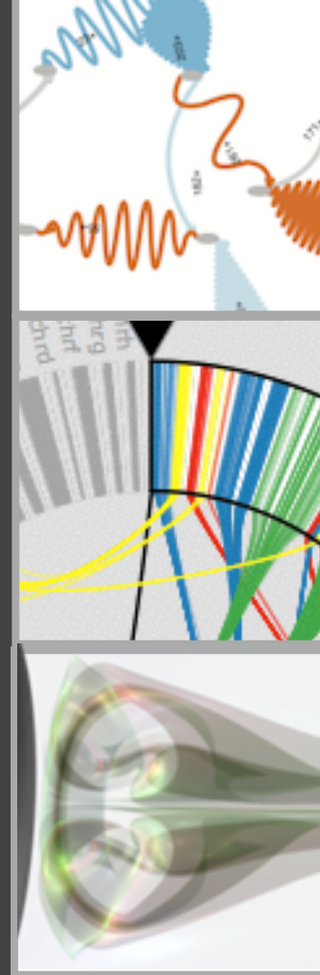
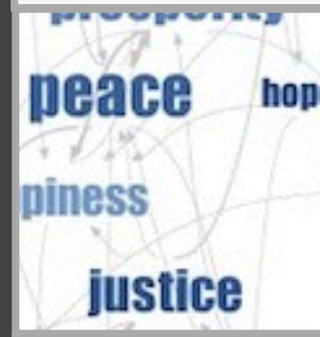
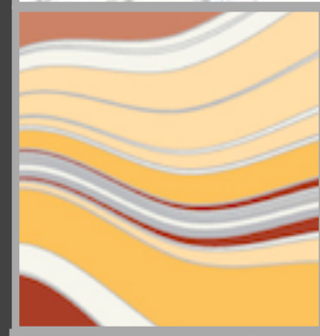
PROCESSING

cs2420 | Spring 2015








administrivia…

-TA office hours

-Ryan’s Review

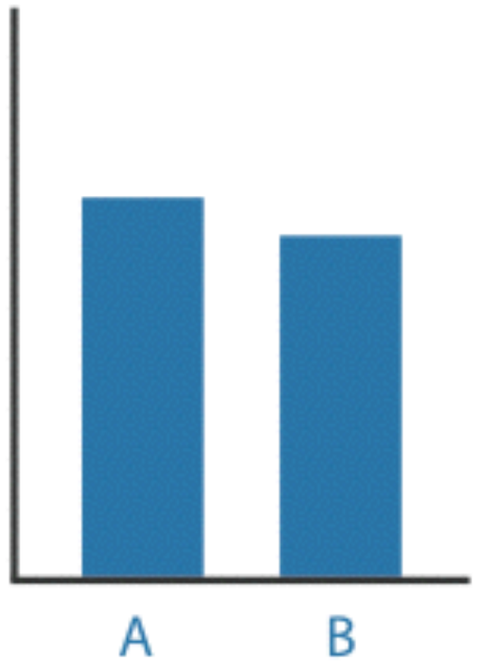
last time…

WEBER'S LAW

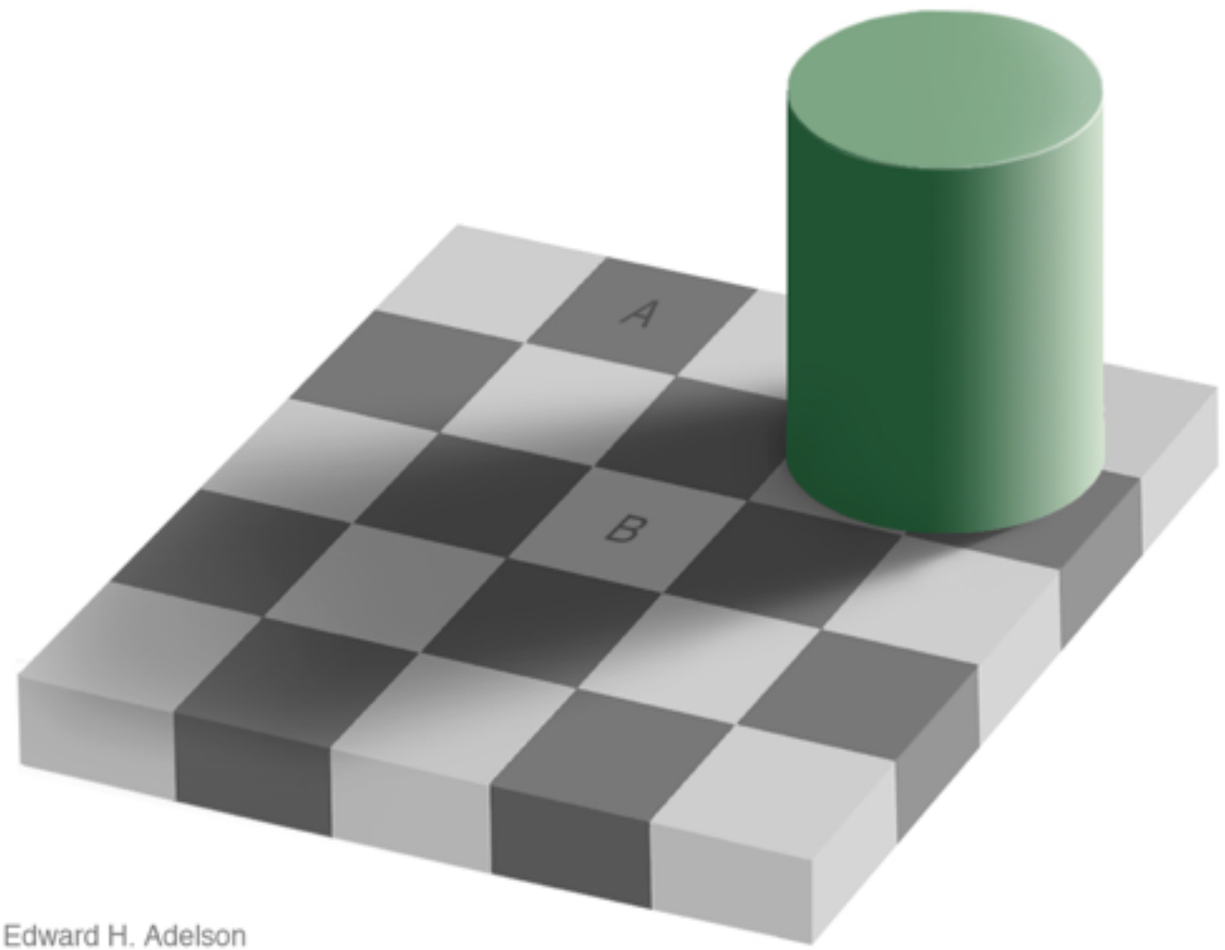
we judge based on relative, not absolute, differences

