

Scientific review

## NEW METHODS IN SPORTS DIAGNOSTICS: THE COLOR ASSOCIATION METHOD

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**Abstract:** In classical psychological diagnostics in sport, athletes may potentially provide rationally corrected and socially desirable responses under the influence of various types of expectations and personal aspirations. In pre-competition situations, it is commonly not due to a conscious intention to manipulate responses, but rather to an inability to consciously perceive the actual mental state for competition. Considering that mental state before a competition can be one of the significant contributors to achievements, the possibility of precise diagnostics of a pre-competition mental state is greatly important. The color association method, derived from the Luscher Color Test, opens new prospects of psychological diagnostics in sport.

**Keywords:** *motivation, emotions, activation level, associations, colors*

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### INTRODUCTION

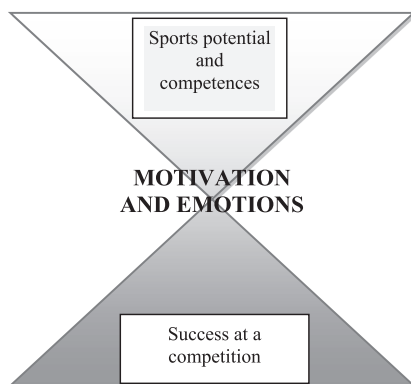
Every competitor has the same goal: to win and take the first place at a competition. Only one competitor or a team can occupy that position at the end of a competition. The desire to win and succeed is related not only to the subjective perception of reality, but it also initiates – to an extent – the physiological tension and excitation of organism. This represents a special dimension in the context of sport, called activation level (Lazarević, 2011). The role of emotions and motivation, i.e. activation level in an intermediation between sports potential and the demonstration of such potential at a competition can be depicted as the narrow neck of an hourglass (Mladenović, 2016). Sports spectators often make layman assumptions that athletes demonstrate their full potentials in every competitive situation, and

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that their current shape is the best possible one. Activation level enables or disables sports potentials and shape to convert into a result at a competition (Picture 1).

**Picture 1.** *The relation between sports potential and success at a competition*  
(Mladenović, 2016)



In order to create conditions that would enable all of their sports potentials and preparation levels to convert into a desired result at a competition, an athlete needs to be in an optimal state of activation of organism, which practically means that they need to be aware of their psychophysical condition, and be able to control it.

Classical sports psychology literature contains various theoretical concepts that seek to explain the ideal activation level in a sports situation and what the relation of motivation and emotions should be like for an athlete to be able to demonstrate their full capacity at the given moment. Those theoretical explanations start at a somewhat simplified view of drive theory, as well as the inverted U theory, the catastrophe model, the zones of optimal functioning, etc. Those and other theoretical standpoints take into account different factors which could help establish what activation level is optimal for a certain sport, a concrete sports situation, in line with the sports tasks throughout a competition and the individual characteristics of an athlete (Lazarević, 2011).

An equally important theoretical and practical question is how should an athlete establish and then also achieve their ideal activation level in a competitive situation. The psychological preparation methods and techniques offer various psychological tools for achieving and maintaining an optimal activation level. But for the psychological training of achievement, control and maintenance of an adequate activation level, an athlete must previously become aware of their pre-competition psychophysical condition (Mladenović, 2016).

The research and theoretical examination of Swiss psychologist Max Luscher (Lüscher, 1971), starting from the mid-20th century, indicate that there is a relation between color perception and psychological states, and they represented a starting point for the development of a sports psychology method called the color association method. This method could improve the understanding of the role of emotions and psychological states in the context of sport.

## **METHOD**

The connection between a person's psyche and colors goes all the way back to the prehistoric age. It is believed that prehistoric people were driven by the calming colors of dusk to go to sleep, while the bright colors of sun and dawn marked a new day and prepared the organism for the activation necessary to survive. That is how colors such as dark blue, dark green, orange and purple are connected to relaxation, lowering blood pressure and heart rate, while yellow and red are related to fight, activation, passion (Lüscher, 1971).

Colors have their special place in sport, too. Whether it is an individual or team sport, the color of a jersey has a seemingly simple purpose to make a difference between "us" and "them", because sport is essentially a fight between different individuals or groups that strive to achieve the same goal. Those "war" sports colors very often come from a specter of natural colors, used by Luscher and Simonek for their tests (Mladenović, 2015).

Neuroscience research indicate the relation between conscience and unconscious content is a complex one (Damasio, 2010; Damasio & Carvalho, 2013). One of Damasio's theses points out that the "jurisdiction" of conscience is often overestimated. It is very often the case that when a person, wants to break a bad habit, for instance, lose weight or quit smoking, an internal factor sabotages the whole process, without the person being gable to foresee this "sabotage", even though on the conscious level they are fully determined to succeed.

