# **SCIENTIFIC PAPERS**

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# HYPOTHETICAL MODEL OF FACTORS DETERMINING PERFORMANCE AND SPORTS ACHIEVEMENT IN TEAM SPORTS

#### Abstract

The objective of this paper is formation of a comprehensive hypothetical dynamic interactional process model structured by assumed constructs, i.e. processes or mechanisms that obtain real features and influences on athlete's performance and athletic achievement. Thus there are formed and assumed reciprocal relations between high training and competition - based stress as the input variable,

cognitive appraisal and interpretation as the mediator, and mood state as the moderator based on the development of the dynamic systems theory. Also, proposed model uses basic assumptions of the Action-Theory approach and it is in accordance with the contemporary social-cognitive view of team functioning in sports.

Within the process model, the output variables are measures of efficacy evident through athlete's individual and team performance and athletic achievement.

The situation, the team and athlete attributes, the performance and the athletic achievement are joined variables, and the individual and the collective efficacy are the consequence of their reciprocal interaction.

Therefore, there are complex and reciprocal interactive processes in real sports and explorative situations amongst the attributes of athlete and team and the behaviour and situation that determine performance and athletic achievement.

This is probably the result of an integrated network of reciprocal multi-causal activity of a set of stated assumed constructs from different theories. Thus the hypothetical model is an effort to describe elaborate correlations and/or interdependencies between internal and external determinants which presumably affect athlete's performance and athletic achievement.

Key words: TRAINING AND COMPETITION STRESS / MODEL / RECIPROCAL INTERACTION / ATTRIBUTE / PERFORMANCE / ATHLETIC ACHIEVEMENT

### **INTRODUCTION**

Competitive sports situations are characteristically very stressful (Trninić, Kardum, & Mlačić, 2010). Stress can be defined as an internal representation of problem transaction between a person and the environment or as a relation between a person and the environment in which the person evaluates the situation as too demanding in comparison to their

resources or threatening for their wellbeing (Lazarus, & Folkman, 2004).

In the context of sport, without a doubt, the biggest stressor is defeat in a competition, but the opponent, audience behaviour, criterion of refeeres, perception of inadequate competition conditions

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and changes in the score during competition can be stressful as well (Horga, 1993; Barić, 2007).

Wooden and Jamison (1997) state that great competitors are motivated by hard situations and quality opponents because at that time they are more focused and function more effectively. They also say that in times of highest pressure players of such profile take on initiative and responsibility. Accordingly they indicate that the higher the competition pressure and the bigger the demands of the game, the more progress they will make. On the other hand, Wooden and Jamison (1997) point out that the situations of high competition pressure enable recognition of athletes and teams of competitive greatness.

Furthermore, high training and competition stress may be interpreted as a process where an athlete notices a disproportion between his ability to react and the situational demands. Reactions to the stressor in sport can be shown in a simplified manner as: tolerance or control. Inadequate stress coping can have negative consequences for psychological processes important for successful sports performing, for example attention focus and arousal level.

Further on, inefficient coping can affect sport performance inhibitory and increase muscle tension and negative emotions, while efficient coping generally has positive effects on performance in sports activities (Anshel, Williams, & Williams, 2000; Gan, & Anshel, 2006).

Athlete personality is a predictor and one of the factors that is one of the determinants of performance and sports achievement (Horga, 1993). However, it is necessary to point out that successful and unsuccessful players do not solely differ in abilities and traits, but also the level of technical-tactical knowledge, motor and psychological skills and habits (Silva, & Stevens, 2002).

The relationship between personalities, the environment and achievement is very complex. Toplevel players have similar profiles regardless the position in the game and are more homogeneous in their sport-specific characteristics than the lower quality players (Silva, & Stevens, 2002).

From the point of view of the science of kinesiology, the biggest problem during research on the relationship between competition stress, personality in a wider sense and performance and sports achievement is the lack of an appropriate paradigm. This means that very often in the context of scientific empirical research there is no universally accepted and scientifically based paradigm that would represent the starting point of the research.

The future of research on the factors that influence athlete's performance and sports achievement should be based on forming a holistic-interactional paradigm frame that would encompass the research of the dynamics of the relationship between hypothetical constructs. Barnes (1982) states that in most social sciences the paradigm is largely absent, which is also the case with kinesiology. So, for example, many scientists search for determining relations between personality traits, performance and sports achievement (Eysenck, Nias, & Cox, 1982; LeUnes, 2008, Galucci, 2008).

