Colour and Memory

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Previously in CSCM27...

- Give a definition and example of a mark
- Give an example of a channel
- What were the three types of data discussed
- Name some effective encodings for them

Previously in CSCM27... (2)

- One important encoding is colour
- We examine it and other types of encoding

Colour, Encodings, and Memory

Thanks

- Huge thanks to Tamara Munzner (my PhD adviser)
- Many of the figures are from her work
- This lecture is based off of her lectures
- Thanks to Rita Borgo and Bob Laramee for this lecture

Colour

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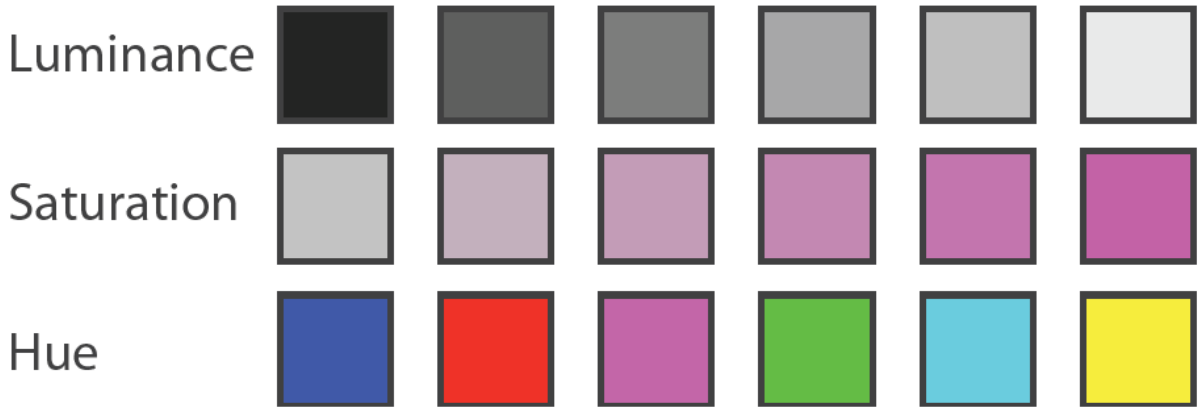
- Colour is very, very hard.

Colour

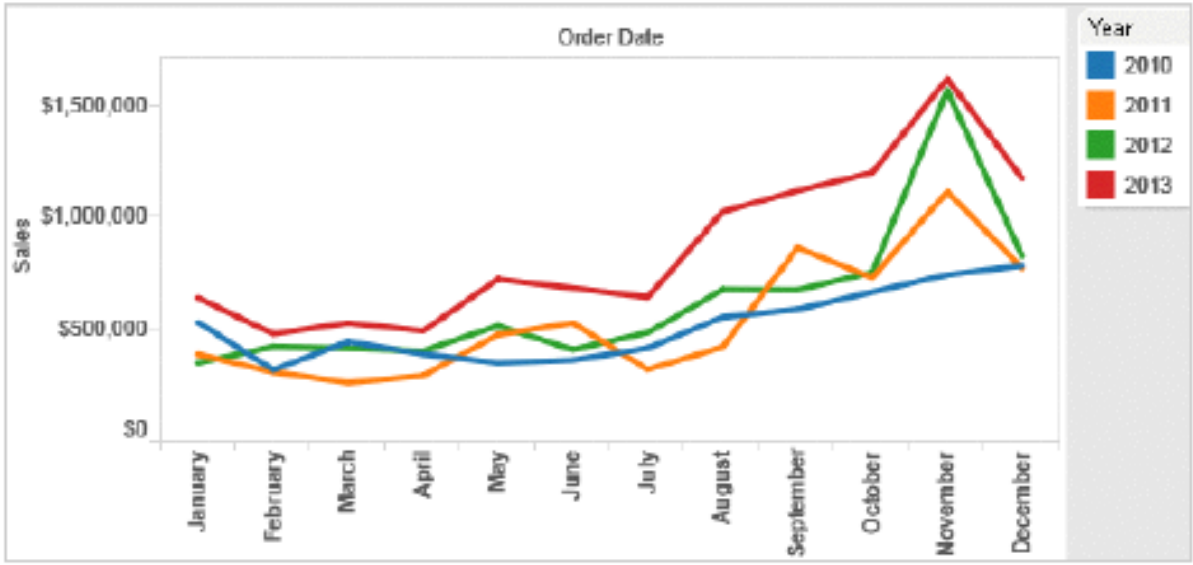
- Colour is hard.
- Colour is very, very hard.
- I'm not super good at colour
- I could do a week on colour
- But, this is not a colour course
- I'll try to do my best in a few slides
- (btw colour projects bad)

