PROJECTED COORDINATE SYSTEMS

Introduction to GIS| Winter 2015

- Cartography = Science + Art
- Cartography = Make maps that people want to look at

Cartography

- What can a map show us?
- Words can be part of the art to illustrate our point of view

THE WORLD ACCORDING TO AMERICANS 2012

from Yanko Tsvetkov's Atlas of Prejudice
www.alphadesigner.com

SEATTLE

neighborhoods on Twitter

BROOKLYN

Cartography

- Older maps were hand-drawn
- Additional conclusions can be drawn depending on who drew the map

Why do Cartographers make maps?

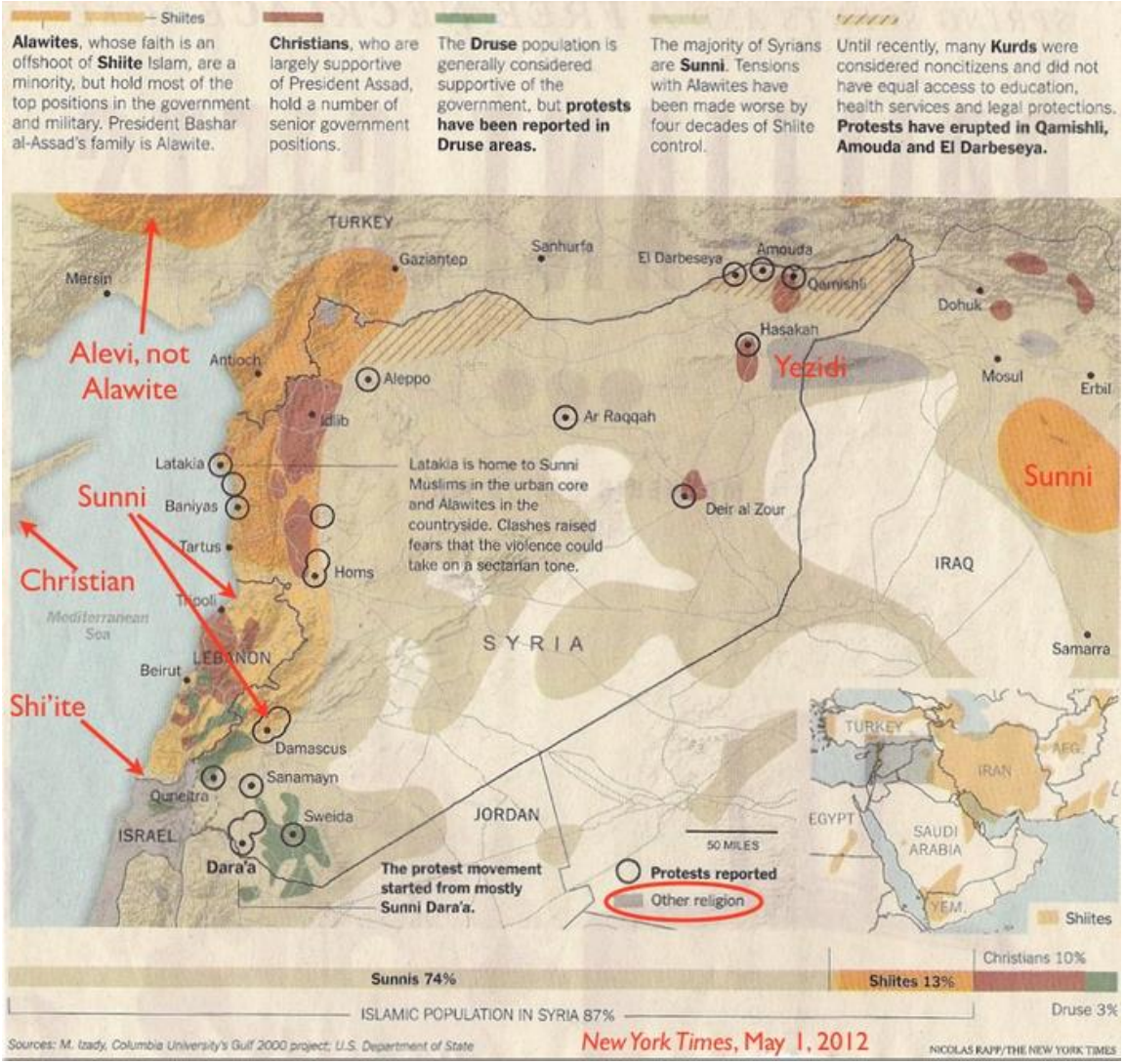
- Spatial visualization – as opposed to charts, graphs, tables
- Communicate information to others
- Synthesize layers of information
- Explore, query, and analyze information
- Used to generate hypotheses or questions
- Inform decision making

Cartographer "Code of Ethics"

- Each Map should have a defining **purpose or goal**
- Know your **audience;** pay attention to differing **cultural values** and principles

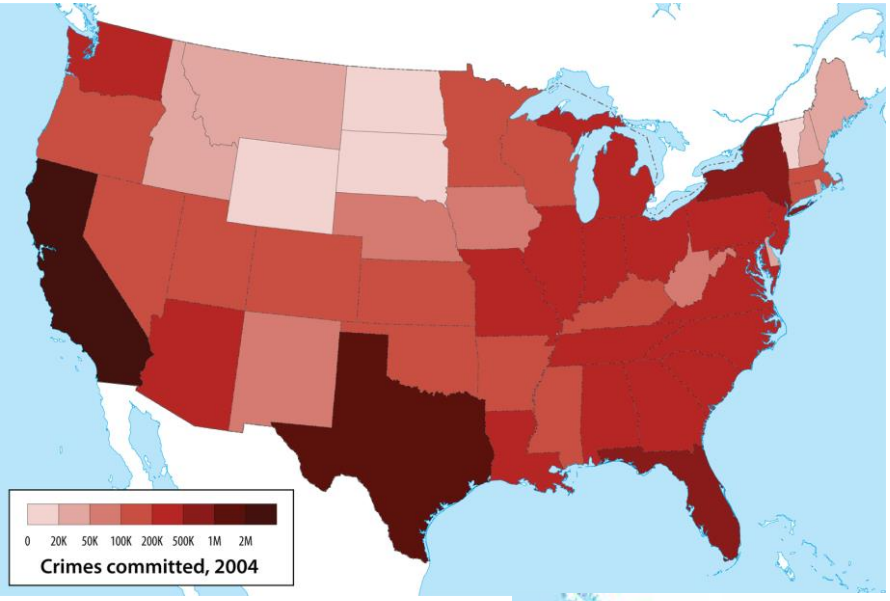
Cultural Diversity Map of Syria, May 2011

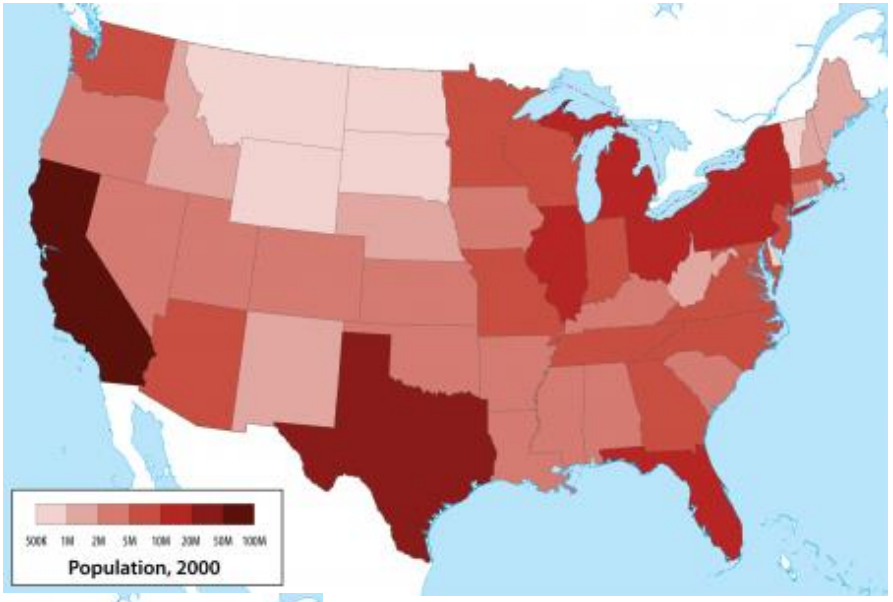
- Who is the audience?
- Why was this map in the NYT in early May 2011?
- Was the Cartographer knowledgeable enough about the Middle East?

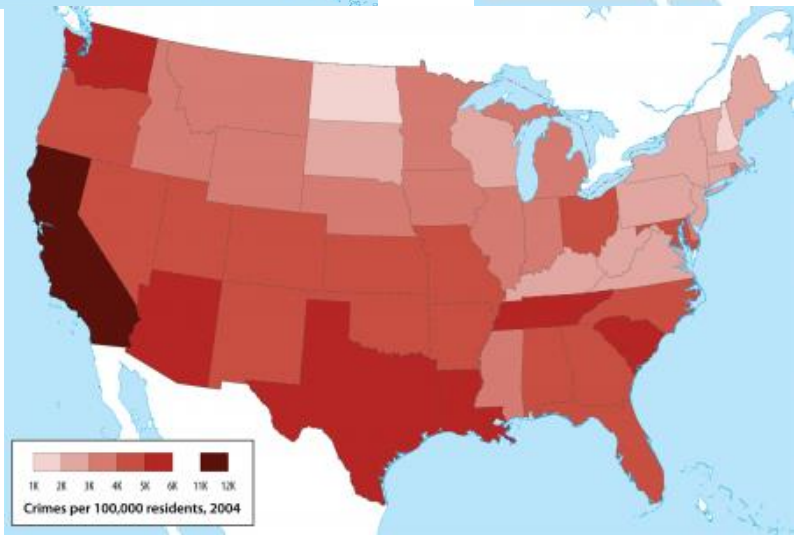


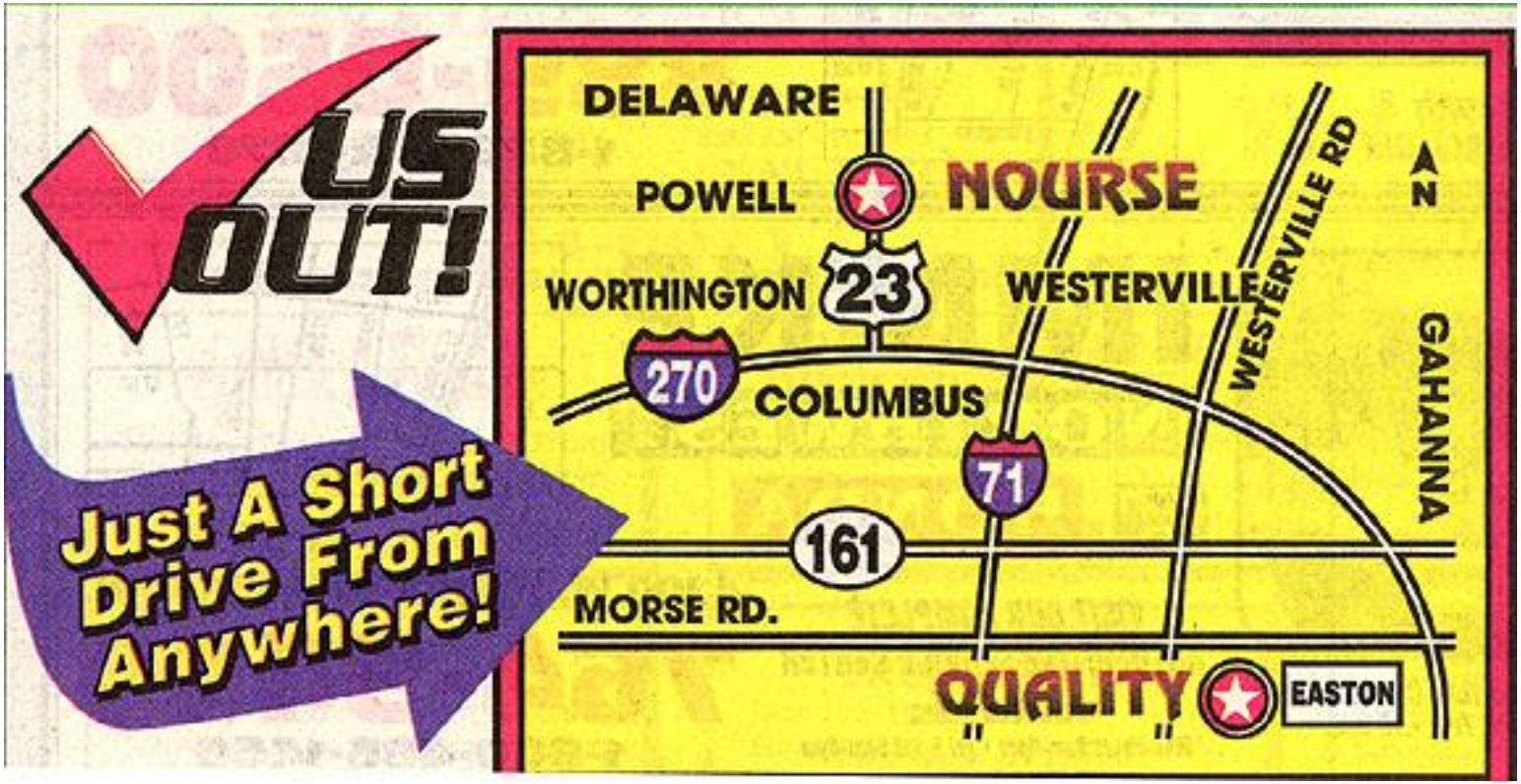
Cartographer "Code of Ethics"

- **Do not intentionally lie with data…**
  - Show **all relevant data**; don't discard data simply because they oppose your position
  - Strive for **accurate portrayal** of the data at all scales; don't select symbols that bias the map interpretation
  - **Avoid plagiarizing**; report all data sources
- Is your map **repeatable** by other cartographers?
- Sometimes these codes are not so well defined…


0 20K 50K 100K 200K 500K 1M 2M
Crimes committed, 2004


500K 1M 2M 5M 10M 20M 50M 100M
Population, 2000


1K 2K 3K 4K 5K 6K 11K 12K
Crimes per 100,000 residents, 2004


US OUT!
Just A Short Drive From Anywhere!
DELAWARE
POWELL
NOURSE
WORTHINGTON
23
WESTERVILLE
WESTERVILLE RD
N
GAHANNA
270
COLUMBUS
71
161
MORSE RD.
QUALITY
EASTON

Propaganda

Camarades!

Telle est la situation!
En tout cas, la guerre est finie pour vous!
Vos chefs vont s'enfuir par avion.
A bas les armes!

British Soldiers!

Look at this map: it gives your true situation!
Your troops are entirely surrounded —
stop fighting!
Put down your arms!