Unframed
Unaligned

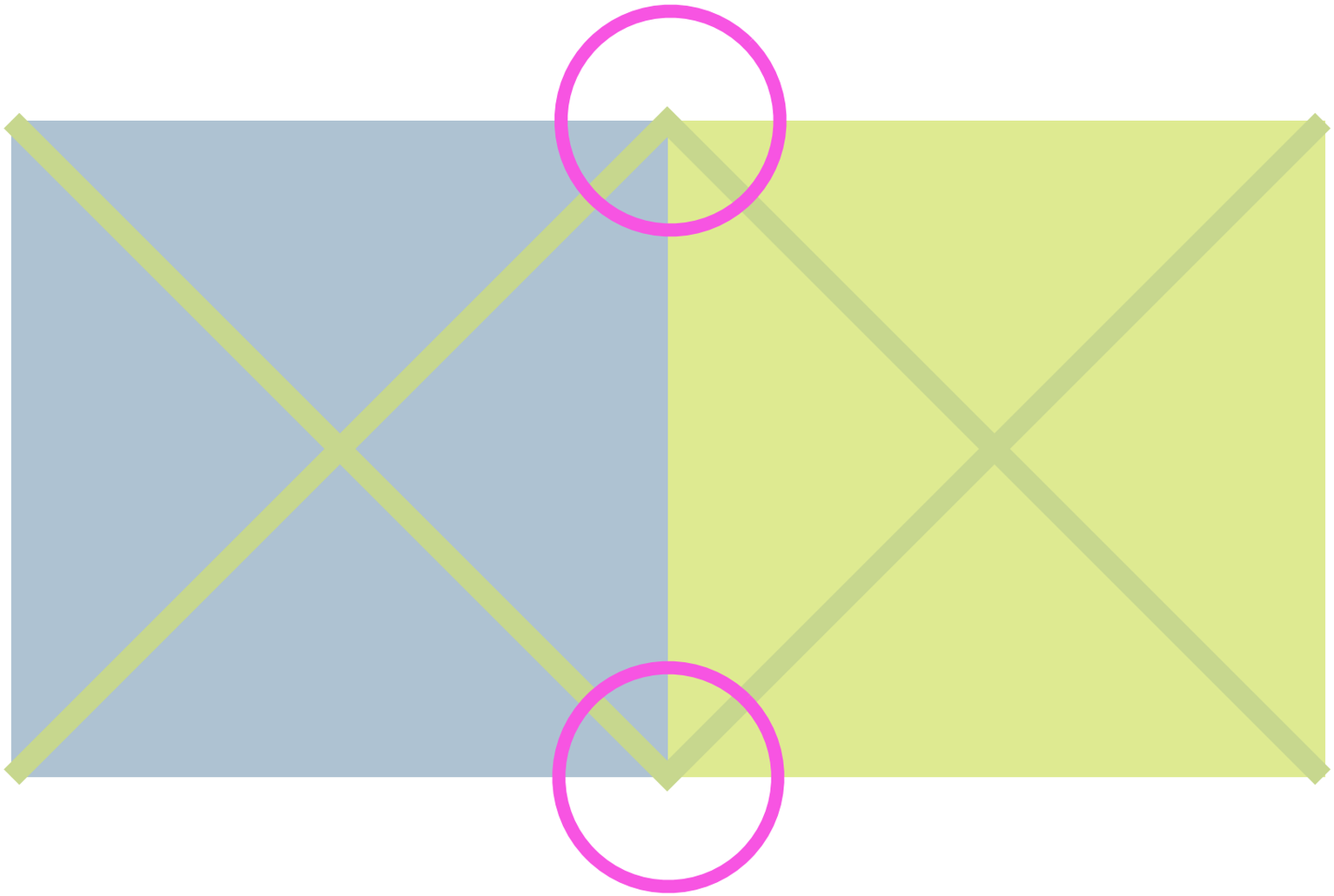
Framed
Unaligned



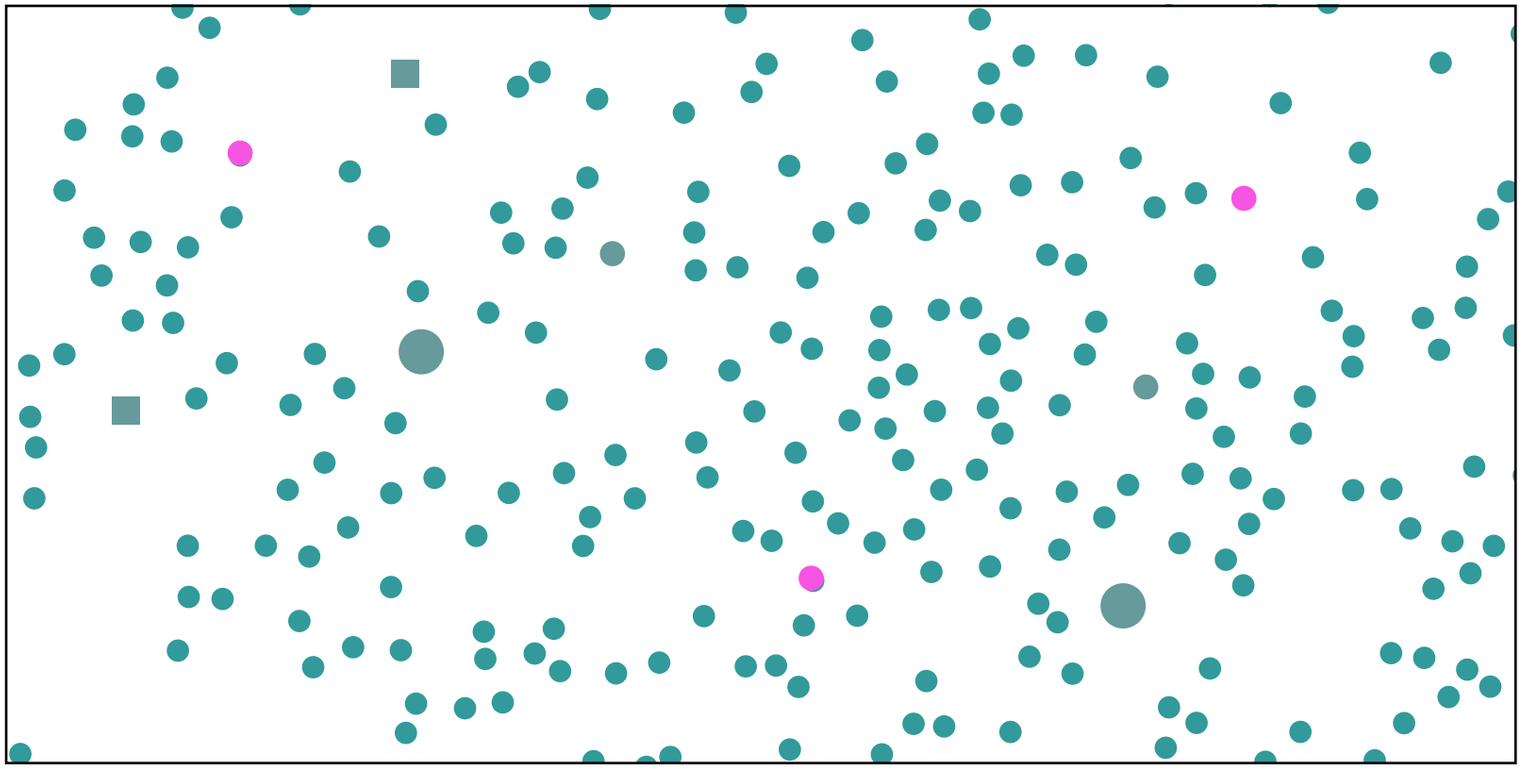
Unframed
Aligned



http://persci.mit.edu/_media/gallery/checkershadow_double_full.jpg



POPOUT



HOW MUCH? magnitude

Position on common scale

Position on unaligned scale

Length (1D size)

Tilt/angle

Area (2D size)

Depth (3D position)

Color luminance

Color saturation

Curvature

Volume (3D size)

Most ▲

Effectiveness

▼ Least

Same

Same

WHAT? category

Spatial region

Color hue

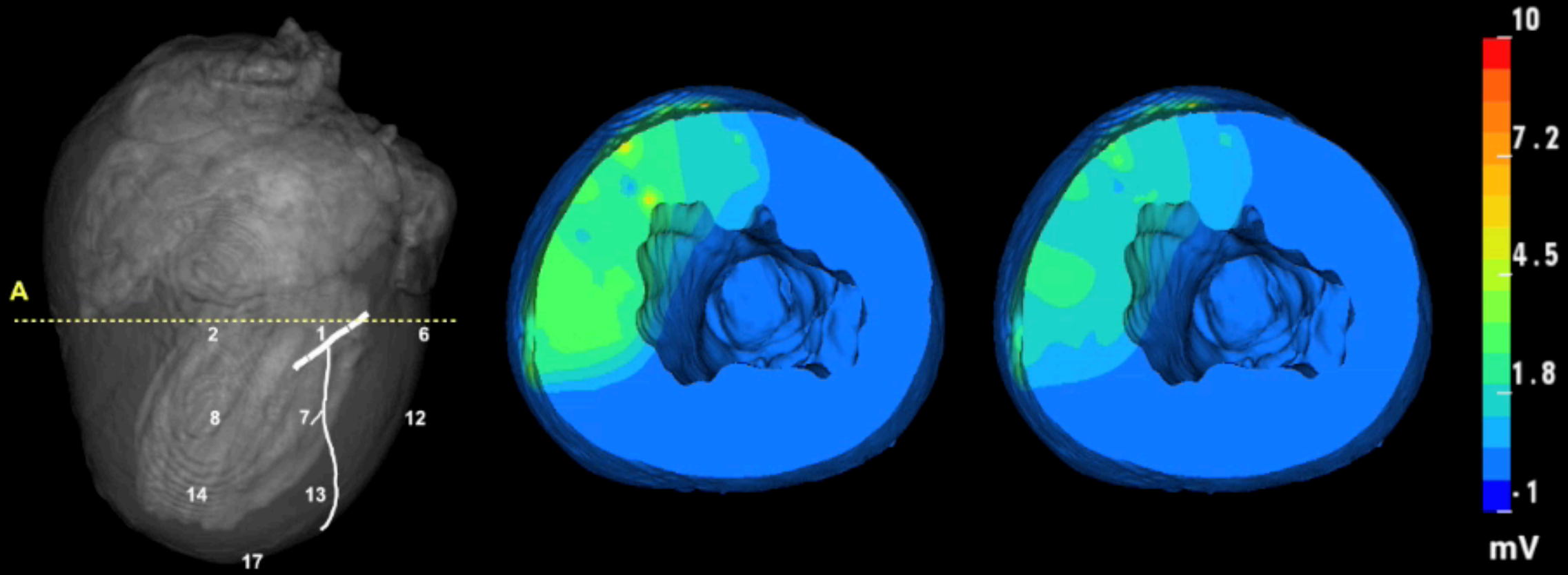
Motion

Shape

- **power does not extend to 3D**
  - perspective cues
    - *interfere with color and size channels*
  - occlusion of data
  - text legibility

RSM-09-11-03 Canine In Situ Model

Progression of ST Elevated Regions (ST 40)



