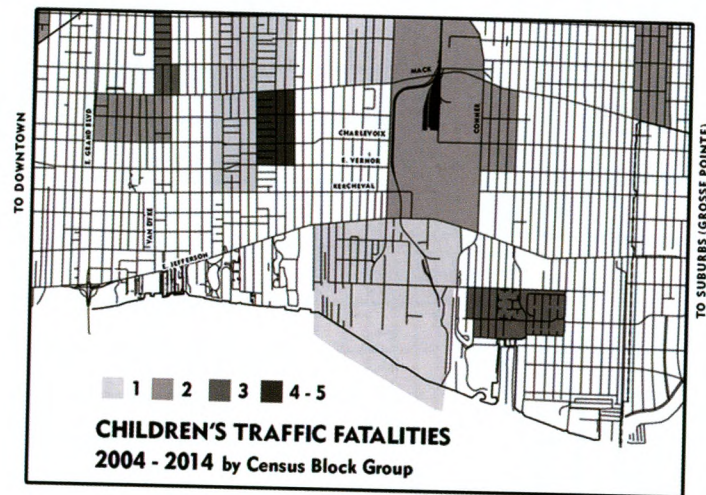


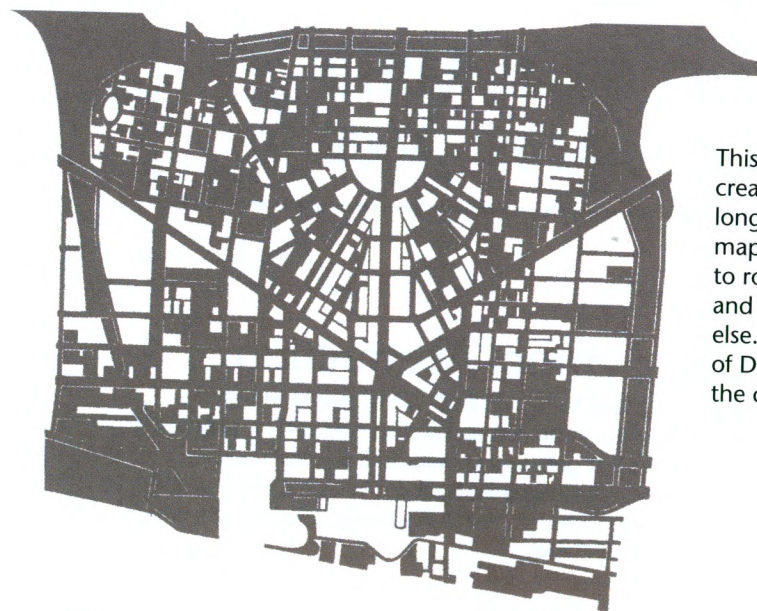
Ways to Think about Map Symbol Abstraction

We often take individual instances (such as traffic deaths) and stick them in areas (census, counties, provinces, etc.). Aggregation and abstraction are convenient for packaging and distributing and mapping data. They can help us think about data. But complexity, substance, and nuance can be masked as a consequence.

