The Effects of Attentional Focus and Skill Level in Performance of Badminton Long Service

Ahmadi, Malek, Kashef, Seyyed Mohammad, Taghavi, Mehrab and Borhani Hossein

Abstract: The present study aimed at investigating the effects of attentional focus and skill level in performance of badminton long service. Forty novice (age: 21 ± 2.6) and forty expert (age: 24 ± 3.8) subjects performed 4 trial groups (10 trial per each block) under four different instructional focus conditions (non-instruction, internal focus on hand movement, external near focus on head of the racket and external far focus on target zone), voluntarily. Scott and Fox’s badminton long service test was used to assess performance accuracy. Factorial repeated measures ANOVA results showed that interaction between optimum distance of attentional focus and skill level was significant (p<0.05). That is, performance in no-instruction condition was better than internal and external near focus in both groups. Nevertheless, novices significantly performed better under external far rather than no-instruction condition. However, this difference was not significant for expert group. Altogether, these findings suggest that using attentional focus instructions depends on skill levels of individuals. On the other hand, attentional focus instructions are not necessary for expert performers.

Key words: Optimum Distance Of Attentional Focus %Skill Level %Internal Focus %External Near Focus %External Far Focus

INTRODUCTION

One of the most important factors in the process of learning and motor performance is the appropriate use of attentional instructions. Attention is a process that directs our awareness in order to keep information available to the senses [1]. In the field of sports and exercising, the coaches deal with the athletes who are different in regard to skill level and usually coaches use the educational instructions to improve those athletes’ performances. As the information processing capacity of individuals is limited, it is necessary that coaches focus the athletes’ attention to the important factors related to the performing of a movement or motion; therefore, one of the important factors about the degree of effectiveness of educational instructions presented by the coaches is the type of those instructions’ focus of attention. If an individual focuses his attention on the movements of his body organs while performing a skill, it is called the Internal Attention, but if the attention is focused on the environmental signs and the effect that the movement remains in the environment, it is called the External Attention [1].

Based on the Constrained-Action hypothesis, when people adopt the internal attention, they consciously involve in the control processes that result in the decline of movement’s performance. Conversely, the adoption of the external attention leads to the improvement of automatic control of movement that this type of processing precedes the unconscious, fast processes and the reflexive control of movements and leads to desirable results [2-4]. The majority of the researches conducted to investigate the effect of focus of attention on learning and the motor performance proved the superiority of external attention and supported theories of constrained-action hypothesis [5-8]. However, the priority of external focus of attention is not shown in several studies.

Although the existing literature have shown the advantage of the external focus of attention over the internal one in relation to learning and the performance of
people, the issue that lately attracted the attention of researches is the interaction between the focus of attention and skill levels (skilled, novice) [9-10]. Based on the Hierarchical Control theory, the actions can be controlled in different hierarchical levels and by gaining experience and automatization in the skill’s performance, the action can be increasingly performed at higher levels. Therefore, it seems that individuals can concentrate on the consequences of moving at different ranking levels and this concentration or focus can be changed by experience and practice [11-13]. Moreover, according to the de automatization of Skill hypothesis internal attention causes disorders in automatic skill controlling for skilled people or those who have gained some degrees of automatization in performing their skills [10, 11]. In line with the above mentioned theory, the reinvestment theory points to the regression to the non-automatic skill control in skilled people when they are under pressure or particular conditions (adopting the internal focus of attention) that leads to disorders in the automatic skill performance. Based on the above-mentioned theories, harmful effects of internal attention adoption are more tangible in skilled people [14].

Several studies have investigated the effects of internal and external focus of attention on subjects with different skill levels. Wulf and Su [15] showed that golf-shot accuracy in both novice and skilled groups results in higher accuracy in external focus of attention than in internal focus of attention. Wulf [16] proved that there is not any significant difference between the fluctuation status of expert acrobats under three conditions (control, external, internal), but adaptive movements have higher frequency under control condition. On the other hand, Beilock et al. [9] and Wulf et al. [17] showed that the performance of skilled people is better under external focus condition while the performance of novices is better under internal focus condition.