It is important to point out that the socialcognitive theory of personality (SCT) as the general psychological theory that differs from other theories in the ways of describing the interaction between personality, behaviour, and the environment or situation (Shaw, Gorely, & Corban, 2005) uses two theoretical principles to analyse the dynamics of the personality process. The first principle is called reciprocal determinism (Bandura, 1986) and it deals with the problem of cause and consequence in exploring the personality process. In the context of this principle, he argues that causality is a two-way street". Stated more formally, causality is reciprocal (Figure 1). Each of the three factors under consideration-behaviour, personality characteristics, and the environment - are causes of one another.

Personality is thus perceived as a cognitiveaffective processing system (CAPS), i.e. different cognitions and affects are interrelated in an organised and complex manner (Mischel, & Shoda, 1995). Furthermore, it is stated that the CAPS model consists of three essential features. First it is said that the cognitive and the emotional variables of personality are correlated in a complex way.

The second key feature of the CAPS model concerns the social environment. In this model, different aspects of social situations, or "situational features" activate subsets of the overall personality system. The third feature follows naturally from the second one. If different situational features activate different parts of the overall personality system, then people's behaviour should vary from one situation to another. This exact postulate is probably the most important feature of the model (Mischel, & Shoda, 1995), and it comes down to the aspect of personality it defines not being an average level of behaviour, but also behavioural *variations*.

Mischel (1999) states that personality encompasses a big set of highly correlated cognitive and emotional processes. This interconnection causes personality to function in an integrated, coherent manner, i.e. like a dynamic system (Cervone, & Pervin, 2008).



Figure 1. Schematic representation of Bandura's principle of reciprocal determinism. Personality (P), behaviour (B) and environment (E) are presented as a system of forces that mutually influence each other (Bandura, 1997)

Therefore, when regarding the tripartite system, we can analyse personality, its behaviour and sports performance from the mutual influence stand. Also, personality, sports performance and behaviour should be observed as a system of forces that mutually influence each other through time.

So, for example, if a certain athlete is successful, his performance and efficacy can chance his self-concept (Marsch, 2007). Here the self-concept and performance have a mutual influence, but also athlete's behaviour affects his personality and vice versa. From the SCT point of view, it is assumed that a particular athlete responds to situations in a particular sports activity, but also actively creates and affects them.

Therefore, athletes act based on their own dispositions and competencies on one hand and situation on the other. SCT suggests self-efficiency, expectance outcomes and dissatisfaction with self-evaluation as important mediators of behaviour and mood changes. Self-efficiency is considered to be the most powerful and most consistent predictor of behaviour in exercise (Shaw, Gorely, & Corban, 2005).

Cox (2012) cites that Smith (2006) referrs to this inconsistency between behaviour and personality as the personality paradox. That seeming contradiction can be perceived in the fact that although personality traits within an individual are considered to be stable and consistent, the individual's behavioural responses in varied situations are not consistent. Furhermore, Smith (2006) based on earlier work by Mischel and Shoda (1995), proposed the cognitive affective processing system (CAPS) as a way to explain personality paradox (Figure 2). According to CAPS, an individual's personality interacts with the environment (situation) to determine a behavioural response (performance). The actual response (shooting the free throws), however, is filtered through the five elements of the CAPS system. The resultant behavioural response will be the end result of the filtering. Because every situation is different, the behavioural responses will also be different and inconsistent from one occasion to the next. This is true despite the fact that the athlete's basic personality has not changed from one situation to the next. As illustrated in Figure 2, the five elements of the CAPS system are as follows:

- 1. Stimuli are *encoded* and are mentally represented in memory.
- 2. Predetermined *expectations* and *beliefs* confer meaning on events.
- 3. Affects and emotions influence behavior.
- 4. Personal goals and values influence behavior.
- 5. *Competencies* and *self-regulation skills* interact with the other four elements to determine behaviour.

The fifth element of the filter interacts with the other four elements to determine how the environmental situation interacts with personality to determine the behavioural response. Behavioral responses are inconsistent and vary from situation to situation because of the changing environmental situation and the influence of the elements of the filter (Cox, 2012).



Figure 2. The Cognitive-Affective Processing System (CAPS) applied to athlete behaviour (based on Mischel, & Shoda, 1995; Smith, 2006).

Smith's model (Figure 2) simply presents behaviour of an athlete and existing constructs along with their mutual interactions. According to the types of presented relations, directions of the processes and the lack of feedback it can be concluded that this model presents behavioral responses in discrete time moment.

Furthermore, Eccles and Tenenbeum (2007) state that the understanding of team functioning in sports can be helped if the topic is studied from a social-cognitive perspective. They also suggest that the team in sports can primarily be observed from the social point of view, and that the research of cognitive aspects of sports successes is above all possible to connect to the person.