Map Symbology

Map Symbols

"Cartography is about representation"

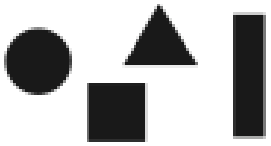
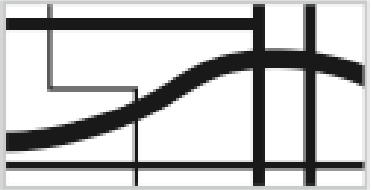
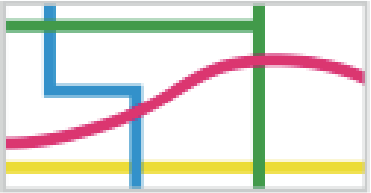
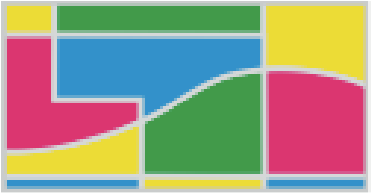
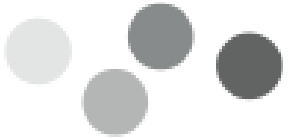
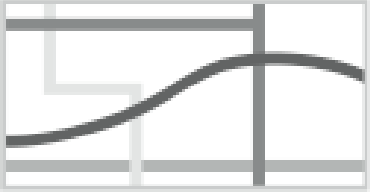
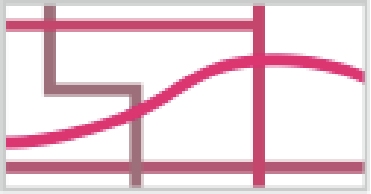
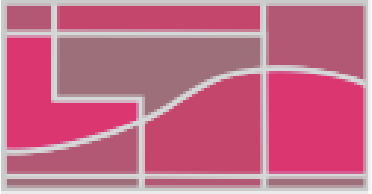
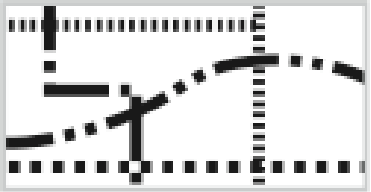
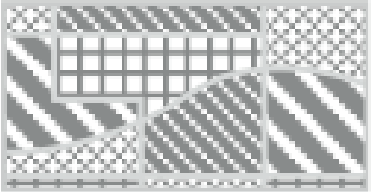
Alan M. MacEachren, How Maps Works

Map symbols

- Symbols are the graphic language of maps
- Selecting and designing symbols are a major part of creating a successful map

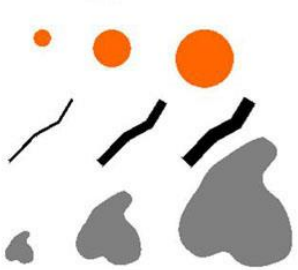
Map symbol properties

- Shape
- Size
- Color
  - Hue
  - Value (tone, saturation)
- Texture
- Orientation

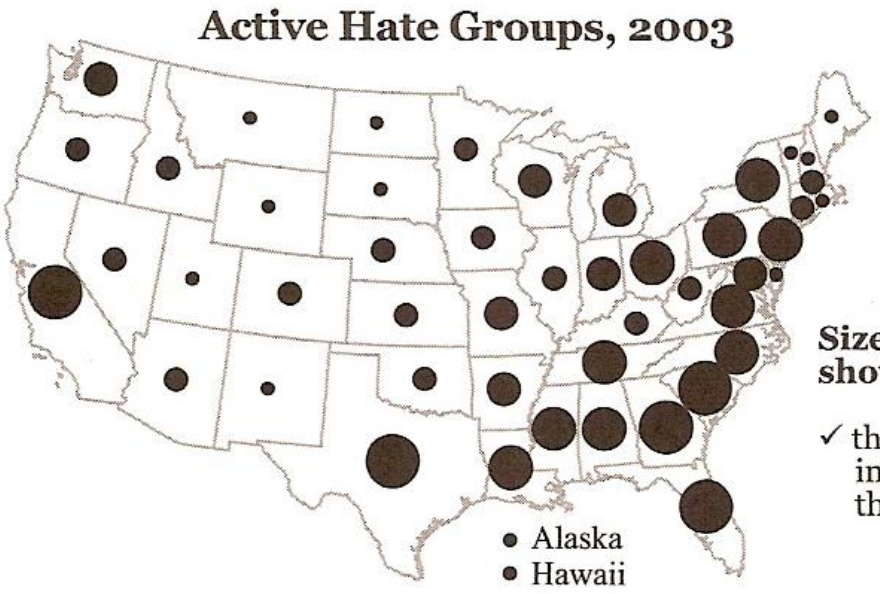
	Points	Lines	Areas	Best to show
Shape		*possible, but too weird to show*	*cartogram*	***qualitative differences***
Size			*cartogram*	***quantitative differences***
Color Hue				***qualitative differences***
Color Value				***quantitative differences***
Color Intensity				***qualitative differences***
Texture				***qualitative & quantitative differences***

Size

Size



Good use of size:



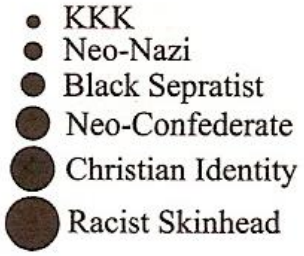
Size is a good choice for showing quantitative data

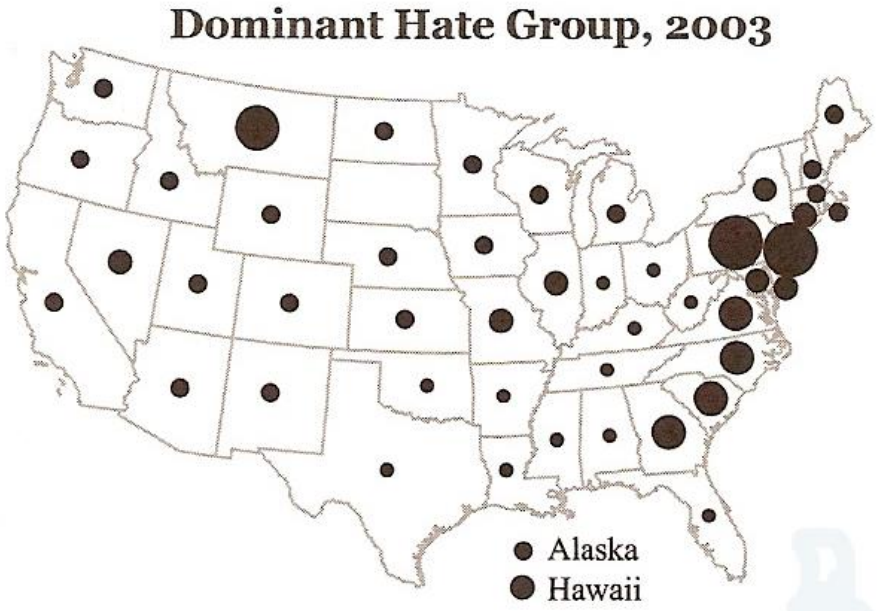
✓ the use of one symbol varying in size parallels the order in the data.

Poor use of size:

Size is a poor choice for showing qualitative data

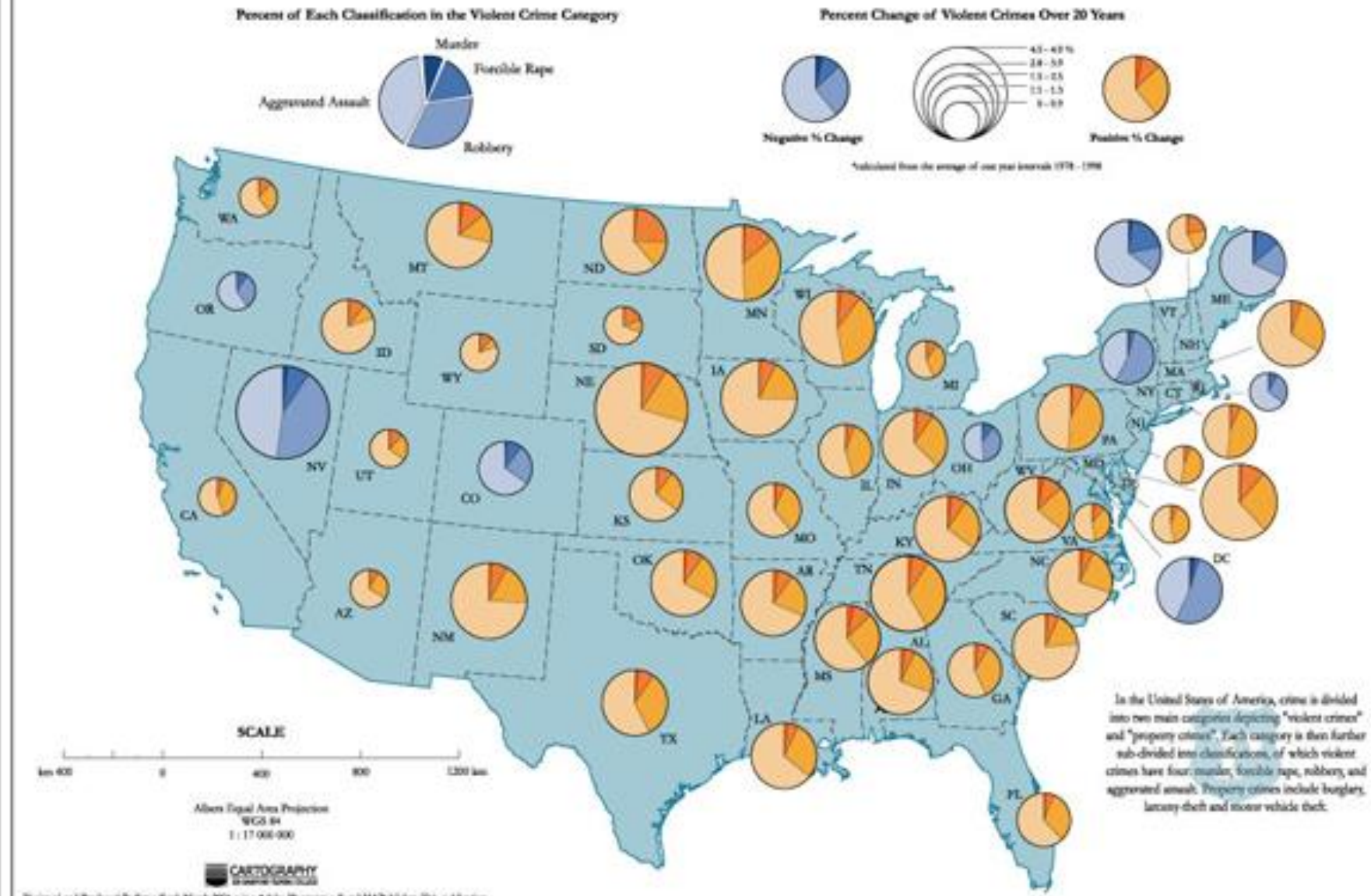
✓ different sizes suggest order in the data, rather than the qualitatively different groups.





VIOLENT CRIMES IN THE USA

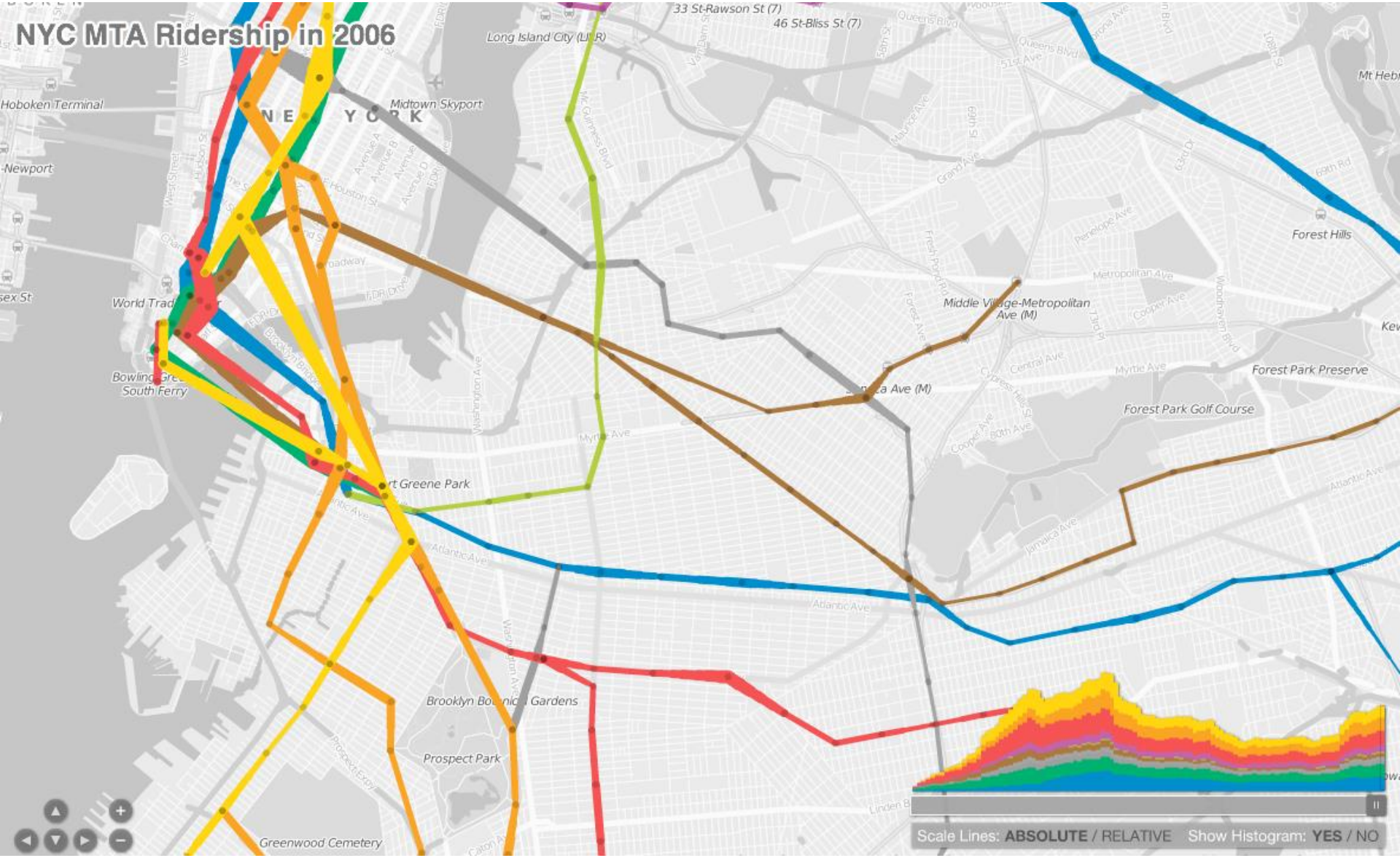
FLUCTUATIONS AND DIVISIONS BY STATE BETWEEN 1978 AND 1998



In the United States of America, crime is divided into two main categories depicting "violent crimes" and "property crimes". Each category is then further sub-divided into classifications, of which violent crimes have four: murder, forcible rape, robbery, and aggravated assault. Property crimes include burglary, larceny-theft and motor vehicle theft.

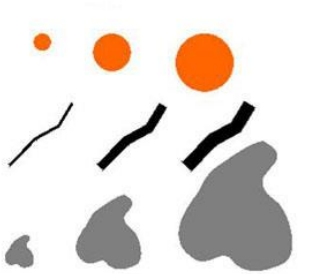
Designed and Produced By Steve Frank, March 2001 using Adobe Illustrator v. 9 and MAPublisher. Non-publication may not be reproduced in any form without written permission from the Cartography Department, School of Environmental and Natural Resource Sciences, Sir Sandford Fleming College, Lindsay, Ontario, Canada.

