



Data Visualization Basics

Dr. Ellen Keister

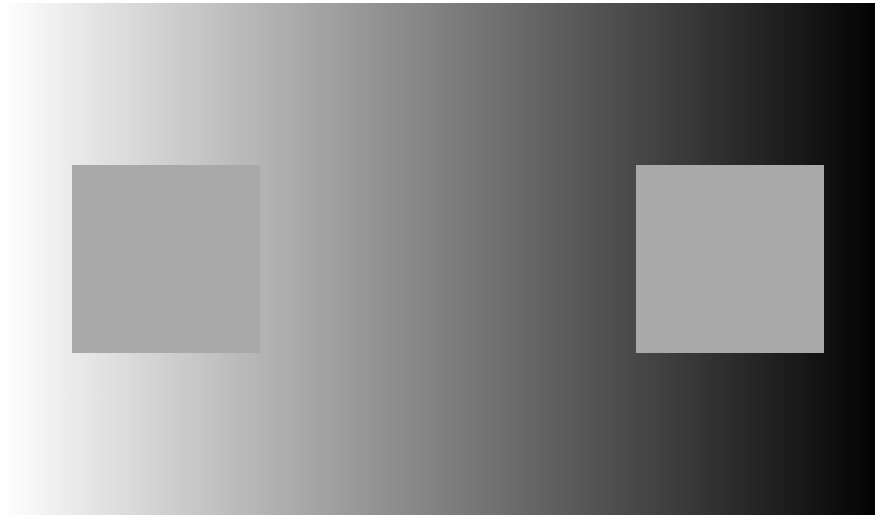
July 1, 2020



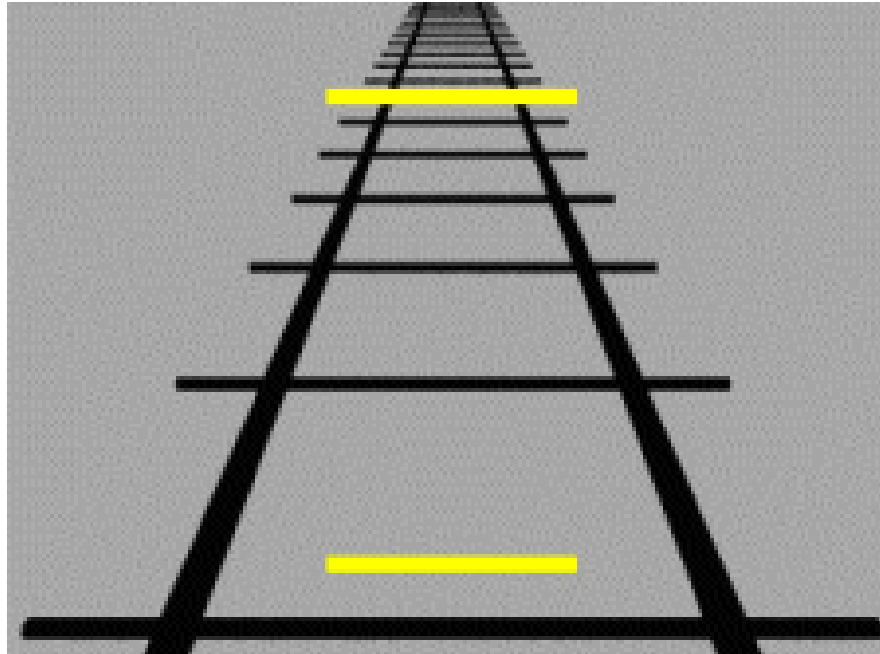


- Consider purpose and goal
 - Paper
 - Conference presentation
 - Poster
- Consider audience
 - Specialists
 - Related fields
 - General public/non-experts
- Determine one main message per visualization/figure

- What story is this visualization telling?
- Is it (accidentally) saying something I don't want?
- The human visual processing system is complex:
 - It is efficient because it takes shortcuts. We have to work with the shortcuts, not against them
- Cite/reference your data sources, especially comparison data
- Be clear about what inputs/assumptions go into your visualization!







position

length

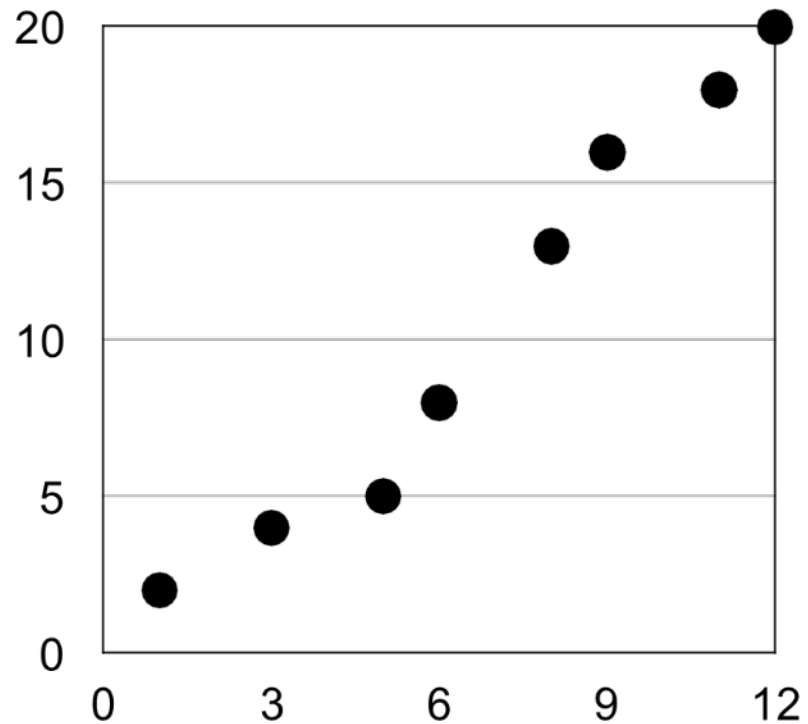
angle (slope)

area + volume

color (saturation & value)

color (hue)

