

Introduction

Elite sporting individuals already have more than adequate skills to perform at their attained level, with research showing that elite sporting individuals have better visual skills than the general population. Performance of elite sportspeople and officials is not so much judged on ability but rather the amount of mistakes made. The decisions made by officials are most often based on the perception of visual information making vision an important sense to measure and monitor.

Typically over time and with age, subtle vision changes can occur that may or may not go unnoticed. If these deficits are left uncorrected the individual will either learn to make compensations to correct these deficits or perform an increased number of on-field errors. Subtle changes to vision can alter visual perception and also either impact decision making and / or reaction times.

The purpose of this vision standards module is to create a template of standards that can be both measured and monitored across all countries without prejudice or compromise.

Why perform vision screenings?

An umpire's performance is multi-faceted with vision an important sense. Vision screenings can be an early indicator of one sense that may impact how an umpire performs on field. It is also evident that umpires of increasing age are remaining at elite level and the subtle effects of age need to be identified as early as possible to minimise any associated errors in judgement.

When should you perform vision screenings?

Vision screening for umpires should be performed routinely on a two-year basis.

Factors that could influence a more regular vision screening or examination are:

1. If the umpire has a history of cardiovascular disease (i.e. diabetes, hypertension), or,
2. If the umpire is over 55 years of age due to age-related ocular diseases.

For these individuals it is recommended that *full eye examinations* are conducted annually or at the very least, vision screenings are conducted annually.

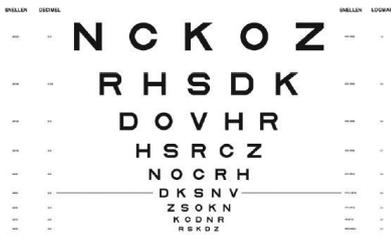
Tests and Standards Explained:

The screening being used is one that has been modified over several years. The screening is designed to uncover obvious visual deficiencies that can have an adverse effect to performing tasks or making decisions both on and off the field.

Importantly, all tests performed evaluate central visual performance and peripheral vision is not assessed. Peripheral vision seldom plays a role in decision making for cricket umpires and secondly deficiencies in central vision are the main detractors to peripheral vision due to increasing the need to concentrate.

Tests Performed:

Visual Acuity



Evaluates the clarity of sight, or visual discrimination ability, and is best known as the “letter chart”. Visual acuity is a universal standard of evaluating the ability of an individual to see small detail, and is done so using smaller and smaller letters that subscribe a smaller angle to the eye. The smaller the letter that can be seen then the better the visual acuity. Decreased visual acuity can be due to congenital issues, refractive errors or pathology. The umpire may or may not be aware of visual acuity problems.

Visual acuity testing for umpires should be performed with the form of visual correction that he or she uses on field. If the umpire has spectacles to correct his or her vision but does not wear them on the field, then visual acuity measures should be taken without correction. Similarly, if the umpire wears contact lenses on field, then testing should be with contact lenses.

A ‘fail’ for visual acuity is vision less than (6/9) in either eye or vision equal to or worse than (6/7.5) in each eye.

Correction for visual acuity is achieved through the use of spectacles and or contact lenses. Laser vision is an option for vision correction however this does not guarantee necessary visual standards and has its own set of side-effects that can affect performance, such as poorer contrast sensitivity.

It should be noted that if an individual performs poorly on visual acuity testing then he or she will also perform poorly on contrast sensitivity testing.

Contrast Sensitivity Function



This gives an evaluation to the individual’s sensitivity to detail or when contrast is not black and white. Contrast sensitivity in relation to cricket can be best demonstrated if one considers the difference in colour or tone between a new red cricket ball and a new pate-coloured bat (high contrast), versus an aging and browning white ball and an older bat (low contrast). Varying lighting conditions such as overcast conditions, changing light levels at dusk and glare can impact contrast sensitivity in cricket. Changes to the structures of the eyes including the tear film can also impact one’s contrast sensitivity. Contrast sensitivity testing is a good test for early detection of refractive errors and

even pathology.

