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# A Study on Implementing New Tactics in Football in Decision Making at Hyderabad

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**ABSTRACT:**

*The purpose of this study was to explore the influence of the affective decision-making on tactical behavior in soccer players under the age of 15 years old. The System of Tactical Assessment in Soccer (FUT-SAT) was used to assess tactical behavior. The goal of the study was to investigate the relationship between domain-general working memory capacity and domain-specific creativity amongst experienced soccer players. We administered the automated operation span task in combination with a domain-specific soccer creativity task to a group of 61 experienced soccer players to address the question whether an athlete's domain-specific creativity is restricted by their domain-general cognitive abilities (i.e., working memory capacity). Given that previous studies have either found a positive correlation, a negative correlation, or no correlation between working memory capacity and creativity, we analyzed the data in an exploratory manner by following recent recommendations to report effect-size estimations and their precision in form of 95% confidence intervals. The pattern of results provided evidence that domain-general working memory capacity is not associated with creativity in a soccer-specific creativity task. This pattern of results suggests that future research and theorizing on the role of working memory in everyday creative performance needs to distinguish between different types of creative performance while also taking the role of domain-specific experience into account.*

**KEYWORDS:** Cognitive abilities; Performance skills; Tactical Assessment in Soccer.

**INTRODUCTION:**

To analyze the impact of implementing new tactics and decision making among football players at Hyderabad. We all know about football. Kicking a ball with the foot is what we refer football game. Nowadays football is one of the most popular sports in the world. "Soccer" is the other name of football. It has a long history. Ancient people started to play first football. During the 20th century various types of football are getting more popular like rugby, American football, Canadian football etc. We all know various forms of football are identified in history. Basically football is played by two teams. Each team consists of 11 players and extra players are waiting outside the line if any player injured or

depends on coach's decisions to change the players. By scoring goals or points is the result of this game. Two teams try to goal their opposite components. In that case players only use their feet or body without using hands to play this game. Players are being required to move the ball by kicking, passing and carrying. There are many roles to play in this game. Players are must abide this role. They cannot hit any players. The total time of this game is 90 minutes, with the most scored team considered as a winner. A game played by two teams of 11 players each on a rectangular, 100-yard-long field with goal lines and goalposts at either end, the object being to gain possession of a ball and advance it in running or passing plays across the opponent's goal line or

kick it through the air between the opponent's goalposts.

### **DECISION MAKING:**

Decision making in sport has been a well investigated topic area in Sport Psychology, and it is one that is constantly developing and becoming more important in the world of sport and sport psychology. Decision making is a complex phenomenon in that if you were to ask a professional athlete why they made a decision, they would probably be unable to tell you, but as psychologists we are able to deduce what separates expert performers from novice performers in their decision making abilities. Much of the research that has been published also examines decision making in officials in sport, i.e. referee's, umpires, etc., a topic which is becoming increasingly popular as we more frequently question an officials ability to make the 'correct' decision in a high pressure situation on a consistent basis. While decision making is somewhat of a new area of interest it has already seen great strides in results and much of this is due to the early research into memory recall by De Groot, (1965) and Chase & Simon, (1973). These early studies were quickly replicated into a sporting setting and it is from this that further research into recall in a sport setting was conducted and eventually grew into decision making research.

One of the first studies into decision making in sport by Berry, Abernethy & Cote (2008) focused on invasion-type sports, more specifically in the Australian Football League (AFL) and what the differences were in expert decision making and novice decision making abilities. The results of the study suggested that it is the amount of time invested into the sport that is experienced that influences the decision making

expertise compared to the level of a novice player. From these findings we can presume that improving an athlete's decision making requires them to invest in the sport through specific training and competition. This type of research could relate back to a memory setting, however.

The results of Berry, Abernethy, & Cote's (2008) study suggested that the athlete must partake in deliberate practice of the sport, which is what separates elite from novice. But can we determine that what the athlete is actually doing is recalling a memory of successful decision making procedures, but merely adapting these to a new, similar setting? A more recent study by Furley & Memmert (2012) examined the effect of controlled attention and working memory capacity in tactical decision making. The results indicated that Working Memory Capacity is predictive of controlling attention in a complex setting and also highlights the importance of working memory in tactical decision making.

