The shape aftereffect: Appearance matters

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One of the oldest known visual aftereffects is the shape aftereffect, wherein looking at a particular shape can make subsequent shapes seem distorted in the opposite direction. After viewing a narrow ellipse, for example, a perfect circle can look like a broad ellipse. It is thought that shape aftereffects are determined by the dimensions of successive retinal images. However, perceived shape is invariant for large retinal image changes resulting from different viewing angles; current understanding suggests that shape aftereffects should not be impacted by the operations responsible for this viewpoint invariance. By viewing adaptors from an angle, with subsequent fronto-parallel tests, we establish that shape aftereffects are not solely determined by the dimensions of successive retinal images. Moreover, by comparing performance with and without stereo surface-slant cues, we show that shape aftereffects reflect a weighted function of retinal image shape and surface slant information, a hallmark of shape constancy operations. Thus our data establish that shape aftereffects can be influenced by perceived shape, as determined by constancy operations, and must therefore involve higher-level neural substrates than previously thought.