International Journal of Physical Education and Sports Sciences
Vol. 14, Issue No. 2, April-2019, ISSN 2231-3745

Analysis of Visual Fixation between Sub Junior and Junior Badminton Players

Singh Surchand Mayanglambam*

Ph.D. Scholar, LNIPE, Gwalior (MP)

Abstract – The visual fixation is the ability to maintain of the visual gaze on or around a certain point. The fovea of the eyes inculcates this task. It consists of functioning of set of cognitive functioning that decides the selection of apropos and the filtering out of irrelevant visual information from current scene ahead. It is one of the major factors that influence the performance in the wide range of sports. The research was aimed to determine and compare the visual fixation of sub junior and junior badminton players. According to the reviews of the related literature it was hypothesized that junior players would have more number of visual fixations than sub junior badminton players. The experiment was conducted on 16 badminton players (N= 8, in each category). The sub junior and junior player's age ranged between 10-14 years (mean and SD 12.58 ± 1.68) and 15-18 years (mean and SD 17.00 ± 1.41). Tobii-Pro Glasses 2 was used to count the number of visual fixations while performing 20 forehand drop shots. The players had to attempt shuttles fed by two feeders from the opponent's court in a random fashion. The study concluded with the result that the junior players tend to have more number of fixates than the sub junior players on the area of opponent's court. Thus it was seen that the sub junior players had the upper hand during the performance of their strokes because they had more visual information thus in a better position to trap the opponent to force him make a weak return. Due to wider peripheral vision the information gathered from the opponent's court become easier for the players to execute the appropriate skills at the right place so as to push the opponent for a no or a weak reply.

----------♦----------

INTRODUCTION

In the era of giving and bringing out the best in everything a human does, the field of sports and performance has never been aback. Thus with the advancement of science and technology the enhancement of sports performances has been a matter of major interest and importance. It is known that sports performance fundamentally depends on a complex set of brain functions engaged once visual signals relayed from the eye. This mechanism of seeing, perceiving, understanding and bringing about some response basically through coordinated movement of the limbs plays a major difference when it comes to manipulation of small muscles for performance of fine motor skills.

The human brain with the capacity of processing numerous information at a time gets most of these information from the eye sight indulging the nervous system. A study by Millar and Clapp (2011) inspected a number of these neural mechanisms-focusing specifically on the critical role of attention in representing the visual processing that takes place leading up to a decision. With the advancement of research in the field, a theoretical concept explaining these brain functions is the 'Perception-Action Cycle'. It is a theoretical construct including the multilevel chain of neural operations that on the basis of one's multimodal sensory experiences are required to effectively guide the action to be performed. Realizing the fact that the vision does not only have eyes on its duty but also a coordinated set of brain mechanism to translate it into an input information to bring about a desired action. Thus in sports too performances are based on efficient use of the visual system that requires to focus their attention on the most appropriate cues to collect only the relevant details. It is therefore not surprising that with time and perfection over their events expert players have been shown to be more efficient from non-experts in the specific measures of attention allowance and acquisition of information.

Learning from the fact that the better performers have more number of fixates a short gaze at various points can be seen as an effort to gather more information. Such information can provide a player a step of advantage when he uses the ability to make quick and precise judgements on the basis of how the opponents move. Badminton being a game of great speed and precise strokes requires ample of confident strokes forcing the opponent into an uncomfortable situation, forcing a weak return. In such situation use of the entire fixates to make one quick decision under the constraint of time and game pressure is the mechanism to be run by the

coordination between the eye, the brain then the body synchronising well to give the best possible outcome.

In support of this prediction, evidence has been presented for the greater use of advance (preflight) cues by expert ball players (Abernethy & Russell, 1984; Jones & Miles, 1978; Starkes & Deakin, 1984) and for the immense capacity of expert players to chunk, encode, and retrieve structural aspects of ball sport displays (e.g. , Allard & Burnett, 1985; Allard, Graham, & Paarsalu, 1980). Some indirect evidence from visual search studies in sport (e.g., Bard & Fleury, 1976; Bard, Fleury, Carribre, & HallC, 1980; Vickers, 1985) and ergonomics (e.g., Kundel & La Follette, 1972; Mourant & Rockwell, 1972) also suggests possible spatial differences in the cue usage of expert and novice performers.