From these results we can see that working memory is not only beneficial to decision making procedures but also helps athletes to focus attention and also helps to block out any irrelevant auditory distractions. From previous studies it has been shown that working memory capacity, attention and the amount of deliberate practice undertaken is what separates elite athletes' decision making abilities to that of a novice athlete. Decision making research is largely conducted upon team sports, mostly invasion-based or striking-based sports. The research conducted into striking-based sports is largely on anticipation, which is a decision making process but in a slightly different manner. Anticipation is a very quick process, and it is no coincidence the research conducted on it is in striking-based sports. The speed at which the ball is pitched and

struck in games such as Cricket, Tennis and Baseball is much quicker compared to sports such as Rugby or Football where the aim is to build the play over time. Although it must be said that anticipation does play a large part in invasion-type games, as we so often hear about players being able to anticipate where the ball is going to go (otherwise referred to in media and society as ‘reading the game’).

### RESEARCH DESIGN:

For many years, physical features have received the most attention as the main factors for players achieving high levels of performance in soccer. However, in recent years, some concerns have been allocated to the development of tactical skills as an important feature of successful performance in soccer players and teams. These concerns are justified by the dynamic and complex features of the game, which is characterized by a cooperation-opposition relationship between teammates and opponents.

Playing well requires repeatedly performing tactical skills efficiently throughout the match. During a soccer game, players are requested to coordinate their actions to recover, retain and move the ball to attack as well as to create goal scoring situations, which requires well-developed tactical skills to achieve successful performance. According to Gréhaigne and Godbout, tactical skills refer to the ability of a player to make and execute an appropriate decision in any given situation according to game constraints. To perform successfully, players should present well-developed tactical knowledge, which has been categorized as declarative (“what to do”) and procedural (“doing it”). Studies have shown that players with a higher level of performance present better tactical knowledge in comparison to those players with lower levels of

performance. In general, players with a better understanding of the game are more able to perform successful tactical behavior and to make correct tactical decisions in game events that enable them to achieve a high level of performance.

### SELECTION OF SUBJECTS:

Sixty one male soccer athletes ( $M_{age} = 23.48$ ,  $SD = 3.6$ ) took part in the study. Their average playing experience was 17.6 years ( $SD = 3.9$ ) at an amateur to semi-professional level. The athletes reported to spend an average of 5.7 h/week ( $SD = 4.4$ ) of playing or training soccer. None of these variables significantly influenced the pattern of results. Written informed consent was obtained from every participant before commencing the experiment.

### SELECTION OF VARIABLES

To evaluate the tactical behavior of the players, the System of Tactical Assessment in Soccer (FUT-SAT) was used. The conceptual structure of FUT-SAT is based on the ten core tactical principles of soccer, being five for the offensive phase: penetration, offensive coverage, depth mobility, width and length and offensive unity; and five for the defensive phase: delay, defensive coverage, balance, concentration and defensive unity.

These principles were chosen since they represent the core aspects of the process of teaching and training of tactical skills. Besides that, this set of principles objectively measures players’ motion according to the management of playing space performed by them. FUT-SAT comprises two macro-categories, seven categories and 76 variables that are organized according to the type of information dealt with by the system. The Macro-Category Observation comprises three categories and 24 variables. This Macro-Category,

named Tactical Principles, comprises ten variables. The category Place of Action in the Game Field features four variables and the category Action Outcomes features ten variables. The Macro-Category Outcome features four categories and 52 variables. In this Macro-Category, all four categories Tactical Performance Index (TPI), Tactical Actions, Error Percentage and Place of Action Related to the Principles (PARP) comprise the same thirteen variables.

The Macro-Category Outcome is so called because its variables are dependent on the information provided by the variables that compose the Macro-Category Observation. The FUT-SAT's field test (Goalkeeper +3 vs. Goalkeeper +3) is performed during four minutes in an area of 36 meters long by 27 meters wide, according to the official laws of soccer, except by the offside rule. To assess tactical behavior we used players' Offensive, Defensive, and Game Tactical Performance Index values.

