Visually Impaired (VI) Archery

By Tony George

What constitutes a visual impairment?

Many people have a visual defect that we describe as 'short-sighted' or 'long-sighted', but these are normally correctable using contact-lenses or spectacles. A visual impairment can thus be defined as a non-correctable defect of the eye or eyes and can be measured in two ways: visual acuity and/or field of vision.

Visual acuity (VA) is acuteness or clearness of vision. It is dependent on the sharpness of the (retinal) focus within the eye, coupled with the sensitivity of the interpretative faculty of the brain.

VA is a quantitative measure of the ability to identify black symbols on a white background at a standardized distance as the size of the symbols is varied. It indicates the size of the smallest detail that can be resolved and is the most common clinical measurement of visual function.

In the term "20/20 vision" the first figure refers to the distance in feet from which a person can reliably distinguish a pair of objects. The second figure is the distance from which an 'average' person would be able to distinguish that same pair of objects (The metric equivalent is 6/6 vision where the distance is 6 meters.)

Twenty feet is essentially 'infinity' from an optical perspective (the difference in optical power required to focus at 20 feet versus infinity is only 0.164 diopters). For that reason, 20/20 vision can be considered nominal performance for human distance vision; 20/40 (worse) vision can be considered half that acuity for distance vision and 20/10 (better) vision would be twice normal acuity.

e.g. A person with 20/200 vision would need to stand at 20 feet to make out a symbol that could be read at 200 feet by an 'average' person.

Field of vision is the angular extent of the observable world that is seen at any given moment.

Sight Classifications

A person's sight category is based on the level of sight and the visual field test. The level of sight is of their better eye with best correction, e.g.. with spectacles or contact lenses. This is the case even if they don't normally wear spectacles.

It is important to note that if someone is fully sighted in one eye they would not qualify for visually impaired sport. This is regardless of the sight level in their other eye.

Classification involves categories B1, B2, B3, B4 and B5

B1, B2 and B3 sight categories are used by most sports for international & Paralympic sport however, you should always check with the individual governing body for the exact requirements.Only the British Blind Sport recreational classification system includes B4 and B5 sight categories.

B4 and B5 sight categories allow people to participate on a level playing field for local and national sports within the UK. Please note that there are some exceptions to this standard, so please check with the sport in which you are considering or with the British Blind Sport team

So to be classified by BBS as a B3 you must be able to see at between 2 and 6 feet the same as a mainstream archer can at 60 feet.

The six most common sight impairments

With this initial understanding we can now turn our attention to the six most common visual impairments.

Macular degeneration

This a condition that causes you gradually to lose your central vision. Macular degeneration occurs when the part of your eye that is responsible for central vision (the macula) is unable to function as effectively as it used to. Macular degeneration doesn't affect your peripheral vision (your outer vision, sometimes known as "side vision"). There are two types of macular degeneration, dry and wet. Dry macular degeneration affects your eyes gradually. There is no treatment for dry macular degeneration. Wet macular degeneration is more serious than dry macular degeneration and can develop very quickly.

Cataract

A cataract is a clouding of the lens in the eye that affects vision. Most cataracts are age related and thus are very common in older people. A cataract can occur in either or both eyes. It cannot spread from one eye to the other.

Tunnel Vision

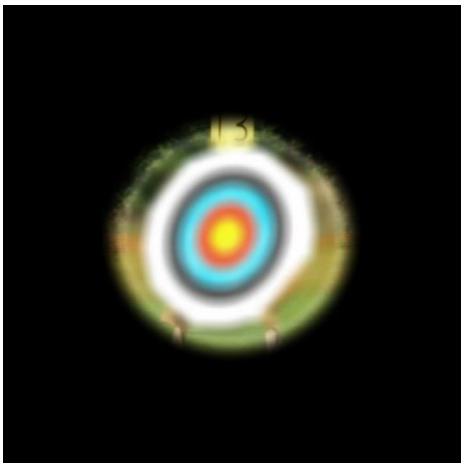
This impairment could be the result of Glaucoma (damage caused by an increased pressure of the fluid of the eye), Retinitis pigmentosa, which is a group of genetic eye conditions. Hypoxia, (lack of oxygen) or a variety of other disorders.

(Temporarily it can be the result of excess alcohol use, blood loss or even extreme anger)

Tunnel Vision plus Cataracts

This combination of visual impairment is quite common and can be the result of Retinitis Pigmentosa with associated cataract or glaucoma with cataract.

