

Constancy

The tendency to perceive objects as unchanging, despite changes in sensory input.¹

People tend to perceive objects as constant and unchanging, despite changes in perspective, lighting, color, or size. For example, a person viewed at a distance produces a smaller image on the retina than that same person up close, but the perception of the size of the person is constant. The ability to perceive objects as having constant properties despite variations in how they are perceived eliminates the need to reinterpret those objects when they are perceived under different conditions. This indicates that perception involves more than simply receiving sensory inputs; rather, it is a process of continuously reconciling sensory inputs with memories about the properties of things in the world. A few examples of constancy include:²

Size Constancy—The size of objects is perceived to be constant, even though a change in distance makes objects appear smaller or larger (e.g., a city skyline at a great distance appears small, but the perception of the size of the buildings remains constant).

Brightness Constancy—The brightness of objects is perceived to be constant, even though changes in illumination make the objects appear brighter or darker (e.g., a white shirt appears gray in a dark room, but the perception of the color of the shirt remains constant).

Shape Constancy—The shape of objects is perceived to be constant, even though changes in perspective make the objects appear to have different shapes (e.g., a wheel from the side appears circular, at an angle it appears elliptical, and from the front it appears rectangular, but the perception of the shape of the wheel remains constant).

Loudness Constancy—The loudness of a sound is perceived to be constant, even though a change in distance makes the sound seem softer or louder (e.g., music playing on a radio seems to get softer as you walk away from it, but the perception of the volume of the radio remains constant).

All senses exhibit constancy to some extent. Consider the tendency when designing high-fidelity renderings, simulations, or models of objects and environments. For example, changes in properties like distance, perspective, and illumination should change appropriately for the type of interaction. Use recognizable objects and distance cues to provide size and shape references for unfamiliar objects. Consider illumination levels and background colors in environments when making decisions about color and brightness levels; lighting and color variations in the environment can trick the senses and alter the perception of color.

See also Color, Highlighting, Interference Effects, and Orientation Sensitivity.

¹ Also known as *perceptual constancy*.

² Seminal works on constancy include “Brightness Constancy and the Nature of Achromatic Colors” by Hans Wallach, *Journal of Experimental Psychology*, 1948, vol. 38, p. 310–324; and “Determinants of Apparent Visual Size With Distance Variant” by A. F. Holway and Edwin G. Boring, *American Journal of Psychology*, 1941, vol. 54, p. 21–37. A nice review of the various forms of constancy is found in *Sensation and Perception* by Margaret W. Matlin and Hugh J. Foley, 4th ed., Allyn & Bacon, 1997.

Despite their apparent differences, the pair of circles within the grid blocks are the same color and brightness—a fact easily revealed by covering the areas surrounding the circles.

The perceived differences are caused by correction errors made by the visual processing system, which tries to maintain constancy by offsetting color and brightness variations across different background conditions.

