TACTICAL CREATIVITY IN TEAM SPORTS

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Abstract:

My keynote lecture focused on tactical creativity in team and racket sport and how coaches and teachers can foster it in training and PE. I started by contextualizing the value of tactical creativity using current statements from world soccer coupled with empirical data. Subsequent to this, the term tactical creativity is operationally defined in team and racket sports, its development is discussed, and centrally an evidence-based Tactical Creativity Approach is introduced. Here, a detailed description of six methods used in current creativity research is provided.

Key Words: Creativity, Attention, Motivation, Invasion Games, Soccer, Sport

Introduction

Earvin “Magic” Johnson and Wayne Gretzky have delighted us with their arts and imaginativeness. Kobe Bryant, Ricky Rubio, Rajon Rondo, Chris Paul, Sidney Crosby and Lionel Messi currently enchant us again and again by providing us new solutions that are surprising for their opponents, fans, their audience, television commentators and sometimes even their teammates. Tactical optimal and creative solutions are of outstanding relevance to success in high performance sport (Memmert, 2014) and a component of talent development and selection systems (Williams, 2013). In soccer, the midfield players have the responsibility to control the buildup play with smart tactical choice behavior. Similarly, playmakers in handball and basketball are able to initialize the closing option of their team mates with creative solutions. To highlight the value of tactical creativity in high performance sport, I provided examples from international soccer. Statements from German national coach Jogi Löw substantiate the special meaning of creativity in this sport: “Creativity and playful class should be the new German virtues”.

Matthias Sammer, the chairman of the Champions-League Winner 2013 Bayern Munich, emphasizes the meaning of creativity in sports; “The first impulse to increase the flexibility in your own team always originates from the coach. […] We just had the feeling that our game had to become more flexible. […] Only then our way of playing was unpredictable and modern – extremely creative”.

Empirical evidence for the value of creativity in soccer can be drawn from Memmert, Vogelbein, Nopp and Knievel (2013). They qualitatively examined all goals in the soccer World Cup 2010 in South Africa. In these games, 159 goals were scored overall with 11 goals resulting from penalty-shootouts. Three experts evaluated the last eight actions before each goal using a creativity scale ranging from 0 to 10 (0 = not creative, 10 = highly creative). The results showed that the closer the actions were to the goal (i.e., temporally from 1-8 actions from the goal), the more creative they were evaluated as. 86% of all goals included at least one of the eight actions in the high creative area. 44% of all goals included at least one of the eight actions in the highest creative area. Further, teams that moved into more advanced rounds of the tournament demonstrated more creativity features in the seventh action (second last pass) than teams that failed to advance past the preliminary round. To sum up, tactical creativity seems to be a more and more important factor in both team and racket sports, especially at the highest levels of performance.

Definition, development and testing of tactical creativity

Tactical creativity and tactical intelligence are concepts based on the theoretical distinction between divergent and convergent thinking by Guilford (1967, for a recent overview, see Sternberg & Lubart, 1999; Runco, 2007). Tactical creativity in team and racket sports can be defined as the generation of several solutions of problems in specific individual groups or in team-tactical game situations, which can be denoted as surprising, rare and/or original (Memmert, 2014). It differs from tactical intelligence, game
sense or game ability where the main task is to find the ideal solution to a given problem (Memmert & Roth, 2007).

Research in psychology indicates that divergent thinking has to be learned and developed early in life (Milgram, 1990). However, a few empirical studies have pursued the development of tactical creativity in sport. A first cross-sectional study (peer group: 7, 10 and 13 years; Memmert, 2010a) suggested that children and adolescents do not develop linearly. While meaningful increases of tactical creativity were found at the ages of 7 to 10, it seemed to stagnate at older ages. Findings from neuroscience support those results, suggesting that the absolute number of synapses and synapse density reaches its maximum in this age range (Huttenlocher, 1990). Moreover, the number and density of synapses in the human primary visual cortex is associated with creativity (Ashby, Valentin, &Turken, 2002). To sum up, teachers and coaches should integrate tasks that concentrate on the development of divergent tactical thinking abilities in their training units as early as possible. After childhood, the effect of training activities for tactical creativity is said to decrease, but is still possible.

Operationalization of tactical creativity is often based on the characteristics originality, flexibility and fluency identified by Guilford (1967) using factor analysis.

Originality: the unusualness of tactical actions of decision-making can be rated by experts.

Flexibility: The variety of tactical actions of decision-making is determined by action and response diversity of the players.

Fluency: The number of tactical actions of decision-making that the players generate for certain situational constellations.

