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THE EFFECT OF DELIBERATE PLAY ON TACTICAL PERFORMANCE IN BASKETBALL[1]

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Summary.—This field-based study analyzed effects of a deliberate-play training program in basketball on tactical game intelligence and tactical creativity. 22 youth basketball players, ages 10 to 12 years, completed basketball training in one of two equal-sized groups. The deliberate-play training program contained unstructured game forms in basketball. The placebo group played in traditional structured basketball game forms. Tactical intelligence and creativity was assessed before and after an 18-lesson intervention. Analysis showed significant training improvement only for the deliberate-play group. In addition, this outperformance of the placebo group was not only observed for tactical creativity but also for tactical intelligence.

Recent research has suggested that the perception of, and acting in, many different sport game situations has a positive influence on improvement of tactical performance (see Baker, Côté, & Abernethy, 2003; Côté, Baker, & Abernethy, 2003; Memmert & Roth, 2007; Berry, Abernethy, & Côté, 2008). More specifically, unstructured play-like involvement (Côté, *et al*., 2003) seems to play a crucial role in the development of tactical behavior in basketball, handball, field hockey, and soccer. In this context, Côté (1999) and Côté and Hay (2002) introduced the term "deliberate play," which refers to involvement in unstructured, play-oriented situations. So far, no experimental research designs have been used to examine the effect of a deliberate-play training program on tactical behaviour.

According to recent research by Memmert and colleagues (Memmert & Perl, 2005, 2009a, 2009b; Memmert & Roth, 2007), tactical game intelligence and tactical creativity were selected as dependent variables. The distinction between tactical game intelligence and tactical creativity may pertain to the theoretical distinction between "convergent thinking" and "divergent thinking" (Guilford, 1967; Runco, 2007). Convergent thinking refers to the ability to find the ideal solution to a given problem. In team sports, this is similar to tactical decision making or simple game skill (Bunker & Thorpe, 1982). In contrast, divergent thinking is defined as the

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unusualness, innovativeness, statistical rareness, or even uniqueness of solutions to a related task. In team sports, this particularly concerns tactical creativity which produces varying, rare, and flexible decisions in different kinds of situations (Memmert & Roth, 2007).

The efficacy of various training approaches in team ball sports for the development of tactical creativity was investigated by Memmert and Roth (2007) who tested 135 children about 7 years old in a 15-month field-based study. Children participated either in nonspecific treatment groups; a specific handball, soccer, or field hockey group; or a control group. Results showed nonspecific experiences (deliberate play; Côté, *et al*., 2003) seem to be promising alternatives to specific treatments. In a further study, Memmert and Perl (2005) showed that game intelligence could be improved by various types of training programs (e.g., soccer, field hockey).

The present study was designed to expand on these previous findings (Memmert & Perl, 2005, 2009a, 2009b; Memmert & Roth, 2007) in three ways: (a) to show the effect of a deliberate-play training program with youth; (b) generalization of the effect to other sport settings, for example, basketball; and (c) tactical game intelligence and tactical creativity need to be measured simultaneously within the scope of a deliberate-play training program.

Thus, the influence of a deliberate-play basketball training method on the development of both tactical performances in youth ages 10 to 12 years was investigated. Previous research suggests that about 18 training sessions are sufficient for that aim (Memmert, 2006). A deliberate-play training program was hypothesized to have a positive effect on tactical creativity and tactical game intelligence relative to the effect on a placebo group. From a methodological perspective, a placebo group—and not only a control group with no training units at all—is required to rule out Hawthorne effects and familiarity effects. When all participants just participate in a training program, this may generate motivational effects, expectancy effects, or confirmation bias, and these may have a positive effect on performance.