Consequently, little attention has been given to interactions between person's cognition and the situational processes and team structure. Eccles and Tenenbeum (2007) point out that the acquisition of the social-cognitive aspect in studying team functioning would enable a better insight to a) the cognitive affects of social processes that are characteristic of teams and which are the focus of existing research on sports teams; b) the way in which social features and processes characteristic of teams affect team cognition, like the one that makes the grounds for decision making in a team, and c) the modalities of achieving team compatibility.

The social-cognitive approach to team functioning that was not previously considered in sports psychology enables a notable expansion of what is known today about sports teams (Eccles, & Tenenbeum, 2007).

Furthermore, in team sports there is a interdependence of situation and/or group occurrences, personality traits, environmental factors, and athlete's performance (individual and team) and sports achievement, that require formation of the dynamic interaction model (Trninić, Trninić, & Papić., 2009; Trninić et al, 2010).

On the other hand, in team sports there is a classification of athletes into several groups, where each has its own characteristics that condition successful task performing in a particular sports game (Trninić, 1995; Trninić, Karalejić, Jakovljević, Jelaska, 2010a, 2010b).

It is therefore necessary, from the aspect of the theoretical and practical reason in sports science, to establish a hypothetical process model that would represent reciprocal relations in hypothetical constructs (competition stress, cognitive assessments and interpretations, mood states, athlete and team characteristics, and the environment on performance and sports achievement) in team sports.

In the context of theoretical approaches in psychology and kinesiology, we can distinguish basic and sport-specific features. On the other hand, from the stand of sports psychologists and social-cognitive theoreticians, it is important to pay special attention to the cognitive assessment and interpretation, as a mediator that connects the high training and competition stress with the mood state as the moderator.

It is thus required to take into account the fact that the mediators change under the influence of big competition stress (independent variables) and modified affect the mood state as well as the output variables (measures of efficacy). It is also important to emphasise that, in the context of applied sports psychology, the scientists - practicioners and expert coaches see pressure as a stimulus for composure and top performance, and stress as a distracting factor that acts as a potential "noise" on athlete's situational efficacy and sports achievement (Pitino, & Reynolds, 2000; Trninić, 2006; Trninić et al, 2010).

They also indicate that pressure becomes negative only if a certain athlete perceives it as a threat, and not a challenge. That is why in elite sports it is encouraged to develop specific personality traits that provide with hardiness (control, commitment and challenge), optimism and attributive style, strategy for stress coping and readiness for contact, that enables athletes in interactive and contact sports to use their potential and successfully resolve situations of high competition pressure (Trninić et al, 2010).

Additionally, they state that people who have a high pain tolerance aspire to sports in which such a characteristic is needed, e.g. contact sports, wrestling, karate, rugby, etc. Also, they note that people who engage in extreme sports reach a higher level on the excitement scale. This is probably due to the fact that extroverts are relatively insensitive to emotional stress, also they are carefree and mostly optimistic, which minimizes the influence of stress.

Considering that successful sports performance under high training and competition stress is connected to cognitive assessment and mood state, which is linked to personality traits and motivation, it is important to explore the relationship between personality traits – motivational factors, and the personality traits – mood states, and the relationship between mood states and motivation. To be more explicit, state denotes changes in emotions and moods (like fatigue, depression and anxiety) which Cattell (1965) suggests can affect personality behaviour at a given moment. He thus states that appraisal of personality traits and of states predicts behaviour. It must be noted here that the term, "personality states" is something that is relatively short-term, and a trait is relatively enduring (Shaw, Gorely & Corban, 2005).

#### HYPOTHETICAL MODELS

The basic action situation in sports consists of the following components: person, task and environment (Nitsch, 1982, 1985, 2000, 2004; Nitsch & Hackfort, 1981; Newell, 1986; according to Schack & Hackfort, 2007). Schack and Hackfort (2007) suggest that sports activities have different systems within themselves.

They thus state that the aspects oriented towards systems are useful for sports psychologists who work this area when they need to analyse problems or structures they face. Accordingly, Schack and Hackfort (2007) presented potential structuring of relevant systems for some action (Figure 3). In Figure 3, action control is visible from the system-theory aspect, where athletes are seen as parts of social systems, and should be seen as a physical system also, especially when in dynamic action (Schack & Hackfort, 2007).



Figure 3. Action control from a system-theory perspective (Schack and Hackfort, 2007)

Furthermore, the physical and the social system are in interaction, as well as the cognitive and affective components within the psychical system. The external (social and physical) system and the internal (psychical) system are also mutually bi-directionally linked.

Also, Schack and Hackfort (2007) state that the systems that influence individual athlete performance are tightly connected to actional goals of that athlete (Figure 4). In Figure 4, the athlete is represented as a bio-psycho-social entity. Also, it is pointed out that physiological processes greatly depend on the conditions of psychological and social frames (Schack & Hackfort, 2007).