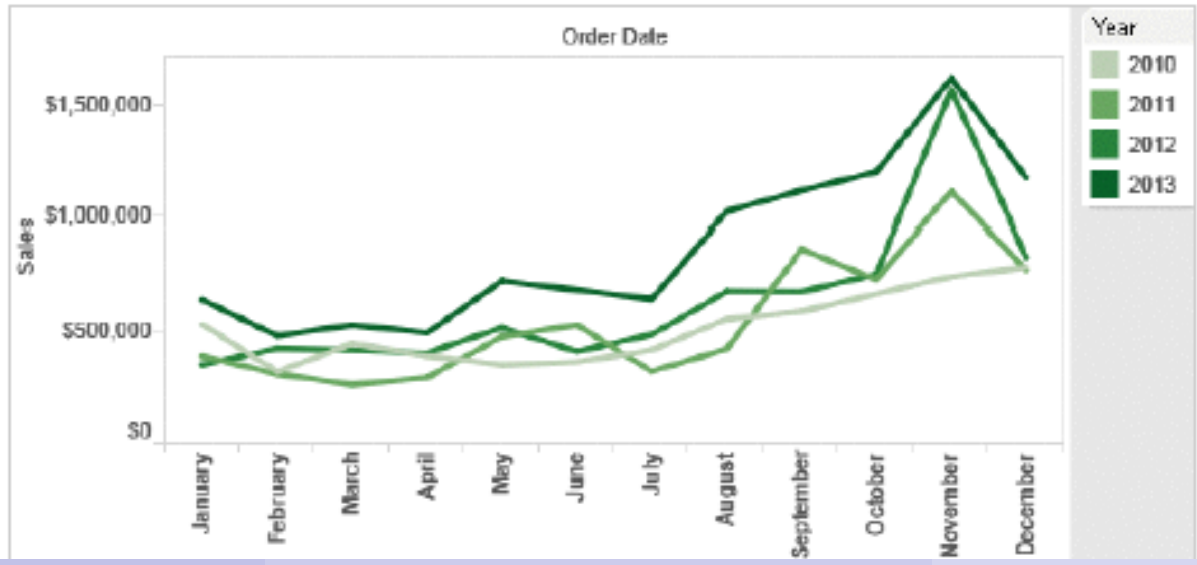
Decomposing Colour



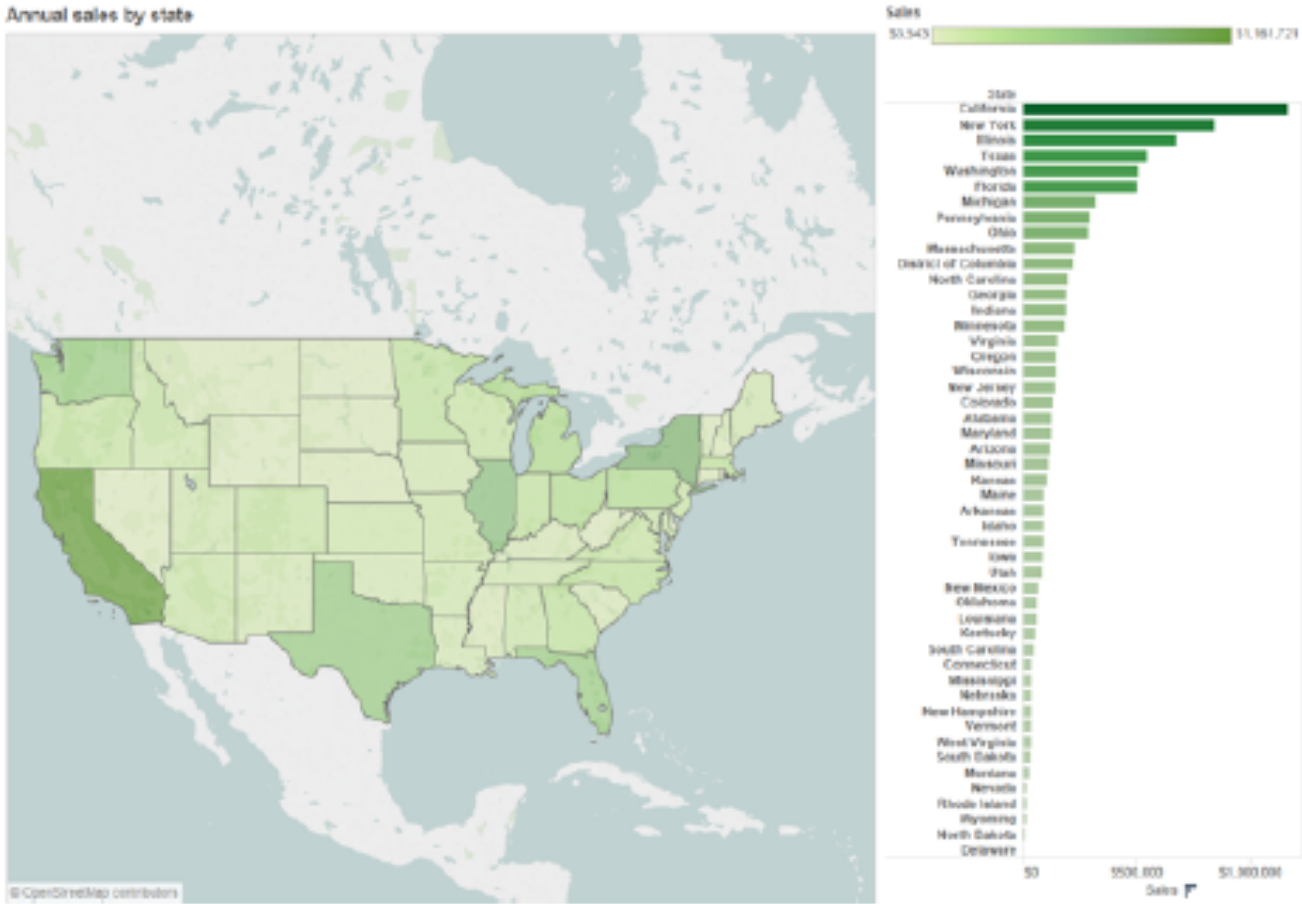
- Hue can represent categorical information
- Luminance and saturation can show ordered information
- Only a finite number of bins

Ordered vs Categorical





Geographic Example



- Is the ranking of states interpretable?

