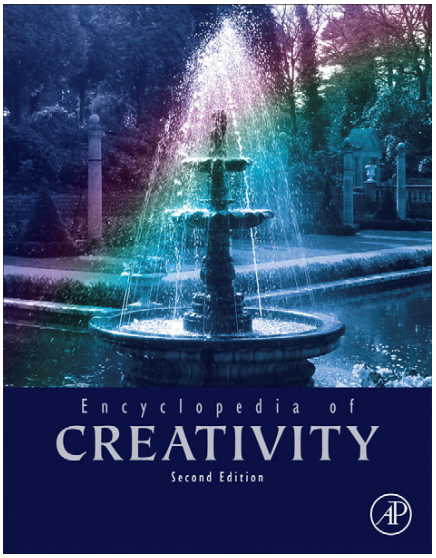

Memmert D. (2011) Sports and Creativity. In: Runco MA, and Pritzker SR (eds.) Encyclopedia of Creativity, Second Edition, vol. 2, pp. 373-378 San Diego: Academic Press.

Sports and Creativity

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Glossary

Game analysis Game analysis software allows study of the individual tactical behavior of the players (e.g., feints in one-on-one-situations), the tactical interactions of a group of players (e.g., specific combinations in offensive play), and the general game strategy of a team (e.g., playing more defensively).

Game sport Team sports such as soccer, basketball, volleyball, and racket sports including tennis, table tennis, and badminton.

Game test situations Game test situations are simple game forms with clearly defined game ideas, fixed numbers of players, as well as defined rules and environmental conditions. The fundamental idea is basic constellations with clearly allocated roles in order to create recurring and consistent conditions with many repetitions for the participants. In order to analyze the creative actions, a video of the recorded behavior is subsequently rated with regard to specific concepts by several independent experts.

Inattentional blindness Failure to detect an unexpected object if attention is diverted to another task or object.

Neural networks A neural network is a type of computer algorithm which consists of a grid or matrix of neurons. The dimension of this neuron matrix determines the dimension of the network. Neurons are trained with data and so build clusters of similar input data, without needing any additional information. These clusters define types of input data and thereby help to recognize and identify test data after the training phase. A given test input is recognized by the net as corresponding to the cluster to which it is most similar and is therefore identified by the type (e.g., name, specification) of that cluster.

Regulatory focus theory Two modes of self-regulation are proposed in this theory: a focus on accomplishments and aspirations is labeled as a promotion focus to regulate pleasure, while a focus on safety and responsibilities is called a prevention focus to avoid suffering.

Tactical creativity (= divergent thinking ability) Tactical creativity is defined at the behavioral level as the unusualness, innovativeness, statistical rareness, or even uniqueness of solutions to a related sport situation in team ball sports.

Tactical intelligence (= convergent thinking ability) Tactical intelligence refers at the behavioral level to the ability to find the ideal solution to a given problem in a specific situation in team ball sports.

What Is Creativity in Sports?

Definitions

Sports is a worthwhile field to study behavior in a complex context. In particular, complex situations enable creative performance to be analyzed in an ecologically valid way. The distinction between expert decision making and creativity in sports are closely linked to the theoretical distinction between 'divergent thinking' and 'convergent thinking,' concepts which were first proposed and defined by Joy P. Guilford and first transferred to the world of sport by Klaus Roth.

Convergent thinking, or tactical intelligence, refers at the behavioral level to the ability to find the ideal solution to a given problem in a specific situation in sports. For example, basketball star Dirk Nowitzki may anticipate future moves of an opposing offensive player and step in front of him provoking an offensive foul. Divergent thinking or tactical creativity is defined at the behavioral level as unusualness, innovativeness, statistical rareness, or even uniqueness of solutions to a related sport situation. Therefore, tactical creativity can be regarded as a variety of rare and flexible decisions used in different kinds of situations. Basketball star Earvin 'Magic' Johnson became famous for his so-called 'no-look-passes,' seeming to be able to take in all relevant stimuli of a situation, and use this information to fool his opponents by looking in the direction of the most obviously free teammate while passing the ball to another player.

