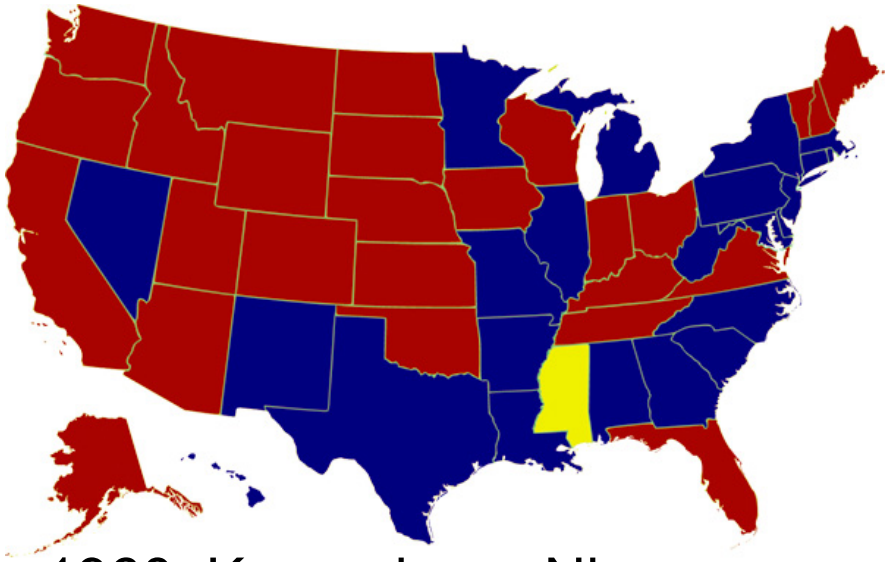
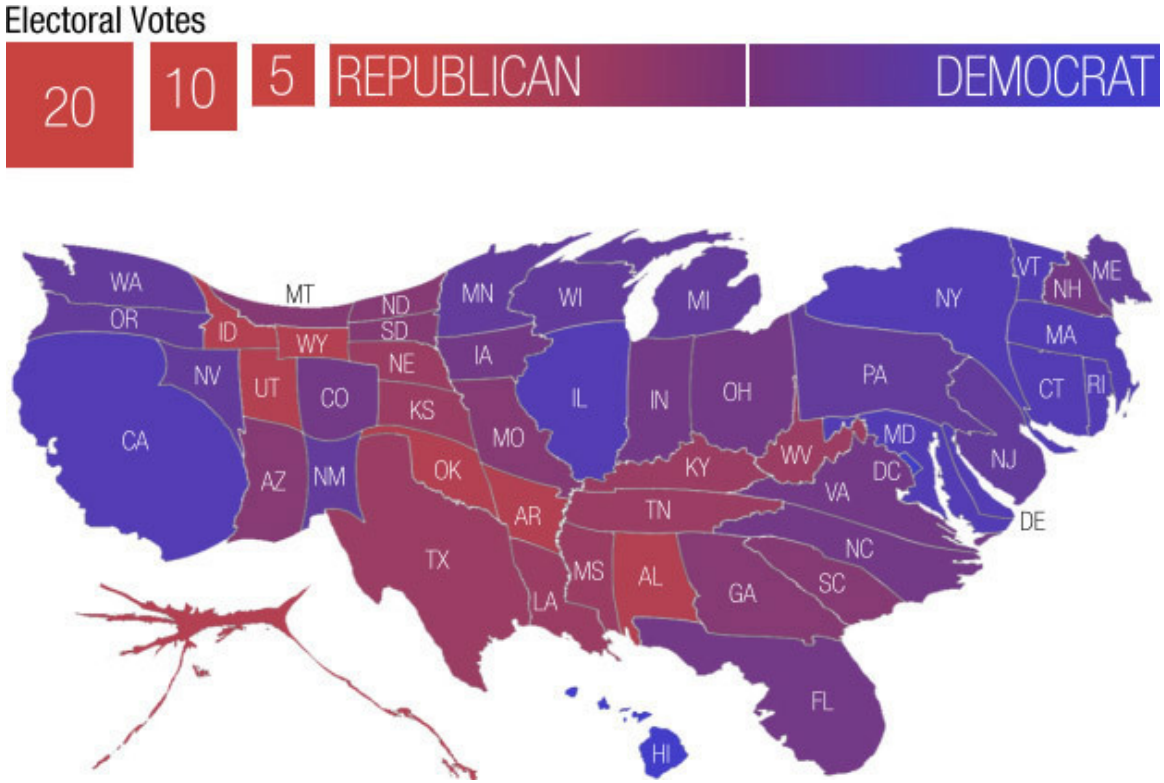
2008: Obama vs. McCain