Illumination and Context Matters

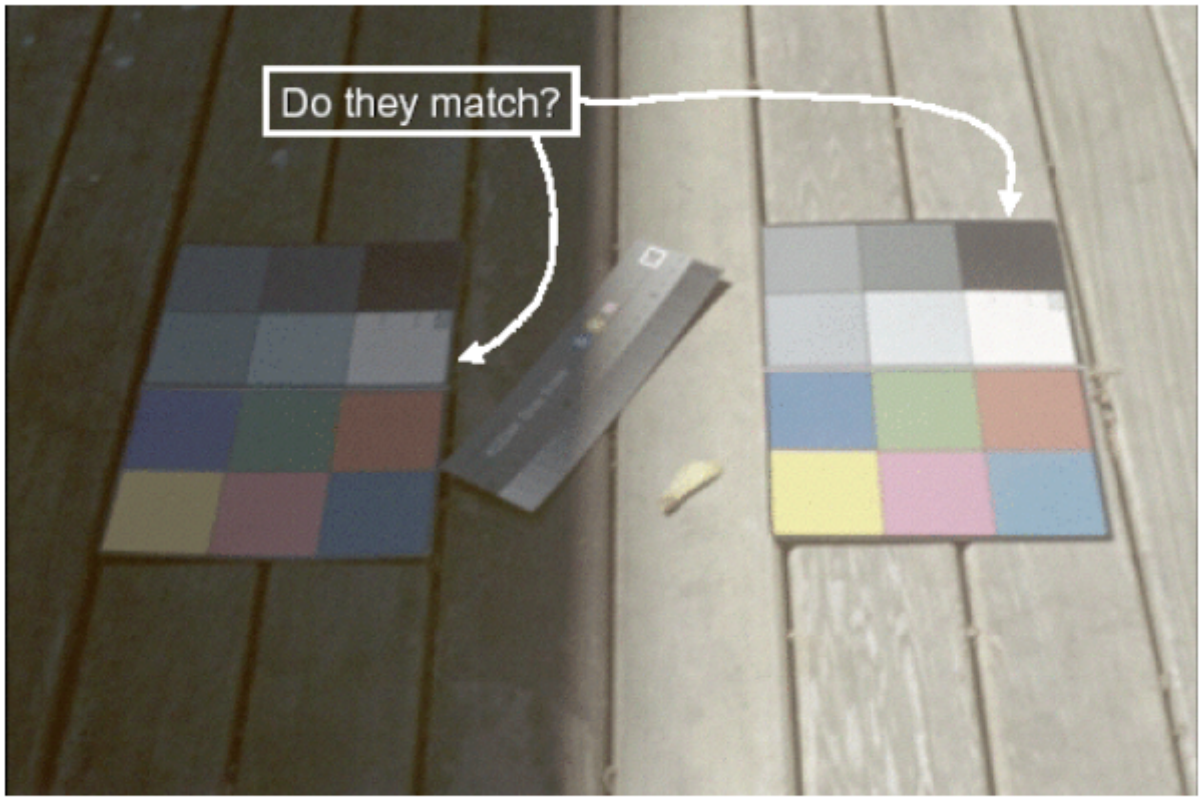


Image courtesy of John McCann

- Are these colours the same?

Illumination and Context Matters (2)

