A Reverse Correlation Test of Computational Models of Lightness Perception

Submission ID 3000234

Submission Type Oral Presentation

Topic Cognitive Science

Status Submitted

Submitter Richard Murray

Affiliation York University

SUBMISSION DETAILS

Presentation Type Either Poster or Oral Presentation

Presentation Abstract Summary Lightness constancy is the ability to perceive surface albedo accurately despite changes in illumination. This fundamental ability is still poorly understood, and current computational models have widely differing views on what image properties guide lightness perception. Here we adapt reverse correlation methods, which have mostly been used to probe low-level physiological and perceptual computations, to test computational models of the much higher-level phenomenon of lightness perception. Observers viewed the argyle illusion, one of the strongest known lightness illusions, in the presence of visual luminance noise, and judged which of two image patches appeared lighter. We measured the influence of noise at each image location on observers' judgements. We find that lightness percepts are driven by highly local, anisotropic image regions around the patches being judged. We ran several leading computational models of lightness perception in the same experiment, and we find that they fail to predict even qualitatively which images features guide lightness perception for human observers. Our findings show that any successful computational model of lightness perception must have a role for "lighting frameworks", i.e., regions of approximately constant illumination. We also suggest how some current computational theories of lightness perception can be revised to account for our findings.

Paper Upload (PDF) ccn.pdf

Co-author Information

* Presenting Author

First Name	Last Name	Affiliation	E-mail
Richard *	Murray *	York University	rfm@yorku.ca
Minjung	Kim	York University	mkim85@gmail.com
Jason	Gold	Indiana University	jgold@indiana.edu

Keywords

Keywords
human visual perception
psychophysics
computational modelling
lightness perception