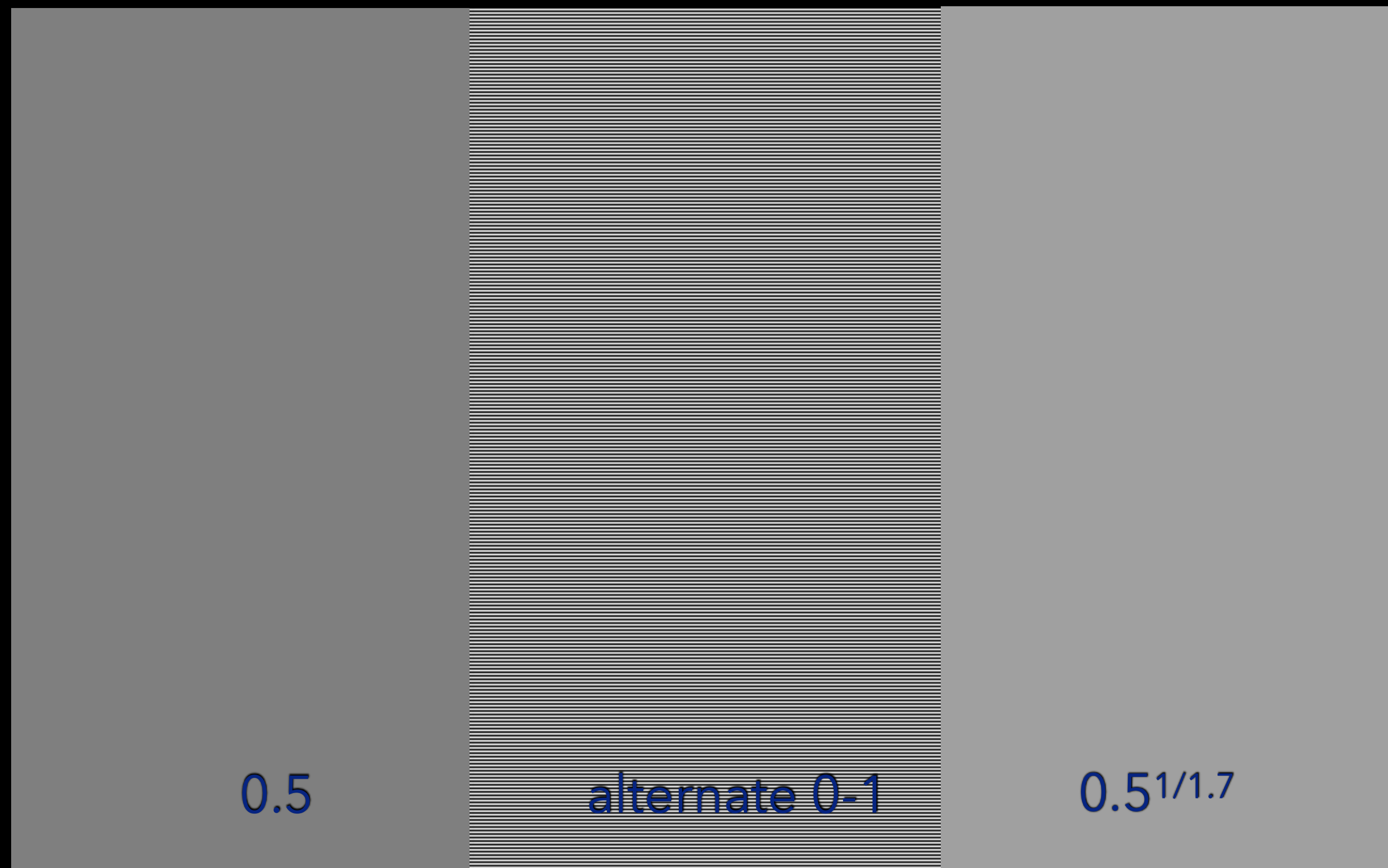


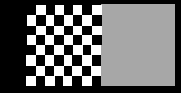
Displayed Color

- The R-G-B gamut differs from monitor to monitor
 - Different white points, varies with ambience, knob controls, even age
- We do not store color in any physical unit, but in an arbitrary range: 0..1
 - 1 may translates to maximum brightness supported by monitor, 0 to minimum
- What about the intermediate values? 0.5?
 - Some scale is assumed, usually not uniform
 - we can distinguish differences in low luminance better
- How do monitor use these values? Control a voltage? Pulse width modulation?
 - Map each channel value to a control

