘almost never’ to ‘always’. By testing the four key elements of tactical skills (i.e. declarative versus procedural and attacking versus defensive situations), the TACSIS captures all four aspects of tactical skills.

In previous research the TACSIS was shown to have good psychometric characteristics with internal consistency coefficients (Cronbach’s alphas) of all four subscales ranging from 0.72 to 0.89 (Elferink-Gemser et al., 2004b). The Intra-class correlation coefficients (ICC) for repeated measures was 0.76 for Knowing about others and 0.88 and 0.82 for Positioning and deciding, and Acting in changing situations, respectively. The scale Knowing about ball actions had an ICC of 0.60 (Elferink-Gemser et al., 2004b). [For detailed information about the development of the TACSIS, see Elferink-Gemser et al. (2004b).] The TACSIS subscales of the Bahasa Indonesia version had good psychometric characteristics with Cronbach’s alpha of 0.73 for Knowing about ball actions, 0.88 for Knowing about others, and 0.87 for Positioning and deciding. The Acting in changing situations scale had a Cronbach’s alpha of 0.61.

To validate the players’ scores on the TACSIS, three of the teams’ regular trainers were asked to rate the tactical skills of each Dutch player on a 6-point Likert scale, ranging from ‘very poor’ to ‘excellent’. The Spearman’s correlation coefficient between the trainers’ ratings and the players’ TACSIS sum score was high (rho=0.79, P<0.01). The trainers of the Indonesian team were unable to provide a valid judgment of the players’ tactical skills because they only worked with them during the 6 months of preparation for the Asian Games qualification tournament.
Data analyses

The teams’ mean scores and standard deviations were calculated for each subscale of the TACSIS and multivariate analyses of variance (MANOVA) were conducted (factor of team) to examine group (team) differences. Standardized mean scores or effect sizes ($d$) were also computed; we followed Cohen’s (1988) suggestion in that we classified effect sizes around 0.20 as small, around 0.50 as moderate and around 0.80 as large. Next, we analyzed the data of each team separately. As explained earlier, for each team the players were divided into two groups based on their playing time during the games of the tournaments. We then compared the scores on the TACSIS of these within-team subgroups using a MANOVA (factor of subgroups). Effect sizes were also computed for the two groups of the teams. Statistical significance was set at $P < 0.05$ for all tests.

4.3 Results

Figure 4.1 presents the means and standard deviations of the four TACSIS subscales for the Dutch and the Indonesian national youth teams. In table 4.1, effect sizes between the teams and within the teams are presented.

![Figure 4.1. Mean scores ($) for the four TACSIS subscales for the two national youth soccer teams](image)

* Significant difference between the Dutch and the Indonesian national team ($P<0.05$)
The MANOVA revealed a significant main effect for the differences between the Dutch and Indonesian teams on the TACSIS subscales (F=7.29, P<0.01). The Dutch players outscored the Indonesian players on Knowing about ball actions (F1,36=10.58, P<0.01), Knowing about others (F1,36=28.88, P<0.01), and Positioning and deciding (F1,36=11.53, P<0.01).

Table 4.1. Effect sizes (d) of tactical skills between the teams and within the teams divide by the number of minutes played per game during international tournaments

<table>
<thead>
<tr>
<th>TACSIS</th>
<th>The Netherlands vs. Indonesia</th>
<th>The Netherlands most PT vs. less PT</th>
<th>Indonesia most PT vs. less PT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Declarative knowledge subscales</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowing about ball actions</td>
<td>1.07</td>
<td>0.06</td>
<td>0.06</td>
</tr>
<tr>
<td>Knowing about others</td>
<td>1.78</td>
<td>0.47</td>
<td>0.07</td>
</tr>
<tr>
<td>Procedural knowledge subscales</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positioning and deciding</td>
<td>1.12</td>
<td>0.05</td>
<td>0.99</td>
</tr>
<tr>
<td>Acting in changing situations</td>
<td>0.64</td>
<td>0.10</td>
<td>0.25</td>
</tr>
</tbody>
</table>

Note: A Cohen’s d around 0.20 reflects a small, around 0.50 a moderate and around 0.80 a large effect size

Figure 4.2 lists the means and standard deviations for the four TACSIS subscales for the Dutch and Indonesian players by the number of minutes played per game (PT) during international tournaments. For the Dutch team the MANOVA yielded no significant main effect (P>0.05). Also for the Indonesian team, MANOVA revealed no significant main effect (P>0.05). However, the players with the most playing time tended to score higher than those having played less on the Positioning and deciding scale (d=0.99, see table 4.1).

