

# SPORTS VISION FEATURE

## CURRENT TRENDS IN THE UK

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Recent research<sup>1</sup> in the UK has begun to justify the role of vision in sport more directly and this work is now beginning to unify the different strands of Sport Vision, for instance:

- Correction of sight
- Orthoptics / therapy
- Sporting performance / physiology
- Nutrition
- Psychology
- Sport vision appliances

This research came out of accumulated data from the Sports Vision Association, which showed that hand and eye dominance is sport specific and varies considerably from one sport to another. This also varies from the accepted norm of about 68%, right eye right hand<sup>2</sup>. See table 1 - Eye dominance in sport.

Table 1 Incidence of eye dominance in elite sport %

| Dominance   |       | Cricket           | Archery        |         | Football            | Rifle       |
|-------------|-------|-------------------|----------------|---------|---------------------|-------------|
| Eye         | Hand  | Scottish National | Internationals | Coaches | Leyton Orient Squad | G.B. Junior |
|             |       | N = 15            | N = 16         | N = 70  | N = 18              | N = 32      |
| Right       | Right | 46.7              | 62.5           | 84.3    | 55.5                | 87.5        |
| Left        | Left  | 6.6               | 18.75          | 10      | 11                  | 3.1         |
| Right       | Left  | 6.6               | 6.25           | 2.85    | 16.7                | 0           |
| Left        | Right | 40                | 12.5           | 2.85    | 16.7                | 9.4         |
| % Cross Dom |       | 46.6              | 18.75          | 5.70    | 33.3                | 9.4         |

### SPORTING TASK

Two groups of International and National athletes from tennis and clay shooting were given specific sporting tasks wearing goggles which successively blurred their dominant and non dominant eyes. The blur, to about the UK driving standard, was achieved with graded Bangiter foil<sup>1</sup>.

From the results it was possible to conclude that clay pigeon shooting is an aiming sport and relies on good vision in the dominant eye. What was less predictable was that it also requires good depth perception to judge the speed of the bird, which apparently slows as distance increases. What was unexpected is that cross dominance may be an advantage in this sport (much higher incidence than in rifle shooting).

More surprisingly, it was found that the process of aiming in tennis in the traditional shooting sense, is subsumed by the need to anticipate or judge distance and that it was the non dominant eye which was critical to this skill, especially in very strongly right eyed right handed players.

A poignant aside, was that cross dominant athletes who have had to cope with binocular deficiencies, learn to judge depth using monocular clues much better and are therefore less affected by binocular imbalance; a less sensitive but more robust visual system. Indeed it could be argued that in some sports less that total reliance on sensory information directly from the eyes frees the memory and improves reaction time. Preliminary findings in Formula 1 racing support this theory.

The overriding conclusion was that whatever the configuration of the athletes visual system, optimal correction was the single most important consideration in competitive sport. It may follow from this that the best form of eye exercise (impossible to duplicate in the laboratory) is playing the game in the real competitive situation with optimally corrected vision.

Significantly, the proposed laws of sports vision may demonstrate a direct link between vision, occupation and behaviour for the first time and begin to bridge the gap between Sports Science and Optometry.

Based on the evidence of this research the following laws of Sports Vision are proposed:

- The primary visual skills in sport are aiming and anticipation, upon which all other skills are based.
- Visual performance is the controlling external factor\* in the development and maintenance of sporting performance throughout life. (\*Other external factors that can be influenced by coaching procedures include physiology, nutrition and psychology).
- Sporting performance is more or less dependant (according to the visual requirements of the sport) on the maintenance of the normal, established relationship between the two eyes.
- A deficiency in visual performance will inhibit the development of sporting potential through poor eye / hand / body co-ordination, but perfect eyes do not make a perfect athlete. This depends on innate physiology (-nature) and psychology (the grit in the oyster, the will to win - nurture).

These laws apply where vision is the primary sense and would have special applications in monocular athletes.

### SPORTS VISION SCREENING

On route to these results, a battery of 6 diagnostic screening tests has been developed. These are designed to measure any deficiencies in the key elements of visual performance and at the same time demonstrate to the player why each is individually important to their game. A key element in the athletes' acceptance of optometric advice is a full understanding of its purpose and benefits. They can be done individually for one player in the clinic, or given to a whole squad as part of a formal team screening.