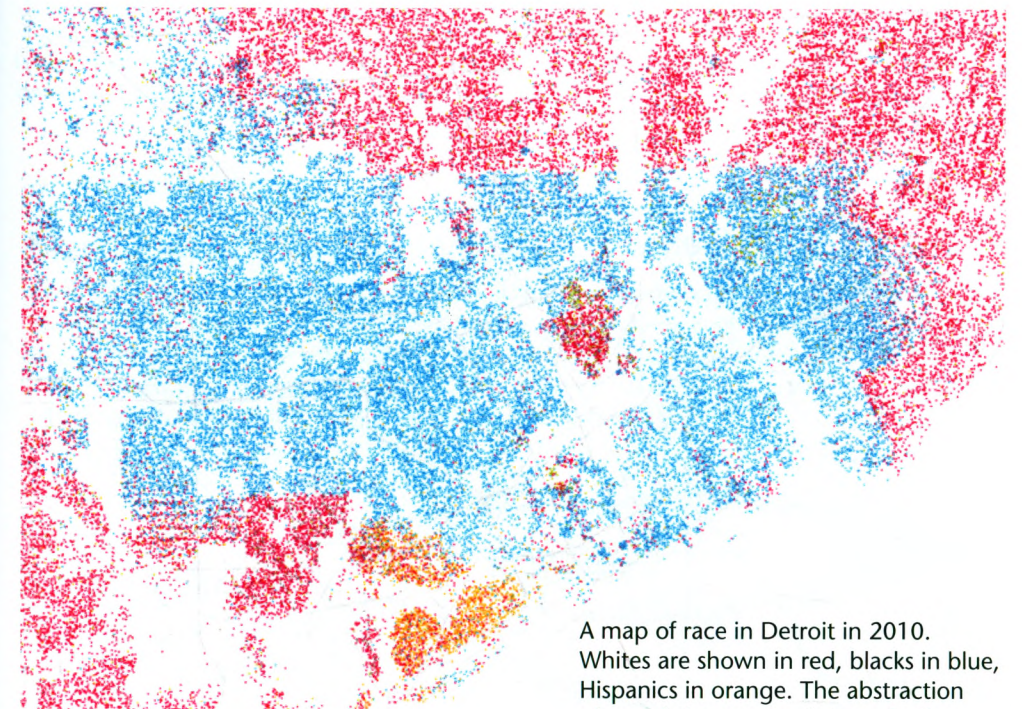


The children's traffic fatalities map by Census Block Group is, according to its author Alex Hill, a stinker. Accidents occur on roads, the dividing lines between block groups. The aggregated data is skewed by the address (side of the street) recorded for the accident.

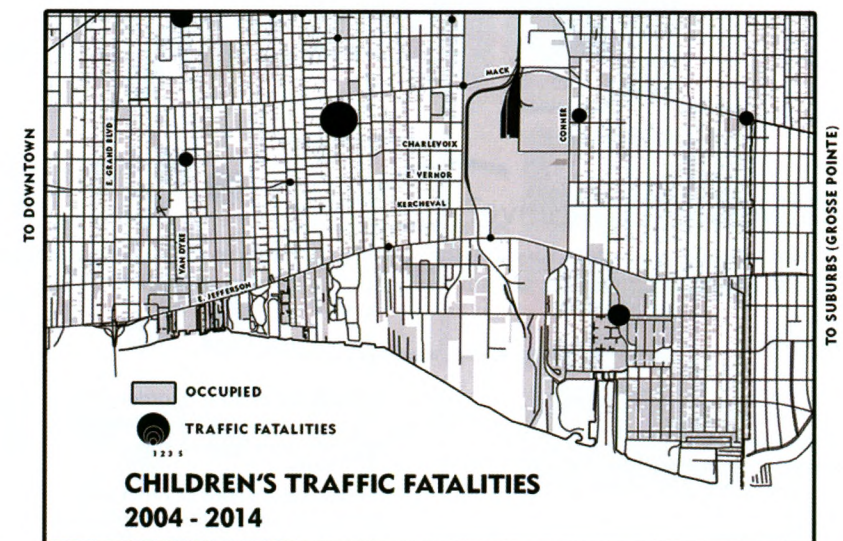
Dangerous intersections are abstracted away. The title further contributes to this map of the banality of death. It's hard to feel that Detroit has the highest rate of pedestrian traffic deaths in the U.S. The map lacks the impact of Warren and Bunge's original.



This map of downtown Detroit, created by Ronald Horvath not long after the Warren-Bunge map, isolates the space devoted to roads, parking and the service and sale of cars. It subordinates all else. It makes clear how much of Detroit is turned over to the car.



A map of race in Detroit in 2010. Whites are shown in red, blacks in blue, Hispanics in orange. The abstraction of people by race to dots perfectly delineates both Detroit (the blue area) and the area's intense segregation.



