TOMA DE DECISIONES Y HABILIDADES PERCEPTIVO VISUALES EN JÓVENES JUGADORAS DE VOLEIBOL Y NO JUGADORAS.

DECISION-MAKING AND VISUAL PERCEPTION SKILLS IN YOUTH VOLLEYBALL PLAYERS AND NON-PLAYERS.


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RESUMEN
Se han desarrollado dos experimentos para analizar las capacidades perceptivo-visuales y la toma de decisiones de 10 jugadoras de voleibol de género femenino (edad 17.2 ± 1.31 años) y 10 personas del mismo género (edad 16.4 ± 1.26 años) sin experiencia en deportes de colaboración-oposición con balón. El objetivo del primer estudio es determinar las diferencias clave de toma de decisiones y percepción visual. Con este fin se evalúa el tiempo de reacción de las participantes en la acción de bloqueo, ante secuencias de colocación reales, utilizando unas gafas de oclusión visual de cristal líquido que evitan que las participantes vean la escena completa. El segundo estudio tuvo como objetivo evaluar diferentes habilidades visuales en laboratorio. En este experimento se midieron las habilidades de anticipación, percepción periférica y atención visual selectiva, utilizando el Viena Test System en laboratorio. Los resultados mostraron que las participantes con experiencia en voleibol presentan una toma de decisión más acertada en las situaciones de juego que las no experimentadas, no encontrándose diferencias en los tests de laboratorio.

Palabras clave: anticipación, oclusión temporal, Viena Test System, precisión de la respuesta.

ABSTRACT
In this study, two experiments were undertaken to analyze the perceptual-visual skills and decision making of 10 female volleyball players (age 17.2 ± 1.31 years) and 10 female individuals (age 16.4 ± 1.26 years) without experience in team sports. The first experiment aimed to determine key differences in decision-making skills and visual perception using the varying skills and experience of the participants. With this aim, response time of the participants in blocking action were evaluated when facing real passing sequences in a volleyball court; liquid crystal visual occlusion glasses were used to prevent participants from seeing the complete scene. The second experiment aimed to test anticipation, peripheral perception, and selective visual attention skills in a laboratory setting. In this experiment, we measured anticipation, peripheral perception, and selective visual attention skills using the Vienna Test System. The results showed that experienced participants presented more accurate decision making than inexperienced participants, with no significant differences in laboratory tests.

Keywords: anticipation, temporal occlusion, Vienna Test System, response accuracy.
INTRODUCTION

According to Schmidt (1988), vision is one of the most important information sources of the human being; its relevance is accentuated when we speak of athletes in general, especially when they interact in a changing environment where mobiles acquire high speed and follow complex paths. In sports where such conditions occur the time deficit becomes the decision-making speed that is crucial for the success of a particular action, a process for which an appropriate visual perception is essential. Athletes must use visual strategies based on a tactical way of thinking that allows identification and resolution of the problem presented by the opponent (Williams and Ford, 2008). The attention by research on vision, perception and decision-making in sports are increasing in the last years (Gegenfurtner, Lehtinen & Säljö, 2011; Mann, Williams, Ward & Janelle, 2007; Travassos, Araújo, Davids, O’Hara & Leitão, 2013).

One of the aspects related to the visual behavior of athletes is decision-making and reaction time. In team sports, characterized by fast ball movements, where the uncertainty besides the mobile is focused on opponents and teammates (Savelsbergh, Williams, Van der Kamp & Ward, 2002), the perceptive and decisional activity of the player acquires greatest relevance, and the ability to detect game patterns at an early moment is an essential component for performance (Williams & Ford, 2008).

Volleyball is an open-character sport, in that a player has to behave in accordance with the actions of the opponent and of the environment (Liu, 2003). Perception and decision making acquires more importance in the blocking action, because the blocker must observe his/her opponent and gets information about the development of the game to make a decision. Thus, individual blocking tactics entail great difficulty for those without much expertise; this expertise comes from the complex management of information and the temporal deficit for its processing.