Method

Participants and Design

Twenty-two youth basketball players from different teams participated voluntarily (*M* age = 11.1 yr., *SD* = .8). They were all boys and played in the FMBb (Federation of Basketball of the State of Minas Gerais, Brazil). Because of the average age of the participants (about 11 yr.), the youth basketball players had no experiences in competitive sport and only marginal experiences in leisure sport (basketball: 17.9%; football: 14.3%; swimming: 3.6%; volleyball: 3.6%). Past experiences as a covariate did not influence the results and were of no further theoretical interest. Informed consent was obtained before commencing the study. In addition, this project was approved by the Ethics Committee of the Universidade Federal de Minas Gerais (COEP: EITC 499/05).

Two groups were constructed in a quasi-experimental research design. The deliberate-play group ($n=11$) was taught within unstructured game forms, e.g., playing in 1-on-1, 2-on-2, or 3-on-3 small-sided games (for more details, see Table 1). Specifically, they used more frequently activities of attack and defense in situations of numerical equality (1 × 1, 2 × 2, and 3 × 3), numerical inferiority (1 × 2, 2 × 3, and 3 × 4), and numerical superiority (2 × 1, 3 × 2, and 4 × 3) as often happens in the formal game. Also, they used tactical task conditions using game situations of the type 1 × 1 + 1, 2 × 2 + 1, 3 × 3 + 1, and 4 × 4 + 1. "+1" means that this player helps the team which has the ball, with the option to pass, but is not allowed to score.

A placebo group ($n=11$) was taught with a traditional basketball training program (for more details, see Lumsden, 2001, and Table 1). These training units typically entailed a large amount of structured game exercise with exact guidelines. Specifically, they used more isolated activities of skill training (e.g., dribbling, passes, throws) with and without a defensive player. Two coaches had been individually and specially trained for one of the programs, insofar as all the games and exercises were introduced to the trainers and they were under obligation to teach those in a given way.

Fidelity of Instruction

To verify the teaching methods in the two treatment groups, it was necessary to develop a validation protocol. Through training observations by video recording in the training sections ($n=18$ sessions; about 60 min. long), six different types of training units (conversation with the coach, stretching/warm-up, physical training, training in structured/unstructured game forms, and training competition) were identified by two independent experts, and the time for each category was measured. These types of training units were following the theory of ecological development of Bronfenbrenner and Morris (1998). Through interviews and direct observation of the trainings of different kinds of collective sports, the classification of the activities was established in the sessions of training, privileging the process-context-person-time. Break periods for participants' hydration and the transition from one activity to another were recorded and the time spent in these segments calculated. In addition, sport activities outside the usual training units, e.g., competitions, were registered.

Data-collection Procedures

For the tactical performance, the well-established game-test situations were used (e.g., Memmert & Perl, 2005; Memmert & Roth, 2007; Memmert & Perl, 2009a, 2009b). These had been tested for objectivity, reliability, and validity in many preliminary studies (cf. Memmert, 2006, 2007). In recurring comparable situations, tactical behavior in general basketball-specific situations was evoked. The game-test situations contained basic tactical tasks in identification of gaps and off-the-ball movements (for more details, see Memmert & Roth, 2007). Performance in the game-test situations was recorded on videotape and judged by two raters who used subsequent concept-oriented, 11-point expert rating scales for tactical intelligence and tactical creativity (for details, see Memmert, 2007). All participants in the two groups were tested before (Time 1) and on conclusion (Time 2) of the 18-session training program. No communication was possible between any of the groups or any trainers. Both coaches were blind to the hypotheses.

Data Analysis

Performance on the game-test situations was analyzed statistically using a 2 (group: deliberate-play group vs placebo group) × 2 (tactic: intelligence vs creativity) × 2 (time; Time 1 vs Time 2) mixed, randomized analysis of variance with repeated measurements on the last two factors. Planned comparisons were carried out to compare the performance of both groups on each dependent measure, respectively. An alpha level of .05 was used for all statistical comparisons, and effect sizes were calculated, power evaluated.

