126 - METACOGNITION: EFFICIENCY IN THE TESTS OF TIME OF SIMPLE REACTION AND TIME DISCRIMINATION REACTION, IN PLAYERS OF VOLLEYBALL

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INTRODUCTION:

In the last years, in the area of the motor learning, it has been having a concern in the elaboration of a series of beginnings and theoretical approaches that have been sub-serving to the teaching skilled-motor. For that, in what it specifically plays to the subject of the learning, the effective notion that it orientates such beginnings and theories is the one that, any that is the sport to be learned, the development of the motor skills happens starting from the organizing mental functions and managers of the motor behavior (AMARAL and SILVA, 2006).

The volleyball was created by Willian G. Morgan, in 1895, in the United States. After the consolidation period, the modality is developing and became a game highly competitive. This evolution was found by the growing increase in the clubs and children's volleyball athletes sporting schools, mainly pré-pubescent, in function of the popularity of this sport that takes the apprentice to develop specific motor skills to the sport practice of the volleyball (BENETTI; SCHNEIDER and MEYER, 2005; BIZZOCHI, 2004; PRUDENCIO and TUMELERO, 2006). Ally to this development is made necessary that volleyball athletes constantly improve the neural mechanisms of identification of the opponent's actions, because the same ones will serve as base for the success us "rallis" (HIGAJO; ANDRADE and PEREIRA, 1991; SOUZA; OLIVEIRA and OLIVEIRA, 2006).

To identify these actions, it is necessary that the understanding on the tactical nuances of the game is workout and that those trainings request of the athlete a high knowledge degree and perception on the performance events related to the sport (AMARAL and SILVA, 2006), since the volleyball is characterized by actions of short periods, maximum intensity and reduced intervals (BENETTI; SCHNEIDER and MEYER, 2005; FONTANI et al., 1999).

Like this, a considered component of great importance in the elaboration, execution and decision of the fast actions made during the game is the capacity or the metacognition tax that it is direct and intimately related to the time of the athlete's motor reaction (SILVA, 2000; OLIVEIRA et al., 2002). This way, the speed of processing of information appears as indicator of the individuals' intellectual capacity, above all with works laboratory around the simple and complex tasks of reaction (RIBEIRO and ALMEIDA, 2005b).

This study, therefore, had for purpose to compare the results in the tests of simple reaction and discrimination, in volleyball athletes with different levels metacognitive and, to verify the relationship among the best reaction scores with high metacognition levels.

SAMPLE:

It was used in this research a sampling of fifteen volleyball athletes (n=15) masculine, belonging to the juvenile team of the Municipal Foundation of Sports of the city of Campos of Goytacazes (RJ), with age varying between 18 and 20 years. All properly registered in the Federation of Volleyball of Rio de Janeiro (FVR). The athletes were divided in three groups and classified in agreement with the identification of the capacity metacognitive, where the five scores superiors characterized the Group Superior Level of Metacognition (GNSM), the five medium scores represented the Group Medium Level of Metacognition (GNMM) and the five scores inferior corresponded to the Group Inferior Level of Metacognition (GNIM).

METHODOLOGY:

All the participants of the study were tested only maintaining an athlete and the appraiser in the room of collection of the data (volleyball department), with the objective of avoiding any disturbance type. The study was accomplished in two days no consecutive: the 1st day consisted of the analysis of the participants' of the study condition metacognitive, through the Record of Observation of the Knowledge Metacognitive (FCOM). All of the items were analyzed (for the tested) starting from answers to sport situations, shown in video and lived under practical form (a departure of the respective sport) for each individual of the sample (models of shown records). In the 2nd day it evaluated the scores of motor reaction by the instructions standardized through an itinerary of explanations and introduced to each athlete vocally. The test was only begun when there were not more doubts on the procedure. A session of familiarization of the tests was not accomplished. The athlete stayed seating in front of the instrument of test of motor reaction. To answer accurately to the tests, the athletes maintained the index finger of the hand preferably, that used to write, slightly leaning on an answer key (space). The results obtained in the Tests of Motor Reaction (TRM) of each athlete they corresponded to the average of the fifty incentives, presented in the center and sidelong in the screen of the lap top. There was an interval of five minutes among the tests. They are followed the order of application of the tests below.