Representing quantitative information



position

length

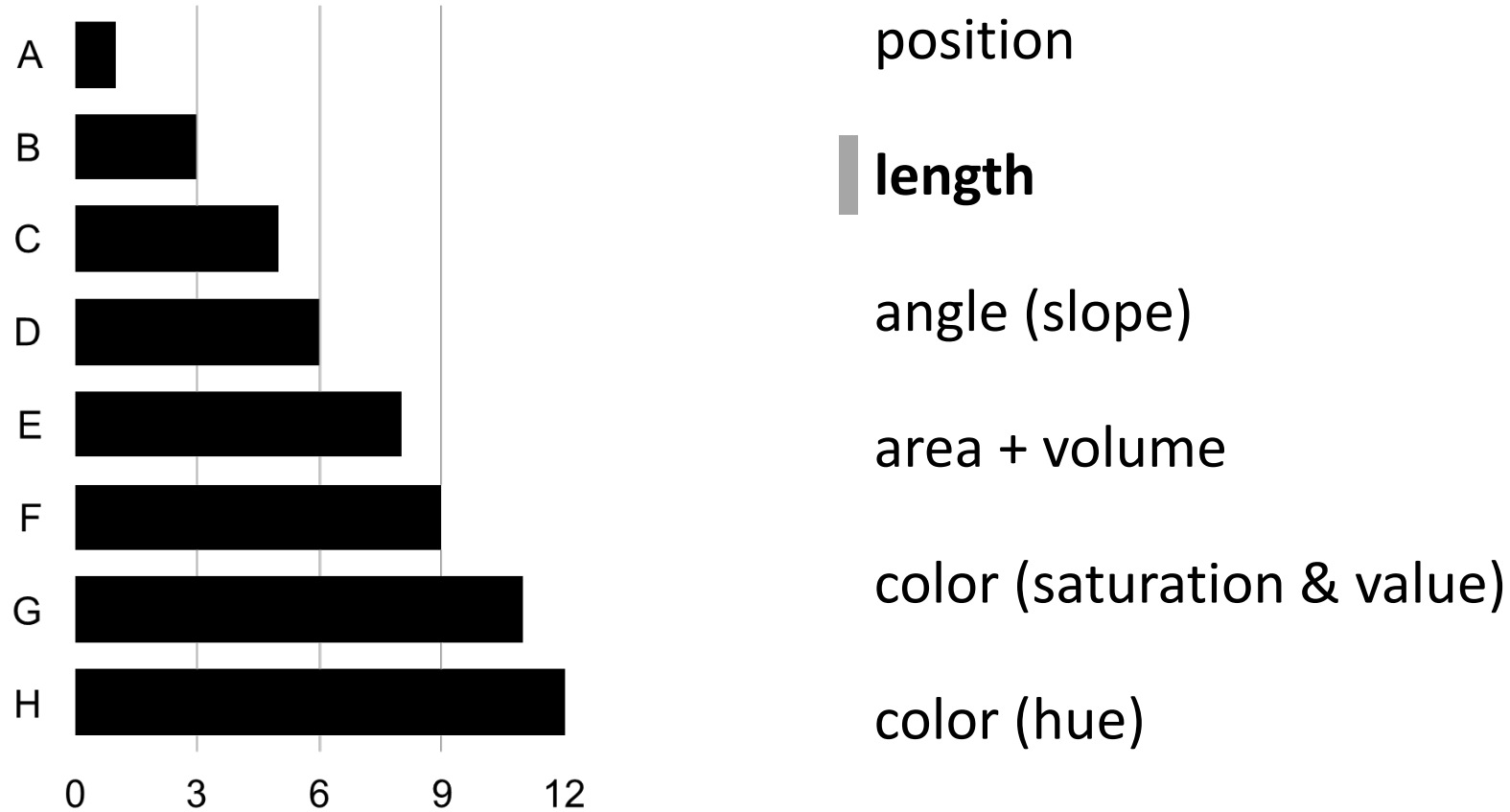
angle (slope)

area + volume

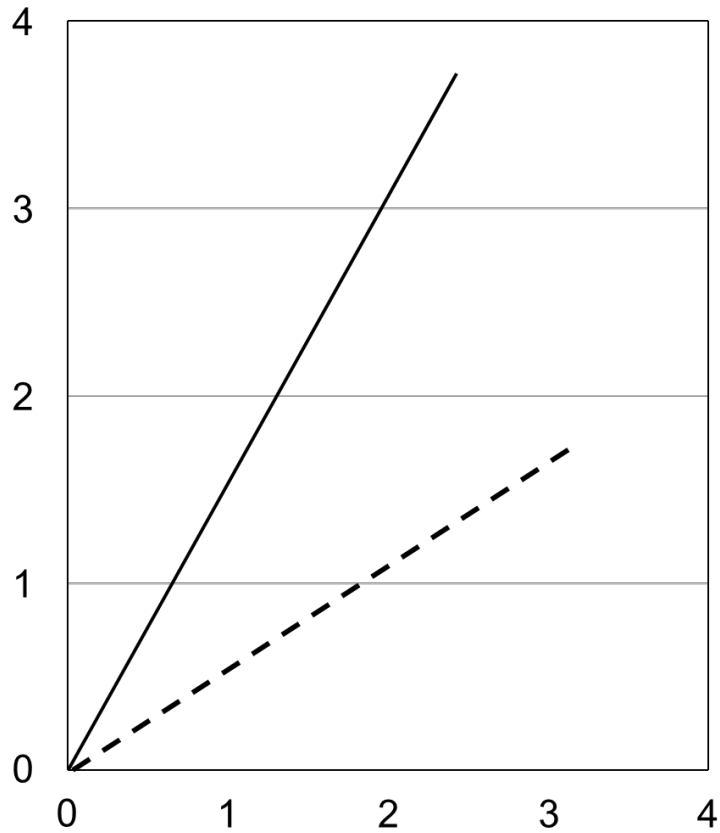
color (saturation & value)

color (hue)

Representing quantitative information



Representing Quantitative Information



position

length

angle (slope)

area + volume

color (saturation & value)

color (hue)

Representing Quantitative Information



position

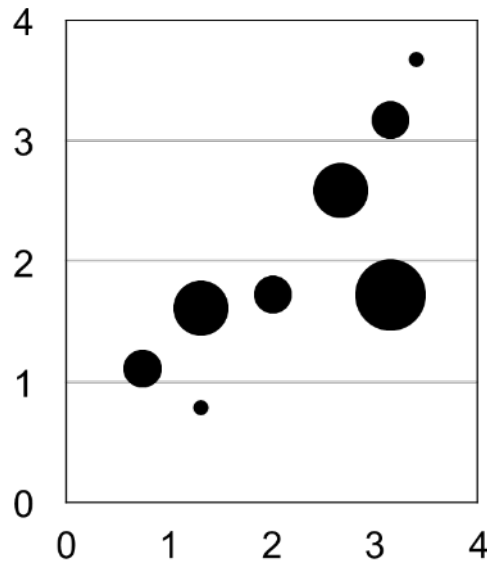
length

angle (slope)

