



Understanding Vision 16-Oct-2017

## Why do people see differently?

Richer colours, better night vision, enhanced contrast – for better use of our full vision potential.

**Whether colour perception, 3D vision or night vision: they all vary from one person to the next. Why does visual performance vary so much from one person to another – and how can we improve our eyesight and ensure that we benefit from our full vision potential?**

Some people have 20/20 vision, while others have problems distinguishing different colours or seeing in three dimensions – but why are there such differences in visual performance? Provided their eyes are healthy, young people with short or long sight enjoy almost identical visual quality if their spectacles have been properly fitted. The right spectacles effectively correct any variation in visual performance. As time goes by, however, this becomes increasingly difficult as the differences between one person and another may increase with age. At 80 it's simply a fact of life that we no longer see as well as we did at 20 – visual acuity, colour and spatial perception and our ability to see at night all deteriorate with age. > [Between the age of 40 and 50](#), the eye's lens and ciliary muscle start to lose their elasticity and we become increasingly unable to focus at different distances. Having to hold a book further and further away from our eyes is a typical symptom of this condition. This continues to worsen as we get older.

Differences also emerge due to illness or other ailments that occur during our lives and that are not corrected by spectacles – > [cataract](#), [glaucoma](#) or [age-related macular degeneration](#) are some examples. So, different levels of visual performance generally have a pathological background. Night vision depends on how well the rods on our retina function. When it gets dark, the remaining light passes through the cornea and lens before reaching the retina. It is there that the light is then processed into signals for the brain. This is performed by two types of receptors: the rods and the cones. The cones are responsible for vision in daylight, the rods for vision at night. In some rare cases, a vitamin A deficiency can also lead to reduced night vision. If the deficiency is removed, our twilight vision improves again.

## Women and men have different colour perception

Colour perception is an exception. Women and men generally perceive colours differently. Women experience the world in warmer colours, for example, and can usually distinguish different shades of red better than men. Men, on the other hand, are better able to perceive poor contrast and rapid movement. It is assumed that this has an evolutionary background: in primeval times women had to be able to see red berries on a green bush, for example, and men had to hunt wild animals. Testosterone also plays a certain role as it promotes the formation of nerve connections and cells in the visual centre of an unborn child's brain. Within each gender, however, defective colour vision and color blindness are responsible for the variation: if someone is  [> colour-blind](#), they cannot perceive any colours whatsoever, while defective colour vision involves a shift in the colour spectrum – all colours can be perceived, but in different shades and nuances. This is a typical "man's problem": 8 to 9 per cent of the male population suffer from a red-green deficiency, considerably more than women (only 0.5 to 0.8 per cent).

## 3D vision for everyone?

Although "3D" in movies and on television is a hot topic at the moment, not everyone has three-dimensional vision. This is particularly the case if one eye is impaired and therefore does not see as well as the other. Sometimes it is also difficult for the brain to process the specially aligned images and generate the typical impression of depth. A little patience is often needed, as the brain frequently needs some time to become accustomed to the new situation.

## How to use our full vision potential

Another important factor is visual acuity: how well can I distinguish detail? The same rule applies here as before: without the right pair of spectacles, the wearer's vision potential cannot be fully utilised, and the finer points of detail are simply lost. As a result, differences in perception occur from one person to another that can be corrected with spectacles. Indeed, the personal vision potential of many people does not automatically end at 100 per cent, but can even exceed this figure. To achieve this goal, the eye exam and refraction process must be as precise as possible to ensure that the wearer receives lenses that maximise his or her vision potential.

[> More information...](#)

## The ZEISS Online Vision Check

How well do you see contrast and colour? Check your vision quickly and simply here!

[Start Eyesight Test Now!](#)

## How do we know that one person sees differently from another?

Various standardised texts are available to determine how well we see. ZEISS uses the i.Polatest®, which can be used to test visual acuity, 3D vision and contrast vision quickly and precisely. Color perception is tested with Ishihara colour charts (also called pseudochromatic charts). These are discs featuring coloured dots in different sizes and with different nuances. People with normal colour

vision can recognize certain numerals or letters, while persons with defective colour perception cannot. A device known as an anomaloscope can be used to determine defective colour vision and is often used by employers for suitability testing for occupations in which colour vision plays an important role (e.g. train drivers, pilots, even electricians). > [More information...](#)

It is considerably easier to test visual acuity which is of central importance for the quality of vision we enjoy. Here, it suffices to view distant objects: can certain details be recognised or not? Eye care professionals use a procedure known as subjective refraction to test this: different trial lenses are placed in succession in front of the eyes, and the patient is asked whether he or she sees better or worse in each case.

## How can night vision, 3D vision and colour perception be improved?

Professionally fitted spectacles normally correct defects in night vision, 3D vision and colour perception. Colour perception can be optimised with special filter lenses adapted to each wearer's personal defective colour vision. If the lenses are optimally fitted, feature an anti-reflection coating and correct the patient's current refractive status, they make a key contribution to enhancing colour perception. 3D perception and night vision can also be improved with perfectly fitted spectacles. It is important that the lenses take all of the eye's visual defects – also known as aberrations – into account. Therefore, it is essential to determine these aberrations right from the outset. The i.Profiler® and lenses featuring i.Scription® technology are ideal for identifying and correcting the aberrations of the eye - and achieve better vision, also in poor light or at night.

Lenses without i.Scription® technology correct aberrations only on the basis of the subjective refraction. The refraction values are obtained by using trial lenses, normally in well-lit surroundings. The prescription is therefore suitable for daylight conditions, but not necessarily for poor light. However, the > [i.Profiler®](#) also measures the eye with the patient's pupil dilated, therefore imitating night vision, and can obtain the information required in this way. As a result, lenses are obtained that provide good vision during daytime conditions, and also for poor light or night-time vision. At the same time, contrast perception is often also increased because halo effects are reduced on the retina.

Although the i.Profiler® cannot sufficiently test colour perception because the retina plays a key role here, it has been shown that sharp vision is a must for the perception of rich, saturated colours. This means that more precise lenses also lead in many cases to better colour perception.

Incidentally, children's eyes (from around the age of 4 onwards) also benefit from measurements taken using the i.Profiler®. The high degree of automation in the measuring process allows the eye care professional to concentrate on the little patient while the machine is measuring.

Only injury or diseases such as cataract, that inevitably occur from a certain age onwards, make it impossible to improve visual performance with spectacles. The lens then becomes dull and cloudy. The only remedy here is cataract surgery, in which the cloudy lens is replaced by a transparent artificial lens.

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