Results

Manipulation Check

Overall, both experts analyzing the training units showed excellent agreement in their classification and in the measurement of the different training times in each category, as the intraclass correlation was .92. According to the nature of both training programs, significant differences occurred between the two training groups only in the two unstructured categories (deliberate-play group: $M = 32.9$ min. per unit, $SD = 22.7$, vs placebo group: $M = 15.1$, $SD = 14.9$; $t_{34} = -7.82$, $p < .001$) and structured training forms (deliberate-play group: $M = 4.0$, $SD = 5.5$ vs placebo group: $M = 27.4$, $SD = 11.4$; $t_{34} = 2.78$, $p < .01$). No differences in the other types of training activities, the overall time spent in training units, and competitions outside of the training were noted (see Table 1).

Tactical Performance

All intrajudge reliability coefficients for both dependent variables were above the crucial limit of .90. For mean data presented in Table 2, significant temporal effect was evident across the two measuring times ($F = 33.91$, $p < .001$; $\eta_p^2 = .63$). In addition, significant effects of group ($F = 8.57$, $p < .01$; $\eta_p^2 = .30$) and tactic ($F = 300.00$, $p < .001$; $\eta_p^2 = .94$) were found.

TABLE 1
Mean Time Spent in Various Training Units by Two Training Groups

Training Unit	Deliberate-play Group		Placebo Group	
	Time (min.)	Play (%)	Time (min.)	Play (%)
Conversation with coach	201.3	20.0	221.7	19.0
Structured game forms	72.5	7.2	493.1	42.3
Unstructured game forms	591.6	58.8	271.3	23.3
Training competition	141.1	14.0	178.5	15.3
Total time	1,006.4	100	1,164.6	100

The significant interaction of group by time demonstrated a difference in performances between training courses ($F = 8.22$, $p < .05$; $\eta_p^2 = .29$). No other interaction was significant.

To test the interaction effect and the differences between the groups, a series of simple one-way analyses of variance were conducted for the two measurement times. No significant differences in tactical intelligence or tactical creativity were found in the placebo group over the two measurement times, respectively. In contrast, the deliberate-play group showed significant improvement in both dependent variables over time (intelligence: $F = 53.09$, $p < .001$; $\eta_p^2 = .84$; creativity: $F = 27.17$, $p < .001$; $\eta_p^2 = .73$).

TABLE 2
Ratings of Training Performance in Tactical Intelligence and Creativity: Means and Standard Deviations For Two Training Groups at Both Measurement Times

	Deliberate-play Group		Placebo Group	
	M	*SD*	*M*	*SD*
Tactical intelligence				
Time 1	4.39	0.57	4.17	0.85
Time 2	6.12	0.64	4.67	0.63
Tactical creativity				
Time 1	3.18	0.72	3.00	0.88
Time 2	4.39	0.74	3.46	0.81

Discussion

The analysis and evaluation of deliberate practice expertise is currently a scientific and hot topic among investigators (De Bruin, Smits, Rikers, & Schmidt, 2008; Weissensteiner, Abernethy, Farrow, & Mueller, 2008; Ford, Ward, Hodges, & Williams, 2009). The first purpose of this study was to assess whether tactical creativity and tactical intelligence in youth might be improved by using a deliberate-play training program in basketball. The second aim was to evaluate whether this hypothesized improvement in original solutions (tactical creativity) has negative consequences for the best tactical solutions (tactical intelligence) because relatively unstructured training forms were used. A relatively demanding placebo group was included to ensure any benefit of training would be due to a meaningful training effect rather than to confirmation bias or test familiarity.

First, one could confirm the hypothesis that the deliberate-play training program had positive effects on tactical creativity, as this would confirm findings by Memmert and Roth (2007). Such a finding would expand the effect of "deliberate-play" (Baker, *et al.*, 2003; Côté, *et al.*, 2003) with youth of 10 to 12 years of age in basketball. Participants of the placebo group, in contrast, essentially showed no significant improvement in performance over the two measurement times. This shows that improvement in performance is a meaningful training effect.