Time Simple Reaction (TRS) - it was constituted by fifty appearances of circular illustrations (true objectives in the center of the screen), randomly, up to two seconds, among each illustration and certain for the own software, requesting the athlete that the fastest reacted possible.

Time of Reaction Discrimination (TRD) - it was constituted by fifty appearances of illustrations square (true objectives presented sidelong in the screen), in which among the same ones, they appeared, randomly, of one to three circular illustrations (distract), with intervals of up to eight seconds, where it was certain to the athletes that reacted for the illustrations square (true objectives).

To reach the relative objectives to the methodological actions of this study they were analyzed the participants' conditions metacognitives, through a record of observation of the knowledge metacognitive, used in the study of (OLIVEIRA; BELTRÃO and SILVA, 2003), accredited scientifically as Record of Observation of Knowledge Metacognitive (FOCM). Such procedure allows the identification of the individual's capacity metacognitive in blocks of competences. Each competence block was constituted by 5 (five) questions, totaling 20 (twenty) subjects. The punctuation varied among 1 (one) to 3 (three) points, totaling 60 (sixty) points.

The instrument above was validated through a study denominated statistical "Face Validity", whose coefficient correlational was revealed above 0,93 (OLIVEIRA; BELTRÃO and SILVA, 2003).

For the collection of the scores of motor reaction, a Software MATLAB 5.3 was used (The MathWorks, Inc.) installed in a lap top (Acer® processor Intel Celeron®, composed by a screen of 14.1").

STATISTICAL ANALYSIS:

The data originating from of the procedures described above were analyzed in the program 10.0 (SPSS® for Windows),

being used the medium descriptive "tools", standard deviation and percentage of successes. All the data were considered parametric, for the test of Shapiro-Wilk. In agreement with the results obtained in the normality test, opted for the parametric instrument ANOVA (Oneway) for comparisons between groups p value <0.05. As complemental test was adopted the post-hoc, following for the test of Tukey.

RESULTS:

The indicative data of the profile and of the athletes' selection that compose the groups metacognitives they are represented in the TABLE 1.

The average of GNSM was in 55,2 ± 1,30 points, contemplating 92% of successes, while for GNMM it was of 50,4 ± 2,40 points, representing 84% of successes. For GNIM, the average was in 42,8 ± 1,92 of successes, characterizing 71,3% of the scores obtained in this evaluation. This way, all of the athletes obtained above 50% in their scores of successes.

Table 1. Results descriptive obtained in the evaluation of the athletes' levels metacognitives through the record of observation of the knowledge metacognitive (fcom).

	GROUP SUPERIOR LEVEL OF METACOGNITION (GNSM)	GROUP MEDIUM LEVEL OF METACOGNITION (GNMM)	GROUP INFERIOR LEVEL OF METACOGNITION (GNIM)
N	5	5	5
LEVEL METACOGNITIVE	55,2 ÿ 1,30	50,4 ÿ 2,40	42,8 ÿ 1,92
PERCENTILE OF SUCCESSES (%)	92	84	71,3

The TABLE 2 represents the medium scores of motive reaction obtained by the groups metacognitives.

For the analysis regarding the (TRS), GNSM reached an average of 274 ± 5,84; GNMM obtained an average of 273,9 ± 22,03; and GNIM an average of 292 ± 31,05. These data demonstrated a similarity in the reaction scores, among the groups with a larger metacognition level. The averages of the scores of the (TRD) for GNSM 317 ± 4,3; GNMM 334 ± 28,1; and GNIM 352 ± 13,74 were larger in relation to (TRS). The groups with high levels of metacognition presented lower scores in relation to the groups with low levels of metacognition, evidencing a larger efficiency in their reaction scores.

Table 2. **Results descriptive of the medium scores of motor reaction, with their respective standard deviations of the groups metacognitives**.