Sources: Base Map Avenza Software Inc. Data: Bureau of Justice Statistics FBI Uniform Crime Reports, May 1, 2000.

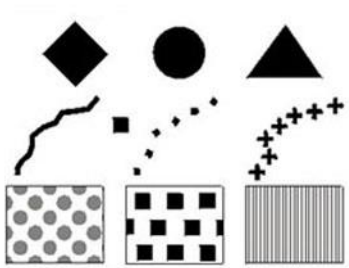

NYC MTA Ridership in 2006
33 St-Rawson St (7)
46 St-Bliss St (7)
Long Island City (LIRR)
Hoboken Terminal
Midtown Skyport
Newport
Forest Hills
Middle Village-Metropolitan Ave (M)
Forest Park Preserve
Forest Park Golf Course
South Ferry
Brooklyn Botanic Gardens
Prospect Park
Greenwood Cemetery
Scale Lines: ABSOLUTE / RELATIVE
Show Histogram: YES / NO

Shape

Size



Shape



Poor use of shape:

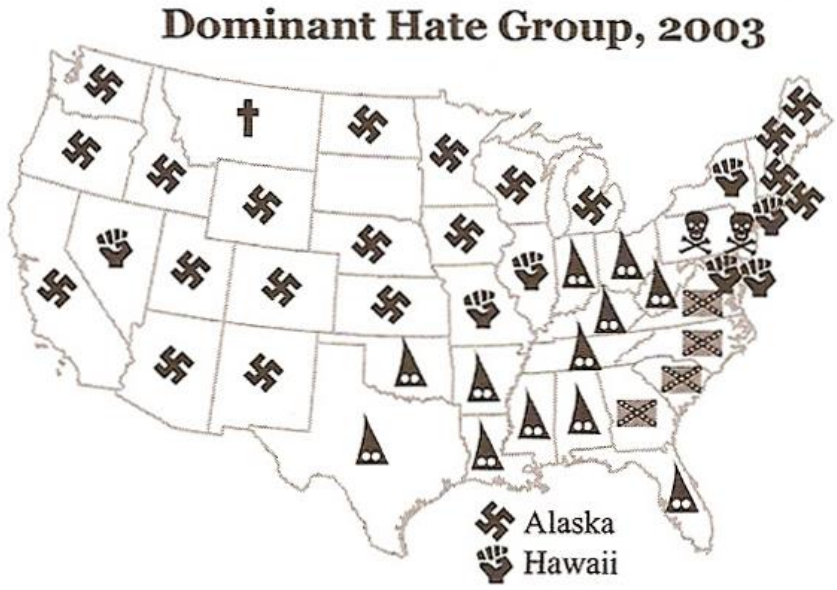
Shape is a poor choice for showing quantitative data

✓ using shape makes it difficult to see the patterns on the map, as the symbols do not suggest the order (low to high) in the data.

Good use of shape:

Shape is a good choice for showing qualitative data

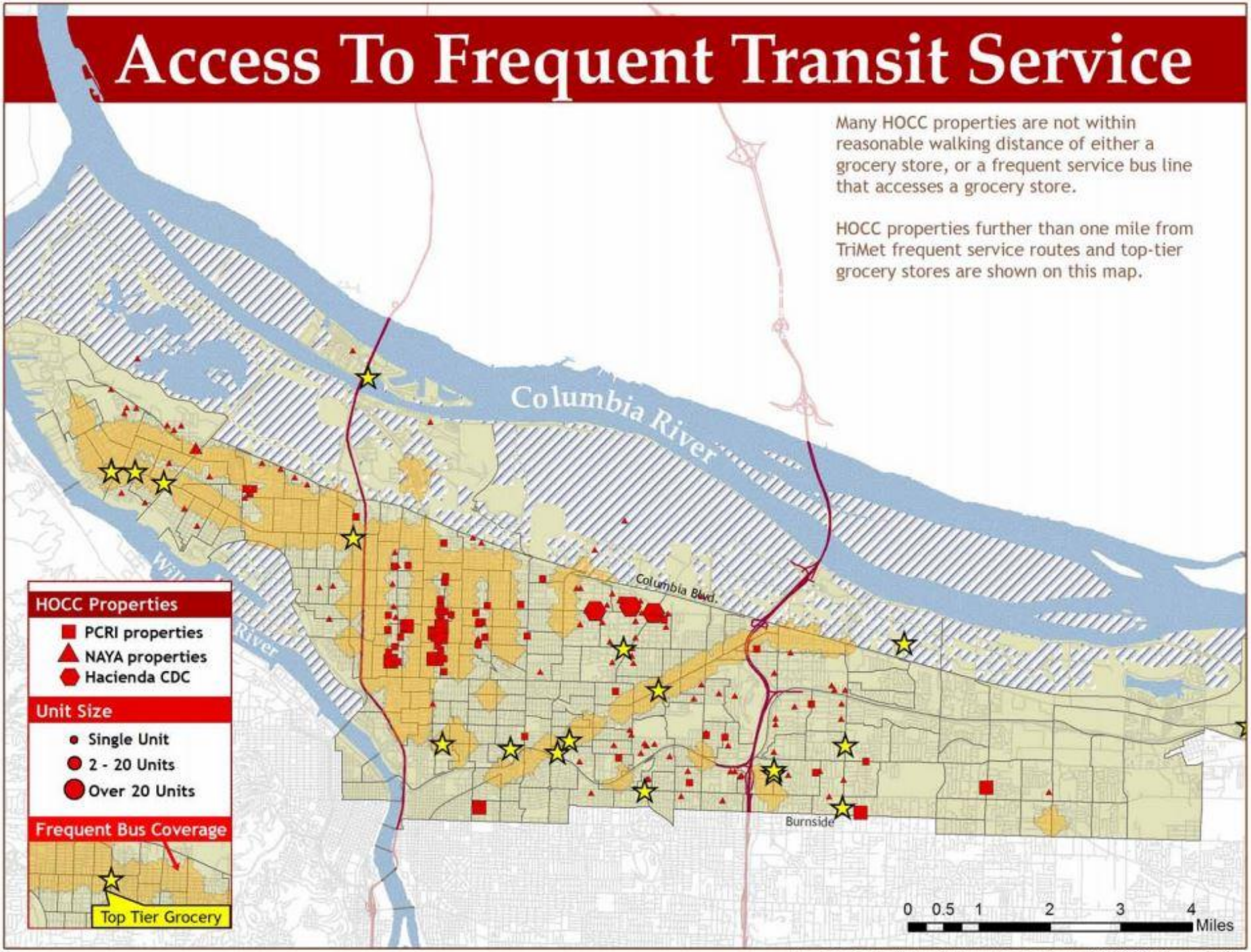
✓ different shapes suggest the qualitatively different groups.



Access To Frequent Transit Service

Many HOCC properties are not within reasonable walking distance of either a grocery store, or a frequent service bus line that accesses a grocery store.

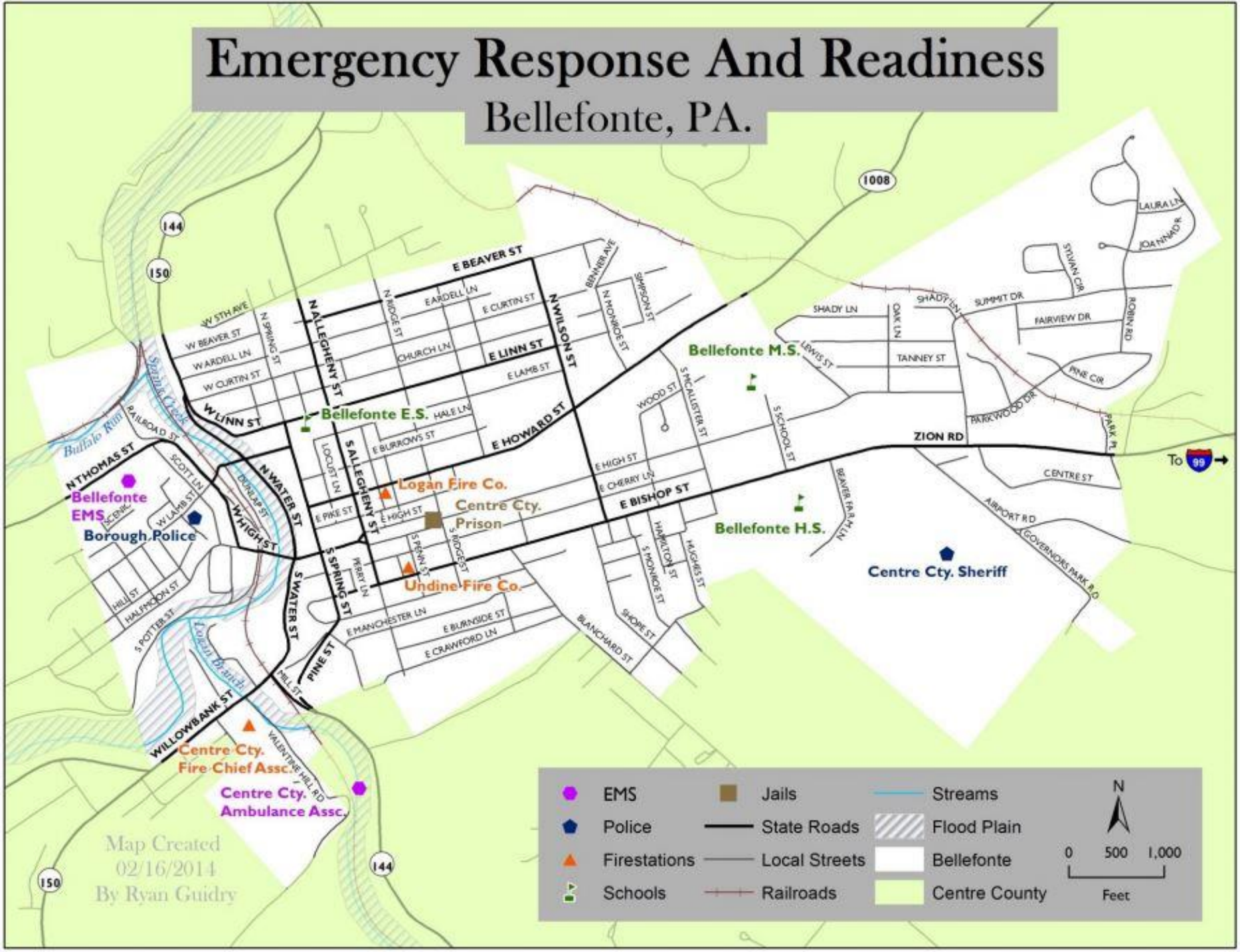
HOCC properties further than one mile from TriMet frequent service routes and top-tier grocery stores are shown on this map.



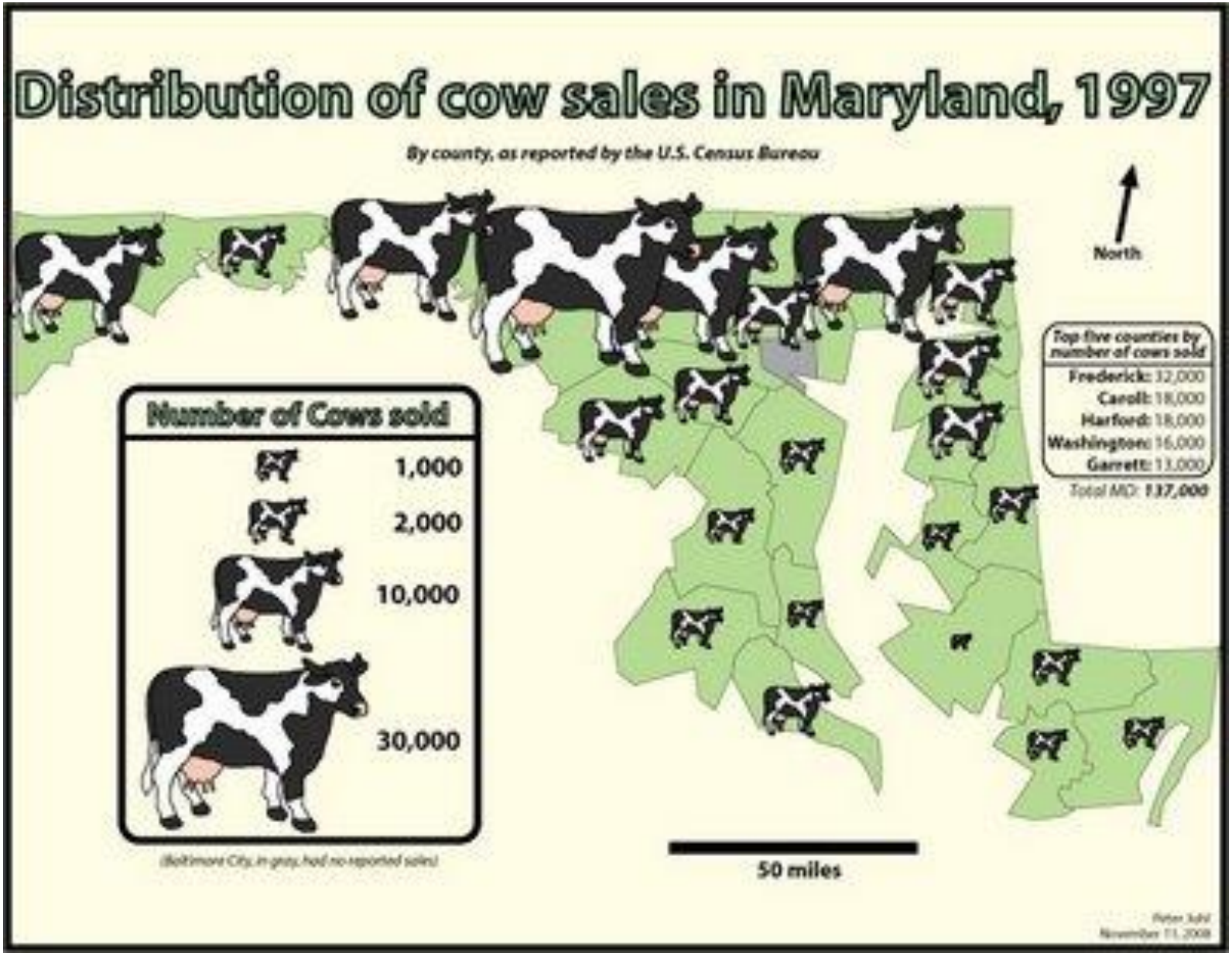
Map data from Metro RLIS and the students of GEO 221 Spring 2011

Emergency Response And Readiness

Bellefonte, PA.