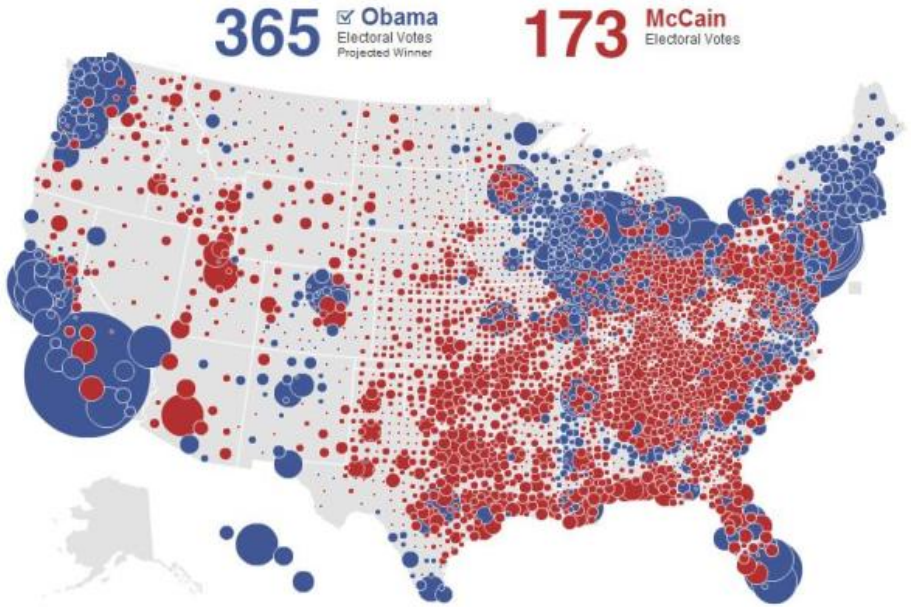
1960: Kennedy vs. Nixon

http://www.presidency.ucsb.edu/showelection.php?year=1960



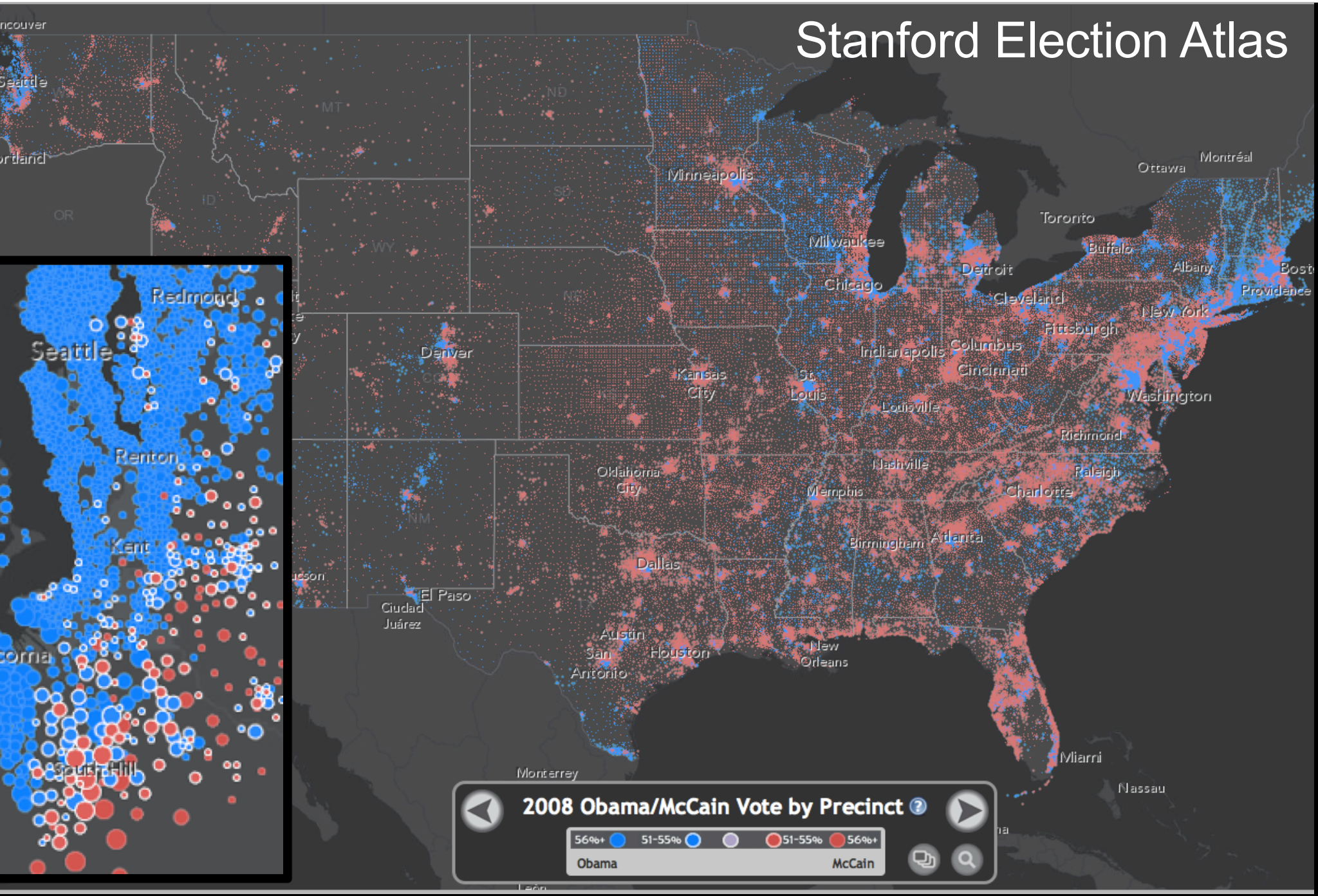
2008: Obama vs. McCain

http://www.npr.org/blogs/itsallpolitics/2012/11/01/163632378/a-campaign-map-morphed-by-money