On the other hand, biological and social factors are important for the psychic system of an individual. Still, the psychic system can change through own activity, which gives the entire system a certain amount of freedom. One of the tasks of the sports psychologist in practical work is to use those levels of freedom in order to reach optimal performance. This could mean, e.g. it is important to teach the athlete how to deal with social demands during competition (spectators, mass media, etc.).

However, this also means that the psychological variables (fatigue, stress, etc.) from a determinist view, have no direct effect on athlete's performance, but are mediated by the psychic system. Thus it is important to note that the multifactorial theory of training, besides for the occurrence of supercompensation and fatigue, includes strategies and manners of coping of the athlete and/or the whole team with training and competition stress (Trninić, 2006).

This is especially important for modelling integral sports preparation that must be based on control of the rest period, regeneration and measures for recovery. This is so because the development training and stressful situations cause fatigue reactions, exhaustion, and they demand regeneration and quick recovery in the process of compensation and super compensation, as well as athlete's efficient coping with high emotional stress (e.g. defeat).



Figure 4. Interrelation of systems with respect to actions

Behaviour, athlete's performance and sports achievement in team sports, in the context of sports surroundings, changes from situation to situation, and primarily depends on player selection based on the level of development of their potential and overall actual quality, coach's leadership, as well as the quality level of the competition.

On the other hand, a functional perspective on action organization is based on relations between task, person and environment. This constellation task-person-environment is presented in figure 5 and it is fundamental for the understanding of the construction of actions (Schack & Hackfort). In applied disciplines, the action-theory approach has been formulated elaborately for sport psychology (Hackfort, 2001; Hackfort & Munzert, 2005; Hackfort, Munzert, & Seiler, 2000; Nitsch, 2004).



Figure 5. Dynamical model: Action situation as a person-environment task constellation (Schack & Hackfort, 2007)

According to the previous dynamic models, it is assumed that the athlete, high competition stress, personality traits, motivation factors, athlete and team attributes, and athlete's performance and sports achievement are interrelated. So, for example, empirical results find existence of a connection between personality traits and motives.

Winter, John, Stewart, Klohnen, & Duncan (1998) have given it a preeminent status of a universal trait extraversion-introversion, and state that it probably channels many different motives. Would other traits also act as moderator variables in this way? Agreeableness (Factor II in the FFM) ought to be an important moderator of social motives such as affiliation and power.

And high conscientiousness (Factor III) might channel TAT-measured achievement motivation into aspirations for conventional competence and efficiency, whereas low conscientiousness might channel it into cheating and illegal short-cuts. Power motivation, also, would be quite different depending on whether it is combined with high or low conscientiousness.

Finally, neuroticism (or its opposite, emotional stability) might make an enormous difference in how almost any motive is expressed. For example, in combination with high neuroticism, affiliation motivation should be associated with self-rated unhappiness, whereas in combination with low neuroticism it should be associated with happiness (over and above the independent contribution of neuroticism).

Furthermore, Ingledew and Markland (2008) are suggesting that motives influence behavioural regulation, and that motives are themselves influenced by personality traits.

To that end, they hypothesised a general motivational model (Figure 6). According to this model, motives influence behaviour by influencing behavioural regulation, and motives are themselves influenced by personality, though behavioural regulation may also be directly influenced by personality.



Figure 6. General motivational model of exercise participation (Ingledew & Markland, 2008)

Hatfield and Kerick (2007) predicts that soon, although we are talking about the mere beginnings, affective neurosciences will be applied more intensively on sports psychology, aiming to form superior sports performance.

In essence, this involves an assessment of brain activity during stress or while performing psychomotor tasks under pressure.

They thus indicate how a neurobiological model of stress-related brain dynamics is described and based largely on a marriage of concepts from LeDoux (1996), on the central role of the amygdale in fear-related processes, and the work of Davidson (1988, 2002, 2004) on the role of frontally mediated processes in the regulation of emotion (Pinel, 2002).

Limbic and paralimbic cortical fields are responsible for managing and sustaining homeostasis, and they balance internal states of the body with the realities of the outside world. Accordingly, the amygdale is bidirectionally connected to numerous areas in the cortex (Judaš, & Kostović, 1997) as shown in Figure 7.



Figure 7. Neurobiological model of the fear circuit, with central roles of the amygdale (Box 6) and medial and orbital frontal regions (Box 1) in the expression and management of anxiety (Hatfield, Kerick, 2007).

Figure 7 represents a schematic representation of processes and outcomes that are basic to reactivity stress, and it integrates affective and cognitive activity with psychomotor performance (Hatfield, Kerick, 2007). It is important to point out that the basal ganglia, like the cerebellum, modulate activity of the motor cortex and the descending motor pathways (Judaš, & Kostović, 1997).