	GROUP SUPERIOR LEVEL OF METACOGNITION (GNSM)	GROUP MEDIUM LEVEL OF METACOGNITION (GNMM)	GROUP INFERIOR LEVEL OF METACOGNITION (GNIM)
TIME OF SIMPLE REACTION (TRS) t/s	274 ÿ 5,84	273,9 ÿ 22,03	292 ÿ 31,05
TIME OF DISCRIMINATION REACTION (TRD) t/s	317 ÿ 4,3	334 ÿ 28,1	352 ÿ 13,74

For the analysis in the statistics ANOVA, in the scores of Reaction Discrimination's Time (TRD), it happened a significant difference among the groups, considering F = 4,701, (gl1) 2, (gl 2) 12 and p = 0,031 <0,05.

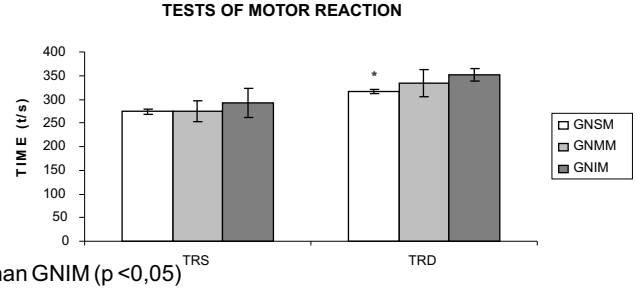
Table 3. **Result of the statistics of the variables of motor reaction among the groups metacognitives.**

VARIABLES	GROUPS	GROUPS	SIG.
TIME OF SIMPLE REACTION (TRS)	GNSM	GNMM	1,00
	GNSM	GNIM	0,43
	GNMM	GNIM	0,42
TIME OF DISCRIMINATION REACTION (TRD)	GNSM	GNMM	0,33
	GNSM	GNIM	0,02*
	GNMM	GNIM	0,28

* Significant index p <0,05

However, according to the test of post hoc of Tukey, that significant difference was verified in a single comparison GNSM-GNIM (p = 0,02), as observed in the TABLE 3, above and in the FIGURE 1, below.

Figure 1. Scores medium of the groups metacognitives with their standard deviations.



*Significantly smaller than GNIM (p <0,05)

DISCUSSION:

Important fact in the analysis of the Record of Observation of the Knowledge Metacognitive (FOCM), applied in the athletes' selection that composed the groups in this study it was that the scores obtained by the groups were above the average, being considered the maximum total of (60) sixty points that the groups could obtain. That is, all the three groups metacognitives got right more than 50% of the score possibility. It is worth to stand out that, the athletes selected compose for the Group Superior Level of Metacognition (GNSM), they belonged to the first team, showing this observation form as soon as can be a great "tool" for the technicians, in the composition of their teams.

The content of the tests of motor reaction was characterized by subjects that requested answers of dependence of capacity metacognitive. The results obtained in this test went to the encounter of the results obtained by Oliveira, Beltrão and Silva (2003), in study done on metacognition in young athletes, us which the results of the groups were analyzed starting from the practiced sport modality, in this case the volleyball and the soccer. It was observed that in reference to the same test of knowledge metacognitive, the practicing group of volleyball was revealed superior significantly to the soccer players' group. These differences may be could be explained by the applied methodologies to the soccer. It is known that surrounds of only 5% of the sport training, in general, it is of character neurogenic or bioperactional and that, in a conventional planning, the necessary cognitive competences for a great learning are not meditated (SILVA, 2000; SILVA, 2002; SILVA, 2005).

The Test of Simple Reaction (TRS), applied to the groups metacognitives it showed that the results were not significant estatisticly in the comparison between groups (p>0,05). This fact can be explained with the help of Kida, Oda and Matsumura (2005),

that accomplished a study involving baseball players, academical tennis players and individuals no athletes (all Japanese). The results indicated that the time of simple reaction was not significantly different when compared among the groups. That demonstrated that the time of simple reaction is not a factor performance (ANDRADE et al., 2005). In that way, what can differentiate the groups metacognitives in this variable would be the time of processing of an information, and no the time that the athlete takes to reaction specifically, because in the very simple tasks the times of reaction would contemplate more the sensorial-motor processes than cognitive processes in the treatment of information (RIBEIRO; ALMEIDA, 2005a; CHAGAS et al., 2005).