2008: Obama vs. McCain

http://elections.nytimes.com/2008/results/president/map.html

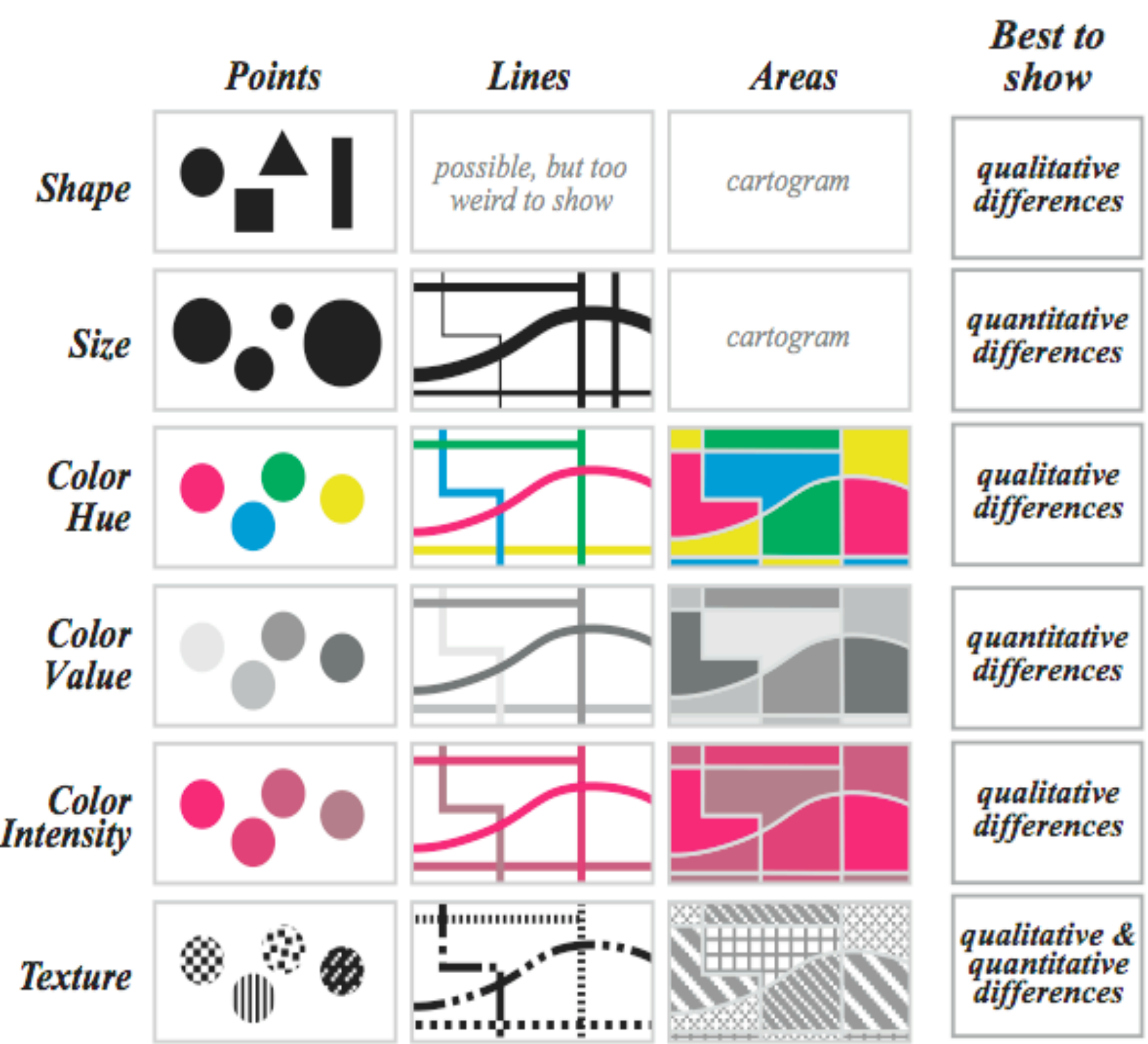


Which visual variable(s) is(/are) accomplishing what

Geography 360
October 7, 2016

Expressing relationships, with a focus on color

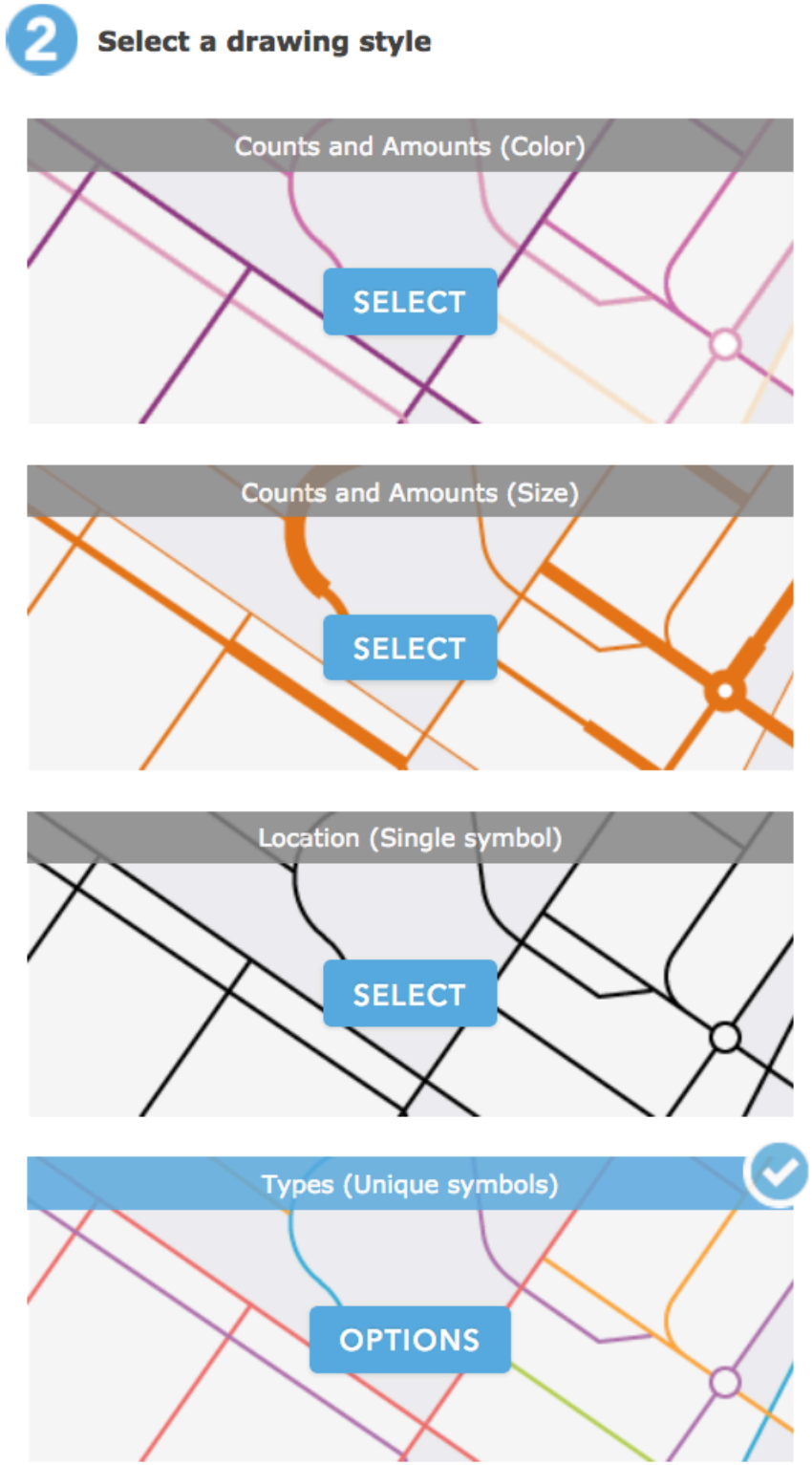
1. Questions! (about last time, from the labs, etc.)
2. Visual variables (continued): What, why, when.
3. Color: how we talk about it, how we use it
4. Differences in color perception and meaning



(from Wood and Krygier)

A. Qualitative
B. Quantitive
C. Both
D. Neither

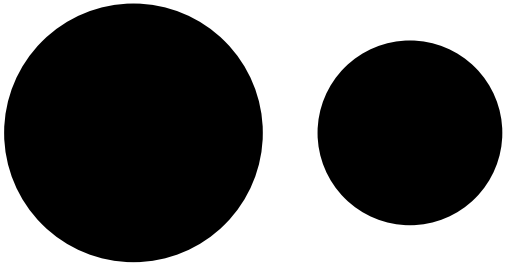
ArcGIS Online mapping ‘styles’ let you select which visual variables you are going to use (for which kinds of data)



Visual variables are your toolkit to express the relationships in your data to your reader via your map.