#### **SELECTION OF TEST:**

This study comprised 9,713 tactical behaviors (4,698 offensives and 5,015 defensives) performed by 153 under-15 soccer players (Mean age=14.35; SD=0.63). All participants were engaged in regular training sessions in soccer at least three times a week. Moreover, they were participating in a regional level championship for their age category. Before the data collection, the directors of teams signed a document authorizing the research. Additionally, the participants and their parents signed a legal consent allowing data collection and the use of the data for research purposes. This study was authorized by the Ethics Committee (Of. 132/2012/CEPH/01-12-11) of the university Osmania. Two experiments investigate soccer players' cognitive representation, the cognitive processing, and the visual attention

patterns of team-specific tactics in soccer. Both experimental setups used the identical stimulus material.

#### **RELIABILITY OF DATA:**

Descriptive statistics were used to verify the means and standard deviations of offensive, defensive and game tactical behaviors. Values of quartiles were also obtained. The normality of the data distributions was verified by the Kolmogorov-Smirnov test. The low and high groups were compared and found to be different. Comparisons of the performance in IGT net score between the low and high groups for offensive, defensive and game tactical behaviors were accomplished using the non-parametric Mann-Whitney test. The effect size analysis for the Mann-Whitney was calculated using the following equation: where,  $r$  is the effect size,  $Z$  is the  $z$ -score, and  $N$  is the overall number of cases.

The test-retest method was used to verify the coefficient of reliability of the tactical analysis. A minimum of three weeks elapsed between analyses. Ten trained observers evaluated a total of 1,583 tactical actions (16.3%), a value higher than the minimum recommended (10%) by the literature. Values of intra-observer reliability varied from 0.79 (SE=0.053) to 1.00, and values of inter-observer reliability varied between 0.71 (SE=0.013) and 0.85 (SE=0.017). The statistic of Kappa was used to verify the coefficient of reliability of the analysis. Statistical analyses were conducted using the Statistical Package for Social Sciences (SPSS) 18.0. The level of significance used was  $p < 0.05$ .

The effects of the "experience level" and "SSG format" on offensive performance indicators were primarily studied through descriptive statistics (means, standard deviations, and absolute frequencies). Then, after the

rejection of the multivariate normality assumption and the homogeneity of covariance matrices (using Box's M test), non-parametric MANOVAs were applied to assess the interaction and the main effects of both factors on simple and composite indicators.

**PROCEDURES**

The first test performed by participants was FUT-SAT. This test was performed according to the published protocol. In the next phase, the participants came to a room individually to perform the IGT neuropsychological test. For this test, they were invited to sit in a comfortable chair in front of a computer. In addition to being given instructions on the computer screen, the participants were read to by the instructor, who also ensured the computational skills of participants for performing the task. The test started after the participants affirmed their understanding of the task. The test ended after the participants chose the last (100<sup>th</sup>) card.

Data from the field test of FUT-SAT were recorded with a digital camera (SONY HDR-XR100). The digital videos were transferred to a laptop (COMPAQ 510 processor Intel Core 2 Duo) via cable and converted into avi. files. The

software Soccer Analyzer was used for data processing. This software inserts spatial references in field test video and permits the identification of the positions and movements of players on the field. Data collection for the IGT was carried out using two laptops (COMPAQ 510 processor Intel Core 2 Duo and HP Pavilion dv4 14300us). These data were stored on a laptop and later analyzed. The values for offensive, defensive and game tactical behaviors were recorded according to the accurate rate of tactical actions performed by players in the field test, which was provided by the output of the test. The participants were grouped according to low, intermediate and high levels of offensive, defensive and game tactical behavior, as defined by their accuracy rates. In the low group were the players who achieved scores  $\leq 25\%$ ; in the high group were those with scores  $\geq 75\%$ . The intermediate group ( $>25\%$  and  $<75\%$ ) was not considered in the analysis. Descriptive values for these groups are shown in Table 1. Data analysis of IGT was accomplished using results provided by the program used in data collection. The performance of participants was measured using the IGT net score provided by the test output.

Table 1: Descriptive values of the tactical behavior of participants.