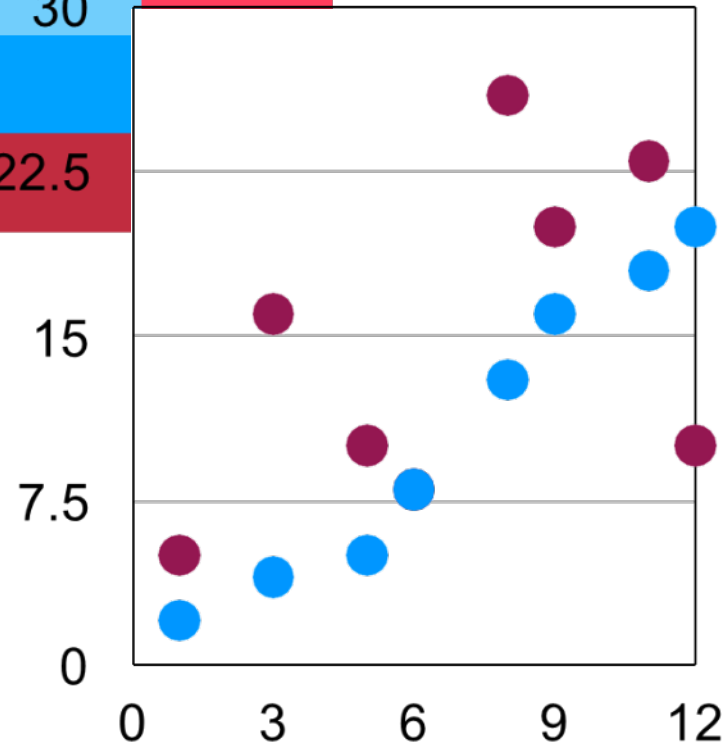
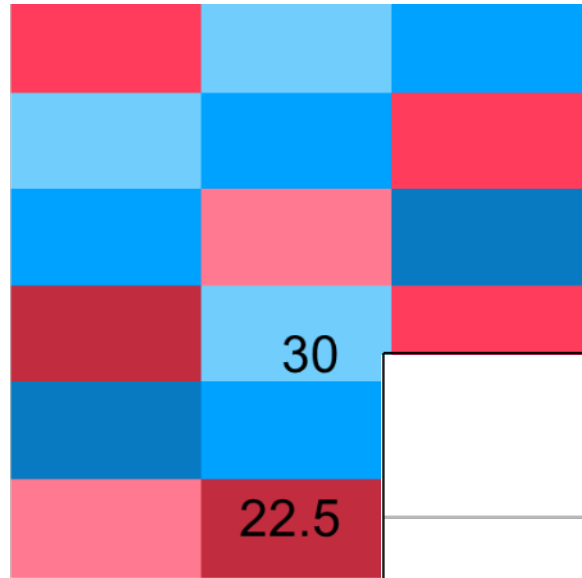
area + volume

color (saturation & value)

color (hue)



Representing Quantitative Information



position

length

angle (slope)

area + volume

color (saturation & value)

color (hue)

QUANTITATIVE

position

lengths

CATEGORICAL

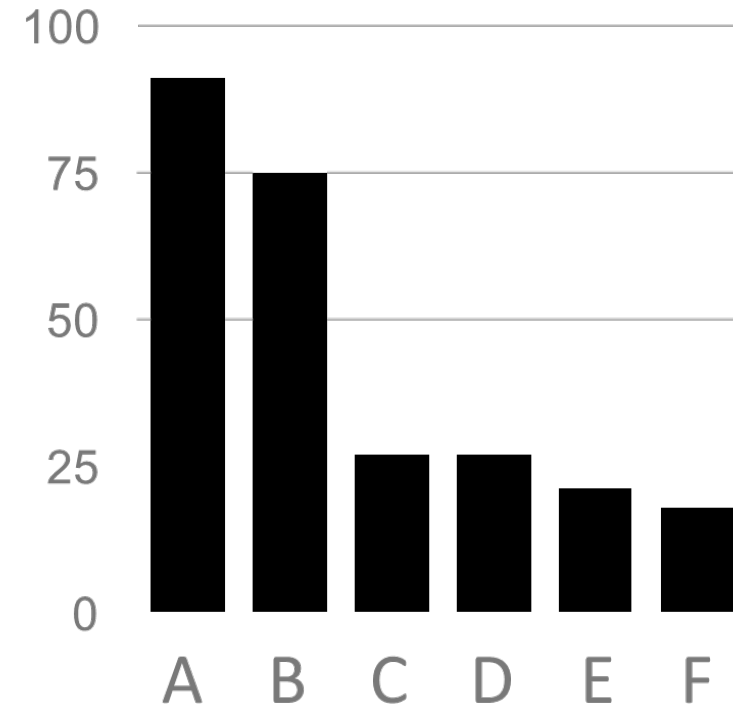
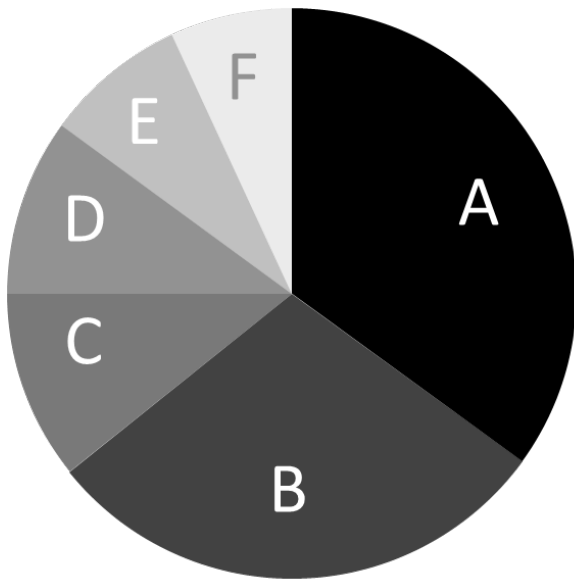
angles + slopes

area + volume

color (saturation & value)

color (hue)

