Visualization & Visual Analytics 1

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creativecoding.evl.uic.edu/courses/cs424

Color

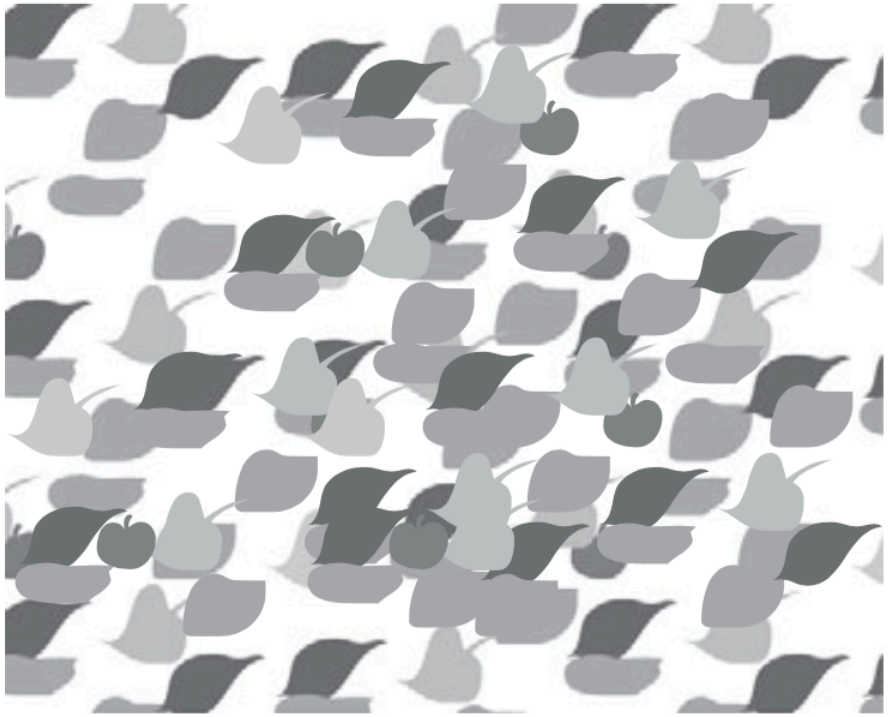
- To label, name, identify, categorize

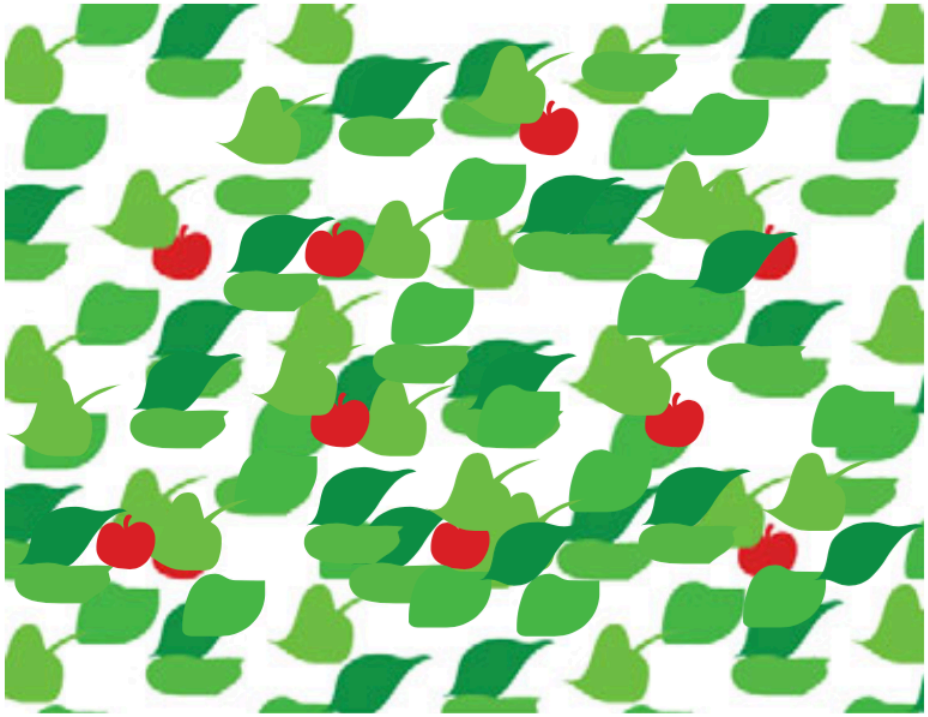
- To measure, quantify

- To represent, symbolize, contextualize

- To decorate, beautify, highlight

Identify, group, layer, highlight





RGB -> HSL

- Hue

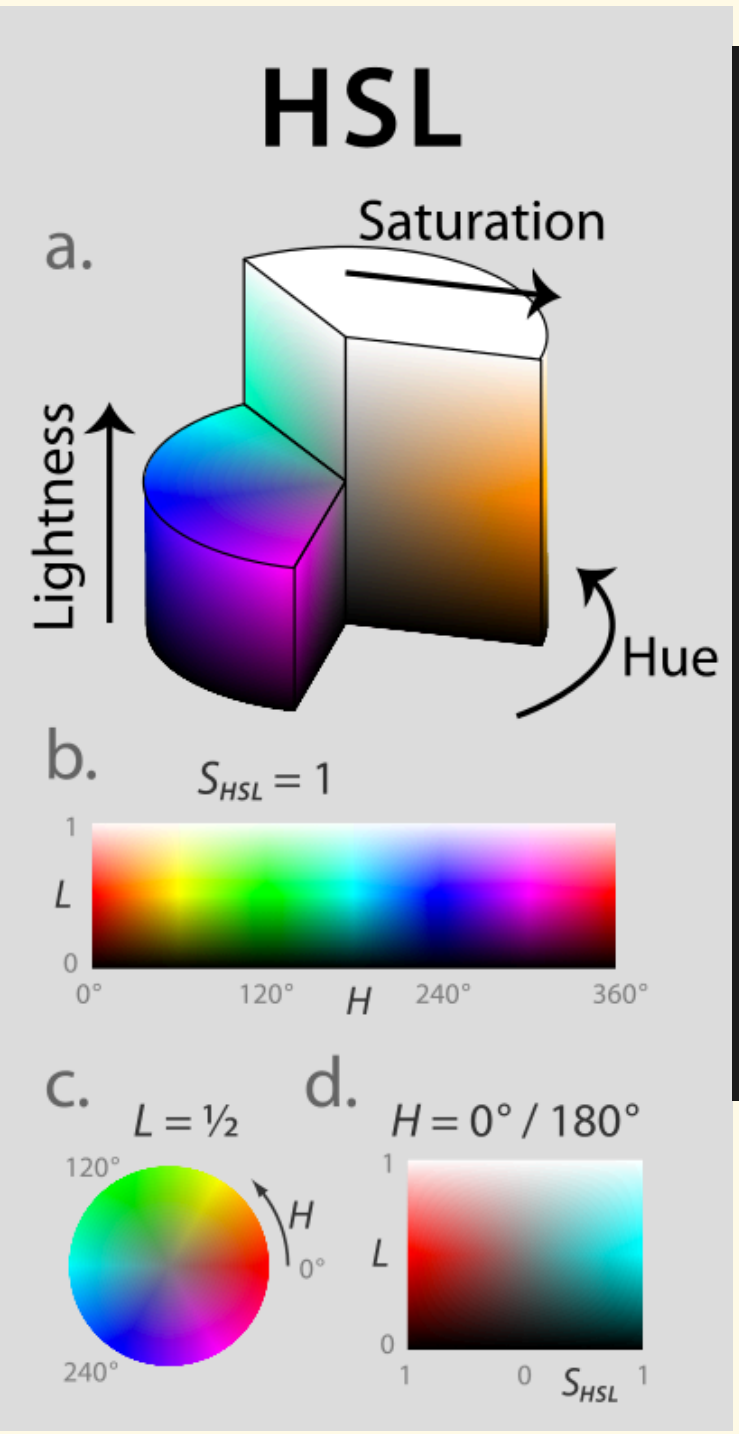
  the primary “color”