In addition, the main effect "tactic" is consistent with previous research (Memmert & Perl, 2005; Memmert & Roth, 2007) phrasing that tactical intelligence is more developed in youth basketball players than tactical creativity. More importantly, not only was tactical creativity improved with the deliberate-play groups, but also tactical intelligence. No interference occurred from training tactical game intelligence together with tactical creativity. This expanded the findings of Memmert and Roth (2007), which showed only effects for tactical creativity. Pragmatically, this means that unstructured game situations worked well for training both components of tactical performance measured here. Specificially, play constellations $1 \times 1 + 1$, $2 \times 2 + 1$, $3 \times 3 + 1$, $4 \times 4 + 1$ are a possibility to develop tactical creativity.

Further research should address the potential limitations of this field-based study. So far, one cannot rule out that the placebo group showed improvement on other variables like endurance or skill performance. According to motor skill, one can refer to some research on implicit learning (e.g., Reber, 1989) which shows this point is highly unlikely. Findings from motor learning would suggest that an implicit learning mechanism inferred from the execution and training of motor skills is the same or even better than an explicit learning mechanism (for a review, see Magill, 1998). Thus, to some extent, possible motor learning improvement in the placebo group is likely not greater than learning improvement in the deliberate-play training group. In addition, several moderator variables could be taken into consideration, as these might have influenced the results of the current field-based project (e.g., individual coaching style). Nevertheless, further reseach should be focused more on the evaluation of real-life training programs in sports having high ecological validity.

The deliberate-play training program in basketball offers an opportunity to coaches and teachers to decide on the application of technical skills in the context of real world situations of the training. Thus, it presents a varied set of similar activities for situations that athletes come across in competitive play. The essential characteristic centered in the tactics makes possible the understanding of the play as well as the acquisition of an appropriate level of tactical knowledge which is important to be successful in finding solutions for different typical problems that show up in the competition.

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Summary.—This field-based study analyzed effects of a deliberate-play training program in basketball on tactical game intelligence and tactical creativity. 22 youth basketball players, ages 10 to 12 years, completed basketball training in one of two equal-sized groups. The deliberate-play training program contained unstructured game forms in basketball. The placebo group played in traditional structured basketball game forms. Tactical intelligence and creativity was assessed before and after an 18-lesson intervention. Analysis showed significant training improvement only for the deliberate-play group. In addition, this outperformance of the placebo group was not only observed for tactical creativity but also for tactical intelligence.

Recent research has suggested that the perception of, and acting in, many different sport game situations has a positive influence on improvement of tactical performance (see Berry, Abernethy & Cote, 2008; Baker, Côté & Abernethy, 2003; Côté, Baker & Abernethy, 2003; Memmert & Roth, 2007). More specifically, unstructured play-like involvement (Côté, *et al*., 2003) seems to be crucial role in the development of tactical behavior in basketball, handball, field hockey, and soccer. In this context, Côté (1999) and Côté and Hay (2002) introduced the term “deliberate play” which refers to involvement in unstructured, play-oriented situations. So far, no experimental research designs have been used to examine the effect of a deliberate-play training program on tactical behaviour.

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The present study was designed to expand on these previous findings (Memmert & Perl, 2005, 2009a,b; Memmert & Roth, 2007) in three ways: (a) to show the effect of a deliberate-play training program with youth; (b) generalization of the effect to other sport settings, for example, basketball; and (c) tactical game intelligence and tactical creativity need to be measured simultaneously within the scope of a deliberate-play training program.

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METHOD

Participants and Design

Twenty-two youth basketball players from different teams participated voluntarily (*M* age = 11.1 yr., *SD* = .8). They were all boys and played in the FMBb (Federation of Basketball of the State of Minas Gerais, Brazil). Because of the average age of the participants about 11 years, the youth basketball players had no experiences in competitive sport and only marginal experiences in leisure sport (basketball: 17.9%; football: 14.3%; swimming: 3.6%; volleyball: 3.6%). Past experiences as a covariate did not influence the results and were of no further theoretical interest. Informed consent was obtained before commencing the study. In addition, this project was approved by the Ethics Committee of the Universidade Federal de Minas Gerais (COEP: EITC 499/05).