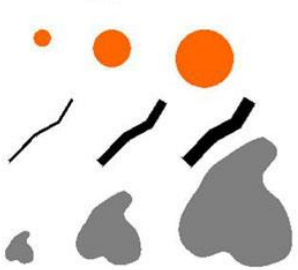


Map Created
02/16/2014
By Ryan Guidry

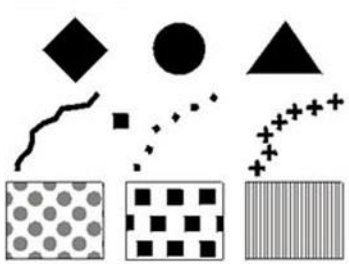

Distribution of cow sales in Maryland, 1997
By county, as reported by the U.S. Census Bureau
North
Top five counties by number of cows sold
Frederick: 32,000
Carroll: 18,000
Harford: 18,000
Washington: 16,000
Garrett: 13,000
Total MD: 137,000
Number of Cows sold
1,000
2,000
10,000
30,000
(Baltimore City, in gray, had no reported sales)
50 miles

Color | hue

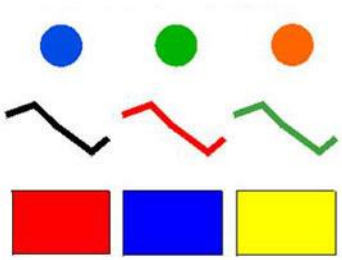
Size



Shape



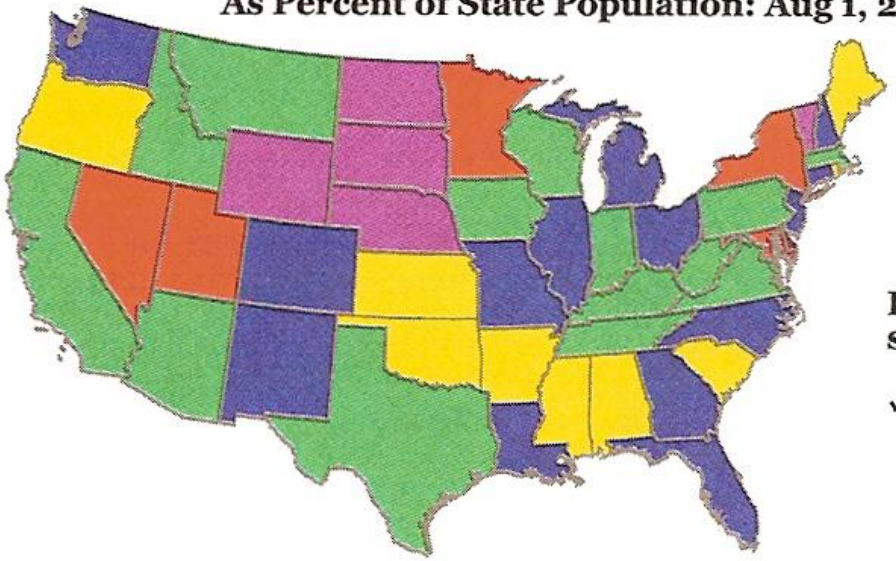
Color (hue)



Poor use of color hue:

Iraq War Casualties

As Percent of State Population: Aug 1, 2004



0.0000060% - 0.0000150%
0.0000042% - 0.0000059%
0.0000031% - 0.0000041%
0.0000021% - 0.0000030%
0.0000008% - 0.0000020%

Hue is a poor choice for showing quantitative data

✓ using hue makes it difficult to see the patterns on the map, as the colors do not suggest the order (low to high) in the data.

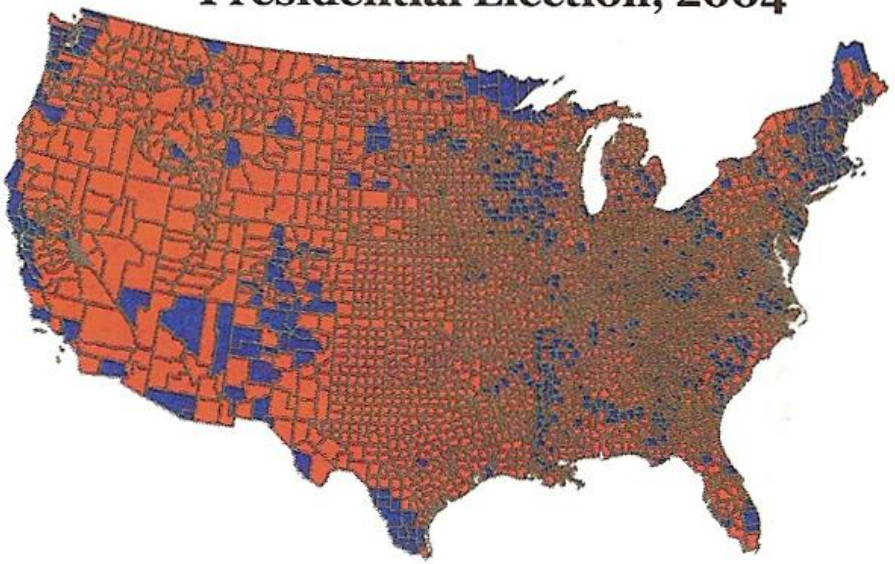
Good use of color hue:

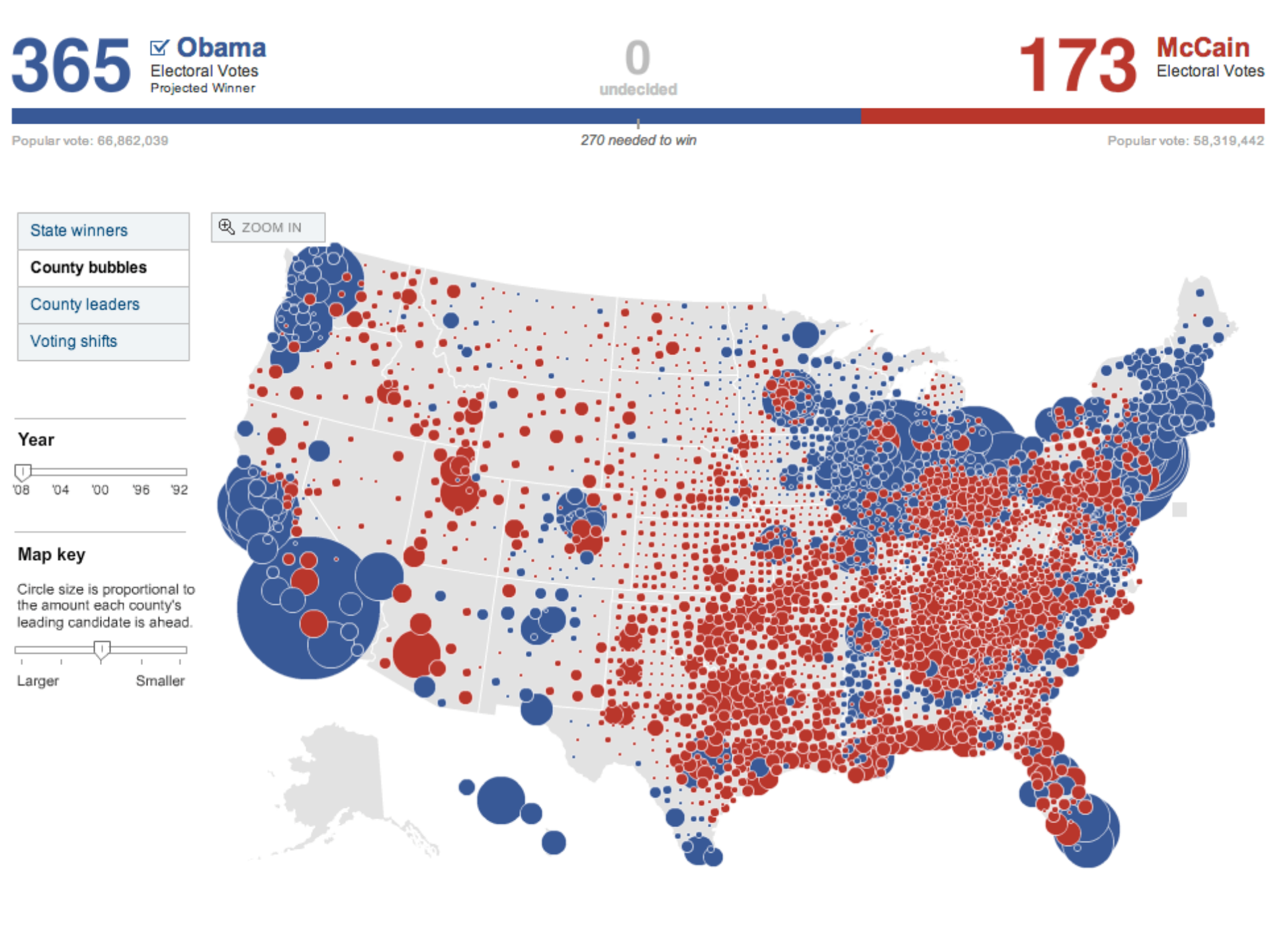
Color hue is a good choice for showing qualitative data

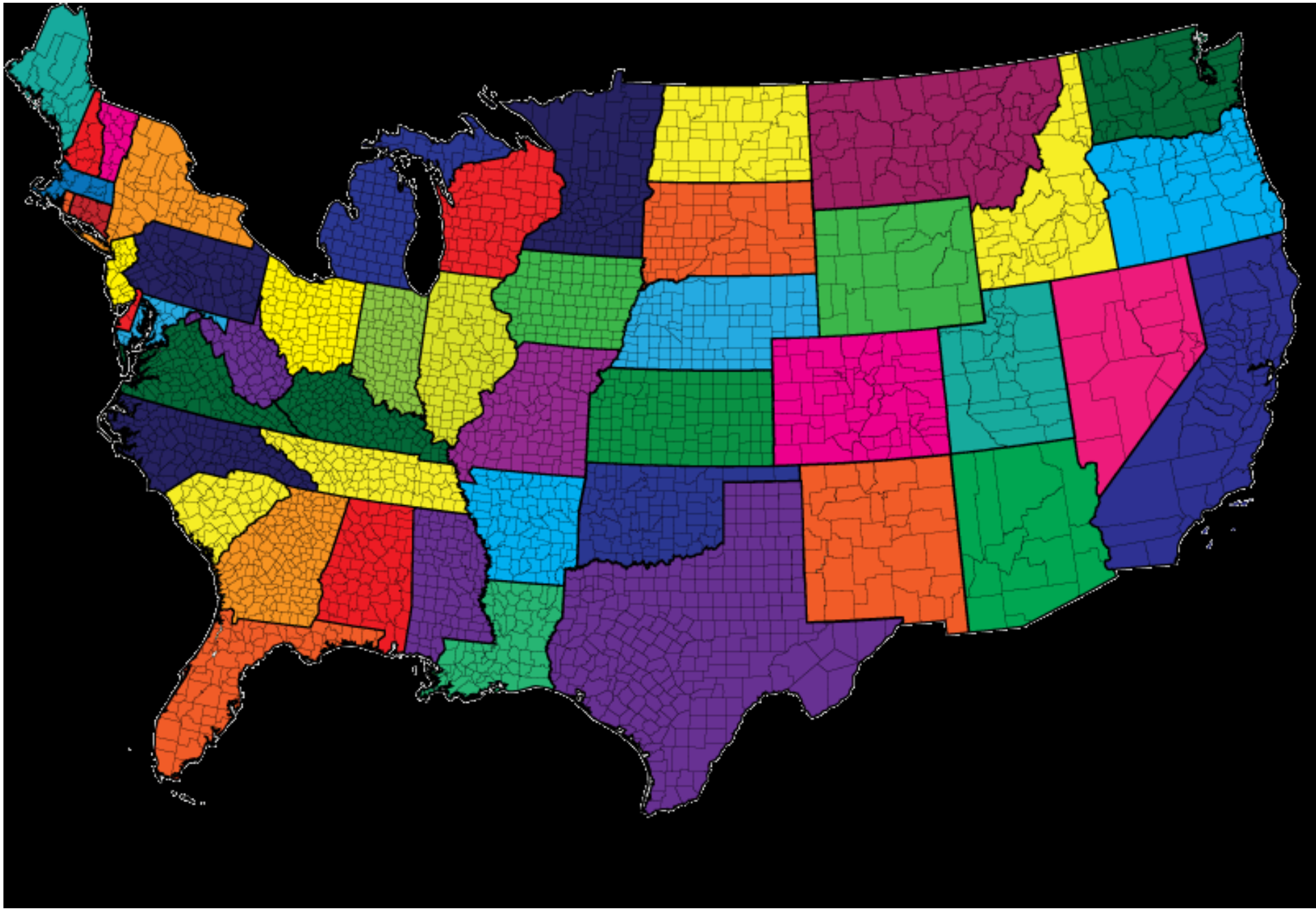
✓ qualitatively different hues parallel the qualitatively different data.

Bush Win
Kerry Win

Presidential Election, 2004

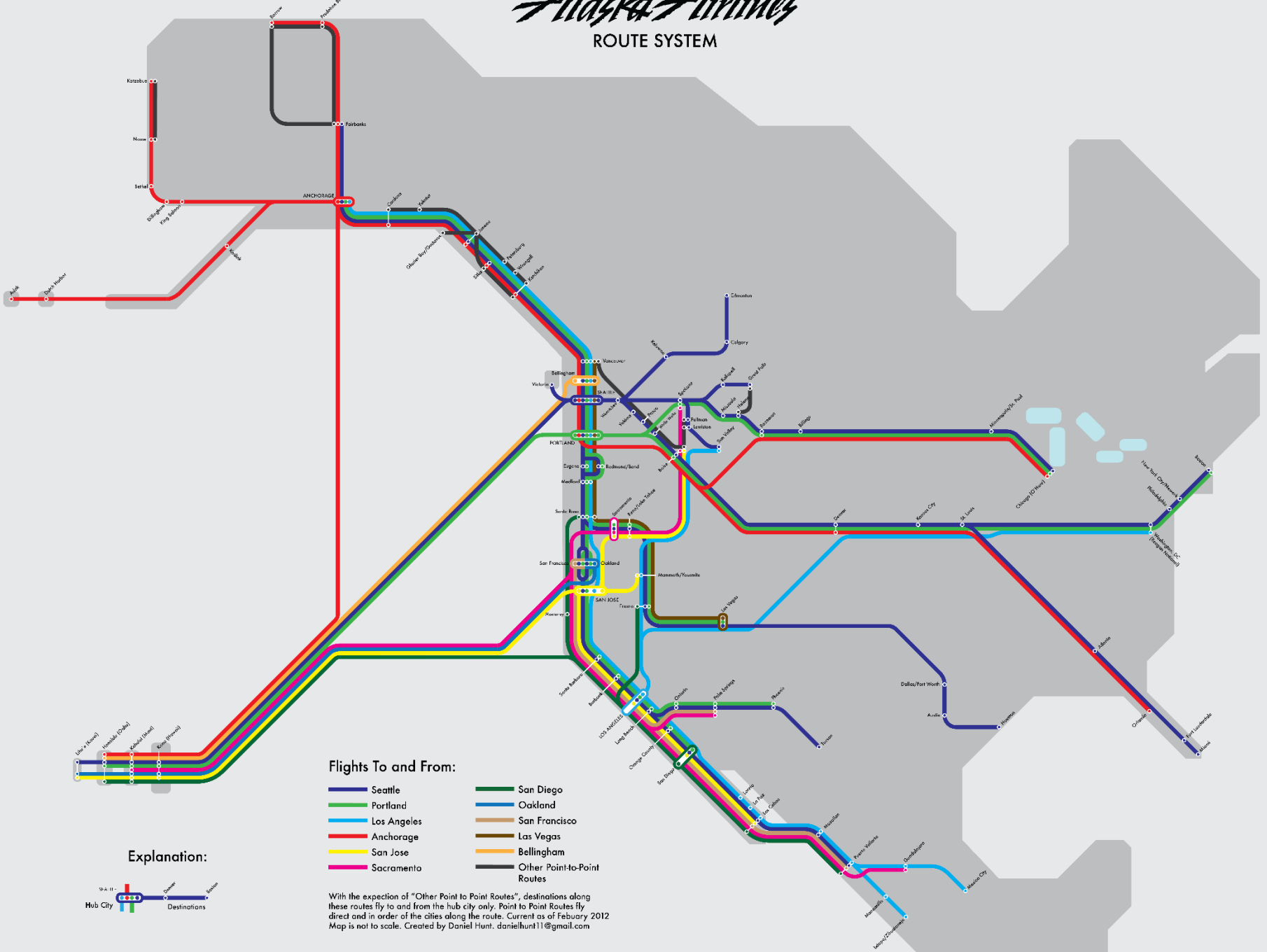



365
Obama
Electoral Votes
Projected Winner
0
undecided
173
McCain
Electoral Votes
Popular vote: 66,862,039
270 needed to win
Popular vote: 58,319,442
State winners
County bubbles
County leaders
Voting shifts
ZOOM IN
Year
'08 '04 '00 '96 '92
Map key
Circle size is proportional to the amount each county's leading candidate is ahead.
Larger
Smaller