Flow Rate: **35ml**

Pacing Rate: **400ms**

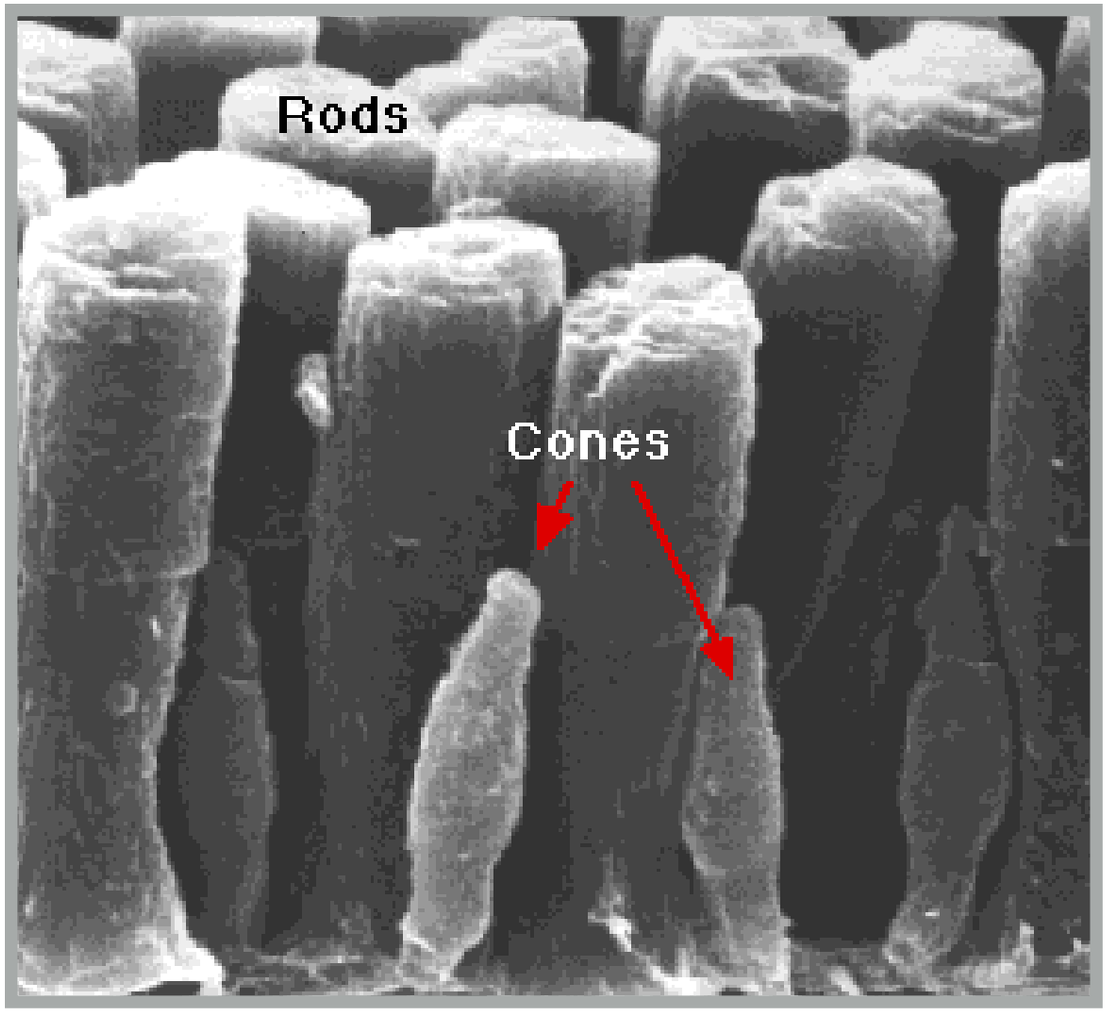
Occlusion Cycle: **15**

today…

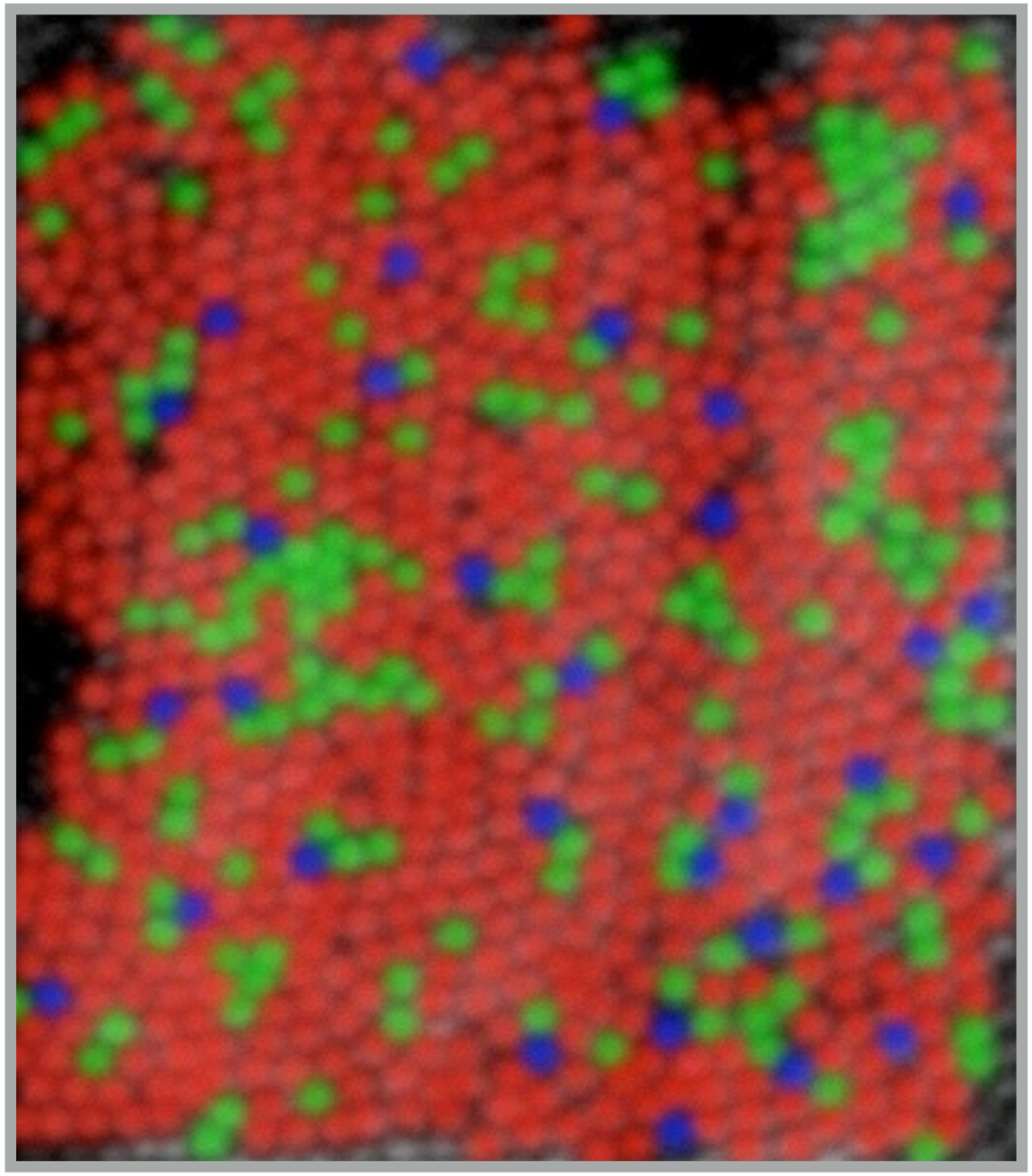
-color

-intro to Processing

color



120 million rods



5-6 million cones

Wandell, "Foundations of Vision" (left)

David R. Williams, Univ. of Rochester (right)

Return Home

Season 10 | Episode 13

Colors

00:00 / 00:00

Listen Add Download Embed Stream

(Adam Cole/WNYC)

Our world is saturated in color, from soft hues to violent stains. How does something so intangible pack such a visceral punch? This hour, in the name of science *and* poetry, Jad and Robert tear the rainbow to pieces.

PODCAST SUPPORT

Latest Comments

What a fascinating story! I found it interesting as some aspects of it reminded me of the conflict in Gaza ...

Benny
on Fu-Go

The Most

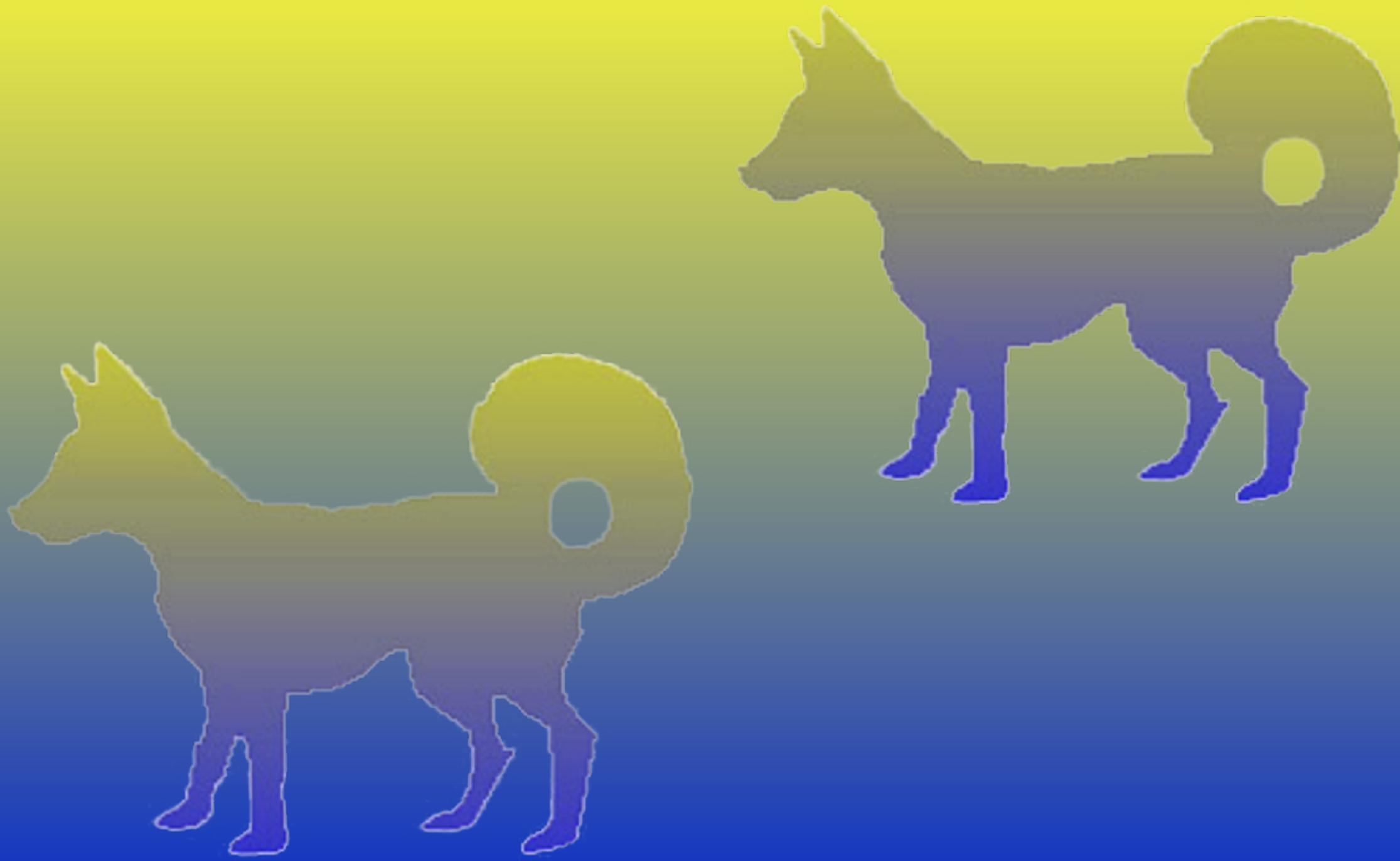
Viewed | Listened | Commented

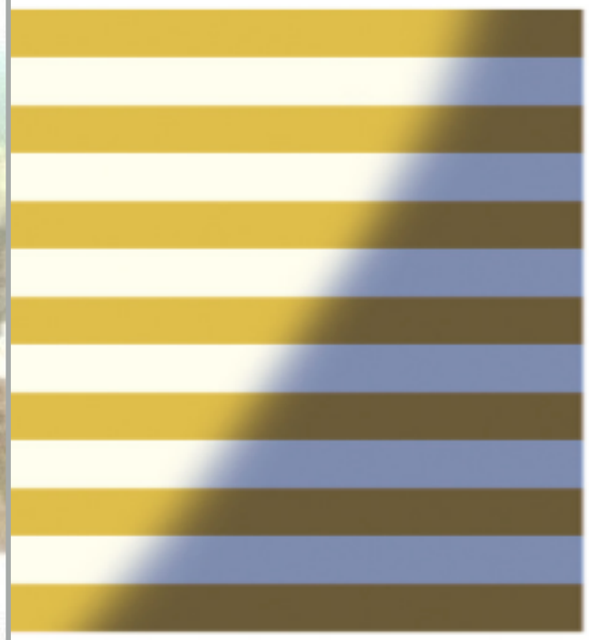
- The Living Room
- Colors
- 60 Words
- All the Covers of the Rainbow

Get it right in black and white.

Maureen Stone

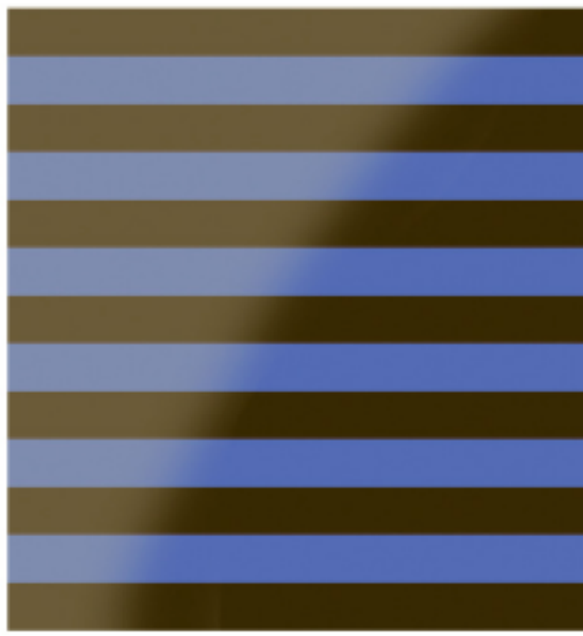
simultaneous contrast





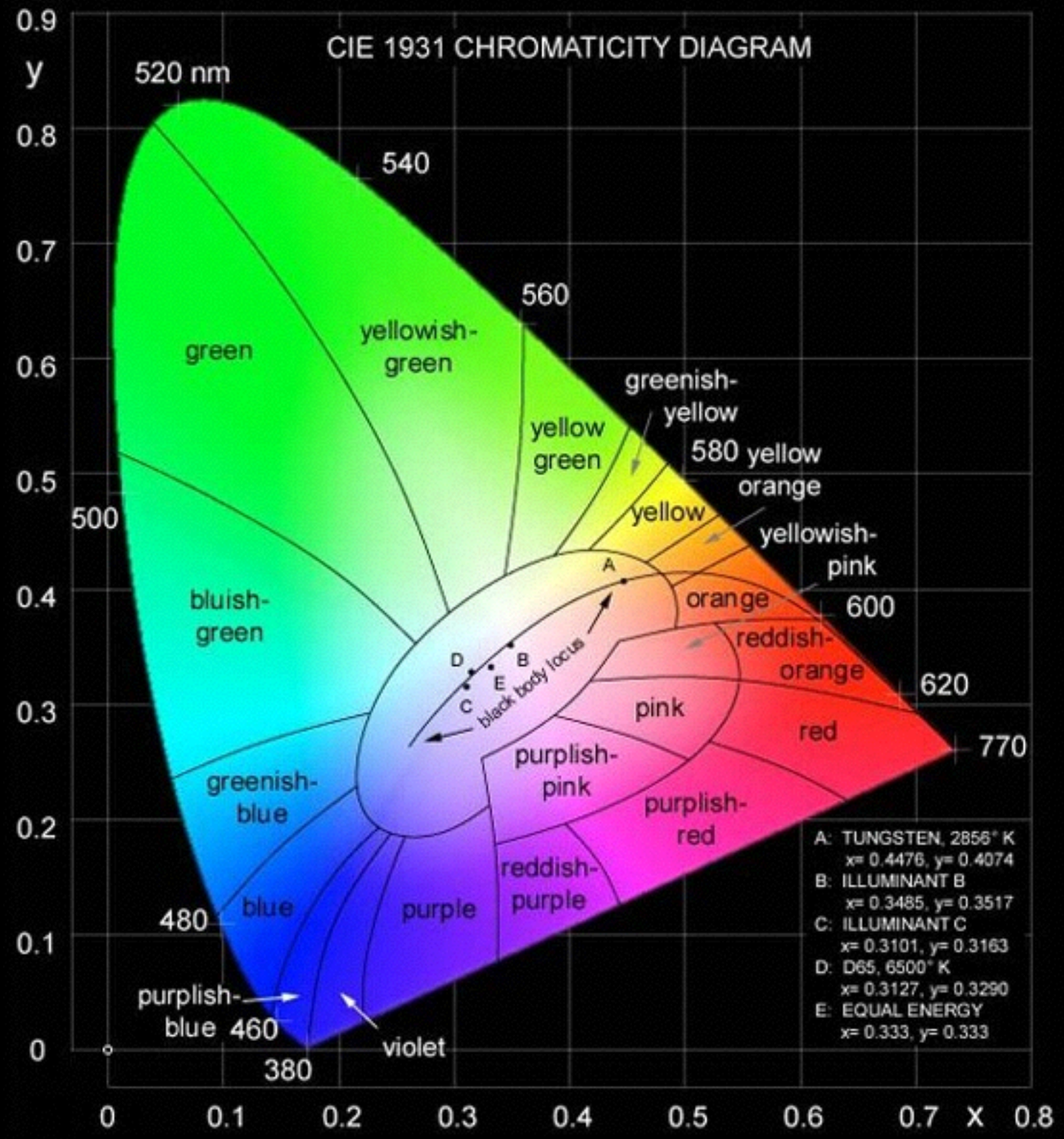
IS THE DRESS IN SHADOW?