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Performance on the game-test situations was analyzed statistically using a 2 (group: deliberate-play group vs placebo group) × 2 (tactic: intelligence vs creativity) × 2 (time; Time 1 vs. Time 2) mixed, randomized analysis of variance with repeated measurements on the last two factors. Planned comparisons were carried out to compare the performance of both groups on each dependent measure, respectively. An alpha level of .05 was used for all statistical comparisons, and effect sizes were calculated, power evaluated.

RESULTS

Manipulation Check

Overall, both experts analyzing the training units showed excellent agreement in their classification and in the measurement of the different training times in each category, as the intraclass correlation was .92. According to the nature of both training programs, significant differences occurred between the two training groups only in the two unstructured categories (deliberate-play group: M= 32.9 min. per unit, SD= 22.7 vs. placebo group: M= 15.1 , SD= 14.9; t_{34}= -7.82, $p < .001$) and structured training forms (deliberate-play group: M= 4.0, SD= 5.5 vs. placebo group: M= 27.4, SD= 11.4; t_{34}= 2.78, $p < .01$). No differences in the other types of training activities, the overall time spent in training units, and competitions outside of the training were noted (see Table 1).

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Tactical Performance

All intra-judge reliability coefficients for both dependent variables were above the crucial limit of .90. For mean data presented in Table 2, significant temporal effect was evident across the two measuring times (F= 33.91, $p < .001$; $\eta_p^2 = .63$). In addition, a significant group effect (F= 8.57, $p < .01$; $\eta_p^2 = .30$) and a tactic effect (F= 300.00, $p < .001$; $\eta_p^2 = .94$) were found. The significant interaction of group by time demonstrated a difference in performances between training courses (F= 8.22, $p < .05$; $\eta_p^2 = .29$). No other interaction was significant.

Comment [SAI2]: Table 2 here

To test the interaction effect and the differences between the groups, a series of simple one-way analyses of variance were conducted for the two measurement times. No significant differences in tactical intelligence or tactical creativity were found in the placebo group over the two measurement times, respectively. In contrast, the deliberate-play group showed significant improvement in both dependent variables over time (intelligence: F= 53.09, $p < .001$, $\eta_p^2 = .84$; creativity: F= 27.17, $p < .001$, $\eta_p^2 = .73$).

DISCUSSION

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The deliberate-play training program in basketball offers an opportunity to coaches and teachers to decide on the application of technical skills in the context of real world situations of the training. Thus, it presents a varied set of similar activities for situations that athletes comes across in the competitive play. The essential characteristic centered in the tactics makes possible the understanding of the play as well as the acquisition of an appropriate level of tactical knowledge which is important to be successful in finding solutions for different typical problems that show up in the competition.

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Table 1

Mean Time Spent in Various Training Units by Two Training Groups

	Deliberate-play group		Placebo group	
	Time (min.)	Play (%)	Time (min.)	Play (%)
Conversation with coach	201.3	20.0%	221.7	19.0%
Structured game forms	72.5	7.2%	493.1	42.3%
Unstructured game forms	591.6	58.8%	271.3	23.3%
Training competition	141.1	14.0%	178.5	15.3%
Total time	1006.4	100%	1164.6	100%

Table 2. Ratings of Training Performance in Tactical Intelligence and Creativity: Means and Standard Deviations For Two Training Groups at Both Measurement Times

	Deliberate-play group		Placebo group	
	M	*SD*	*M*	*SD*
Tactical intelligence				
Time 1	4.39	0.57	4.17	0.85
Time 2	6.12	0.64	4.67	0.63
Tactical creativity				
Time 1	3.18	0.72	3.00	0.88
Time 2	4.39	0.74	3.46	0.81