Perspective (visual)

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Perspective, in the context of vision and visual perception, is the way in which objects appear to the eye based on their spatial attributes; or their dimensions and the position of the eye relative to the objects. There are two main meanings of the term: linear perspective and aerial perspective.



A sharpened pencil in extreme perspective. Note the shallow depth of field.

The development of new forms of geometric projection in the construction of perspective corresponds with the invention of novel pictorial art forms of visual representation in the Italian Renaissance, since the fourteenth century and up till the end of the sixteenth century, and specifically within the circles of architectural and artistic experimentation and design. Treatises were composed on perspective by eminent theorists of art and architecture, including figures like Leon Battista Alberti, Lorenzo Ghiberti, and Piero della Francesca, also aided by experimental uses of optical devices through the installations of Filippo Brunelleschi. The investigations and writings of these Renaissance theorists of architecture and visual art were informed by the studies in classical optics of thirteenth-century Franciscan perspectivists like Roger Bacon, John Peckham, and Witelo, who were all directly inspired and influenced by the translation into Latin from Arabic of the *Book of Optics* (known in Latinate renditions as *Perspectiva*, and in Arabic as *Kitab al-manazir*) of the eleventh-century Arab polymath and optician, Alhazen (Ibn al-Haytham).[1]

According to the book *Practice of Looking: An Introduction to Visual Culture*, Lisa Cartwright and Marita Sturken state, "Perspective refers to a set of systems or mechanisms used to produce representations of objects in space as if seen by an observer through a window or frame. In perspective, the size and detail of objects depicted corresponds to their relative distance from the imagined position of the observer" (page 151).

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Linear perspective

Further information: Mathematics and art

As objects become more distant they appear smaller because their visual angle decreases. The visual angle of an object is the angle subtended at the eye by a triangle with the object at its base. The greater the distance of the object from the eye, the greater is the height of this triangle, and the less the visual

angle. This follows simply from Euclidean geometry.[2]

The Sun and the Moon appear to be roughly the same size because the Sun, although much larger, is also much farther away. The relationship between distance and apparent height of objects is an inverse-linear function:

$$h = \frac{a}{d}$$

where h is the apparent height, d is the distance of the object, and a is the actual size of the object. So if you want to find the true height of an object in the distance, multiply the apparent height with the distance the object is from you.



Railway tracks appear to meet at a distant point.

Hypothetically, if an object were positioned at the focal point of the light entering the eye (i.e., at the single point in space that the rays of light cross over), it would appear infinitely tall.

Perspective is also seen in the way the parallel lines of railway tracks appear to meet at a distant point, the *vanishing point*. This point lies on a line, called the *geometrical horizon*, at the level of the viewer's eye. Because the Earth's surface is curved, the *true horizon* (the line dividing the ground and the sky) is lower than this apparent horizon. The difference is imperceptibly small when standing on the surface, but noticeable from great height (a person standing on a mountain can see farther than someone at ground level). (See horizon for more information.)



A flat road approaching the horizon shows a similar effect when observed obliquely.

In graphic representation, an artist uses intuitive, artistic, scientific, or technical skills to represent the phenomenon of the visual perception of perspective. In simpler terms, these skills are used to add a suggestion of depth to what is ultimately a flat image or drawing. *See Perspective (graphical)*.

Curvilinear perspective uses curving perspective lines instead of straight converging ones to approximate the image on the retina of the eye, which is itself spherical, more accurately than the traditional linear perspective, which uses straight lines and becomes distorted toward the edges.



The Doshan Tappeh Street by *Kamal-ol-molk*

Forced perspective can be used to deliberately misrepresent an object's size, making something appear larger or smaller than it really is. This is common in film, where a distant castle in the background may in fact only be a cardboard model a few feet high (and much closer to the camera). These are forms of optical illusions.

Aerial perspective

Aerial perspective refers to the effect on the appearance of an ordinary object (i.e., other than a self-luminous object) of being viewed through the atmosphere. In daylight, as an ordinary object gets farther from the

eye, its contrast with the background is reduced, its colour saturation is reduced and its colour becomes more blue.

In common speech, the words *perspective* and *viewpoint* tend to be used interchangeably; however, in art, aerial perspective does not imply an aerial viewpoint, such as that exemplified by aerial photography.

Film, television and video games

Perspective in film, television and video games can include first-person view, third-person view and other camera field of view effects.

See also

- Alice in Wonderland syndrome
- Angular diameter
- Graphical projection
- Horizon
- Surveillance
- Top-down perspective
- Vanishing point

References

1. See: Nader El-Bizri, 'A Philosophical Perspective on Alhazen's Optics', *Arabic Sciences and Philosophy* (Cambridge University Press), Volume 15 (2005), pp. 189-218; Nader El-Bizri, 'Ibn al-Haytham et le problème de la couleur', *Oriens-Occidens: Cahiers du centre d'histoire des sciences et des philosophies arabes et médiévales*, Volume 7 (2009), pp. 201-226.
2. Burton, H. E. (1945). The optics of Euclid. Journal of the Optical Society of America, 35, 357-372.

External links

- handprint.com elements of perspective (http://www.handprint.com/HP/WCL/tech10.html) Largest online treatment of linear perspective
- Harold Olejarz's Drawing in One-Point Perspective (http://www.olejarz.com/arted/perspective/) Educational Resource



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