Luminance etc. (1)

Lumen

- Power of light perceived by the human eye
- Reflects the varying sensitivity of the human eye to different wavelengths of light

Radiance

- Amount of light that falls within a given solid angle in a specified direction
- Indicates how much of the power emitted by a reflecting surface will be received by an optical system looking at the surface from some angle of view

Luminance etc. (2)

Spectral radiance

- Characterizes the light at a single wavelength or frequency
- The radiance is equal to the sum (or integral) of all the spectral radiances from a surface.

Illuminance

- Illuminance is a measure of the intensity of the incident light, wavelength-weighted by the luminosity function to correlate with human brightness perception.
- was formerly often called brightness
- Human eye:
  starlight (5×10^{-5} lux), 1,000 times direct sunlight (10^8 lux)

Luminance etc. (3)

Luminance

- Amount of luminous power perceived by an eye looking at the surface from a particular angle of view.
- Used in the video industry to characterize the brightness of displays (computer: 50 - 300 cd/m^2 , HDTV: 450 - 1000 cd/m^2).

Relative Luminance

- Luminance, but the values normalized to 1 or 100 for a reference white
- Calculate rel. luminance: $Y = 0.2126\ R + 0.7152\ G + 0.0722\ B$
- green light contributes the most to the intensity perceived by humans, and blue light the least.

Luminance etc. (4)

Irradiance

- Power per unit area of electromagnetic radiation at a surface
- Total amount of radiation present at all frequencies

Brightness

- subjective attribute/property of an object being observed
- non-quantitative subjective references to perceptions of light
- A given target luminance can elicit different perceptions of brightness in different contexts
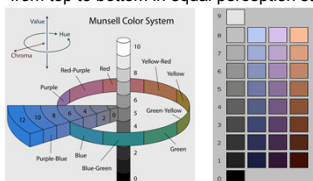
Luminance etc. (5)

Lightness

- Dimension of a color space, that is defined in a way to reflect the subjective brightness perception of a color for humans
- Three hues in the Munsell color model. Each color differs in value from top to bottom in equal perception steps.

Luminance etc. (6)

Luma

- brightness in an image
- Luminance is formed as a weighted sum of *linear* RGB components. Luma is the weighted sum of **gamma-compressed** R'G'B' components

Luminosity

- average visual sensitivity of the human eye to light of different wavelengths