A similar thing happens in sport. In the context of a sports competition, it may happen that an athlete subjected to standard paper-pen tests or the one who makes a statement before the competition that they have achieved an ideal activation level of their organism, does not maintain the necessary level of self-control of their own psychophysical functioning during the competition. Just as Damasio suggests, it seems that something sabotages the athlete from within, from the domain of psychological functioning, and it is something unavailable to the person's conscience.

Even though the standard part of instruction in psychological tests is that an athlete should respond honestly and provide the first answer that comes

to their mind, it may occur that the first association is rationally corrected under the influence of past experience or the expectation of a certain outcome, like being selected to the first team. The associations between words and colors may contribute to a better understanding of an athlete's inner mental state in the context of a stressful situation at a competition. In an attempt to demonstrate the capacity to win to themselves and others, an athlete may deny and suppress their real psychological state, which then turns into an array of bodily and cognitive symptoms, which obstruct an optimal activation level. But it is not easy to rationally correct offered responses such as red, green or black when asked about an association to the word "victory". Those associations could reveal an athlete's authentic and uncensored psychological state (Mladenović, 2016).

At the end of the 19th and the beginning of the 20th century, James (1890) and Wundt (1902) studied associations in psychology, describing and explaining the principles and laws of associations in human brain.

Max Luscher (Lüscher, 1971) is considered a pioneer in studying the connection between colors and psychological states. He presented his original Luscher Color Test (LCT) at the First World Congress of Psychology in Paris in 1947. The test relies on Luscher's concept of psychological functions, according to which colors are defined as the vibrations of waves of different frequencies, registered by sense organs. Luscher found the sensory perception of colors to be independent from volition, universal and in common to all people, which is why it is objectively measurable. Every color has a name, but it is not possible to completely verbalize the impression caused by a color. Different shades of colors trigger different impressions. An impression caused by a shade of a color is a subjective experience. Color preference at a certain moment reflects the person's current mental state.

Luscher's original test comprises eight colors (Lüscher, 1971). Testing is conducted by lining up color cards in front of an examinee, who is instructed to pick a color they like best among the offered colors. However, it is important to underline that it is not an esthetic preference that could be related to the color of a garment or a car, for example, but rather the selection of one of the colors put before the examinee. Once they pick one card, they need to choose another color they like better than the rest of them, etc. until they reach the final card. After the first selection of the cards based on the offered color preference, the procedure is redone. Luscher says this is how an examinee's mental state, uncensored by a rational selection of the response, can be analyzed based on their color preference at the moment of testing (Lüscher, 1971).

The original version of the Luscher test involves four primary and four secondary colors. The primary colors are red, yellow, blue and green, and the secondary ones are purple, brown, grey and black. If a person is emotionally

balanced and has no intrapsychic conflicts, primary colors must be in the first five picks. Preferring achromatic colors (grey, black, purple, brown) indicates a negative attitude toward life. If one of those colors is among the first three picks that would indicate a form of compensatory behavior. However, looking at the shades of the colors Luscher included in his test, one can note that there are no bright and clear shades even among primary colors. Rather, all the colors included in the test are slightly dimmed. Apart from yellow - the only clear and bright color - all the other ones seem “smudged”.

Luscher believed the shade of blue (dark blue) he picked for the test corresponds to inner mental calmness and balance. When a body is exposed to this shade, it slows down biological functions and regenerates, as it naturally does when night replaces day. Picking blue may also indicate increased sensitivity and vulnerability. Luscher's shade of green contains some blue, indicating the existence of the state of “elastic tension” (Mladenović, 2016). This reveals a powerful volition, stamina in action, perseverance, but also resistance to change, the defense of one's standpoint and self-esteem. Red contains some yellow, so it can be said that it reminds of orange. Luscher underlines that red reflects vitality and energy in every sense of the word, but also the aspiration to succeed, achieve a goal. Red means passion for activity, fight, competition, plenitude of experiences in all spheres of life. Yellow is the lightest and the brightest color in the test. Luscher attributes vitality to it, just like to red, but with moderation that is unknown to the preference of red. Unlike green, which is related to constriction, yellow means dilatation and relaxation. Yellow is also connected to the expectation of future and hope. Purple is a mix of red and blue, so it has a bit of both. It contains the tendency to fight and conquer, but also to achieve deep inner peace. It is connected to sensitivity and the intuitive understanding of reality, imagination, etc. The preference of purple is related to emotional immaturity, and Luscher refers to the results of a research according to which adolescents are more likely to pick purple than adults. Luscher believed an emotionally stable adult would always pick one of the primary colors over purple. However, there is information about potential cultural differences. There are cultures (such as Iran, Africa, Brazilian Indians) in which purple has an advantage. The shade of brown contained in the test involves some red and yellow. The impulsiveness and vitality of red are dampened in this case. The vitality of brown is passive, receptive and sensory. Luscher relates brown to the sensory sensitivity of body. When brown is preferred, that speaks of increased bodily sensitivity and potential illness. In the mental aspect, brown is preferred by the persons who are physically dislocated from their home, due to natural disasters, wars, etc. Black is essentially the negation of color. It denotes nothingness, nonexistence. To prefer black implies extreme forms of compensatory

behavior and stubborn protest against the existing order of things. Unlike black, which is the negation of color, grey means the absence of color. Grey is neither light nor dark. As a preference in the test, grey points to the abstinence of all psychological tendencies, non-involvement, reservation, refrain from any activity, standing aloof (Lüscher, 1971).