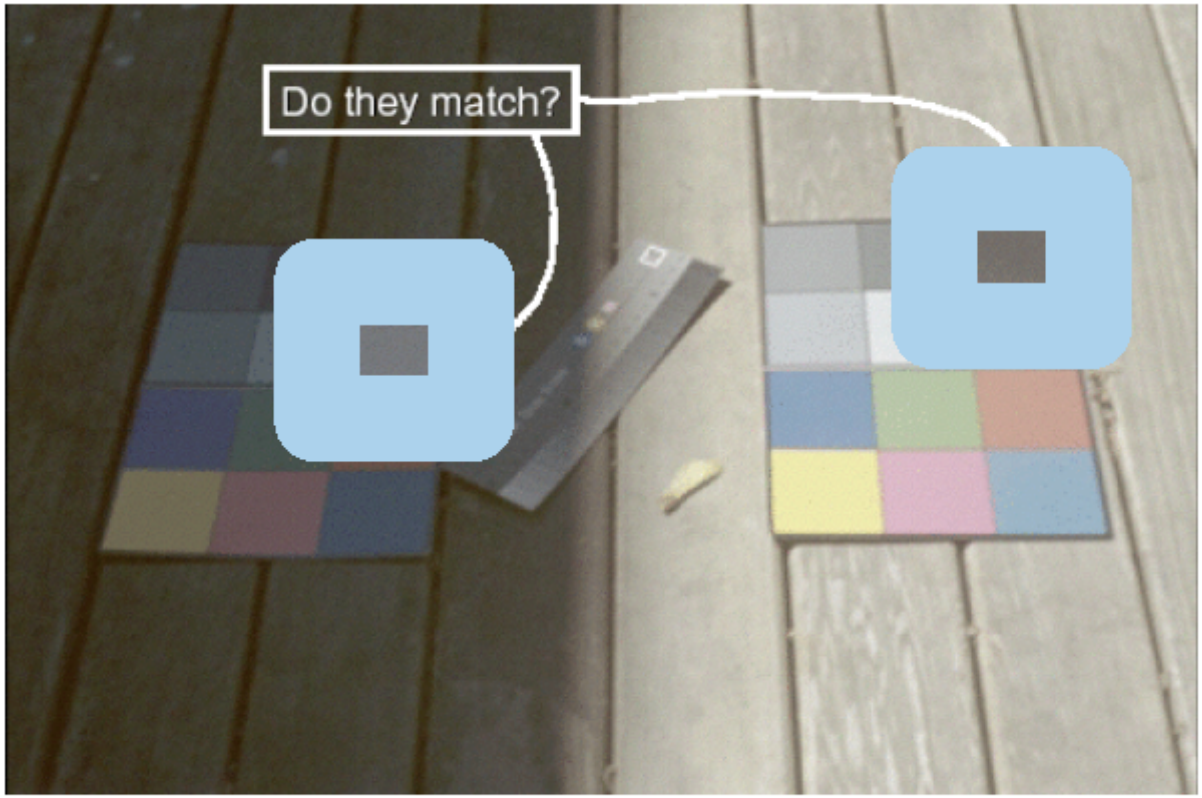
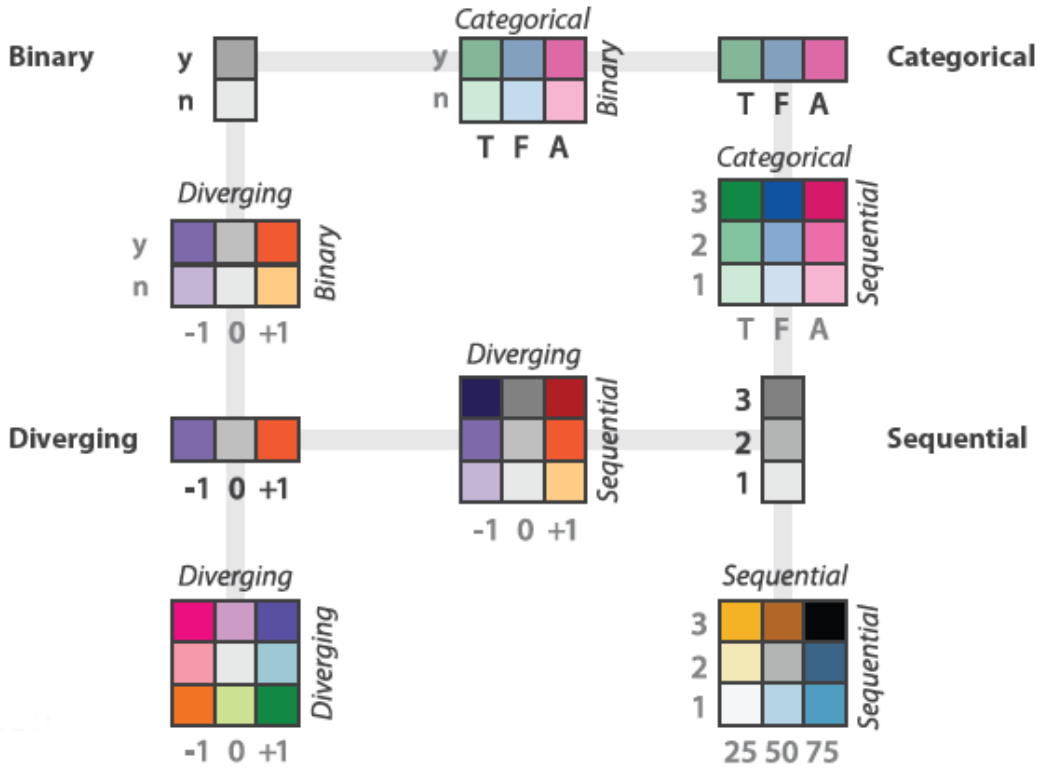


Image courtesy of John McCann

- Are these colours the same?