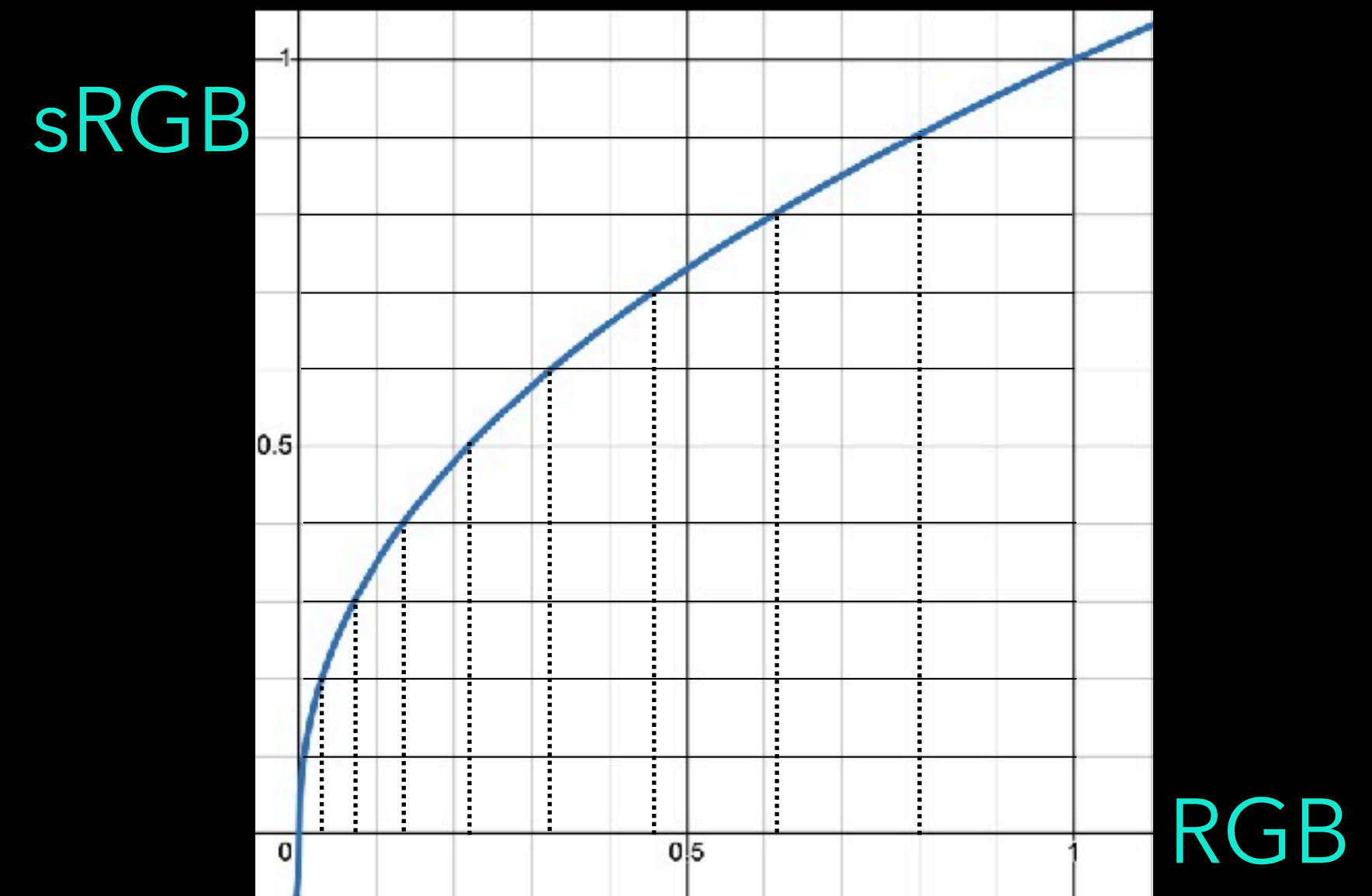
Linear != Perceptually uniform



Gamma Correction



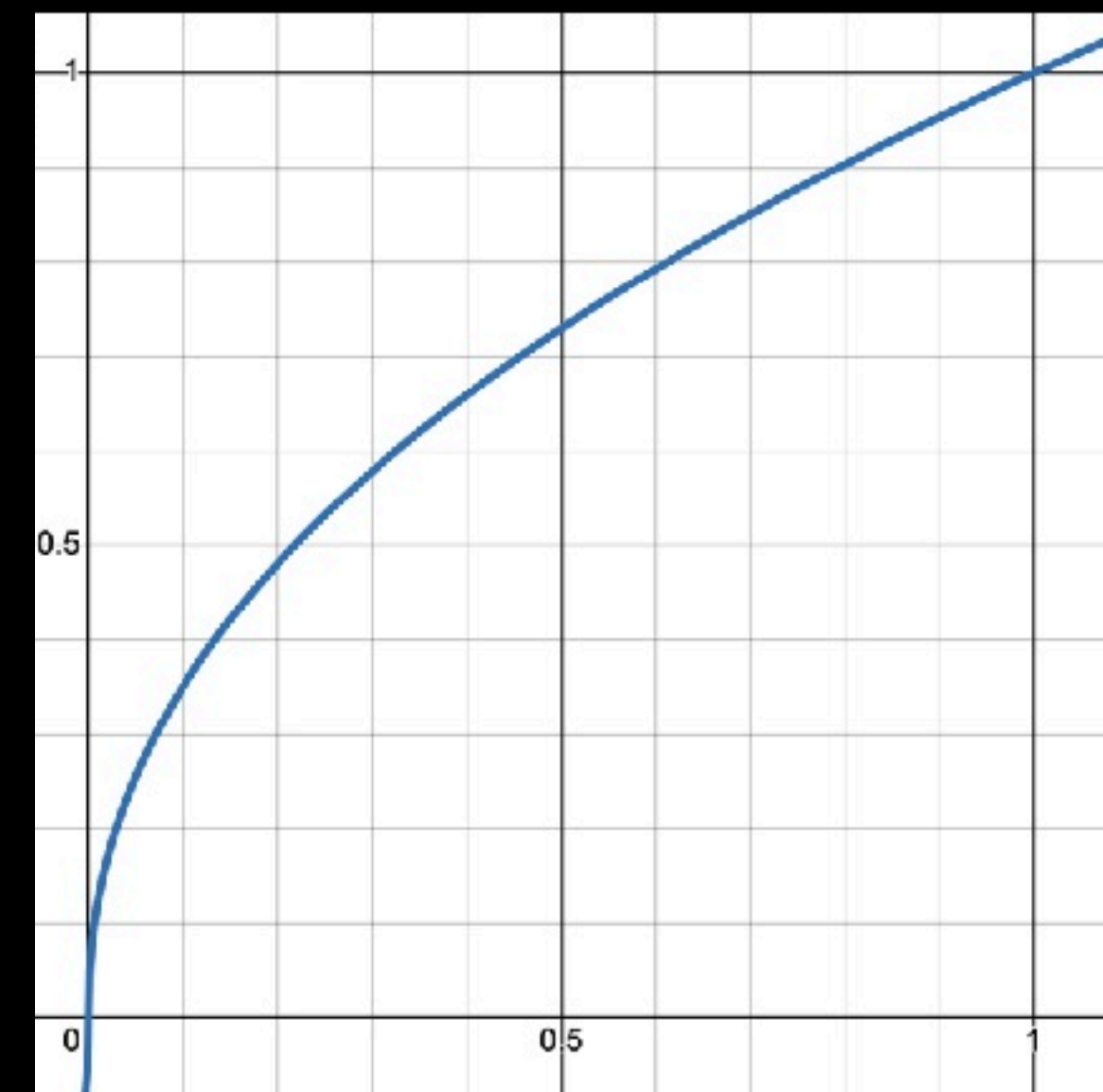
- Say, channel range is 0..1, and digitized into 2^b levels (e.g., using b bits, $b = 8$)
 - Normalized values are 0, $1/255$, $2/255$, ... 1
 - How should these values be displayed?
- For value v , $\text{displayed_intensity} = \text{Max_Intensity} * v^\gamma$
 - Typical value of γ : 2.2
- Note that your image file may store sRGB
 - Already gamma corrected



