

Abstract

There have been many studies looking at how highlight disparity affects an observer's perception of gloss. Most state that the presence of accurate highlight disparity improves the perceived realism and increases the perceived strength of a surface's glossiness. The majority of these studies, however, have used smooth surfaces and simple lighting models.

Our current work uses naturalistic surfaces, in a wide range of roughnesses, combined with physically accurate lighting to examine their possible effect on gloss perception. Early pilot experiments seem to imply that the relationship between gloss perception, highlight disparity and roughness is more complex than previously reported.

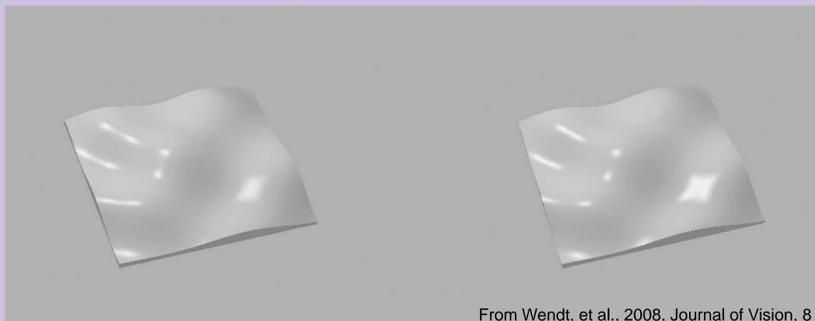
Overview

In 1990, Blake and Bulthoff showed that the disparity of specular highlights affects the realism of gloss with simple convex and concave surfaces.



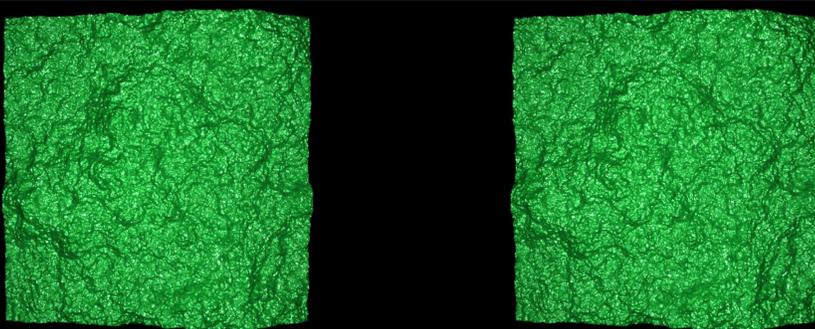
From Blake and Bulthoff, 1990, Nature, 343, 165-168

Wendt et al. extended this work in 2008 with more complex surfaces and concluded that the presence of highlight disparity increases the authenticity and strength of perceived glossiness.



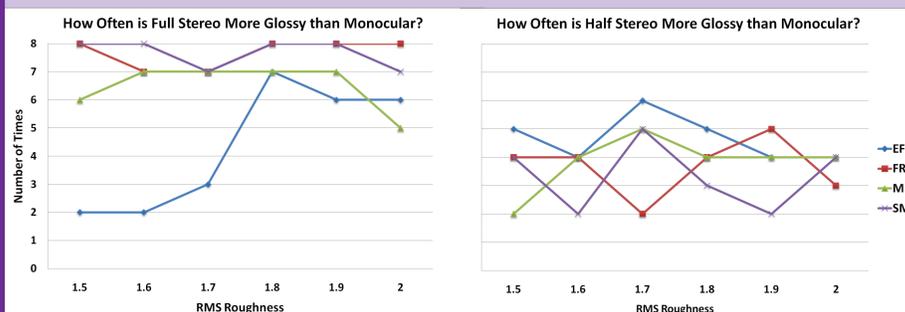
From Wendt, et al., 2008, Journal of Vision, 8

The surfaces used in these previous studies are relatively smooth. In comparison, the surfaces used in this study are perceptually very rough.

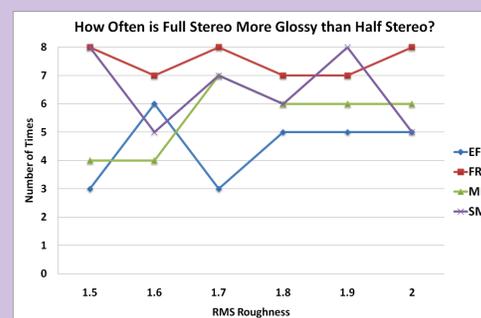


Pilot Study Results

Four participants were presented multiple pairs of surfaces with the same roughness and asked to indicate which was 'glossier'. The only statistical difference between the two surfaces was how they were presented: they were either monocular images, 'Half Stereo' pairs (where the surface was monocular and the gloss stereo) or 'Full Stereo' pairs.



As can be seen in 3 of the 4 cases, the 'Full Stereo' surfaces were consistently perceived as more glossy than the monocular ones. Unexpectedly, the 'Half Stereo' surfaces, which contained full highlight disparity, appeared perceptually equivalent to the monocular surfaces.



Oddly, when comparing 'Full Stereo' and 'Half Stereo' surfaces, the results are more noisy. This appears to disagree with the previous results. We intend to look into this more in the future.

Conclusions & Further Work

While our experiment appears to confirm that stereo disparity increases perceived glossiness on rough surfaces, it didn't hold true for all participants. In addition, specular highlight disparity alone doesn't seem to be enough to ensure increased perceived glossiness.

We therefore believe that these results merit further study with more participants. Hopefully, the increased data will allow us to perform more rigorous statistics and confirm whether it is the highlight disparity, or surface disparity which is most important in gloss perception on rough surfaces.