# Gloss constancy across changes in illumination

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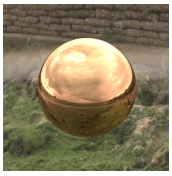
## Gloss constancy

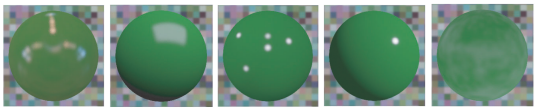
What information do we use to compensate for changes in illumination when estimating gloss?

## Review

Same glossy sphere, rendered under different real and artificial light fields

Poor gloss constancy



Fleming, Dror, Adelson (2003)

Do observers show gloss constancy when they have explicit information about the light field?

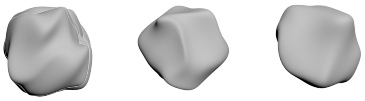
## Experiment 1

Does contextual information about the light field have an effect on perceived gloss?

- Render an object in one light field
- Present it in the context of an incongruent light field

## Stimuli

Spheres warped with multiple sinusoids
"potato" objects



## Stimuli

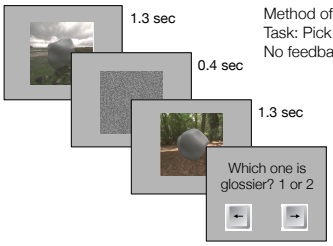
cloudy, coastal

sunny beach

cloudy, residential

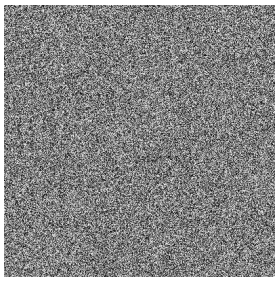
sunny, shadowed forest

## Experimental Task



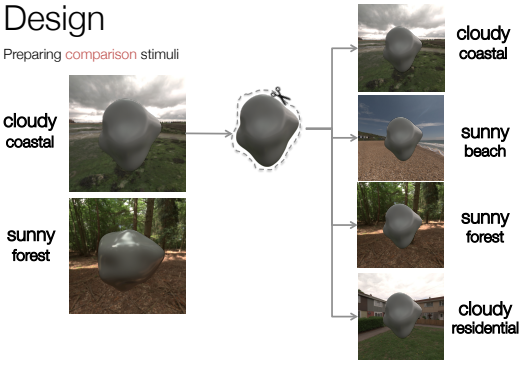

Method of constant stimuli
Task: Pick the object that is glossier
No feedback

## 2IFC: Which one is glossier?



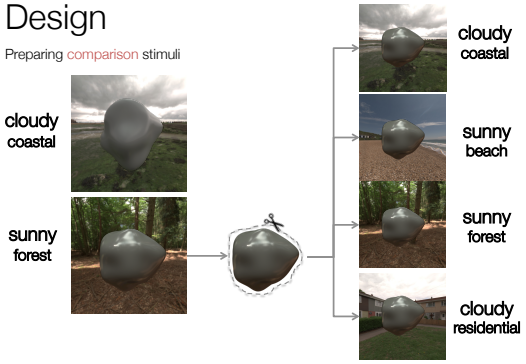
## Design

Preparing comparison stimuli



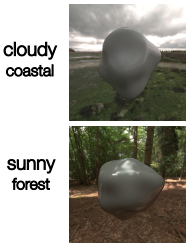

## Design

Preparing comparison stimuli




## Design

Preparing standard stimuli



## Design

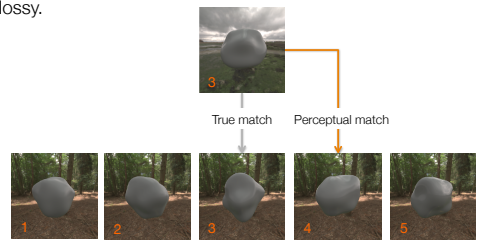
Two gloss levels for standard stimuli


Seven gloss levels for comparison stimuli


glossier

## Predictions

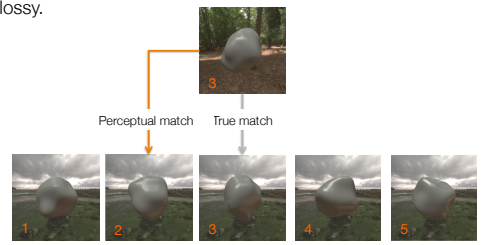
When an object is rendered in a cloudy light field and is shown in a sunny (high contrast) context, it will appear less glossy.




glossier

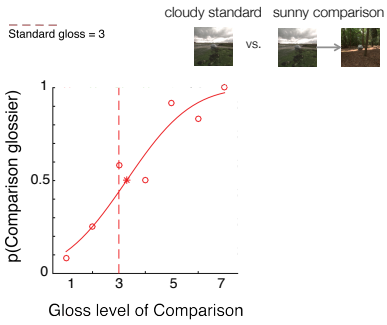
## Predictions

When an object is rendered in a sunny (high contrast) light field and is shown in a cloudy context, it will appear more glossy.