OR IN BRIGHT SUNLIGHT?



chromatic adaptation

WHAT COLOR IS THIS?



CAN A MONITOR DISPLAY THE FULL RANGE OF (HUMAN) PERCEIVABLE COLORS?

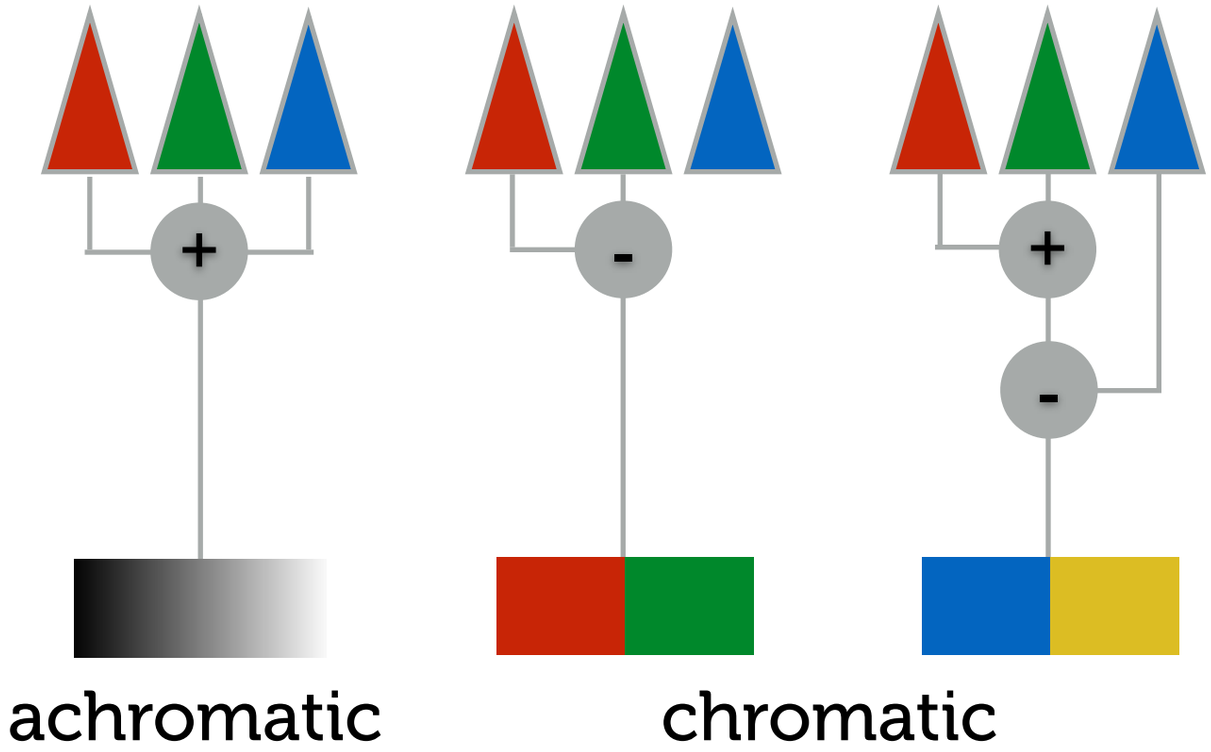
opponent-process model

- ***trichromatic theory*** explains how eye receives signals;
  opponent process theory explains how signals are processed

- visual system detects differences between the response of cones

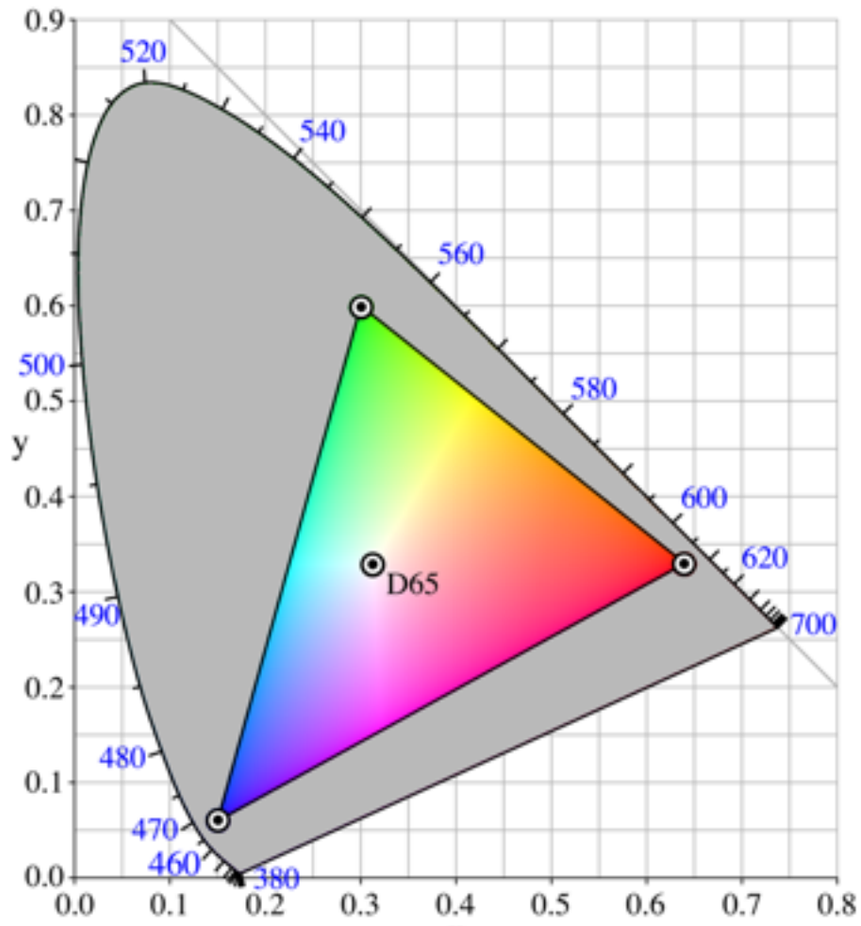
- three opponent channels
  - red vs green
  - blue vs yellow
  - black vs white (luminance)

- opposite colors are never perceived together
  - no reddish green or bluish yellow