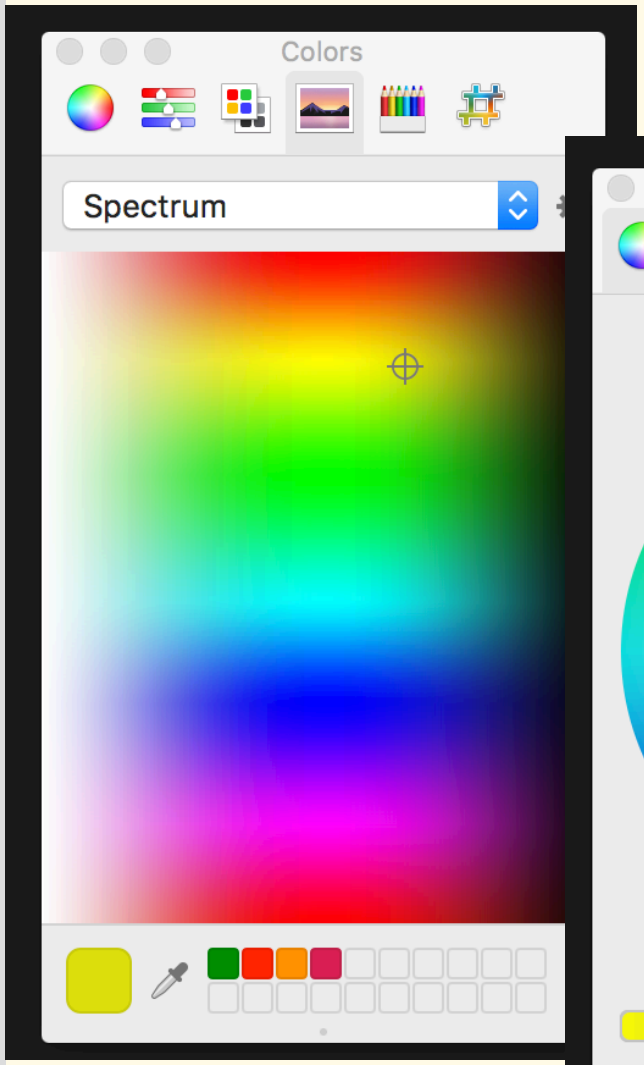
- Saturation

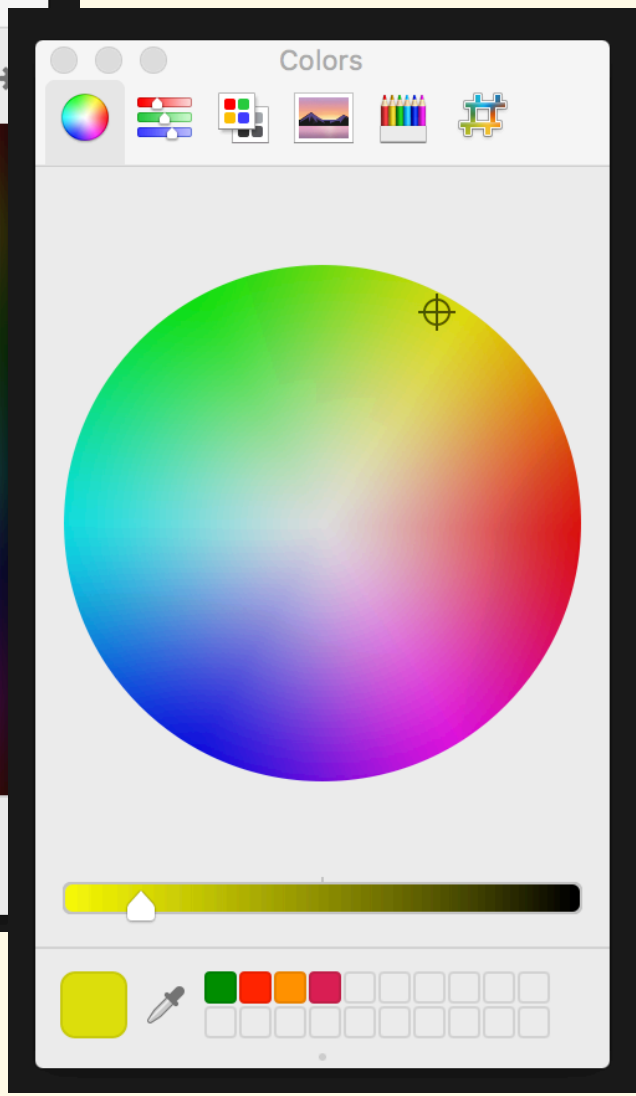
  amount the color is mixed with white

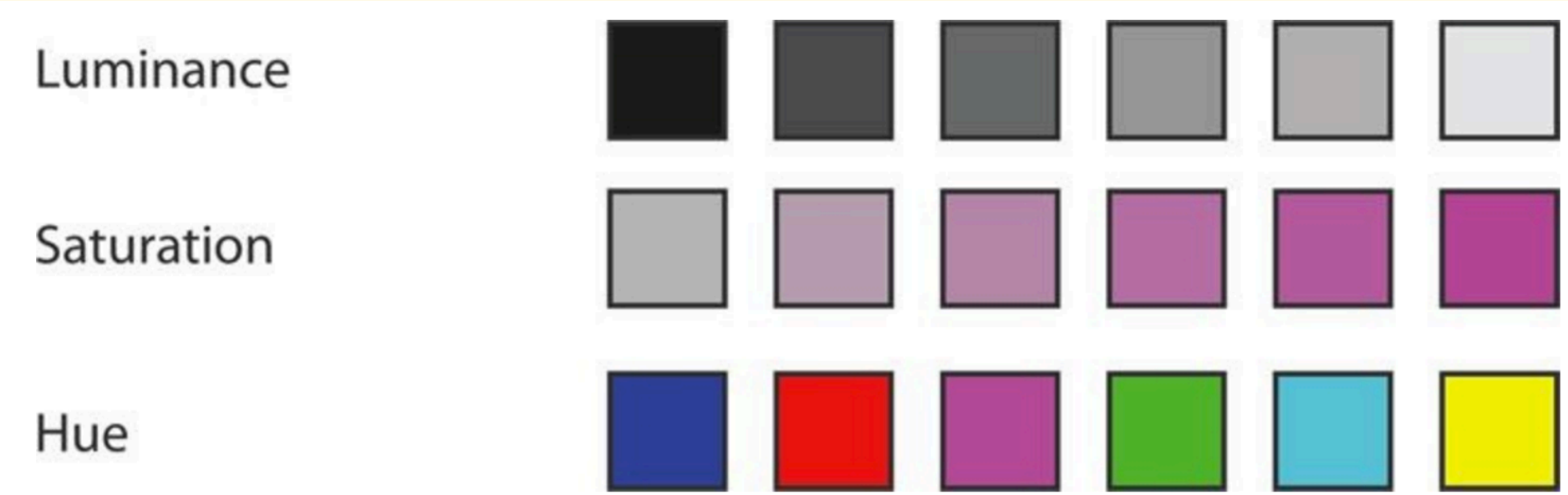
- Luminance

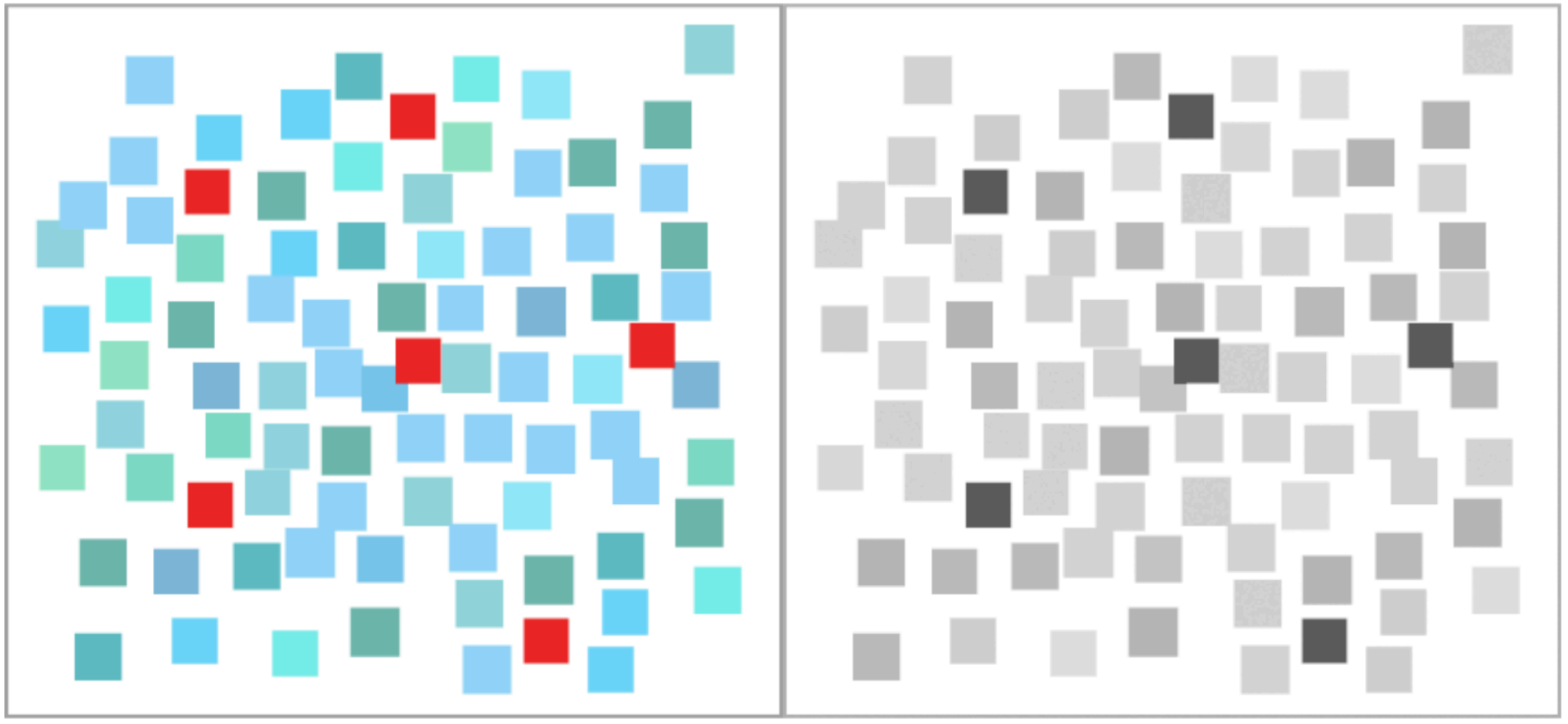
  amount of black that is mixed with the color


HSL
a.
Saturation
Lightness
Hue
b.
$S_{HSL} = 1$
1
L
0
0°
120°
H
240°
360°
c.
L = ½
120°
H
0°
240°
d.
H = 0° / 180°
1
L
0
1
0
S_{HSL}
1


Colors
Spectrum


Colors


Luminance
Saturation
Hue



Showing small blue text on a black background is a bad idea.
There is insufficient luminance contrast.

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There is insufficient luminance contrast.