Alaska Airlines

ROUTE SYSTEM



Flights To and From:

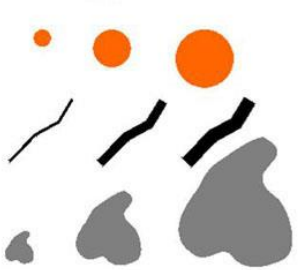
- Seattle
- Portland
- Los Angeles
- Anchorage
- San Jose
- Sacramento
- San Diego
- Oakland
- San Francisco
- Las Vegas
- Bellingham
- Other Point-to-Point Routes

Explanation:

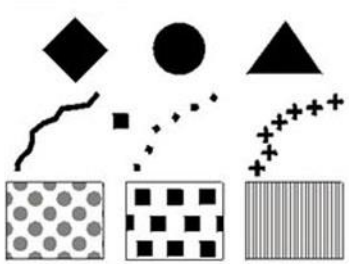
With the expection of "Other Point to Point Routes", destinations along these routes fly to and from the hub city only. Point to Point Routes fly direct and in order of the cities along the route. Current as of Febuary 2012 Map is not to scale. Created by Daniel Hunt. danielhunt11@gmail.com

Color | value

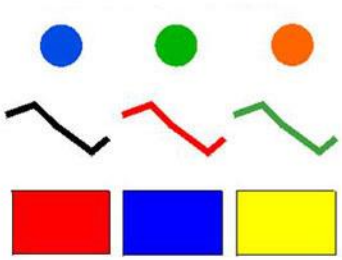
Size



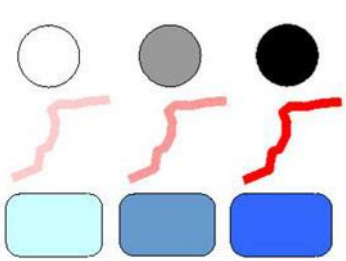
Shape



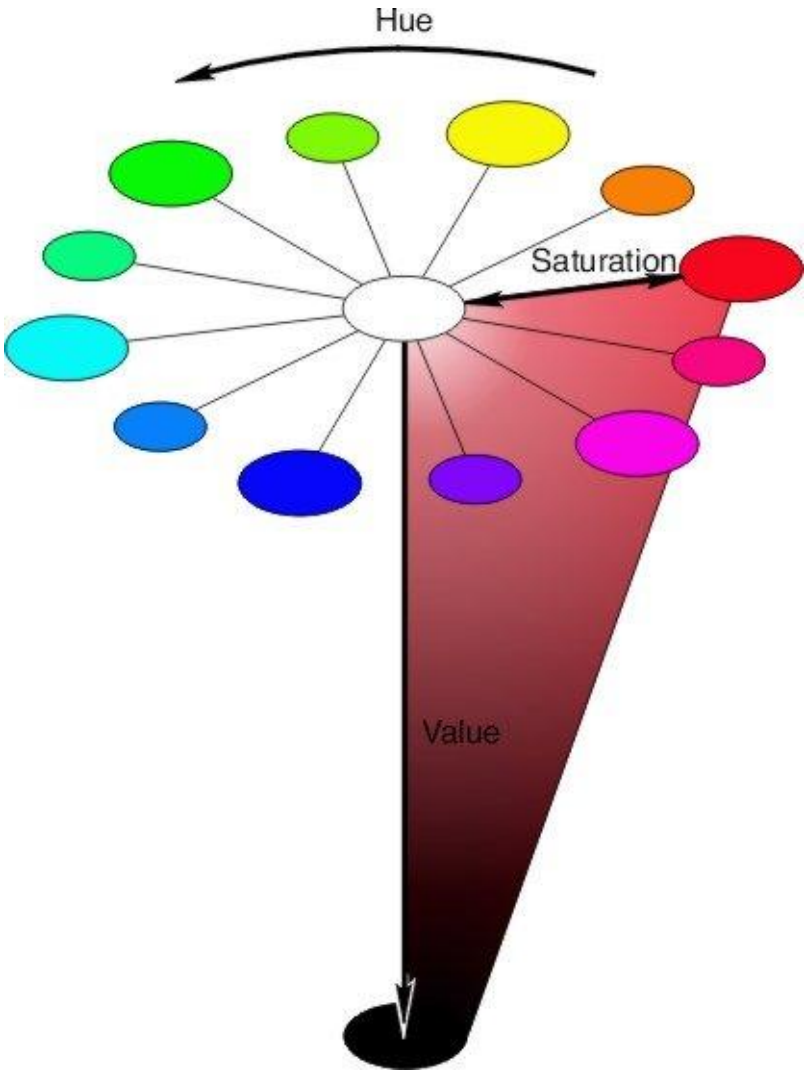
Color (hue)

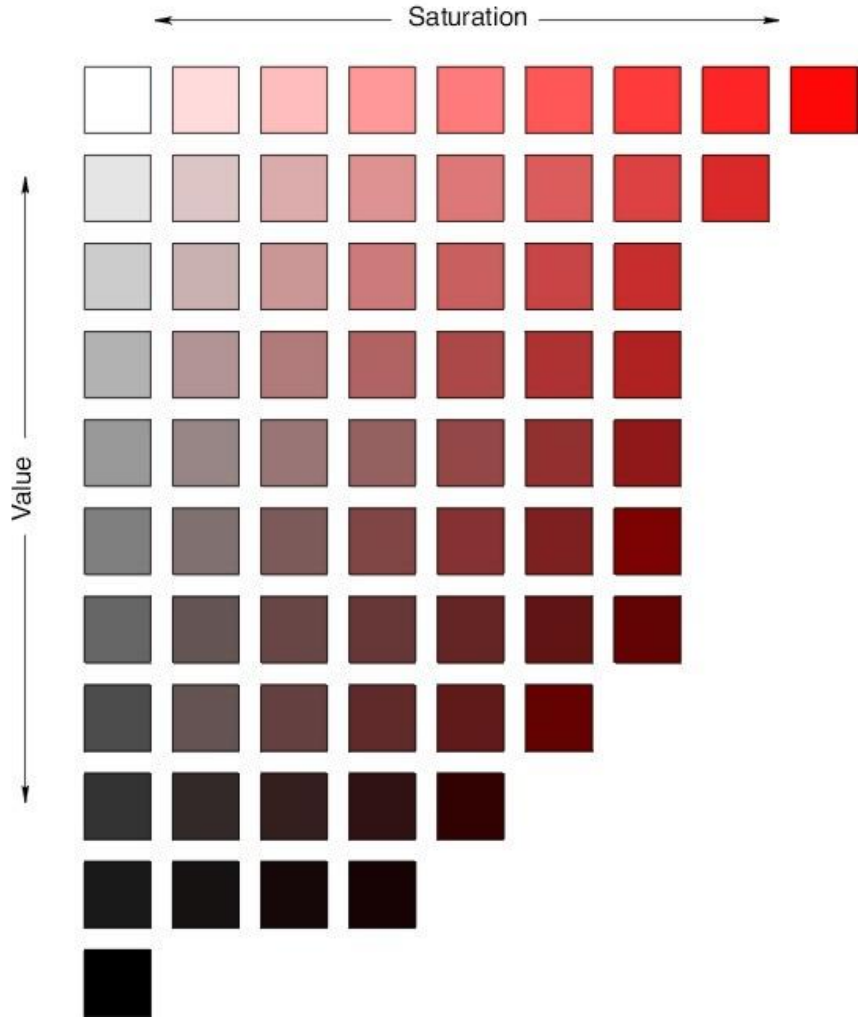


Color (value)



Color | hue, saturation, value

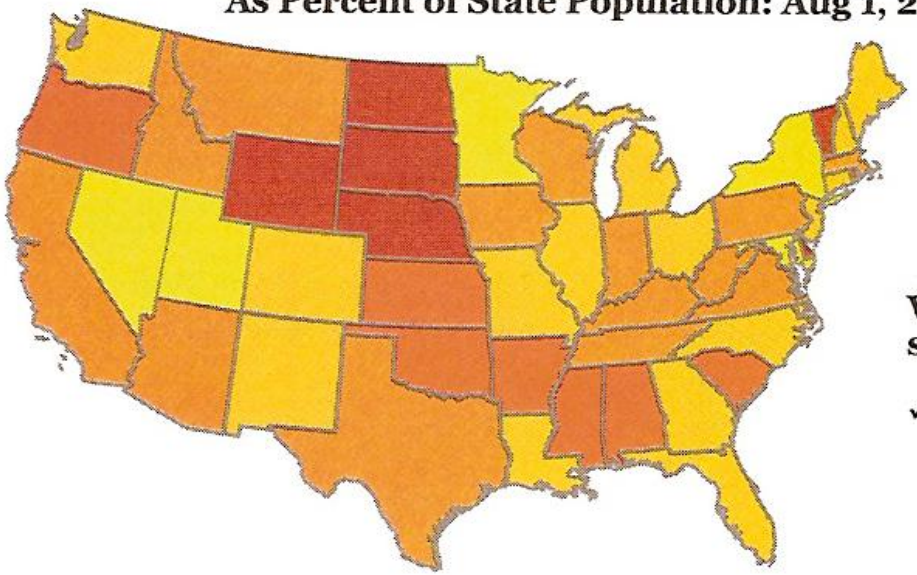




Good use of color value:

Iraq War Casualties

As Percent of State Population: Aug 1, 2004



0.0000060% - 0.0000150%
0.0000042% - 0.0000059%
0.0000031% - 0.0000041%
0.0000021% - 0.0000030%
0.0000008% - 0.0000020%

Value is a good choice for showing quantitative data

✓ the use of one hue varying in value parallels the order in the data.

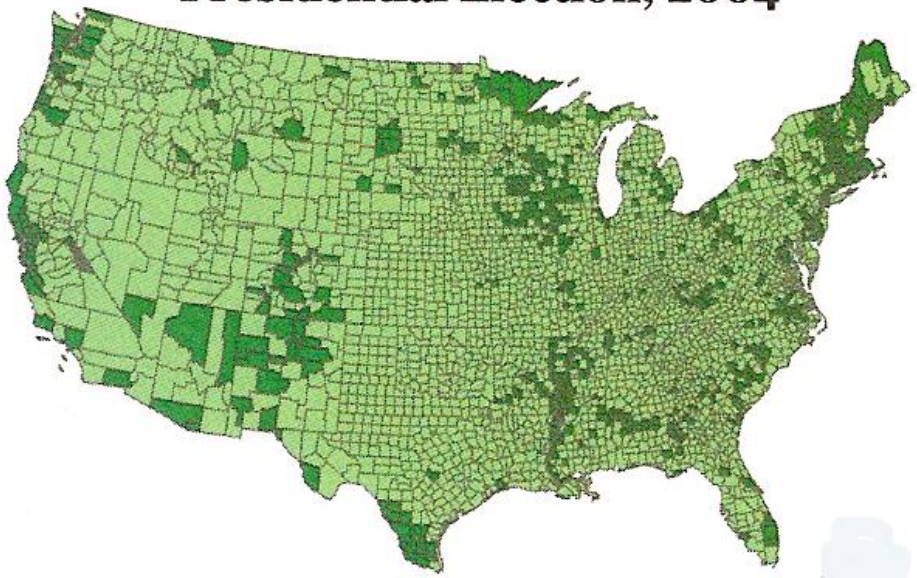
Poor use of color value:

Presidential Election, 2004

Color value is a poor choice for showing qualitative data

✓ values suggest an ordered difference, which is not appropriate for these data.

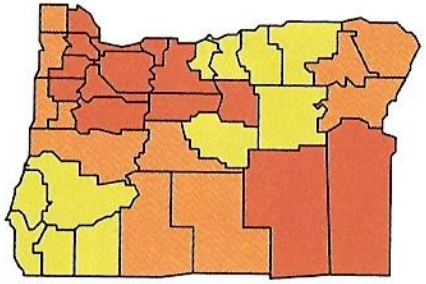
Bush Win
Kerry Win



Mapping Qualitative Data

Poor qualitative colors (value):

Favorite Hotdog Condiment
Majority Opinion, Oregon, 2003

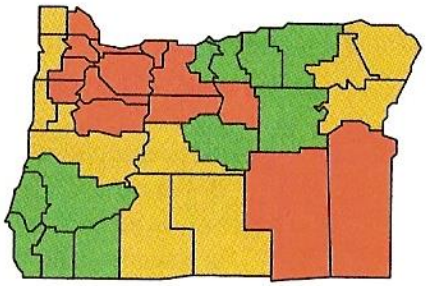


Ketchup
Mustard
Relish

This value series suggests an order in the data that does not exist.

Good qualitative colors (hue):

Favorite Hotdog Condiment
Majority Opinion, Oregon, 2003



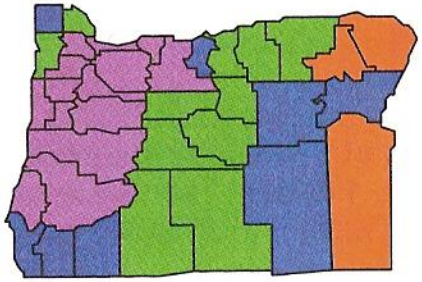
Ketchup
Mustard
Relish

Three hues suggest no order and reflect actual condiment colors.

Mapping Ordered Data

Poor ordered colors (hue):

Fallen, Cannot Get Up
per 1000 population, Oregon, 2002

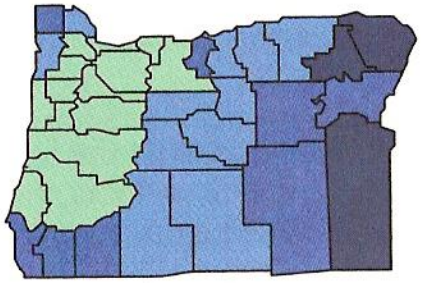


78 to 109
53 to 68
25 to 47
2 to 20

This hue series masks the order in the data.

