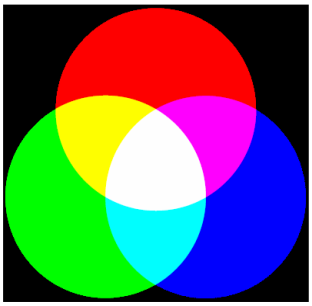
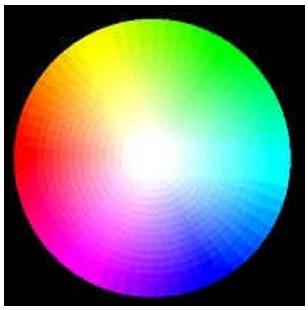
- THE SCIENCE OF SHOOTING (PART 7) -

COLOURED SHOOTING GLASSES

After having a chat on the traps to a fellow shooter, a common misconception became acutely apparent. Said fellow shooter "... I'm telling you a FACT - the lenses in shooting glass make the target brighter". Unfortunately for fellow shooter he, like many, has fallen victim to the optical *illusion* of increased brightness which coloured lenses create.

It is commonly through that visible light comes in only three primary colours – red, green and blue. After all, that how your television works, right? Well sorry, but that's not quite the case. Yes your television has only the three primary light colours which combine to produce all of the colours of the spectrum, including white when they're mixed together as per the following diagram on the left. However in the real world (ie. in sunlight) things aren't quite so.



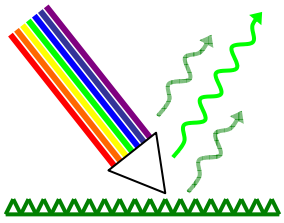


Sunlight for example is basically white light. It's white due to the mixing of other colours of light, but these colours aren't just the primary colours – sunlight is white because ALL possible visible colours are mixed together. As such the colour wheel we see above at left, which is relevant to television and computer screens, actually needs to become a little more smoothed-out if it's to describe sunlight (as at right).

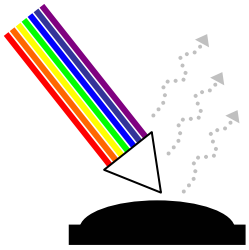
There is one exception to this however – BLACK. There is no such thing as black. It is not a colour, nor is it a shade. Black is an absence of visible light. There's nothing there.

Now when you're shooting, everything you see is illuminated by the white sunlight reflecting off the various objects – the grass, trees, clouds, and even the clay target itself.

Whilst every object is exposed to white light, most objects reflect only a biased mixture of light which is what gives each object its own individual colour. Leaves and grass absorb most other colours except green which is reflected, thus they appear green. Daisy petals absorb most colours of light except yellow (which is reflected) thus appearing yellow. The exception is black which reflects very little visible light at all.



Green Grass
(reflects green ... obviously)



Black Clay Target
(reflects almost nothing)

Obviously you wouldn't want the target to match the colour of the background, however as all real objects reflect at least a small component of each colour of light, it's not always possible to choose a target which contrasts perfectly well against the background and which stands out clearly.

This is where you shooting glasses come into it.

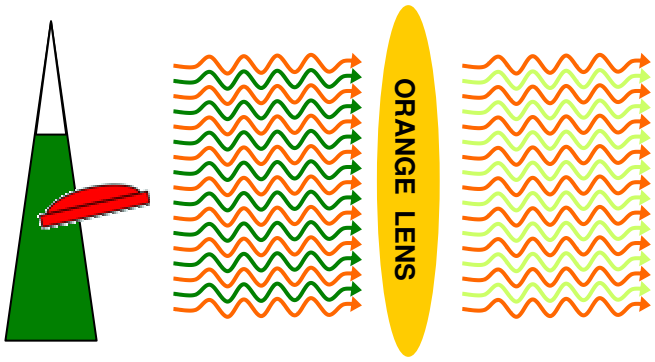
The brightness of your clay target depends on two things, being (1) the brightness of the target itself, and (2) the brightness of the background. To cut a long story short, it's easiest to see a clay target when the target is very bright and colourful compared to the background.

Think of somebody standing in a paddock on a sunny day and lighting a match. If you were a long way away, you wouldn't even be able to tell that the match was lit. This is because the match wouldn't be that bright relative to its surroundings. However, get this person to light the match at night and it's a different story – the match would stand out like a sore thumb.

Further to this, the target will be even easier to see if it's a different colour to the background.

Put these two factors together (ie. relative brightness and colour difference) and you experience the illusion which is commonly referred to as contrast.

This is how shooting glasses help you - by increasing contrast. Say for example you're shooting orange targets against a background of green hills. Wearing shooting glasses with an orange bias / tint (say yellow glasses) will favourably let most of the orange / yellow light through thus leaving the brightness of the target unchanged; the glasses will however prevent a lot of the green light passing through the glasses, effectively dulling the background. The bright orange target is now much easier to see against the dull greenish-grey background, thus the contrast is increased.



It might be useful to think of a the bias of a lens like the holes in a sieve – if the holes in the sieve are sized so that only orange light can get through (mostly), then all of the other colours apart from orange won't get through, and will become more dull. The orange then *appears* brighter.

The lenses in your shooting glasses are probably better described as light filters. All filters do is selectively prevent particular colours of light passing through them. Shooting glasses DO NOT, and CANNOT, actually make a target brighter ... all they do is make the target *appear* brighter relative to it's surroundings. In other words, all shooting glasses do is simply enhance the illusion of *contrast*.

Now don't go and get this discussion all muddled up with the concept of fluorescence. The fluorescence mechanism is a completely different kettle of fish and couldn't possibly be covered here. Let's just say that fluorescence helps and leave it at that.

Some images taken from http://www.diycalculator.com/sp-cvision.shtml which is a fabulous resource on the physics of both light and sight.