Many people with glaucoma report experiencing a blurring in their vision. This may feel similar to the way your eyes often feel when you wake up. However, if this blurred vision is a result of glaucoma, rubbing their eyes, blinking several times or even the use an eye drops to moisturize their eyes will not help.



Hemianopia

This is the result of damage to the visual pathways leading to the eye from the brain. Homonymous hemianopsia, or homonymous hemianopia, is a medical term for a type of partial blindness resulting in a loss of vision in the same visual field of both eyes. It is usually caused by injury to the brain itself, such as from a 'stroke' or trauma'.

Diabetic Retinopathy

This is a visual loss resulting from changes within the blood supply system at the retina caused by diabetes. These spots are often followed within a few days or weeks by a much greater leakage of blood, which blurs vision. In extreme cases, a person will only be able to tell light from dark in that eye. It may take the blood anywhere from a few days to months or even years to clear from the inside of the eye, and in some cases the blood will not clear.

Getting Started

The VI cannot always use the full benefit of vision, although some vision may well exist. As coaches we must thus look for methods to overcome the difficulties produced by the defect. This can be improved by simple changes to the shooting equipment given to the VI which will include arrows, bow strings and 'tactile' sighting aids. However, to shoot effectively in a mainstream club environment the VI should ideally be self-supporting with the provision of a 'spotter', but more on this will come later.

Initially when a club is approached by someone designated as 'VI', the special equipment may not be available however in the early stages it may not be required. This doesn't necessarily matter as we are not looking at international recognition at this point. 'Rule 1' is to utilize whatever sight is remaining. If the novice has enough residual sight to see the shooting line and target, however imperfect to us, it may only be required to modify the sight ring to provide the 'contrast' of sight and target to allow shooting to begin. It is only when insufficient residual sight remains that we may turn to the 'tactile' sights now commonly used.

The VI archer may in many cases, be able to use standard equipment but if difficulty is experienced with, for example, nocking the arrow, then the following suggestions may be applied to make fletching recognition easier:

- A 'notch' cut from a vane may allow arrow placement to be easily found.
- Alternatively, a 'blob' of glue or correcting fluid may be used on the shaft for the same purpose.
- A 'four fletch' arrow cannot be nocked upside down. Even the center serving can be of a distinctive colour to assist arrow placement.

'Notched Fletching'

'Blob Marked Vane'

'Four Fletched Arrow'

In Belgium and Italy the use of an 'assistant' was once common, where directions were given verbally and by touch. This may be accepted recreationally but depends completely on the dedication of the assistant and is unacceptable outside a closed group.

Once vision degrades beyond the level to use 'modified' standard equipment, the VI is unerringly directed more towards the common tactile system now used where direction and elevation are measured and duplicated time after time. To permit effective participation in and beyond a club environment it is almost certain that the VI shall also require the services of an 'assistant' who we would designate as a 'spotter'.

The provision and use of a 'spotter'

A spotter is someone who has the ability and authority to assist a VI archer. It is the responsibility of the archer to recruit a spotter and it should ideally be someone reliable and trusted by the archer as the spotter's diligence in the task is important to the success of the session. The spotter does not necessarily need to be an archer but will act as an agent for the VI to ensure that shooting safety and the transfer of necessary information to the archer is completed. Spotters and helpers are not a

replacement of qualified coaches. A spotter should:

- Understand range safety, general archery safety rules, basic archery terms
- Understand different bow types
- Explain importance of draw force line and good basic technique
- Be able to set up tactile sighting devices and foot locators
- Be able to set up a bow including fitting arrow rest, nocking point, center shot, bracing height etc.
- Undertake basic equipment maintenance. Putting on center serving, fletches, nocks etc.

Having a good understanding of archery gives spotters confidence in their own ability and this could help their relationship with their archer and encourage self-sufficiency and assist VI archers to participate more readily in mainstream clubs knowing that their spotter has some knowledge of archery. It could also give archers the confidence and encouragement to enter open tournaments. Part of the course included information on local coaches who would be able to give advice on coaching and equipment.

Equipment modifications for the VI and the 'Tactile' sighting aid

In trying to explain the reasoning behind the tactile sight I should first attempt to suggest the comparison with a mainstream archer.

Using the following scenario for the example, imagine that you have a new club member who purchases their first bow, sight and set of arrows ready for an outdoor season. You are asked to help them record 'sight marks' ready for the season. What do you need to document to allow this?