Practical Utility

Sport science literature frequently suggests that both game intelligence and tactical creativity are important for successful athletes in different kinds of sports. In order to generate decision possibilities and seek original solutions players must be able to perceive all important information from their environments (positions of team mates and opponents, players emerging unexpectedly, etc.) and consider this information when generating an action plan. Tactical creativity is increasingly significant for complex sport games because coaches are able to collect more information about their opponents. For example, with game observation and game analysis it is possible to study the individual tactical behavior of the players (e.g., tendency to move left or right in one-on-one situations), the tactical interactions of a group of players (specific combinations in offensive play), and the general strategy of a team (e.g., fast breaking at every opportunity). As Table 1 indicates, several famous soccer coaches in Germany pointed to a lack of creative players in all leagues. With the development of versatile, and at times extraordinary solutions (tactical creativity), a significant and domain-relevant ability in sports games is recognized.

Evaluation: Game Test Situations

Different kinds of instruments have been developed to evaluate an athlete's tactical decision making skill. Currently, only a

few sport-specific tactical creativity tasks have been constructed and tested for objectivity, reliability, and validity (see Table 2) and these include game test situations which act as a type of compromise between standardized tests and game observation methods discussed below. Game test situations are simple game forms with clearly defined game ideas, fixed numbers of players, as well as defined rules and environmental conditions. The athlete's creative behavior is assessed without trying to standardize the ball paths and actions of team mates and opponents; hence, the fundamental idea is basic constellations with clearly allocated roles in order to create recurring and consistent conditions with many repetitions for the participants. In order to analyze the creative actions, a video of the recorded behavior is subsequently rated with regard to specific concepts by several independent experts.

Evaluation: Standardized Tests

Tactical creativity tasks are relatively highly standardized. Athletes view brief video sequences of a sports game (e.g., basketball, soccer) in which attacking players play against defending players. At the end of the video clip, the final image appears frozen with one player in possession of the ball. The participant takes over the role of the ball holder in the video clip, identifying all opportunities that might possibly lead to a goal/basket. The motor executions (e.g., pass with the non-dominant hand/foot, indirect pass) should also be mentioned. Athlete's answers were noted on a specially designed sheet that contained all appropriate decisions. The same observation criteria of originality, flexibility, and fluency were used for the athlete's performance as in the usual divergent thinking tasks in psychology; originality of the proposed solutions were rated by experts. For flexibility, all possible tactical decisions in each situation were categorized into ten different kinds of solution options (e.g., perform a one-on-one action, no-look-pass, and pass with a feint). The number of appropriate answers given by a subject for each video scene was used to measure fluency.

Table 1 Statements of soccer coaches from the National Team and the '1. Bundesliga' in Germany

- "Imagination and creativity should be left to the Brasilians" (Franz Beckenbauer)
- "The midfield is not creative enough. We no longer have a Häßler or a Littbarski. Certain things have been neglected that need to be put right" (Jürgen Klinsmann, former German National Team Coach)
- "Technically and tactically, other countries are far ahead of us. That is why in many clubs the creative player is a foreigner" (Christoph Daum, Fenerbahçe Istanbul)
- "Whenever the Germans want to be creative they can't manage it. They are unable to control the game" (Jürgen Klopp, Borussia Dortmund)

Source: Grunz A, Memmert D, and Perl J (2009) Analysis and simulation of actions in games by means of special self-organizing maps. *International Journal of Computer Science in Sport* 8: 22–36.

Analysis: Game Observation

Technological advancements allow the automatic recording of position data of players and the ball enabling reconstruction of tactical patterns. Furthermore, it is now possible to classify action processes in soccer by means of neural networks and to check the identified process types with regard to their effectiveness. In particular, activities can be recognized which indicate creativity, i.e., activities which are original as well as adequate solutions to the situation. For example, in soccer, a rare combination of several passes which leads to a goal.

A central aspect of game analysis is to quantify the complex qualitative information of a game such as soccer or basketball. The focus of such quantification is on the frequency and success of specific actions such as passes or moves. Once the position-oriented tactical patterns can be recognized by means of a correspondingly trained neural network, it is no problem to automatically count transitions between such patterns with respect to the corresponding actions. This leads to a matrix of transition probabilities as is shown in Figure 1, matrix top-right. Moreover, if the corresponding trajectory network is calibrated to record the success of the represented process, a second matrix can be generated representing the success of those transitions, as is shown in Figure 1, matrix bottom-right. The probabilities of transitions and their success help analyze games and the information-theoretical relevance of actions can be estimated using their time-dependent frequency profiles. Under the assumption that a creative action is rare as well as adequate, the information-theoretic relevance, together with the semantic evaluation of adequacy, enables measuring and analyzing the creativity of actions in an ecologically valid setting. For example, Memmert and Perl showed that out of 5903 complex real-life behaviors in team sports only 1 per cent of the evaluated tactical decisions of all participants was a pass over the defenders to the opposite side (= loop shot).