Analytical tests measure a complex visual function, which represents a laboratory simulation of an aspect of the sport, which is visually important, like anticipation or hand eye coordination. If a team is being screened to find out who needs a full eye examination, performance on the analytical tests will be compared to the whole group and problems related to the diagnostic tests.

### DIAGNOSTIC TESTS

#### Retinoscopy

Objective measure of refractive error; long sight short sight and astigmatism.

#### High and Low Contrast LogMAR Vision

Low contrast vision is a better predictor of visual performance in real conditions of poor light, mist, dirty balls and confusing background.

#### Eye Dominance

This gives the characteristic for each player and the importance of ocular correction may vary according to the individuals' eye dominance. A consideration of eye dominance has a great bearing on the fundamental visual skills of aiming and anticipation (depth perception).

**Muscle balance** The Howell phoria chart measures the underlying tendency for the eyes to diverge or converge. Excessive divergence or convergence can be related to prescription and has a profound effect on anticipation



**The Brock String.** Demonstrates and measures the effect of muscle balance (Fixation Disparity) at a cortical level in the central nervous system and is a powerful indicator of the need to prescribe a correction or exercises. It can also be used to measure the effect of therapy.

#### Colour preference and light sensitivity (Eye Bright Test)

Colour preference is affected by light sensitivity. For instance, a liking for blue tints and a strong dislike of yellow, is diagnostic of clinically significant light sensitivity<sup>3</sup>. In outdoor sports, inadequate protection of light sensitive eyes in particular, will measurably degrade visual performance in the long and short term.

### ANALYTICAL TESTS

#### Anticipation Timing

Is measured using the Basin Anticipation timer (see above) a late response (measured to the nearest 100th of a second) is given a positive value and an early response a negative value. This is termed an analytical test which represents a complex visual task but one which is an important element of the game of cricket. Deficiencies in individual members of the squad compared to their peers may point to deficiencies in the elements of visual performance as measured by the diagnostic tests.

#### Eye Hand Coordination

Eye Hand Coordination measures peripheral awareness as well as hand eye reaction speed and can be a useful way of using vision to warm up.

### FOLLOW UP OPTIONS

1. Each player will be given a copy of their individual report and recommendations and various modes of correction will be discussed including contact lenses. It is important where possible, for the correction to be conducted in the same practice that the assessment was carried out in. In the sport vision assessment feedback is very important and some times intervention will have to be arranged out of season.

2. Eye Exercises

The term eye exercises are often misunderstood and may be subdivided into three separate areas:

**Orthoptics:** Established and optometrically proven exercises to remedy muscle imbalance and visual deficiency.

**Visual callisthenics:** Exercises designed to mobilise the extra-ocular muscles like Dynamic Fixation (see photo) and to some extent the intraocular muscles in the same way that other major muscle groups may be trained.

The physiological benefits are relatively easy to justify in terms of greater range of movement, increasing muscle tone and clearing of lactic acid build up. Eye movement is a powerful stimulant to a general physiological warm up and could be used to prepare for competition

**Clockwise from top left:** Howell Phoria for muscle balance less distortion of free space. Hand eye coordination (Acvision 1000) Adrian Moorhouse. Prof David Westerhout Zimbabwe distinguished attendee and key note lecturer at Sportfair 04. The Eye Bright Test. Basin Anticipation Timer. Brock String for fixation disparity. Tennis international Johan Kriek helping with research. Dynamic Fixation - measures eye speed and athletic potential.

using instruments like a hand eye coordination machine (Saccadic Fixator see hand eye coordination above)

It is scientifically difficult to prove that this has any effect on sporting performance.

**Therapy:** this might include visual callisthenics but embraces a much broader understanding of the visual process to include for instance, visualisation and peripheral awareness, as well as the effects of behaviour on vision and vision on behaviour. This could be considered as a panacea given to all athletes regardless of visual deficiency. The scientifically supportable approach is to correct visual deficiencies and that the best form of eye exercise is playing the game competitively. However, the work of colleagues in this field needs to be supported and understood in view of the positive feedback received.

### DIPLOMA IN SPORTVISION PRACTICE

The next phase of development in the UK will include the Diploma in Sport Vision Practice, which will take place at 5 venues throughout the country in August and September 2005. (see next page for details) This will be followed by Sportfair 06 which was inaugurated in 2004 at the International conference centre Loughborough University where the coming together of the profession and industry is uniquely supported by Sport Vision's Holistic approach to Optometry.

### ABOUT THE AUTHOR

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### REFERENCES

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