Badminton Player’s Skills Improvement after Visual Training

Abstract
In this study we try to show the effect of visual training on professional badminton player’s skills.

Keywords: Badminton; Visual skills; Hand eye coordination; Facility of accommodation; Facility of vergence

Introduction
There can be no doubt that that athlete’s visual skills (good or bad) have a significant impact (positive or negative) on their performance. Optometrist have demonstrated that visual skills like all physical skills can be taught, trained, practiced and perfected [1-5]. We are not talking about having clear vision, which is very important, but also about improving dynamic visual acuity, eye focusing and teaming skills, visual spatial perception, and visual processing speed, visual reacting and response, Hand-eye coordination and peripheral awareness [6-9].

Most players are similar in size, speed and conditioning and all learn basic technique, but we have found one of the critical differences between athletes are their visual skills and visual abilities. It has proven in many researches and we can find it in many articles. Chances are that every athlete can improve in one or more visual skills area, i.e. dynamic visual acuity, visual recognition skills, depth perception, tracking or focusing abilities or even eye sight. Vision is the key of victory in all sports and vision performance exercises will become an integral part of athletic training in the near future [10-12].

Badminton is a multidisciplinary skill. A successful player need good physical fitness but, hand eye coordination (HEC) and visual skills may be very useful for players. In our study, the eye works performance program has been designed to provide visual skills assessments and training for all athletes. Using the eye works testing protocol; each athlete’s visual motors skills and sport skills are measured and recorded. We had chosen 40 badminton players and train them for 10 sessions and every session had take 40 minutes. But because their differentiation of their skills and level of their sport, we focused on professional athletes who had similar sport levels and sport skills [13-16].

In this study we try to show the effect of visual training on professional badminton players’ skills. We have decided to focus on trainings which are affected on facility of vergence and facility of accommodation and hand eye coordination.

Material and Methods
Seven female badminton players that have play badminton for at least 5 years participated in this study. Routine and basic ocular and eye examination was done for every subject. Vergences and accommodation facility and hand-eye coordination (HEC) was recorded for every subject at the beginning of this study. Specific training for development of vergences and accommodation facility and HEC was done for all subjects. Vergences and accommodation facility and HEC have been measured and trained for ten sessions (Charts 1-8).

Two badminton coaches separately evaluate the players’ skills. These skills include right and left drop, net and toss.

We focused on these visual skills:

i. Dynamic visual acuity
ii. Eye tracking
iii. Eye focusing
iv. Peripheral awareness
v. Visualization
vi. Visual memory
vii. Fusion flexibility and stamina
viii. Depth perception
ix. Eye-hand speed
x. Eye-foot speed
xi. Anticipation speed
xii. Eye body speed

And then we tried to exercise some of these skills by using these practices:

i. Vergence facility
ii. Accommodation facility
iii. Saccadic and pursuit
iv. HEC
v. Visual acuity at far was measured using the standard Snellen chart
vi. Visual acuity at near was measured using the standard E chart

vii. Dynamic visual acuity was measured using the standard Dynamic Rotator

viii. Pursuit and saccadic eye movement was measured using the standard Wayne Saccadic Fixator

ix. Accommodation facility was measured and trained by using the (+,-) 2.50 lenses method

x. Vergence facility was measured and trained by using the standard prisms bar

xi. Hand-eye coordination, Eye-hand speed was measured and trained by using standard SF

xii. Visual memory was measured and trained by using standard SF

xiii. Stereopsis was measured using standard stereo fly test

xiv. Peripheral awareness was measured and trained by using the standard PAT

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**Chart 1:** Visual skills and performances have shown by these charts: In these charts, Vertical lines shows the scores and Horizontal lines shows the Athletes.

HCE: OD: Hand-eye coordination before training (blue line) and after training (red line) in right eye.

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**Chart 2:** OS: Hand-eye coordination before training (blue line) and after training (red line) in left eye.

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**Chart 3:** OU: Hand-eye coordination before training (blue line) and after training (red line) in both eyes.

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**Chart 4:** Facility of Vergences: FAR: Facility of vergences at far before training (blue line) and after training (red line).

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**Chart 5:** Near: Facility of vergences at near before training (blue line) and after training (red line).

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**Chart 6:** Accommodation Facility: OD: Accommodation Facility in right eye before training (blue line) and after training (red line).
Results

The test result indicates that training could benefit the athlete’s. It means our sport vision training program is developed to strengthen and enhanced the individual motor skills. We discuss our recommendation with athletes and their coaches and we measured their sport skills with collaboration with their professional coaches. The results show there is a significant (p<0.05) improvement in badminton players skills after visual trainings. The number of fouls in “right and left drop, net and toss” significantly (p<0.05) decreased after vergences and accommodation facility and HEC trainings (Table 1-7). Visual skills and performances (vergences and accommodation facility and HEC) show significantly (p<0.001) than sport skills.