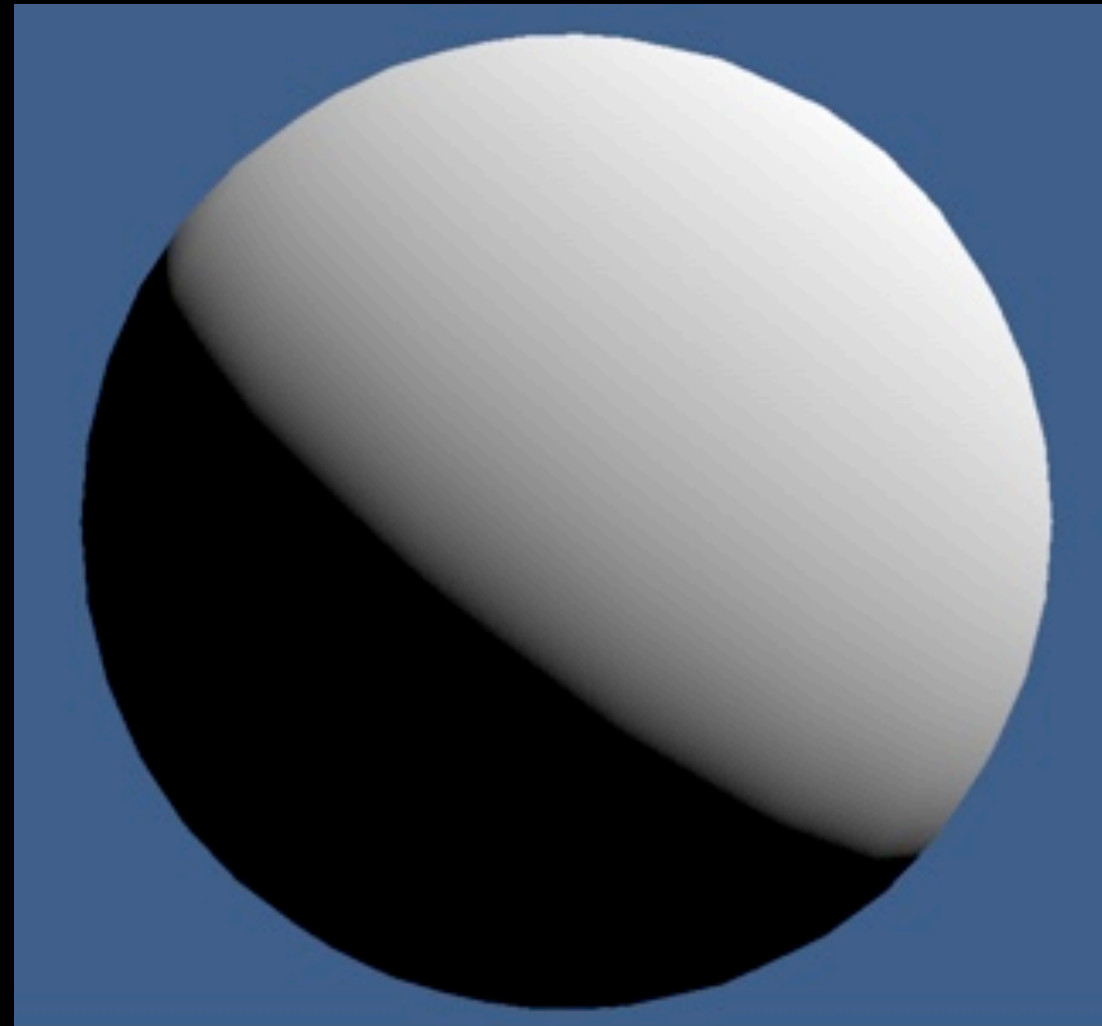
Linear vs Gamma Scale

Without Gamma Correction

