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IMPROVING ATTENTIONAL PROCESSES IN SPORT: DEFINING ATTENTION, ATTENTIONAL SKILLS AND ATTENTION TYPES

Key words: attentional processes, definition, skills and types.

ABSTRACT

Improvement of attentional processes in sport requires an integration of science and arts, i.e. the growing body of knowledge about attention and various ideas used in practice to perfect attentional skills of athletes. The present paper aims to provide guidelines for improving attentional processes based on the analysis of the concepts of attention, attentional skills and various attention types. Questions for further consideration are also raised.

DEFINITION OF ATTENTION

According to Czajkowski [3] attention is “focusing of awareness (cognitive processes) either intentionally or unintentionally, on a certain object, action, activity, situation, incident or phenomenon, which determines the quality and effectiveness of perception, decision- making and performance”. This definition of attention includes four distinct statements:

1. The very basis or essence of attention is focusing of awareness (or cognitive processes).
2. Attention either arises from one's will (intentional attention), or can be caused by external stimuli (unintentional attention).
3. Attention is always directed to something (subject of attention): an idea, object, action, activity, situation, incident or phenomenon.
4. Attention has a direct influence on how well we perceive, whether we make correct decisions and how well we perform.

In our opinion, the definition of the concept of attention as “focusing of cognitive processes” is too narrow, and it does carry a clear implication for coaches. According to Railo [8], the key to improve attention is “learning to choose the most important information” and at the same time “tune out all other (irrelevant) areas, stimuli or actions” [8]. This approach to attention improvement may suggest an overemphasis to find an interest, stick to a single object or action and narrow the scope of attention to a small area or even a single point. No doubt, these all are important aspects of attention in sport, for example, a modern Olympic archer should be able to direct his visual attention to the very heart of the target that he is aiming at. On the other hand, his ancestor – a Bowman hunting in a wild forest – also needed rapt attention, although a bit different. He had to activate more senses and capture many different kinds of stimuli coming from all different directions, in order to spot the game he was seeking without being detected himself, and at the same

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time, to avoid all potential dangers such as trapping pits, poisonous plants, wild animals, etc.

We prefer to view attention as an increase in mental effort and consider the expressions “increasing awareness” or “intensifying cognitive processes” as equally important in defining the essence of attention as the idea of “focusing awareness”. These expressions can be found in the following definitions of attention: “more vivid awareness of relevant stimuli” [3], “a state of increased awareness, increased sensitivity of the CNS towards certain stimuli”, [4] and “an intense cognitive activity” [8].

This understanding of the concept of attention suggests different stages of attentional activity – one can be more or less aware of the existing stimuli and show more or less intense cognitive activity. It makes us also formulate the following questions, which clearly have some practical significance:

- How to increase the intensity of athletes’ cognitive activity: perception, thinking, imagination, memory?
- How to make athletes even more aware of the relevant stimuli, make them see, feel, hear, think, imagine, remember more precisely, vividly, in a more detailed manner?
- How to increase the alertness of athletes to stimuli relevant to success in their preferred sport?

Statement 2: “Attention could be either intentional or unintentional” and statement 3: “Attention is always directed to something” bring about the following problems:

- What ideas, objects, actions, etc. should be attended to in order to succeed in different sports?
- What ideas, objects, actions, etc. should be ignored or blocked, because they are irrelevant or detrimental to successful performance, and could unintentionally distract the athlete’s attention?

These two statements indicate a hypothesis that the direction and the intensity of the athlete’s attention result both from the characteristics of a (sport) situation and the athlete’s mental effort. Consequently, a coach can influence an athlete’s attention either by changing the situation or by persuading the athlete to change his/her mental effort.

Statement 4: “Attention influences (improves) the quality of perception, decision making and

actions” indicates two hypotheses of practical importance. Firstly, it can be assumed that the quality of attention can be assessed (to some extent) by the level of perception, decision making or actions. Secondly, requiring high(er) quality of perception, correct decision making and successful performance can improve attentional processes. Hence, it would be beneficial for coaches to find out:

- What senses are predominantly challenged in different sports? What are the factors that make perception a challenge in a particular sport?
- What kind of decisions do athletes make?
- What actions are athletes supposed to take and what are the indicators of their success?

ATTENTIONAL SKILLS

In order to make the construct of attention even more useful for practitioners, we should differentiate between the following attentional abilities (skills): intensity management, direction control, selectivity, attention capacity (scope), attention flexibility (shifting of attention) and attention span [3, 7].