The most common approaches to rate tactical creativity in team and racket sports by means of those three factors are performed via video tests or game test situations (Memmert, 2013). Video tests scenarios are relatively highly standardized (Johnson & Raab 2003; Memmert, 2010a) and require subjects to watch sport-specific videos that end with a frozen image. They then have to imagine themselves as the acting player and report all possibilities that might lead to a goal. The answers are evaluated according to the criteria of originality, flexibility, and fluency. In contrast, game test situations may have a higher degree of authenticity with regards to complex game situations, which may not be the case for standardized video tests due to the ‘artificial-ness’ of the lab environment. Game test situations contain contextual, real-world representations that provoke creative tactical actions. In comparable tactical situations, this ecological valid setting evokes reliable and repeated creative behaviour in specific match situations (Memmert, 2007, 2010b). During game test situations, the general game purpose, number of players, rules, skill execution (hand, foot, or hockey stick), and environmental conditions are given. In order to analyze creative solutions, a video of the recorded tactical behavior is rated with regard to specific concepts by several independent evaluators (Memmert & Roth, 2007). The specific advantages and disadvantages of both approaches (i.e., standardized video tests and game test situations) are discussed in more detail by Memmert (2011).

**Tab. 1.** The 6 D’s fostering tactical creativity in team and racket sports (see Tactical Creativity Approach by Memmert, 2014).

<table>
<thead>
<tr>
<th>Deliberate-Play:</th>
<th>Uninstructed play without instructions or feedback can lead to trying out a multitude of different solutions.</th>
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<tbody>
<tr>
<td>1-Dimension-Games:</td>
<td>By means of multiple repetitions of similar situations, structured game forms can improve basic tactical skills across different sports with an amount of creative solutions.</td>
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<tr>
<td>Diversification:</td>
<td>Use of different motor skills in 1-Dimension-Games can support the development of original solutions.</td>
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<tr>
<td>Deliberate-Coaching:</td>
<td>In 1-Dimension-Games, no instructions shall be given that narrow the focus of attention of the acting players.</td>
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<tr>
<td>Deliberate-Motivation:</td>
<td>For 1-Dimension-Games, promotion-instructions are to be given, to enlarge the generation of extraordinary solutions.</td>
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<tr>
<td>Deliberate-Practice:</td>
<td>In more advanced games, task-centered practice can lead to repeat and explore seldom but adequate solutions.</td>
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Factors affecting the process of tactical creativity development

In this section, varying factors affecting the process of tactical creativity development will be discussed, ranging from training-related variables such as quantity of deliberate practice and play, diversification, and the quality of coaching and motivational instructions throughout talent development. According to the Tactical Creativity Approach (TCA) by Memmert (2013), different factors affect the development of tactical creativity (cf. Tab. 1) during training in team and racket sports. The theoretical framework of the TCA is based on the integration model “investment approach to creativity: buy low, sell high” by Sternberg and Lubart (1995). Sport psychological studies show that unspecific divergent thinking is not the only relevant factor, cognition (attention), expertise as well as environmental influence also have a decisive influence on the process of developing tactical creativity in sports (for detailed description, see Memmert, 2014). The order – starting on the top with Deliberate Play - of the six training principles showed in Table1 indicates a chronological system according from children and youth training to adolescence and adult training. While the first four principles are more suited for younger age groups, all principles are useful for older age groups.

Deliberate-Play

Uninstructed games and unstructured activities during childhood have been categorized as “deliberate play” (Baker, 2003; Côté, Baker, & Abernethy, 2003, 2007; also see chapter 32). Sport biographical studies indicate that “deliberate play” during youth influence the development of creativity in national team and national league players (Memmert, Baker, & Bertsch, 2010). Uninstructed operating can lead to the trying out of different response variations; Greco, Memmert and Morales (2010) had youth basketball players complete two different kinds of basketball training, one according to the deliberate play approach, one according to a traditional basketball approach with structured game forms and specific routines. The authors demonstrated that a deliberate play training program leads to greater improvements of tactical creativity than the training of the placebo group.

1-Dimension Games

While small-sided games have become more and more popular for the improvement of technical skills and aerobic fitness components of performance (see Hill-Haas, Dawson, Impellizzeri, & Coutts, 2011; Clemente, Couceiro, Martins, & Mendes, 2012), 1-Dimension Games can develop a general and sport-specific tactical game (for a review, see Memmert, 2014). Recent research has demonstrated that 1-Dimension Games foster the development of tactical components (Memmert & König, 2007), train players in creating creative solutions (Memmert, 2007; Memmert & Roth, 2007), and have a structure that is easily applied to different team and racket sports which have a non-specific format (Memmert & Harvey, 2010). The main aim of 1-Dimension Games is that players learn divergent tactical thinking in complex and dynamic situations, which means that the children train single basic tactical components through a great amount of continuously repeating comparable tactical constellations (cf. “representative learning design”, Pinder, Davids, Renshaw, & Araújo, 2011; see also chapter 4). However, 1-Dimension Games have also clearly defined game ideas, a stable numbers of players, as well as defined rules and environmental conditions. Non-specific 1-Dimension Games were developed and validated in the context of team and racket sports (cf. Griffin, Mitchell, & Oslin, 1997; Memmert & Harvey, 2010). They can be used to train elementary basic tactics, which are of importance in many different team and racket sports. In addition, specific 1-Dimension Games also exist in youth soccer, especially for group tactical abilities (Memmert, Bischof, Endler, Grunz, Schmid, Schmidt, & Perl, 2011).