Table 2 Description of sport-specific divergent thinking tests which evaluate tactical creativity in sport

Label	*Task*	*Authors*
Game test situation	This instrument contains a context-dependent real world setting that can directly provoke tactical tasks in ecologically valid situations. Participants' tactical behaviour is recorded on videotape and their tactical decisions are analyzed by expert coders using a subsequent concept-oriented expert rating system (criteria: originality, flexibility).	Memmert (2006, 2007, in press); Memmert and Roth (2007)
Video creativity task	In this decision task, participants watch sport-specific videos. The image is frozen after 1 min. The participants have to imagine themselves as the acting player and name all opportunities that might possibly lead to a goal. The answers are evaluated according the criteria of originality, flexibility, and fluency.	Johnson and Raab (2003); Memmert (in press)

Source: Grunz A, Memmert D, and Perl J (2009) Analysis and simulation of actions in games by means of special self-organizing maps. *International Journal of Computer Science in Sport* 8: 22–36.

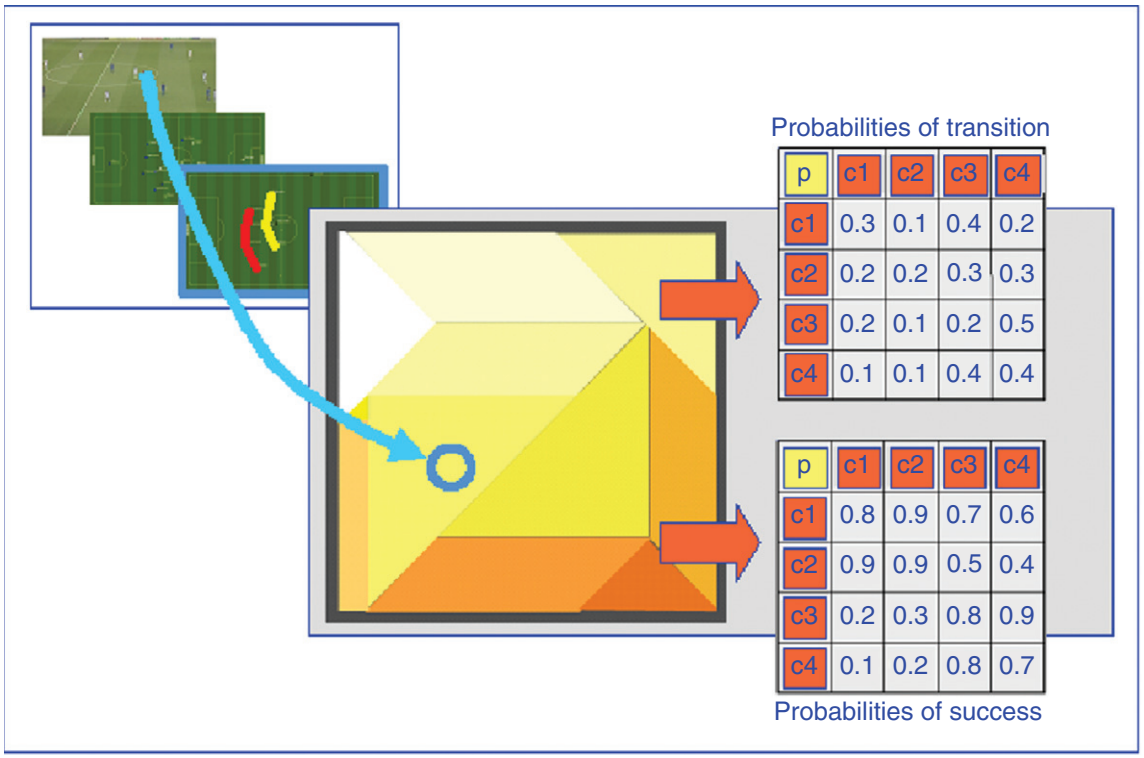

Figure 1 Process analysis resulting in statistic contributions. Grunz A, Memmert D, and Perl J (2009) Analysis and simulation of actions in games by means of special self-organizing maps. *International Journal of Computer Science in Sport* 8: 22–36.