Tactical Variables	Low group		High group		P
	Mean	SD	Mean	SD	
OTB1	73.92	7.8	96.97	2.2	p<.001
		9		5	
DTB2	59.69	9.8	92.32	3.7	p<.001
		3		1	

GTB3	69.70	6.6	92.83	1.9	p<.001
		6		9	

OTB: Offensive Tactical Behavior; DTB: Defensive Tactical Behavior; GTB: Game Tactical Behavior; SD: standard deviation.

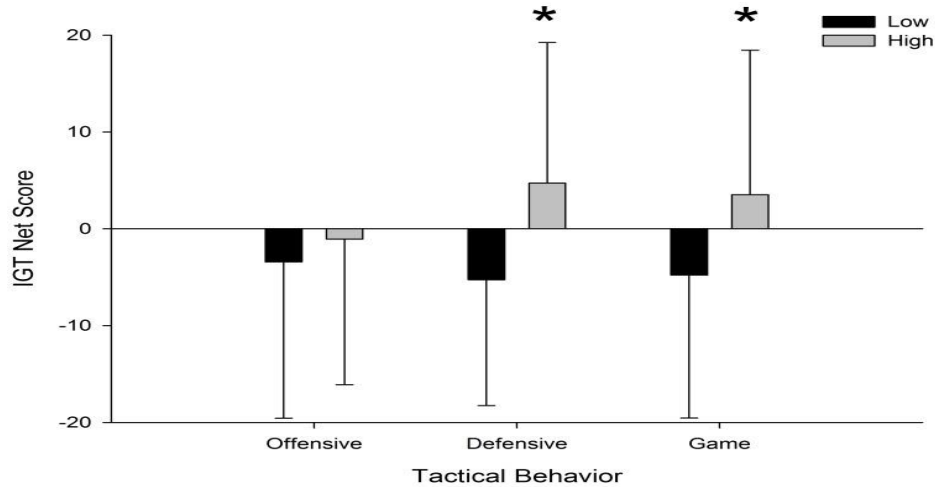
### EXPERIMENTAL TASK AND MEASURES

Participants were recruited from local football clubs and tested individually in a quiet laboratory on a standard 15 inch notebook. After filling out a questionnaire, gathering biographic data, participants were randomly allocated to either first take the automated operation span or the soccer-specific divergent thinking test to avoid potential order effects. Altogether, testing took approximately 50 min. E-prime 2.0 professional was used to administer both the automated operation span task and the soccer-specific divergent thinking task. The instructions were standardized and presented on the computer screen. For the divergent thinking task, participants were instructed to assume the role of the player in possession of the ball. Half of the participants viewed 10 videos and 10 stills presented in random order, while for the other group this was reversed and the 10 videos were presented as stills and the 10 stills as videos.

The rationale for this was to explore the difference between dynamic and static information in domain-specific creative problem-solving as dynamic information is more representative of the decision making demands experienced soccer-players are confronted with in their performance environments. As no differences were evident between static and dynamic scenes we collapsed data analysis over both categories. After every stimulus presentation participants had to write down all the tactical decision making options that came to their mind. Participants had 45 s time (the time was indicated by a countdown after every stimulus presentation on the screen) to generate as many adequate tactical solutions as possible (divergent thinking) and then bring these generated options in a hierarchical order (within the 45 s time frame) with option one being the option that they would actually decide upon in that situation (convergent thinking). After completing the testing procedure, participants were informed about the purpose of the experiment.

### RESULTS AND INTERPRITATION OF DATA:

Figure 1: presents the performance of players on the IGT. Comparisons of the IGT net scores achieved by players from low ( $\leq 25\%$ ) and high ( $\geq 75\%$ ) Offensive, Defensive and Game Tactical Behavior are shown.



Differences between the low and high groups on the IGT net scores were observed with regard to Defensive Tactical Behavior (DTB) (low group (M=-5.263; SD=12.998); high group (M=4.718; SD=14.513); (Z=-3.113; p=0.002; r=-0.355) and Game Tactical Behavior (low group (M=-4.790; SD=14.752); high group (M=3.526; DP=14.926); (Z=-2.267; p=0.023; r=-0.260)).