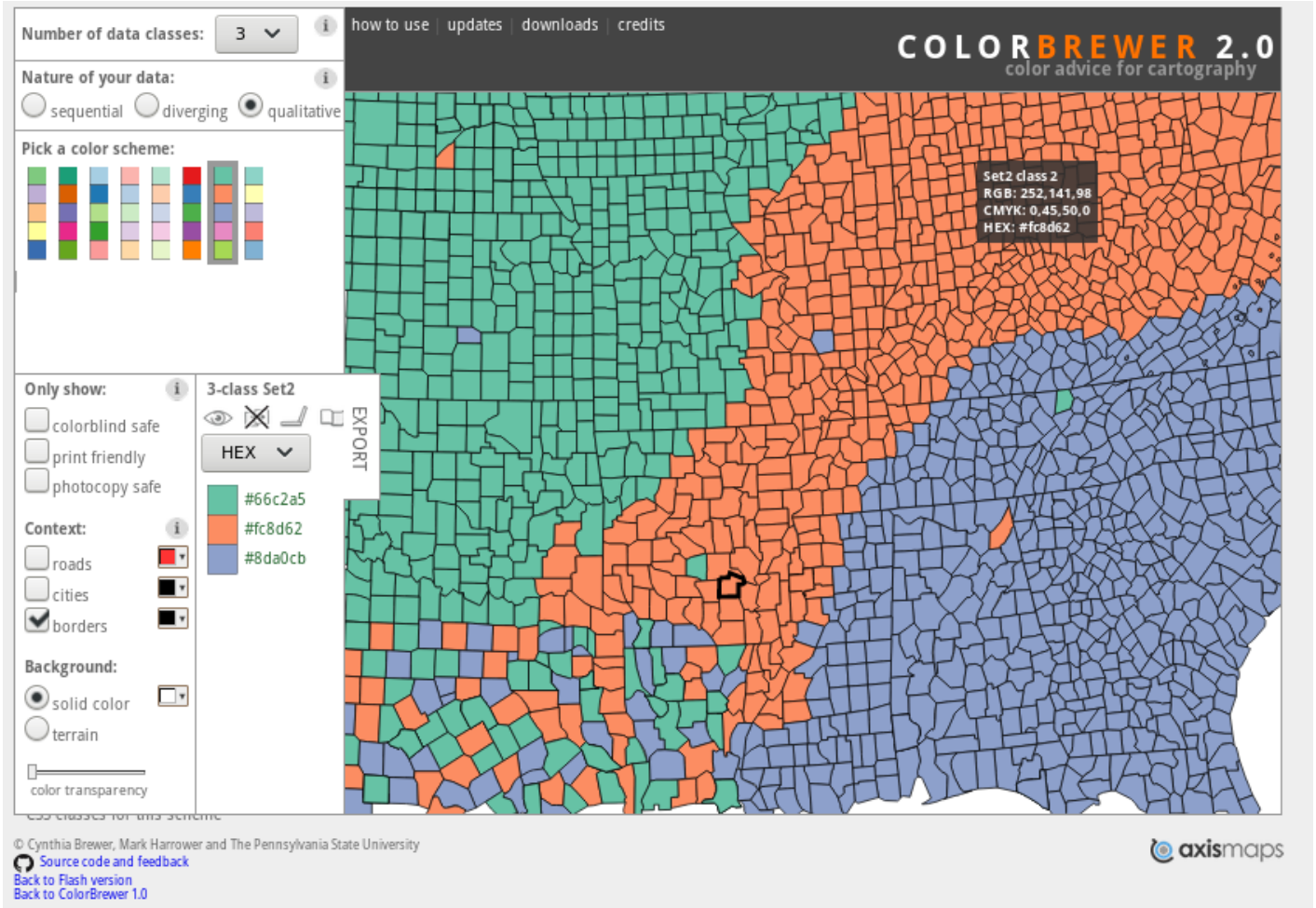
Categorical, Sequential, Diverging

- Different encodings for ordered and categorical
- Can do combinations if careful
- Size influence salience
  - large regions low saturation
  - small regions high saturation
- 3-4 luminance & saturation bins max



