PSYCHOLOGY

Visual Perception

The visual perception system consists of the complete network of physical structures involved in vision. Essentially, it is the brain (specifically the primary visual cortex) making sense of the visual information received by the retinas of the eyes. Light is in fact a physical source of energy as its existence is felt and our brain responds it.

There are six major steps involved in the process of visual perception: reception, transduction, transmission, selection, organisation and interpretation. Each of these processes is dependent on each other and is interactive in nature. For instance, when a person is reading this essay, the reader's retina from both eyes receive this information and photoreceptors within their retina are activated. Although this occurs in the retina, even the detection of the light energy has to be registered with the brain for us to become aware of its presence. After we become aware of it, the electrochemical energy (light surrounding the letter) is changed to neural impulses. This is now transmitted to the reader's occipital lobe where the words are selected. Despite the process of selection overall occurring in the brain, some aspects of it also occur in the retina, such as during transduction, where the photoreceptors only select specific wavelengths of light. Moreover, rods and cones are selective in their overall sensitivity to specific wavelength of light. Selection in the brain occurs by feature detectors which 'detect' specific features or parts of a visual stimulus. The information selected at these various levels are now organised into an orderly manner so that the visual stimuli can be recognised and interpreted into a meaningful experience. Hence, the person can read and understand what they read.

Visual perception can be classified into three broad categories called: Gestalt principles (their types include figure-ground, closure and similarity), depth principle and perceptual constancies.

Figure-ground is when we organise visual information by perceptually separating important aspects of the visual field into the 'figure', which stands out from the background. Examples include when we notice a STOP sign in the road. The presence of the white block letters in the midst of the red background makes it standout and noticeable. Closure refers to the perceptual tendency to mentally 'close up', fill in or ignores gaps in a visual stimulus and to perceive objects as complete. This includes the ability to recognise the symbol of a disabled person and understand what it means as we mentally complete the incomplete figure. Similarity is the tendency to perceive parts of a visual stimulus that has similar features as belonging together in a unit, such as perceiving those wearing the same uniform as belonging to the same group. Depth and distance perception include retinal disparity and convergence (both binocular depth cues) as well as accommodation (monocular depth cues).

Retinal disparity refers to the very slight difference in the location of the visual images on the retinas (due to their slightly different angles of view), which enables us to make judgments about the distance of an object from the viewer. This is demonstrated when we hold our fingers relatively close in front of us and we get 'different' views of the same finger when we look at it through our left eye and our right eye. Convergence involves the brain detecting and interpreting depth or distance from changes in tension in the eye muscles when the two eyes turn inward (towards the nose) to focus on nearby objects.

When we bring our finger close to our face, as we are staring at the finger, our eyes turn toward the nose. Accommodating involves the automatic focusing mechanism of the lens in the eye to adjust the shape of the lens in response to differing distances of view from the object. For example, as you watch a cricket ball leave the bat and travel 200 m down the field, the lens quickly elongates.

Visual constancy includes size, shape and brightness. Size constancy involves recognising that an object's actual size remains the same, even though the size of the image that is cast on the retina changes. For instance, although we perceive the same object from close-up to be larger in size than when it is far away, we know that the size remains constant. Shape constancy is the tendency to perceive an object as maintaining its shape despite any changes in the shape of the image cast on the retina. An example is looking at a person from different angles, which gives us different views/shapes of them. However, we know that they actually have not changed shape. Brightness constancy is the tendency to perceive an object as maintaining its level of brightness relative to its surroundings, despite changes in the amount of light being reflected from the object onto the retina. This is demonstrated as looking at an object at night and in the afternoon gives different brightness but we know that the object has the same brightness.

Perception is influenced by psychological factors, mainly past experience of the situation and the context of it. Influences of context on visual perception include perceiving an object or action to be something because of the scenario and situation in which it occurs. Likewise, influences of past experience on visual perception include perceiving an object or action to be something because of having prior exposure to that. For instance, when I saw my friends smiling at me as I walked towards them, I assumed that they were talking behind my back just before. The context here was the GROUP of people looking at me.

The same assumption was also made because of my past experience with them. Just a week before, I heard them talk about me and their nature is well known to me. As such, I assumed that this time, it was no different.

A visual illusion is a misinterpretation of real sensory stimuli. It is an experience in which there is a mismatch between our perception and what we understand as physical reality. Muller-Lyer illusion is a visual illusion in which one of two lines of equal length, each of which has opposite shaped ends, is incorrectly perceived as being longer than the other. When viewing the standard Muller-Lyer illusion, the shape with inverted arrows seems to be longer than that with normal arrow ends, although they both of the same size.

This is perhaps because of the length between the tips at each end of each figure. When the arrows are pointing outward, this distance is greater and hence their whole figure is larger than when they are pointing inward.

The visual perception is the process that is responsible for us to be able to see objects and identify their features. Without their presence, it is not possible to see anything. However, even 'normal' functioning visual perception system at times cause us to see illusions for various reasons.

References

Psychology VCE Units 3 & 4 third edition
http://en.wikipedia.org/wiki/Visual_perception