The Role of Expertise on Visual Search Strategies and Action anticipation in Female Field Hockey Players

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Abstract

Previous research has demonstrated the role of experience in improvement of the quality of decision making and its components. The aim of present investigation is assessing the role of experience in visual search strategies and action anticipation as two phases of cognitive process involve in decision making in female field hockey players. For the purpose of this study fifty female field hockey players divided into two different experience levels (≥10 yrs. and < 10 yrs.). General information questionnaire and decision-making quality questionnaire have been used for the purpose of gathering related information. Findings of the present study revealed that, athletes with high playing experience scored higher in compare with low playing experience in relation to visual search strategies and action anticipation process, and significant correlation was found between visual search strategies and action anticipation in lower experience level group but not in higher experience group. From the results of the study we concluded that other cognitive factors may cause better anticipation with increasing level of expertise which needs further researches.

Keywords: cognitive process, decision-making, experience, field hockey

Introduction

Athletes need certain cognitive characteristics also as they are in need of well-developed physiological and technical characteristics to reach higher levels (French and Thomas, 1987; Starkes, 1987; Williams et al., 1993; Helsen and Starkes, 1999; Nougier and Rossi, 1999). These certain characteristics are applied on Athletes who plays in invasive sports such as field hockey, basketball, soccer, etc., in which they compete at the same field as their opponents. Invasive games are time dependent games such goal-throwing, try scoring and goal striking games. A characteristic of invasive game players is that they constantly need to adapt to opposition by punctual adaptation to new play configurations and to the circulation of the ball (Gréhaigne and Godbout, 1995). In invasive team ball game such as hockey, players have to deal with a complex and rapidly changing environment while making decision for their next best move (Almond, 1986; Williams, 2000; Hughes and Bartlett, 2002).

Behavioral studies show that high level experience athletes exhibit high execution accuracy and excellent performance in action anticipation of rapid and complex motor tasks. In particular, high level experience athletes are able to make decisions within limited time when the game is in progress (Allard et al., 1980; Starkes and Allard, 1983; Starkes, 1987; Bard and Goulet, 1994; Williams et al., 1999).

Many researchers have attempted to determine the importance of some phases of decision making process including visual perception and/or action anticipation in different sports and most of the studies in this concept conducted upon striking based sports and team ball sports such as tennis, basketball, cricket, field hockey, soccer, rugby, and volleyball, in which they focused on the difference between experts and novice players to show the effect of experience on quality of decision making (Houlston & Lowes, 1993; Williams & Davids...
The difference between elite athletes and novices in action anticipation may be resulted from better visual perception in elite athletes compared to novices. Previous studies revealed that the methods elite athletes and novices used to extract visual information for action anticipation are different (Abernethy, 1990, 1991; Williams and Davids, 1998; Abernethy et al., 2005) and that elite athletes might extract kinematic information of observed domain-specific actions to predict their future course more efficiently than novices (Ward and Williams, 2003; Overney et al., 2008). In this regard, many studies focused on the different contribution of motor and visual expertise in the perceptual advantage of elite athletes.

Action anticipation is highly relevant to motor skills. Visual perception is an active process of locating and extracting visual information from the environment and integrating them with other sensory inputs. In addition, various cognitive factors including past experience, motivation and development are involved in incorporating all the integrated information in visual perception. (Wu, Y. et al. 2013).

The study focused on relationship between visual search strategies and action anticipation as two of different phases of cognitive process and also role of experience on visual search strategies and action anticipation to find out that visual perception is involved in the action anticipation in female field hockey players with considering their expertise levels.

Materials and Methods

Participants

For the purpose of this study 50 female field hockey players have been divided into two equal groups with (≥ 10 Years, and <10years) playing experience. Participants were playing in fixed playing position including goalie, forward, fullback or midfielder at least for two years.

Measures

According to the research objectives, general information questionnaire (individual) required by the study included demographic information and also decision-making quality questionnaire which was loosely based on an inventory of Elferink-Gemser et al. (2004), have been used. This questionnaire was included two subscales: 1) Visual search strategies 2) Action anticipation. Each item has been assigned a score ranging from 1=very poor to 5=excellent based on self-rated on-field performance of the players.

Internal consistency and test-retest measure have been used to found out the reliability of the questionnaire that each one was at acceptable level. Validity of this questionnaire was determined by helping some of expert coaches of field hockey of India.

Procedures

Two questionnaires including general information questionnaire and decision-making quality questionnaire as evaluation tools, distributed between participants. They have been divided into two groups according to their playing experience (≥10 years and <10 years). The participants were asked to answer the questions as they are, not as they think or desire to be. All completed questionnaires were collected after a few days.

Results

Descriptive statics of age and playing experience of each group of participants have been tabulated (table1).