Table 1

| Athlete NO.1 | Before training | After training |
|--------------|-----------------|----------------|
| Right hits   | Foul            | Right hits     | Foul |
| Right Drop   | 20              | 25             | 5    |
| Left Drop    | 23              | 22             | 8    |
| Net          | 18              | 18             | 12   |
| Toss         | 30              | 33             | 2    |

Table 2

| Athlete NO.2 | Before training | After training |
|--------------|-----------------|----------------|
| Right hits   | Fouls           | Right hits     | Fouls |
| Right Drop   | 25              | 30             | 0    |
| Left Drop    | 24              | 28             | 2    |
| Net          | 22              | 25             | 5    |
| Toss         | 30              | 31             | 4    |

Table 3

| Athlete NO.3 | Before training | After training |
|--------------|-----------------|----------------|
| Right hits   | Fouls           | Right hits     | Fouls |
| Right Drop   | 22              | 26             | 4    |
| Left Drop    | 20              | 23             | 7    |
| Net          | 20              | 21             | 9    |
| Toss         | 30              | 33             | 2    |

Table 4

| Athlete NO.4 | Before training | After training |
|--------------|-----------------|----------------|
| Right hits   | Fouls           | Right hits     | Fouls |
| Right Drop   | 22              | 25             | 5    |
| Left Drop    | 23              | 24             | 6    |
| Net          | 20              | 26             | 4    |
| Toss         | 29              | 33             | 2    |

Table 5

| Athlete NO.5 | Before training | After training |
|--------------|-----------------|----------------|
| Right hits   | Fouls           | Right hits     | Fouls |
| Right Drop   | 22              | 28             | 2    |
| Left Drop    | 24              | 25             | 5    |
| Net          | 22              | 24             | 6    |
| Toss         | 32              | 33             | 2    |

Table 6

| Athlete NO.6 | Before training | After training |
|--------------|-----------------|----------------|
| Right hits   | Fouls           | Right hits     | Fouls |
| Right Drop   | 23              | 25             | 5    |
| Left Drop    | 26              | 26             | 4    |
| Net          | 22              | 24             | 6    |
| Toss         | 32              | 33             | 2    |
### Discussion and Conclusion

Ocular accommodation and fusional vergences were improved more rapidly and prominently after visual training. Sport performances showed slower, but, significant ($P<0.05$) changes after visual trainings. It seems, sport activities are more complicated than visual tasks. Improvement in visual performances may be so critical for badminton players. A developed visual system may provide “faster, more accurate and enough spatial and temporal information. This information may help the players to predict, estimate and judge the shuttlecock, racquet, net, court layout and opponent player. Therefore, HEC and visual training may be useful for badminton players. Evaluation of visual skills may be a powerful tool for talent finding or improving the sport skills of any players (Table 8).

### Table 7

| Athlete NO.7 | Before training | After training |
|---------------|-----------------|----------------|
|               | Right hits | Fouls | Right hits | Fouls |
| Right Drop    | 21 | 9 | 23 | 7 |
| Left Drop     | 22 | 8 | 23 | 7 |
| Net           | 20 | 10 | 24 | 6 |
| Toss          | 29 | 6 | 31 | 4 |

Tables 1-7: The score before and after training and the number of fouls in right and left drops net and toss hits before and after training in the tables above.

### Table 8

This table shows the scores of visual skills before and after training.

| Athlete | HCE | Vergence Facility | Accommodation Facility |
|---------|-----|-------------------|------------------------|
|         | OD  | OS | OU | OD  | OS | OU | NEAR | FAR | NEAR | FAR | OD | OS | OU | OD | OS | OU |
| Athlete 1 | 75 | 72 | 88 | 85 | 82 | 92 | 6 | 11 | 17 | 19 | 25 | 25 | 20 | 25 | 26 | 23 |
| Athlete 2 | 60 | 66 | 77 | 70 | 75 | 80 | 8 | 6 | 11 | 20 | 15 | 17 | 19 | 18 | 23 | 20 |
| Athlete 3 | 73 | 70 | 85 | 89 | 81 | 102 | 11 | 15 | 14 | 15 | 17 | 22 | 16 | 25 | 22 | 23 |
| Athlete 4 | 77 | 71 | 80 | 80 | 81 | 85 | 18 | 20 | 22 | 22 | 20 | 21 | 16 | 24 | 22 | 20 |
| Athlete 5 | 80 | 74 | 90 | 95 | 77 | 100 | 11 | 15 | 16 | 16 | 20 | 18 | 15 | 20 | 20 | 15 |
| Athlete 6 | 71 | 71 | 90 | 95 | 80 | 93 | 9 | 5 | 12 | 13 | 19 | 16 | 17 | 25 | 23 | 18 |
| Athlete 7 | 60 | 70 | 83 | 85 | 90 | 96 | 4 | 9 | 12 | 12 | 9 | 11 | 8 | 12 | 12 | 10 |

The professional athletes in the high-speed sport which demand superior skills in balance, precision and perception have exceptional visual prowess. Sport vision offers training techniques to help achieve the alpha brain pattern characteristic of achieving “focus” or “in zone” facilitating sporting excellence. Visual rehearsal program together with Bio-Feed Back Mechanism pushes Sport vision beyond simple mechanism (Table 9).