Two distinct areas need to be addressed: direction and elevation. Direction should be simple as it is developed by attention to the 'shooting line'. Simple for those with vision as it may well be marked by either a white line, tape, rope or other medium. Also, the position of the target can be seen.

Elevation is a little more difficult, but this can be addressed by the position of the sight (pin) up or down the sight bar, the extension of the sight towards or away from the riser and even the length of the face (eye to chin).

The mainstream archer can 'see' the bow sight and this sight always moves with the bow. *Quite quickly, by a little careful work with your 'novice' a list of sight-bar and sight-pin positions can be documented, and these should be relatively accurate for any venue.*

Now compare the situation that has to be considered by the VI archer. The shooting line may not be visible, nor the target nor a sight. Certainly, at international level with 'black-outs' nothing can be seen at all. It is here that the 'tactile sight' has to be used to provide the feedback that has been denied by poor vision.

Over time we have had a variety of tactile/foot locator designs and various set-up procedures but, in my opinion, it was Archery GB's senior coach Ken Bearman who applied a little more science to the set-up and developed a more sophisticated and accurate method of using the tactile. This description, unfortunately, is copyrighted to FITA as it forms part of the FITA level 2 manual.

However, without using this description word for word I believe I can pass on the theory and purpose of this method.

In essence we have the same question to pose for the VI as we did for the 'new club member' above. "How do we record direction and elevation required to shoot accurately, and on target, from the start and at any venue"?

The VI archer has only the tactile/foot locator to provide direction and elevation to the target and this 'sight' does not move with the bow. Because of this we need to be able to predict where the arrow is aimed BEFORE an arrow is shot so that the 'tactile' device is aligned accurately from the start. So how do we do this? Although we look at the tactile sight set-up as one item, it is, by design, actually two. One for direction (foot locators) and one for elevation (tripod and sight head button).

The set-up procedure described here is designed to create and mark three static points of reference in space. Later, in use, by having two of these points, we can recalculate the third.

Basic Tactile Sight design

If the VI is unable to use any residual sight as an aiming tool and has decided to use a tactile aiming device, we must now learn to understand what parts of that tool are needed and why.

For example, we accept that the 'back of the hand' is used as a physical reference, but what part and why? By referring to the picture shown it can be realized that the joint between the first finger and middle finger is preferred from a coaching perspective as it allows any 'canting' of the bow to be minimized. If 'canting' begins it should be felt by increased pressure on the middle knuckle and less on the first finger knuckle, or vice-versa. Unless this reference point is developed and maintained, elevation will vary and the bow/arrow reference can be lost as a result, thus accuracy will be lost.

Correct posture is important, as it would be with a mainstream archer. In the case of the VI archer, we will be using 'good' posture to help us to 'calibrate' the tactile to be accurate and repetitive so we have no 'guessing' when shooting starts. As the complete tactile device set-ups are 'personal' due to height and other anatomical archer variations, each set-up is unique.

What are we initially trying to do? In principle, we are trying to determine, by trial and error, three stable points of reference for a given target distance, using first the target and archers tactile as two points and calibrating a reference 'pole' as the third point. (This need only be done once at the first stage to 'calibrating' the tactile so that we can have a record of 'sight marks' similar to those we would all have for a conventional bow-sight). Once determined we can set up the archer's 'sight' at any venue by using the target and 'pole' as stable reference points and placing the tactile in line to reproduce the position first calibrated earlier.

Ken Bearman's set-up initially looks for two measurements:

- The distance from the arrow (A), where it would be positioned on the rest, to the body's center of gravity (A-B).
- The distance from the centre of gravity (B) to the back of the heels where they will contact the foot locators (B-C).

A 'quick' guide to center of gravity is often thought to be about 1 inch behind the navel or just forward of the ankle bone (B).

With an archer correctly balanced and aiming towards the target the arrow would sit on a line through 'A'. So that we can repeatedly find this line we add the distance A to B and B to C and this will give us the measure A to C (commonly about nine inches but determined by the physique of the archer).

Upon setting up the tactile foot locators **for the first time** we would now drill a vertical 'dowel' sized hole in each of the foot locator side arms at the A to C distance from where the archer's heel would touch the foot locator. Be as accurate as possible as once set, will be used each time the tactile device is set up. Two dowels are now needed, and these would afterwards become your 'directional' sight pins. In essence you now have two pins (dowels) that point along the arrows path towards the target (direction).