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Experience</td>
<td>25</td>
<td>19.72</td>
<td>2.05</td>
<td>17.00</td>
<td>24.00</td>
<td>7.40</td>
<td>.86</td>
<td>5.00</td>
<td>9.00</td>
</tr>
<tr>
<td>High Experience</td>
<td>25</td>
<td>22.12</td>
<td>2.96</td>
<td>17.00</td>
<td>27.00</td>
<td>14.28</td>
<td>2.55</td>
<td>11.00</td>
<td>20.00</td>
</tr>
</tbody>
</table>
Visual search strategies scores showed significance difference between two levels of expertise, t (48) = 4.83; p<.05. The mean of visual search strategies scores in low experience group was (Mean=3.35; SD=.47) and mean of high experience group was (Mean=4.07; SD=.60).

Similarly, we found that there was a significant difference between two level of expertise in relation to action anticipation process t (48) = 4.39; p<.05. The mean of action anticipation score in low experienced group was (Mean=3.60; SD=.57) and mean of high experience group was (Mean=4.20; SD=.38). The results appear in Table 2.

<table>
<thead>
<tr>
<th>Variables</th>
<th>t</th>
<th>df</th>
<th>Sig(2-tailed)</th>
<th>Mean difference</th>
<th>Std. Error Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual Search Strategies</td>
<td>4.83</td>
<td>48</td>
<td>.000*</td>
<td>.73</td>
<td>.15</td>
</tr>
<tr>
<td>Action anticipation</td>
<td>4.39</td>
<td>48</td>
<td>.000*</td>
<td>.60</td>
<td>.14</td>
</tr>
</tbody>
</table>

*.significant at the 0.05 level

Moreover, we found a strong, positive and significant correlation between visual search strategies and experience level r (50) = .65; p<0.01 and also there was a strong, positive and significant correlation between action anticipation and experience level r (50) = .54; p<0.01.

On the other hand, the findings of this study indicated that, there was a strong, positive and significant correlation between visual search strategies and action anticipation r (25) =.47; p<0.01 in low experienced group but there was a weak, positive and not significant correlation found between visual search strategies and action anticipation r (25) =.27; p=.41 in group with high playing experience. The results show in Table 3.

<table>
<thead>
<tr>
<th>Levels of Experience</th>
<th>N</th>
<th>Pearson Correlation (r) between visual search strategies &amp; action anticipation</th>
<th>Sig(2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Experience</td>
<td>25</td>
<td>.47</td>
<td>.019*</td>
</tr>
<tr>
<td>High Experience</td>
<td>25</td>
<td>.17</td>
<td>.41</td>
</tr>
</tbody>
</table>

*. Correlation is significant at the 0.01 level (2-tailed)

Discussion and Conclusion

This investigation examined the difference between visual search strategies and action anticipation and also relationship between visual search strategies and action anticipation with regard to experience level in female field hockey players. Moreover, we investigated the relationship between visual search strategies and action anticipation in different playing experience levels.

As predicted, athletes with more experience compared to less experience exhibited better scores in visual search strategies and action anticipation, furthermore positive correlation found between visual search strategies and action anticipation with playing experience. The results were consistent with previous studies (Abernethy, 1990, 1991; Williams and Davids, 1998; Abernethy et al., 2005; Urgesi et al., 2012 and Wu Y. et al. 2013) and suggested that expert athletes have higher abilities in visual search strategies and action anticipation; therefore it can be stated that along with the increase level of experience, visual search strategies and action anticipation will improve.

Previous studies have suggested that elite athletes have a higher ability in action anticipation and visual search strategies than novice which confirmed our findings that level of experience has significant effect on action anticipation and visual search strategies in female hockey players as field hockey players with more than ten years playing experience scored themselves higher in term of perceived on-field action anticipation and visual search strategies in compared with those players with less than ten years playing experience. The results of our study supported findings of Ericsson (1996) that amount of experience and deliberate practice is required for each athlete to achieve a level of motor and cognitive expertise in sport and moreover sportsmen will able to make right decision in right moment. Additionally, prolonged playing of a sportsman in a specific sporting code, for example field hockey, can effect on sportmen’s mental capabilities associated with expert performance in that sport which will help to sportmen to store on-field experience in long-term memory to inform and guide the decision made in every new playing situation.

However, the result of this study and also previous studies revealed that experts exhibit higher visual perception and action anticipation in compare with novice players, but this may not highly related to better
visual perception in athletes as we considered other results of this investigation in relation to the relationship between visual search strategies and action anticipation in each group. The role of visual search strategies on action anticipation was higher in low experienced group in compare with high experienced group; so, we interpreted from these findings that the role of other factors such as past experience may increase by increasing experience level of players or in other words other cognitive factors may cause better anticipation with increasing level of expertise which needs further researches.

Conflict of interest

The authors declare no conflict of interest

References