One set of relationships are indicated by the level of measurement of the data you want to express:

If your data are ‘ratio’ and you want your reader to understand that one quantity on your map is twice as big as another quantity, use a visual variable that can [be perceived to] express it!



Twice the area
(but only 1.41 times the radius)

Think: Carbon footprint tutorial

Twice the width

Think: Traffic map tutorial

An unusual experiment using size as a visual variable to express a ratio relationship

Afzal et al. 2012 and Axis Maps

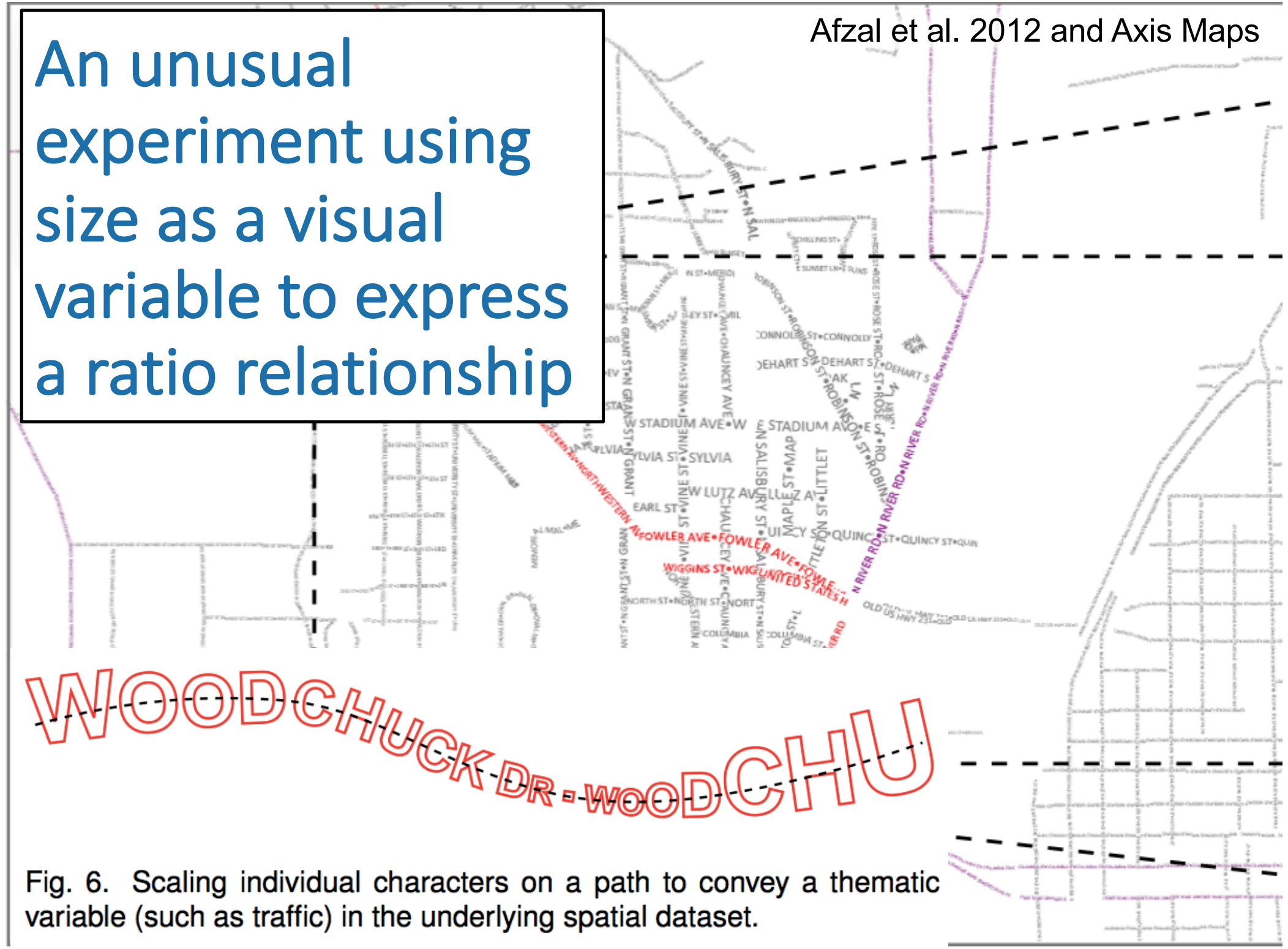


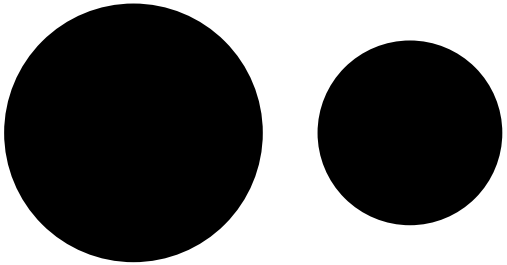
Fig. 6. Scaling individual characters on a path to convey a thematic variable (such as traffic) in the underlying spatial dataset.

Visual variables are your toolkit to express the relationships in your data to your reader via your map.

One set of relationships are indicated by the level of measurement that you want to express from your data.

Imagine you want to express the 'ratio' character of some data.

So, if you want your reader to understand that one quantity on your map is twice as big as another quantity, use a visual variable that can [be perceived to] express that relationship!



Twice the area
(but only 1.41 times the radius)

Think: Carbon footprint tutorial

Twice the width

Think: Traffic map tutorial

Visual variables are your toolkit to express relationships

What about a presentation method that can express the 'interval' or 'ordinal' character of data?