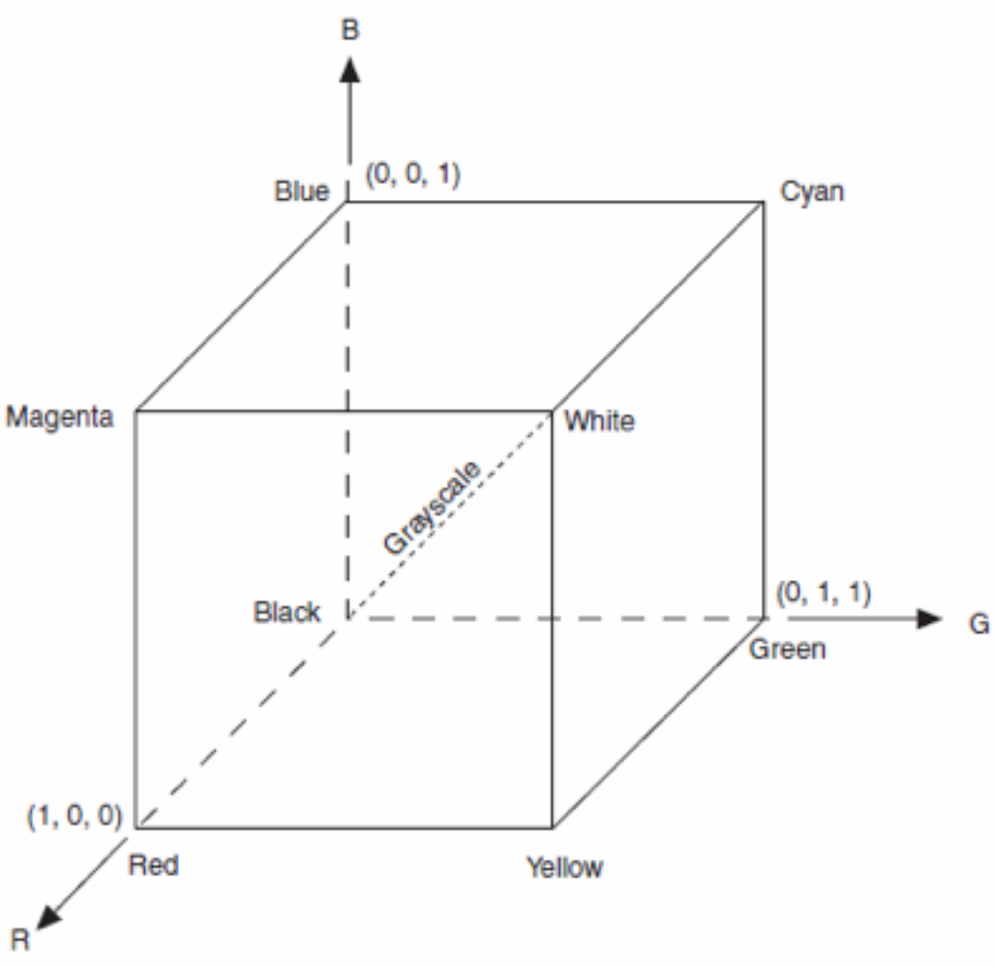


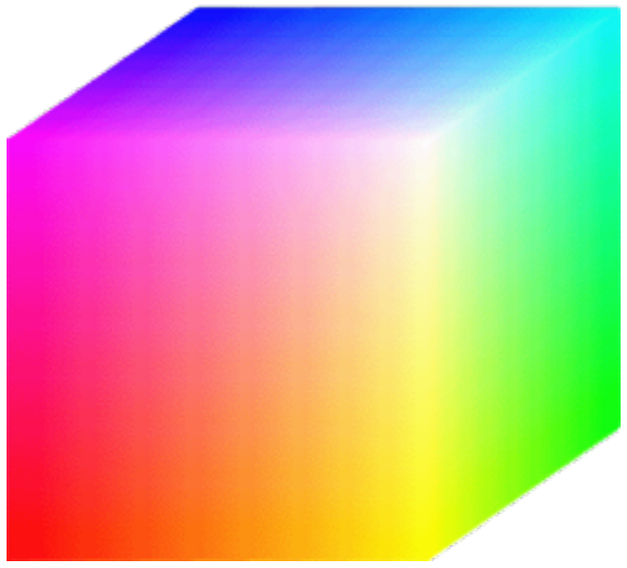
RGB color space

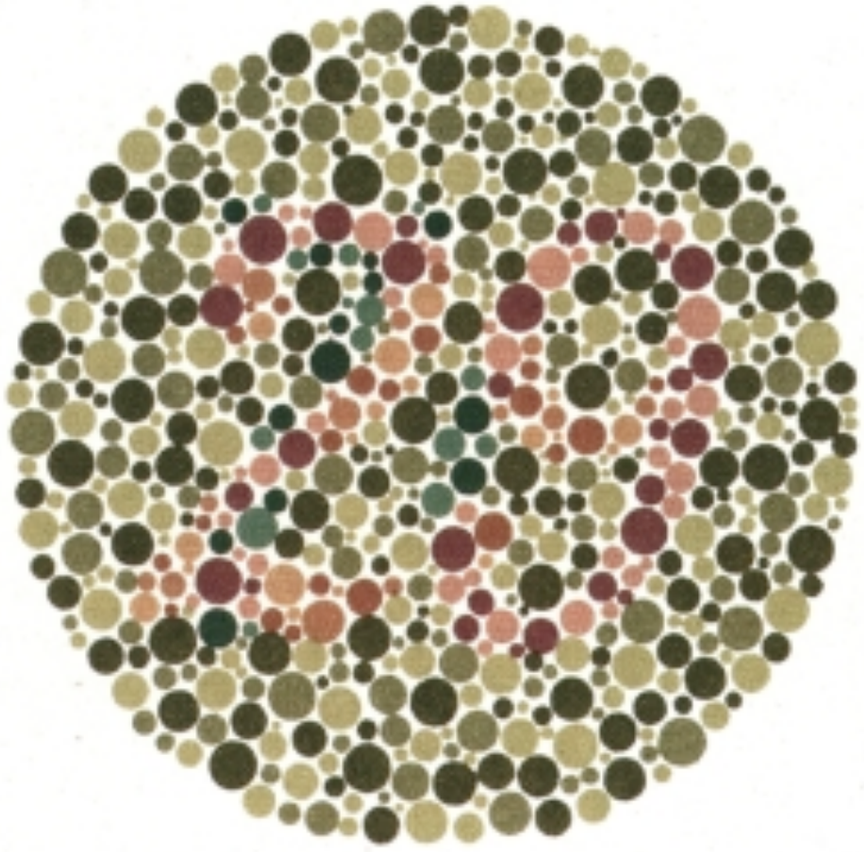
- very common color space
- additive, useful for monitors
- not perceptually uniform

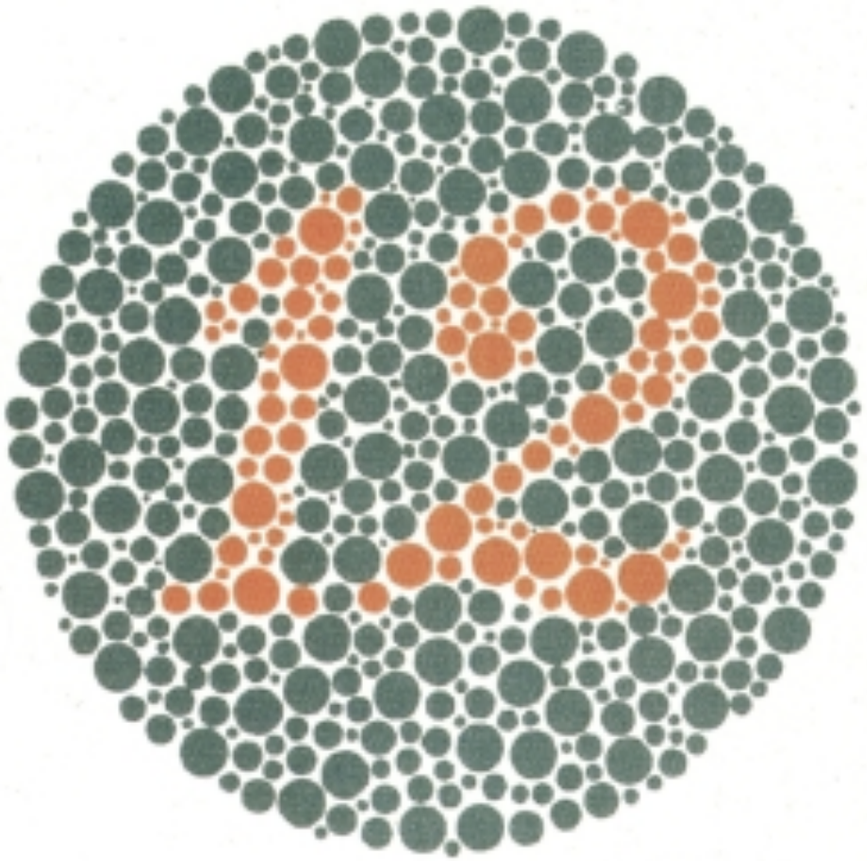


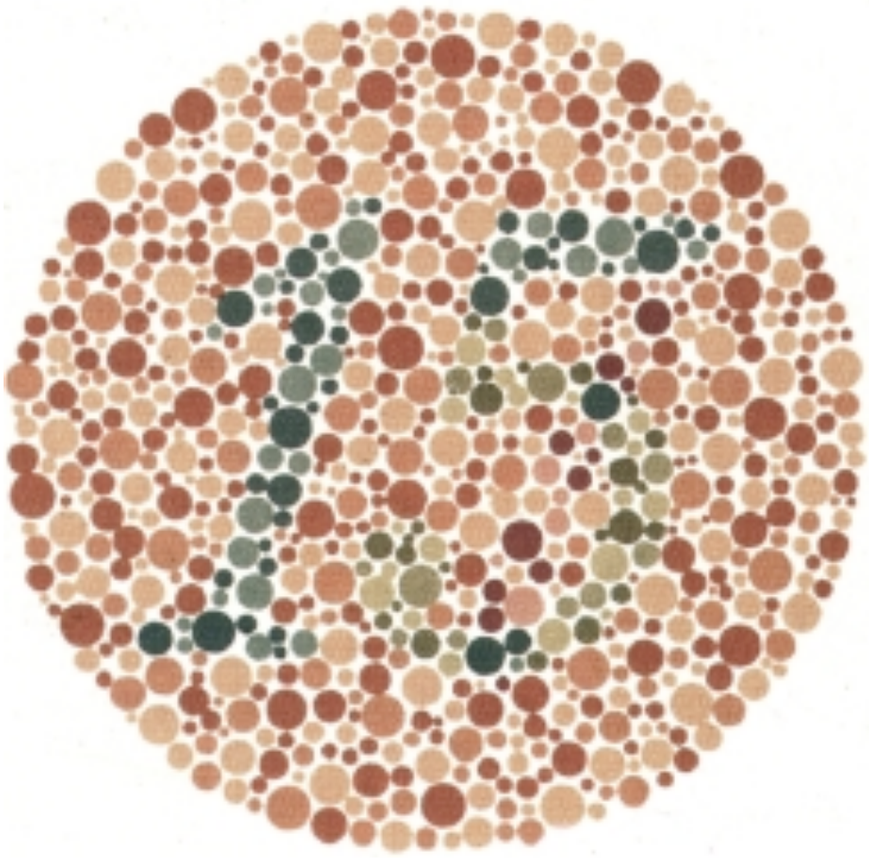
D65: midday sun in Western Europe











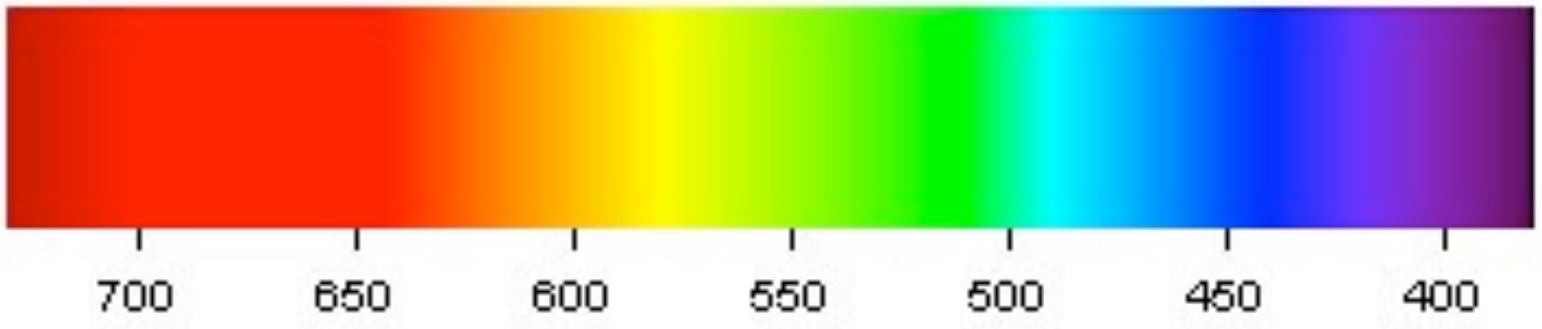
color deficiency

- sometimes caused by faulty cones, sometimes by faulty pathways

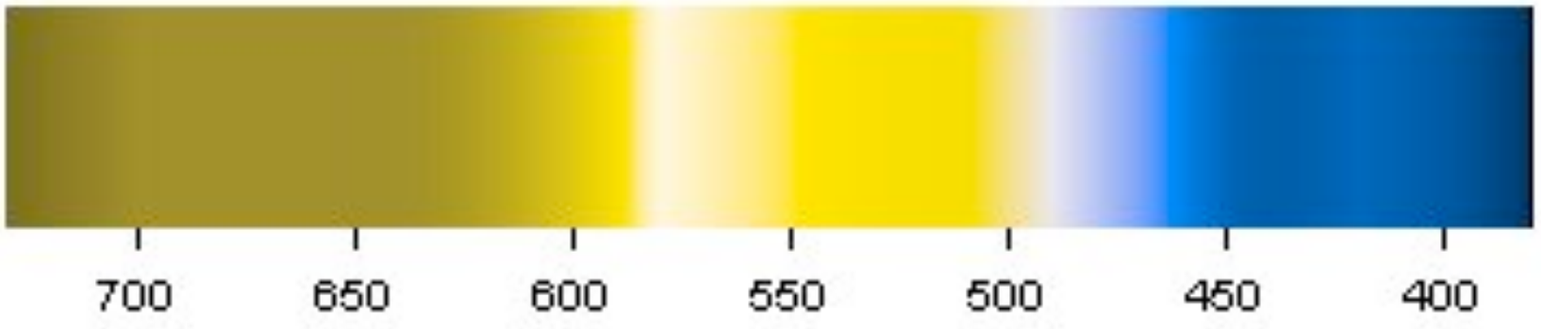
- red-green most common
  - 8% of (North American) males, 0.5% of females

