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## Perceptual models in volleyball players training

George Dina, Liliana Dina, Gabriel Popescu

*National University of Physical Education and Sports, 140 Constantin Noica, Bucharest, 060057, Romania*

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### Abstract

Volleyball game is played in an unstable setting, characterized by a great variability of the coordinates that, associated to the important number of informational clues, to the specific way of playing the ball and to the ball high flight speed, determine a series of perception difficulties and a very short time to analyze all the information. Thus, the identification of the significant indices characterizing a situation is essentially based on the perception selectiveness.

This study aims at organizing the information specific to a game action within a perceptual model including data about the situational framework in which it takes place. To perceive only what is important in a game situation is an extremely complex process, which can be improved through a perceptual and motor-perceptual learning program. By means of this program, the athlete learns what to perceive, relying on the information organization under the form of perceptual models. The research consisted of a pedagogic experiment that aimed at modeling the preparation of some actions, by using the perceptual models. They show an improvement of the game efficiency in the indicators that will be detailed in our full paper. The study proves that the learning program focused on the perceptual models leads to an improvement both of the perception and of the game. This program can also be extended to the utilization of perceptual models for the preparation of the other game actions.

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### 1. Introduction

Motor performance translated by the execution of certain actions in an efficient manner, is the result of gathering and analysing information from the specific environment and the mode in which we adapt to it. The game of volleyball is played in an unstable environment characterised by a great variability of coordinates which generate numerous perception problems. These problems are amplified by the tremendous number of informational indexes included in a game situation, Carriere and Brenton have identified, in a critique, a combination of over 135 informational indexes, considered practically impossible to analyse. In this context, the perception imposed is that of the essential indexes, by which the game situation may be quickly and correctly analysed. Perceiving only the essential aspects is an extremely complex process that can be improved with a perceptual and perception-motor learning programme which leads to selectivity in perception.

## 2. Organisation of the research

### 2.1 Scope

The study's goal is the organisation of information specific to each game action in perception models and their integration in a perception and perception-motor learning programme. By specialising certain perception components and by perception selectivity, game efficiency will rise. Organising information in the form of perception models, the athlete learns to quickly perceive only important aspects and thus, is capable of anticipating the possible outcomes of a game action and better adapt to game conditions.

### 2.2 Subjects

The study was conducted during a year in which time the evolution in training and competition of a girls' volleyball team, between the ages of 14 – 15 years, was observed, registered and analysed. At this age, skills are learned at an optimum level, which ensure a fluent game with continuous game actions that permit repeated contact with specific indexes. On the other hand, actions are not yet automated and can be intervened upon with specific training methods. The game skill, which is the object of the study, is the receiving of the serve and extremely important in game economy.

### 2.3 Methods

The methods applied in this study were observation and psychological/pedagogical experiments that aimed the shaping of the training for serve reception on the basis of perception models and had 5 important stages:

1. Determining the perception models for each game action.
2. Theoretical training based on observations and analysis of suggestive images from the game and video montages to stimulate the formation of operational thinking and anticipative capacity.
3. Initial testing of important indexes and game actions efficiency.
4. Organising a training programme based on specific methods. Modifications have been made at this level, so that they mainly impact specific perception components, as well as, mental processes that influence perception (attention, anticipation mechanisms, memory, cognitive processes).
5. Final testing using the same trials, in order to determine the dynamics of the result.

The perception model must contain significant informational indexes that belong to the stimuli with which the player comes into contact and which influence his behaviour and the efficiency of his actions. The main sources that generate information in the game of volleyball are: the ball, the athlete, his teammates and his adversaries. Thus, we can deduce that the perceptual model must contain information regarding:

- **General indices** regarding constant and variable elements from the game zone are at the base of establishing the general frame of the situation in which the action is integrated.
- **Action indices** (before, during and after player interference), associated with the coordinates of the situation will make determining the action's space, time and movement coordinates possible.
- **Special indices** are found in all three moments of the action, contain subtle information regarding the intentions or possibilities of taking action, determined by the coordinates of the situation and are essential because of the fact they enable accurate prediction of the action's outcome and efficient adaptation of one's own behaviour.
- **Triggering signals** represent **relevant stimuli** regarding the certainty of the direction in which the situation is evolving and which give the "go" signal for the decision making of triggering the best response.

The training programme aimed to integrate perception models for optimising the perception components involved in the execution of the action, and through this, improves efficiency in close correlation with the other aspects of training (tactical, technical, physical, theoretical), that complete it. This programme has integrated exercises for:

- **Developing proprioceptive perception (kinaesthetic sense):** the goal is to develop kinaesthesia expressed through “*the sense of perceiving one's own body*” and through “*the control of moving segments*”, as a basis to forming specialised perception.
- **Influencing specialised perception through coordinates specific to playing the ball with two hands from a low point:** utilised mainly when receiving the ball. The goal is to develop components such as: sensing the ball at the contact surface and sensing the body's orientation and the contact with the ball as opposed to the place in which the ball is transmitted.
- **Influencing specialised perception on the coordinates characteristic to the receiving of the serve with the purpose of developing components such as:** sensing the ball's trajectory on its way to the receiving zone, sensing how to move one's body in the game zone to properly play the ball, sensing how to place one self and the dynamics of the playing field and sensing the ball - this means knowing the optimum coordinates for passing the ball to the setter.