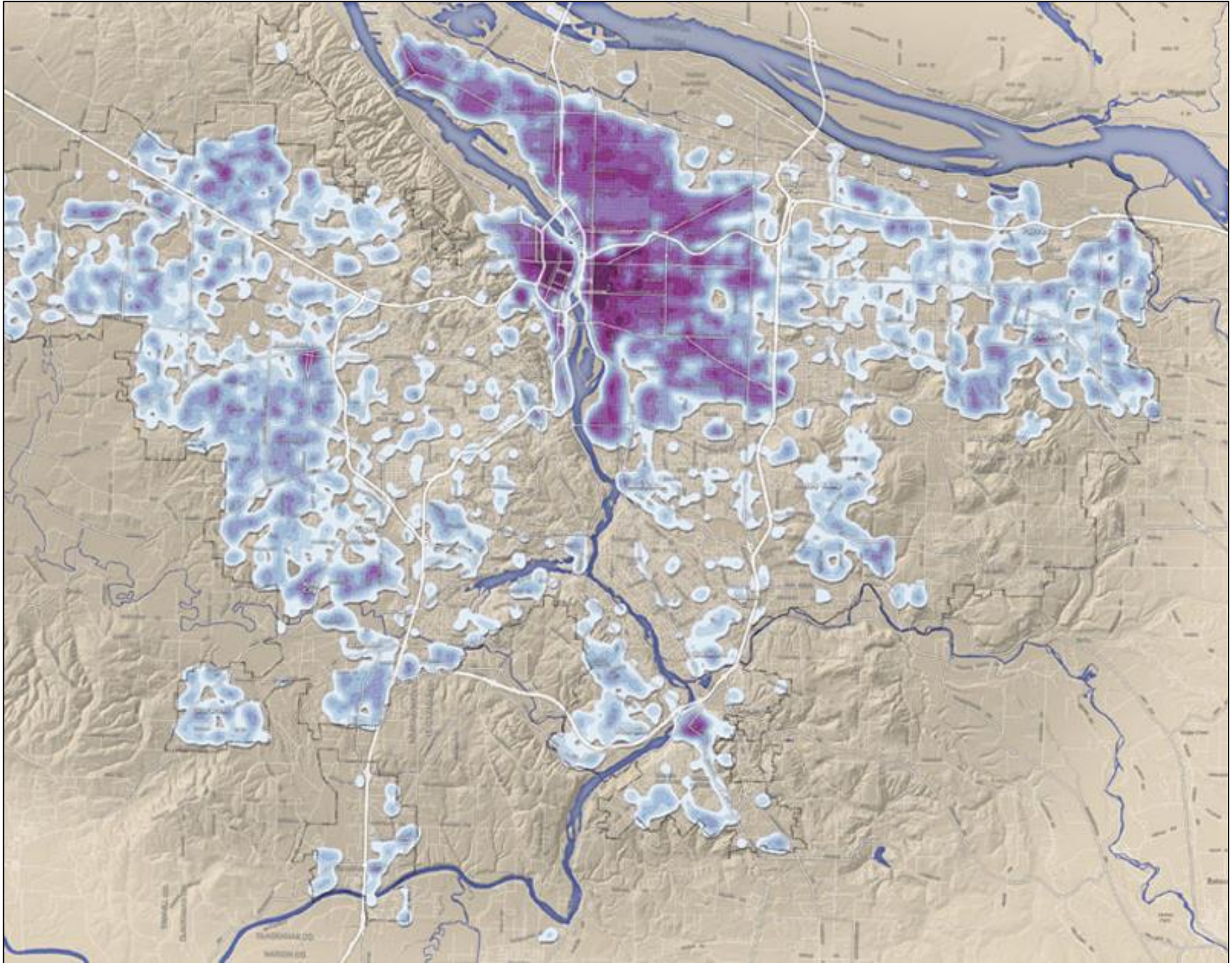
Good ordered colors (value):

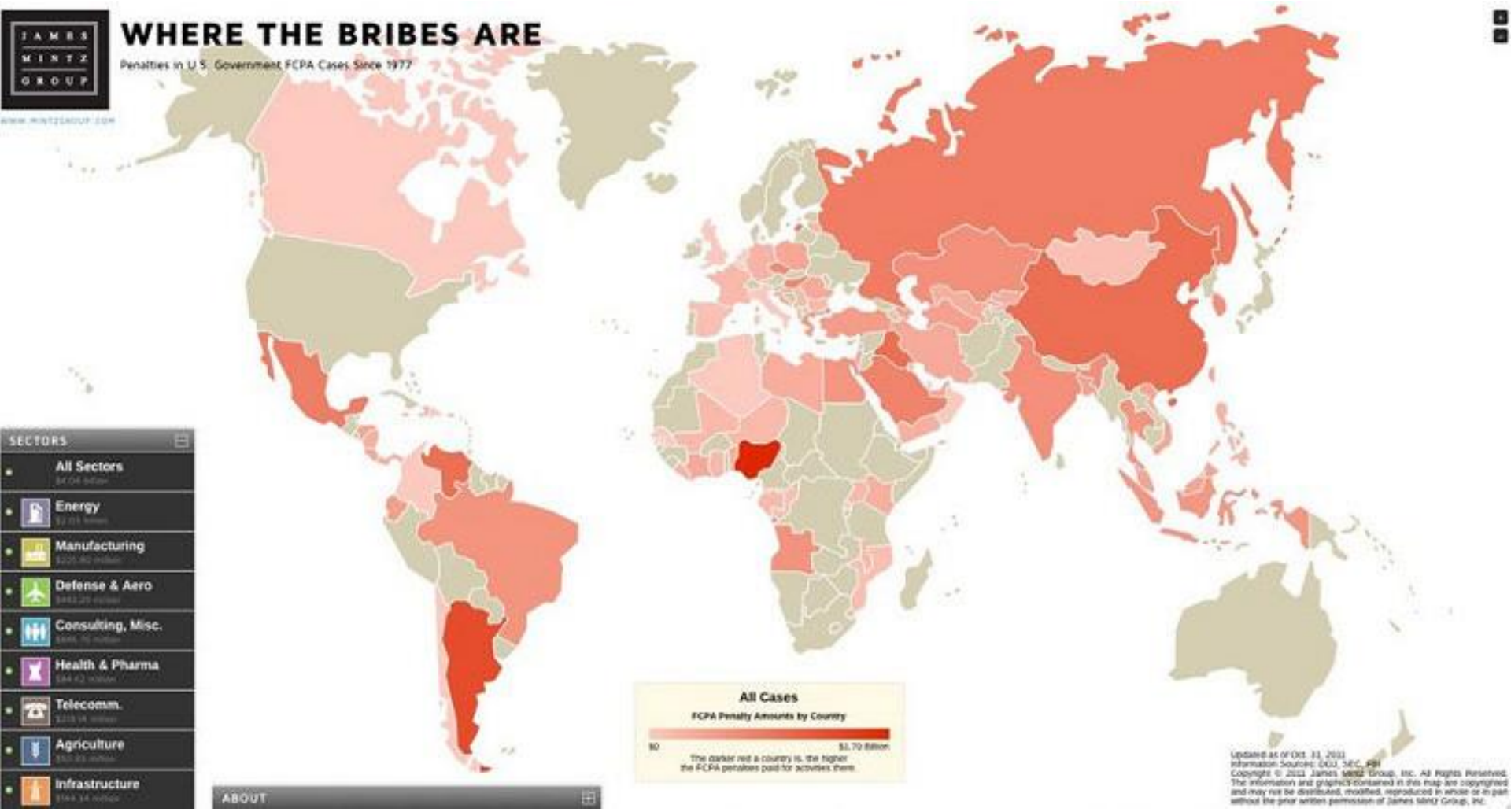
Fallen, Cannot Get Up
per 1000 population, Oregon, 2002



78 to 109
53 to 68
25 to 47
2 to 20

This value series reveals the order in the data.




JAMES MINTZ GROUP
WHERE THE BRIBES ARE
Penalties in U.S. Government FCPA Cases Since 1977
SECTORS
All Sectors
Energy
Manufacturing
Defense & Aero
Consulting, Misc.
Health & Pharma
Telecomm.
Agriculture
Infrastructure
ABOUT
All Cases
FCPA Penalty Amounts by Country
$0
$1.70 Billion
The darker red a country is, the higher the FCPA penalties paid for activities there.
Updated as of Oct. 31, 2010
Information Sources: DOJ, SEC, FBI
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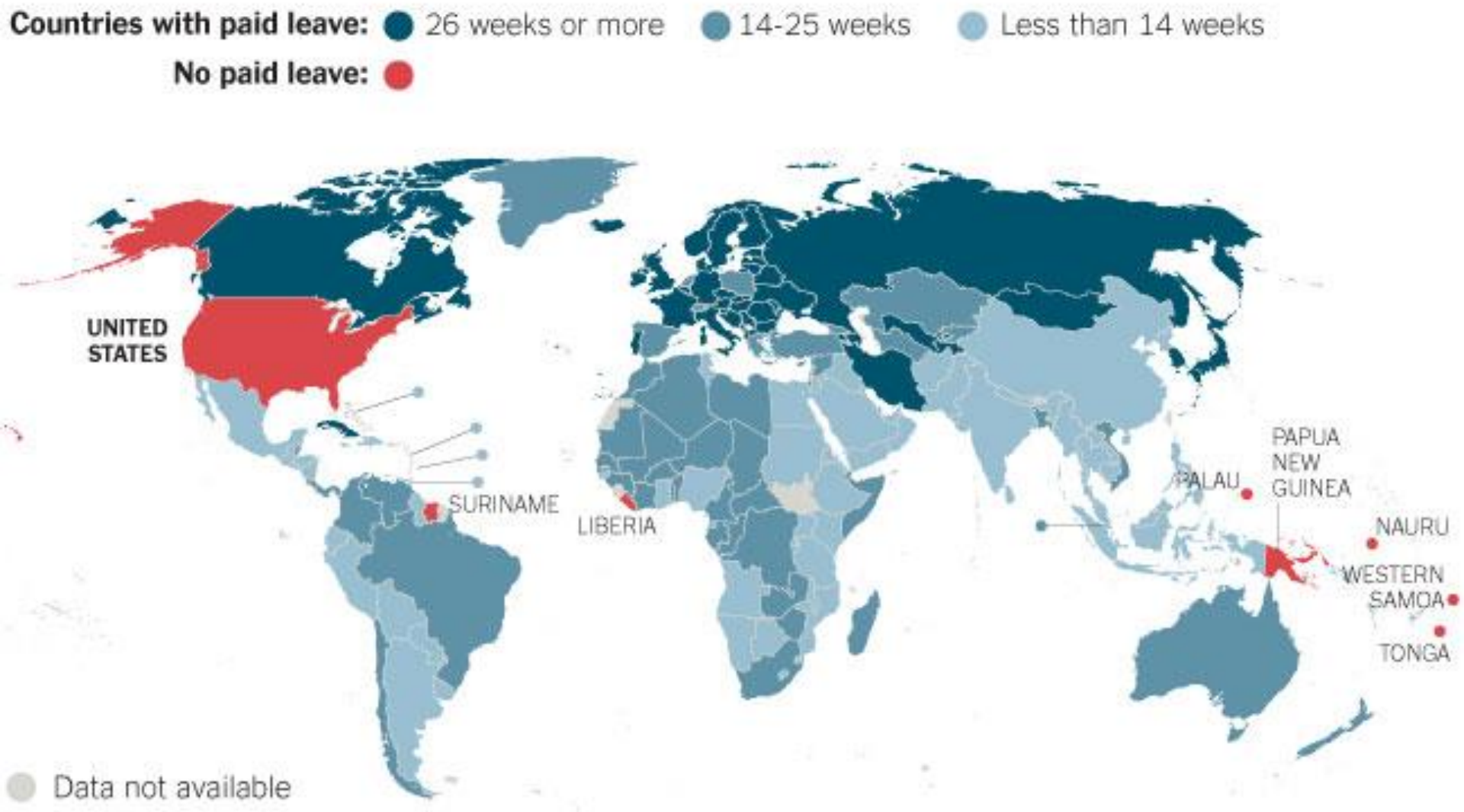
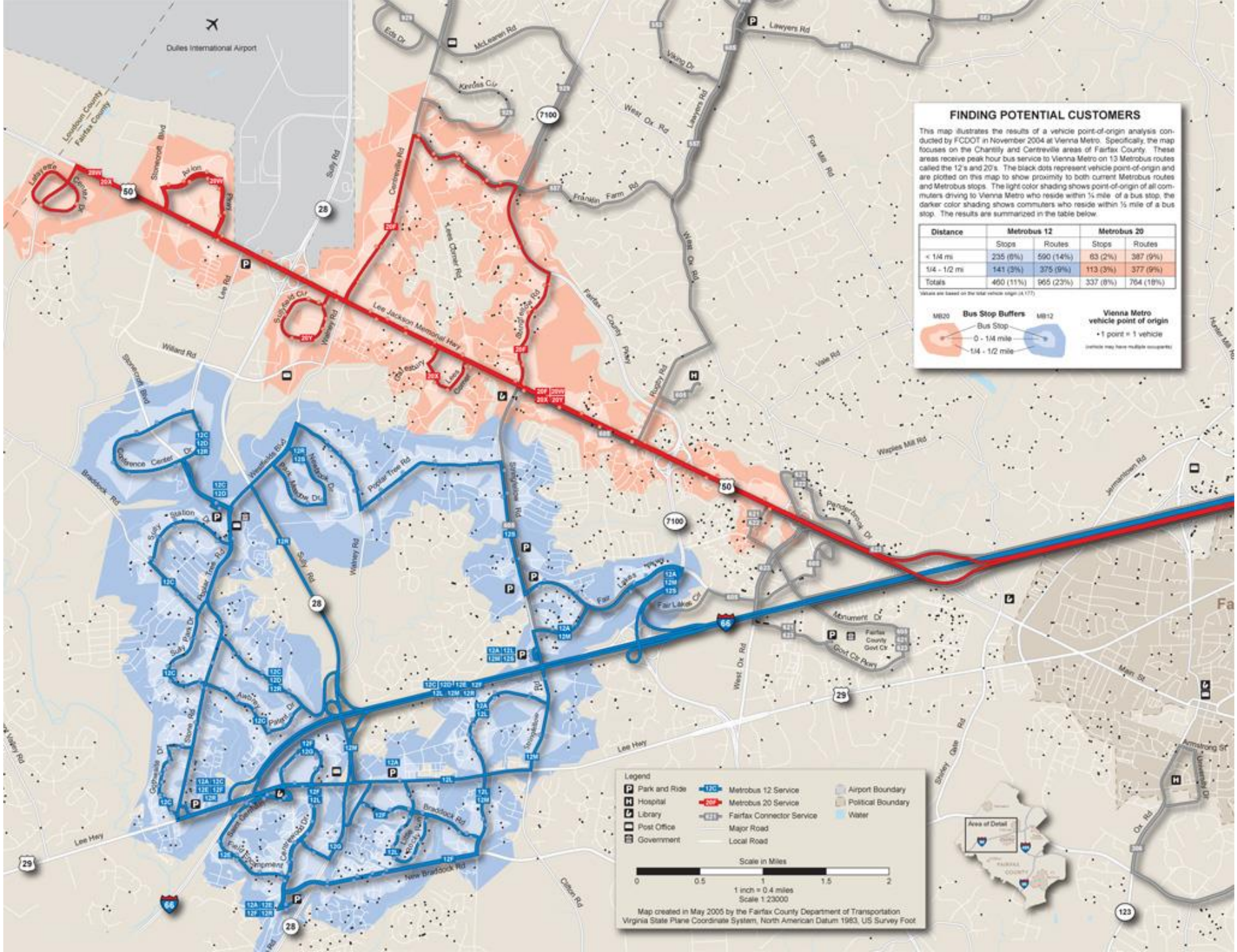
Paid Maternal Leave: Almost Everywhere

The United States is one of only eight countries, out of 188 that have known policies, without paid leave.