Intensity management is, in our opinion, the most important attentional ability. Regardless of the sport or life situation, a person can do something with a relatively low level of attentional intensity, but can also be fully absorbed in one’s activity, which means a very high level of attention intensity [3]. Weinberg & Gould [9] report that athletes asked about their peak performances describe themselves as “being in a state of extraordinary awareness of their own bodies and the external environment”. However, it is equally important to be able to relax and reduce the intensity of concentration during certain parts of competition (e.g. between shots in golf, bowling or during numerous breaks in racket sports competitions), as concentrating for extended periods of time is immensely energy consuming [9]. It can be thus stated that thanks to intense concentration, cognitive processes (like perceiving, thinking, etc.) become more clear and vivid, and that low intensity attention allows saving and regaining energy. Changes in the intensity of attention can be registered by EEG devices [3], which unfortunately, have not been available for daily coaching practice so far.

According to Czajkowski [3], factors impairing the ability to increase the intensity of attention include tiredness, boredom and an inadequate (too high or too low) level of activation. Inversely, higher intensity of attention is easier to achieve, when the athlete is rested, optimally activated and the activity or object is interesting to him (her). Consequently, it can be assumed that achieving the very same (given) level of performance, while having to overcome tiredness, boredom or inadequate (too high or too low) level of activation, would be a greater challenge to the athlete's attention (and at the same time an interesting way to improve it) than in optimal conditions. There has been already some anecdotal evidence backing up this assumption. Weinberg & Gould [9] quote the tennis legend Rod Laver, who said that: "What I used to do was force myself to concentrate more as soon as I'd find myself getting tired, because that's usually when your concentration starts to fail you. If I'd find myself getting tired in practice, I would force myself to work much harder for an extra ten or fifteen minutes, and always felt as though I got more out of those extra minutes than I did of the entire practice".

Other daily observations and experiences suggest that intensity of attention is positively correlated with the:

- *novelty* of a stimulus, situation, action, activity, object, environment, e.g. driving a car in a new town makes the driver watch the road and traffic signs more carefully (with greater intensity) than when driving in a familiar environment;
- *precision requirements*, which are greater when walking on a line than on a balance beam; they are also greater when trying to kick a table tennis ball than a soccer ball; shooting arrows with a bow into the very center of the target requires more precision than just hitting the target in general; hitting a pitched ball with a baseball bat requires more precision than hitting it with a tennis racket;
- *stakes* (rewards and prizes strived for as well as properties risked) – consequences of a successful or poor performance are different when executing a penalty kick during a training session than during a Champions League final (money, prestige, image, self-esteem at stake); they would also be different when walking on

a balance beam in a training facility or above a precipice (life at stake).

Another important attentional ability is managing the direction of attention. As Morris and Summers [6] put it: "It is important to focus on the right thing(s) at the right time". It means that the direction of attention should be considered both in the spatial and temporal dimensions. Nideffer [6] stresses the spatial aspect, when he claims that athletes can direct their attention either to external objects (e.g. a target, goal, basket, ball, opponent, teammate, etc.), or internal phenomena (e.g. thoughts, images, emotions, kinesthetic sensations, etc.). Apart from the spatial aspect, the temporal dimension should be also useful – attention can be directed to past events, current events or future events. In our understanding, attention tends to wander both in space and in time, and can be characterized as vigorous, spontaneous, unpredictable or even chaotic.

Skillful management of the direction of attention is also related to the capability of maintaining a behavioral or cognitive set facing distracting or competing stimuli. It incorporates the notion of "freedom from distractibility". The common distracters in sport include airplanes flying overhead, trains rattling nearby, opponent's provocative behaviors, crowd noise, flash lights, TV cameras, personal or family problems, feelings of tiredness, etc. [9]. This ability to block or tune out the unimportant stimuli is called selective attention [3].

Attention scope (capacity) refers to the amount of information that can be received and processed at a given time [4]. More specifically, in sports, this ability determines the:

- *number of external objects* that can be managed successfully at the same time, e.g. soccer referees need to control the actions of well over ten players, a rowing coach observes the moves of 1-8 rowers, and a tennis coach usually needs to watch carefully 1-4 players;
- *number of features of an external object* that can be controlled successfully, e.g. a tennis coach must sometimes try to see many different features of a player's technique, body language, mimics, gestures, signs of tiredness, etc.;
- *number of internal phenomena that can be managed* successfully – e.g. thoughts, internal body signals, feelings or available courses of action (the more options need to be analyzed,

the more time consuming the decision making process becomes);

- *number of actions* that can be executed successfully at the same time, e.g. making separate movements of the head, arms, trunk and legs or combining running with dribbling the ball, watching the opponents and finding a basket or a teammate;
- *area of the space* that can be controlled successfully, e.g. playing chess in a garden with a big chess set requires to control the same number of chess pieces but distributed on a much bigger area (64 m², for example), than when playing chess on a magnetic board that may be as small as 64 cm²; because of the field dimensions a soccer player will need a bigger scope of attention than a handball player, and a tennis player must control a larger area of action than a badminton, squash or table tennis players.