Simulation

An advanced application of neural networks is the simulation of tactical behavior, creative actions, and dynamic learning in games. The current action such as tactical decisions in the game process or movement behaviors of the athletes is tested on the network, activating the corresponding neuron, which then returns information in different semantic categories such as type of activity, degree of creativity, probability of success, or probability of transition to other activities. The goal is to replace the current activity with a simulated one, which when activated in a game situation could be more creative or more successful. More specifically, the resulting simulated process could improve the team's tactical behavior. Mapped to a network, this means that neurons should have the ability to represent not only frequent but also rare actions. If such a net is calibrated with respect to success or adequacy, then the time series of a process is mapped to a trajectory, where the neurons can be recognized to correspond to creative actions. For example new specific tactical combinations in soccer could be theoretically or practically developed and directly tested in a neural network simulation.

Factors Influencing Tactical Creativity

A theoretical framework is suggested in the next two main sections that contain several individual studies and experiments, which can be seen as the basis for the development of tactical creativity in sports. Figure 2 outlines a theoretical framework resulting from extensive research and can be seen as the basis for the development of tactical creativity. It distinguishes between a micro level (process) and a macro level (content). The micro level examines the mechanism and psychological processes in the respective training situation (micro rules) that lead to the generation of creative ideas. The macro level examines the environmental conditions that can be steered by teachers and coaches (macro rules).

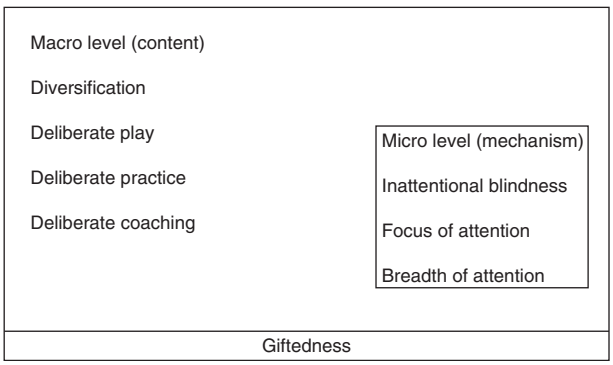

Figure 2 Theoretical framework for 3×4 environment-training-model of the development of tactical creativity.

On a micro level, there are three mechanisms that facilitate unexpected and original solutions:

1. by using fewer instructional options to focus attention in team ball sports (inattentional blindness, micro rule 1), and
2. by giving no external attention cues which point out 'information rich areas', the attention is not restricted and thereby facilitate creative behavior (micro rule 2);

3. with a large breadth of attention (micro rule 3) unexpected and potentially better alternative solutions can be perceived, used, and hence learned.

In addition, the genetic dispositions of athletes are important. While to our knowledge there exists only preliminary studies linking talent development (motor skill giftedness) and tactical creativity in sport, early evidence suggests cognitive giftedness is a valid predictor of faster development of creative solutions in sport (see Figure 2, bottom).

On a macro level, environmental conditions are created and curriculum designs have to be implemented that correspond to the criteria of

1. diversification (macro rule 1),
2. deliberate play (macro rule 2),
3. deliberate practice (macro rule 3), and
4. deliberate coaching (macro rule 4).

Inattentional Blindness

As described above, tactical creativity is always associated with the ability to generate unexpected and unusual solutions in sports. For this reason, the inattentional blindness paradigm (if attention is diverted to another object, observers sometimes fail to notice an unexpected object, even if it is right in front of them) is ideal for the research of creative processes in sports, since attention performances are associated with the discovery of unexpected objects. Developmental research by Memmert makes a direct link between inattentional blindness, expertise, and creativity. Sport-specific trained adolescents with the ability to notice the free player could describe more original solutions in the sport-specific situation than the 13-year-olds who were 'blind' to the free team mate. At this point, it should be mentioned that the effect reported for the domain of sports was also found in the area of general psychology. Here, the untrained adolescents, who achieved better performances in a general inattentional blindness task, also fared better in the general creativity test in contrast to the participants who could not describe the unexpected object.

The above findings highlight the fact that the inattentional blindness paradigm also appears to play a considerable role in competitive sports. Team players often fail to find the optimal tactical solution to a situation because the coach narrows their focus of attention by giving restrictive instructions. Team members could, however, capture the attention of other team mates by waving their hands as important meaningful exogenous stimuli. This led to a major reduction in inattentional blindness. These findings show that current theories in the field of neuropsychology also have explanatory potential in more complex contexts. Motivational factors therefore control the direction of attention and influence information processing before players consciously perceive specific input.