Farrow and Abernethy (2003) tested the ability of players, experts and novices, to predict the direction of the serve in tennis under in situ conditions. They used the temporal occlusion paradigm and had two different response conditions: oral response and movement response. The results revealed the superiority of experts in decision making where movement was concerned, as well as a higher acuity in movement predictions when both groups could see the flight of the ball. Jackson and Mogan (2007) also evaluated the awareness and the confidence level and the associated right or wrong judgment in tennis service of expert recreational players and novice players. Five video conditions were used; it was concluded that the throwing of the ball and the racket-arm zone information supported the abilities of anticipation, and that expert players use information sources significantly more than novices. Similar conclusions were reached by Ranganathan and Carlton (2007) with batters in baseball. The researchers manipulated, among other aspects, the visual information of the pitcher and the ball in six visual conditions. Comparing experts with novices, they found that experts were more accurate in predicting the kind of throw and could make judgments based on the beginning of the ball’s flight, regardless of the movements of the pitcher.

The studies of Abernethy and colleagues are particularly relevant (Abernethy, Gill, Parks & Packer, 2001; Abernethy & Zawi, 2007; Abernethy, Zawi & Jackson, 2008) in racket sports (badminton and squash). The authors proved that experts demonstrated greater accuracy in their predictions, under all the occlusion conditions and in all the combinations. In that situation, with conditions close to a real game, we find similar results: when compared with novices, the experts were clearly better in their predictions when the occlusion was done before any significant pre-contact movements were made.

Among the most recent studies, we find the contributions of Huys et al. (2009) investigating the anticipation of hit direction in tennis. In separate experiments, they occluded five body zones in two different hit situations (parallel and crossed). This study resulted in new findings that divide the participants (recreational tennis players) based on their cognitive-perceptual abilities, and not on their ranking level or experience. They used the results obtained in a control situation, in which occlusion was not performed, to extract two groups, one being the perceptually skilled group and the other the perceptually less-skilled group. Participants were
asked to anticipate the direction of the hits in occlusion situations of different parts of the body (and the racket). Most of the skilled participants had a more accurate response than the less skilled; moreover, the accuracy in the response of the skilled participants decreased significantly when the dynamics of the arm, racket, and trunk were neutralized. Müller et al. (2009) applied the occlusion paradigm to cricket batsmen in a field test. Visual occlusion glasses were used. The participants, divided into two groups, with highly skilled batsmen in one group and less-skilled batsmen in the other, faced three throws in different occlusion conditions: moments prior to the ball’s release, prior to the ball’s release, and without occlusion. The highly skilled batsmen were found to have a greater number of bat-to-ball contacts using advanced information and the ball’s flight, with expert batsmen using such information to determine where the ball was going to bounce.

The desire to know what aspects make experts excellent in their sport has prompted researchers to undertake studies indirectly related to sports environments, investigating the decisional and perceptive profile of the elite athlete and its differences with that of the less experienced. The conclusions of these studies agree on an essential point: the differences between the expert and the novice in terms of perceptive-visual skills become visible in tasks directly related to the specific domain. Thus, in their study involving general and specific optic tests among pool players, and differentiating between expert, intermediate, and novice players, Abernethy, Neal and Koning (1994) found no differences between the three groups in general tests; however, they found differences in the specific test, corroborating the argument that experience, not better visual abilities, determines the success of experts. Kioumourtzoglou Derri, Tzetis and Therodorakis (1998) examined the cognitive, motor, and perceptual skills of elite volleyball players and students with no experience in this sport. Experts in volleyball did not show better cognitive abilities; there were differences only when specific volleyball stimuli were presented.

However, we find authors who have obtained opposite conclusions in their investigations, such as Azneder and Bösel (1998), who studied the modulation of the attentional focus spatial extension in high-level volleyball players compared with novices. Participants visualized nonspecific tests, in which they had to respond to various stimuli without shifting their gaze. The authors concluded that volleyball players are better modulating the distribution of attentional resources and extract cues from peripheric areas. Jafarzadehpur, Aazami, and Bolouri (2007) measured the facility of accommodation and that for saccade for optotypes at three distances in volleyball and found a better facility of accommodation and saccadic eye movements in players as compared with non-players, with significant differences between non-players and novice groups and advances and intermediates. Zwierko, Osinski, Lubinski, Czepita and Florkiewicz (2010) obtained that volleyball players showed a shorter total reaction time when are comparing with non-athletes by using test within the Vienna Test System.