In addition to this traditional one, there are other versions of the Luscher color test. Max Luscher spent a lot of time developing the test and implementing it in the selection of human resources.

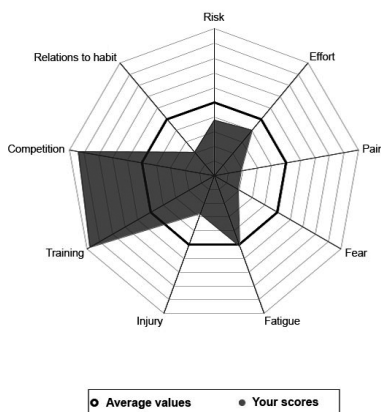
## DISCUSSION AND CONCLUSION

Working with the Luscher test, three decades ago Czech psychologist Jiri Simonek came up with an idea to combine colors with words. Uncensored automatic associations caused by the observed color are possible to channel by association a word to a color (Mladenović, 2015). Throughout two decades of research, the test was perfected from a paper-pen version to a computer software. The Luscher cards have been replaced by spherical shapes, and the colors gained much clarity. The Simonek color association test follows Luscher's requirement that the colors in the test need to correspond to natural colors, only now the colors correspond to the rainbow specter, instead of dusk and dawn, like in Luscher's test.

The Color Association method comprises eight spherical colors that shape a circle. At the beginning of the test, an examinee needs to pick all of the colors in the order of their current preference (Mladenović & Trunić, 2015). Apart from the eight colors that shape a circle, every next sensory input contains one word in the middle of the circle. Examinees should pick three colors that stand out from the other colors in their mind as an association to the given word. At the end of the test, an examinee makes the final selection of the colors, and just like at the beginning of the test, picks the colors in the order of their current preference. Thanks to computer technology, the color-word sensory input can be adapted to the demands of research of practical problems. During the three decades of implementation, Simonek and his associates composed a major database, which represents the basis of the standardization and interpretation of individual results.

The parameters evaluated by the test (Picture 2) are related to the psychological resilience of an athlete in a competitive situation (training, match), the capacity to rely on automatism in sports functioning (habit relations), the anxious tendencies in a competitive situation related to the subjective perception of the competition (fear, tiredness) and bodily limitations (pain, injury), as well as the volition to overcome difficulties at a competition (risk, effort). The values for each of the given parameters range from 0 to 100 (Mladenović, 2015).

**Picture 2.** *The Color Association method: an example of the profile of an athlete's mental state at a competition*



**Risk** – to which extent I am willing to take a risk. **Effort** - to which extent I am mentally adjusted to make the effort. **Pain** - to which extent I am mentally adjusted to tolerate pain. **Fear** - to which extent I am mentally adjusted to tolerate fear. **Tiredness** - to which extent I am mentally adjusted to cope with tiredness. **Injury** - to which extent I am mentally adjusted to perceive a possibility of an injury. **Training** - to which extent I am mentally prepared to tolerate training. **Match** - to which extent I am mentally adjusted to master a match. **Habit relations** - to which extent I am mentally able to use habit relations, i.e. repeatedly and without thinking (automatically) perform some activities.

The test provides another two measures. One is operationalized as a relation between volition and the limitation of bodily reality in a competitive situation. The results are presented as a continuum from 0 to 100, at one of whose ends is a full domination of the body and physical limitations in a competitive situation, while the other end of the continuum refers to complete predominance of volition and the potential to overcome bodily limitations by means of mental effort. The other measure is operationalized as the totality of mental energy at a given moment, which conditions the possibility of activation and engagement. It is, actually, a motivational-volitional moment in a competitive situation. The results are also shown as a value on the continuum from 0 to 100 (Mladenović, 2015).

In Serbia, the research and empirical verifications of the color association method are currently conducted on athletes from different sports and different competition levels. Previous research showed there is a connection between the results gained by means of the color association method and those acquired by other psychological instruments, but also that there is a potential new and independent part of the mental state variance in

a competitive situation, which can be explained by this method (Mladenović, 2015; Mladenović & Trunić, 2015; Mladenović, 2016).

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