- can be explained by opponent color theory

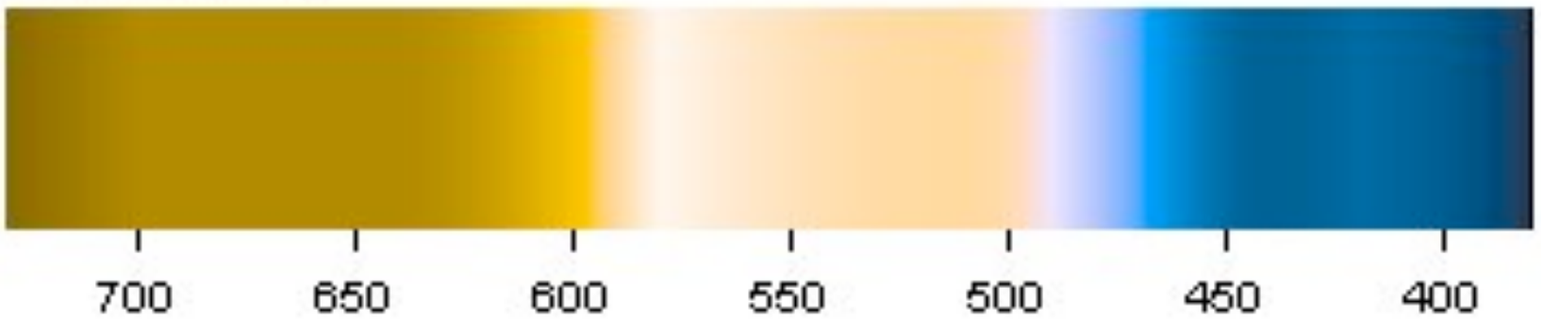
Normal



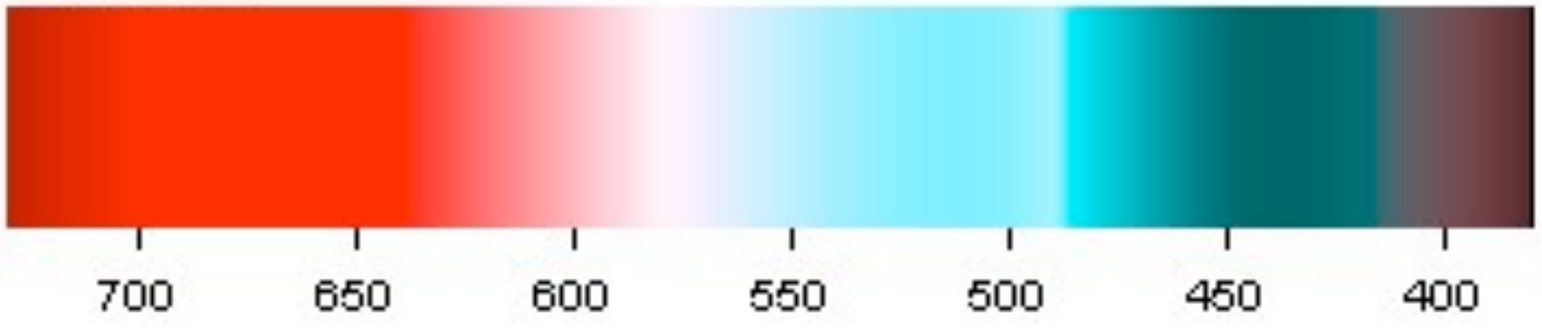
Protanopia

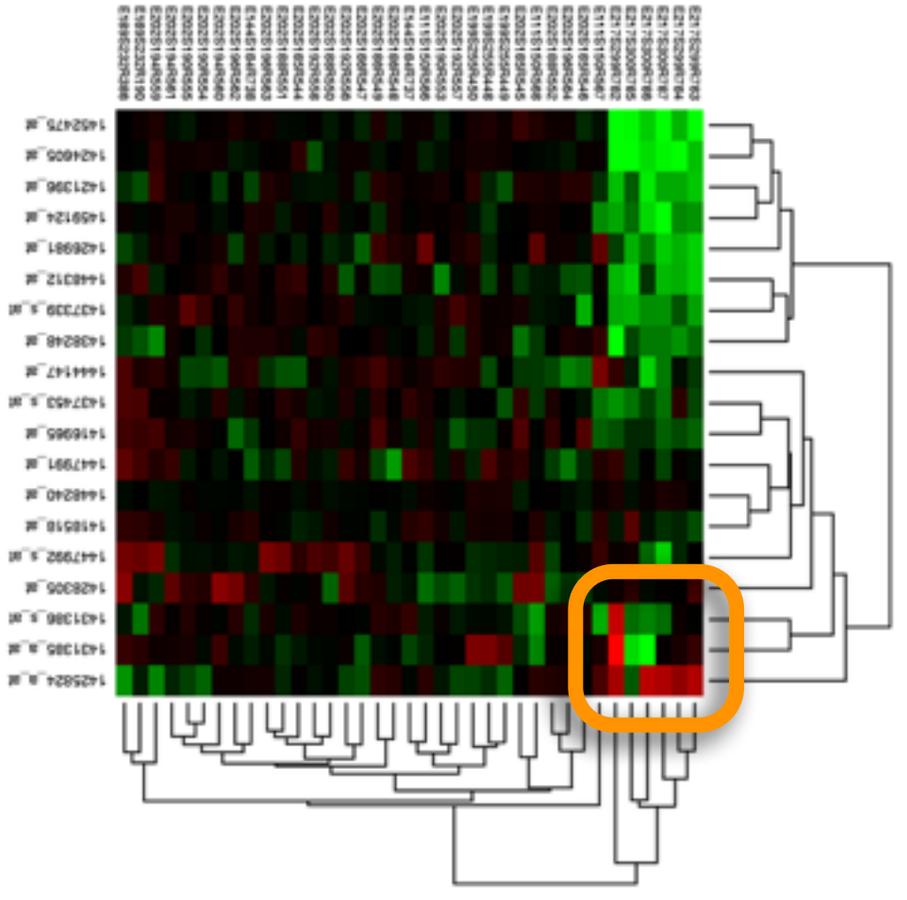


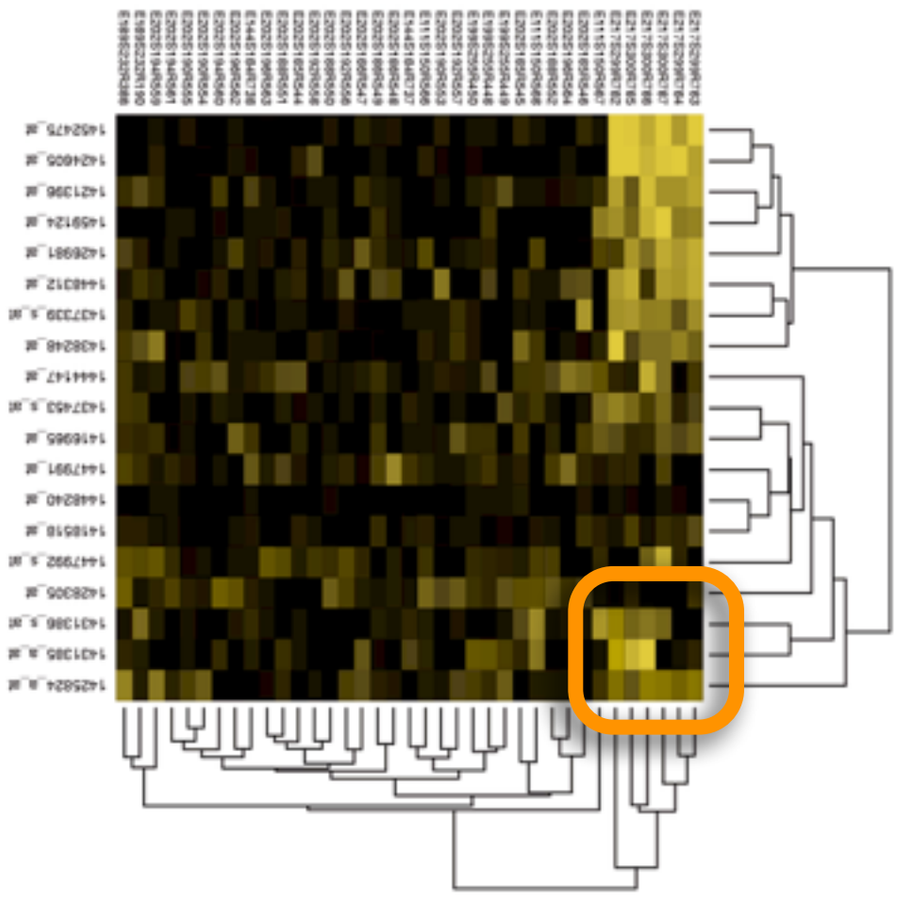
Deuteranopia

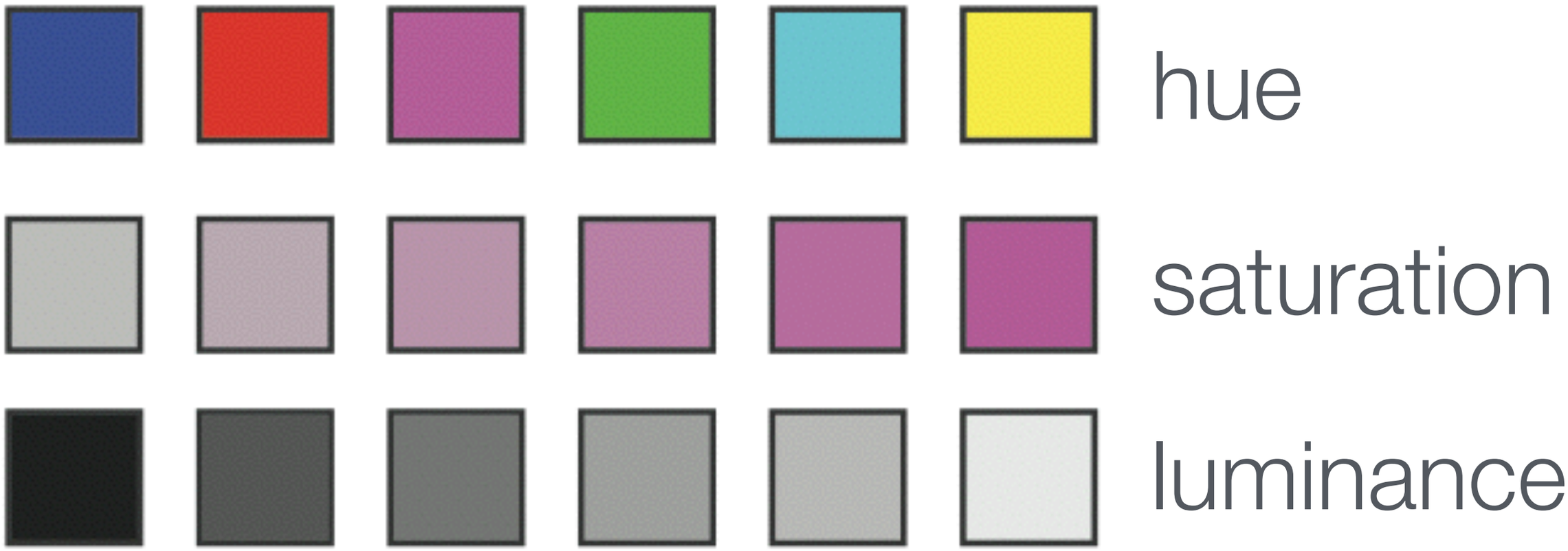


Tritanopia

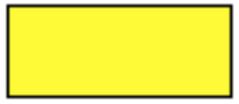






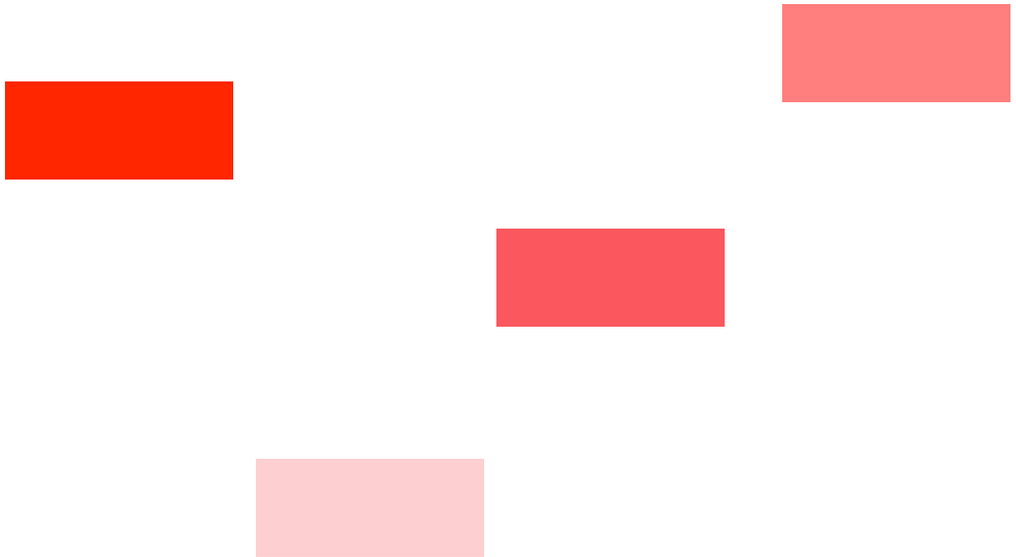

hue
saturation
luminance

order these colors…



order these colors...