Choices include:

- Lightness/Value,
- Size,
- Saturation,
- *occasionally* hue

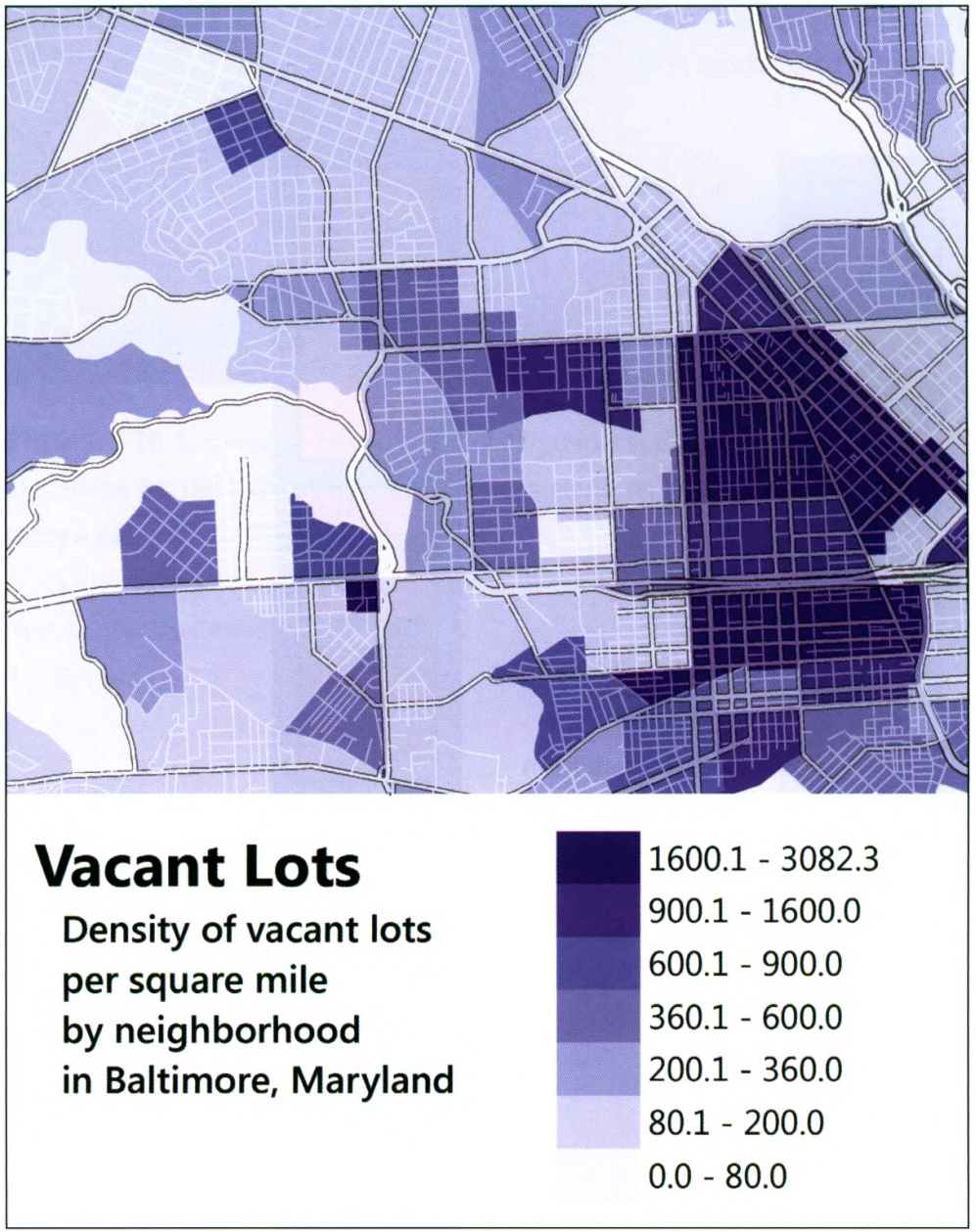


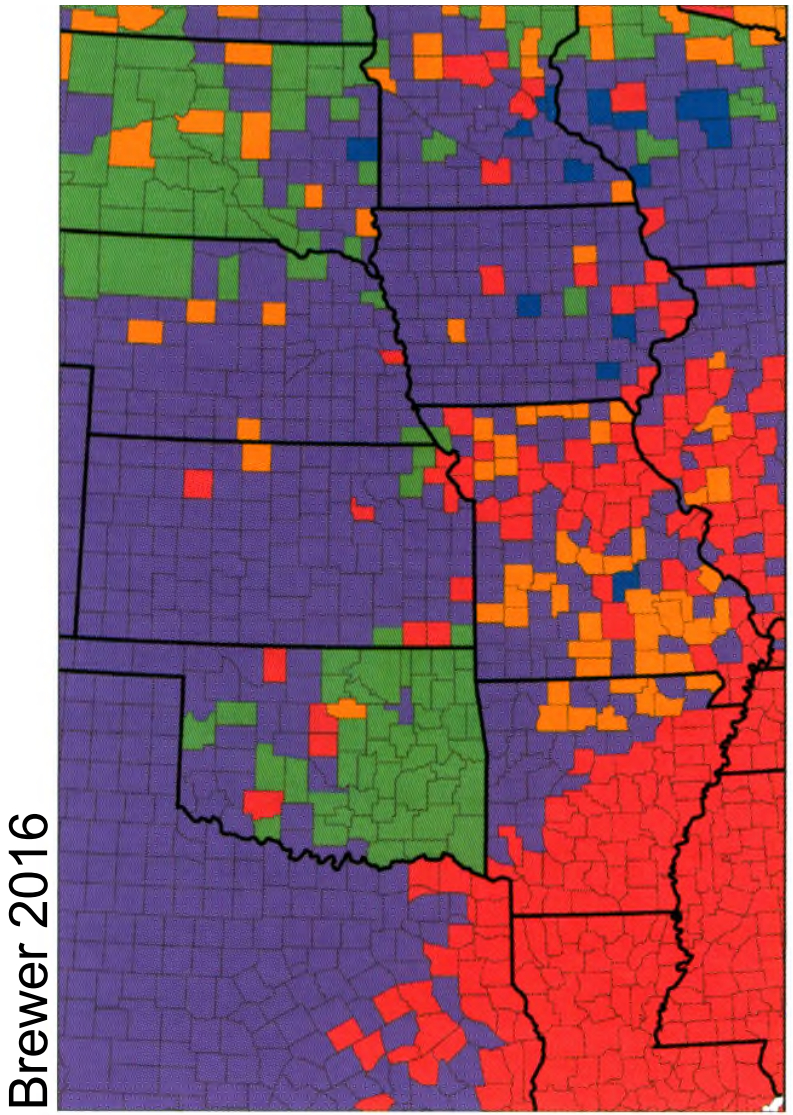
Figure 7.10 Density of vacant lots shown by lightness change only.