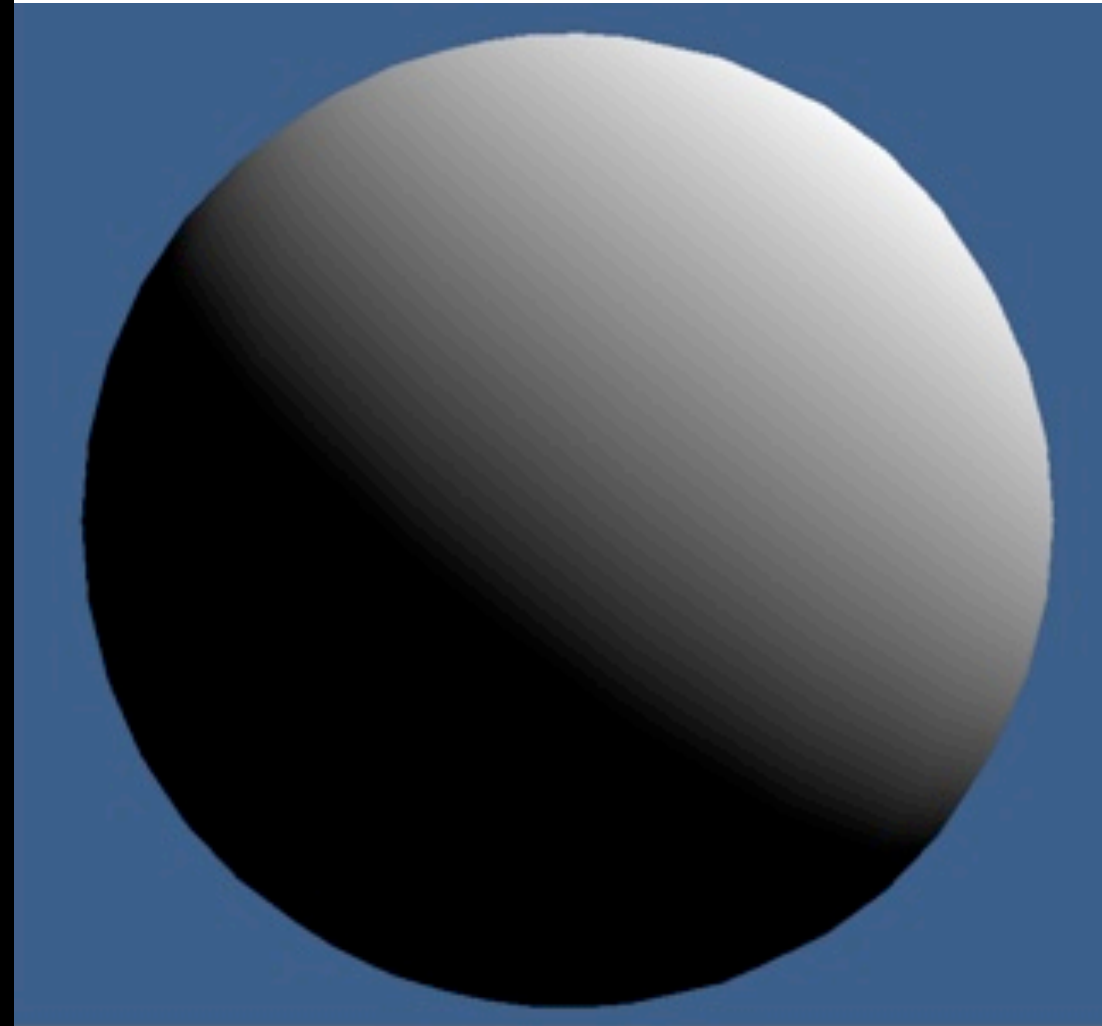
Gamma Corrected



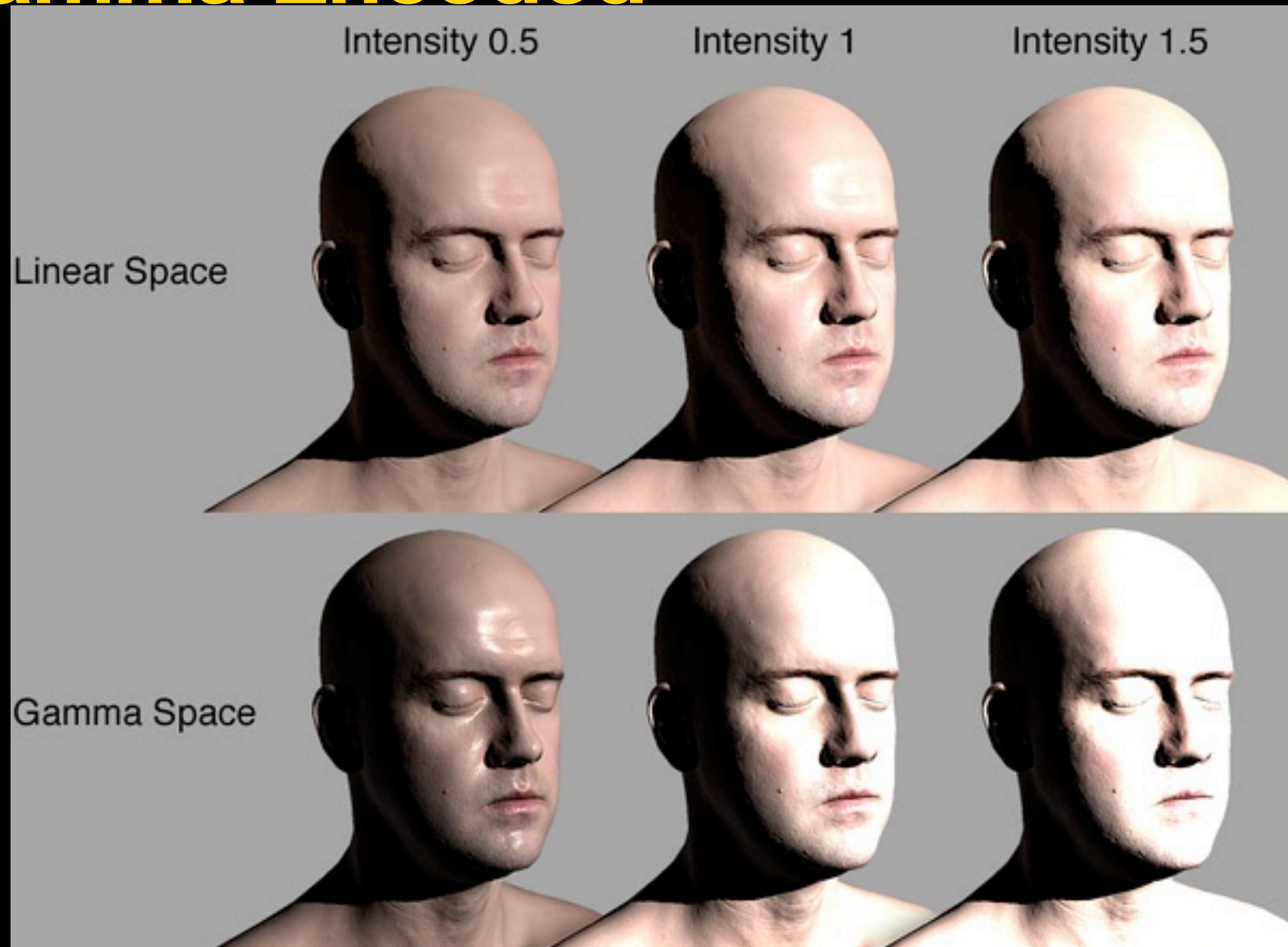
Linear vs Gamma Encoded