Showing small yellow text on a white background is a bad idea.
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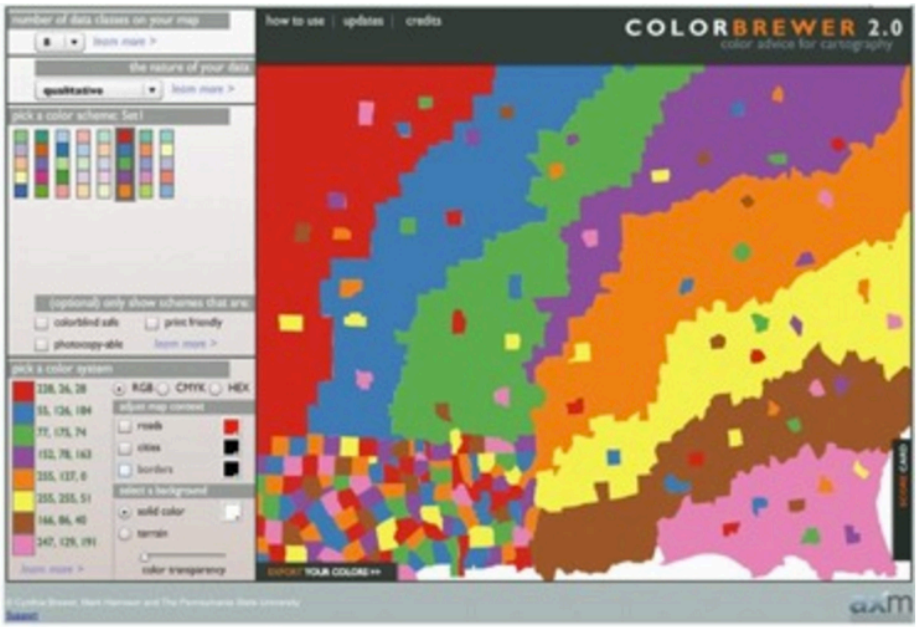