Focus of Attention

Following the inattentional blindness paradigm, a series of experiments on attention focusing analyzed the influence of special kinds of instruction on tactical decision making in team ball sports. Players do not find creative tactical solutions if they receive attention-directed instructions, because of their reduced attention focus. More complex and sport-related problems were constructed for a series of cumulative labor experiments. In a sport specific tactical decision making test, adolescents were given the primary task of naming the position of their direct opponent at the end of the trial (attention-demanding task), while also finding a totally open player (secondary decision-making task) that would most likely lead to a goal. Of the participants, 45% failed to notice the open team member. This result was confirmed in other sport-specific situations with adults. Completely open team members were missed by approximately 40% of male basketball players with more than ten years of competitive experience. Even in more realistic contexts with motor responses as well as a primary task closer to the field (triple selection task), this effect was unchanged. That means that instructions that give a narrow focus, for example, just mark a player, lead to players not seeing as many creative opportunities as when instructions are less specific.

Breadth of Attention

Breadth of attention is the term used to refer to the number and range of stimuli that a subject attends to at any one time. Results from attention-narrowing environment stimulation experiments indicated that with a narrow breadth of attention, not all stimuli and information that could lead to original and possibly unique solutions in a certain situation can be perceived. A wide breadth of attention, on the other hand, makes it possible to associate different stimuli that may initially appear to be irrelevant. Colin Martindale (1981, p. 372) explained this fact as follows:

> The more elements that a person can focus on simultaneously, the more likely it is that a creative idea will result. [...] Thus, with three elements [...] there are three potential relationships [...] to be discovered. With four elements, there are six potential relationships, and so on.

Experiments in sports science supported the view that fewer instructions by the coaches during game play lead to a wide breadth of attention and therefore facilitated greater improvements in tactical creativity. Participants were confronted with exactly the same tasks as above (focus of attention) while one group received more, and the other group fewer tactical instructions (narrow/broad breadth of attention), in order to investigate the influence of these instructions on the tactical decision. The results indicated that too specific instructions prior to the tactical decision lead to inferior tactical decisions compared to fewer instructions.

Giftedness

Research also suggests that cognitively gifted persons (IQ > 130) seems to improve their tactical creativity more quickly than individuals with average IQs (IQ = 100). In contrast to a gifted control group (gifted children without a sport-relevant intervention) and a nongifted sport-relevant intervention group, the sport-specific creative performance of the gifted children significantly improved after a six month training program of tactical creativity. Here again, the influence of attention performance and inattentional blindness for the development of creativity was demonstrated.

Factors Supporting Tactical Creativity

Diversification

A longitudinal research talent program was designed to investigate the efficacy of various training approaches in team ball sports for the development of tactical creativity. The main assumption was that the perception of many different sport game situations and the acting in these situations has a positive influence on the development of tactical creativity. A total of 135 young athletes took part in a 15-month, field-based study, where they participated in either nonspecific treatment groups (tactical training with hand, foot, and implements); a handball group (tactical training only with the hand); a soccer group (tactical training only with the foot); a field hockey group (tactical training only with implements), and a control group (no training at all). General and specific sport-oriented tactical creativity as dependent variables were measured with game-test-situations. The analysis of treatment-related effects showed that the areas in which the groups were trained (e.g., soccer, handball, hockey), were precisely the areas in which they showed significant improvements. This could be interpreted as evidence for specific training effects; however, nonspecific experiences seem to be a promising alternative to specific treatments. Unlike motor competencies, it seems possible to train tactical creativity independently from motor skills. In summary, nonspecific and specific concepts are on a similar level in terms of tactical creativity development. In fact the nonspecific approaches can even prove to be more workable in the long term.

Deliberate Practice

The term 'deliberate practice' refers to targeted and task-centered training programs based on instructions. Studies of eminent athletes' early development indicates that deliberate environmental influences and organizational conditions benefit the generation of original thinking in sport. Trainers from different types of team sports selected the most creative and the least creative players from their teams. Creative, exceptional athletes in basketball, soccer, handball, and hockey trained significantly longer and more purposefully in their main sport before they were 14 than less creative top athletes ('deliberate practice'). In this case, specific experiences over a long time (ten plus years) are necessary for the attainment of expertise.