Linear Space



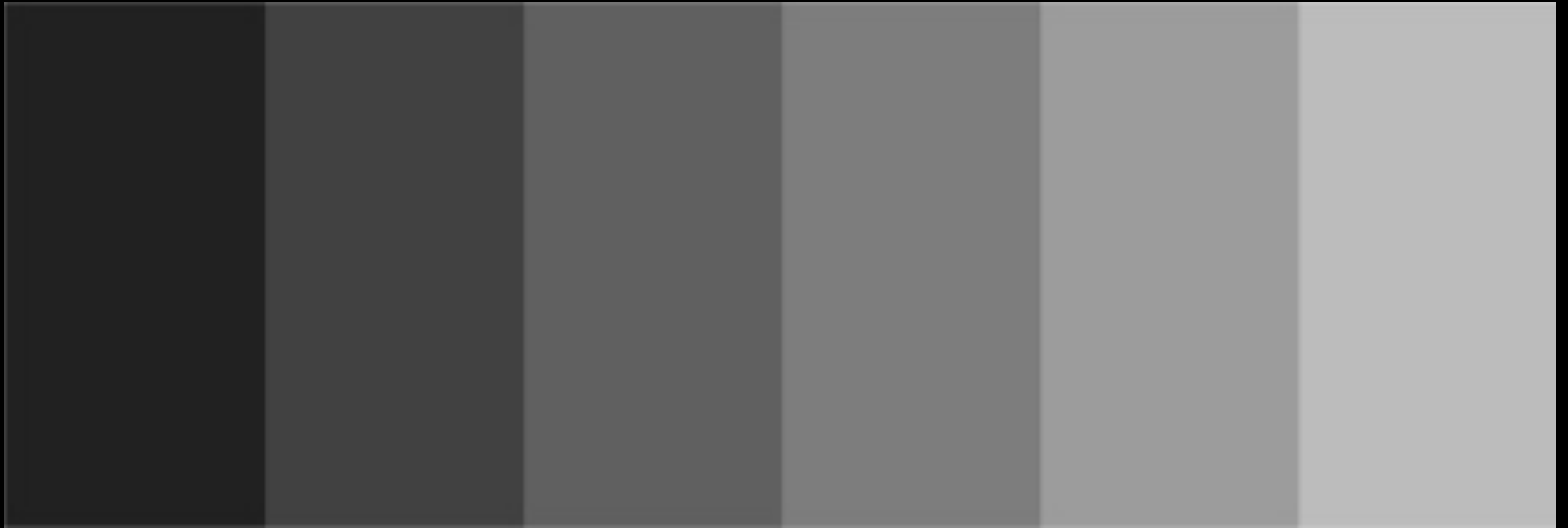
Gamma Space



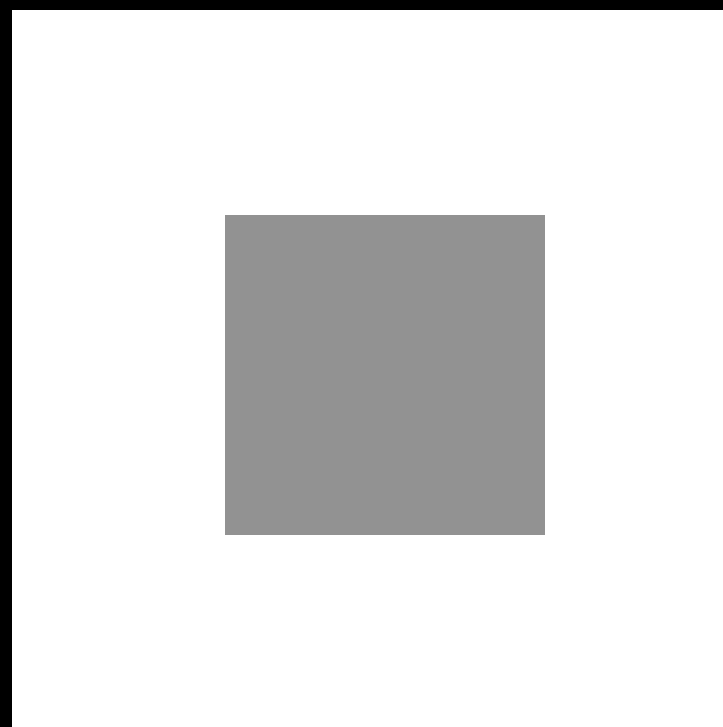