Several studies have also explored the optimum distance of focus. Perkins-Ceccato et al. [18] compared the difference of two types of external focus (near and far) for novice golf players and showed that in delayed tests the group focusing on the club (external, near) has more accuracy in their shots than the group focusing on the target (external, far). Perkins et al. [18] proved that the novice golf players has weak performance while focusing their attention on the target (external far attention) rather than the practice’s technique (external near attention). Bell and Hardy [6] investigated the effect of internal focus of attention, external near attention and external far attention for experts and showed that focus of external near attention results in higher operation accuracy. The finding of the study carried out by Shojaei and Daneghian [19] which showed that the transfer of the external far attention into the external near attention leads to the better learning of basketball shoot.

As stated, the researches on the optimum distance of focus have yielded contradictory results [6, 17-19]. Moreover, the effect of distance of focus (internal, external) on the performance of people with different expertise is reported differently [11-18, 20]. Therefore, the aim of the present study was the investigation of the interaction between the optimum distance of focus (internal, external near and external far) and different skill levels (expert, novice) in performing the long badminton service.

**MATERIAL AND METHODS**

The present study was conducted utilizing a semi-empirical design and it used two research factors: (1) skill level for two novice and expert groups (inter-subject factor) and (2) the levels related to the distance of focus at four levels of (a) internal focus, (b) external near, (c) external far and (d) control conditions (intra-subject factor).

**Participants:** Forty male students of physical education faculty studying in Urmia University, who had passed the technical Badminton course but did not have the regular practice experience or were not members of university teams or club teams, were chosen as the novices. Also, with the cooperation of Badminton panel of Urmia city, 40 badminton players, who took part in provincial championships or higher level competitions during the last year as well as being club members and practicing regularly, volunteered to participate in this study as expert players.

**Measuring Instruments:** Standard badminton ground, Badminton racket, Badminton ball and enough amount of rope for the badminton net.

**Procedure:** In the present research, the long service of Scott and Fox was used which aimed at measuring the accuracy of performance of long badminton service and the subject was supposed to pass the ball from the top of a rope that was 2.40 meters high while he was standing 4.20 meters away from the net. Scoring of the test was based on the ball’s grounding in the areas scored by the 5 concentric quadrants specified at the end of the ground (with the specified scores of 1, 2, 3, 4 and 5).
Having received the prior notice, the participants were present in Azad University’s indoor club (Urmia branch). They were justified that every trial had some points and that they had to conduct the trials with considering the presented instructions of attentional focus. Participants were given 10 minute-long time to warm up and perform some long badminton services. In the phase of action, the participants performed four groups with 10 trials of long service’s skill (10 trials with no focus instructions, 10 with internal focus of attention instruction, 10 with external near focus of attention and 10 trials with external far focus of attention). While performing the expertise, the subjects had to focus on the movement of their arm and hand under internal attention condition, to focus on the head of the racket under the external near attention condition and to focus on the target (the ball’s grounding place) under the external far attention condition. Attentional focus instructions were chosen in accordance with the related body of literature [6, 15, 18, 19, 21]. In order to be sure, prior to the performing of every trial, the participants verbally repeated the type of the presented attentional instructions. It should be noted that in order to eliminate the ordering effects of the presentation of the instructions, each group in 3 distinct sub-groups performed the trial groups with different orders of focus instructions. Between each trial three-minute rest was given. The results were analyzed using the SPSS14 software. Descriptive statistics were used to estimate the mean and standard deviation (SD), the Kolmogorov-Smirnov test was used to ensure the normal distribution of data, factorial repeated measures ANOVA was employed to check the interaction between the variables and at last, the LSD post hoc test with the significance level of p<0.05 was utilized to explore the main effects.