Visual variables are your toolkit to express relationships

What if you want to express qualitative difference?

Choices include:

- Shape
- Hue
- Texture



Brewer 2016

"Take care with some literal uses of color, such as black for people who are African American, yellow for Asian Americans, and red for American Indians.

"The superficial and exaggerated emphasis on skin color associations for groups is likely to offend your readers.

"Use a purposely abstract set of hues for mapping race groups instead."


Tom Miller Dam
Bee Creek
Lions Municipal
Golf Course
EMMETT SHELTON BRDG
LAKE AUSTIN BLVD
RED BUD TRAIL
Red Bud
Isle
University
of
Texas
LAKE CLIFF TRL
STRATFORD DR
STRATFORD HILLS LA
200 0 200 Feet

Other relationships you can express:
Complex similarities and differences within qualitative data

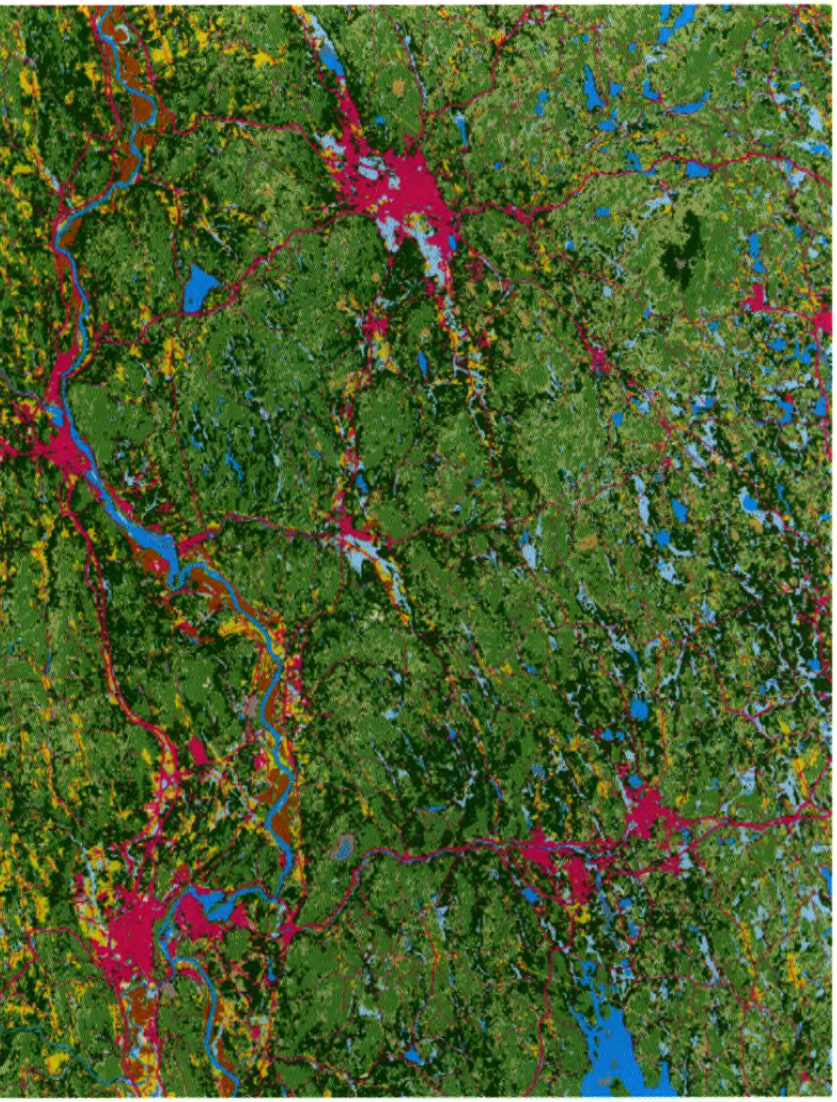
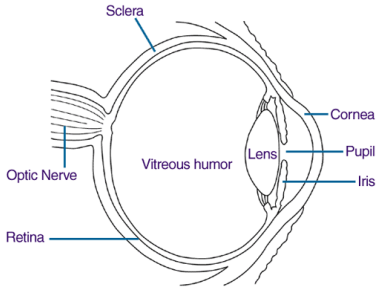