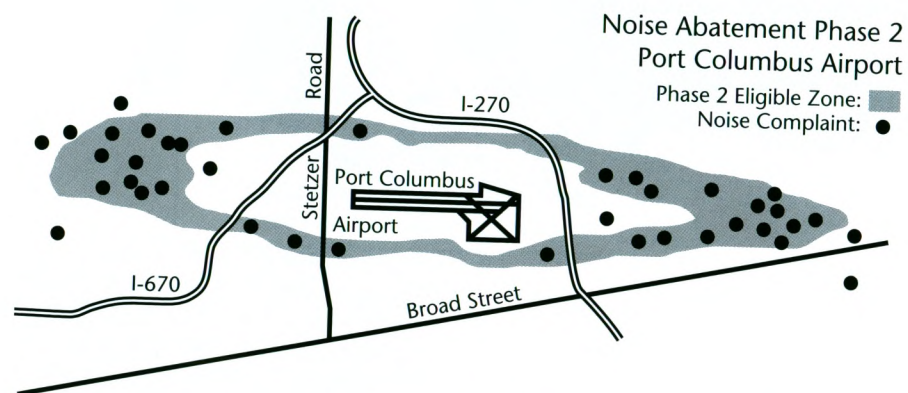
Warren and Bunge were right: commuters run over black kids in Detroit.

Visual Variables

Mappable data vary immensely. One approach to symbolizing your data, the visual variables, guides map symbolization by considering the characteristics of your data. Are your data at points, along lines, or in areas? Are your data qualitative or quantitative? Wedded to a careful consideration of the concepts behind your data, the visual variables serve to guide basic map symbol design.

Points, Lines, or Areas?

Most mappable data are at points (zero dimensions), lines (one dimension), or in areas (two dimensions).



Things Are Complicated!

You can vary the dimensions of a map symbol. For example, you can show a river, for example, as an area or a line.

Qualitative or Quantitative?

Consider next whether your data vary in either quality (differences in kind) or quantity (differences in amount). Some data are not easily qualitative or quantitative.

Qualitative Data

House location
Border or boundary
Land vs. water
Religious denominations
Animal species
Plant types
Sexual orientation
Political affiliation

Quantitative Data

Ordinal: distinctions of order with no measurable difference between the ordered data: high-, medium-, and low-risk zones

Interval: distinctions of order with measurable differences among the ordered data but no absolute zero: temperature F°

Ratio: distinctions of order with measurable differences between the ordered data and an absolute zero: murder rate per country

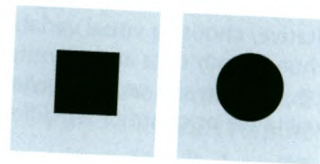
Matching Data to Visual Variables

Particular visual variables may suggest important characteristics of your data. If your data are qualitative, choose a visual variable that suggests qualitative differences, such as shape or color hue. If your data are quantitative, choose a visual variable that suggests quantitative differences, such as size or color value. Some visual variables can be manipulated to suggest either qualitative or quantitative differences, such as texture.

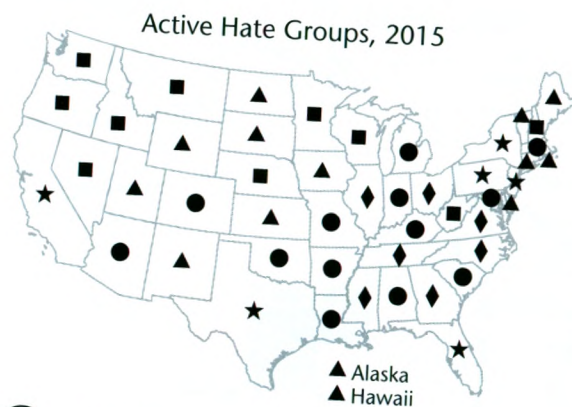
	Points	Lines	Areas	Best to Show
Shape		<i>Possible, but too Weird to Show</i>	Cartogram	Qualitative Differences
Size			Cartogram	Quantitative Differences
Color Hue				Qualitative Differences
Color Value				Quantitative Differences
Color Intensity				Qualitative Differences
Texture				Qualitative & Quantitative Differences

Shape

Map symbols with different shapes imply differences in quality. A square is not more or less than a circle, but is different in kind. Map symbol shapes can be pictorial or abstract.