Reaction Discrimination's Test (TRD), applied to the groups metacognitives, it showed that just the athletes that composed the Group Superior Level of Metacognition (GNSM), demonstrated be efficient estatisticly in their medium scores, in relation to the Group Inferior Level of Metacognition (GNIM) (p=0,02). These results are in agreement with the results found by Ribeiro and Almeida (2005b), that demonstrated that the superior levels of intelligence can turn the most skilled subject in the use of effective strategies of working, concomitantly with larger amounts of information and with processing. This "reading" seems enough in agreement with the existence of an inherent "central executive" the whole cognition, more concretely a neurological structure of activation and attention that it would assure an organized flow of the information in the work memory (VASCONCELOS and ALBUQUERQUE, 2006). Fontani et al. (2006) in study, they identified in experienced athletes of volleyball, a high attention and stability regarding the scores of tasks of complex reactions, in relation to the athletes no experts. Therefore, it seems that the job of strategies metacognitives influences the "base" knowledge significantly, in the field of the motor learning (FLAVELL, 1979). In this case, the knowledge becomes outstanding in the differences between experts and beginners in the acting of motor skills through the components atencion, in a great variety of sporting modalities.

CONCLUSION:

In agreement with the objectives of the present study and with the reports found in the literature, it is believed that the results found in this research constitute important argument on the importance of we work the aspects metacognitives in the sports, mainly during the process of the student's formation. Such teaching method can improve the neurological structures of activation and attention, in what concerns the complex tasks of motor reaction that demand high cognitive analyses and answer high-speed.

The time of reaction discrimination presented significant differences among the groups, differently of the time of simple reaction, confirming previous studies that point the importance of the training and of the time of practice for the development of this motive capacity. This way, it seems that the cognitive strategies and metacognitives used by the subjects interfered positively in the obtained measures.

A larger deeperly of the subject is fundamental. In that sense, it is done necessary to the verification, simultaneously, of the use of the electroencephalogram (EEG) and of the electromyography (EMG) in the mensuration of the reaction of time. The intention would be it of separating cognitive processes of the motor gesture in tests of motor reaction. It is believed that the main differences among inexperienced and professional athletes would appear this way.

Key Words: Volleyball, Reaction of Time and Metacognition

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METACOGNITION: EFFICIENCY IN THE TESTS OF TIME OF SIMPLE REACTION AND TIME DISCRIMINATION REACTION, IN PLAYERS OF VOLLEYBALL

ABSTRACT:
The development of the motor skills happens starting from the organizing mental functions and managers of the motor behavior. In this context, it is necessary that volleyball athletes improve the mechanisms of identification of the opponent's actions. Like this, a considered component of great importance in the elaboration, execution and decision of the fast actions made during the game is the metacognition capacity that is directly related to the time of the athlete's motor reaction. The objective of that research was to verify the relationship of the speed of mental processing with different levels metacognitives, in masculine athletes of volleyball. For so much, a n=15 was used, with age between 18 and 20 years, divided in three groups, in agreement with the individual capacity of metacognition. The five scores superiors characterized the Group Superior Level of Metacognition (GNSM), the five medium scores represented the Group Medium Level of Metacognition (GNMM) and the five scores inferior corresponded to the Group Inferior Level of Metacognition (GNIM). The data were analyzed by ANOVA (Oneway). he/she was differentiates significant in Reaction Discrimination's Time (TRD). In the post hoc of Tukey it was verified differentiates in the comparison among the groups GNSM-GNIM (p = 0,02). It was ended that the athletes with high level metacognitive were faster in the comparison between groups.
Key Words: Volleyball, Reaction of Time and Metacognition