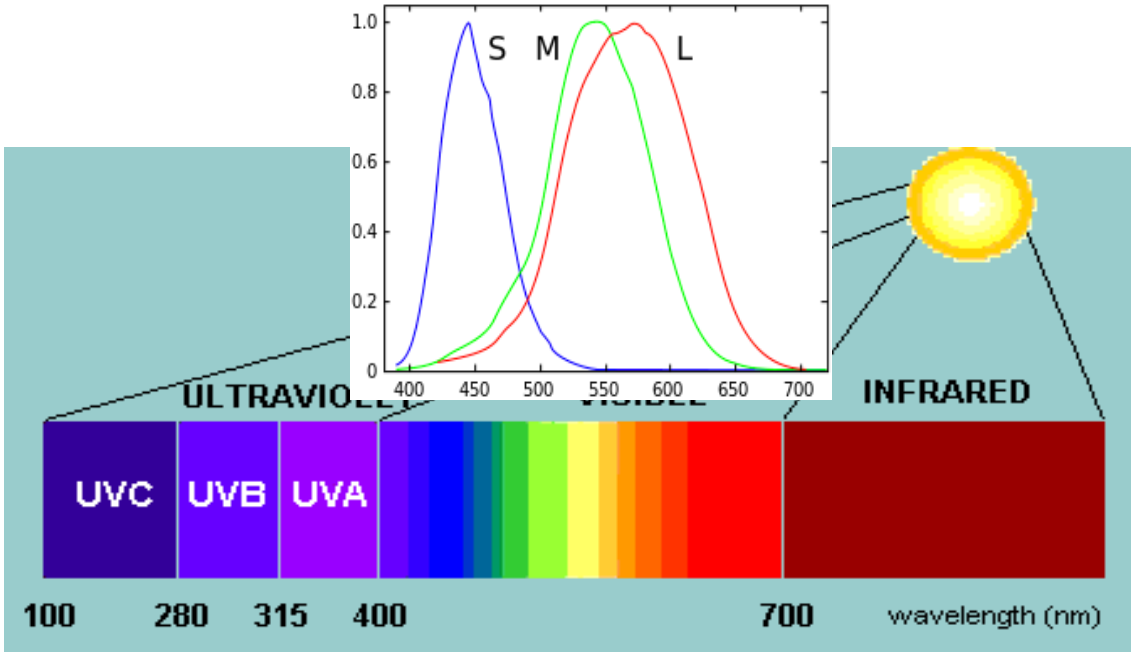
Figure 8.14 Qualitative land-cover map with varied lightness and saturation for map symbols. Greens, browns, and blues are used to group related classes. High-saturation cyan and magenta colors are used to emphasize small and important land-cover classes. Source: USGS National Land Cover Database (NLCD). Map by A. Dennis, Penn State Geography.



Color

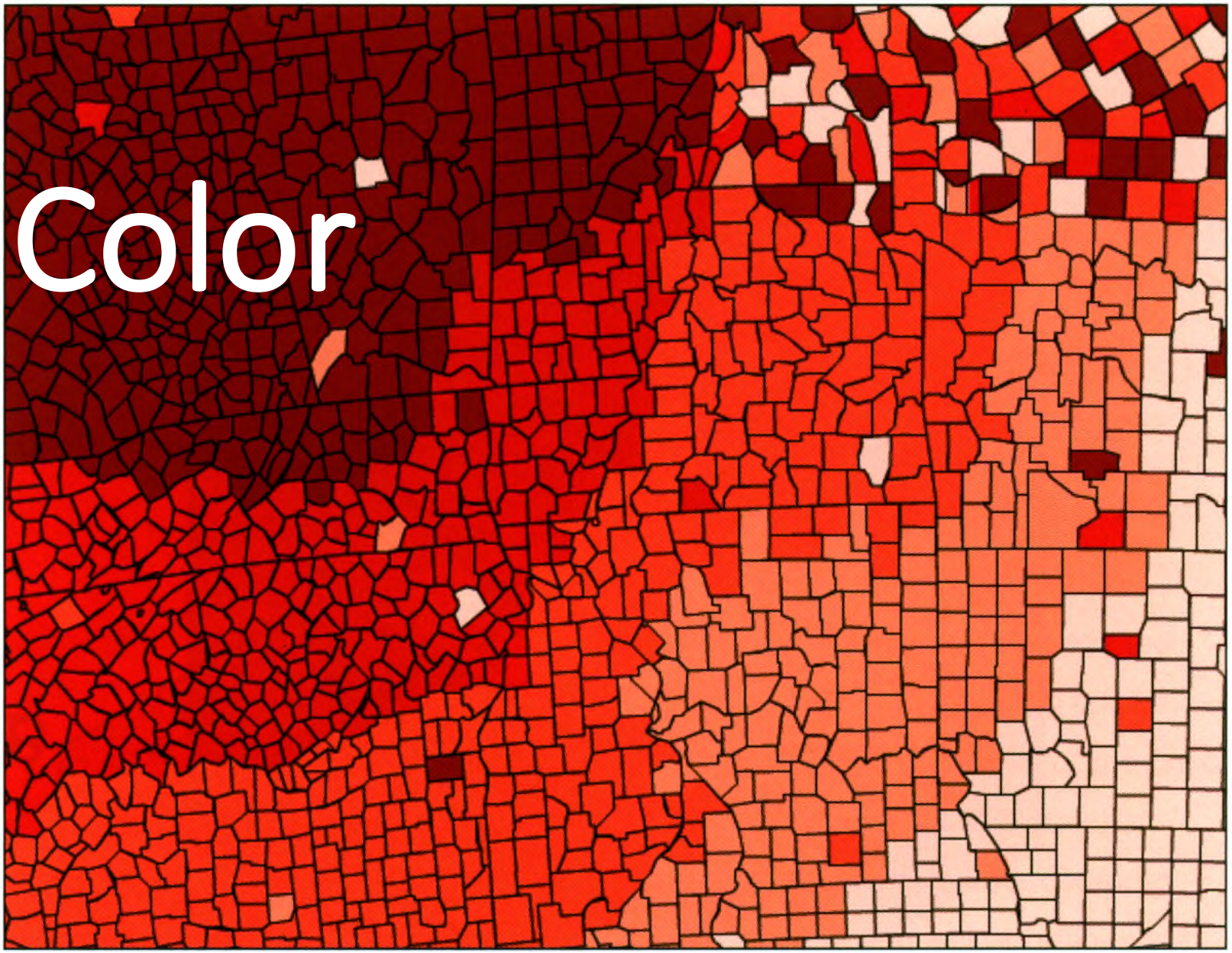
is not simple.

Responsivity of different cells in the eye, by wavelength



- Physical phenomena
  - Light has different wavelengths and intensities.
- Physiological phenomena
  - We have several types of cells in our eyes perceiving light differently.
  - We register different combinations as colors.
- Contexts also matter: spatial arrangement of colors, culture, individual genetics, age.