We have proven that visual skills increased by visual trainings and it affected on sport skills directly, but in high speed sports like badminton, some other special skills may affected on our results, some skills like the ability of “prediction” which is a complicated brain skills in an athlete that help him or her to predict the place of shuttlecock in every hit which has send to him or her, without even seeing it. These special abilities can be increased by practicing just like visual skills and affected on sport skills too (Table 10).

### Table 9

These 2 tables are just for one of our athletes. We have 14 tables like this.

| Sessions | Acc. facility | Vergence facility | HEC |
|----------|---------------|-------------------|-----|
| N0.1     | OD:20/OS:18/OU:15 | Near:12/Far:11 | OD:80/OS:74/OU:90 |
| N0.2     | OD:12/OS:23/OU:18 | Near:15/Far:15 | OD:73/OS:70/OU:100 |
| N0.3     | OD:21/OS:23/OU:18 | Near:8/Far:8 | OD:91/OS:75/OU:115 |
| N0.4     | OD:18/OS:26/OU:18 | Near:10/Far:8 | OD:95/OS:77/OU:100 |
| N0.5     | OD:19/OS:24/OU:19 | Near:10/Far:10 | OD:100/OS:84/OU:100 |
| N0.6     | OD:19/OS:20/OU:18 | Near:10/Far:10 | OD:98/OS:90/OU:102 |
| N0.7     | OD:21/OS:23/OU:20 | Near:12/Far:12 | OD:99/OS:90/OU:108 |
| N0.8     | OD:21/OS:21/OU:19 | Near:12/Far:10 | OD:100/OS:90/OU:110 |
| N0.9     | OD:23/OS:22/OU:23 | Near:16/Far:10 | OD:100/OS:90/OU:114 |
| N0.10    | OD:23/OS:22/OU:23 | Near:16/Far:11 | OD:100/OS:90/OU:115 |

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Table 10: Sport skills for athlete no.1.

| sessions | Right drop | Left drop | Net | Toss |
|----------|------------|-----------|-----|------|
| NO.1     | 20         | 23        | 18  | 30   |
| NO.2     | 23         | 17        | 20  | 33   |
| NO.3     | 20         | 19        | 14  | 32   |
| NO.4     | 24         | 25        | 15  | 32   |
| NO.5     | 23         | 26        | 18  | 32   |
| NO.6     | 24         | 20        | 18  | 33   |
| NO.7     | 25         | 22        | 18  | 33   |

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References

1. Edward BJ, Lindsay K, Waterhouse J (2005) Effect of time of day on the accuracy and consistency of the badminton serve. Ergonomics 48(11-14): 1488-1498.
2. Torola AL, Toriola OM, Dhaliwal HS, Igboke NU (2004) Relationship between physical education student’s achievements in a French badminton service test and expert ratings of technique quality. Percept Mot Skills 98(2): 406-408.
3. Cabello Manrique D, Gonzalez-Badillo JJ (2003) Analysis of the characteristics of competitive badminton. Br J Sport Med 37(1): 62-66.
4. Neggers SF, Bekkering H (2002) Coordinated control of eye and hand movements in dynamic reaching. Hum Mov Sci 21(3): 349-376.
5. Kimberley Jeffries-Rich Sanders (2003) optometrist give athletes vision of success.
6. Lambert LD (2005) vision therapy-sport vision training neuro-optometric rehabilitation. optometrist.org
7. Schor CW, Ciufrreda KJ (1983) Vergence eye movements: basic and clinical aspect. Boston, Butterworth, USA.
8. Griffin JR, Grisham JD (1995) binocular anomalies: Diagnosis and vision therapy (3rd edn) Boston: Butterworth-Heinemann, USA.
9. North RV, Henson DB (1992) The effect of orthoptic treatment upon the vergence adaption mechanism. Optom Vis Sci 69(4): 294-299.
10. Mitchell Scheiman, Bruce Wick (2002) Clinical Management of Binocular Vision. Mitchell Scheiman & Bruce Wick (Eds.), (2nd edn) USA.
11. (Getting in the Game: Sports Performance) from (Northern Virginia Doctors of Optometry website).
12. (Summary of research on the efficacy of vision therapy for specific visual dysfunctions) by (Jeffrey Cooper, State University of New York, State College of Optometry).
13. (Visual Skill and Pole Vaulting) by (Brian Risk, National pole vault chair for Canada).
14. (Sport Vision Enhancement and Behavioral Optometry) from (AGAPE Optometry Center).
15. (Vision therapy) from (A New Vision website).
16. (Sport Vision) from (Eye Works website).