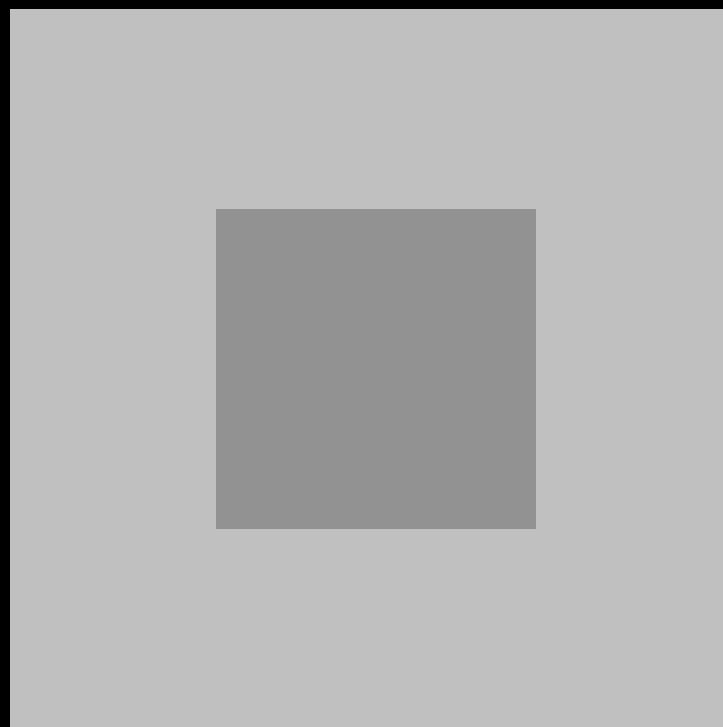
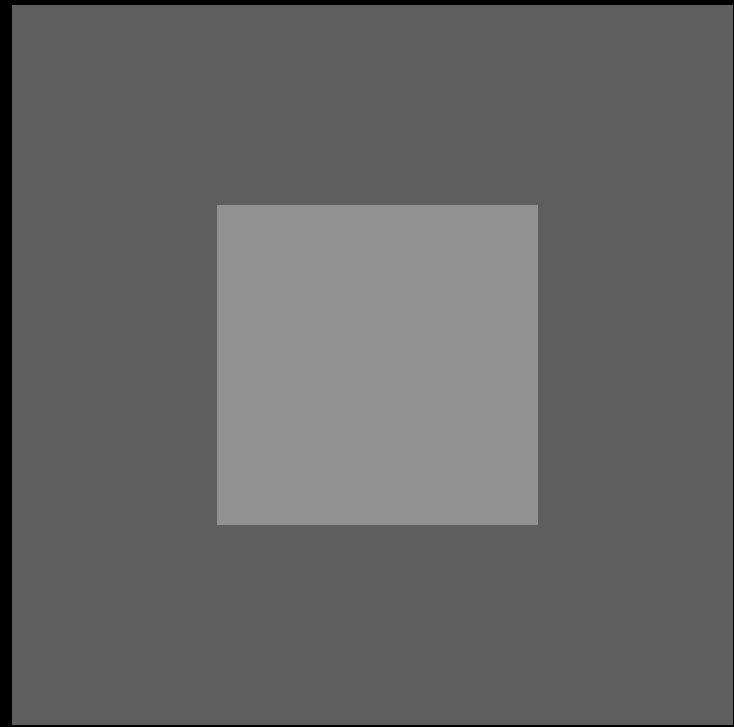
Intensity Quantization