FINDING POTENTIAL CUSTOMERS

This map illustrates the results of a vehicle point-of-origin analysis conducted by FCDOT in November 2004 at Vienna Metro. Specifically, the map focuses on the Chantilly and Centreville areas of Fairfax County. These areas receive peak hour bus service to Vienna Metro on 13 Metrobus routes called the 12's and 20's. The black dots represent vehicle point-of-origin and are plotted on this map to show proximity to both current Metrobus routes and Metrobus stops. The light color shading shows point-of-origin of all commuters driving to Vienna Metro who reside within ¼ mile of a bus stop; the darker color shading shows commuters who reside within ½ mile of a bus stop. The results are summarized in the table below.

Distance	Metrobus 12		Metrobus 20	
	Stops	Routes	Stops	Routes
< 1/4 mi	235 (6%)	590 (14%)	63 (2%)	387 (9%)
1/4 - 1/2 mi	141 (3%)	375 (9%)	113 (3%)	377 (9%)
Totals	460 (11%)	965 (23%)	337 (8%)	764 (18%)

Values are based on the total vehicle origin (4,177)

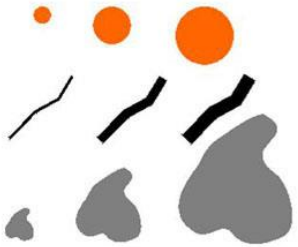
Vienna Metro vehicle point of origin

• 1 point = 1 vehicle

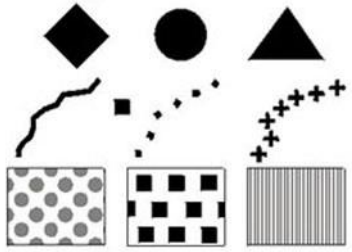
(vehicle may have multiple occupants)

Color | value

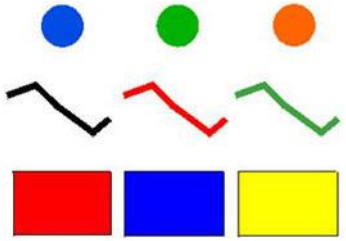
Size



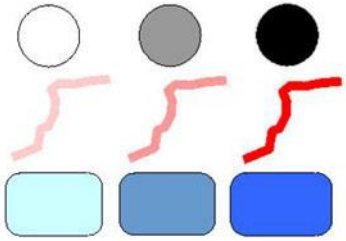
Shape



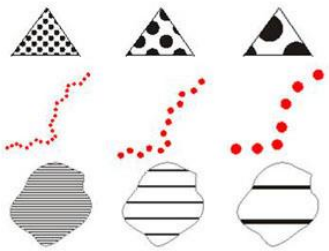
Color (hue)



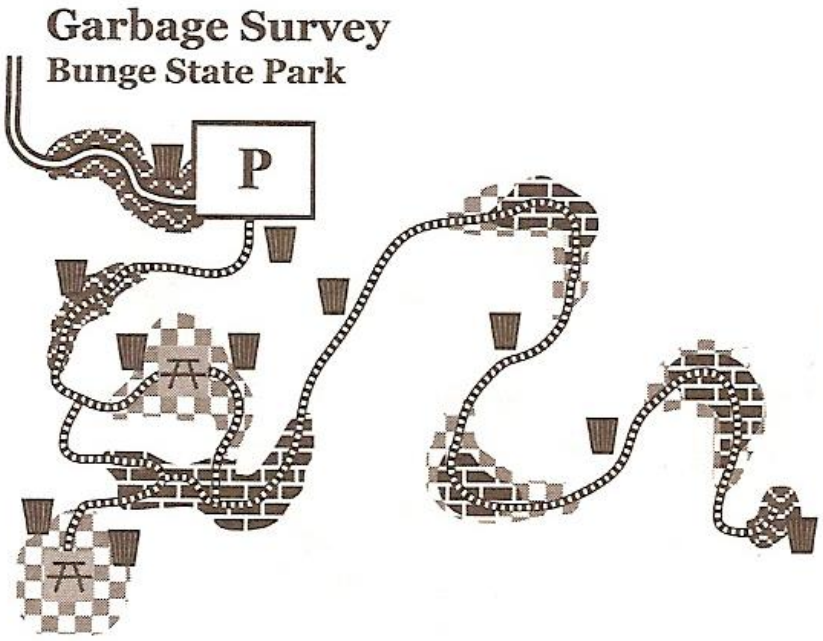
Color (value)



Texture



Poor use of texture:



Cigarette Butts
Paper Debris
Glass & Cans

Textures can be visually noisy and imply ordered differences

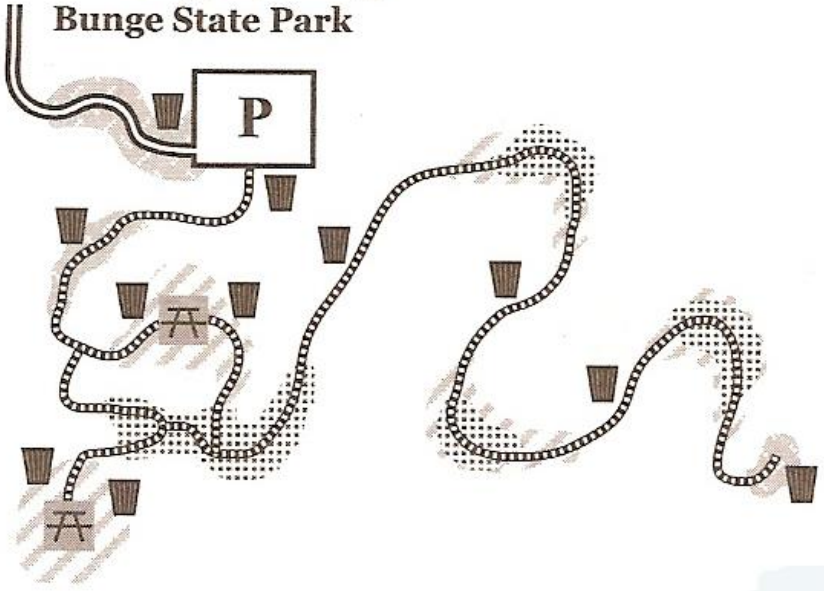
✓ Be careful with textures that look like something: glass and cans are shown with a brick pattern, which does not make sense. The patterns here are noisy and interfere with the trail pattern.

Good use of texture:

Texture can be good for showing qualitative data

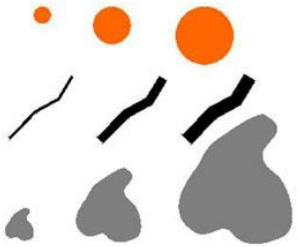
✓ Select textures that are not visually noisy and that suggest the qualitative differences in the data.

Cigarette Butts
Paper Debris
Glass & Cans

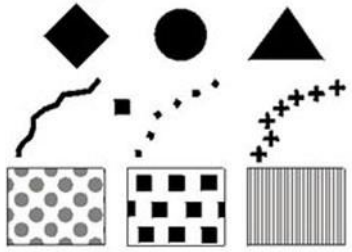


Color | value

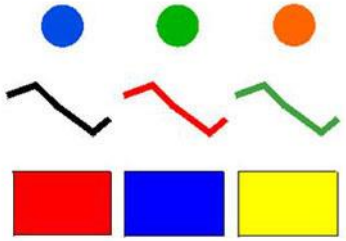
Size



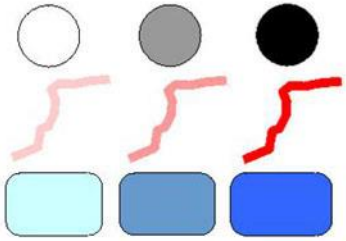
Shape



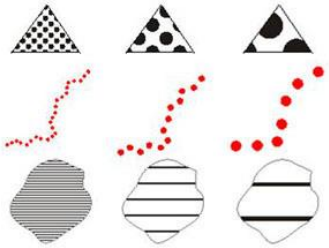
Color (hue)



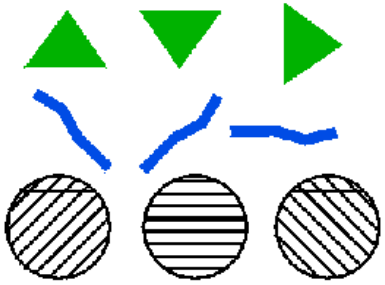
Color (value)