The next initial measurement is to find out where to put the tactile 'sight head' and tripod (elevation) and this is done as follows:

We now need to know the distance from where the arrow would sit on the rest to the contact point of the tactile sighting head (back of hand). In the image of the 'back-of hand' contact point shown earlier it can be seen marked by two white arrows.

The reason for this is to allow us to create a constant location for reference to the tactile 'sight' head. Unlike our mainstream archer the sight pin and arrow position will not be 'one above the other'.

For the sake of this description let us say that the distance from the arrow rest to the upper knuckle is two inches. We now need to find out where the tripod and tactile sight head need to be placed with reference to the foot locators and to do this we need our archer as the whole device will now become a personal piece of equipment. With our archer at 'full draw' we will mark on the foot locator a point below which the bow hand knuckle will be and fit to this area a tongue of wood that will shortly serve as our tactile head calibration marker. The tongue should be long enough to pass through an imaginary line from the two 'lining' dowels towards the target. Mark on the tongue where this imaginary line crosses over the tongue. Using the distance measured from the arrow rest to the knuckle, we can now make a mark on the tongue that should be exactly below the end point of the tactile head. In our 'test' case this is two inches closer to the foot locator. Mark this point with a nice 'dot', as this point will be used repeatedly when setting up the device in the future. We have now completed the initial calibration for 'direction'. Now for elevation.

The tactile sight head and tripod can now be placed beside the foot locators. A ‘plumb’ line is hung from the tip of the tactile head and the whole tripod unit moved until the tip of the plumb sits over the mark created on the tongue. The Tripod should now be pegged down securely. The following should be completed, initially, in an indoor environment where the floor is flat and level as the measurements taken here will be used repeatedly when setting up at other venues. For the final measurement you will need another individual and unique piece of equipment and it should be a dowel approximately the height of the archer. (Tip: for convenience an old set of tent poles that add up to the height of the archer can be used provided that they fit together snugly). On a level floor set the foot locators down facing the target, fit the dowels into the two holes and line up the dowels and target center. Tape the foot locators to the floor then set up the tripod and tactile head. Fit the plumb line to the tip of the tactile head and move the tripod until the plumb touches the mark made on the tongue. Weight down the tripod to prevent it moving.

Your archer is now required to shoot using trial and error **vertical positioning** of the tripod/sight head until the arrows strike at the center of the target. Try 20 yards first as this will be needed for indoor shooting and set the height of the tactile head about shoulder height as a starting point. Once the arrow strikes are central the archer can move aside leaving the tactile system unoccupied. Using the ‘height dowel’ mentioned earlier, place the end on the floor where your archer once stood with the lower tip in the center of where the feet would have been. Keep the dowel vertical and sight past the dowel, past the tip of the tactile head and to the center of the target. Make a mark on the dowel where this ‘invisible’ line from target Center, and tactile pin would have passed the through the dowel. Write the distance next to the mark. What you are doing is creating a three dimensional ‘notebook’ of sight marks.

Move to 30 meters and repeat this procedure. You should then have two marks on the dowel and two distances recorded. In theory you could carry this on for other distances, but a flat area is required otherwise these initial calibrations can be inaccurate.

In practice you now have all you need to set up the foot locator/tactile sight device at any venue and with pre-recorded sight marks. Variations in the ground would not matter, as you will be sighting on a point to point basis. So to cover the ‘live’ setting up in précis it is as follows:

- Lay the foot locators on the ground facing the target. Insert the two dowels and line these up to the center of the target.
- Peg the foot locators down.
- Erect the tri-pod and tactile head and fit the plumb line to the tip of the head. Move the assembly until the end of the plumb line is positioned over the ‘dot’ on the tongue.
- Peg the tri-pod down.
- Place the bottom end of the ‘sighting’ dowel on the ground between the side arms of the foot locators and keep the dowel vertical. Sight between your ‘distance’ mark on the dowel and the target Center. Move the tactile head up or down to meet this imaginary line.
- Recheck that the tactile head is still vertically above the mark on the tongue. If so your VI is ready to shoot on target from the start. Slight variations for any reason, wind, weather or equipment can now be accomplished in a confident manner.

This guide is an excerpt from 'Pass it on: Disability Awareness', a book assembled by Helen George (Paralympic Coach) to give coaches and volunteers greater understanding of the issues facing archers with a disability and the confidence to support them.