Representing Quantitative Information

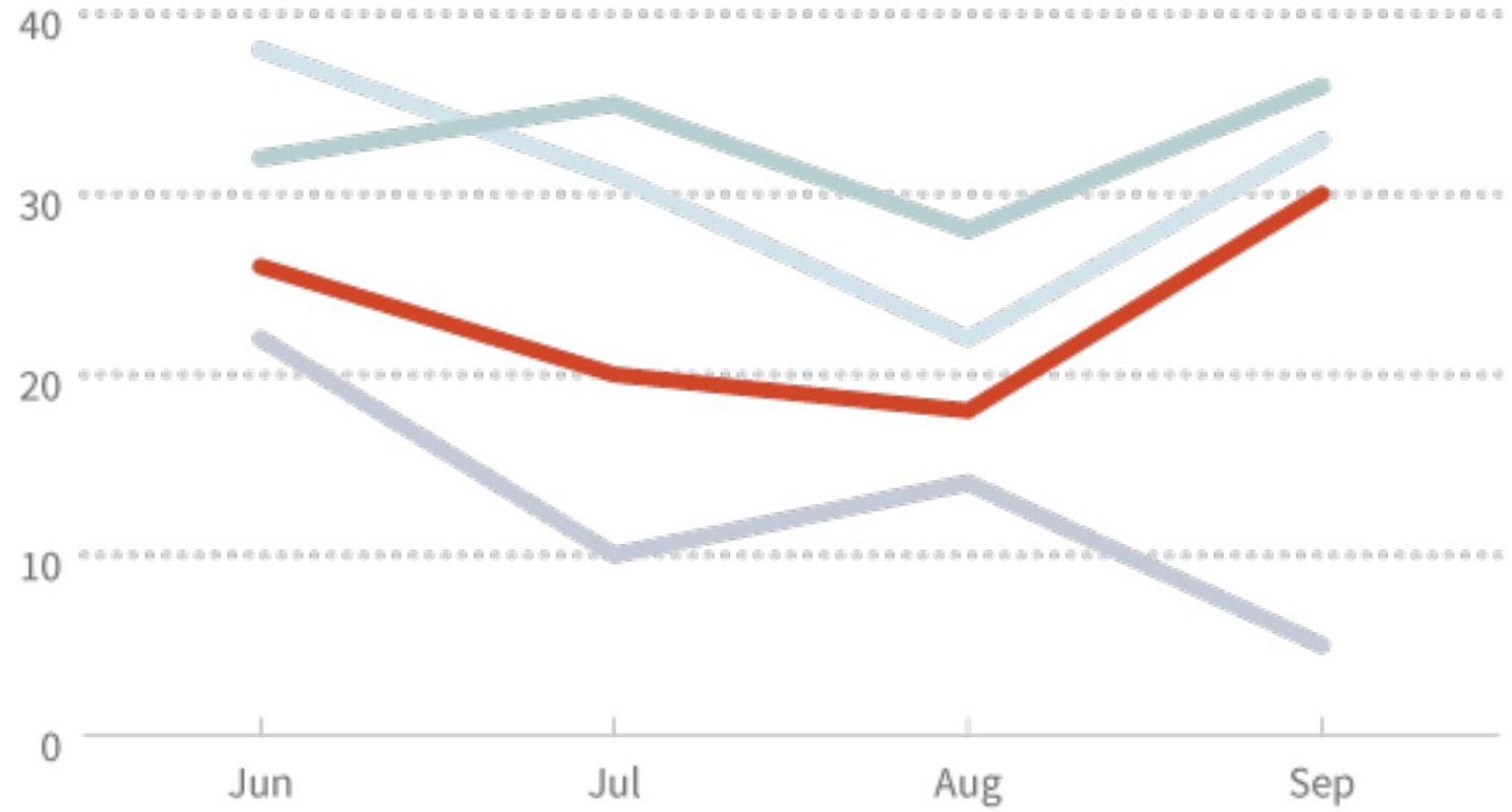


Initial visual assessment

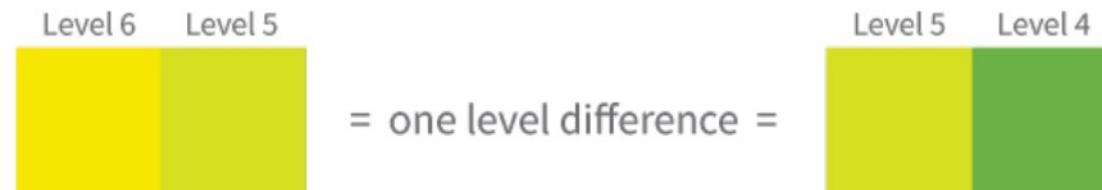
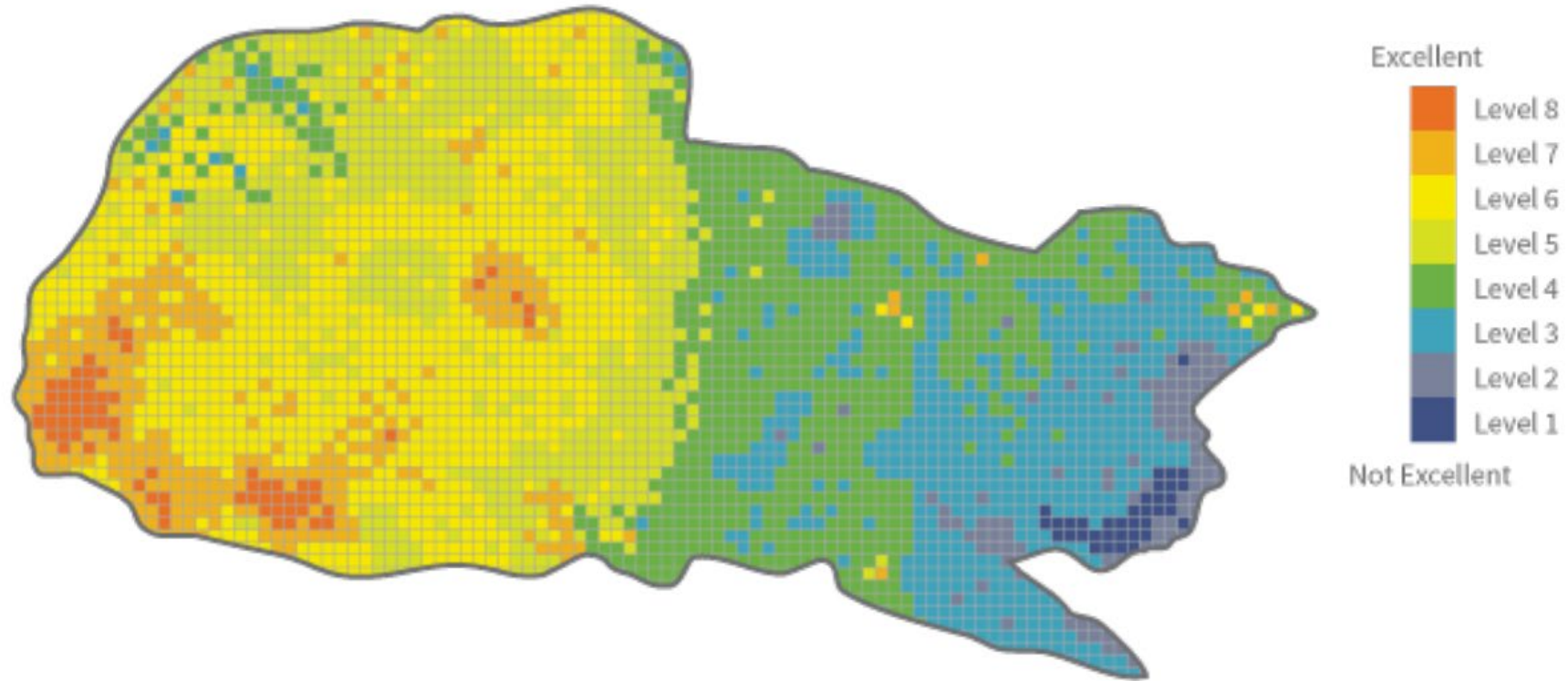
- Is any part of the diagram unreadable?
- What stands out as “important”, based on visual cues? (don’t try to assess the content, just top level visual perception)
- If quantitative information is being displayed, how is it represented? (position, length, area, color, etc)