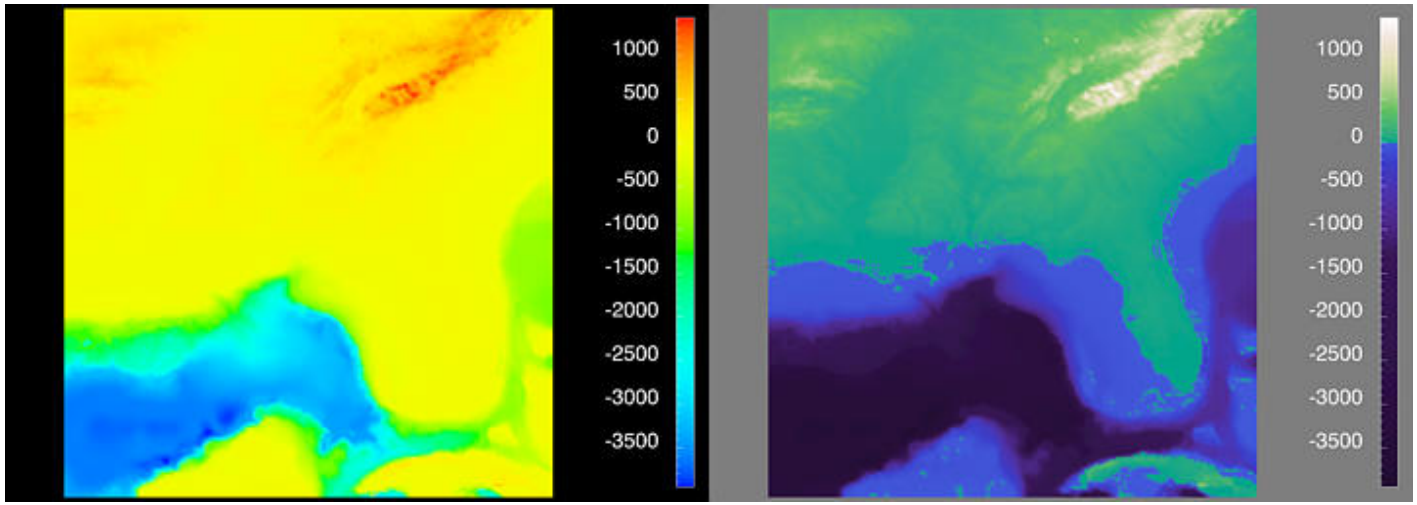
after [Color Use Guidelines for Mapping and Visualization. Brewer, 1994. http://www.personal.psu.edu/faculty/c/a/cab38/ColorSch/Schemes.html]