Shifting attention (flexibility) is another important ability, which enables athletes to quickly move the focus of attention [5] from one object or area to another (from one opponent to another, from an opponent to a teammate, from a goal to the ball, from one square on the chessboard to another, from internal to external objects, etc.) as well as from one task, action or activity to another (e.g. receiving and sending a ball, defending and attacking, moving from tactical system A to tactical system B, etc.). Shifting of attention, also called mental flexibility, depends upon the mobility of the nervous processes [3].

An important attentional skill is the ability to maintain attentional focus for a longer period of time [9], which is called the length of the attention span (also sustained attention or attention durability). According to Olszewska, it is the ability to produce consistent results on a task requiring many repetitions or over a longer period of time [7]. There are many different indicators that can be used in daily coaching practice to evaluate the athlete's performance and, indirectly, attention span:

- duration of error-free activity (e.g. 1000 minutes of a team/goalkeeper without losing a goal);
- number of consecutive successful performances (e.g. 20 consecutive basketball free throws);
- number of successful performances at a given time (e.g. number of successful passes, shots on

goal, goals, assists made by a hockey player during a game or a whole season);

- percentage of successful performances (e.g. the number of three-point field goals in a basketball game divided by the number of attempted shots).

The above analysis shows that, for coaching purposes, we are able to differentiate between various types of attention.

ATTENTION TYPES

The classification of attention types should be based on the following criteria: intensity, direction, predominant cognitive processes involved, predominant sense used, scope (capacity), shifting demands and duration demands.

Depending on the intensity level, attention can be of low, medium or high intensity. If we take into consideration the direction of attention then we should speak about internal and external attention as well as three other types: attention directed to the current events (feeling, watching, listening), attention directed to the past events (recalling) and attention directed to the future events (anticipating, planning).

On the basis of the challenged predominant cognitive processes we differentiate between sensual attention, i.e. requiring various kinds of perception without pronounced mental activity or visible motor actions (a tennis fan simply watching a tennis match); mental attention, i.e. requiring thinking processes, but not necessarily involving senses and visible actions (a coach recalling and analyzing competition and planning future actions); executive attention, i.e. choosing and controlling the implementation of verbal or non-verbal actions. It is obvious, that most sport activities will require all three kinds of cognitive processes at the same time.

If the activity involves perception, then based on the challenged predominant sense we can differentiate between visual attention (the most common and useful sort of attention both in sports and other areas of human activity), auditory attention (extremely needed in goalball, which is a team sport designed for blind athletes), taste attention (especially used by wine or food specialists), aroma attention (indispensable for fragrance or perfumes specialists), tactile attention (very helpful for reading Braille – a system of

raised dots that can be read by touch), vestibular attention (extremely useful for gymnasts exercising on a beam), and kinesthetic attention (widely used in all kinds of physical activities). Then, in terms of the scope of attention we can differentiate between narrow attention (single object, detail, action or a small area) and broad attention (multiple objects, details, actions or a big area).

In terms of shifting (flexibility) demands, we can think of activities that require more shifts (e.g. when controlling the activities of many students in a class), fewer shifts of attention (only one pupil in a class), or even no shifts of attention (staring at a small object, sticking to a single thought for as long as possible). One should also acknowledge that there are slower shifts of attention (golf, archery) and faster shifts of attention (badminton, squash). We should also point out many different sorts of shifting, e.g. intensity changing, direction changing or altering the scope of attention.

We would also like to suggest the following classifications based on the activity duration demands: continuous attention (needed during all kinds of sports races), interval attention (throwing and jumping athletic events, racket games, volleyball, golf) as well as short-term attention (100 meters athletic race) and long-term attention (marathon run).

SUMMARY

After discussing the general aspects of attention, i.e. the concept of attention, attentional skills and types of attention, in the next paper we will attempt to identify sport specific particularities and requirements important for improving attentional processes. Throughout the forthcoming analysis the questions formulated below will be taken into account:

- How to increase the intensity of athletes' cognitive activity (perception, thinking, imagination, memory)? How to make athletes even more aware of the relevant stimuli, make them see, feel, hear, think, imagine, remember more precisely, vividly, in a more detailed manner? How to increase the alertness of athletes to stimuli relevant to success in their preferred sport discipline?
- What ideas, objects, actions, etc. should be attended to in order to succeed in different sports?

- What ideas, objects, actions, etc. should be ignored or blocked, because they are irrelevant or detrimental to successful performance, but often unintentionally draw the athlete's attention?
- What senses are predominantly challenged in different sports? What are the factors that make perception a challenge in particular sports?
- What kind of decisions do athletes make in different sports?
- What actions are athletes supposed to take and what are the indicators of their success?

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