Content

- Can you determine a main “message”? (if there seems to be more than one, how might you separate them into multiple figures?)
- Is the quantitative representation appropriate? (quantitative vs. categorical)



Level of Excellence in Relethounia

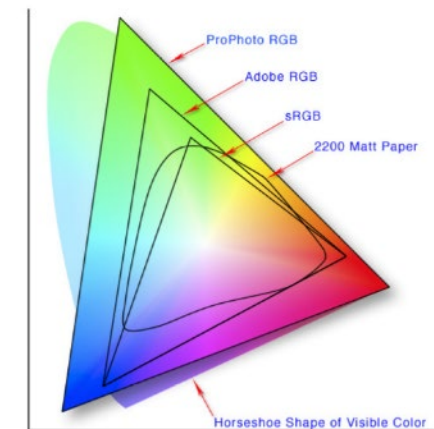
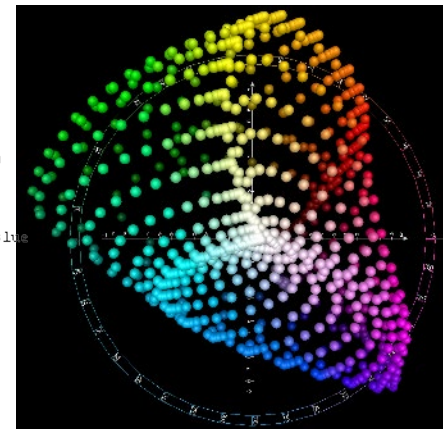
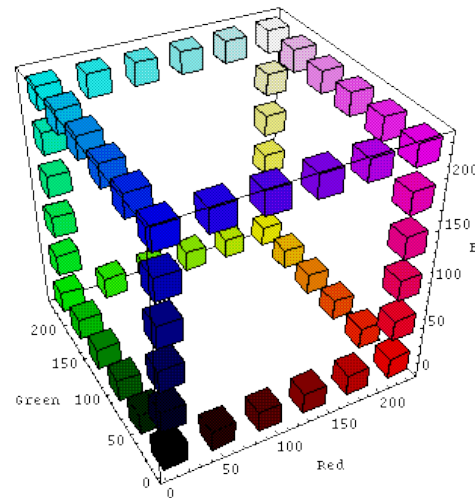
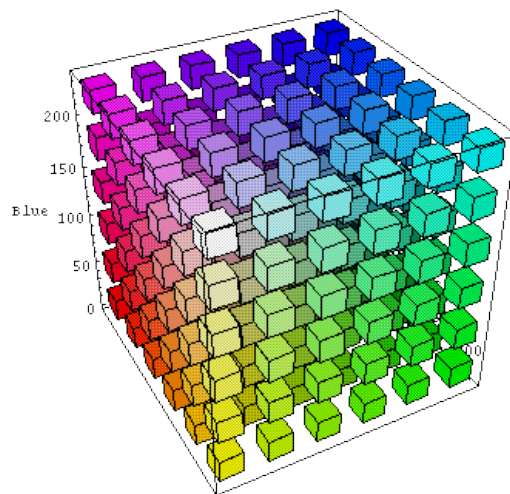


Colorspace:

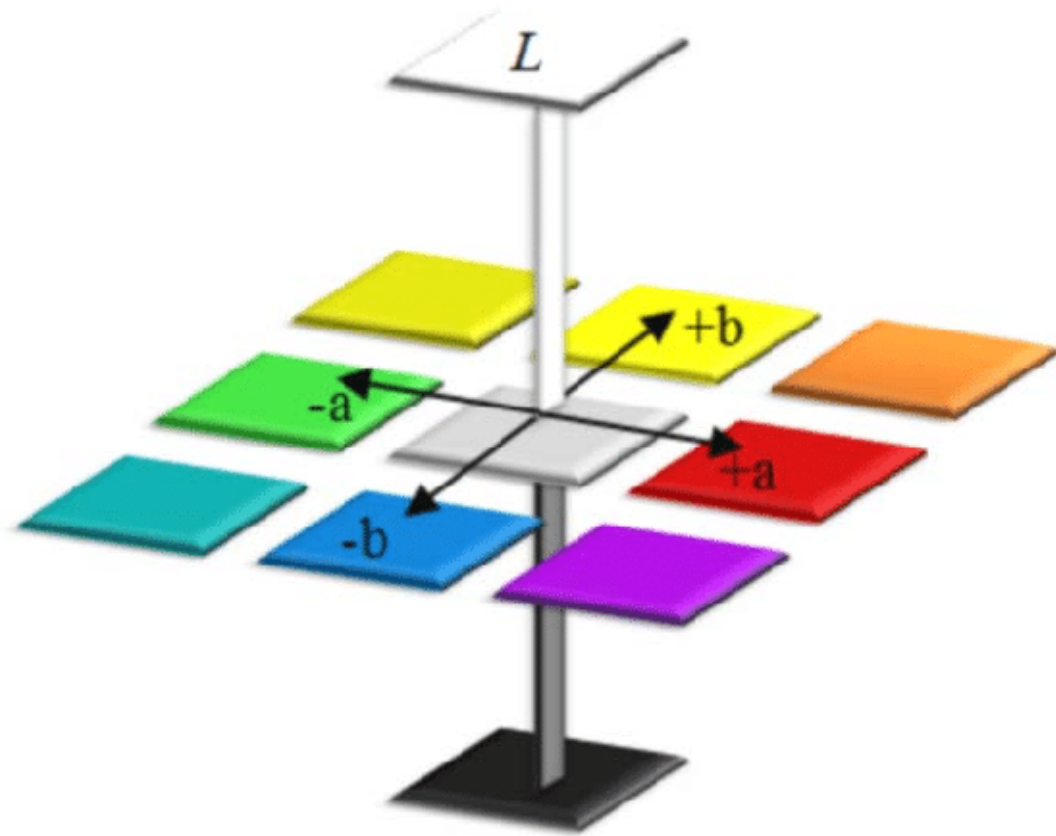
3D organization of colors for setting standards and reproducibility

Examples:

RGB, HSV, CMYK, CIELAB (Lab)



L: lightness, a: green-red, b: blue-yellow

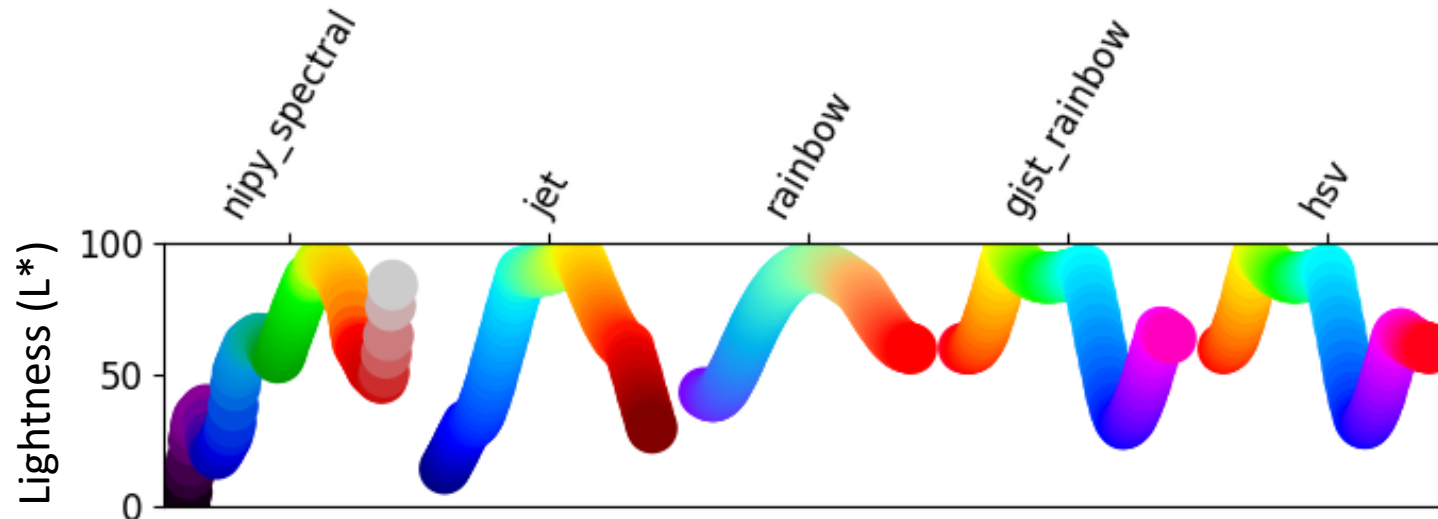


Research shows the human visual system perceives changes in the **lightness** much better than, for example, changes in hue.