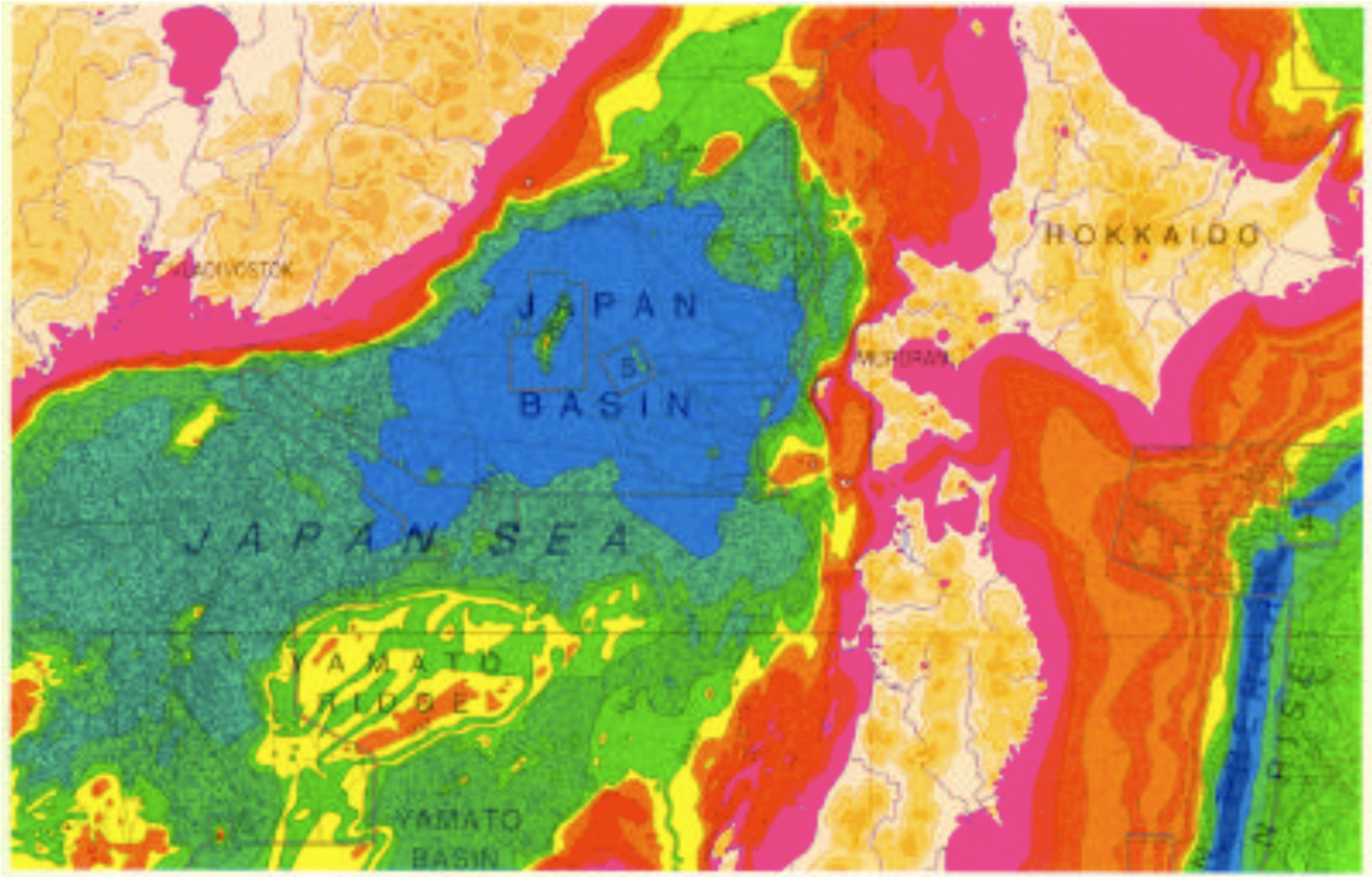
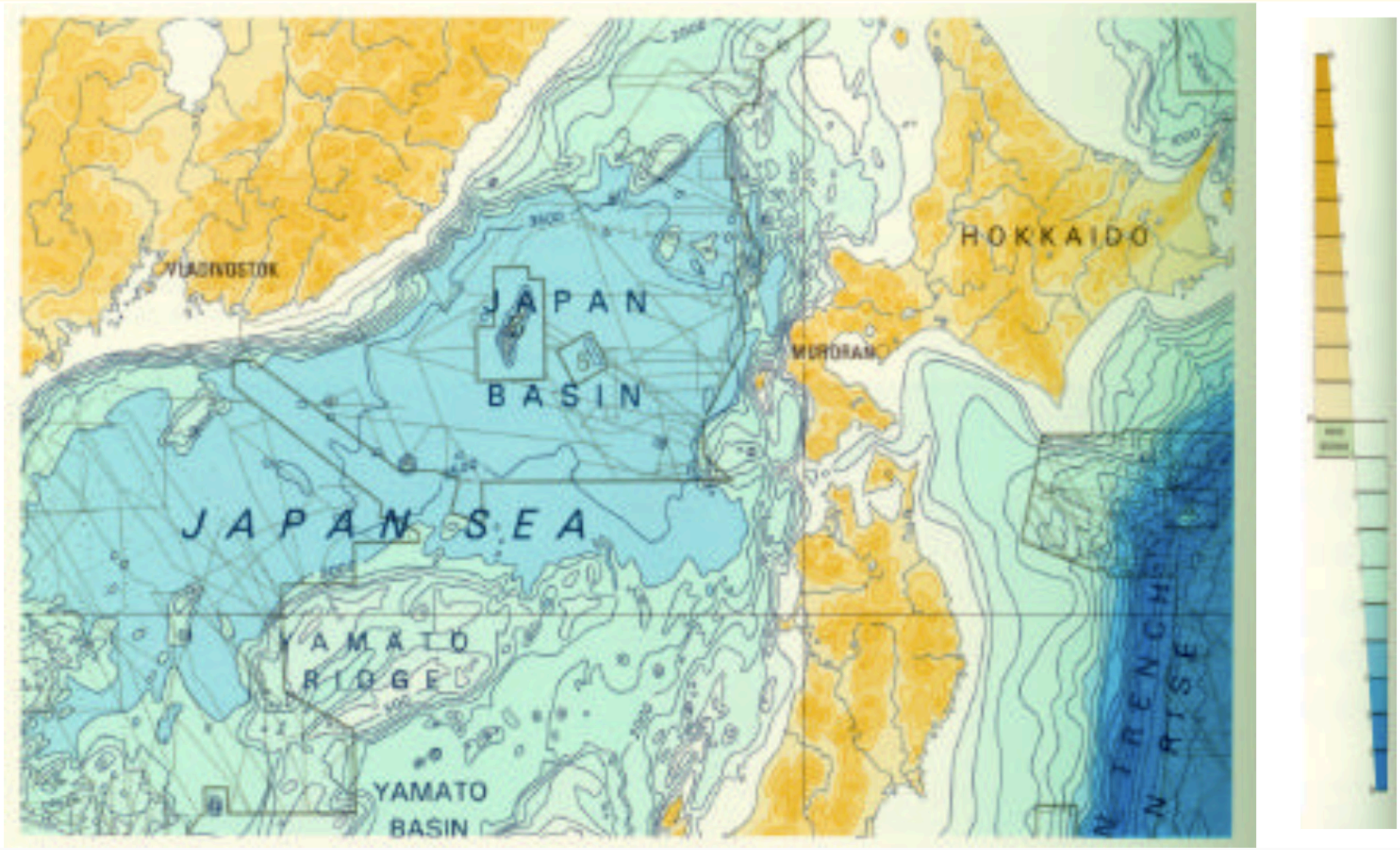
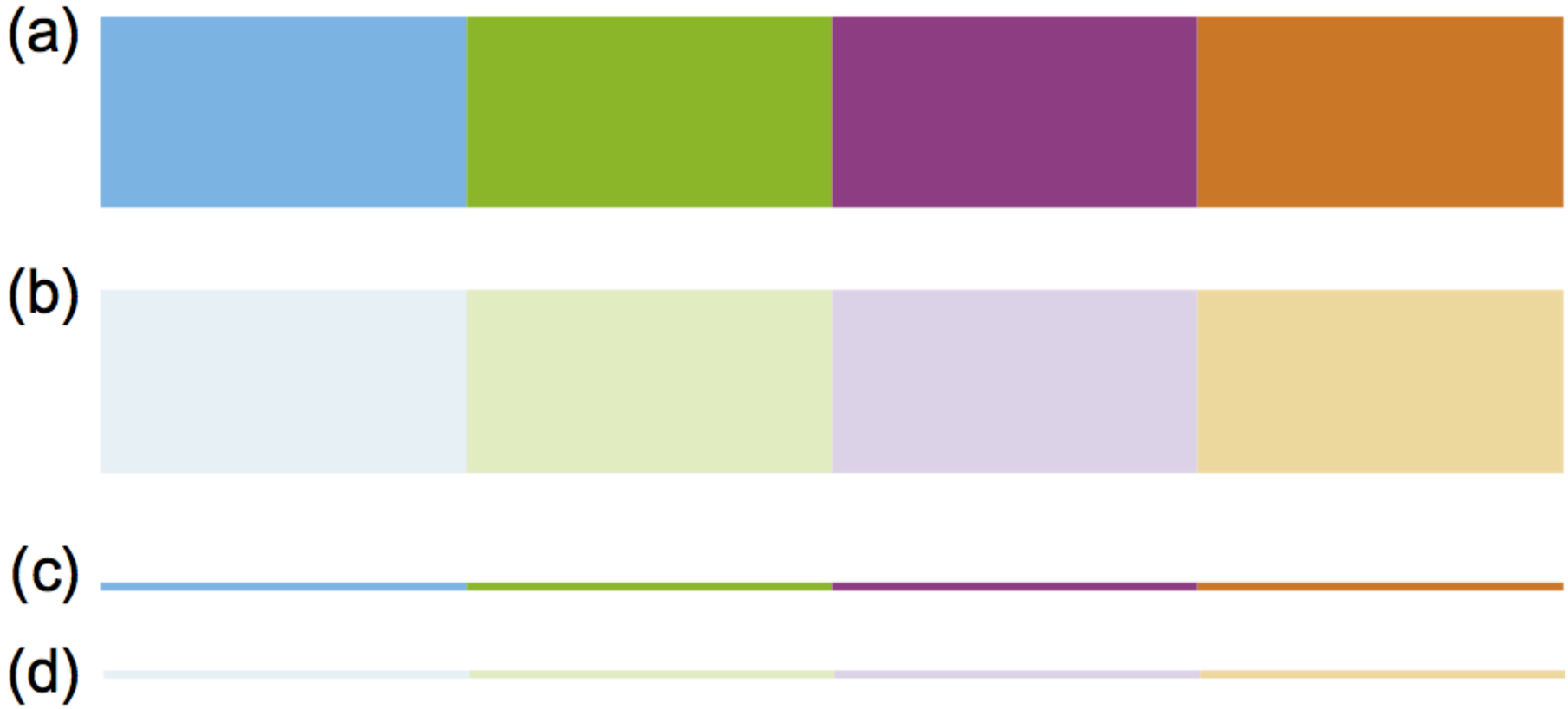
There is insufficient luminance contrast.