Pearson’s correlation coefficients for the operation span and the different measures of creativity are shown in Table 2 and their graphical equivalent in Figure 4.1. The pattern of results clearly shows no relationship between domain-general working memory capacity and domain-specific creativity. Even when only comparing the 25% highest (M = 65.7, SD = 7.1) and 25% lowest (M = 23.5, SD = 4.4; t(28) = - 19.649; p < 0.001, d = 7.1) working memory capacity athletes—which is common practice in the working memory capacity literature (Engle, 2002, for a review)—no significant differences emerged for the combined creativity value (t(28) = - 0.560; p = 0.58, d = 0.204), the fluency value [t(28) = - 0.752; p = 0.46, d = 0.275], the flexibility value [t(28) = 0.641; p = 0.53, d = 0.233], and the originality value [t(28) = - 0.749; p = 0.46, d = 0.273].

Table 2: Correlations (Pearson’s *r*) coefficients for working memory capacity and the creativity measures.

	WMC	Divergent	Fluency	Flexibility	Originality	Convergent
WMC	-	0.102	0.107	-0.004	0.061	0.132
Divergent	[-0.15,0.35]	-	0.835**	-0.821**	-0.051	0.056
Fluency	[-0.15,0.35]	[0.74,0.89]	-	-0.868**	-0.530**	0.105
Flexibility	[-0.26,0.25]	[0.72,0.89]	[0.79,0.92]	-	-0.552**	-0.034
Originality	[-0.19,0.31]	[-0.30,0.20]	[-0.69,-0.32]	[-0.71,-0.35]	-	0.019
Convergent	[-0.12,0.37]	[-0.20,0.31]	[-0.15,-0.35]	[-0.28,0.22]	[-0.23,0.27]	-

Further, the correlation between working memory capacity and a measure of convergent thinking—the final option chosen—was not significant, indicating that a high domain-general working memory capacity is not associated with better decisions in soccer. This was also evident when comparing the 25% highest and 25% lowest working memory capacity athletes [ $t(28) = -0.429$ ;  $p = 0.67$ ,  $d = 0.156$ ].

This finding is in line with Furley and Memmert (2012) who provided evidence that a higher working memory capacity is only associated with superior decision making in certain situations, e.g., when a predominant response tendency interferes with the best solution in a situation or when there is external distraction from the decision making task. However, there was no association between overall decision quality and working memory capacity.

