Introduction

My name is Dr Brian Evans. I am 64 years of age, and have albinism. My corrected eyesight is about 6 18 I have spent most of my working life in scientific research. My retirement hobby is gaining a better understanding of my condition and communicating that information to people with albinism (and their families) and to eye care professionals.

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The brain expects our two eyes to work together in partnership. Each eye encourages the other to develop. In the albino brain, however, the visual pathway partnership is not set up properly so each eye develops independently of the other. This can lead to lazy eye or a strabismus/squint.

Non-albino people with normal vision (pigmentos) sometimes suffer from double vision when their usual eye partnership breaks down.

Pilots need to have good eyesight. Military pilots need to undergo a further training program that allows each eye to accept different information from instruments attached to their helmet.

People with albinism are quite used to seeing different images with each eye.

The albino eye is over sensitive to light. There are two reasons for this.

The first reason is that there is no black pigment inside the eye. Open an old fashioned film camera and you will notice that all the insides are painted matt black. The inside of the normal pigmento eye is just the same – with a matt black coating that stops unwanted reflections. The albino eye does not have the black coating.

Naughty Boy Brian !

The lack of pigment inside the eye allows strong light to mask more dimly lit objects. The bright sunlight that enters through the window behind me makes it very difficult for people with albinism to see my face.

Good Man Mike !

Mike, on the other hand, is standing away from the window. He is also standing under a ceiling light which makes him easier to be seen.

Mike McGowan is President of the Noah Albinism support Group in the USA.

www.albinism.org

Feeling Washed Out ?

The picture on the right shows what happens when unwanted “back” light is allowed to enter the picture.

The left hand picture does not suffer from back light. Rather it suffers from too much light.

The middle picture is what I should look like.

Professional photographs use lens hoods to shield the lens from too much light.

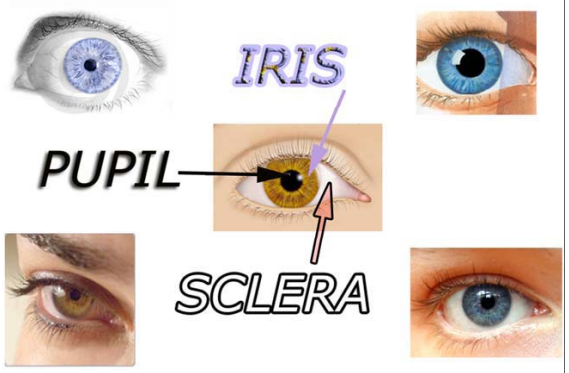
People with albinism can achieve much the same effect if they wear a baseball cap.

Will wearing a Baseball hat fix the problem ?

Nope

The baseball cap will prevent light from entering the eye from above. Sunglasses should be close fitting with a minimum distance between eyebrows and glasses. The sunglasses should also wrap around the sides to stop light entering from the side.

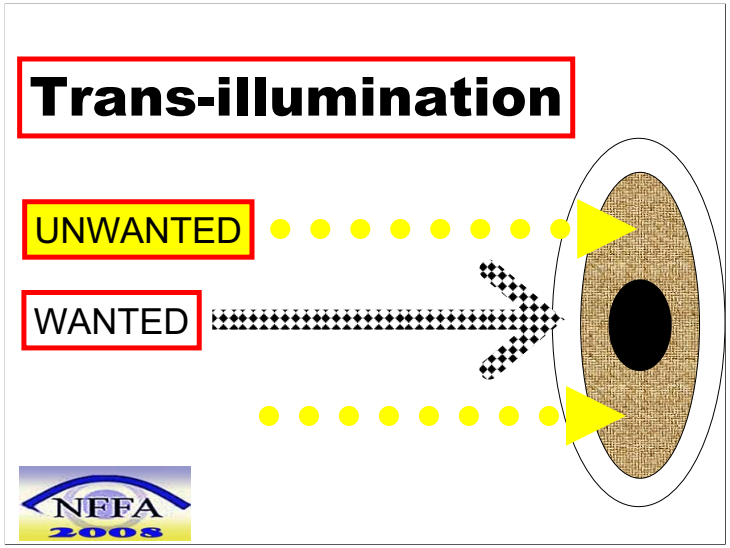
However, even with a baseball cap and good sunglasses there is still an excess light issue.