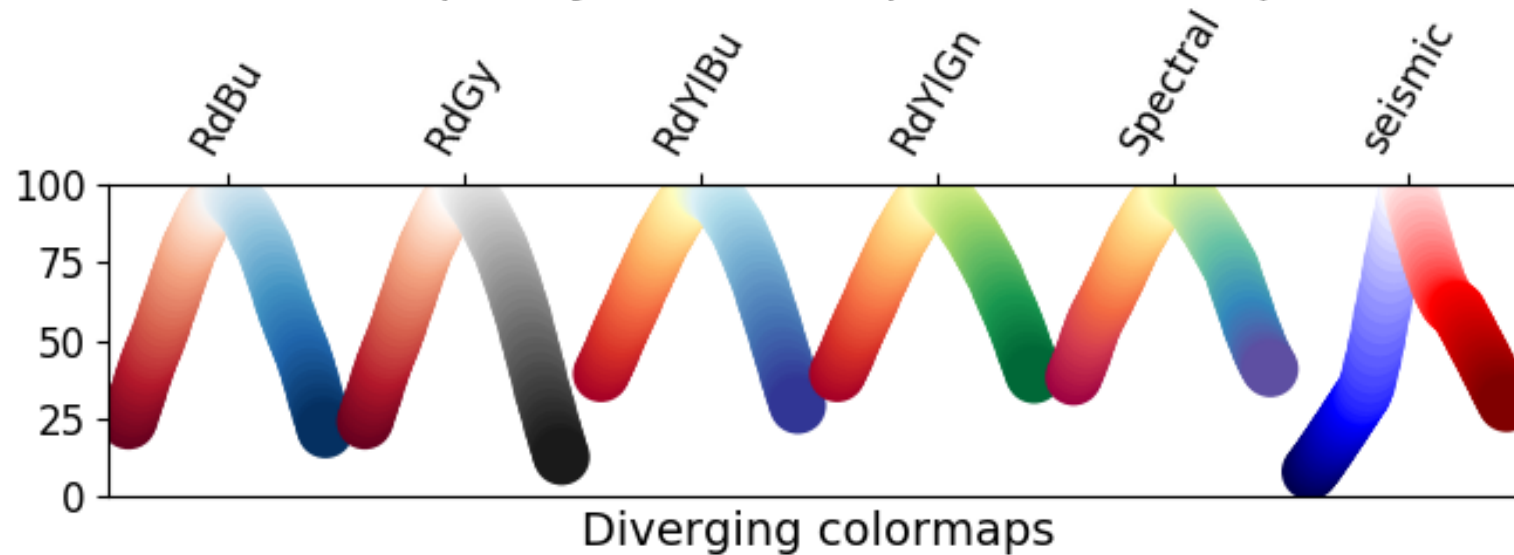
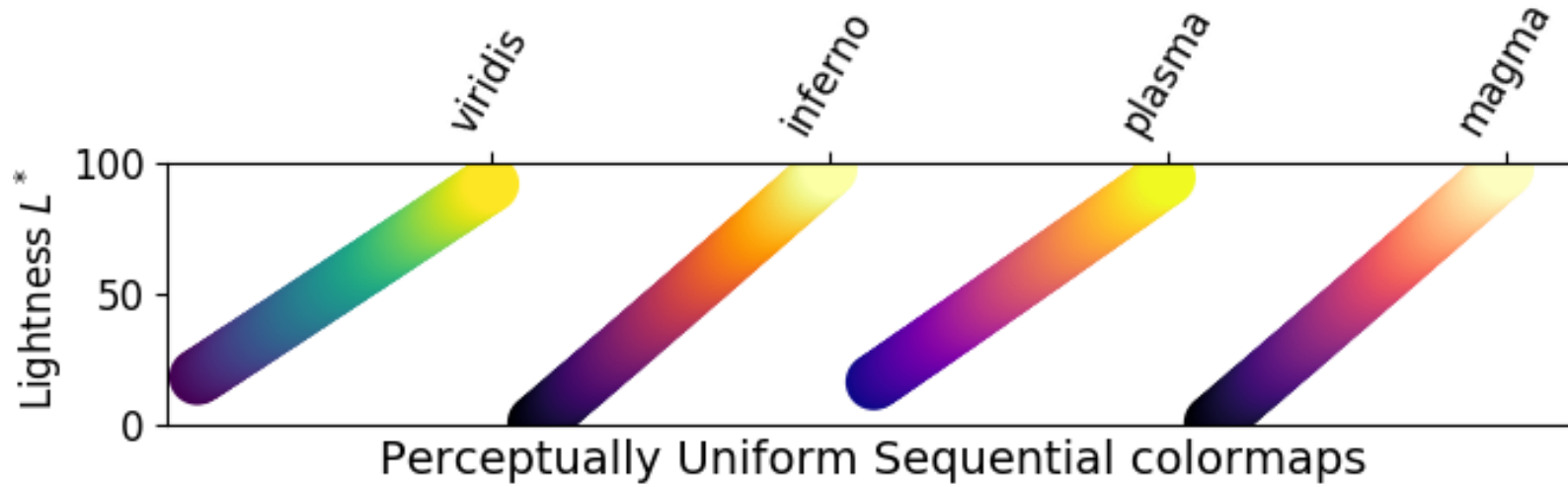
Side note: this is critical for JPEG image compression algorithms