Hatfield and Kerick (2007) say that a central tenet is lack of frontal executive control over subcortical processes would result in heightened emotional influence (limbic structures) that, in turn, disrupt higher cortical association processes and activation of the motor loop - the frontobasal ganglia structures that initiate and execute movement.

Neurobiological model of the fear circuit, with central roles of the amygdale (Box 6) and medial and orbital frontal regions is shown in Box 1 in the expression and management of anxiety.

The amygdales (left and right) are largely responsible for the orchestrated response to fear-eliciting stimuli; however, the action of these important brain regions is affected by the prefrontal cortex (dorso-lateral, medial and orbital frontal regions) as well as the anterior cingulated region (Box 7) such that the higher centres can exert inhibitory control for the purpose of emotional regulation.

Lack of control or hyperactivity of the amygdales may cause interference and noise in the motor loop (basal ganglia and thalamus), resulting in unintended alterations in motor behaviour (Hatfield & Kerick, 2007).

Hatfield and Kerick (2007) state that the relevancy of this model is in the accentuation of the fact that top-level performance level is marked by an economic brain activity which is at the core of mental processes. Based on this scientific cognition, they indicate how the coaches should structure the training environment in order to help achieving this state.

They thus indicate that coaches should focus on athlete's correct performance of skills and rewarding, rather than accentuating error reduction. This way coach's leadership behaviour style can be deeply connected to neural dynamics which is linked to efficient skill learning.

## PROPOSED HYPOTHETICAL MODEL

In accordance with above mentioned considerations, a hypothetic model was formed with a primary assignment to show correlations between the hypothetical constructs. The mechanisms enforcing athlete's performance and sports achievement are based on an integrated network of theoretical, biological, psychological, kinesiological and social hypothesis, and the combined elements of different approaches (Figure 8). The hypothetical model thus explains and describes internal and external determinants that affect performance and athletic achievement.

Many constructs were used with different correlations and complex relations. Therefore, within the model we can distinguish between internal variables or determinants of athlete's personality (cognitive appraisal and interpretation, motivation, mood state, personality traits), kinesiological constructs (motor and functional abilities, morphological characteristics), cognitive constructs that encompass experience, expert knowledge, skills and strategies, social-cognitive constructs (role(s), expectations and believes, set goals), and the external (exogenous) variables (level of competition, coach's demands, team cohesion and environment) that are in a reciprocal relation with behaviour, sports performance and sports achievement (reciprocal effects model).

Milas (2009) states that the internal variables are those whose change is conditioned by other variables in the model, and that they themselves may, but needn't influence other internal variables. On the other hand, he suggests that the external variables, according to the hypothesis, are the ones that change independent of the other variables in the model. In context of this paper, the input variable is the high training and competition stress that affects the structure and the function of athlete's organism, as well as his decisions and reactions.

How the high training and competition stress would affect a certain athlete is primarily conditioned by the cognitive appraisal and event interpretation (a set of perceptions and attitudes according to which the athlete evaluates events), athlete's personality traits (e.g. emotional stability) and former competition experiences, and his motivational variables as mediators that affect the regulation of perception and behaviour. This is because the reaction to stress depends on cognitive appraisal and event interpretation, and the mechanisms of adjustment that an individual uses to maintain or restore a state of physiological and psychological homeostasis.

Also, Milas (2009) says that the amount of stress can be influenced by a subjective appraisal of stress that depends on objective stressfulness and former experiences. Furthermore, he suggests that in this case the influence of the situational objective stressfulness is not direct, but mediated by subjective appraisal.



Figure 8. Proposition for a specific hypothetical dynamic process model that explains the interaction of high competition stress, cognitive appraisal and interpretation, mood state, personality traits and motivation, as well as other psycho-social variables and environment with sports performance and/or sports achievement

#### DISCUSSION

There are a number of controversial topics in psychology and kinesiology that encompass reciprocal, causal, complex, multilayered relations between input variables, mediators and/or moderators, and the output variables. Understanding the interactions between high competition stress, athlete and team attributes and the environment on one hand, and performance and sports achievement on the other, demands a creation of a clear model that represents reciprocal relations between hypothetical constructs. This initiates the question – why that really is so, and could it be a random coherence, or something completely different.

It is evident from the proposed model, that high training and competition stress, through the mediator *cognitive assessment and interpretation* affects the moderator *mood state*. Also, the mood state affects cognitive appraisal and interpretation. Lazarus and Folkman (2004) state that, depending on how the person perceives the situation, we can derive specific qualities of emotional reactions and/or mood states. They thus believe that appraisal is crucial for emotion, but it is not necessarily a conscious one.