ColorBewer2 Demo



http://colorbrewer2.org/

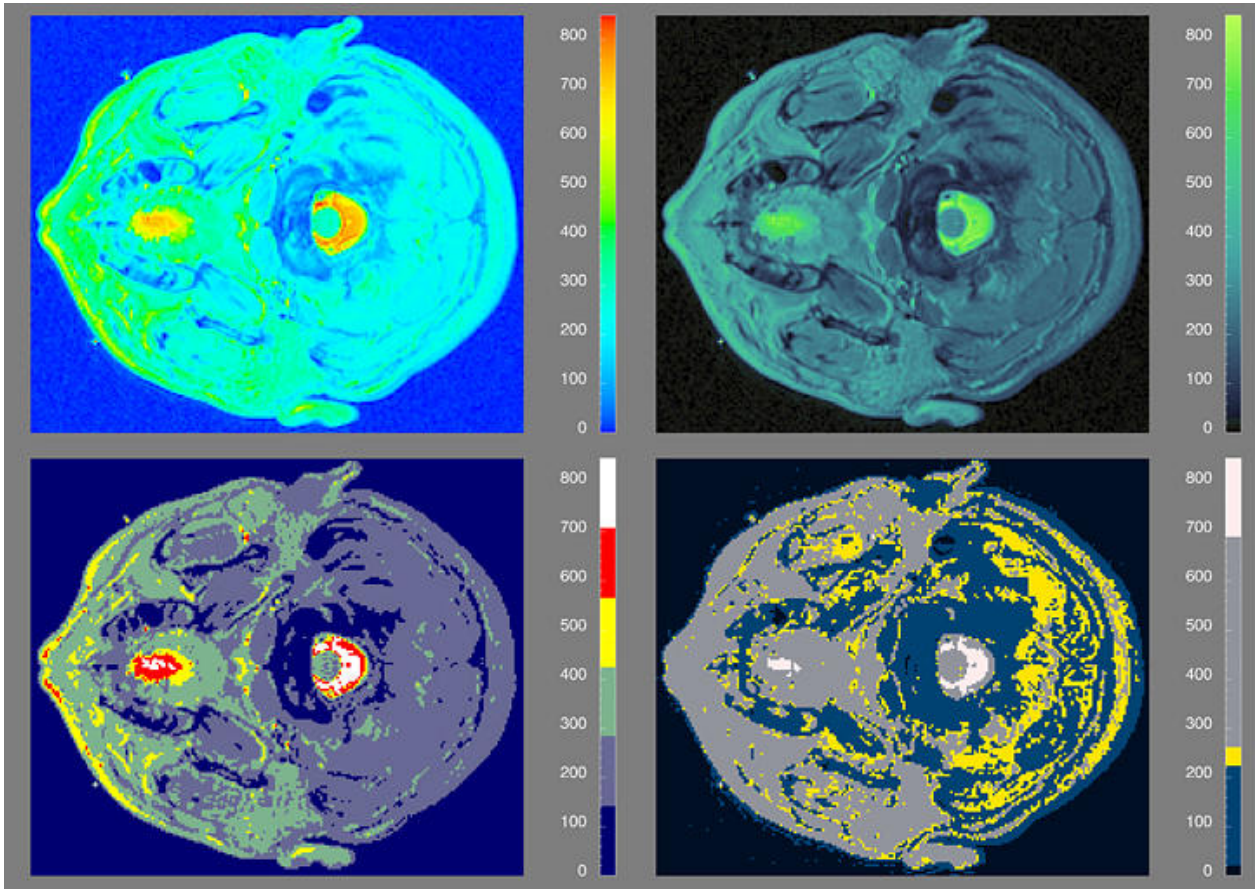
Beware of the Rainbow



B. Rogowitz `https://www.research.ibm.com/people/l/lloydt/color/color.HTM`

- Where did Florida go?
- Rainbow by default is not perceptually linear
- Is red > blue?
- Why not monotonically increasing luminance?

Segmented Rainbow an Improvement



B. Rogowitz `https://www.research.ibm.com/people/l/lloydt/color/color.HTM`

- If used, consider segmented version
- Perceptually linear version can exist as well.

Memory

- Memory properties
  - Encoding: type of things stored
  - Size: number of things stored
  - Decay time: how long memory lasts

Unit of Memory: Chunking

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- Chunking depends on presentation and experience

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- 3-4 digit chunking is ideal
  - Dan story: phone numbers in Canada, France, Ireland, Britain

Working Memory

- Small capacity: 7 ± 2 “chunks”
- Fast decay (7 [5-226] sec)
- Rehearsal dampens decay
- Interference causes faster decay
  - stimuli with conflicting chunks harder to retain
- Interference demo... Ready?
- Tell me the colour of the word, OK?

Slide

Window

Book

Pencil

Car

Hat

Say the Colours of the Words Aloud

- Repeat with a different set of words
- Ready?

Pink

Yellow

Red

Black

White

Orange

Interference Example

- Once again, previous experience alters perception
  - It's much harder, and most people do it much slower
  - Why? Because the name of a colour interferes with the actual colour

Long Term Memory