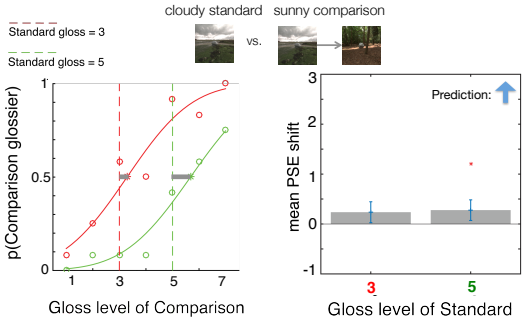



glossier

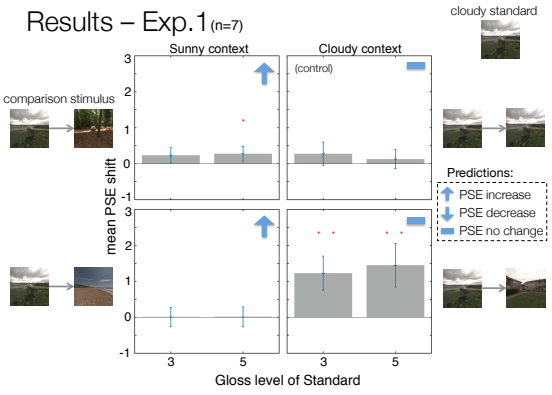
## Results – Exp.1



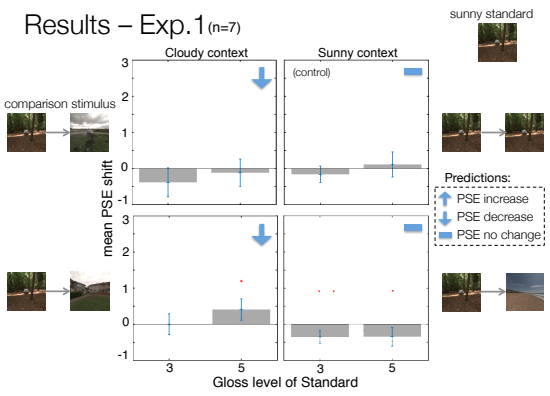

## Results – Exp.1




## Results – Exp.1 (n=7)



## Results – Exp.1 (n=7)

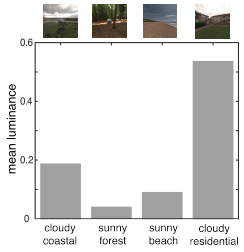



## Interim summary - 1

Context affects gloss judgments, but not in the way we predicted.

Large PSE shifts with cloudy residential light field

- The cloudy residential had the highest mean luminance



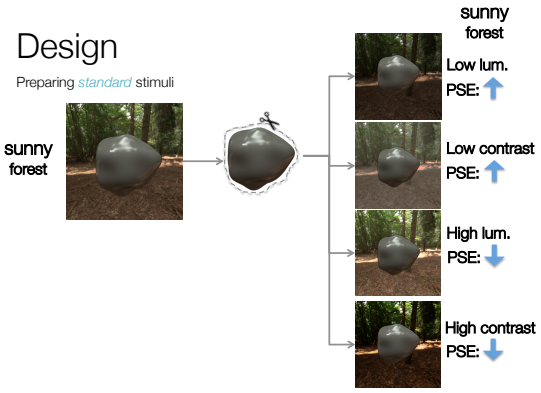

## Experiment 2

Do observers use simple image statistics to compensate for the changes in the light field?

- Render an object in one light field
- Present it in the context of a similar, high/low luminance or high/low contrast light field

## Design

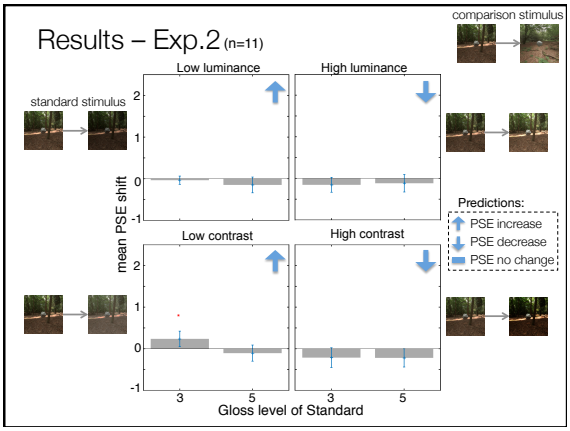
Preparing *standard* stimuli




## Design

Preparing comparison stimuli


## Results – Exp.2 (n=11)



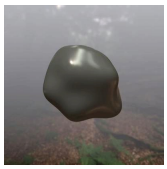
## Interim summary - 2

No gloss constancy across changes in luminance and contrast

Observers use something other than mean luminance and contrast of the light field when estimating gloss

## Experiment 3

What happens to gloss constancy when we reduce the structure of the light field?

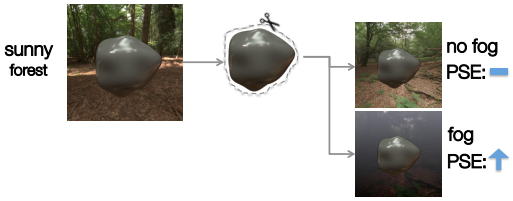


Foggy light fields

Binomial coefficient filter with a vertical gradient
(Simoncelli, Adelson 1990)

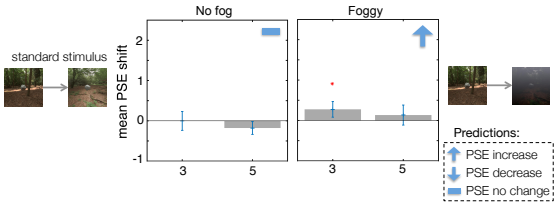
## Design

Preparing *standard* stimuli




## Results – Exp. 3 (n=10)

comparison stimulus




## Conclusions

What information do we use to compensate for changes in illumination when estimating gloss?

- The light field context

What information do people not use to estimate gloss?

- Simple image statistics (mean, variance)
- Light field structure

Michael Landy

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Landy Lab

Thank you!

NYU

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