Recently researchers had focused in volleyball, for example Vila-Maldonado, Saéz-Gallego, Abellán and Contreras (2012) found that the decision making of volleyball players during block action did not differ between two different types of set (standing and jump setting). In addition, Vila-Maldonado, Saéz-Gallego, Abellán and García-López (2014) showed that the success or fail in a block is not determinate for the zone; authors did not found differences between blocks directed to zone 3 or zone 4. Also, Barcelos, Morales, Maciel, Azevedo and Silva (2009) compared the performance of volleyball players in a battery of tests in order to investigate the reaction time. They found that experienced players had a better understanding of the game and are able to answer faster. And Afonso, Garganta, McRobert, Williams and Mesquita (2012) employed an in-situ test to study gaze behaviour and verbal reports of athletes during a 6 vs. 6 task in volleyball. Results revealed that skilled players used a more exploratory visual search strategy.

Following the line of the above-mentioned investigations, the present study centered its attention on the anticipation of perceptive-visual skills, associated with the passer, and the blocker’s decision-making skills. Therefore, in the current study, the first aim was to determine key differences in decision-making skill and visual perception using youth participants who differ in skill and experience.
We employed a group of volleyball players and a group of non-players. A real play situation play was set up, in which the participants viewed different pass situations in the field. We hypothesized that decision-making skill would increase concomitantly with playing level; we also expected that experienced players have developed greater response accuracy.

The second aim of the current research was to test anticipation, peripheral perception, and selective visual attention skills in a laboratory setting, in order to see if there were differences between the two groups in these abilities in a sport environment. In line with previous findings, we hypothesized that there would be no differences between players and non-players when they are measured in situations outside the specific situations found in sports.

MATERIAL AND METHODS

Participants

Participants in the experienced group consisted of 10 females (n=10; \( M \) age=17.2 years, \( SD \) age=1.31 years) with an average of at least two years of experience in federate volleyball competition. Participants in the novice group consisted of 10 female (n=10; \( M \) age=16.4 years, \( SD \) age=1.26 years) who had no experience in opposition/collaboration sports. All the participants in both groups presented normal or corrected to normal vision.

All the parents of the participants were informed about the nature of the experiments and signed a written consent before initiating the experiments. The Ethic Committee of the University of Castilla-La Mancha approved this study.

Measures

Two different kinds of data were analyzed:

In situ test. Dependent variables:

- Response accuracy: percentage of trials in which the player pushed the button on the correct side.
- Decision time: the time between the touch of the ball by the setter and the push of the button by the blocker (in seconds).

Laboratory test. The analyzed variables of the Vienna Test System were the following:

- Time Movement Anticipation (ZBA); with two variables, Anticipation Time, which is the time difference between real time and the participant’s estimated time (in centiseconds), and Anticipation Movement, which is the difference between the participant’s estimated position and the real position (in pixels).
- Visual Pursuit Test (LVT): variables were Correct Answers in visual recognition and Time used in correct decision making.
- Peripheral Perception (PP): the variable Field of View is the amplitude (in degrees), considering left and right angles, and the variable Visual left/right degree is the degree of this angle.

Apparatus

The in situ test was carried out in a sports center, where the following instruments were situated, as shown in Figure 1: manual buttons made “ad hoc”, two digital video-cameras (JVC, GR-DVX 10, with MiniDV format and PAL standard signal format with 25 fps), two tripods, music equipment, and headphones. The volleyball court was equipped with official posts and a net (according to the FIVB), rigid pads to prevent participants from feeling the vibrations of the ball hitting the floor, a wooden lectern, and 20 Molten balls model V5FLC.

The specific characteristics of the manual buttons made “ad hoc” were as follow: An electric system composed by two triggers and two bulbs (blue and red respectively), the bulbs pressed it turned on indicating the selected destination zone.
Liquid crystal visual occlusion glasses were used (PLATO System; Translucent Technologies, Toronto, Ontario, Canada) to occlude the vision of the participants at the appropriate moment, and an observation record card was used to record data in situ.

For the laboratory situation, the Vienna Test System was used. In this case, participants went through the following tests:

- **Time Movement Anticipation (ZBA).** This test is used to determine how participants estimate the speed and movement of objects in space. A ball, moving slowly, appears on screen; at one point, unknown to the participant, this ball disappears, and two red lines appear. One line is situated at the point where the ball disappears whereas the other line is the finish. The participant must press one button the moment she thinks the ball passes the second line, thus marking the supposed position of the ball, by which we measure the estimation of speed and movement of objects in space.