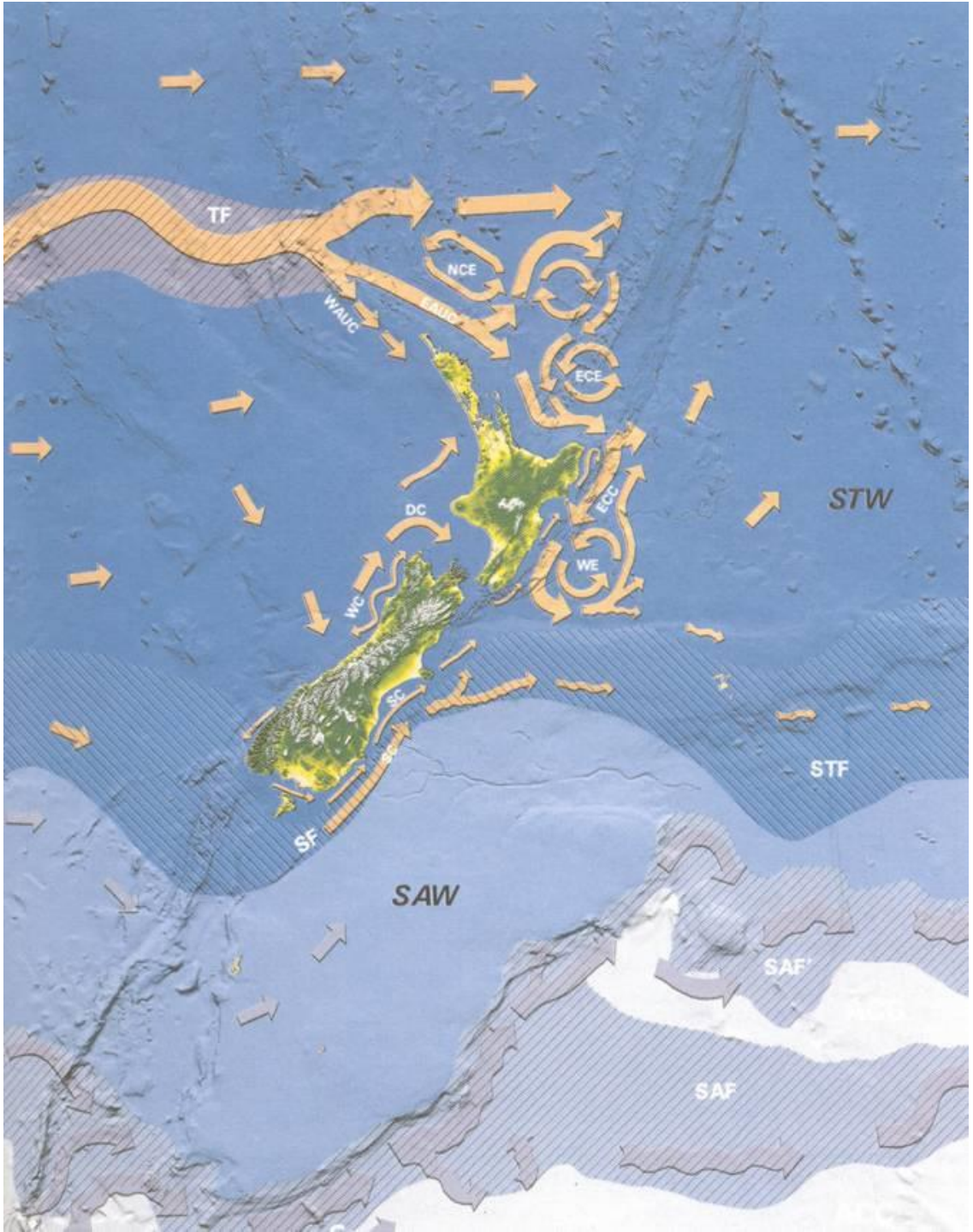


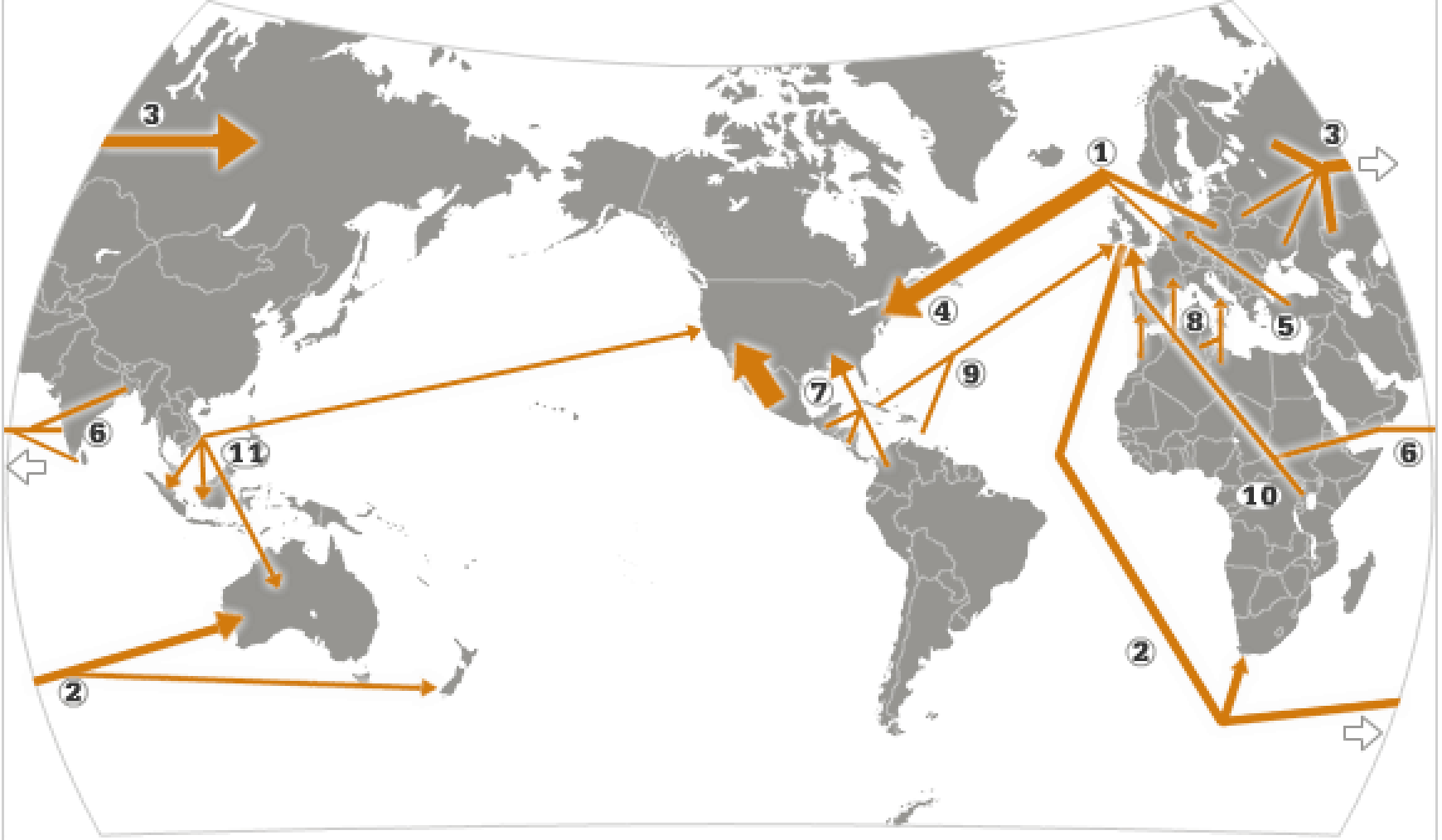
Texture



Orientation

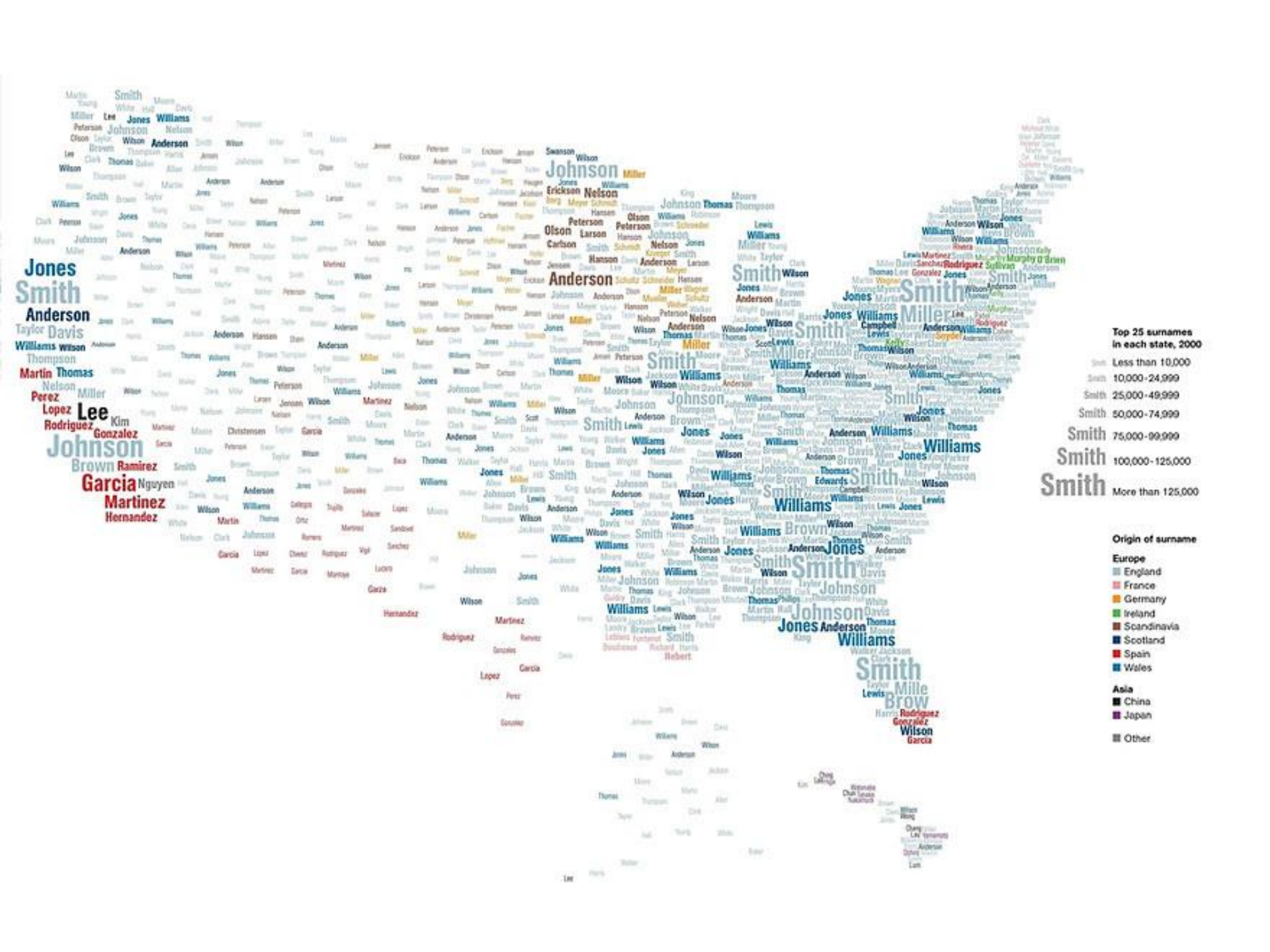



TF
NCE
WAUC
SAUC
ECE
ECC
DC
WE
WC
STW
SC
SF
STF
SAW
SAF'
SAF



1. 1918 - 1919 : Eastern Europe to USA and Canada
2. 1918 → : Britain to Australia, South Africa and New Zealand
3. 1930 - 1940 : Russia to Siberia
4. 1940 → : European Jews to USA
5. 1945 → : Turkey to Germany
6. 1947 → : India, Pakistan and Sri Lanka to UK
7. 1950 → : Mexico and Central America to USA
8. 1950 - 1960 : North Africa to France, Spain and Italy
9. 1950 - 1960 : West Indies to UK
10. 1973 → : Ugandan Asians to UK
11. 1975 → : Vietnam to Malaysia, Australia and USA

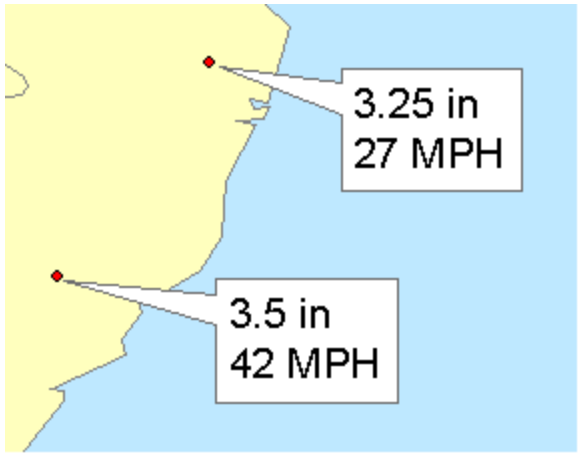
Labels as symbols


Top 25 surnames in each state, 2000
Less than 10,000
10,000-24,999
25,000-49,999
50,000-74,999
75,000-99,999
100,000-125,000
More than 125,000
Origin of surname
Europe
England
France
Germany
Ireland
Scandinavia
Scotland
Spain
Wales
Asia
China
Japan
Other

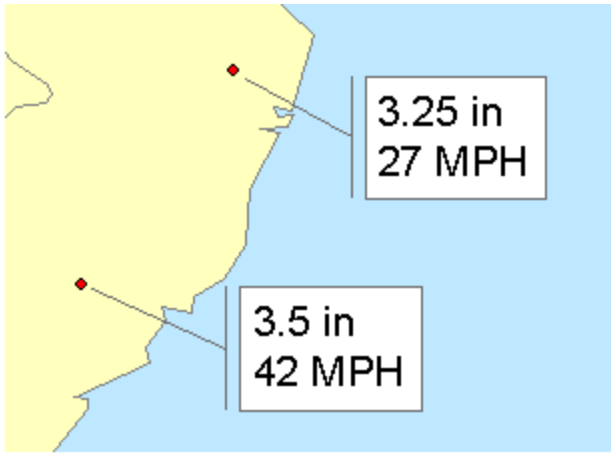
Map Label | characteristics

- Fonts
  - Family (Times New Roman, Arial)
  - Posture (*italics,* **BOLD,** underline)
  - Case (lower case, UPPER CASE, Title Case)
  - Size Size Size
  - S p a c i n g
- Symbols or icons can be used
- Effects shadows, halos callouts

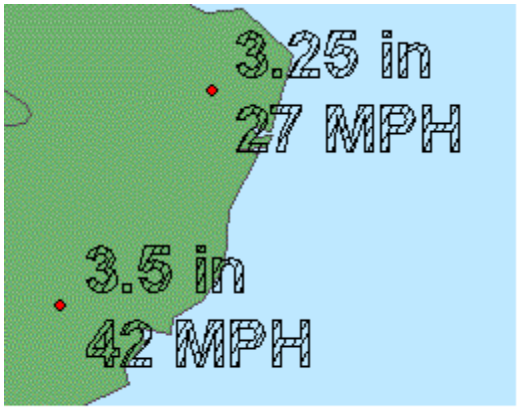
Map Label | effects



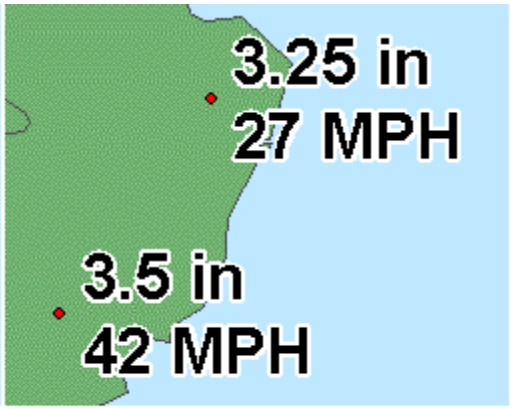
Balloon Callout



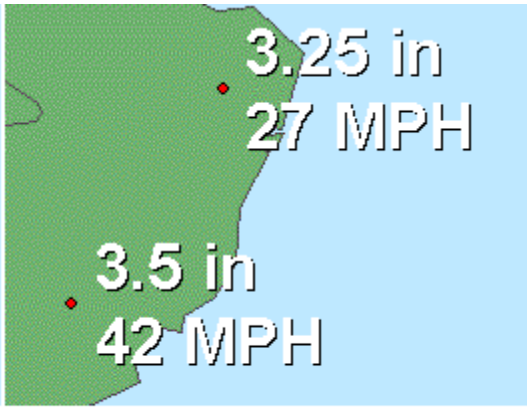
Line Callout



Filled Text



Halos



Drop Shadow

Map Labels | general rules

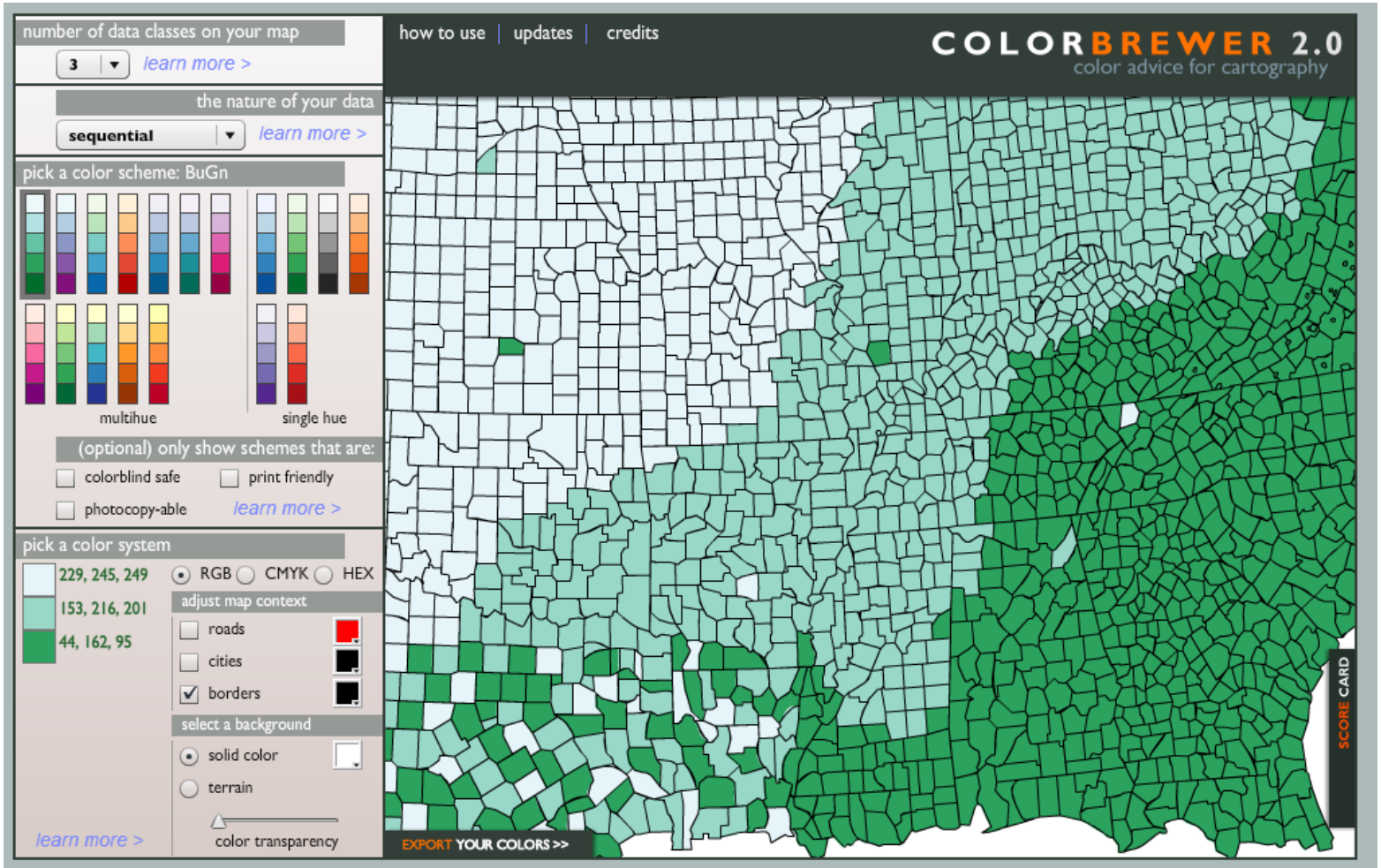
- No more than 2 font families on maps
  - To establish different categories change characteristics
- Serif font for physical features
  - A serif is a small ‘foot’ or finishing stroke on a letter
  - Rivers, mountain ranges, lakes, etc.
- San Serif for cultural features
  - Fonts without serifs (‘sans’ means without)
  - Cities, states, countries, counties, etc.

Resources

Map labels & symbols

Map symbols | resources

- Type Brewer, http://www.typebrewer.org/typebrewer.html

Map symbols | resources

- Color Brewer, http://colorbrewer2.org/