Surface Attitude Judgements in Synthetic Textures and Real-world Images: a method evaluation

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Introduction

- Judging surface attitude is critical to human visual perception and action preparation.
- We assessed whether results from synthetic textures generalize to real-world scenes and whether misperception of the gauge figure could lead to bias in these results.
- Surface attitude is measured by slant and tilt.

Stimuli and Design

Observers responded to monocularly presented images or textures.

Response Methods: Gauge Figure Dial

Results: group analyses

Synthetic Textures:
- Dial method: overestimation of high slant and underestimation of low slant
- Gauge figure methods: general overestimation. The degree of the overestimation is higher when the surfaces were less slanted.

Real World Images:
- Both methods had an underestimation of slant and showed a gain less than 1. The gauge figure method had a significantly higher correlation.

Reliability:
- The gauge figure methods are more reliable than the dial method, regardless of stimuli.

Sensitivity: 1.35 * RMSE/slope

Discussion

- Observers performed more accurately in surface attitude judgements in synthetic textures than real world images.
- Tilt judgments were accurate and reliable for synthetic textures, but lost accuracy in real world images and gravitate to Cartesian directions.
  - Cartesian tilt directions are very prevalent in real world images
  - The two response methods did not correlate with each other when judging the tilt of real world images, showing that observers were not consistent between methods when judging the same image.
  - The dial method had higher gain and sensitivity than the gauge figure method when judging synthetic textures, but the pattern reversed when judging real world images.

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