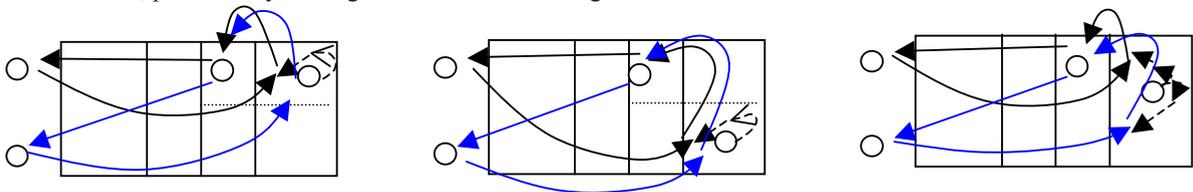
Test description:

The study has included 5 tests of important factors involved in the conduct of the action. These factors are: the volume and mobility of attention, memory, visual and auditory specific perception. Aside from these, specific tests have been developed to evaluate specialised perception components of a person's own movements in the direction of the zone where the serve shall be received and also specialised perception components that condition the receiving of the serve. The level of these perceptions is expressed through the efficiency of the actions which they condition. In the initial phase of the evaluation, the analysis of these perceptions will be made based on specific coordinates such as: placement (which include: sensing the ball movement, sensing the movement and body movement, sensing placement and the playing field) and constantly orienting the receive to the setter area (here we encounter the ball sense). These coordinates represent the basis of making an action more efficient. Based on these coordinates associated with the serve area and the serve receive area, we have elaborated a test made out of 3 parts. Testing factors associated with all the possible coordinates for taking action during the game have been observed.

**Test 1:** Receiving the serve, alternately from areas 1 and 5, from the right half of area 1, while facing away from the net, preceded by turning around at the audio signal.

**Test 2:** Receiving the serve, alternately from areas 1 and 5, from the left half of area 5, while facing away from the net, preceded by turning around at the audio signal.

**Test 3:** Receiving the serve everywhere on the playing field, alternately from areas 1 and 5, while facing away from the net, preceded by turning around at the audio signal.



#### Organisation conditions:

- A series of 10 actions is executed (5 for each serve area), preceded by 2 warm-up actions; these have the role of activating attention mechanisms that generate a state of perceptive preparation.
- The audio signal is the ball being hit while serving.
- After each intervention, the receiving player is given the possibility of reverting back to the initial spot.
- The accent is placed not on execution speed, but on the moments of focus before the serve; focus allows the perception of the audio stimulus and reaction in optimal time frame.

Important factors:

- Player placement regarding optimal ball orientation according to the setter's area and movement plus the placement of the arms according to the trajectory of the ball before making contact with it.

- The consistency of directing the ball to the setter's area, which comes from pointing the ball contact surface to the setter, regardless of body positioning when receiving the ball. The fact that the ball gets to the setter's area is taken into consideration. The quality of the pass is not taken into consideration.

Determining serve reception efficiency is made based on game footage (5 on the initial evaluation and 5 on the final evaluation). This has been noted on special charts meant to permit the observation and recording of the necessary coordinates. Evaluation is made on 4 levels proposed by International Volleyball Federation (IVF) which grades according to quality, between 0 and 3. The calculus formula (Şerban M.) takes into consideration the percentage that each group of actions (graded from 0 to 3) has in the value of the efficiency index. Efficiency can have values between 0 and 1. The value 0 corresponds to the evaluation grade 0 and the value 1 corresponds to the evaluation grade 3.

We have made a separate analysis of the efficiency of receiving a serve executed in the direction of the receiving player. It is a known fact that it is more difficult to perceive an object coming directly to us rather than at a certain angle. Based on past recordings of the game that confirm this, we consider the inclusion of this necessary in training.

<b>PERCENTAGE</b>	0	0,33	0,66	1
<b>EVALUATION LEVEL</b>	0	1	2	3

$$I_E = \frac{0 \times \sum "0" + 0,33 \times \sum "1" + 0,66 \times \sum "2" + 1 \times \sum "3"}{\text{Total number of actions}}$$

### 3. Results

Due to the fact that the large number of resulting data can't be fully presented in this type of format, we shall only point out the aspects that target the described test and those referring to the efficiency of the action. Efficiency is the main indicator that brings out the level and quality of other components involved in the execution of the action. It is the most relevant from this point of view (Figure nr.1):