Weber ratio: Minimum perceptible intensity change

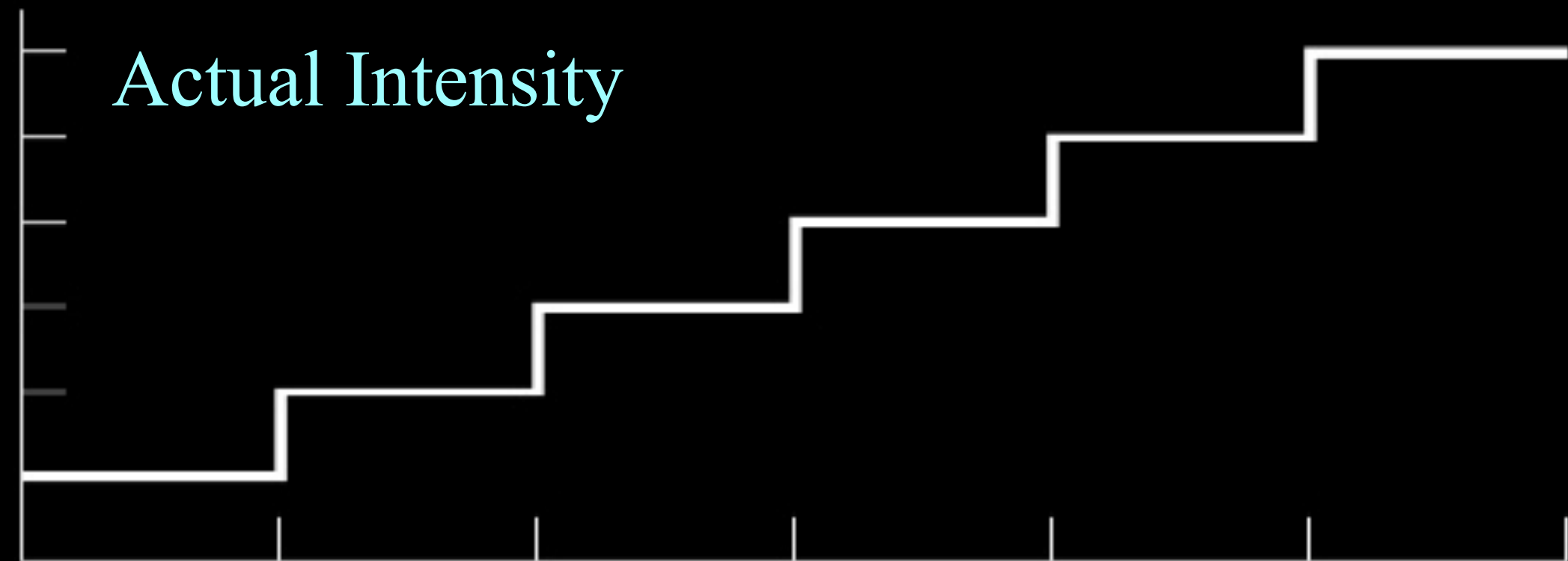
(varies with background illumination)



Relative Intensity Perception



Actual Intensity



Perceived Intensity



Hue Perception



$R = 0.92$
 $G = 0.82$
 $B = 0.89$