- **Visual Pursuit Test (LVT).** With this test we can measure performance in visual orientation for simple structures in a complex environment. Here we measure selective attention. In the LVT, a kind of labyrinth shaped for nine lines is presented to the participant, and at the end of every line is a box with a number (from 1 to 9, placed in order). One of the lines is marked at the beginning with a red arrow. The participant, with eyes on the screen, must say the number where she thinks the line will finish.

- **Peripheral Perception (PP).** This test measures peripheral perception during task realization. The participant sits in front of the screen, on which appears a ball that ranges in space, centered on the screen. The proposed task is to keep that ball inside a target controlled with a rotor placed in the keyboard. Meanwhile, on both sides of the participant, on the side screens, spotlights will appear, sometimes alternating vertical lines of the same color and intensity. The participant must press a pedal located on the floor when she notices one of these vertical lines, while continuing to attend to the task at hand. During test execution, the participant must keep her sight centered on the task, focusing her attention on the center of the field of vision, her head in front of the screen, thereby assuring that the perception of the other stimuli will be through peripheral vision. If she does not, the system alerts the researcher of the situation.

**Procedures**

**In situ test**

The experiment recreates 15 attack sequences in which the passer, placed in zone 2 in court B, sends the ball, which comes from zone 6, to one of the two attack zones of the court (zones 3 and 4). The participant, who is placed in court A on a carpet in front of the net (in the zone where the main blocker would be placed in a real match), receives the appropriate instructions to perform the experiment, as shown in Figure 1. The test was based on the visualization, in a real volleyball court situation, of 15 passes made by an experienced passer of under-16 level (who played in the regional volleyball team, with six years of experience in volleyball). In the 15 sequences, the passer receives the ball in perfect conditions, as passed by an experienced volleyball player, so that the ball may be passed to any attack zone.

The performed passes are all second passes to the central zone (zone 3) and third passes to the wing (zone 4), and the pass direction is always forward. For the further analysis, we selected the correct passes, in which the ball direction was adequate to the task (the remaining attempts were removed from the analysis). The participant, located where the main blocker would be in a real match, should predict in every trial the zone to which the pass will go, providing a fast answer by pressing one of the triggers. Just behind the participant, the researcher is responsible for activating the visual occlusion glasses through different triggers, one for the right lens and the other for the left, linked to the glasses by a cable. All the occlusion process was carried out for a unique research, which had experience in volleyball and completed a previous pilot study.

The test was performed for two consecutive days. The first day was spent on familiarization, so the participants’ vision was not occluded during the
passer performance. For the rest of the time, however, the participant could not see what was happening on the court. On the second day, the test was applied, with the same characteristics as those of the first day (before the initiation of tests, two trials are performed), but now the participants’ vision was occluded. Occlusion was always done post-contact, so that the complete scene was shown till the moment the ball was passed to a passing zone; therefore, decision making was based on the visual pre-cues of the passer.

**Laboratory test**

This experiment was based on the realization of standardized tests with the Vienna Test System. For this, only the described instruments were necessary apart from the help of a researcher who, during the entire process, was in the same room as the participant, and was responsible for monitoring and switching on the Vienna Test System. Once in the laboratory, the participant sat in front of the instrument, and the researcher gave the appropriate explanations. The tests then began, with the program offering several instructions and tests that helped in the subsequent realization of the trials.

**Statistical Analysis**

Results are expressed in means (SD). The data were analyzed through the statistical program SPSS (version 17.0), with descriptive and differential analyses carried out on the participants’ answers. Pearson correlations were used to analyze relations between variables. To analyze differences between groups, we used Student’s t-test for independent samples, establishing a significance level of $P < 0.05$.

**RESULTS**

**In situ test**

- **Response accuracy.** Table 1 presents the results. The mean percentage of correct decision values were 82.66 (12.65) and 69.33 (15.13) for the players and the non-players, respectively. Significant effects were observed for groups in correct decisions concerning zone 3 and for the total of correct decisions and the total of correct answers. Skilled players ($M= 81.25, SD = 13.50, p<0.05$) were more accurate than their less-skilled counterparts ($M= 63.75, SD = 17.12, p<0.05$) in their correct decisions for the passes to zone 3 and for the total answers, and players ($M= 82.66, SD = 12.65, p<0.05$) had higher percentages than did non-players ($M= 69.33, SD = 15.13, p<0.05$).

