Investigating Different Methods to Study Human Brightness Perception

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Agenda

1. Basics
2. Methods
3. Prior Results
4. Research Question
Basics

Brightness = Perceived Luminance

Lightness = Perceived Reflectance
Physical Properties

Illuminance

Reflectance

Luminance

Subjective Variables

Brightness = Perceived Luminance

Lightness = Perceived Reflectance
Brightness Effect
Brightness Effect

Checker Shadow Illusion

by Edward H. Adelson, MIT in 1995
Brightness Effect
Brightness Effect

Same Luminance
Different Brightness
Stimuli

Consists of

2 equiluminant gray regions ("targets")
Methods

2/4
Methods

Method of Adjustment

Brightness Rating

(a) (b)

(c) (d)

Which target is brighter?

Left target is definitely brighter
Left target is maybe brighter
Targets are equally bright
Right target is maybe brighter
Right target is definitely brighter
Method of Adjustment
Brightness Rating

Which target is brighter?

- Left target is definitely brighter
- Left target is maybe brighter
- Targets are equally bright
- Right target is maybe brighter
- Right target is definitely brighter
Prior Work & Results
Method of Adjustment

Brightness Rating

Which target is brighter?

- Left target is definitely brighter
- Left target is maybe brighter
- Targets are equally bright
- Right target is maybe brighter
- Right target is definitely brighter

Marcus Bindermann

Anas Allaham
Vergleich ausgewählter Helligkeitsphänomene: 

Modellbasierte Vorhersagen

und psychophysische Messungen

ODOG-Model

27 Participants

Compare Results
Method of Adjustment

Which target is brighter?

- Left target is definitely brighter
- Left target is maybe brighter
- Targets are equally bright
- Right target is maybe brighter
- Right target is definitely brighter

Marcus Bindermann

Anas Allaham
Investigating Inter-Individual Differences in Human Brightness Perception
Anas Allaham

Investigating Inter-Individual Differences in Human Brightness Perception

16 Participants
<table>
<thead>
<tr>
<th></th>
<th>Bindermann</th>
<th>Allaham</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of stimuli</td>
<td>10</td>
<td>45</td>
</tr>
<tr>
<td>Avg. Duration of a run</td>
<td>45 min</td>
<td>17 min</td>
</tr>
<tr>
<td>Judgements</td>
<td>Absolute</td>
<td>Relative</td>
</tr>
<tr>
<td>Measurement</td>
<td>Pearson's contingency coefficient</td>
<td>Krippendorff's alpha</td>
</tr>
<tr>
<td>Stimulus from Bindermann</td>
<td>Stimulus from Allaham</td>
<td>Comments to obvious differences in the stimuli</td>
</tr>
<tr>
<td>-------------------------</td>
<td>----------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Which target was used as a reference when the adjustment results were brighter on average?</td>
<td>Which target is perceived brighter by the participants on average?</td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="stimulus" /></td>
<td><img src="image" alt="stimulus" /></td>
<td>Stimulus from Allaham is stretched vertically.</td>
</tr>
<tr>
<td><img src="image" alt="stimulus" /></td>
<td><img src="image" alt="stimulus" /></td>
<td>One stimulus rotated at 90 degrees.</td>
</tr>
<tr>
<td><img src="image" alt="stimulus" /></td>
<td><img src="image" alt="stimulus" /></td>
<td>The Sizes of both stimuli are different.</td>
</tr>
<tr>
<td><img src="image" alt="stimulus" /></td>
<td><img src="image" alt="stimulus" /></td>
<td>One stimulus is flipped horizontally.</td>
</tr>
</tbody>
</table>

- Different Experiments
- Different Participants
- Different Apparatus
- Different Photometric
- Different Stimuli
  - Luminance
  - Size
  - Type
Research Question
Research Question

Do data collected with two different methods - method of adjustment and brightness ratings - give similar estimates for the perceived brightness in different brightness illusions? 😐
Thank You :D
Mohamad Anas Allaham (2022). Investigating Inter-Individual Differences in Human Brightness Perception


Questions?