- Huge capacity
- Little decay
- Rehearsal moves chunks from working to long term
- By making connections with other chunks

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- Complete the following sentence...

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- Complete the following sentence...
  - *Previously...*
- We have tried to begin each class with rehearsal.

Primacy and Recency

- Recalling lists in any order is known as free recall:
  - it is easier than recalling lists in a particular order
  - primacy effect: first one or two words to be remembered well
- The middle will be less well remembered while
- The words at the end well remembered
  - this is called the recency effect
- Words at the end are remembered: still in working memory
- or even in the auditory loop if they have been heard

Recognition vs Recall

- We recognise material easier than recall from memory
  - eg: learning a foreign language...
- To help recall task order we develop cognitive aids
  - Post-it notes (e.g. Bookmarks, history)
- To remember things we develop cognitive mnemonics
  - **N**ever **E**at **S**hredded **W**heat
  - Compass directions (in order)

Colour in Altair (+ other stuff)

- At minimum, you should do the following tutorials:

https://github.com/uwdata/visualization-curriculum/blob/master/altair_data_transformation.ipynb
https://github.com/uwdata/visualization-curriculum/blob/master/altair_scales_axes_legends.ipynb

- API information in here:

https://altair-viz.github.io/

Interesting Question

What are the coolest things learnt this week in CSCM27?