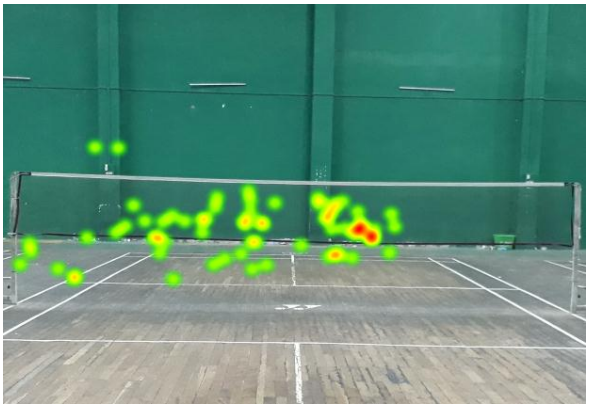
It's always been seen that studies done on vision the focus has remained to its role in perception and its cognitive aspect only. Along the change of generation of ever expanding technological advancements and interest of studies on the eye movements, which have been known as an information-seeking mode about visual perception is under growth, though lesser attention was paid to the way in which vision could control our actions, particularly the basic motor abilities. Such studies will definitely benefit the context of research in sports where the understanding of performance and its enhancement can be greatly influenced. Visual fixation is an important factor amongst others which need a lot of further information through experiments and studies in order to expand the depth of the topic, the science of vision and its influence on sports performance. So it is interesting to investigate the eye movement behaviour and the number of fixates upon a game. The present study focuses to promote the knowledge of differences in visual fixation between sub- junior and junior badminton players' while performing the forehand drop shot.

METHOD

The study was conducted on 16 badminton players (8 in each category). The sub junior and junior players' age ranged between 10-14 years (mean and SD 12.58 ± 1.68) and 15-18 years (mean and SD 17.00 ± 1.41). Two feeders randomly fed the shuttles from the opposite side of the player position in the badminton court. The eye-movement of the subjects was recorded with the help of Tobii-Pro Glasses 2 while hitting 20 forehand drop shots and the number of visual fixation was measured. Further the recorded videos were analysis with the help of Tobii-Pro Analyser.

RESULT AND DISCUSSION

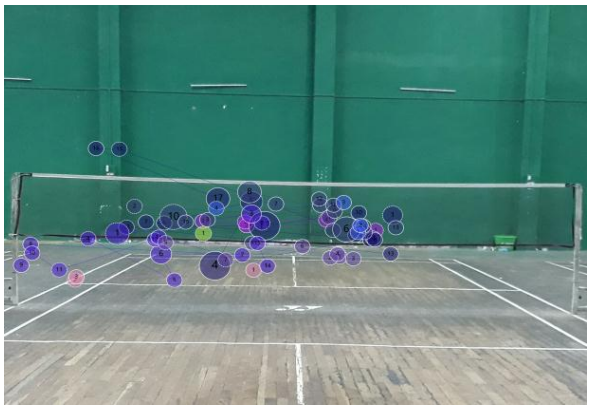
A



B

***Figure 1*: Heat map of junior (a) and sub-junior (b) badminton players during forehand drop shot.**

A



B

***Figure 2*: Gaze plot of junior (a) and sub-junior (b) badminton players during forehand drop shot.**

Visualization can be shown in two ways, i.e. heat map and gaze plot. Figure 1 shows the visualization of eye in the form of heat map over the snapshots taken separately during the study. Warmer colour (red/orange/yellow) in the snapshot represent more gazing time, and cooler colour (green) indicates less gaze time.

Figure 2 shows the visualization of eye gaze pattern, where the sequence of the gaze point was indicate in numbers and the size of the circle over the snapshot represent the duration of fixation on the particular point, the bigger circle indicates the longer fixation duration. The different colours of the fixation marked circles indicates different players, each with unique colour. The more circles appeared on the snapshot shows the more frequency of the fixation occurred.

