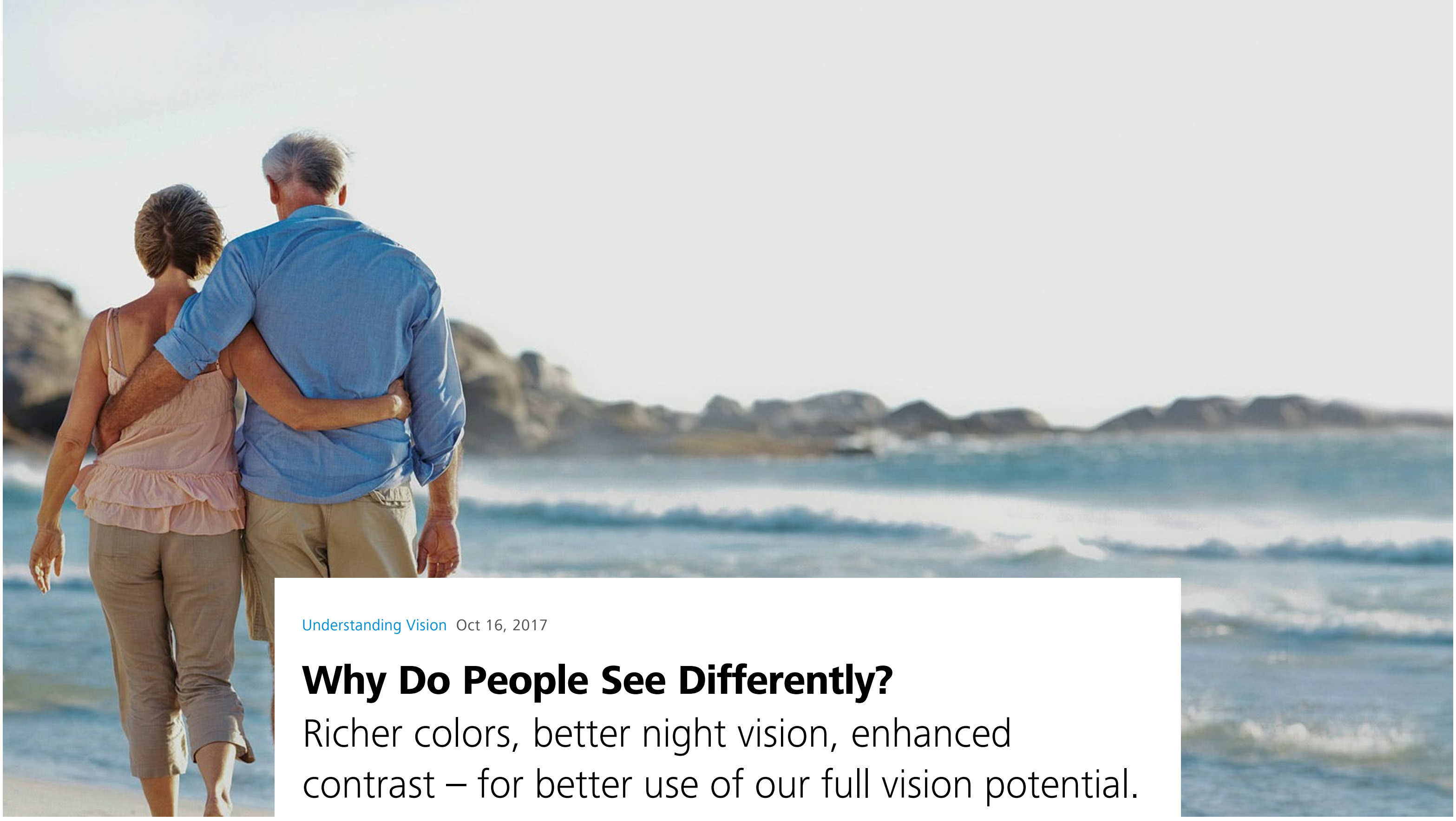


Understanding Vision Oct 16, 2017

Why Do People See Differently?