RESUME:
Le développement des capacités du moteur arrive commencer de l'organisation fonctions mentales et directeurs du comportement du moteur. Dans ce contexte, c'est nécessaire que les athlètes du volley-ball améliorent les mécanismes d'identification des actions de l'adversaire. Comme ceci, un composant considéré de grande importance dans l'élaboration, exécution et décision des actions rapides faites pendant le jeu est la capacité du metacognition qui est en rapport directement avec le temps de la réaction du motif de l'athlète. L'objectif de cette recherche était vérifier le rapport de la vitesse de traitement mental avec différent nivelle metacognitives, dans athlètes masculins de volley-ball. Pour si beaucoup, un n=15 a été utilisé, avec âge entre 18 et 20 années, a divisé en trois groupes, en accord avec la capacité individuelle de metacognition. Les cinq marquent des points les superiors ont caractérisé le Groupe Niveau Supérieur de Metacognition (GNSM), les cinq scores moyens ont représenté le Niveau du Moyen du Groupe de Metacognition (GNMM) et les cinq scores inférieur a correspondu au Groupe Niveau Inférieur de Metacognition (GNIM). Les données ont été analysées par ANOVA (Oneway). il/elle était différencie considérable dans le Time de Discrimination de la Réaction (TRD). Dans l'hoc de poteau de Tukey qu'il a été vérifié différencie dans la comparaison parmi les groupes GNSM-GNIM (p = 0,02). Il a été terminé que les athlètes avec haut metacognitive égal étaient plus rapides dans la comparaison parmi groupes.
Mots clés: Volley-ball, Réaction de Time et Metacognition

RESUMEN:
El desarrollo de las habilidades de motor pasa, mientras empezando de la organización las funciones mentales y gerentes de la conducta de motor. En este contexto, es necesario que atletas del voleibol mejoran los mecanismos de identificación de las acciones del antagonista. Así, un componente considerado de gran importancia en la elaboración, ejecución y decisión de las acciones rápidas hechas durante el juego es la capacidad del metacognition que se relaciona directamente al tiempo de la reacción del motivo del atleta. El objetivo de esa investigación era verificar la relación de la velocidad de proceso mental con diferente nivela metacognitives, en los atletas masculinos de voleibol. Para tanto, un n=15 fue usado, con la edad entre 18 y 20 años, dividido en tres grupos, conforme con la capacidad individual de metacognition. Los cinco anotan los superiores caracterizaron el Nivel Superior De grupo de Metacognition (GNSM), las cinco cuentas elemento representaron el Nivel Elemento De grupo de Metacognition (GNMM) y las cinco cuentas inferior correspondió al Nivel Inferior De grupo de Metacognition (GNIM). Los datos se analizaron por ANOVA (Oneway). el he/she era diferencia significante en el Time de Discriminación de la Reacción (TRD). En el poste hoc de Tukey que fue verificado diferencia en la comparación entre los grupos GNSM-GNIM (p = 0,02). fue acabado que los atletas con el metacognitive nivelado alto eran más rápidos en la comparación entre los grupos.
Palabras Cables: El voleibol, la Reacción de Time y Metacognition

METACOGNIÇÃO: EFICIÊNCIA NOS TESTES DE TEMPO DE REAÇÃO SIMPLES E TEMPO DE REAÇÃO DISCRIMINAÇÃO, EM JOGADORES DE VOLEIBOL.

RESUMO:
O desenvolvimento das habilidades motoras ocorre a partir das funções mentais organizadoras e gestoras do comportamento motor. Neste contexto, é necessário que atletas de voleibol aperfeiçoem os mecanismos de identificação das ações do adversário. Assim, um componente considerado de grande importância na elaboração, execução e decisão das ações rápidas efetuadas durante o jogo é a capacidade de metacognição que está diretamente relacionada ao tempo de reação motriz do atleta. O objetivo dessa pesquisa foi verificar a relação da velocidade de processamento mental com diferentes níveis metacognitivos, em atletas masculinos de voleibol. Para tanto, utilizou-se um n=15, com idade entre 18 e 20 anos, divididos em três grupos, de acordo com a capacidade individual de metacognição. Os cinco escores superiores caracterizaram o Grupo Nível Superior de Metacognição (GNSM), os cinco escores médios representaram o Grupo Nível Médio de Metacognição (GNMM) e os cinco escores inferiores corresponderam ao Grupo Nível Inferior de Metacognição (GNIM). Os dados foram analisados pela ANOVA (Oneway). Encontrou-se diferença significativa no Tempo de Reação Discriminação (TRD). No *post hoc* de *Tukey* verificou-se diferença na comparação entre os grupos GNSM-GNIM (p= 0,02). Concluiu-se que os atletas com alto nível metacognitivo foram mais rápidos na comparação entre grupos.
Palavras Chaves: Voleibol, Tempo de Reação e Metacognição