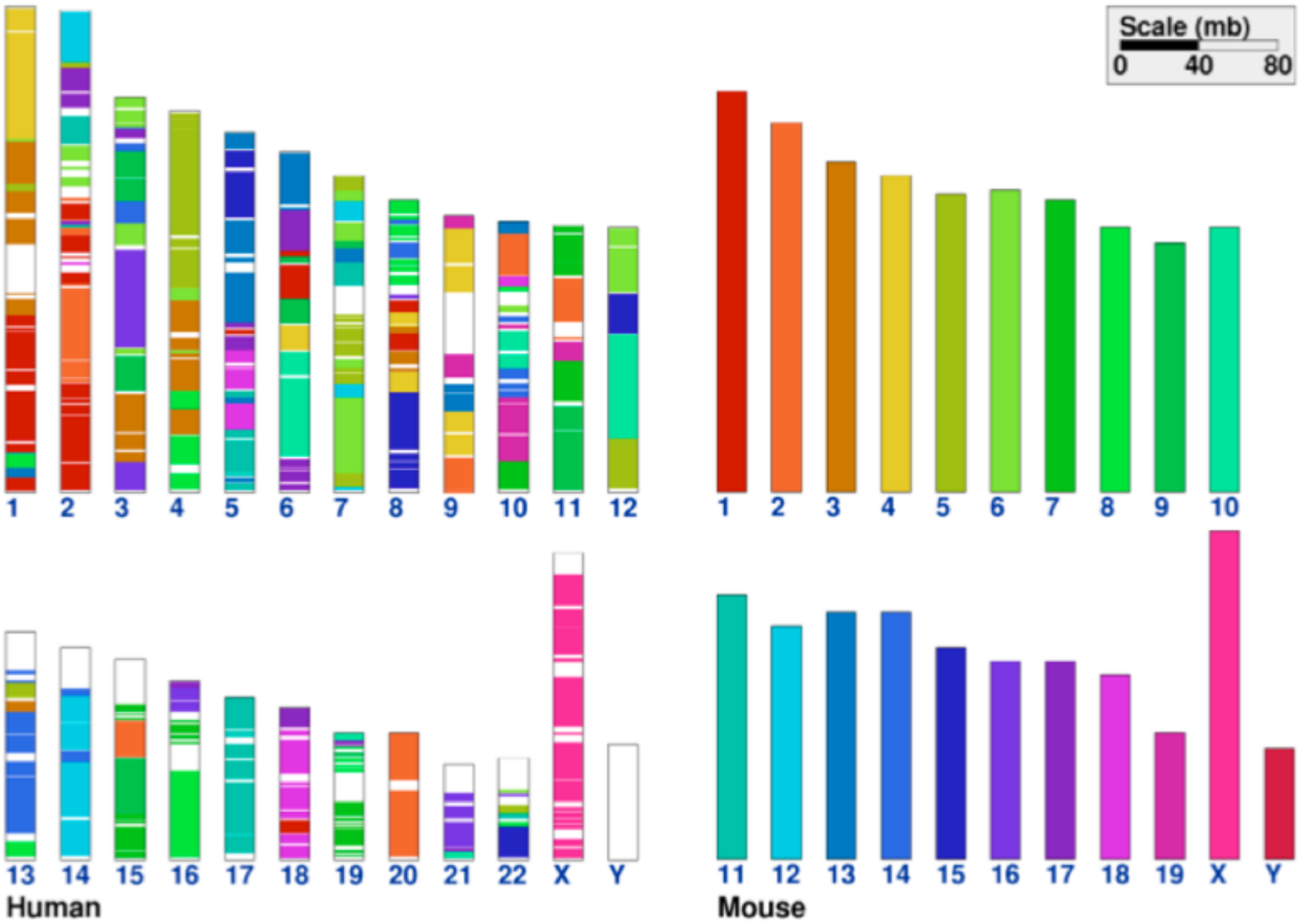
order these colors...



hues for categories

distinguishability

only good at distinguishing 6-12 simultaneous colors



guidelines

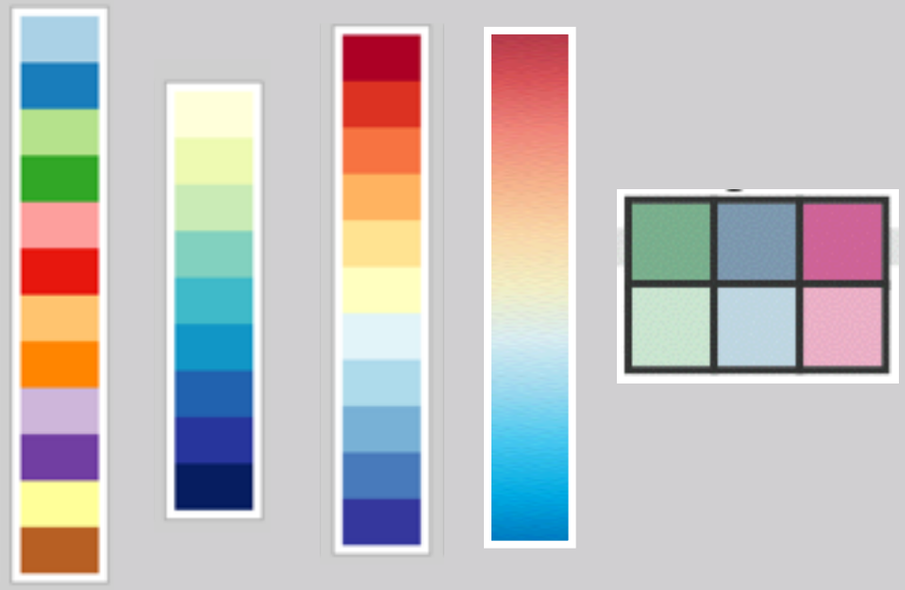
- luminance and saturation are most effective for ordinal data because they have an inherent ordering

- hue is great for categorical data because there is no inherent ordering
  - but limit number of hues to 6-12 for distinguishability

what is a colormap?

[0,8] →

- specifies a mapping between color and values
  - sometimes called a transfer function

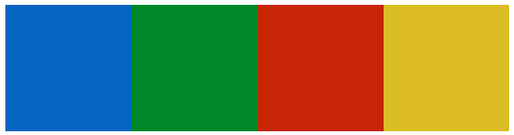


- categorical vs ordered
- sequential vs diverging
- segmented vs continuous
- univariate vs bivariate

- **expressiveness**: match colormap to attribute type characteristics!

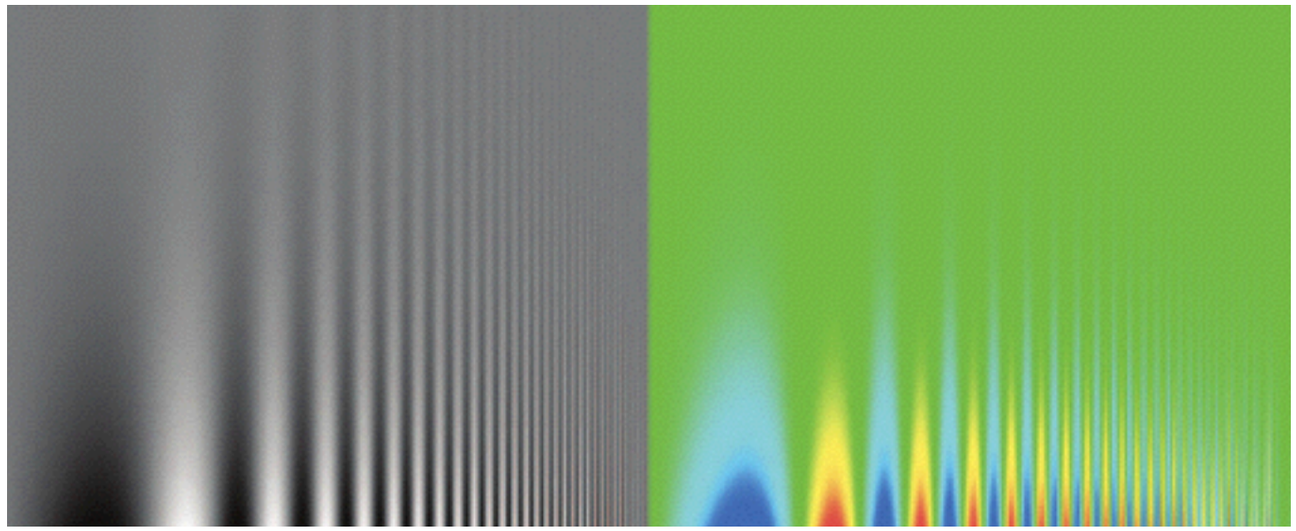
rainbow colormaps: challenges

no implicit order

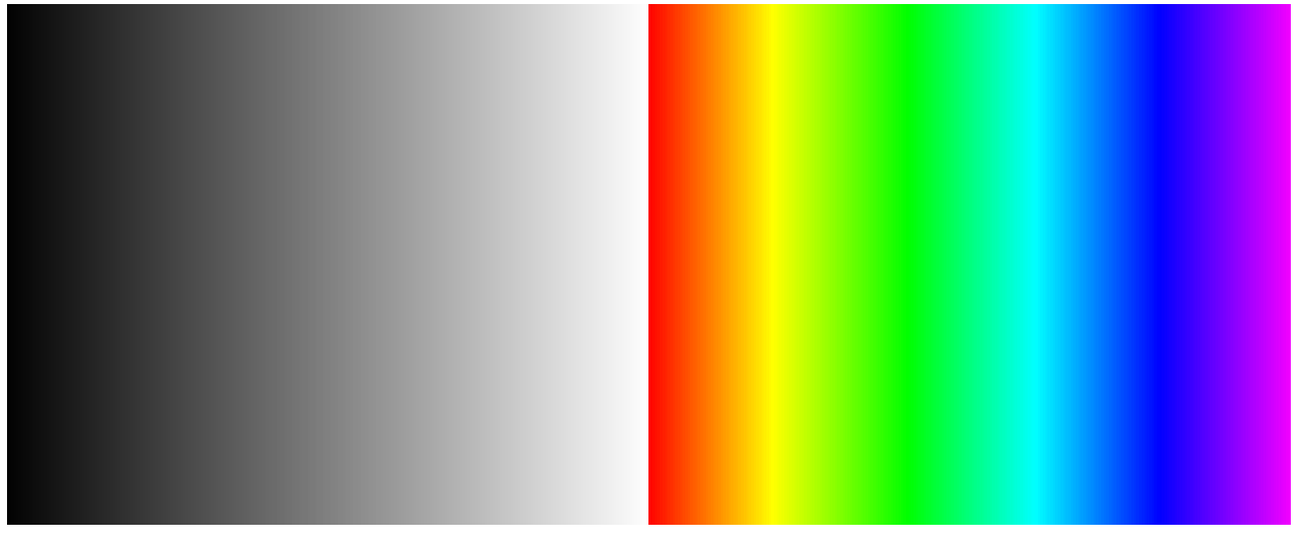


easy to order

lower resolution



creates artifacts



not perceptually linear

Borland 2007

guidelines

poor

good

ColorBrewer: Color Advice for Maps

colorbrewer2.org

Reader

Device(Anonymous) camera http://192.168.2.1/ Google Scholar UT hiking poetry-vis Marriott Library

how to use | updates | downloads | credits

COLORBREWER 2.0
color advice for cartography

Number of data classes: 3

Nature of your data:
(•) sequential ( ) diverging ( ) qualitative

Pick a color scheme:

Multi-hue:

Single hue:

Only show:
- [ ] colorblind safe
- [ ] print friendly
- [ ] photocopy safe

Context:
- [ ] roads
- [ ] cities
- [x] borders

Background:
(•) solid color
( ) terrain

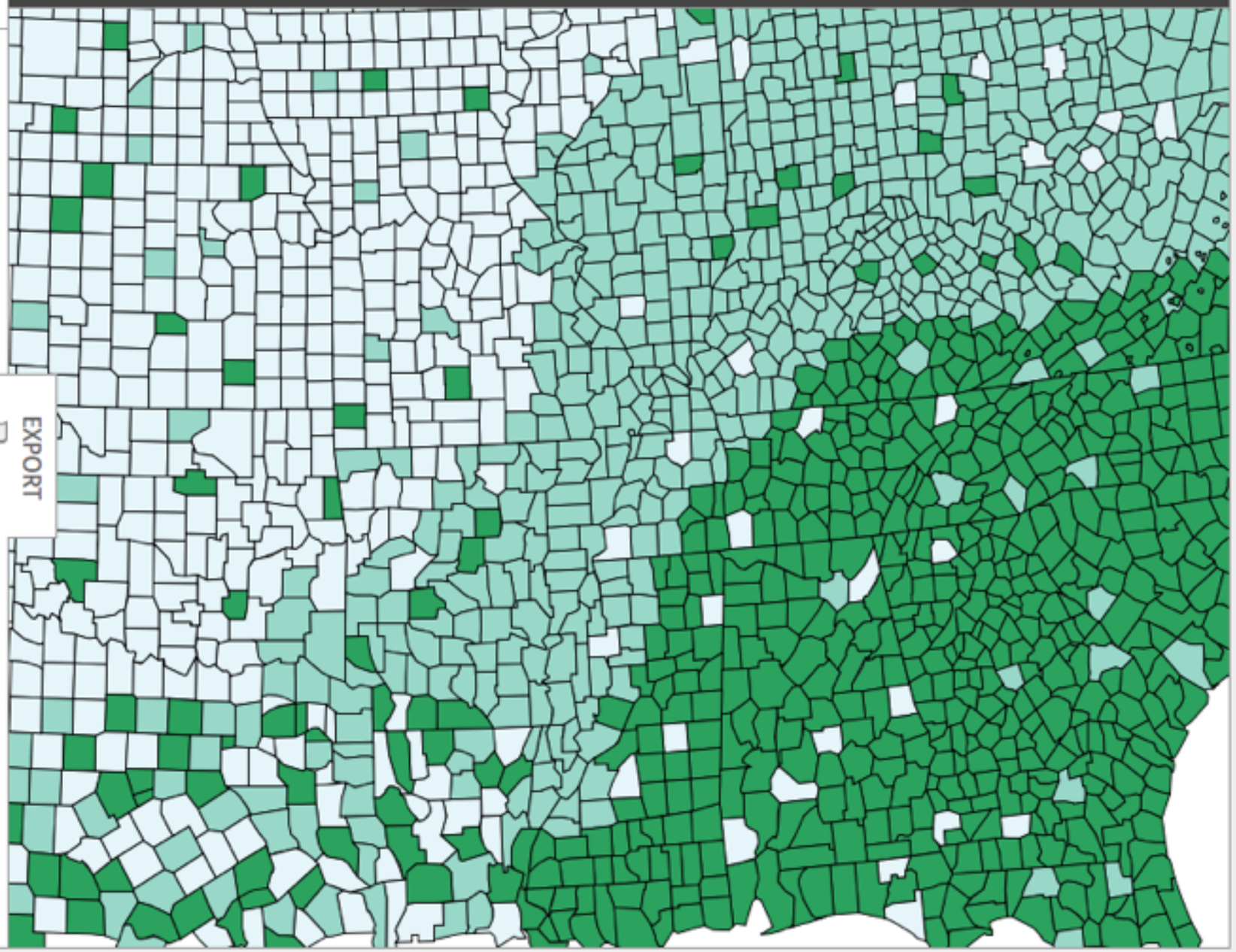
color transparency

3-class BuGn

HEX

#e5f5f9
#99d8c9
#2ca25f

EXPORT



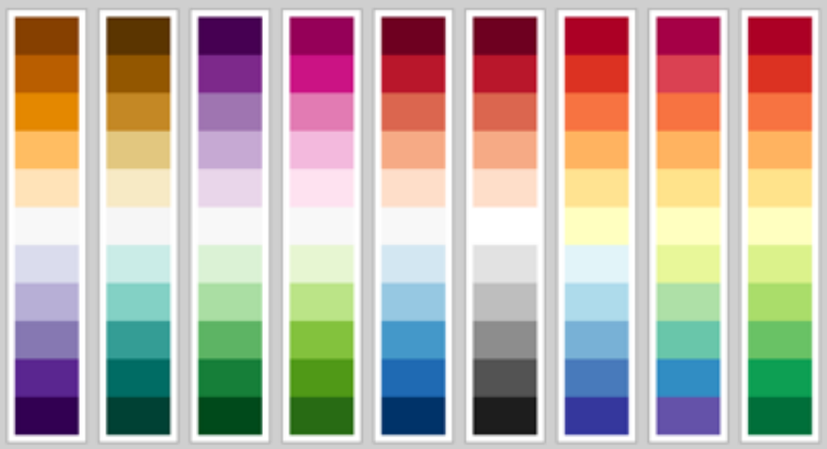
Support
Back to Flash version
Back to ColorBrewer 1.0

axismaps

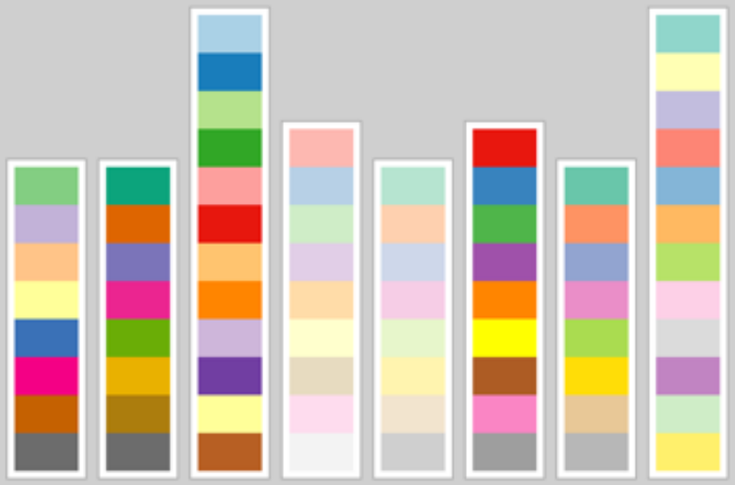
ColorBrewer palates

sequential

diverging

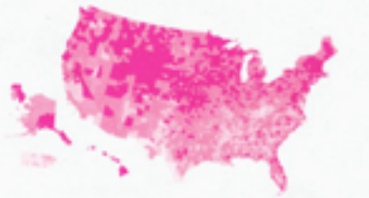


categorical



READING, WRITING, AND EARNING MONEY

The latest data from the U.S. Census's American Community Survey paints a fascinating picture of the United States at the county level. We've looked at the educational achievement and the median income of the entire nation, to see where people are going to school, where they're earning money, and if there is any correlation.



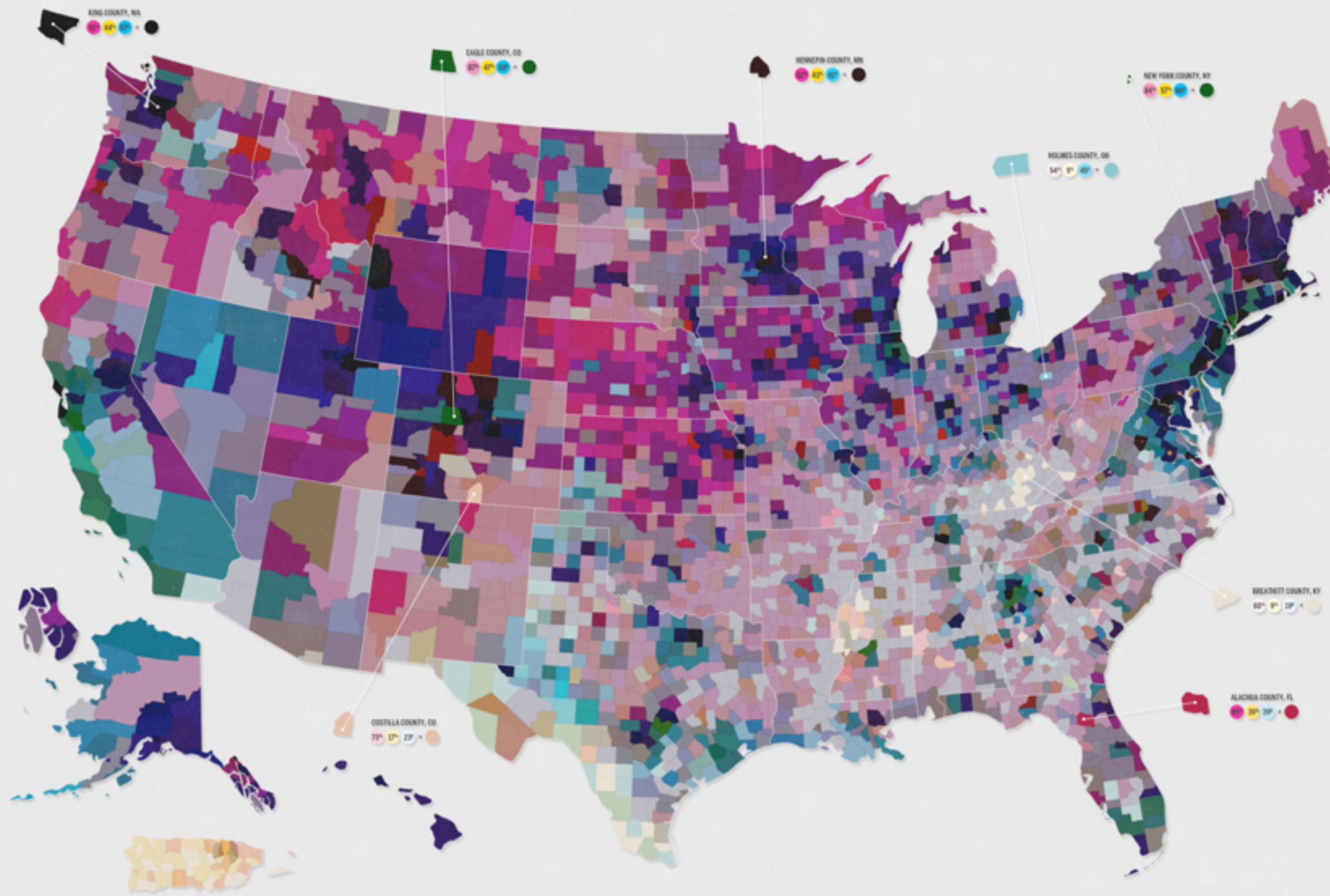
A HIGH SCHOOL GRADUATES 65% 75% 82% 88%

B COLLEGE GRADUATES 15% 22% 30% 40%

C MEDIAN HOUSEHOLD INCOME 25K 40K 50K 65K

The map at right is a product of overlaying the three sets of data. The variation in hue and value has been produced from the data shown above. In general, darker counties represent a more educated, better paid population while lighter areas represent communities with fewer graduates and lower incomes.

A collaboration between GOOD and Gregory Huberek
SOURCE: US Census



http://www.good.is/post/america-s-richest-counties-and-best-educated-counties/

next time…

-lab

-bring your example test questions

-optional

-Tuesday is the last class

-review