IRIS = Window Blind

The eye control the amount of light by changing the size of the pupil. The iris is like a blind that can be drawn over a window to reduce the amount of daylight entering a room.

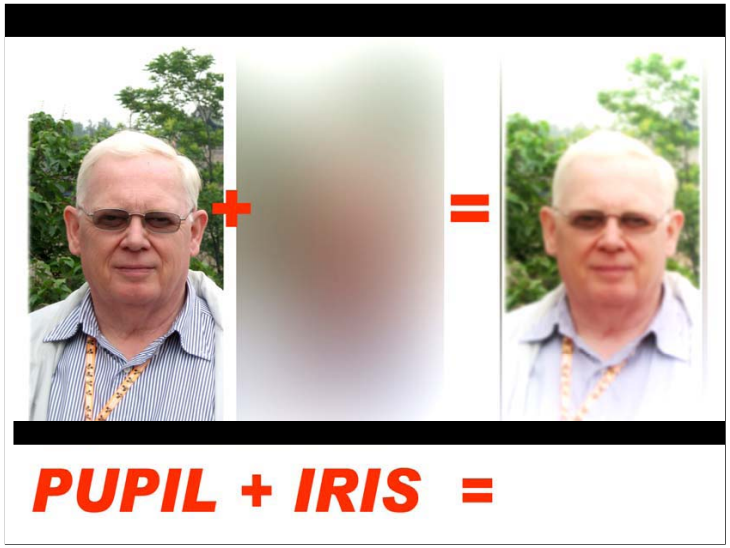
Some eyes have large pupils – some small. Most albino eyes have smaller pupils in order to help keep out the light.



The albino eye suffers from an effect called transillumination. The iris “blind” does not have any black pigment so the blind does not work too well in keeping out the light. The white of the eye – the sclera - also has no black pigment – so it lets in light as well.

This is not good news.

Perhaps we have all opened a film camera at some time – and discovered that there is a film inside. When the film is developed the image is blurry and washed out. Albino vision is just the same when there is too much light.



The wanted light that travels through the pupil reaches the retina at the back of the eye in good shape.

The unwanted light that trickles through the iris (and through the white of the eye) gets defocused in its passage through the “blind”. The unwanted light also reaches the retina – but it is no more than a blur.

The resultant image sent to the brain is a mixture of pupil light and iris light. In dim lighting this is not too much of a problem because the pupil opens up and lets good light into the eye.

In bright light, however, the pupil gets smaller. Good pupil light is reduced. Unfortunately the bad iris light just keeps streaming through.

In bright light there is more iris light and less pupil light. The retina gets more blurred light and less good light. Visual acuity gets really bad.

Remember – strong iris light causes uncontrolled PAIN.

How can we fix the problem. ?

Need something prettier ?

Use Coloured Contacts

The simple solution is to cover the iris with something opaque that will not let light onto the iris – while still letting light enter the pupil.

Try the black cardboard test. Cut a piece of black cardboard about 2 inches square and punch a quarter inch hole in the middle with an office hole punch. Hold the black cardboard tight against the eye and look through the hole.

85 percent of people with albinism notice an outstanding improvement in their vision – especially outdoors.

Colour but no script

Deeper colours for non-whites

Black cardboard is impracticable for everyday wear – but coloured cosmetic contact lenses can perform the same feat. Daily disposable coloured contacts – with no script – will stop about 25 – 35 percent of the light going through the iris.

For a 100 percent solution to the iris light issue then a bespoke contact lens is probably the answer.

