MINI ENCYCLOPEDIA OF HEALTH

BINOCULAR VISION (BASIC TRANSCRIPTION)

Welcome to a new information pill of your MINI ENCYCLOPEDIA OF HEALTH on the Internet. This time we are going to explore BINOCULAR VISION and how it allows us to obtain depth perception, that is, to see in 3 dimensions, despite the fact that our retina is a flat tissue that collects visual information in only 2 dimensions.

This ability is possible because we do not have only one retina, but two. Our eyes share most of their visual field, but because they occupy different positions on the face, both provide us with images of the same scene with a slightly different angular perspective.

Our brain is able to combine both images to obtain a single image with depth of field, a phenomenon known as STEREOPSIS or STEREOSCOPIC VISION.

How exactly does this phenomenon occur?

In this scene we can observe how the left and right eyes are obtaining slightly different images of the blue and red primes and their relative positions.

The FOCUS POINT is located in the blue prism, and we can observe how its projection through the lens is incident on anatomically corresponding areas of both retinas.

This property is not unique to the focusing point, but all the points located on the arc called HOROPTER project onto anatomically corresponding points of the retina and can be interpreted as belonging to the same perceptual object.

The brain is also capable of integrating into the same perceptual object the projections coming from bands located in front of and behind the HOROPTER, forming a space known as the PANUM FUSION AREA. Although the projections coming from this area are not incident on anatomically corresponding points on the retina, the brain is able to fuse them into a single image, using binocular disparity to obtain a very accurate depth perception. This is what allows us to know that the red prism is behind the blue prism.

What about projections from OUTSIDE THE PANUM FUSION AREA? If we place a new orange prism behind the Panum fusion area, we will observe that the place on the retina where it is projected is very different. So much so that the brain is no longer able to fuse both images, resulting in physiological diplopia (i.e., non-pathological double vision) due to the large binocular disparity.

This disparity is called NON CROSSED as it is behind the horopter, and its qualitative steropsis gives us less accurate information about deep objects with respect to the point of focus. You can reproduce this phenomenon by focusing a finger in front of your face and paying attention to the scene in double vision that forms behind it.

Something similar would occur by placing a green prism in front of the Panum fusion area, again generating anatomically very dissimilar projections on each retina. In this case, it would be a CROSSED disparity, being behind the horopter, and its qualitative stereopsis gives us inaccurate information about the depth of objects close to our face. You can reproduce this phenomenon by focusing on an object far away from you and placing your finger in front of your face. How many fingers do you see?

Thank you very much for visiting your MINI ENCYCLOPEDIA OF HEALTH on the Internet!