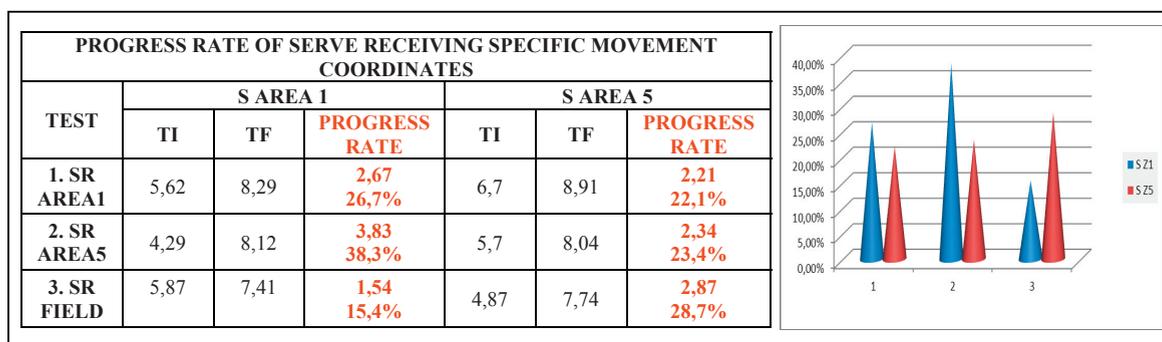


Figure nr.1

- Final results show reasonable value growths, especially at indexes that had low initial levels;
- The clearest progress (38,3%) was recorded at the most difficult coordinates for receiving the ball. This shows the efficiency of the training methods used (marker 2 blue from the chart – receiving the ball coming from the player situated in the farthest area from the receiver and at the most difficult angle for the receiver)

Concerning the efficiency index, we must mention that we have made a separate analysis of receiving serves that come straight to the receiver. Based on past recordings of the game that confirm this, we consider necessary the inclusion of this in training.

Looking at the resulting data as well as the graphic representation, a rising trend can be observed (Figure nr.2). Although the growths do not seem spectacular, we point out the fact that we are talking about a game action which conditions an important sequence of actions. At this level, that is extremely important in game economy. Also, we are talking about an action that is already learnt and its association with game characteristics at this age. The serve is not very difficult to receive yet, and a spectacular leap is not possible at the moment, but it does form a series of abilities and develops skills that insure ulterior improvement closely linked with serve improvement.

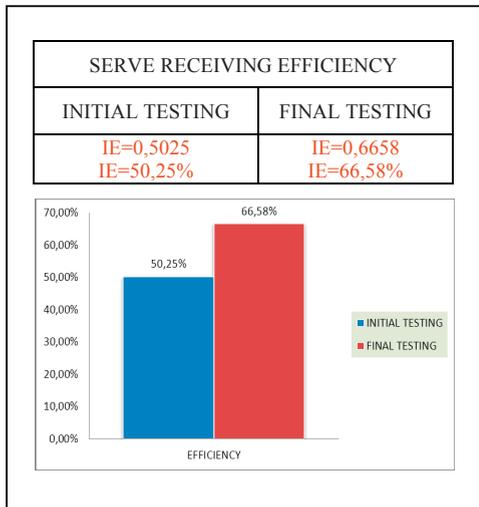


Figure nr.2

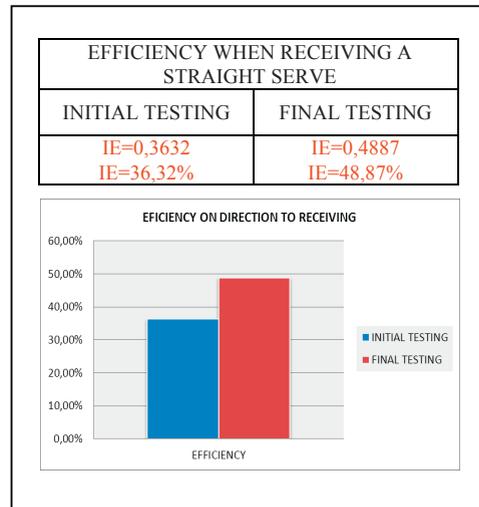


Figure nr.3

#### 4. Conclusions

The experimental research's results can be synthesized in just few general conclusions that will help us bring out the validity of our experiment:

- Mastering certain forms of perception through coordinates specific to the deployment of game actions and exercising these in a perceptually specific frame determines the improvement of the skills
- Determining perception models, informing the athletes about informational indices and their familiarisation with them, accelerates specialised perception development, thus improving perception selectivity. As a result, actions are initiated faster, are more adapted to the situation and are more efficient.
- Improving efficiency, especially based on improving difficult coordinates (48.87% as opposed to 36.32%), demonstrates the positive effects of the training programme (Figure nr.3).
- Regarding the statistical significance of the obtained results, in all situations, the value of "t" are superior to de the value 3,10 from the Fischer table, at a significance level of 0,01. These values show that differences between averages are significant, which demonstrates the efficiency of the means used during the proposed perception learning programme, with a probability of over 99%.
- The results obtained in this study lead to the idea of possibly generalizing training based on perception models and other game actions
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