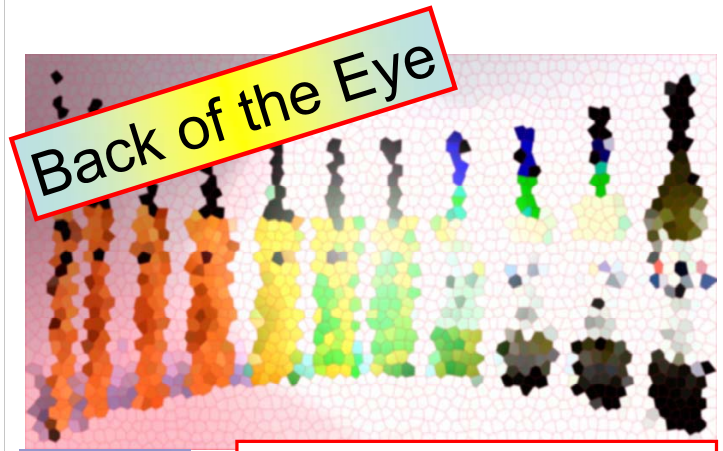
These contacts have a natural iris pattern pained on the front of the lens and have a matt black opaque black coating painted on the back of the lens – the side that touches the eye.

Paradox: PWA tend to show less “eye white” than pigmentos

The contact lens covers the coloured iris part of the eye but does not extend into the sclera (white) part of the eye. If you naturally show a lot of “white” then the opaque contact lens may not be quite as effective.

However, most people with albinism tend to close their eyes – to keep out unwanted light – so in practice show very little eye white.

Cosmetic contact lenses cost very little whereas the pained opaque contact lenses are relatively expensive. Lens hygiene is very important if the lens is to be used for a period of months.

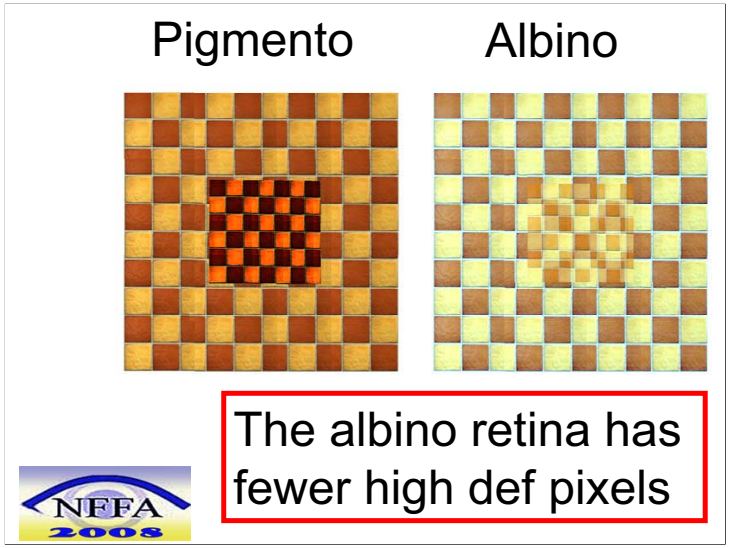


Where is the Retina ?

As part of the eye exam the eye Doctor will check the health of the retina at the back of the eye. He is not expecting a blond coloured retina – he expects much darker colouring.

Biologists stain their samples to make them easier to see through a microscope – without the stain it is difficult to clearly see the features of the sample.

So the eye Doc might believe that the albino retina is in bad shape – when it is really OK.

