

CONSTRAINTS OF SPECULARITY MOTION ON GLOSSINESS AND SHAPE PERCEPTION

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The image motion of a specular highlight constrains the recovery of surface curvature, under the assumption of a single, stationary light source. We have derived results demonstrating this relationship for a rotating object viewed by a stationary observer (cf. Blake and Bulthoff, *Phil. Trans. R. Soc. Lond.* **B** 1991, for similar results). A specularity on a rotating sphere remains stationary in the image; on a non-spherical ellipsoid, it moves with a velocity dependent on the radius of curvature. We ask whether humans exploit these cues in perceiving glossiness and 3-D shape. Observers view sequences of rotating objects, perspective projections of textured ellipsoids with Phong shading displayed on a CRT monitor. Observers perform a binary forced choice task, classifying each rotating ellipsoid as either (1) more or less glossy than the mean or (2) more or less elongated than a sphere. Most observers perceive objects on which the specularity moves relative to the texture (regardless of the sign or amplitude of the motion) as more glossy than objects with a "stuck-on" specularity. For some observers, the amplitude of the specularity motion influences surface curvature perception; for others, it does not. In a third experiment, we find that specularities with physically correct motion do not disambiguate stimuli in which the motion is otherwise ambiguous.

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