4.4 Discussion

Comparing the tactical skills of two national youth soccer teams, we found that the Dutch team, whose ranking is for superior to that of the Indonesian team according to FIFA’s 2005-2006 world ranking (http://www.fifa.com), outscore the Indonesian team on the TACSIS subscales Knowing about others, Knowing about ball actions, and Positioning and deciding. Although some previous studies found evidence of a positive relationship between tactical skills and competitive standard based on expert-novice differences (e.g., McPherson, 1999; Ward & Williams, 2003), the current study is one of the first to confirm such an association within a population consisting exclusively of soccer players selected for their national teams.
That the players’ knowledge and application of tactical skills coincided with the standard at which they competed may be explained by the differences in accumulated experience in organized soccer. The Dutch players had spent more time playing organized soccer at a younger age than their Indonesian counterparts: with a mean age of 21 years, the Indonesian players had an average of 12 years of organized soccer experience; in contrast, the Dutch players had a mean age of 20 years and had 14 years of organized soccer experience. Our findings are consistent with the deliberate practice theory, which states that differences between athletes and competitive standard can mainly be attributed to accumulated practice (e.g., Ericsson, Krampe & Teschromer, 1993). Other researchers have also found support for the importance of practice and competitive experience in the development of highly skill performance (e.g., French & McPherson, 1999; Janelle & Hillman, 2003). The standard of youth soccer competition is higher in the Netherlands than it is in Indonesia, creating a more challenging environment in which not only sound soccer-specific physiological and technical skills are developed, but also (complex) tactical skills. Advanced physiological and technical skills will provide the player with more and better tactical options (Janelle & Hillman, 2003).

Recently, empirical research on soccer has been stepped up considerably (see e.g., Castagna, D’Ottavio, & Abt, 2003; Reilly & Gilbourne, 2003). In the Netherlands many premier league clubs work together with universities to enhance their training methods and talent development programmes. It is mandatory for Dutch first- and second division soccer clubs to apply for official approval of their talent-development programmes with the Royal Netherlands Football Association (KNVB, 2008a). This KNVB accreditation guarantees that
the programmes meet the highest standards. One requisite for certification is that the talent development programmes are delivered by highly skilled coaches and trainers. The training courses for coaches/trainers the KNVB Academy (the Educational Department of the Dutch soccer federation) are among the world’s best (KNVB, 2008b). As the Academy also offers state-of-the-art coaching courses for youth team trainers at all levels, this is likely to have played a role in the variance between the Dutch and the Indonesia soccer players. Future research will need to determine whether and in what way differences in the organization and standard of competition and the quality of coach/trainer educational programmes in different countries affect the tactical skills of their elite youth soccer players.

The TACSIS Acting in changing situations scale, which gauges defence situations, failed to show any significant differences between the two national teams. This absence of variation may be explained by the fact that defensive actions are generally less complicated than attacking ones and that the differences in competitive standard had less of an effect than they had in other areas. This is in line with earlier findings of our research group (Elferink-Gemser, Visscher, Lemmink, & Mulder, 2007), in that elite female field hockey players scored higher on tactical skills when they were in possession of the ball than their sub-elite counterparts, but that this difference became non-significant when players were not in possession of the ball.

The Indonesian players with the longest playing time per game (i.e. the best players) had a positive association with one procedural knowledge factor. They scored higher than their team-mates who had played less long during the tournament on the TACSIS scale Positioning and deciding. Procedural knowledge entails the interpretation of a specific situation and refers to the ability to make a decision in a split second and to be at the right place at the right moment (French & Thomas, 1987; McPherson, 1994; McPherson & Thomas, 1989; Thomas & Thomas, 1994). As all players were selected for the national youth team, the Indonesian players must all have been highly skilled and, accordingly, have had similar declarative knowledge in terms of playing time. However, when it came to procedural expertise (i.e. what they do with this knowledge), their achievements did make a difference when a trainer/coach has to decide which players would play and which players would remain in reserve. The players with more playing time had more experience in specific game situations and this additional experience will have raised their competitive standard (Ward, Hodges, Starkes, & Williams, 2007). In contrast, within the Dutch team (ranked third in 2005-2006), no such playing-time differences in TACSIS scores were found, possibly because all members were world-class players and any difference between them would have been very small. Moreover, the Dutch players had completed almost every stage of their talent development programme and survived many selection procedures, as the talent development teams only holds on the best players, making the Dutch team a rather homogenous group. Perhaps the TACSIS is not sensitive enough to detect small differences in tactical skills when the competing standard of the players tested is particularly high.
In summary, in our study of two national youth soccer teams, we largely confirmed the positive relationship between level of tactical skills and competitive standard as reported in expert-novice studies. We hence conclude that tactical skills are indispensable for a successful, high-profile career in soccer. Also within this elite population, the more skilled players outperformed the lesser skilled counterparts on aspects of declarative and procedural knowledge. Based on our findings, we tentatively conclude that core factors for the development of good tactical skills include ample, expert-led training and high-quality talent development programmes.
References

• http://www.fifa.com