Goal: Equal steps in data are perceived as equal steps in the color space

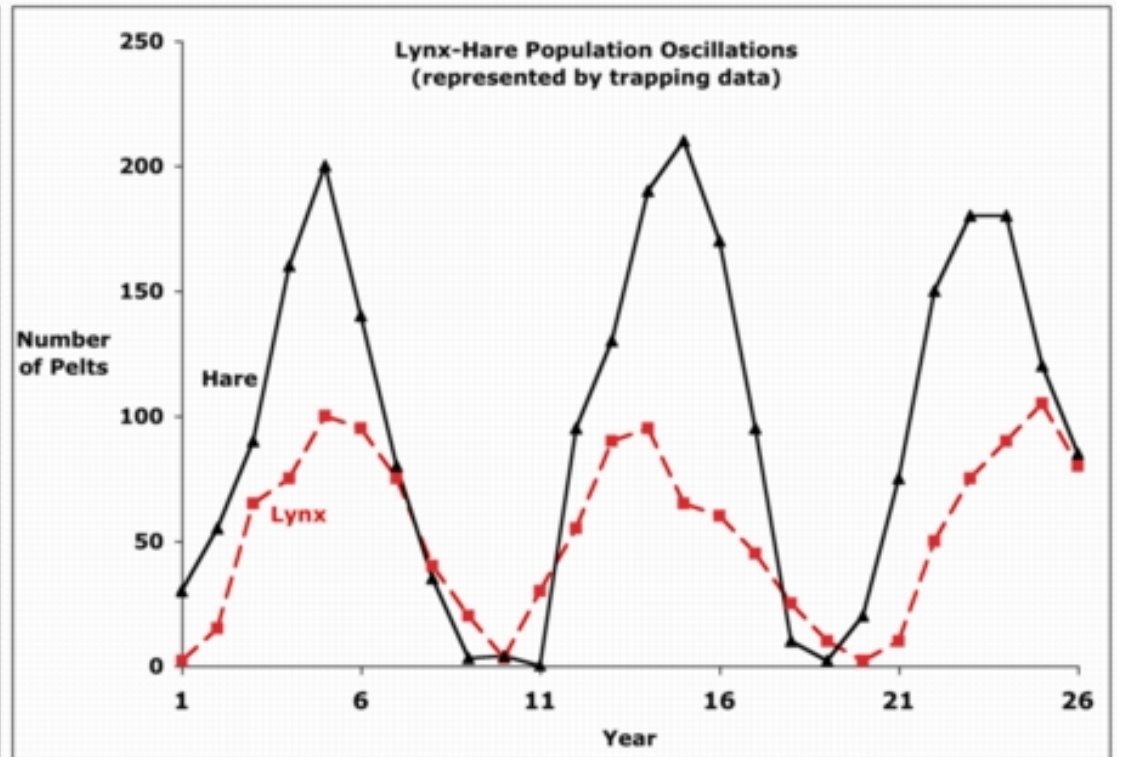
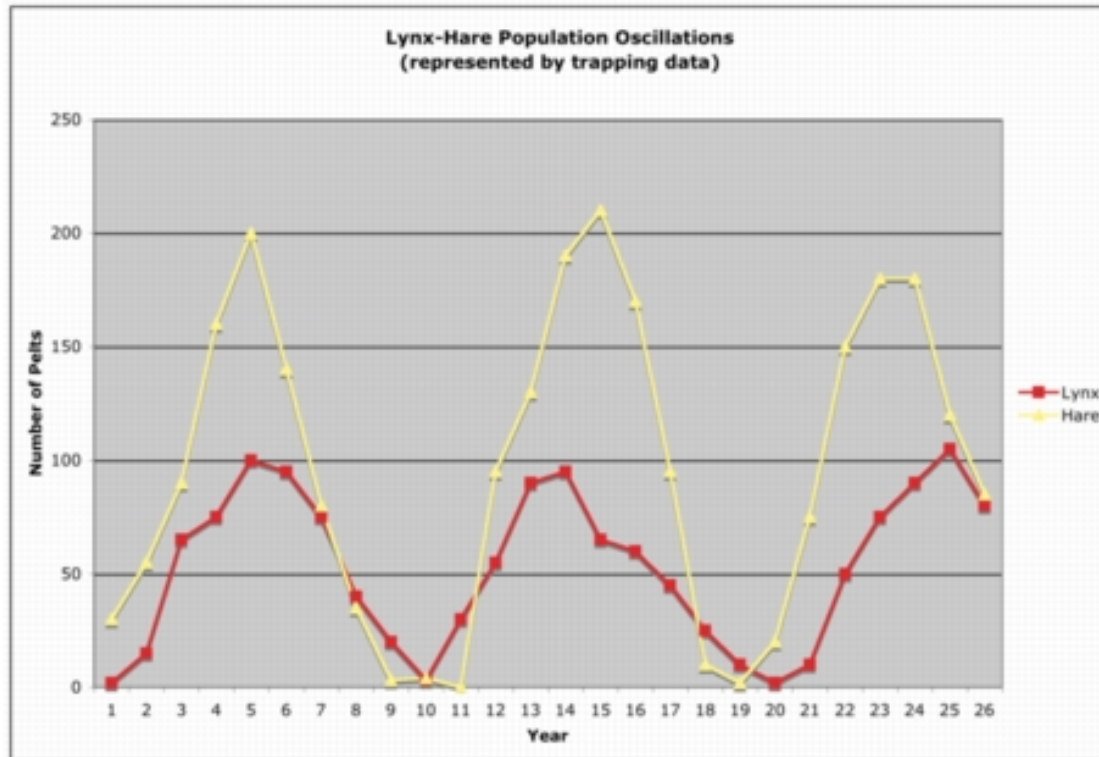
Research shows the human visual system perceives changes in the **lightness** much better than, for example, changes in hue



Colormaps: sequential vs diverging

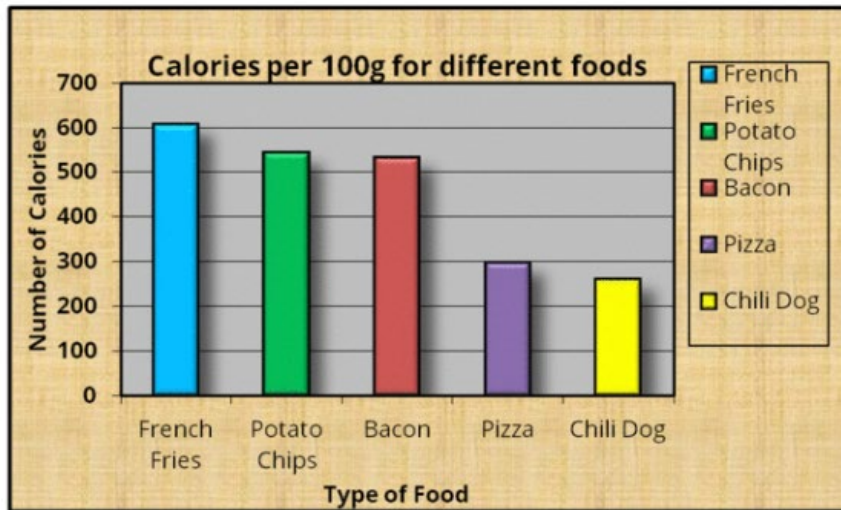


Effective figures: graph example 2



Effective figures: graph example

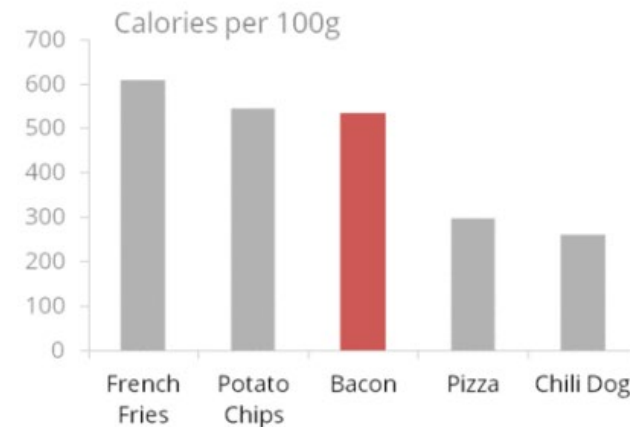
Before



Created by Darkhorse Analytics

www.darkhorseanalytics.com

Or remove lines



Created by Darkhorse Analytics

www.darkhorseanalytics.com

Initial visual assessment

- Is any part of the diagram unreadable?
- What stands out as “important”, based on visual cues? (don’t try to assess the content, just top level visual perception)
- If quantitative information is being displayed, how is it represented? (position, length, area, color, etc)

Content

- Can you determine a main “message”? (if there seems to be more than one, how might you separate them into multiple figures?)
- Is the quantitative representation appropriate? (quantitative vs. categorical)

- Is any part of the diagram unreadable?
- What stands out as “important”?
- If quantitative information is being displayed, how is it represented?
 - Is this appropriate?
- Can you determine a main “message” or story?