"For small regions, designers should use bright, highly saturated colors to ensure that the color coding is distinguishable. When colored regions are large, as in backgrounds, the design guideline is the opposite: use low-saturation colors; that is, pastels."


HOKKAIDO
JAPAN
BASIN
JAPAN SEA
YAMATO
RIDGE
YAMATO
BASIN


VLADIVOSTOK
JAPAN
BASIN
HOKKAIDO
MURORAN
JAPAN SEA
YAMATO
RIDGE
YAMATO
BASIN
KURILE TRENCH


(a)
(b)
(c)
(d)

Color

→ Color Encoding

→ Hue

→ Saturation

→ Luminance

→ Color Map

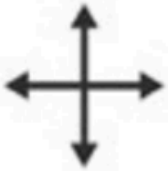
→ Categorical

→ Ordered

→ *Sequential*

→ *Diverging*

→ Bivariate



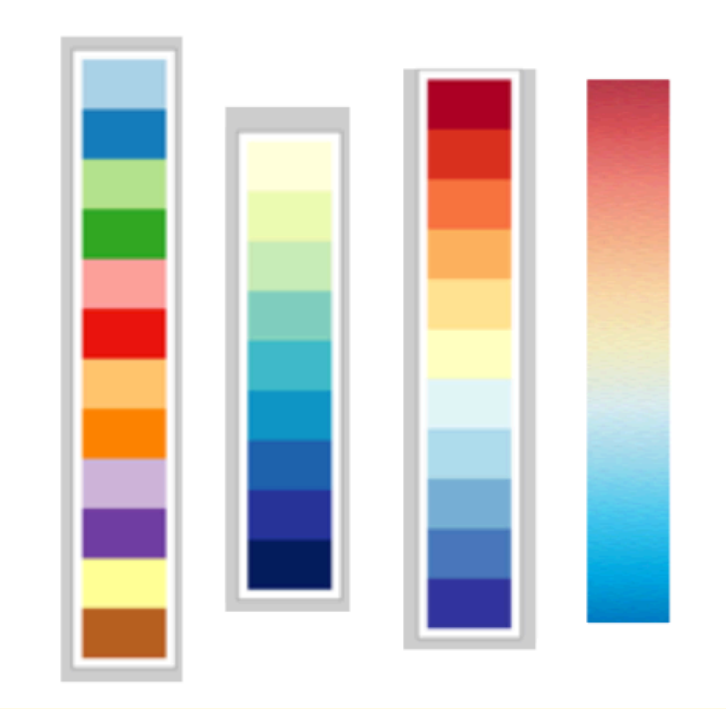
Colormaps

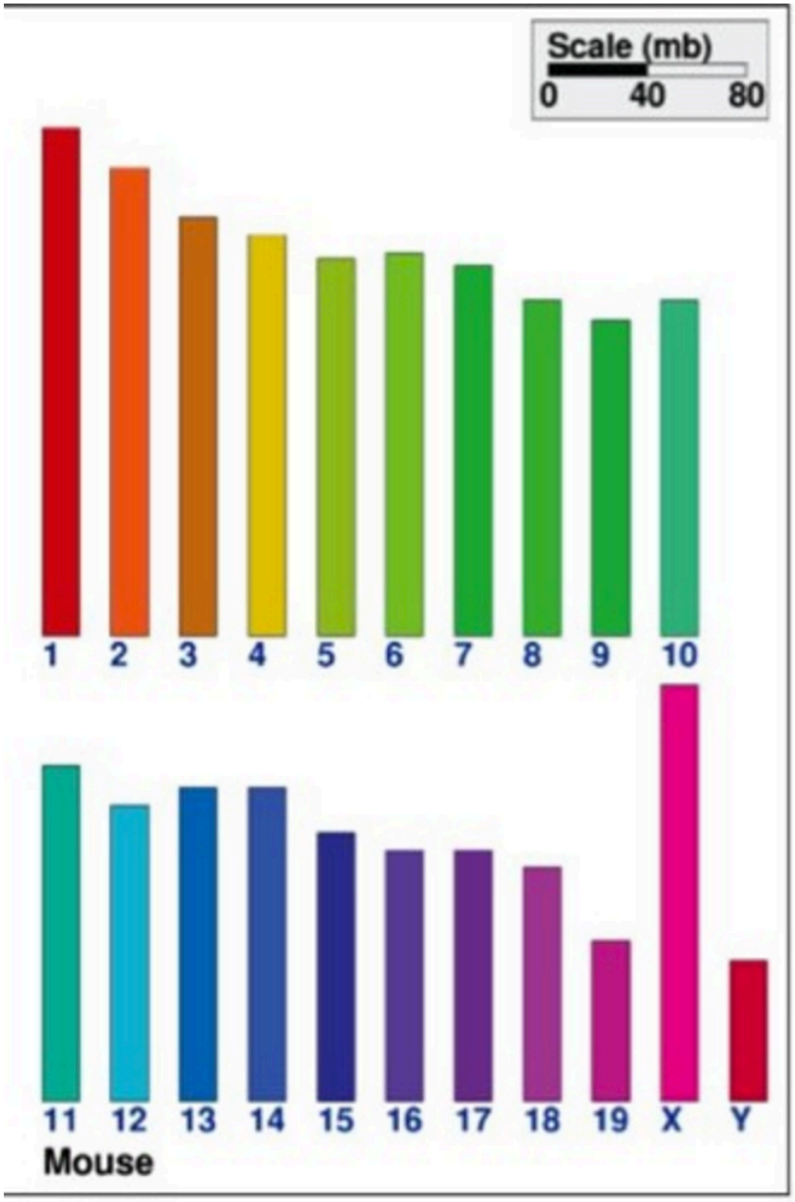
A colormap *maps* a value to a color

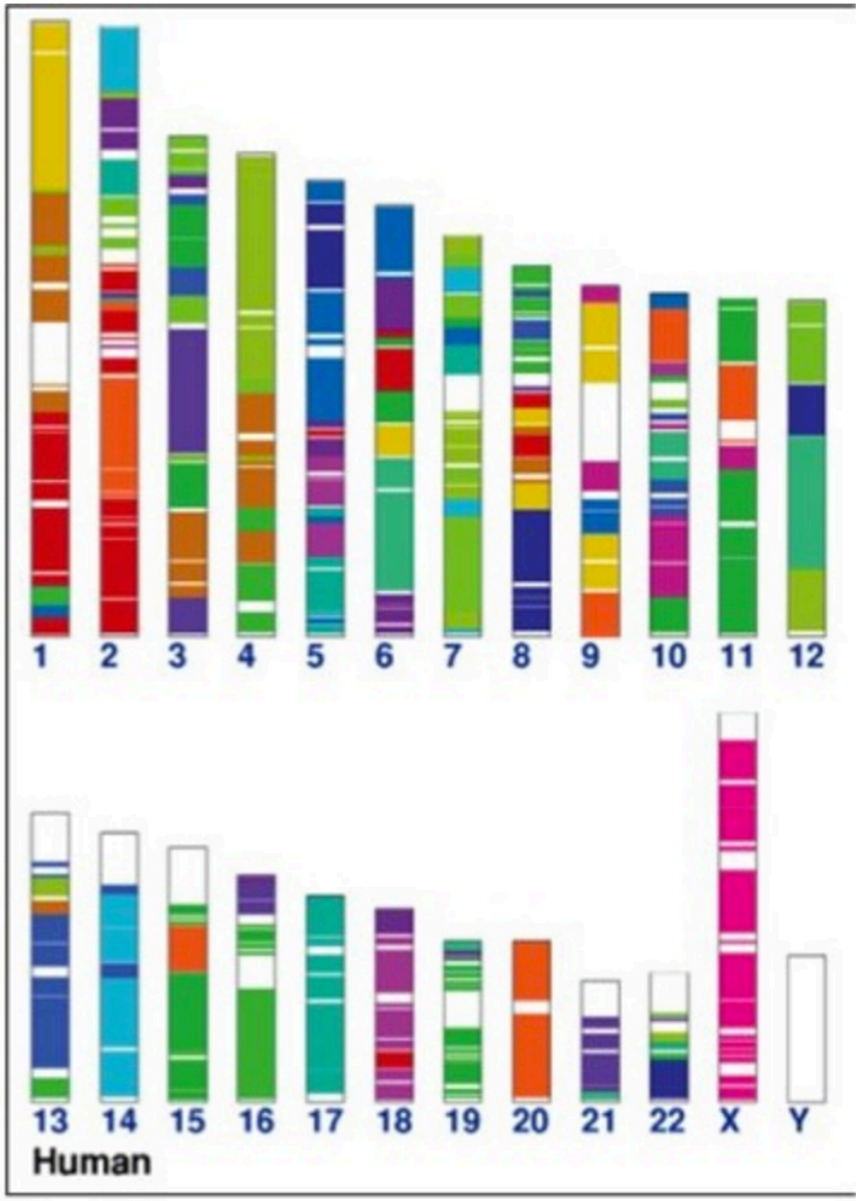
- categorical vs. ordered

if *ordered*:

- sequential vs. diverging
- continuous vs. segmented




Scale (mb)
0
40
80
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
X
Y
Mouse

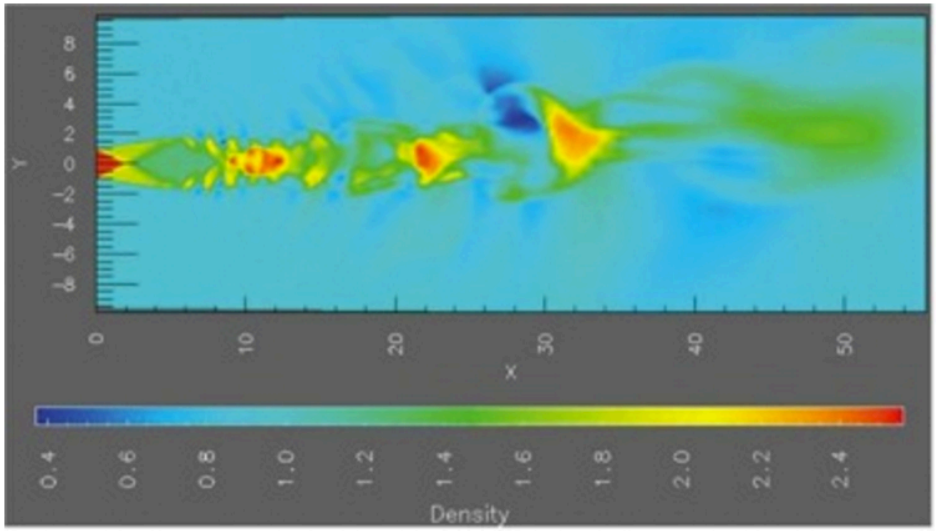

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
X
Y
Human

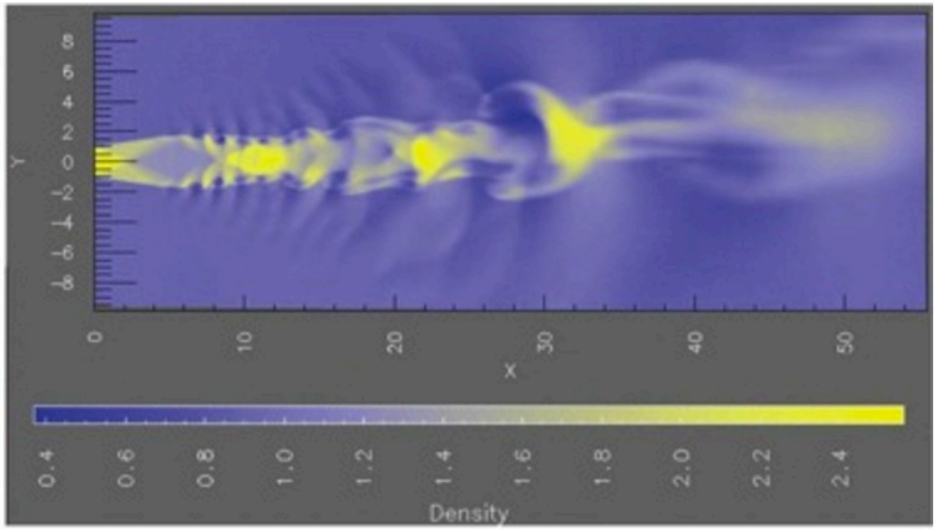
Discriminability Mismatch

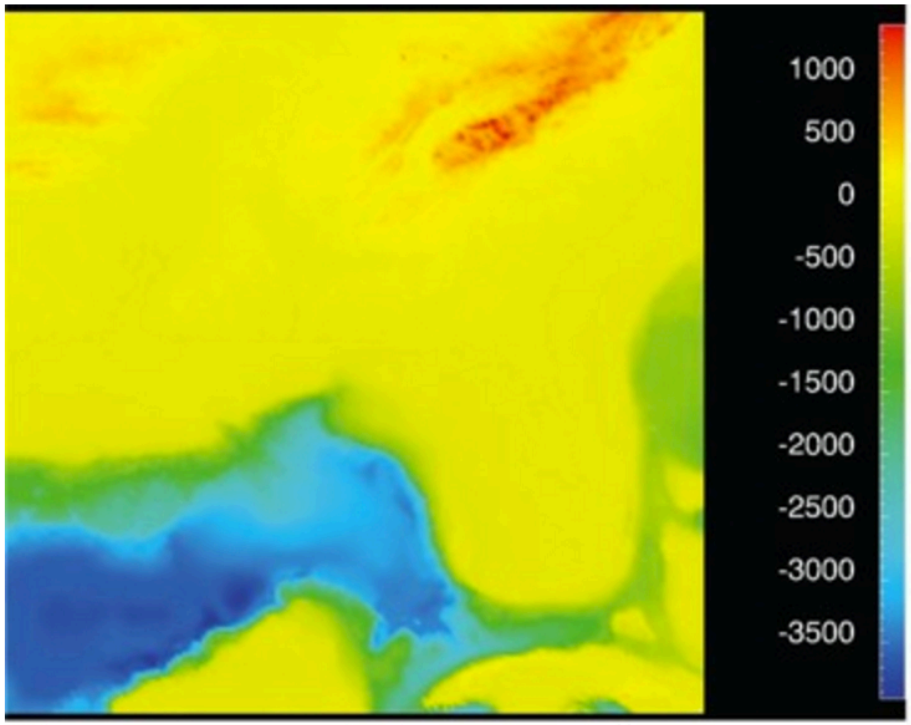
"One choice is to **reduce the number of bins** explicitly through a deliberate data transformation that takes into account the nature of the data and task, so that each bin can be encoded with a distinguishable color. [...]