☹ use of shape



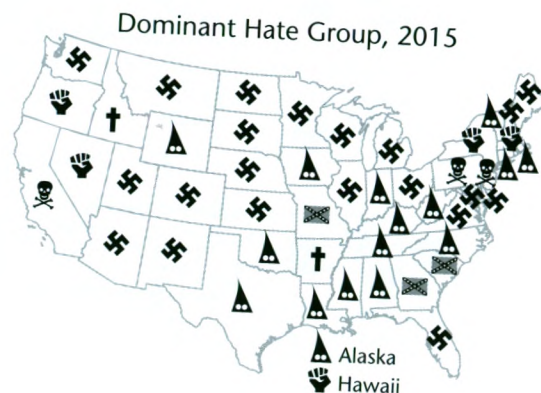
- ★ 31 – 57
- ◆ 21 – 30
- 11 – 20
- 5 – 10
- ▲ 0 – 5

Shape is a poor choice for showing *quantitative* data. Using shape makes it hard to see the patterns on the map, as the symbols do not suggest the order (low to high) in the data.

😊 use of shape

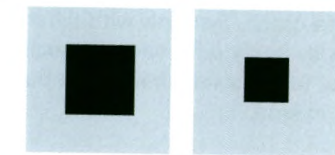
- ▲ KKK
- ✠ Neo-Nazi
- ✋ Black Separatist
- ☠ Neo-Confederate
- ✝ Christian Identity
- ☠ Racist Skinhead

Shape is a good choice for showing *qualitative* data. Different shapes suggest the qualitatively different groups.

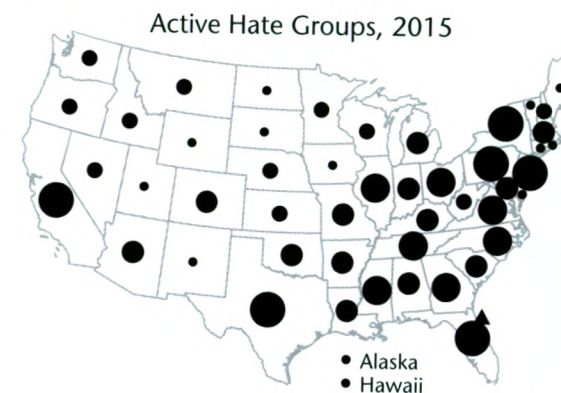


Size

Map symbols with different sizes imply differences in quantity. A larger square implies greater quantity than a smaller square.



😊 use of size



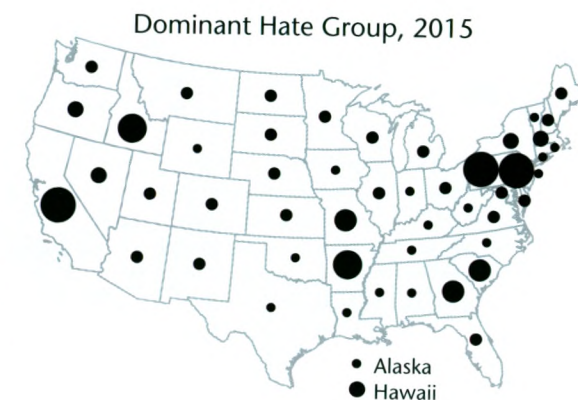
- 31 – 57
- 21 – 30
- 11 – 20
- 5 – 10
- 0 – 5

Size is a good choice for showing *quantitative* data. The use of one symbol varying in size parallels the order in the data.

☹ use of size

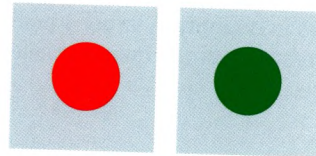
- KKK
- Neo-Nazi
- Black Separatist
- Neo-Confederate
- Christian Identity
- Racist Skinhead

Size is a poor choice for showing *qualitative* data. Different sizes suggest order in the data rather than the qualitatively different groups.



