Cue usage in volleyball: a Time course comparison of Elite, Intermediate and non-experienced players

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Introduction. In volleyball, one can not interrupt the opponents game, so a volleyball team has to anticipate and be prepared to counter or defend an attack. Research on visual search in volleyball[1,2] and other ball sports[3] has suggested that, unlike non-experienced volleyball players, experienced players do not keep their eyes on the ball continuously. They only watch the first part of ball flight and then watch the setter. However, these experiments were performed on one isolated action (pass) and with only one opponent (setter). Because the presence of more opponents has an effect on the visual behavior[4], this study examined the visual behavior of a realistic volleyball situation with six opponents.

Methods: Ten professional volleyball players, ten Intermediate level volleyball players and twenty Non-experienced students, all female and between 18 and 24y old (av.20), were asked to watch twenty film fragments projected on a large screen. Fragments showed a volleyball situation (reception-pass-attack) with passes forwards, backwards or in the center. Participants were asked to react as quickly and accurate as possible to the set by moving in the same direction, imitating the movement of a counter. Eye movements were recorded with an eye tracker and reaction time was recorded by reaction sensors. Fixation location was analyzed in function of three moments: reception, when ball reaches highest point (BHP) and pass.

Results: Reaction time of Non-experienced participants (N) was significantly higher than RT of Intermediate (I) and Elite (E) group (E: 0.24s ±0.06; I: 0.25s ±0.03; N: 0.35s ±0.35), no difference was found between E and I. E was significantly more accurate than I and N (E: 97.5% ±3.5; I: 91.5% ±4.7; I: 83.5% ±17.55), no difference was found between I and N. Similar gaze patterns were found for the three groups but more experienced players changed fixation more consistently on specific moments, i.e. reception and pass. Immediately after reception only 10% of fixations to receiver are maintained by E while this is 27% for I and 42% for N. Difference was significant between E and N. Subsequent to BHP, none of the E still fixated the ball while 40% of the fixations of I and 39% of the fixations of group were still directed to the ball. No significant difference was found between I and N group.

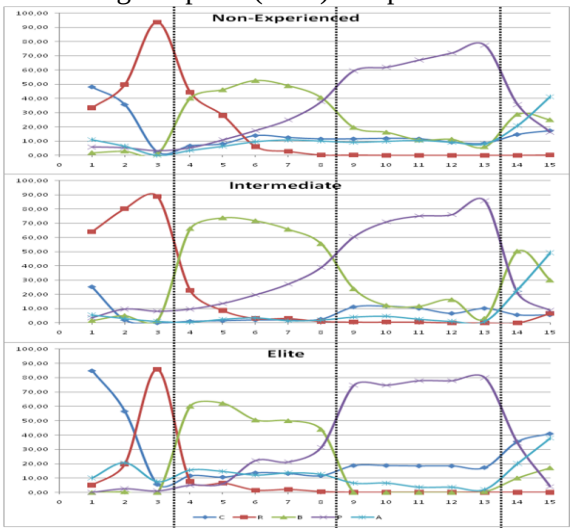

Fig.1: Time course of gaze location. Start graph: Ball on screen, Stop: contact spiker-ball. C = Central, R = Receiver, B = Ball, S = Setter, A = Attacker. Lines indicate Reception, BHP and Pass

Conclusions: All groups use a similar gaze strategy but E use it more consistently. Possibly E needs less time to process the visual information and therefore are able to switch their gaze sooner. An alternative explanation is that E have a better knowledge of the game and visually anticipate on it. There was a remarkable decrease in 'ball watching' after BHP. This adds to the suggestion that volleyball players do not follow the whole trajectory but only watch it to BHP. After this point, future trajectory can be predicted and gaze is directed to the setter to search for advanced cues which can reveal the direction of the pass.

References (listed by authors following the MSSE model)

1. Piras, A., Lobietti, R., Squatrito, S. A study of saccadic eye movement dynamics in volleyball : comparison between athletes and non-athletes. *J sports med phys fitness* 50 : 99-108,2010
2. Wright, D.L., Plaesants, F., Gomez-Meza, M. Use of Advanced Visual Cue Sources in Volleyball. *J Sport Exerc Psychol* 12 : 406-414, 1990
3. Abernethy, B. Visual Search Strategies and Decision-Making in Sport. *Int. J Sport Psychol* 22 : 189-210, 1991
4. Vaeyens, R., Lenoir, M., Williams, A.M., Philippaerts, R.M. Mechanisms Underpinning Successful Decision Making in Skilled Soccer Players : An Analysis of Visual Search Behaviors. *J Mot Behav* 39 (5) :395-408, 2007