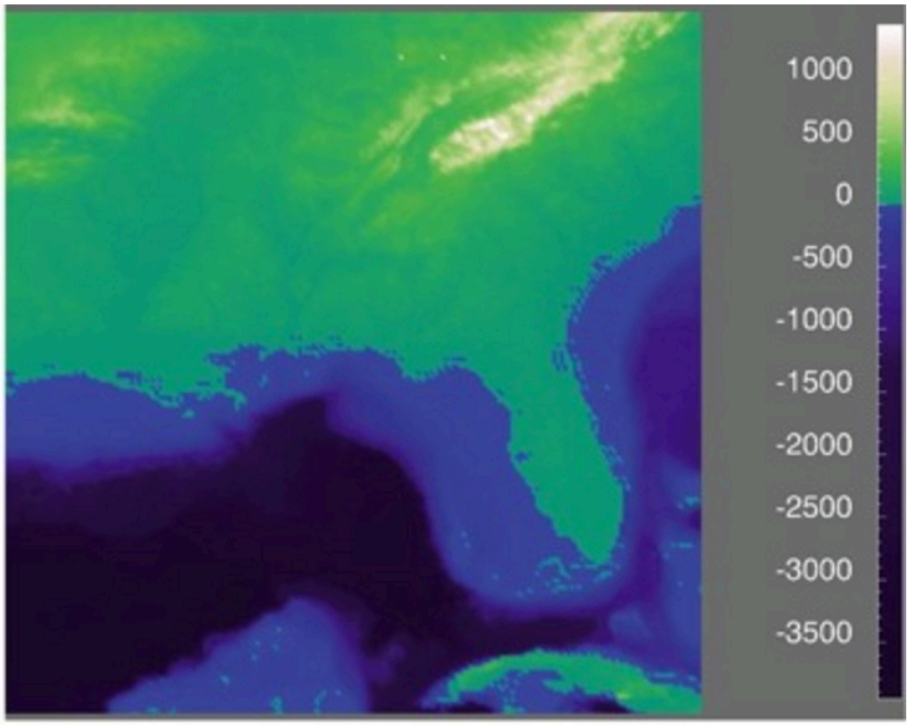
"Another possibility is to filter the attributes to only **encode a small set of the most important ones with color**, and aggregate all of the rest into a new category of other.

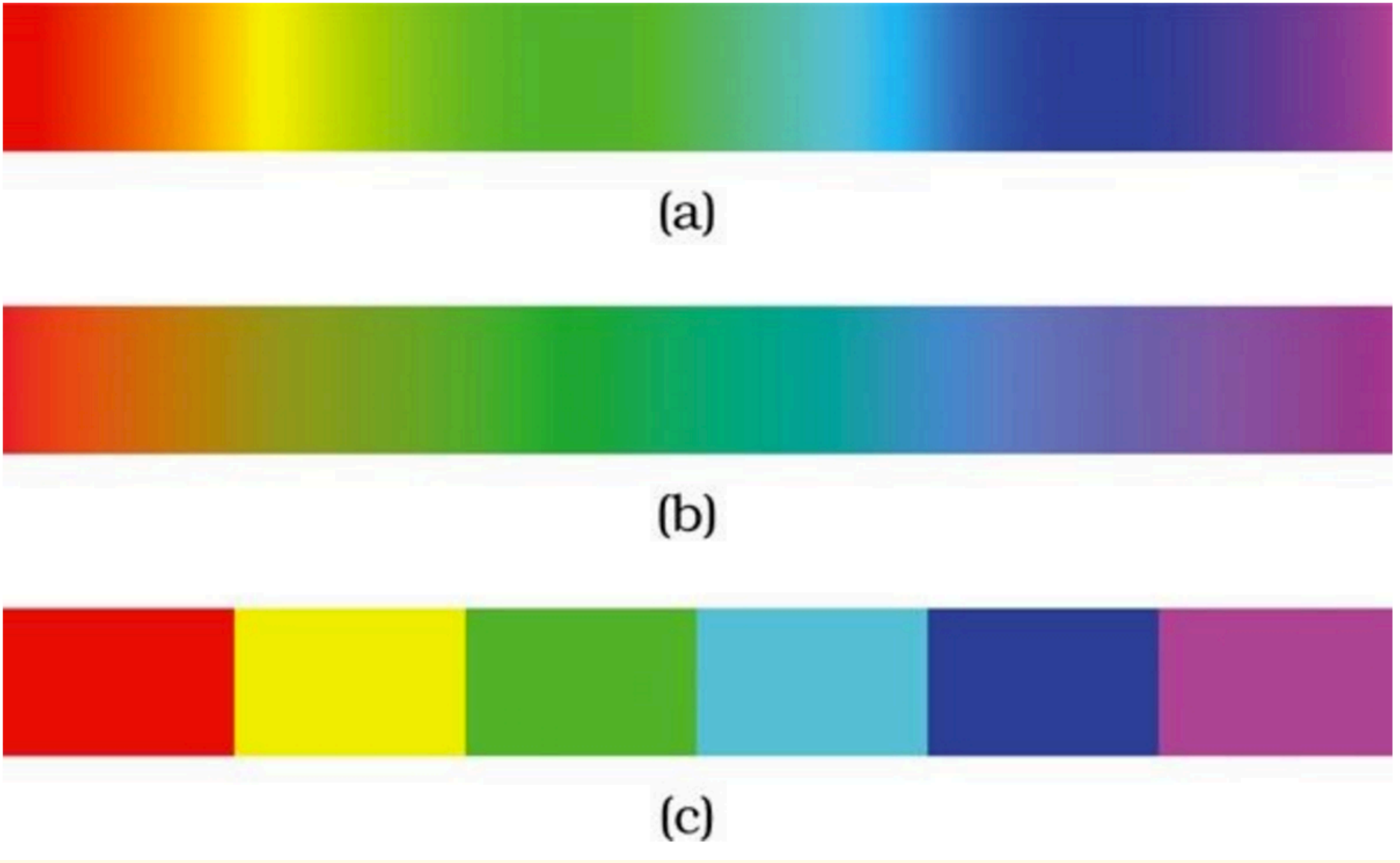
"The other choice is to use a **different visual encoding idiom** that uses other visual channels instead of, or in addition to, the color channel alone."


Y
8
6
4
2
0
-2
-4
-6
-8
0
10
20
30
40
50
X
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
2.2
2.4
Density


Y
8
6
4
2
0
-2
-4
-6
-8
0
10
20
30
40
50
X
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
2.2
2.4
Density


1000
500
0
-500
-1000
-1500
-2000
-2500
-3000
-3500


1000
500
0
-500
-1000
-1500
-2000
-2500
-3000
-3500


(a)
(b)
(c)

Homework:

- Tuesday: Coding assignment complete – Due Monday at 11:59pm

- Tuesday: Quiz on Chapters 9 & 10 and anything we've talked about this semester

- I will post the instructions for the final Project 2 package this weekend