Diversification

Participation in many different sports/game situations seems to have a positive influence on the transferability of cognitive skills like pattern recognition (Abernethy, Baker & Côté, 2005) as well as on the development of tactical creativity (Memmert & Roth, 2007). Studies of highly creative athletes (Memmert, Baker, & Bertsch, 2010) emphasize that creative players were given the possibility to try different sports and develop a breadth of movement experience, in contrast to less creative ball game athletes. Therefore, for the generation of original ideas to sport problems, it is important that children and adolescents a) get into contact with different balls in their „ball-game-life“ as early as possible, b) learn to adequately operate with hand, foot and tennis/hockey racket and c) think of situations in a different or new manner over and over. Thus, clubs and associations should encourage their coaches at an early stage,
especially during the training of beginners and talent promotion, to train tactical creativity by using wide-ranging sport games that overlap regular training and thereby letting the children learn to solve tasks with a variety of solutions.

**Deliberate-Coaching**

A wide focus of attention (Memmert & Furley, 2007) is necessary to perceive unexpected objects like freestanding team mates, which could be the starting point of original solution operations. Reduced instruction on the side of the coach leads to children and adolescents – due to a wider focus of attention – more frequently being able to generate original solution possibilities with many variations than children and adolescents who were frequently confronted with attention leading hints during practice (Memmert, 2007). This suggests that the coach who continuously stops the training game and constantly gives tactical instructions to his youth players may not be designing their training for optimal creativity development (Furley, Memmert, & Heller, 2010). Psychological experiments also demonstrate that a wider focus of attention facilitates the production of creative performance, because different, spatially further away and secondarily relevant stimuli can be included in the task solution (Kasof, 1997). A narrow focus of attention results in less original methods of solution, since not all of the relevant information is noted. Generally, coaches have two possibilities to influence their players' scope of attention: first, directly through instructions, or indirectly by inventing forms of game or exercise that provoke a wider focus of attention for the players. Through certain instruction possibilities and providing external (implicit) stimuli, attention-focusing can be controlled (Memmert & Furley, 2007). Another training goal should be that the coach or teacher provides the children the possibility to perceive and search for unexpected and (potentially) better solution variations through reduced instruction parallel to his own solution demands.

**Deliberate Motivation**

Current models and empirical results from social psychology highlight that creative accomplishments can directly be influenced by the simplest instructions, which, for example, manipulate the emotional conditions of the participants (Friedman & Förster, 2000; 2001; Hirt, Levine, McDonald, Melton, & Martin, 1997; Isen, 2000; Isen, Daubman, & Nowicki, 1987). A promotion-focus, which regulates pleasure as the achievement of positive results of action and suffering as an absence of those positive results (cf. Higgins, 1997), facilitates the generation of creative solutions more than a prevention-focus, which expresses the successful avoidance of unpleasant, negative results and their arrival as suffering.

Memmert, Hüttermann, and Orliczek (2013) were able to show that divergent performances of decision-making in sports also benefit from a promotion-focus. In this study, soccer players had to name as many decision options as possible per video-clip with a standardized video soccer test (cf. 35.3). Analogous to the work of Friedman and Förster (2001), the players were shown identical labyrinths with different framing in the run-up: Half of the players had to find the way on which the mouse would reach the cheese (“promotion”-focus), while the other participants had to solve the labyrinth with the goal that the mouse would not be caught by the owl (“prevention”-focus). In the “promotion”-condition, soccer players generated more original and flexible solutions than in the “prevention”-manipulation. On the whole, all results emphasize that coaches and teachers should try to optimize the divergent thinking of the athletes with suitable promotion-focus-instructions (“My wish is that every third ball is kicked through gaps.”; Not: “I expect you to kick every third ball through gaps.”)

**Deliberate-Practice**

Working with instructions in exercise-centered and more structured situations with the goal to effectively improve specific individual performance criteria are called „deliberate practice“ (Côté, Baker, & Abernethy, 2003, 2007; also see chapter 32). Expertise research has demonstrated that high professional experts spend more than 10-years of extensive effort in the acquisition of decision-making and skill execution in their sports (see chapter 31). According to the theory of deliberate practice (see Ericsson, Krampe, & Tesch-Römer, 1993), expertise in a given sport like soccer and basketball is the final result of extended engagement in high-quality training. Memmert and colleagues (2010) showed that former creative athletes had practiced much longer in their main sport in a goal-oriented way than less creative players. The quantity of hours of deliberate practice makes the difference between more creative and less creative team sport players, especially for top team players in the national teams. National league
athletes began their specific sport later than players in the next highest level of competition. Therefore, also deliberate practice seems to be an important characteristic for the support of tactical creativity, especially in the later childhood and in the beginning of adolescents.

Conflicts of interest
The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

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