RESULTS

The means and SD of the subjects’ scores under 4 different conditions of attentional focus were presented in Table 1. As observed, the highest performance scores for novice group were related to external far focus of attention, no-instruction, external near and internal, respectively. For expert group the highest performances were for conditions of no-instruction, external far attention, external near attention and internal attention, respectively.

The results of the analysis of the factorial repeated measures ANOVA: 2(skill level) ×4(focus distance) by repeated measures on the focus distance, shown in table 1, implied that the main effect of distance of focus and the main effect of skill level are significant. Also, the interaction between the distance of focus and skill level was significant (p<0.05).

Considering that the interaction between distance of focus and skill level is significant, for the purpose of investigating the levels of focus of attention on each of the skill levels, repeated measures ANOVA and LSD post hoc test were used. The results of the analysis of the repeated measures ANOVA showed a significant difference between novices (F=153.73, p<0.001) and the experts (F=216.69, p<0.001) on levels of focus of attention. The results of the LSD post hoc test were shown in Table 2.

This table indicates that the performances of expert and novice groups under control conditions were better than the performances under internal and external focus conditions. Nevertheless, for novice group the performance under external far attention condition was better than the performance under the control condition. Whereas, the performance of expert group under external far condition and control condition did not have any significant difference.

Table 1: The results of the analysis of the factorial repeated measures ANOVA: 2(skill level) ×4(focus distance)

<table>
<thead>
<tr>
<th></th>
<th>Degrees of Freedom</th>
<th>F</th>
<th>Sig</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance of focus of attention</td>
<td>3</td>
<td>306.80</td>
<td>0.001*</td>
<td>0.92</td>
</tr>
<tr>
<td>Skill level</td>
<td>1</td>
<td>137.19</td>
<td>0.001*</td>
<td>0.63</td>
</tr>
<tr>
<td>Distance of focus of attention× skill level</td>
<td>3</td>
<td>16.72</td>
<td>0.001*</td>
<td>0.39</td>
</tr>
</tbody>
</table>

Fig. 1: Groups’ performance under different focus of attention conditions
Table 2: LSD post hoc test results to compare focus levels for expert and novice groups

<table>
<thead>
<tr>
<th>Place of difference in levels of focus of attention</th>
<th>Groups</th>
<th>Mean differences</th>
<th>Error of standard deviation</th>
<th>Significance level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novice</td>
<td>Control-internal</td>
<td>0.79</td>
<td>0.05</td>
<td>0.001*</td>
</tr>
<tr>
<td></td>
<td>Control- external near</td>
<td>0.57</td>
<td>0.05</td>
<td>0.001*</td>
</tr>
<tr>
<td></td>
<td>Control-external far</td>
<td>-0.18</td>
<td>0.04</td>
<td>0.002*</td>
</tr>
<tr>
<td></td>
<td>Internal-external far</td>
<td>-0.22</td>
<td>0.05</td>
<td>0.001*</td>
</tr>
<tr>
<td></td>
<td>Internal-external far</td>
<td>-0.98</td>
<td>0.06</td>
<td>0.001*</td>
</tr>
<tr>
<td></td>
<td>External near-external far</td>
<td>-0.75</td>
<td>0.04</td>
<td>0.001*</td>
</tr>
<tr>
<td>Expert</td>
<td>Control-internal</td>
<td>1.21</td>
<td>0.04</td>
<td>0.001*</td>
</tr>
<tr>
<td></td>
<td>Control- external near</td>
<td>0.93</td>
<td>0.05</td>
<td>0.001*</td>
</tr>
<tr>
<td></td>
<td>Control-external far</td>
<td>0.07</td>
<td>0.03</td>
<td>0.365</td>
</tr>
<tr>
<td></td>
<td>Internal-external far</td>
<td>-0.28</td>
<td>0.06</td>
<td>0.001*</td>
</tr>
<tr>
<td></td>
<td>Internal-external far</td>
<td>-1.14</td>
<td>0.05</td>
<td>0.001*</td>
</tr>
<tr>
<td></td>
<td>External near-external far</td>
<td>-0.85</td>
<td>0.08</td>
<td>0.001*</td>
</tr>
</tbody>
</table>