Deliberate Play

The term 'deliberate play' refers to noninstructed involvement in play-oriented and at first sight unstructured situations in sport games. In the past, children used to play in fields and roads without coaches and systematic training schedules. Today in Western Europe and North America, they miss the natural experience of playing in the streets for their creative development. As Jean Côté suggested, the sampling years (ages 7–12) are characterized by a high frequency of deliberate play. Self-determination theory and Vallerand's hierarchical model of sport motivation both support the notion that early deliberate play will have a positive effect on intrinsic motivation over time. It also showed that highly creative athletes played far more often in their early youth (up to 14 years of age) and hence more intensely in many relatively unstructured (complex) team ball sports situations ('deliberate play') without guidance than less creative team players. The results suggested that unstructured play-like involvement plays a crucial role in the development of creative behavior in basketball, handball, field hockey, and soccer. At the same time, current theoretical approaches and empirical research regarding the development of creativity support this view that nonspecific experience over time, such as unstructured play, is an ideal medium for the development of divergent thinking.

The reported evidence provides a basis for the convergence of two prevalent research programs (expertise research, creativity research) that have not yet been discussed in the same context. Both results suggest that practice experiences and early play significantly influence the development of creativity. In this case, specific experiences over a long time (ten year rule) are necessary for the attainment of expertise. At the same time, current theoretical approaches and empirical research regarding the development of creativity support the view that diversified and even nonspecific experience, such as unstructured play, over time is an ideal medium for the development of creative thinking. It is possible that sports science in ecological settings can contribute to the further development of expertise models from developmental psychology.

Deliberate Coaching

As stated previously, research demonstrated that simple instructions lead to reduced attention focus and less effective decision making. Research on training examined if these results could be directly translated into practical training concepts. A six-month longitudinal study examined different kinds of instructions by coaches ('deliberate coaching') during training sessions on the development of tactical creativity in team sports. Creative performance was measured by a real-world sport-specific creativity task in which an attention-broadening and an attention-narrowing group of young athletes performed the same kind of exercises. The only difference concerned the role of the trainers who gave the attention-narrowing children explicit tactical instructions and corrections for each game type. In contrast to the teaching models of the attention-broadening program, this training program discouraged the young athletes from learning to direct their attention toward different kinds of stimuli. As a result of this narrow breadth of attention, not all stimuli and information that could lead to original and possibly unique solutions in a game situation could be identified and applied appropriately. In the attention-broadening training group, the coaches only defined the idea and the rules of the games, and no special tactical advice or feedback regarding attention focus was given. As a result, the young athletes learned to have a wide breadth of attention in complex situations which significantly improved their creative performance. Considered together, these findings highlight the opportunity to focusing attention on the coaching process while training creativity in sports. A wide breadth of attention makes it possible to associate different stimuli that may initially appear to be irrelevant. Giving children reduced instructions, offers athletes the possibility to seek out and recognize unexpected and possibly better alternative solutions.

Summary and Future Directions

Summary

In all sports, athletes have to absorb and process substantial amounts of information within a very short time. They have to pay attention to sensory impressions that are at first very new to them and, because of that, are often unexpected. This raises the question of how athletes can become more proficient at perceiving constant minor and major changes caused by the interaction of their opponents and team members when their attention has only been directed to a few specific aspects of the situation by their coach. Coaches are challenged to find ways of increasing their players' proficiency by identifying tactical solutions; however, it is not possible for any coach to mention all possible solutions for any situation or for the player to remember all of them. Phil Jackson has won more National Basketball Association titles than any other coach by teaching his players the triangle offense where they are trained to improvise and always pass to the open man.

Considered together, the findings discussed earlier highlight the fact that the 3×4 environment-training model can play a useful role in promoting the development of creativity in athletes. Research suggests that keeping conditions playful encourages greater learning for young children in team sport games. In addition, findings suggest that experiencing a number of different sports and games is an ideal medium for players' creative development. Young athletes appear to benefit from the different tactical situations encountered in sports games played during their childhood.

On a practical level, the research presented has implications for the design of tactically oriented training programs and curricula. Environmental conditions can be created and curriculum designs implemented that correspond to the criteria of diversification, deliberate play, and deliberate practice. There are also some methodological principles for training athletes . . . For example, attention focus in team ball sports can be broadend, through lessening specific instruction. With a wider attention focus, unexpected and potentially better alternative solutions can be perceived and executed.