In this study, it was found that the junior players fixated more with shorter visual fixation time (shown in figure 1.a & 2.a), on the other hand the sub-junior players fixated less with longer visual fixation time (shown in 1.b & 2.b). The sub-junior players concentrated in few areas precisely in the shuttle feeding areas. In the game like badminton one have to collect as much information from the opponent count, this will help players to get better ideas about the opponent's positions and more accessible in selection of appropriate strokes.

DISCUSSION AND CONCLUSION

In some target or shooting game like archery, shooting, dart, etc. it is known to be beneficial for the player to hold his focus to the specific target area. But in the game like badminton, the player have to pay attention to several different areas, as often occurs in other sports also, it is more convenient to have a wider point of fixation in order to include wider areas of the courts along with the position of the opponent. In addition, and most importantly, it will help the player in the selection of strokes and the decision making before positive execution of strokes.

Within the limits and limitations of the study and on the basis of obtained results it was found that the junior badminton players have more number of visual fixation in comparison to sub-junior badminton players. The results of the present study to a great extend is in consonance with the findings of the study conducted by Gegenfurtner et al. (2011) in some of the similar parameters.

REFERENCE

Abemethy, B., & Russell, D.G. (1984). Advance cue utilisation by skilled cricket batsmen. *Australian Journal of Science and Medicine in Sport*, 16(2), pp. 2-10.

Allard, F., & Bumett, N. (1985). Skill in sport. *Canadian Journal of Psychology*, 39, pp. 294-312. http://dx.doi.org/10.1037/h0080063

Allard, F., Graham, S., & Paarsalu, M.E. (1980). Perception in sport: Basketball. *Journal of Sport Psychology*, 2, pp. 14-21. https://doi.org/10.1123/jsp.2.1.14

Bard, C., & Fleury, M. (1976). Analysis of visual search activity during sport problem situations. *Journal of Human Movement Studies*, 3, pp. 214-222.

Bard, C., Fleury, M., Carri&re, L., & HallB, M. (1980). Analysis of gymnastics judges' visual search. *Research Quarterly for Exercise and Sport*, 51, pp. 267-273. https://doi.org/10.1080/02701367.1980.10605195

Gegenfurtner, A., Lehtinen, E. & Säljö, R. Educ Psychol Rev (2011). Expertise differences in the comprehension of visualizations: a meta-analysis of eye-tracking research in professional domains. *Educational Psychology Review*, 23: pp. 523. doi:10.1007/s10648-011-9174-7

Jones, C.M., & Miles, T.R. (1978). Use of advance cues in predicting the flight of a lawn tennis ball. *Journal of Human Movement Studies*, 4, pp. 231-235.

Kundel, H.L., & La Follette, P.S. (1972). Visual search patterns and experience with radiological images. *Radiology*, 103, 523-528. DOI: 10.1148/103.3.523

Miller, B.T., & Clapp, W.C. (2011). From vision to decision: the role of visual attention in elite sports performance. *Eye & contact lens*, 37 3, pp. 131-9. doi: 10.1097/ICL.0b013e3182190b7f

Mann, D.T., Williams, A.M., Ward, P., & Janelle, C.M. (2007). Perceptual-cognitive expertise in sport: a meta-analysis. *Journal of sport &*

exercise psychology, 29 4, pp. 457-78. https://doi.org/10.1123/jsep.29.4.457

Mourant, R. R., & Rockwell, T. H. (1972). Strategies of Visual Search by Novice and Experienced Drivers. *Human Factors*, 14(4), pp. 325–335. https://doi.org/10.1177/001872087201400405

Ripoll, H. (1988). Analysis of visual scanning patterns of volley ball players in a problem solving task. *International Journal of Sport Psychology*, 19(1), pp. 9-25.

Starkes, J. L., & Deakin, J (1984). Perception in sport: a cognitive approach to skilled performance. In W. F. Straub & J. M. Williams (Eds.), *Cognitive sport psychology*. Lansing, NY: Sport Science Assoc. pp. 115-128.

Corresponding Author

Singh Surchand Mayanglambam*

Ph.D. Scholar, LNIPE, Gwalior (MP)

bhanuindia86@yahoo.com