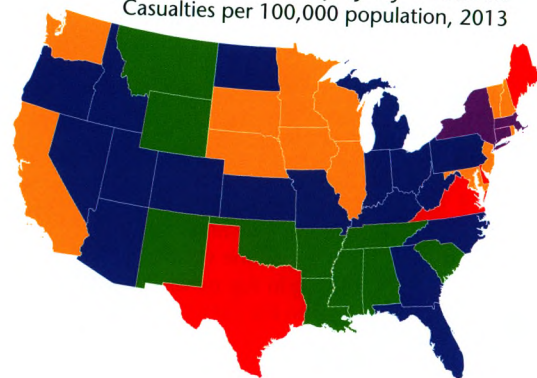
Color Hue

Color hue refers to different colors such as red and green. Symbols with different hues readily imply differences in quality. Red is not more or less than green but is different in kind.



use of color hue

Deaths Due to Injury by Firearms
Casualties per 100,000 population, 2013



15.2 – 19.8
11.0 – 14.4
10.2 – 10.9
5.3 – 10.0
2.6 – 4.4

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.

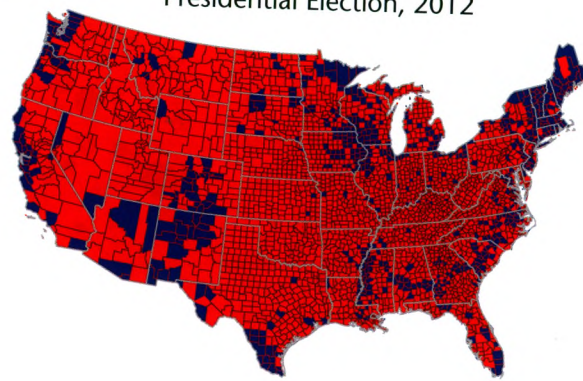


use of color hue

Romney Win
Obama Win

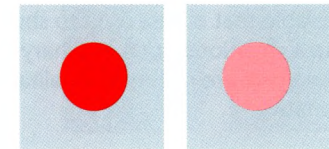
Color hue is a good choice for showing *qualitative* data. Qualitatively different hues parallel the qualitatively different data.

Presidential Election, 2012



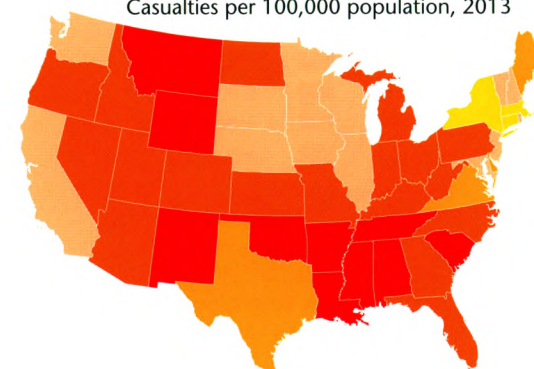
Color Value

Color value refers to different shades of one hue, such as dark and light red. Map symbols with different values readily imply differences in quantity. Dark red is more than light red.



use of color value

Deaths Due to Injury by Firearms
Casualties per 100,000 population, 2013



15.2 – 19.8
11.0 – 14.4
10.2 – 10.9
5.3 – 10.0
2.6 – 4.4

Value is a good choice for showing *quantitative* data. The use of one hue varying in value parallels the order in the data.

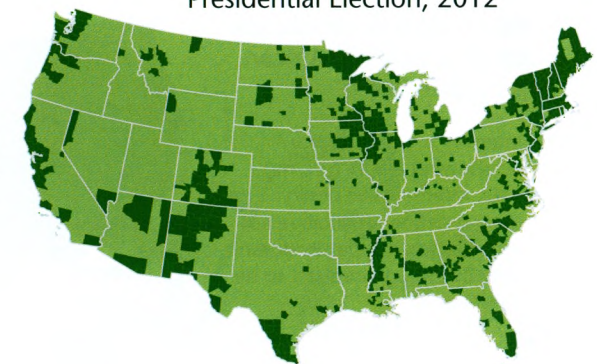


use of color value

Romney Win
Obama Win

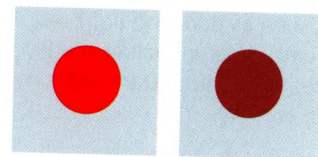
Color value is a poor choice for showing *qualitative* data. Values suggest an ordered difference, which is not appropriate for these data.