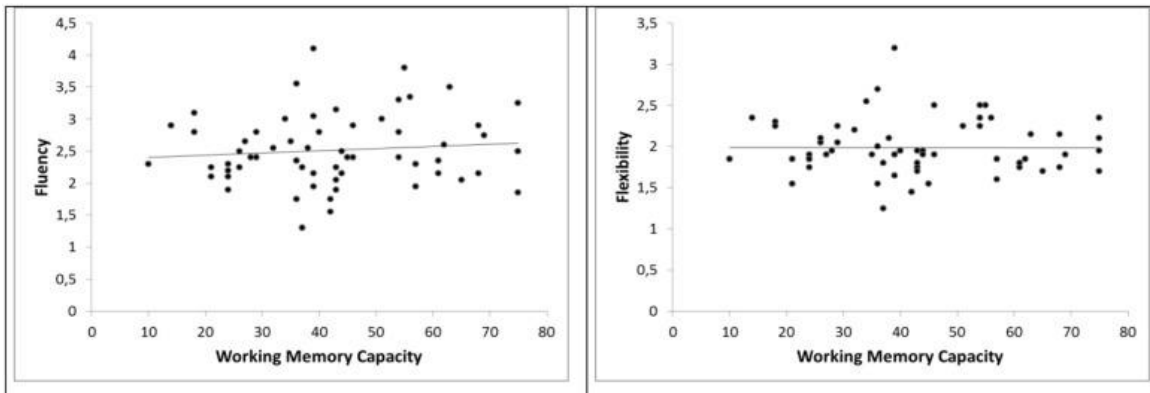


Figure 3a): Flexibility and Fluency

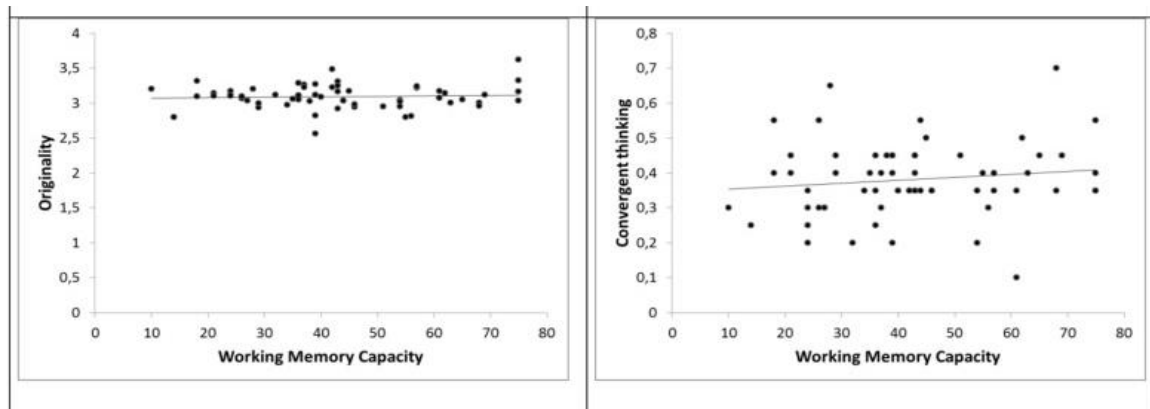


Figure 3B): Bivariate correlations between working memory capacity and the three divergent thinking measures (fluency, flexibility, and originality) and working memory capacity with the convergent thinking measure.

## CONCLUSION

The research concludes, from the results observed in this study, it is possible to affirm that tactical behavior influences affective decision-making in under-15 soccer players. It was found that differences in performance on the Iowa Gambling

Task (IGT) neuropsychological test were linked to the tactical behavior scores of players. Players with high Defensive and Game Tactical Behavior presented better performance on IGT than those with low Defensive and Game Tactical Behavior. Such findings support the statement that affective decision-making is an important measure for



predicting the level of tactical behavior to be achieved by young soccer players. Data from this study highlight the importance of developmental factors in soccer players, but there is a need for additional studies that analyze the influence of affective decision-making on the tactical behavior of young soccer players of different age categories and levels of competitiveness.

Thus, our findings do not support the previously reported suggestion of a positive relationship between a domain-general measure of working memory capacity and domain-specific creativity (De Dreu et al., 2012). The present findings are in line with existing studies that do not find any direct correlation between working memory and creativity (e.g., Takeuchi et al., 2011; Lee and Therriault, 2013).

Therefore, our results suggest that the moderating role of the nature of the creativity task plays an important role in the interaction between divergent thinking and working memory, as it is evident in current creativity research (for reviews, see Kasof, 1997). Or as Fugate et al. (2013, p. 236) pointed out: "In sum, the mediating effect of working memory on creativity depends on the type of task to be performed." In this respect, the present findings are well aligned with current theorizing (see Wiley and Jarosz, 2012, for a review) on the role of working memory capacity in problem solving, concluding that successful problem solving depends on the needs of the situation.

### RECOMMENDATIONS:

- This study presents important findings on the role of affective decision-making for tactical behaviors in soccer players.
- Such findings could help to highlight functions performed by the complex neurocognitive system and their role in

supporting players' abilities to achieve successful performance.

- This information could also be useful to technical committee professionals in the process of identification and development of young soccer players. Greater affective decision-making abilities were related to better tactical behavior in young soccer players; thus, affective decision-making must be developed in training.
- It is important to affirm that the task used to assess affective decision-making in the present study is neither specific nor ecologically related to the game of soccer.
- However, the findings presented here are important because they reveal that the assessment of affective decision-making by a validated neuropsychological test can estimate players' potential to perform efficient tactical behaviors.
- Additional research involving players from different age categories and levels of competitiveness could also increase the impact of the findings of this study.
- A possible limitation of this study is that we did not control for the level of education/academic achievement and for years of practice.

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