**Laboratory test**

- **Decision Time.** Table 1 presents the results. The mean decision time values in correct answers were 5.67 (±2.65) and 4.35 (±2.2) for the players and the non-players, respectively. For wrong answers, the means were 4.03 (±2.85) and 4.29 (±2.1) for these groups, respectively. No significant differences in decision time were observed across groups for correct or for incorrect decisions.

**Table 1. Mean values of response accuracy and decision time ± SD per group**

<table>
<thead>
<tr>
<th></th>
<th>Players</th>
<th>Non Players</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correct answers in zone 3 (percentage ± SD)</td>
<td>81.25 (13.50)</td>
<td>63.75 (17.12)</td>
<td>0.021</td>
</tr>
<tr>
<td>Correct answers in zone 4 (percentage ± SD)</td>
<td>84.28 (17.10)</td>
<td>77.14 (20.42)</td>
<td>0.408</td>
</tr>
<tr>
<td>Total correct answers (percentage ± SD)</td>
<td>82.66 (12.64)</td>
<td>69.33 (15.13)</td>
<td>0.047</td>
</tr>
<tr>
<td>Correct answers time (seconds ± SD)</td>
<td>5.67 (2.65)</td>
<td>4.352 (2.2)</td>
<td>0.243</td>
</tr>
<tr>
<td>Incorrect answers time (seconds ± SD)</td>
<td>4.038 (2.85)</td>
<td>4.294 (2.1)</td>
<td>0.817</td>
</tr>
</tbody>
</table>
advanced time were 1.099 (±0.661) seconds for players and 0.922 (±0.456) for non-players. The means values of advanced movement were 59.2 (±16.13) and 64.3 (±27.93) pixels for players and non-players, respectively.

– Peripheral Perception Test (Table 2). In the variable Vision camp, the players group had a mean 167.20 (±8.991) grades, whereas the non-players group had a mean of 168.50 (±5.869) grades; there are no differences across groups in this variable or in Visual right and left angle.

– Visual Pursuit Test. There were no significant differences across groups in the variable Correct answers or Average time used to make the correct answers (Table 2). The means in the number of Correct answers were 39.30 (±0.823) for the experienced participants and 38.70 (±2.669) for the inexperienced; the means in Average time were 3.608 (±0.5771) and 3.605 (±0.77318) seconds for players and non-players, respectively.

Table 2. Mean values for the Vienna Test System per group

<table>
<thead>
<tr>
<th>Test</th>
<th>Players</th>
<th>Non Players</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZBA. Advanced time (seconds ± SD)</td>
<td>1.099 (0.661)</td>
<td>0.922 (0.456)</td>
<td>0.495</td>
</tr>
<tr>
<td>ZBA. Advanced movement (pixels ± SD)</td>
<td>59.2 (16.13)</td>
<td>64.3 (27.93)</td>
<td>0.623</td>
</tr>
<tr>
<td>PP. Vision camp (grades ± SD)</td>
<td>167.2 (8.991)</td>
<td>168.5 (5.869)</td>
<td>0.824</td>
</tr>
<tr>
<td>PP. Visual left angle (grades ± SD)</td>
<td>87.8 (4.131)</td>
<td>88 (7.803)</td>
<td>0.944</td>
</tr>
<tr>
<td>PP. Visual right angle (grades ± SD)</td>
<td>79.5 (7.605)</td>
<td>80.6 (8.396)</td>
<td>0.762</td>
</tr>
<tr>
<td>LVT. Correct answers (M ± SD)</td>
<td>39.3 (0.823)</td>
<td>38.7 (2.669)</td>
<td>0.500</td>
</tr>
<tr>
<td>LVT. Average time (seconds ± SD)</td>
<td>3.608 (0.557)</td>
<td>3.605 (0.773)</td>
<td>0.990</td>
</tr>
</tbody>
</table>

Mean values for the test ZBA (Time Movement Anticipation), PP (Peripheral Perception Test) and LVT (Visual Pursuit Test) ± SD.