Presidential Election, 2012



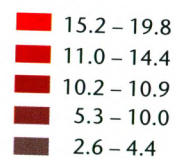
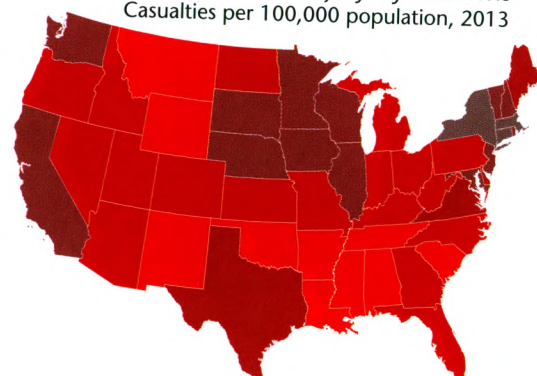
Color Intensity

Color intensity (or saturation) is a subtle visual variable that is best used to show subtle data variations, such as binary (yes or no) data that are not really qualitative or quantitative.



use of color intensity

Deaths Due to Injury by Firearms
Casualties per 100,000 population, 2013



Intensity is a poor choice for showing *quantitative* data. Intensity may suggest order, but due to the lack of variation in value the sense of order is weak.

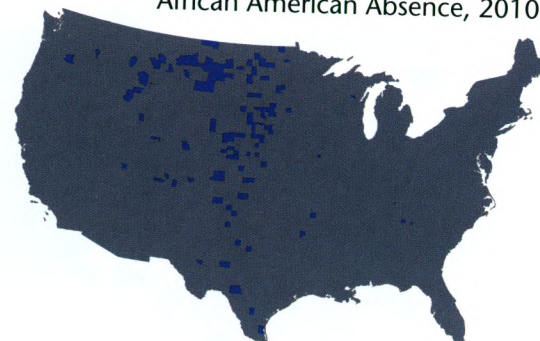


use of color intensity

■ No African Americans
■ One or More African Americans

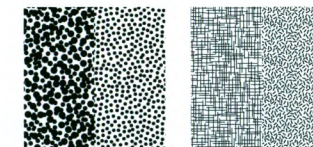
Intensity is a meh choice for showing *binary* (yes/no) data. Intensity, like binary data, is neither qualitative nor quantitative. It typically doesn't provide enough contrast to be effective.

African American Absence, 2010

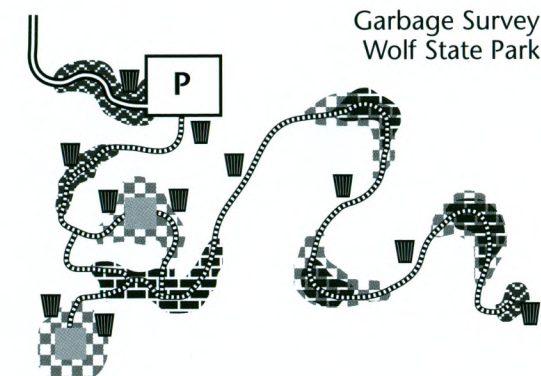


Texture

Texture (pattern) can imply both qualitative (brick vs. cloth) and quantitative (coarse vs. fine) differences. Select textures so that they suggest the qualitative or quantitative character of your data.



use of texture



■ Cigarette Butts
■ Paper Debris
■ Glass & Cans

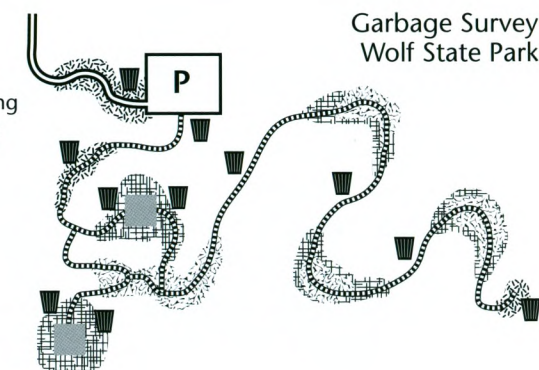
Textures can be visually noisy and imply ordered differences. Be careful with textures that look like something: glass and cans are shown with a brick pattern, which does not make sense.



use of texture

■ Cigarette Butts
■ Paper Debris
■ Glass & Cans

Texture can be good for showing qualitative data. Select textures that are not visually noisy and that suggest the qualitative differences in the data.



Garbage Survey
Wolf State Park