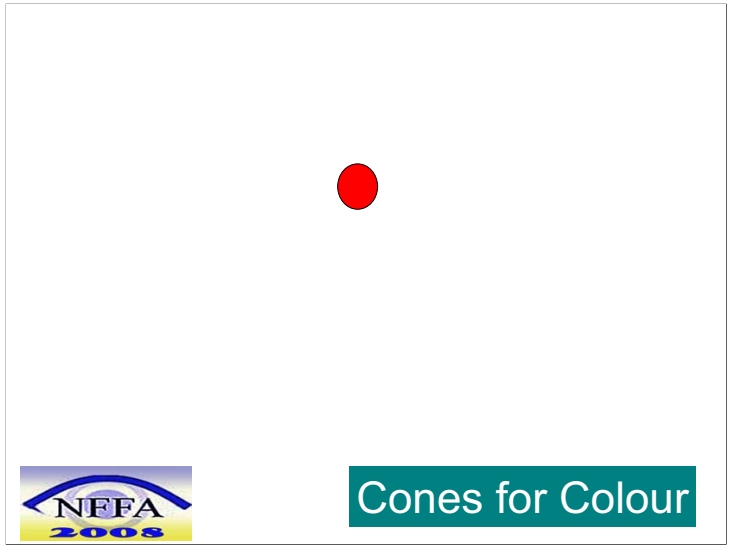


The retina at the back of the eye has a similar array of pixels to those in a digital camera.

The “rods” in the retina produce a black and white picture that has a definition of about 6 24.

The “cones” in the retina are found mostly in the middle of the retina. The cones provide us with colour vision and a central high def visual acuity that ranges from 6 6 to 6 3.

The inside of the regular pigmento eye has a black pigment that stains the rod and cones – making it easy for the eye Doc to see them. The albino eye has very little pigment so there is no staining. The rods and cones are therefore almost impossible to see – but they are still there.

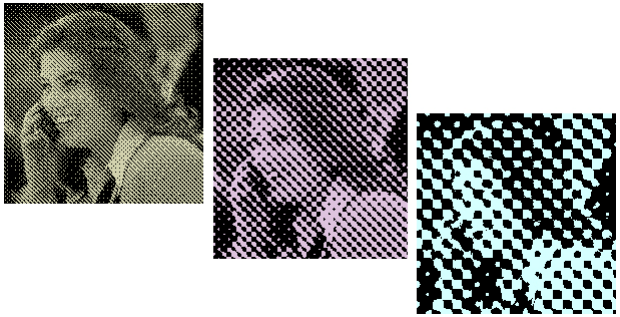


Because the eye Doc cannot see the unstained cones then he may think that you haven’t any.

If you have colour vision then you have cones. Maybe not as many as you should – but you do have some.

Try this test. In a darkened room look at the red standby light on your TV set. Is it Red ?

Now look at it out of the corner of your eye. If you (probably) have no cones in that part of your retina then the standby light will appear white not red.



Pixellation

The pictures in a newspaper are made up of dots. These are called picture elements – or pixels for short.

More pixels means better definition.

35 mm film =
15 Megapixels

Camera-phone
1 Megapixel

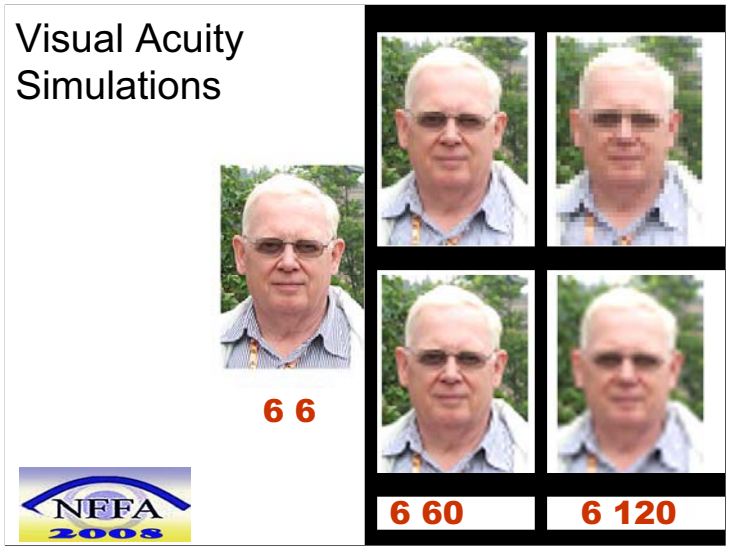
Better than 6 6

6 12
6 18

Over the past few years most of us have switched from old fashioned film cameras to digital cameras.