Future Directions

Different types of motivationally oriented theoretical models from social psychology indicate that creative performances can be directly influenced by the simplest of instructions, for instance manipulating emotional states of the subjects. Tory Higgins proposed two modes of self-regulation, in order to regulate pleasure and suffering, that is, to direct behavior towards promotion or prevention targets ('regulatory focus theory'). More specifically, a focus on accomplishments and aspirations is labeled as a promotion focus, and a focus on safety and responsibilities is called a prevention focus. In addition, there is no prior advantage of either motivational orientation in terms of performance. According to this approach, the performance on a given task may depend on the fit between people's regulatory focus (promotion or prevention) and people's chronic regulatory orientation (promotion or prevention). This idea of better performance and a more positive effect via regulatory fit has already received some empirical support in the domain of cognitive tasks and sport-related settings.

Numerous studies show that different cognitive performances can be influenced through motivational states or the 'regulatory focus theory.' For instance, a series of experiments strikingly document that a happy mood can positively influence creative performances, encourage the generation of innovative ideas, and promote the generation of exceptional free associations. At the moment neurocognitive mechanisms underlying the flow experience like happiness or fulfillment are discussed and investigated. Beyond this, Ronald Friedman and Jens Förster presented further experiments that underlined the influence of attitude on achieving positive outcomes (promotion focus) and creative performances. Recent results of studies in sport science suggest that it is worthwhile examining in more detail, in sport-specific settings, the dependent-variable divergent tactical thinking in line with the 'regulatory focus theory.'

Aside from the aforementioned further studies necessary on the link between motivation and creativity, the largest gain in insight is expected in the future exploration and experimental examination of attention theories. Unconscious processes serve as an early selection mechanism, which favors useful or emotionally interesting information for further processing.

See also: Flow and Optimal Experience; Play.

Further Reading

Baker J, Côté J, and Abernethy B (2003) Sport specific training, deliberate practice and the development of expertise in team ball sports. *Journal of Applied Sport Psychology* 15: 12–25.

Dietrich A (2004) Neurocognitive mechanisms underlying the experience of flow. *Consciousness and Cognition* 13: 746–761.

Ericsson KA, Krampe R, and Tesch-Römer C (1993) The role of deliberate practice in the acquisition of expert performance. *Psychological Review* 100: 363–406.

Friedman RS and Förster J (2001) The effects of promotion and prevention cues on creativity. *Journal of Personality and Social Psychology* 81: 1001–1013.

Guilford JP (1967) *The Nature of Human Intelligence*. New York: McGraw Hill.

Johnson JG and Raab M (2003) Take the first: Option-generation and resulting choices. *Organizational Behavior and Human Decision Processes* 91: 215–229.

Memmert D (2006) Developing creative thinking in a gifted sport enrichment program and the crucial role of attention processes. *High Ability Studies* 17: 101–115.

Memmert D (2007) Can creativity be improved by an attention-broadening training program? – an exploratory study focusing on team sports. *Creativity Research Journal* 19: 281–292.

Memmert D (2009) Noticing unexpected objects improves the creation of creative solutions – inattentional blindness influences divergent thinking negatively. *Creativity Research Journal* 21: 1–3.

Memmert D, Baker J, and Bertsch C (2010) Play and practice in the development of sport-specific creativity in team ball sports. *High Ability Studies* 21: 3–18.

Memmert D and Perl J (2009) Analysis and simulation of creativity learning by means of artificial neural networks. *Human Movement Science* 28: 263–282.

Memmert D and Roth K (2007) The effects of non-specific and specific concepts on tactical creativity in team ball sports. *Journal of Sport Science* 25: 1423–1432.

Plessner H, Unkelbach C, Memmert D, Baltes A, and Kolb A (2009) Regulatory fit as a determinant of sport performance. *Psychology of Sport & Exercise* 10: 108–115.

Runco MA (2007) *Creativity – Theories and Themes: Research, Development, and Practice*. Burlington: Elsevier Academic Press.

Sternberg RJ (ed.) (1999) *Handbook of Creativity*. Cambridge: University Press.

Relevant Website

http://www.dshs-koeln.de/wps/portal/sportspiel_en/home/Forschung/Forschung2?WCM_GLOBAL_CONTEXT=/wps/wcm/connect/sportspiel_en/home/Forschung/Forschng2