Tests for CSF vary between professionals. Simpler testing such as the Pelli-Robson version where letters lose their contrast are a good screening tool, while more complicated sine wave grating testing could be used during a full consultation, if indicated by a “fail” during the screening process.

On vision screening, a decrease in letter recognition of 2 lines or 12 letters from the level achieved in Visual Acuity testing indicates the need for further evaluation.

Depth Perception



This test essentially measures where the individual spatially positions himself to other objects i.e. how far away he thinks an object is from him. Depth perception is interpreted through the relative size of objects and on movement parallax and is thus very dependant on the alignment and movement of the eyes.

Errors associated with poor depth perception are often reflected in having difficulty making decisions about precise movement of ball in “hot zone”, misjudgement of area on pitch where ball bounces and an inability to consistently change fixation between bowler and “hot zone”.

Causes of errors in depth perception can be congenital in origin or due to differences in acuities between each eye, incorrect visual correction, pathology or poor binocular vision and fusional reserves. Remediation is then based on the correct diagnosis of the cause of the poor depth perception.

Testing involves the use of a modified Brock String to assess the relative spatial or depth perception of the individual. A ‘fail’ in depth perception is a significant over or under alignment of perception of the string and / or significant disparity in the binocular reflex when changing fixation or gaze – the examiner needs to closely observe binocular eye movements when performing this test. A lack of physiological diplopia whether due to amblyopia or not requires further evaluation and the optometrist discuss this with the umpire at the time of screening.

Binocular Vision and Fusional Reserves



Observation of binocular asymmetry during depth perception testing should alert the optometrist to problems with binocular vision. Often the initial indication of issues is the lagging of the non-dominant eye with a change in fixation. This should be noted if present and considered borderline in repeated. A loss of fixation under cognitive load should constitute failure of binocular control and both require correction through the use of orthoptic vision training exercises.

Establishment of binocular fusional reserves serves to provide a measurable indication of binocular performance and will support any observations made with the Modified Binocular String testing. A good range of fusional reserves is necessary to avoid unnecessary visual fatigue when umpiring. When testing at near, an expected range for positive fusional reserves is a break of fusion of at least 20 prism dioptres base out with a recovery of no less than 18 prism dioptres. An expected range for negative fusional reserves is a break of fusion of at least eight prism dioptres base in and a recovery of no less than six prism dioptres.

Vertical fusion reserves should be evaluated where indicated and a difference between of base up and base down for fusion between eyes of more than 1.5 prism dioptres indicates the need for further examination.

Remediation of binocular vision deficiencies is through the use of orthoptic exercises and free space prism training. Baseline and follow up fusional reserve measure along with observations of binocular movement symmetry should be recorded.

Eye Dominance and Eye – Hand Dominance

The dominant eye is simply determined as the preferred eye for sighting a target. This is determined by having each umpire sight a target through a small hold made with both hands. Eye dominance is recorded as either RE or LE, and in the occasional instance the recording of ‘cyclops’ made be made for umpires who do not have a preferred ocular dominance. The dominant hand is the preferred hand for sport or and or writing. If the eye and hand are on the same side of the body they are classified as same dominance, and if the eye and hand are on opposite sides of the body they are classified as cross dominance.

The results from the testing of eye – hand dominance do not impact on the overall screening outcomes. However the data is useful when performing depth perception and binocular vision and can be used to determine if an umpire adopts a certain stance when tired to compensate for visual difficulties. If there is compensation and eye dominance is significant, then this can lead to a different perception of alignment between ball and player or stumps.

What Options are there for Remediation Should an Umpire Fail a Vision Screening?

Failure of a vision screening isn’t the end of the road rather it is just the beginning. The purpose of the vision screenings is to identify umpires who may be assisted by further consultation and any necessary optometric or ophthalmic intervention.

Firstly results need to be ascertained and then linked to performance in an endeavour to assist the umpire. In some cases retesting and / or monitoring the umpire can be the simple outcome, however where definite visual deficiencies are found and a direct link to performance is agreed then the following options are advised.

