УДК 535.6=111

OPTICAL ILLUSION. ERRORS OF PERCEPTION

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What you see isn't always what you get!

Since ancient times, humans have known that immediate perception is not a reading of physical reality. Vision is the most creative act that a human being is capable of. Seeing is depicting the world on the living canvas of our mind. As we depict well only what we really know, our mind is both the canvas and the artist. In this creative process, the eyes represent nothing other than a medium with which our mind interprets and reconstructs our near environment. Some illusions teach us to doubt and to question the many appearances of the reality - they are a kind of school of life!

Philosophy and science have traditionally separated intelligence from perception, vision being seen as a passive window on the world and intelligence as active problem-solving. It is a quite recent idea that perception, especially vision, requires intelligent problem-solving based on knowledge.

Errors of perception (phenomena of illusions) can be due to knowledge being inappropriate or being misapplied. So illusions are important for investigating cognitive processes of vision. Acceptance that knowledge makes a major contribution to human vision is recent, remaining controversial. This applies even more to the machine vision of artificial intelligence. Perhaps progress in artificial intelligence has been delayed through failure to recognize that artificial potential intelligence of knowledge is needed for computer vision to be comparable to brains.

There are, however, theorists who try to maintain 'direct' accounts of visual perception as requiring little or no knowledge, notably followers of the American psychologist J. J. Gibson (l904–l979) whose books The Perception of the Visual World (1950) and The Senses Considered as Perceptual Systems (1966) remain influential.

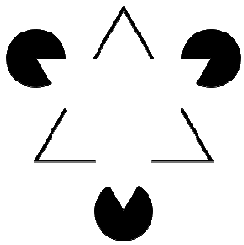
There are three main types of visual: literal optical illusions that create images that are different from the objects that make them, physiological ones that are the effects on the eyes and brain of excessive stimulation of a specific type (brightness, tilt, color, movement), and cognitive illusions where the eye and brain make unconscious inferences. They can also be known as "mind games".

Physiological illusions, such as the afterimages following bright lights, or adapting stimuli of excessively longer alternating patterns (contingent perceptual aftereffect), are presumed to be the effects on the eyes or brain of excessive stimulation of a specific type - brightness, tilt, color, movement,

Cognitive illusions are assumed to arise by interaction with assumptions about the world, leading to "unconscious inferences", an idea first suggested in the 19th century by Hermann Helmholtz. Cognitive illusions are commonly divided into ambiguous illusions, distorting illusions, paradox illusions, or fiction illusions. Cognitive illusions include ambiguous illusions, distorting illusions, paradox illusions, fictional illusions.

Gestalt theory can be used to explain the illusory contours in the Kanizsa Triangle. A floating white triangle, which does not exist, is seen. The brain has a need to see familiar simple objects and has a tendency to create a "whole" image from individual elements. Gestalt means "form" or "shape" in German. However, another explanation of the Kanizsa Triangle is based in evolutionary psychology and the fact that in order to survive it was important to see

form and edges. The use of perceptual organization to create meaning out of stimuli is the principle behind other well-known illusions including impossible objects. Our brain makes sense of shapes and symbols putting them together like a jigsaw puzzle, formulating that which isn't there to that which is believable.



Perceptual constancies are sources of illusions. Colour constancy and brightness constancy are responsible for the fact that a familiar object will appear the same colour regardless of the amount of or colour of light reflecting from it. An illusion of colour or contrast difference can be created when the luminosity or colour of the area surrounding an unfamiliar object is changed. The contrast of the object will appear darker against a black field that reflects less light compared to a white field even though the object itself did not change in colour. Similarly, the eye will compensate for colour contrast depending on the colour cast of the surrounding area.

Object consistencies. Like color, the brain has the ability to understand familiar objects as having a consistent shape or size. For example a door is perceived as rectangle regardless as to how the image may change on the retina as the door is opened and closed. Unfamiliar objects, however, do not always follow the rules of shape constancy and may change when the perspective is changed. The Shepard illusion of the changing table is an example of an illusion based on distortions in shape constancy.

The Cognitive processes hypothesis claims that visual illusions are because the neural circuitry in our visual system evolves, by neural learning, to a system that makes very efficient interpretations of usual 3D scenes based in the emergence of simplified models in our brain that speed up the interpretation process but give rise to optical illusions in unusual situations.

The representation of distant objects near the horizon is less "adequate". In fact, it is not only the Moon that seems larger, when we perceive it near the horizon. In a photo of a distant scene, all distant objects are perceived as smaller than when we observe them directly using our vision.

The retinal image is the main source driving vision but what we see is a "virtual" 3D representation of the scene in front of us. We don't see a physical image of the world. We see objects; and the physical world is not itself separated into objects.

What are Illusions?

It is extraordinarily hard to give a satisfactory definition of an ‘illusion’. It may be the departure from reality, or from truth; but how are these to be defined? As science’s accounts of reality get ever more different from appearances, to say that this separation is ‘illusion’ would have the absurd consequence of implying that almost all perceptions are illusory. It seems better to limit ‘illusion’ to systematic visual and other sensed discrepancies from simple measurements with rulers, photometers. clocks and so on. There are two clearly very different kinds of illusions: those with a physical cause and cognitive illusions due to misapplication of knowledge. Although they have extremely different kinds of causes, they can produce some surprisingly similar phenomena (such as distortions of length or curvature), so there are difficulties of classification that require experimental evidence.