A 3 megapixel camera with a regular lens produces a picture that is approximately equivalent to 6 6 eyesight. A 6 megapixel camera produces the equivalent of 6 5 eyesight and a 12 megapixel camera achieves the equivalent of 6 4 vision – provided it has a good lens.

The following 6 6 pictures have been taken with a 3 megapixel camera. The pictures are approx 1500 pixels high by 2,000 pixels wide.



The picture on the left was taken with a 3 megapixel camera and will have a print quality equivalent to 6 6 vision. On the overhead projector screen the definition may be reduced.

The 6 60 images have been obtained by first reducing the number of pixels 100 fold – then increasing the resultant image 100 fold. Photoshop offers a number of ways of performing this transformation. The upper picture retains sharp edged pixels whereas the lower image softens the edge of each pixel. Essentially they are the same.

The 6 120 pictures are obtained in a similar way: 400 x down then 400x back up.

Both the above two-people pictures and the previous single person pictures show that a person with 6 120 vision can recognise people across a table without undue difficulty.

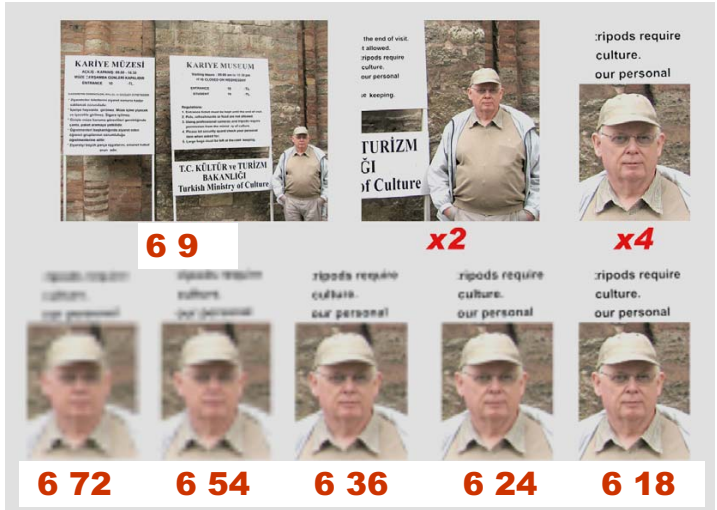
6 6

6 60

6 120

Someone with 6 60 or 6 120 vision would not experience undue difficulty in recognising the faces of a group of people maybe 3 metres away.

But look carefully at the lady wearing the black T shirt. In the 6 6 picture it is possible to see the word “Noah” on the T shirt. In the 6 60 and 6 120 pictures the writing is no more than a blur.



6 9 x2 x4

6 72 6 54 6 36 6 24 6 18

This picture was taken from about 8 metres away. The middle top row picture is magnified 2 times and the right side top picture a further 2 times.

My face is recognisable all the way down to 6 72 but the writing above my head is not readable beyond 6 18

Our brains are really good at recognising faces but new fangled writing is much too much of a challenge for someone with poor vision.

This picture shows a typical American street scene.

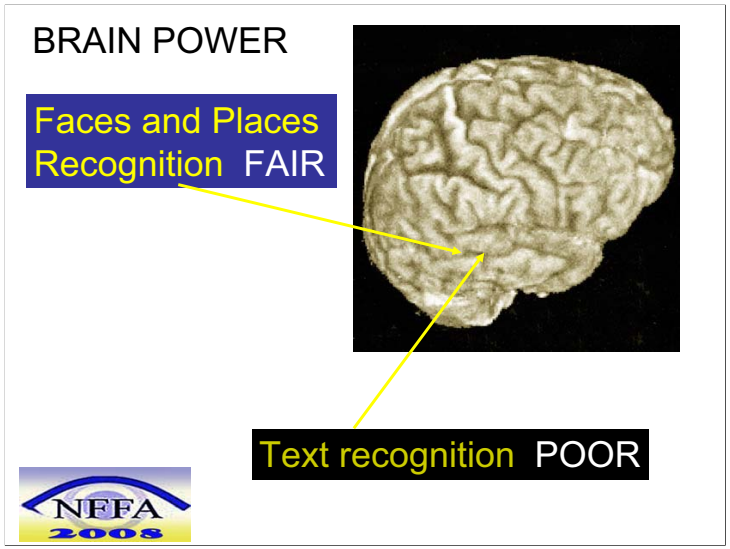
Apart from the signing there is very little difference between the 6 9 and the 6 60 versions of the scene.