Color



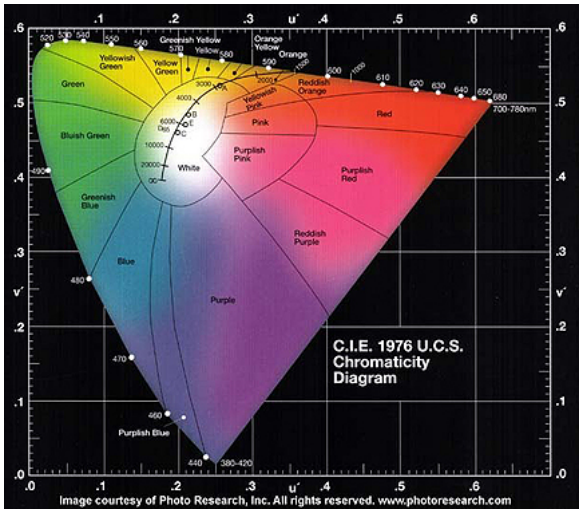
What are different ways you could describe this color?

Albert Munsell's work in the early 20th century is one still influential way of differentiating colors by…

- Hue
  - 'red', 'blue', etc.
- Value (or Lightness)
  - Perceived lightness or darkness
- Chroma (Saturation)
  - How 'strong' or 'pure' it is…

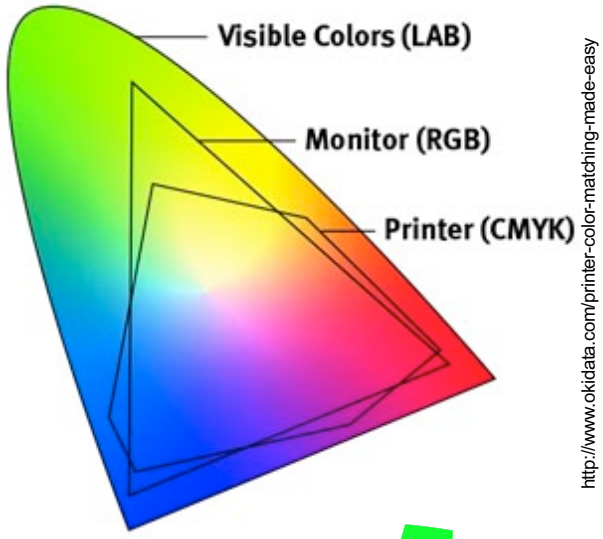
(Figure from David Slonim, 2010)

Describing Color



Color models:

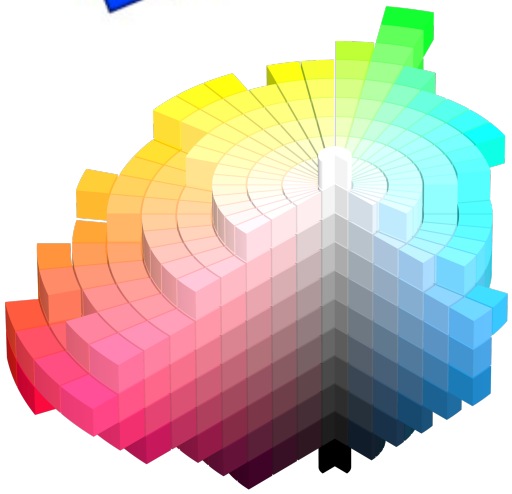
- Ways of describing colors, usually with several coordinate numbers.
- Those coordinate axes might include: Hue, Saturation, Red, Green, Value, L, a, b, etc.
- Models include RGB, Munsell, HSV, CIELAB (L*a*b*)



http://www.okidata.com/printer-color-matching-made-easy

Examples from the 'RGB' color model:

Colors are expressed as (red, green, blue) with each between 0-1, or sometimes 0-255. On the web, this can be written in 'hexadecimal'.

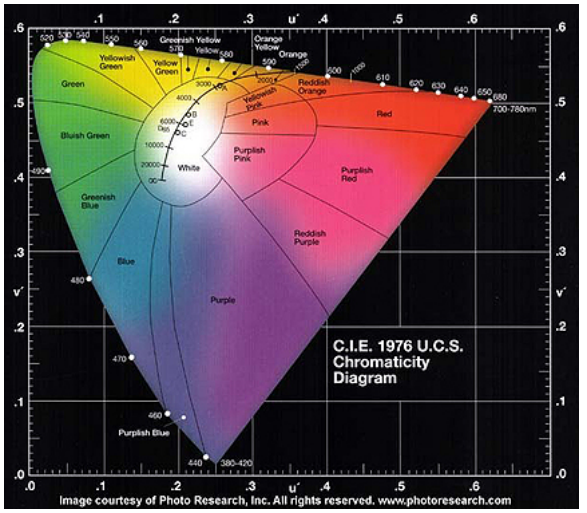


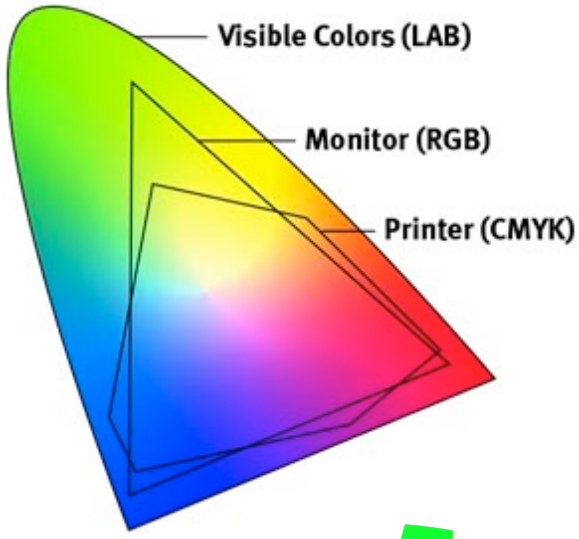
(1, 1, 1) is white (or in hexadecimal: #FFFFFF)
(0, 0, 0) is black (or in hexadecimal: #000000)
(1, 0, 0) is red (or in hexadecimal: #FF0000)
(1, 0.5, 0) is orange (or in hexadecimal: #FF8000)
etc…

Describing Color

Color models:

- Models generate abstract color ‘spaces’.
  - These differ in what colors they can describe.
  - They also differ in how they portray relationships between colors.
- You have a **perceptually uniform color space** when different ‘distances’ in the color space are proportional to what people perceive is the amount of difference between colors.
  - Example: CIELAB (or L*a*b* or Lab)
  - When is using a perceptually uniform color space useful for your mapping?
    - When you want your map to express certain types of quantitative relationships! (e.g., ‘interval’ and above)
  - RGB is not perceptually uniform.





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