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

Color perception, 3D vision or night vision: 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 colors or seeing in three dimensions – but why are there such differences in visual performance? Provided their eyes are healthy, young people who are nearsighted or farsighted enjoy almost identical visual quality if their glasses have been properly fitted. The right glasses effectively correct any variation in visual performance. As time goes by, however, this becomes increasingly difficult since the differences between one person and another may become more pronounced 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, color and spatial perception and our ability to see at night all deteriorate with age. > Between the ages of 40 and 50, the eye's lens and ciliary muscle start to lose their elasticity and we have increasing difficulty focusing 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 cannot be corrected by glasses - > 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 corrected, our twilight vision improves again.

Women and men have different color perception

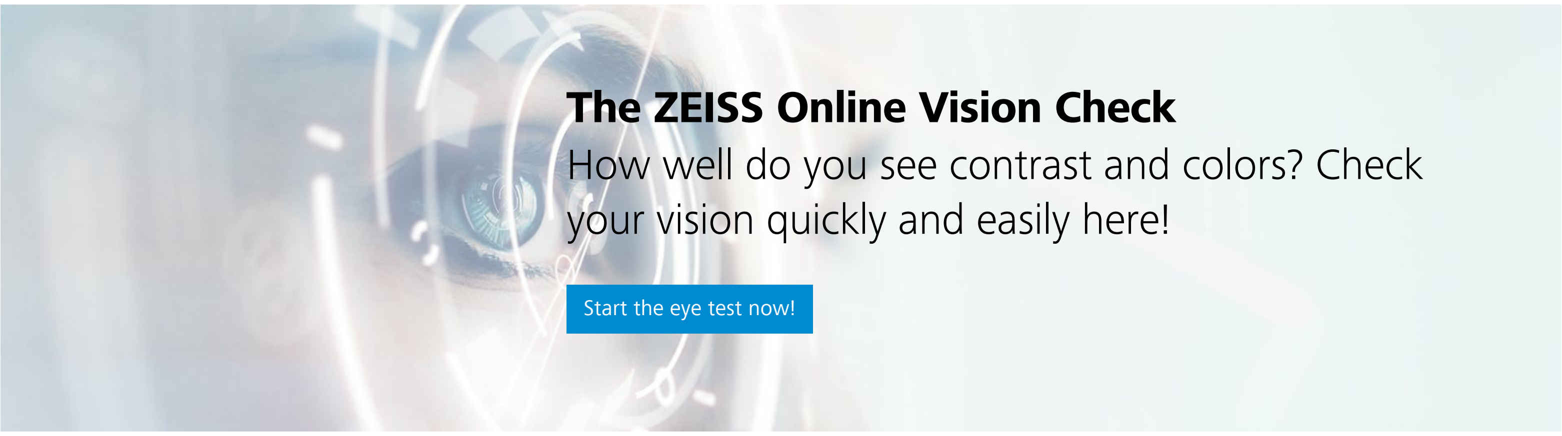
Color perception is an exception. Women and men generally perceive colors differently. Women experience the world in warmer colors, for example, and can usually distinguish different shades of red better than men. Men, on the other hand, are better able to perceive poor contrast and rapid movement. It 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 center of an unborn child's brain. Within each gender, however, the variation is caused by defective color vision and color blindness: if someone is color-blind, they cannot perceive any colors whatsoever, while defective color vision involves a shift in the color spectrum – all colors can be perceived, but in different shades and nuances. This is typically a "man's problem": 8 to 9% of the male population suffer from a red-green deficiency, considerably more than women (only 0.5 to 0.8%).

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 does not see as well as the other. Sometimes it is also difficult for the brain to process specially aligned images and generate the 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 glasses, the wearer's vision potential cannot be fully utilized, 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 glasses. Indeed, many people’s personal vision potential does not automatically end at 100%, but can even exceed this figure. The eye exam and refraction process must be as precise as possible so as to ensure that the wearer receives lenses that maximize his or her vision potential. More information…



The ZEISS Online Vision Check

How well do you see contrast and colors? Check your vision quickly and easily here!

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

Various standardized tests 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 using Ishihara color charts (also known as pseudochromatic charts). These are discs featuring colored dots in different sizes and with different nuances. People with normal color vision can recognize certain numerals or letters, while those with defective color perception cannot. A device known as an anomaloscope can be used to determine defective color vision and is often used by employers for suitability testing for occupations in which color vision plays an important role (e.g., train drivers, pilots, and 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 recognized or not? Eye care professionals use a procedure known as subjective refraction to test this: different trial lenses are placed in front of the eyes in succession, and the patient is asked whether he or she sees better or worse in each case.

