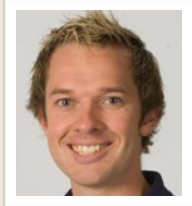


# Contact Lens Update

CLINICAL INSIGHTS BASED IN CURRENT RESEARCH

## The visual function of Olympic-level athletes

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Intuitively, some sports should rely more on certain aspects of vision (such as visual acuity and contrast sensitivity) than other sports do. Knowing the important visual parameters required for success in different sports is useful because it guides clinicians towards the types of correction<sup>1</sup> and vision training<sup>2</sup> that might improve sporting performance. But in the absence of scientific evidence, clinicians can only guess or assume what might be the important factors for a given sport.

This represents a problem, because it turns out that we are not always very good at doing so. For instance, most would expect good visual acuity to be vital in fast ball-sports like baseball and cricket, yet recent evidence shows that batting performance can be unaffected by surprisingly high levels of myopic blur<sup>3,4</sup> (and there are similar examples in golf and basketball<sup>5,6,7</sup>). So too might we expect good distance visual acuity to be essential for archery (Laby et al.<sup>8</sup> certainly do in their paper), yet the archer considered by many to be the best in the world is close to legally blind! Korean archer Donghyun Im set the 72-arrow world record at the London 2012 Olympics despite his remarkably poor visual acuity (reportedly OD 20/100 and OS 20/200).

These examples show that our assumptions about how important certain aspects of vision might be can be misguided, and therefore evidence-based clinicians need access to population data which demonstrate the visual parameters important for performance. The following review summarizes an article that provides a useful overview of what might be the visual parameters needed for good performance in eight different Olympic sports.

***Laby, D. M., Kirschen, D. G. & Pantall, P. The visual function of olympic-level athletes—an initial report. Eye & Contact Lens 37, 116-122 (2011).***

### Method

A commercially available screen-based system was used to test the vision of 157 Olympic-level athletes (72 male) from eight different sports (archery, boxing, fencing, soccer, softball, speed skating, track-and-field, and volleyball). The testing incorporated assessments of distance visual acuity, stereoacuity (contour and random dot), and contrast sensitivity (letters, gratings, and gratings with glare).

### Results

Although there was no control group of non-athletes with whom the athletes could be compared, the overall level of visual performance was good compared to what one might experience in clinical practice. More importantly, certain tests highlighted differences in visual performance depending on specializations in specific sport, supporting the idea that the visual profiles of athletes may be specific to the sport that they play.

**Visual acuity.** The visual acuity of softball players and archers were significantly better than athletes specializing in track-and-field and boxing. Otherwise, there were no statistically significant differences between the athletes.

**Stereoacuity.** There were no statistically significant differences in the stereoacuity of the athletes from the eight different sports. The archers did score lowest on stereoacuity, a finding that is not necessarily surprising given the monocular nature of the sport. The fencers scored best, consistent with the idea that stereopsis may be important in predicting the actions of an opponent in that sport.

**Contrast sensitivity.** The contrast sensitivity of the softball players was significantly better than it was for the track-and-field athletes (for both letters and a grating at high spatial frequency) and for the boxers (grating sensitivity only). There were no other statistically significant differences between the different sports, and there were no differences when sensitivity was tested with glare.

### Conclusions

These results<sup>8</sup> show that there are differences in the visual profiles of athletes from different sports, supporting the idea that clinicians should tailor their approach for athletes according to the sport that they play, rather than adhering to generalised training programs that are the same irrespective of sports.<sup>9</sup>

To give athletes the best chance of achieving their on-field potential, clinicians should maximise an athlete's level of visual performance for those parameters found to be important for their chosen sport (e.g., contrast sensitivity in baseball, stereoacuity in fencing). Caution is required, though, in excluding potential athletes who might not have the ideal levels of visual performance. The case of Donghyun Im shows that optimal visual function might not be a necessary pre-requisite for good performance, even in a sport like archery where good archers generally are found to have excellent acuity.

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