In accordance with the above mentioned Beck (2003) points out that the cognitive processes are important for emotions. Therefore, an individual cognitively evaluates and interprets situations that have the supporting components. It is thus probable that the cognitive situation appraisals and the physiological arousal are intertwined, and that situational and arousal level assessment determine emotional reactions (Lazarus, & Folkman, 2004).

Furthermore, a cognitive interpretation of the same situation can make the person have a different emotional and motor reaction, as well as a specific mood state. Therefore, causality is bidirectional because emotions and cognitions naturally come in conjunction.

The motivation state and the level of particular personality traits expressiveness (e.g. neuroticism, extraversion, conscientiousness) can be an indirect determinant of athlete's actualisation of potential and overall actual quality in a particular sport (Trninić, Barančić, & Nazor., 2008; Trninić et al, 2010).

It is quite probable that efficient situation resolving demands a high score of specific personality traits, e.g. tactical discipline and responsibility, and cooperation. Trninić et al (2010) state that personality hardiness, optimism, attributive style, strategies and manners of coping with stress, and readiness for in game contact are specific traits that in interactive and contact sports enable efficient resolution of situations of high training and competition pressure. Also, Maddi and Hess (1992) refer about connection between personality hardiness and basketball performance.

It is assumed that the mentioned personality traits have a mediator role in the context of a high competition pressure, and they affect athlete's emotional reaction and mood state, and also athlete's performance that is determined by motor-functional abilities and morphological characteristics.

Also noticeable is the bidirectional coherence of motor-functional abilities with internal data processing. It is important to point out that morphological characteristics depict body build and influence motor-functional abilities, as well as athlete's performance and sports achievement. Morphological characteristics and motor-functional abilities are probably relatively stable human characteristics, and thus the fundamental precondition of successful performance and sports achievement.

Athlete's performance is thus directly linked to morphological characteristics motor-functional player abilities. Furthermore, state of development of motor-functional abilities influences mood state (Weinberg, & Gould, 1995).

Accordingly, it is important to accentuate that team sports demand optimal development of morphological characteristics and motor-functional abilities. The question that remains is how and how much certain morphological characteristics and motor-functional abilities affect individual and/or team performance and sports achievement.

The proposed model shows a reciprocal relation of internal data processing (process of coding, storing and retrieving information) and emotional and physiological state (level of arousal and activation state).

In elite sports we strive to create optimal arousal in athletes (cognitive and behavioural techniques), which is one of the preconditions for efficient simultaneous multitasking in a certain position in a sports game. Internal data processing is thus under the influence of skill of data processing (Berk, 2007), mood states, previous experiences, demands and expectations (from the coach, athlete, social and sports environment), their knowledge, skills and strategies (perceptive, cognitive and motor).

Experience implies applications of the processed data at a situational training and competition, which affects personality traits, expert knowledge, skills and strategies, and is finally evident in athlete's performance (Starkes, 1993). Older and competitionwise more experienced athletes, and cognitively more skilled players anticipate several moves ahead, predicting escape routes in different situations that require complex decision making (Starkes, 1993, 2003).

Experience is connected to the learning process and crucial in modelling personality traits, and it obviously affects cognitive appraisal and interpretation of events, and sports performance. Low level of experience knowledge can limit the development of overall athlete's potential.

The SCT view presumes that the construct of expectations that athletes have on what and how much they can do and can't do in a given situation (their self-efficacy perception) largely determines how an individual will act (Bandura, 1986), and those expectations are an important mediator in task performing in the game, behaviour changes and motivation.

Furthermore, athlete's expectations of own situational efficacy is essential in elite sports. Presumably, the higher the level of self-efficacy, the better the achievements. McPherson (1993) claims that motor and cognitive skills are tightly related and needed for modelling a skilled performance in a sport. Scientists who investigate the selection of player's decisions (cognitive skills) and reactions (motor skills) remind us that both variables contribute to the efficacy of simultaneous multitasking in the game (Trninić, 1995).

The investigation on processing complex information and reducing the processing period (e.g. solving problems under time stress in team sports games) are probably the foundation for examination of efficacy of multitasking in team sports games.

Athlete's sensory systems and the central nervous system probably function as a computer that processes environmental information through a sequence of parallel and serial processes. Athletes' simultaneous processors are thus extra important in very complex team sports (Horga, 1993). This is evident in simultaneous multitasking in the game, which requires realisation of individual and collective responsibilities at the same time (Trninić, 1995; Trninić et al, 2010a, 2010b).

Sports performance can affect the situation and the athlete through feedback and cognitive reassessment. Furthermore, it is assumed that sports environment affects athlete's performance and sports achievement and vice versa. Also, the hypothetical dynamic model shows that the level of competition affects roles, expectations and beliefs, as well as coach's demands and his set efficacy standards.