DISCUSSION

The first of the proposed aims, connected with the in situ test, was to determine if there were differences between the volleyball players and the non-players in terms of response time and in the number of correct answers in a volleyball blocking situation, based on their answers on the pre-cues of the passer, occluding the post-contact phase. In relation to this objective, we found significant differences in the number of correct answers, specifically in the answers related to zone 3 and in the total answers. The significant differences found between the two groups indicate that the experienced players decide better, in a significant manner, in the passes to zone 3 and in the total answers. This conclusion was reached in similar studies and with diverse sport actions by several authors (Oudejans, Michaels & Bakker, 1997; Ranganathan & Carlton, 2007; Savelsbergh et al., 2002; Starkes, Edwards, Dissanayake & Dunn, 1995). These differences are due to the higher consonance of the players with the content of the information (Abernethy et al., 2001; Abernethy et al., 2008; Abernethy & Zawi, 2007), always in cases where the stimuli or environments are related to the specific sport.

No significant differences were found in the passes to zone 4 and in the response time. Where response time is concerned, the results differ from the findings of other studies (Amazeen, Amazeen & Beek, 2001; Helsen and Starkes, 1999) that say that expert players can decide with more accuracy than can less-experienced ones. However, in so far as the characteristics of volleyball as a sport are concerned, we must not forget that performing a good blocking action at the right moment during a game is an ability used by players with more experience. Because of this, excessive anticipation can lead them to make wrong decisions that, due to the deficit of time, cannot be amended. Therefore, expert players are more accurate and wait longer to react in game actions, according to the results obtained by Savelsbergh et al. (2002) and Oudejans et al. (1997). This can explain the absence of significant differences that would point to faster decisions from the most experienced.

The second objective, related with the laboratory experiment, was to find the possible differences in anticipation, peripheral perception, and visual
recognition speed abilities between volleyball players and participants of the same age range without any experience in collaboration-oppisition ball sports. Three tests of the cited capabilities were made, and the results showed no significant differences between the groups in any of the test variables.

Therefore, we can state that in anticipation capabilities, peripheral perception, and visual recognition speed, as measured in a laboratory situation unrelated to volleyball, there are no differences between players and those participants without experience in this sport. Singer and Janelle (1999), in their review involving sports experts, said that athletes are characterized by greater knowledge in specific tasks restricted to their sport. Thus, in a laboratory measure of perceptive-visual skills, in a situation that is not related to volleyball, no differences were found. In investigations concerning anticipation and visual strategies (Abernethy, 1990; Abernethy, Baker & Côté, 2005; Abernethy et al., 1994; Abernethy & Rusell, 1987; Kioumourtzoglou et al., 2000), differences were found in specific tests applied to the sport. In general, however, visual tests did not reveal differences between experts and novices, indicating that experts are more efficient than novices at interpreting the available visual information in their field of expertise, in this case volleyball, but outside this area, no differences were necessarily found. Results support the idea of experts players has not a superior hardware visual than novices players (Williams, 2000).

Reviewing these results, we find that experienced players have a higher successful level in their actions, due to their capability to process information during the game. Abernethy et al. (2001) attribute this to the experts’ knowledge of the game and their ability to anticipate the opponent’s action through a limited base of previous information. For example, Sáez-Gallego, Vila-Maldonado, Abellán and Contreras (2013) showed that successful volleyball players obtained a higher accuracy predicting the destination of the ball in order to block it (across two different setting conditions) using a higher visual rate, ball-wrist fixation was the most repeated fixation, especially in jump setting.

The main conclusion of this study is that participants, who are more experienced in volleyball, using pre-cues from the passer, obtain a higher percentage of success in their decision making than do less-experienced players in a blocking situation in the volleyball court. In perceptive-visual skills studied in the laboratory, however, no differences were found across the two studied groups in situations not related to the sport. Therefore, this investigation corroborates the results of studies made by other authors that emphasize the fact that the differences between experts and novices in perceptive-visual skills are found in the related situations specific to the sport.

Because of the ecological value of the study, the data provided by the investigation are perfectly applicable to real game situations, and corroborate the conclusions of other studies developed in less ecological environments. As there are no studies using visual occlusion in a real blocking situation in volleyball, which would be a scientific advancement in this specific field, and in a practical and sport-applied level, identifying the attention capabilities of elite players is important for diagnosis and training procedures (Azenden & Bösel, 1998). Finding the differences between the abilities of athletes of different levels can help in the identification and selection of better players in a specific sport (Kioumourtzoglou et al., 2000).

REFERENCES