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

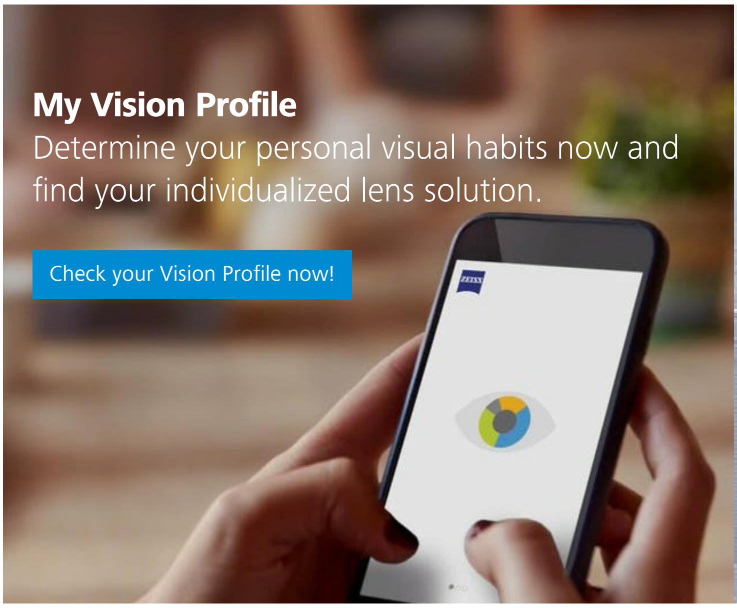
Professionally fitted glasses normally correct defects in night vision, 3D vision and color perception. Color perception can be optimized using special filter lenses adapted to each wearer's personal defective color vision. If the lenses are optimally fitted, feature an anti-reflection coating and correct the patient's current refractive status, they make a significant contribution to enhancing color perception. 3D perception and night vision can also be improved by wearing perfectly fitted glasses. 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$^{\text{plus®}}$ 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 night. However, the i.Profiler$^{\text{plus}}$ 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, the lenses obtained provide good vision during daytime conditions as well as correcting poor light or nighttime vision. At the same time, contrast perception is often also increased because halo effects are reduced on the retina.

Although the i.Profiler$^{\text{plus}}$ cannot sufficiently test color 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 colors. This means that more precise lenses also lead to better color perception in many cases.

Incidentally, children's eyes (from around the age of 4 onwards) also benefit from measurements taken using the i.Profiler$^{\text{plus}}$. 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 disorders such as cataracts, that occur from a certain age onwards, make it impossible to improve visual performance with glasses. 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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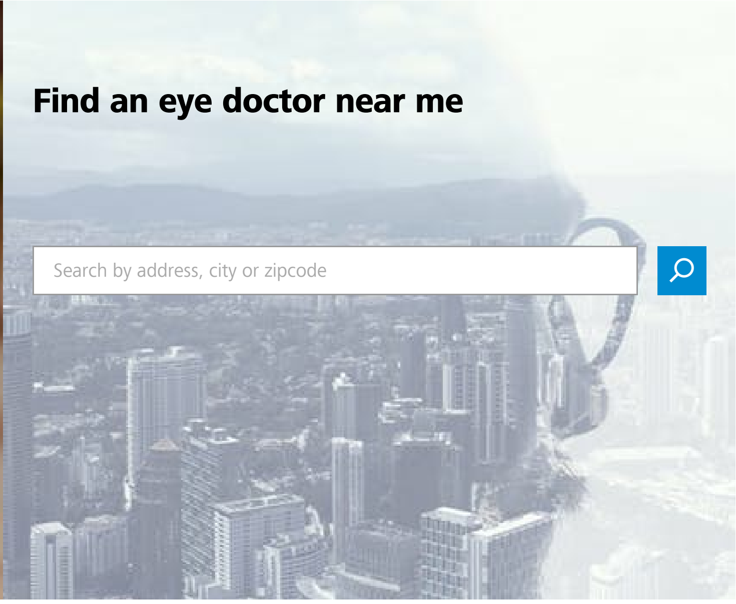

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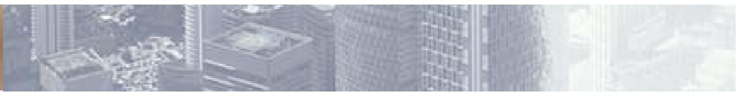

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