Furthermore, there exist continuous goal influences and coach's demands influences on motivation and cohesion. Thus, when speaking of sports goals we also mean desired future events that motivate a person during time and encourage the development of motivation and athlete's performance, which reflects on the sports achievement of a single person and/or the whole team. It is evident from the proposed specific hypothetical dynamic model, that setting goals influences motivation and performance (Horga, 1993).

Goal setting is an effective method for improving performance (Locke, & Lathen, 1990). It is also important to say that there exists an influence of performance improvement on goal setting (Rowley, Landers, Kyllo, & Etnier, 1995). In accordance, process theories of motivation applied to sports performance indicate that the decisions on how we will react in a certain situation are based on the perception of probability that a goal can be achieved, and the valence of that goal.

On the other hand, empirical research show that the cohesive teams have higher sports achievements than those less cohesive (Mullen, & Cooper, 1994; Tušak, 1997, 1999; Tušak, Misija, & Vičić, 2003).

Carron, Colman, Wheeler, & Stevens (2002) and Greenleaf, Gould, & Dieffenbach (2001) state that cohesion is the team's ability to stick together and remain united in the pursuit of its goals, which is an important predictor of team performance.

Mullen and Cooper (1994) determined that the relation between cohesion and performance was stronger when they assessed cohesion in respect to task performance in a group, than it was when investigating interpersonal attraction and group pride.

Furthermore, they established that the performance efficacy rate is probably connected to "team chemistry" and vice versa. They thus verified the hypothesis that cohesion is important in team sports that are classified as interactive sports, since performance efficacy depends on the interaction between team members. Therefore, the relationship between cohesion and performance is bidirectional and complex, as explained in the suggested model. Also, cohesion in performing tasks within team sports is a performance predictor, and performance is a cohesion predictor.

Additionally, Shaw, Gorely and Corban (2005) state that cohesion causes performance and that performance causes cohesion (reciprocal causality). Shaw, Gorely, and Corban (2005) suggest that the direction of causality is more powerful with performance directing to cohesion than cohesion directing to performance. Furthermore, Carron et al (2002) provided results of cohesion's influence on performance (0.57) and performance's on cohesion (0.69). In the proposed model cohesion is shown as the final mediator. Evidence suggests a stronger link between task cohesiveness and performance, than social cohesiveness and performance (Shaw, Gorely, & Corban, 2005).

Tušak (1997) states that cohesion positively influences the persistence of athletes and teams, and indicates that the most successful teams are those that are most homogeneous in perceiving team cohesion. Empirical results provided by Mullen and Cooper (1994) show that cohesion is connected with high level performance in all types of tasks and sports achievement (Bray, & Whaley, 2001; Grieve, Whelan, & Meyes, 2000). Furthermore, there is some scientific research that showed that cohesion is connected to mood as well (Terry, Carron, Pink, Lane, Jones, & Hall, 2000).

### CONCLUSION

The multiple approaches to research enable a contribution of different theories that do not exclude each other. It is assumed that the described hypothetical constructs can have different implications on expert coaches and scientist-practitioner, and their management of athlete's development. In the hypothetical model, we reached for constructs that are potentially important for the comprehension of athlete's functioning domain. The formed hypothetical model presents an ordered integrated set of attributes of athletes and teams and the environment, which are dynamically interrelated, and manifest to the performance and sports achievement. The hypothetical constructs (input variables, mediators and/or moderators and output variables) and their relations are thus explained.

So, for example, cognitive appraisal and interpretation as the mediator, and mood state as the moderator are described as constructs that intervene between competition stress, athlete's performance and sports achievement in team sports games. This makes up the basis for understanding mutual, dynamic and reciprocal processes that exist in a real sports context.

The goal of this scheme is to gain insight on the possibility, from the theoretical aspect, of using a certain number of hypothetical constructs when explaining the effects of functionally interdependent external and internal variables which determine athlete's performance and sports achievement. It is apparent that emotional reactions and mood state are determined by the interaction of a great number of variables.

Furthermore, cognitive appraisal and interpretation depends on variations of situational demands, guides athlete's behaviour and can be an intervening or a mediating variable. This mediator determines if and how much will the situation act as a stressor. Competition as a situation in which the players and/ or team try to defeat the opponent with a task performing strategy is a factor of sports activity representing the essence of professional sport.

Also, a tendency to assess coach's demands as challenging rather than threatening, and a sense that the athlete recognises, predicts and controls situation resolving, can be a relevant determinant, not only of emotional reactions and mood states, but in the end athlete's performance and sports achievement in a certain sports discipline.