It must be remembered that the screenings are just that, vision screenings. They do not constitute a full eye examination. Failure of a vision screening should result in follow-up for a full eye examination and necessary remediation with a qualified optometrist or ophthalmologist. Umpires and their supervisors also need to be aware that passing a screening one year does not necessarily ensure that the same individual will pass a screening two years later, especially if age or health issues are relevant.

Visual acuity and Contrast Sensitivity:

The most likely cause for failures in these two tests is undiagnosed refractive errors (i.e. the need to correct the power of the eye with lenses.) Refractive errors typically are corrected with either spectacles or contact lenses and the need for correction when wearing sunglasses also needs to be considered and addressed. Refractive surgery is also an option however this option needs to be discussed at length as expectations are not always met with surgery and there is always the chance of regression. Other concerns are glare and flare from lights at night which could make umpiring night games very difficult. Any umpire wanting to choose this form of correction needs to be adequately evaluated and advised. As with umpires with spectacles or contact lenses, umpires who have already undergone this form of correction or who undergo this form of correction are not exempt from future vision testing due to potential post-surgical changes in their vision.

Finally any umpire who has a decrease in visual acuity or contrast sensitivity which cannot be improved upon with refractive correction needs to undergo sufficient testing to exclude pathology as a cause of failure.

Depth Perception and Binocular Control:

These two attributes are often deficient together, hence the grouping of their results and treatment. However failure of either can be exclusive of the other.

Generally speaking both of these two conditions can be improved with techniques that come under the banner of vision training (VT). Whilst some medical journals may question the relevance of vision training as the ailments seem minor (i.e. not sight-threatening) research does prove vision training to not only be effective but also able to maintain results once completed effectively. This re-aligning of the neuro-muscular pathway can be achieved between six to twelve weeks with as little as 15 minutes of VT per day.



The methodology of correcting these errors may vary between optometrists from different regions but could be expected to require two to three follow-ups of in-office VT. It would be envisaged that vision screenings are performed with the first follow-up for VT occurring the following day, say at a conference. From here the initial VT can be outlined and assigned then the umpire could either liaise with the optometrist who performed the screening or be referred to a local optometrist be the screening optometrist.

It should be noted that umpires who do have deficiencies in depth perception and / or binocular control tend to favour the use of their dominant eye far more than those who do not experience visual difficulties. As such these do umpires will benefit greatly in their in-field performance based on both body positioning and perception of ball position.

Other Visual Factors Associated with Umpiring.

Ocular Surface Disease and Dry Eyes.

Environmental and physiological changes can impact on the integrity of the ocular surface and tear film. These changes can often impair visual functions such as visual acuity and contrast sensitivity function.



Symptoms of dry eyes are the most common indication of the more general term ocular surface disease (OSD). These symptoms can manifest as either blurred vision, intermittent blurring of vision, itchy or irritable eyes and general tiredness or fatigue.

Management of symptoms is best done under the care of a health professional. Treatment options can vary from heat therapy, tear additives, antihistamines and analgesic eye drops along with the incorporation of oral omega 3 capsules and even the prescription of eyewear to protect the eyes form the environment.

Sunglass tints and filters.



Tints and filters can assist umpires by reducing glare and improving contrast. The most important aspect when choosing a lens tint or filter is to ensure that it is not too dark. Whilst a darker lens has the ability to reduce glare, it also reduces transmissible light leading to poorer contrast.

Other considerations are colour preferences, variable tint lenses and polarised lenses. All options have benefits and limitations. Due to potential changes in the umpiring environment, an umpire may prefer to have several different lens filters and densities at his or her disposal to provide an optimal viewing environment.

The trial of tints undertaken in Melbourne 2015, (during bright conditions) found the following preferences between umpires. These varying results highlight the fact that inter-individual preferences exist and that there is not one tint that will benefit all umpires. The tints used during the trial, were yellow (often referred to as an “enhancer”); red; rose; brown and grey.

The results from these trials that proved most successful were:

With viewing a red ball – 73% of umpires who trialled different tints found that a rose coloured tint improved their ability to perform, while 40% found benefit from wearing a yellow tint.

With viewing a white ball – 84% of umpires who trialled tints found that a red tint improved visual performance, 77% found benefit with using a yellow tint and 64% found benefit with a rose tint.