If you know where you are going and don't need to read the signs then, in my opinion, with care, legally blind 6 60 vision is not as dangerous as it might appear.

Miniature telescopes (Bioptics) that are attached to regular glasses are used for "spotting". They are not intended for general road positioning – only for reading road signs.

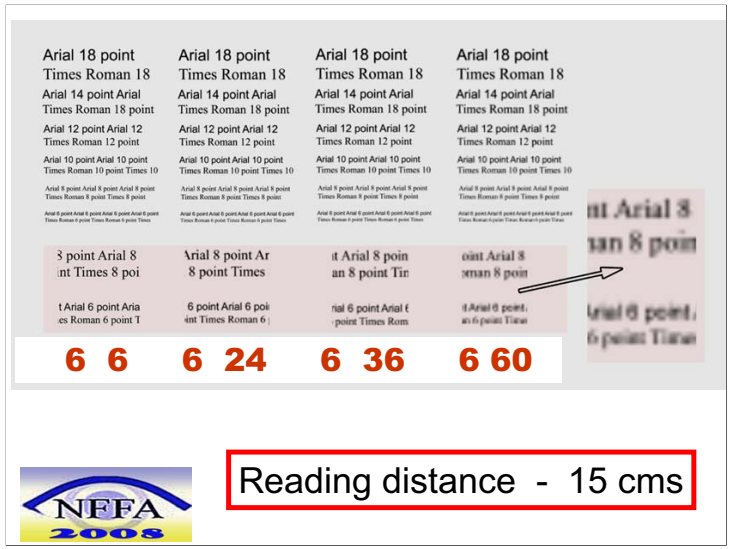
UK medical opinion currently prefers the use of GPS satellite navigation rather than telescopes for driving.

Some US States allow bioptic driving provided that visual acuity with glasses or contacts reaches minimum standards. Some States do not permit Bioptics. Each State has different criteria.



Humans have been looking at natural objects for thousands of years. Only recently have Reading and Writing skills become necessary.

Our brain is good at seeing natural objects – even when our vision is technically poor. To Read and Write, however, our brain needs to work on a much better quality image.



As we have learned – the most difficult task for people with low vision is reading.

18 point text is OK for someone with 6 60 vision. but text sizes below 12 point offer increasing difficulty. The pink area at the bottom of the slide is a 2 times magnification of the 8 and 6 point text lines. The bottom right pink area is a further 2 times magnification of what 6 and 8 point text looks like to someone with 6 60 vision.

Reading small print has an easy fix – it just requires to be made bigger. i.e. Magnification.

Close Up

No refractive error – just pixellation

Eighteen 6 6

Eighteen 6 60

Eight Eight Eight 6 6

Eight Eight Eight 6 60

6 6 versus 6 60

This slide shows in close up what 18 and 8 point script looks like to someone with a shortage of pixels in the retina.

Too Close For Comfort?

No known hazard from Plasma, LCD or Projection TV sets

One way of making things bigger is to get closer.

Children's eyes can easily focus down to less than 10 cms so there is little harm in a low vision child sitting close to the TV set.

For regular pigmento children there is a risk of developing short sight (myopia) if they undertake lots of close up visual tasks.

Children should not be exposed to hours of 2D screen watching – in case the development of their 3D perception is inhibited.

The Story so far :-

A Baseball hat and coloured contacts can make life outdoors as nice as life indoors.

6 60 vision is more than OK for “talking range” contacts, not too bad for driving, but crap for reading.

Eye Shape

Coming Next --