Mood state, emotions and motivation are probably determined by athlete's structure of thought, and are caused by the evaluation of the situation, motor activity and physical changes and environmental variables. It is important to note that emotions are predominantly situation-conditioned, i.e. generated by what a certain situation means to the athlete, and they have a special interactive effect on the cognitive processes and behaviour. It is also important to point out that the mood state is not easily redirected into desired direction in situations of the so called "result psychosis", in a competition. Furthermore, motivation is a state or a process that changes, i.e. varies in intensity and type, depending on the individual and the situation, and is a regulator of directed behaviour, while the motives themselves are influenced by personality traits that can also directly influence behavioural regulation (Ingledew, & Markland, 2008).

Unlike the personality traits, motivation is inconsistent, and motivated behaviour is functionally dependent of emotion, while emotions almost on regular basis accompany motivation induced behaviour. Therefore, motivation as a process takes place inside an individual, and encourages, maintains, and directs behaviour towards a set goal (Bratko, 2001). One might say that the optimal state of mood and motivation is an interactive process that requires athletes to have the ability of selfregulation, the coaches to provide encouragement and quality support, and the environment to be optimal for athlete's life, training and competition.

From the aspect of cognitive psychology, athletes process information from a situation and then behave on the basis of their cognitive appraisal and interpretation. Information processing refers to a complex process of modification of acquired data and/or its linking to other data which enables selective decisions and selective motor reactions.

It is assumed that the hypothetical constructs, i.e. expert knowledge, skills, experience, coach's demands, precisely determined roles, expectations, values and beliefs that an individual and his surroundings acquire in a certain sport or branch of sport are important components of sports performance that probably influence sports achievement. Accordingly, if results come out to better than expected in a certain level of the competition, the level of expectation will probably grow in this competition field, and vice versa. The listed constructs are connected to the outcomes of athlete's behaviour as well as with the perceived or subjective value of these outcomes.

Considering that due to the complexity of human nature and behavior there is no consent on which of the given constructs are crucial for sports performance and sports achievement in team sports, and what their role is in the structure of athlete's personality, it is necessary to draw up experimental blueprints that would try to provide explanations for the wholeness and complexity of psychological and kinesiological phenomena.

That is why it is important to establish a concept of research according to which the overall potential and overall actual quality in a particular team sports game should be observed as a whole. Accordingly, it is necessary to apply the theory of dynamic systems when explaining the processes that are not directly observational, but have real features.

The proposed hypothetical dynamic model is an attempt to determine new concepts and relations in the fields of psychology and kinesiology that would include a greater number of theoretical constructs which affect performance and sports achievement. Thus the listed hypothetical constructs arise from quite versatile theoretical background.

Some constructs originate from personality traits theories, some from the socio-cognitive approach, some from the action theoretical approach, and some from the kinesiological field. Therefore, this specific hypothetical dynamic model attempts to identify and include different biological, psychological and social variables, which together with the kinesiological constructs (motor-functional and morphological athlete features) make a significant contribution to success in team sports.

Furthermore, neither sports psychology nor sports kinesiology ever developed a multi-causal model that could explain the interaction between competition stress, athlete and team attributes and the environment, and the sports achievement in team sports. The appointed dynamic model shows that different hypothetical constructs are mutually correlated and are considered important for a successful simultaneous performance of multiple tasks in the game in a particular team sport, which is probably the most important criterion, for expert coaches, that distinguishes elite athletes from all others. This is because the presented model explains the processes and possible changes over time, but also adequately describes and explains the current behavioral responses.

The hypothetical model is important for the optimisation of kinesiologist's and sports psychologist's work because it creates an assumption for managing the process of training directed at inducing the development of athletes' adaptation to high training and competition stress. The mentioned model specification in the scientific-research and applicative sense demands appraisal and determination of the appropriateness of the model, and accordingly an elaboration of presumed dynamic relations between the proposed variables, as well as model modifications.

Additionally, the dynamic model should enable deriving hypotheses on these relations and their empirical verification, and explaining the obtained results. Hypotheses verification presumes a necessary empirical verification of the theoretical model extract and an explicit operationalisation of proposed hypothetical constructs, as well as adequate instruments for their reliable and valid measurement. We consider that in the upcoming studies, the scientists in the fields of sports psychology and sports kinesiol-

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ogy should empirically verify presumed correlations of the mentioned hypothetical constructs, and interpret them according to the obtained parameters.

Since this model is very complex and it includes multiple relations (one-directional and twodirectional) between variables, it is necessary to decompose it into several smaller models and to make empirical evaluation of each sub-model separately. Defining of required procedures of empirical evaluation will be the object of future research. After implementation of that set of procedures, further modifications of proposed hypothetical dynamical process model are possible.

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