*Significance level of p ≤ 0.05

DISCUSSION

The results revealed that the performance of novice individuals under the external far condition was better than the other conditions; under the no-instruction condition was better than the external far and external near conditions; under the external near condition was better that the internal focus condition. It means that by adopting the attentional instructions the performance improved as the distance of focus got farther away from the body. These results are consistent with Wulf and Sue’s findings [23]. Conversely, these results are inconsistent with the findings of Beilock et al. [9-10], Gray [11] and Perkins et al. [18]. Moreover, the results showed that the experts’ performance under the control condition was better than their performance under the internal and external near conditions while the external near focus was better that the internal focus as well. On the other hand, although the performance on the level of external far focus was better than the performance on the levels of external near and internal focus, any significant difference between the performance under the control condition and the performance under the external far focus condition was not observed. These results are consistent with the findings of Beilock et al. [9-10], Gray [11], Wulf and Sue [15], Wulf [16] and at the same time inconsistent with the findings of Sue [23], Bell et al. [6]. The possible reason of inconsistency of the results of these studies could be attributed to the skills used. On the other hand, majority of the studies have stereotypically investigated the performance on levels of internal and external focus while the present study have explored the effect of distance of focus on four levels.

As it can be seen, the results regarding the interaction between the distance of focus of attention and skill level are contradictory. Based on the results of the current study, adopting the internal focus had harmful effects on the performance of both novice and expert groups. Some of the theories can more tangibly notice the harmful effects of internal focus on the accuracy of performance for experts in higher degrees than for the novices. De automatization of the Skill Hypothesis states that for expert players who have reached a specific degree of automatization of performance, the internal focus leads to disorder in automatic control of skill [10, 11]. Besides, the theory of Reinvestment stresses that when expert or skilled people are under pressure, they regress to the non-automatic control of their skill. This theory implies that when some degree of control of automatization during the performance is created, some performance disorders under particular conditions (internal focus) will be observed [14]. Therefore, this study supports these theories for high skill levels (experts) and it supports the Constrained-Action Hypothesis as it justifies the harmful effects of internal focus in lower skill levels [2-4]. Based on this hypothesis, when people adopt the internal focus, consciously they interfere with automatic controlling processes which in turn lead to a drop in performance. Conversely, adopting the external focus results in the improvement of automatic movement control that this processing results in fast, unconscious processes and the reflection of movements’ control and thus causes favorable outcomes. Since some of the recent studies have obtained neurophysiological and biomechanical approaches; Zachery et al. [24], reduction of EMG activities of muscles while doing basketball free-throw under external attention condition.
rather than internal attention condition, Lohse et al. [5], reduction of EMG activity of triceps and the increase of the variability of kinematic sizes of shoulder joints while adopting the external focus of attention for dart throwing skill), they presented more scientific reasons for supporting the Constrained-action Hypothesis; therefore, it can be concluded that the internal attention has harmful effects for both novice and expert groups while performing badminton long service.

The remarkable finding of this study is that performance accuracy mean of expert players under the control condition was better than the external far focus (although this difference was not statistically significant). This finding is consistent with Wulf’s results [16]. The possible reason of this fact can be attributed to the reduction of non-automatic control (although insignificant) in expert players’ performance under external focus condition. As Wulf showed that the adaptive movements of international expert acrobats are more under the no-instruction condition rather than the external and internal focus conditions. He inferred that the control condition leads to the better stability of status and more automatization. Therefore, for expert players there are no boundaries for benefiting from the external focus of attention instructions [16].

It can be concluded that when attentional instructions are used the skill levels of people should be taken into account. In other terms, the findings indicate that for novice and expert players, the performance will be weakened if the distance of focus approaches the body (arm and hand). The findings of this study have important practical implications for badminton coaches.

REFERENCES


