

# Geography 360

## Cartography

April 12, 2006

# Outlines

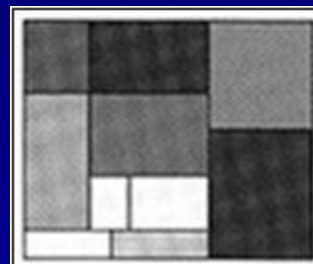
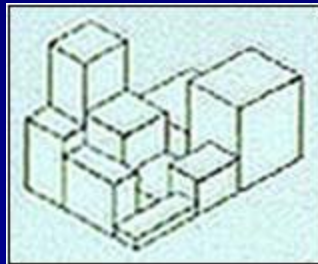
- Choropleth map
  - What is it?
  - Why is it so popular?
  - Issues to consider
  - When to use
- Cartographic design
  - Cognitive principles behind cartographic design
  - Organizing map elements
  - Achieving visual hierarchy
  - Achieving balance

# Choropleth map

- Value by area (choro=area, pleth=value)
- Focus on “typical value” collected for enumeration units
  - [Lec\\_W3W\USPD.jpg](#)
  - [Lec\\_W3W\1OregonPopDensity.jpg](#)
  - [Lec\\_W3W\2USPopChange.jpg](#)

# Choropleth map

- Conceptually similar to prism map
- Data value is portrayed as if it has no variation within enumeration units



# Why do you think choropleth map is so popular?

- It is easy to construct
  - Data is already available in pre-defined enumeration units (e.g. census)
- It is easy to read
  - Polygon boundaries are somewhat familiar
  - Readers can gain a sense of overall pattern with attention to lows and highs

# Issues to consider

- Data standardization
- Data classification
- Symbolization

# What are consequences of not standardizing data value?

- Illustrations -

- US Population map
  - [Lec\\_W3W\USPop.jpg](#) Total population
  - [Lec\\_W3W\hispanic.jpg](#) Hispanic population
- Compare Figure 4.8 A and B
- Seattle population map [Lec\\_W3W\SeattlePop.mxd](#)
  - One is normalized by area
  - The other is not
- Compare Figure 4.7 B to C (p. 67)

# Standardizing data value

- Adjust for varying areal size (e.g. density)
  - e.g. population density
- Adjust for total (e.g. proportion, rate, average)
  - e.g. Percentage of Hispanic, Mortality rate, Median income, average SAT score



# Symbolization

- Consider kinds of numerical data
- Unipolar: no natural dividing point → use **sequential** scheme
  - E.g. per capita income
  - [Lec\\_W3W\sequential.jpg](#)
- Bipolar: natural dividing point (it logically divide the data into two parts) → use **diverging** scheme
  - E.g. % population change
  - [Lec\\_W3W\diverging.jpg](#)

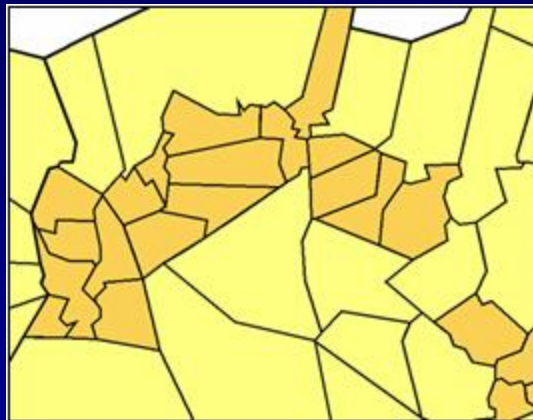
Web search: "[Color Brewer](#)"

# When to use choropleth map?

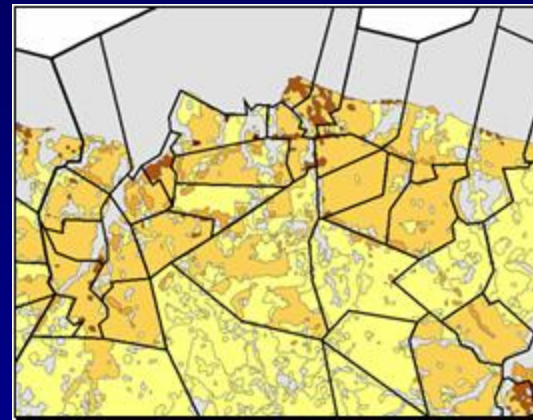
- Consider models of geographic phenomenon (Figure 4.1)
- **Continuous**
  - Data standardization transforms discrete phenomenon (e.g. population, income total) to continuous surface (e.g. population density, per capita income)
- **Abrupt**
  - The spatial distribution of the phenomenon mapped should ideally coincide with the boundaries of enumeration units (even though it is rare in reality)

Such limitation can be overcome with dasymetric map

Choropleth map



Dasymetric map



In dasymetric map, the mapped zones do not correspond to enumeration units, but ancillary information are used to change the boundaries of zones to better represent the actual distribution of the data within zones. Image source: Mennis J 2003

# Tips for choropleth mapping

- *Do not use choropleth map for total values:*
  - In most cases, the enumeration units on a map are unequal in area
  - Unequal size of enumeration units can alter the impression of the distribution
- *Do not use choropleth map for data which has nothing to do with enumeration units:*
  - Choropleth maps are used when data occur or can be attributed to definite enumeration units (e.g. The distribution of temperature is not controlled by administrative boundaries)

# Cognitive principles behind cartographic design

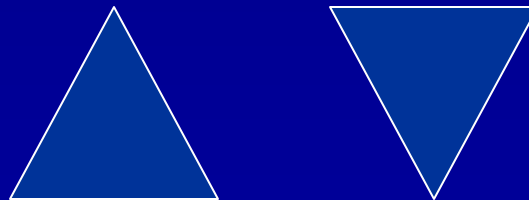
- Figure-ground phenomenon

What forms figure, and what forms ground?



- Preference for stability

Which seems more stable?



# Which is better? Why?

- Compare Figure 11.30 A to B (p. 221)
- Compare Figure 11.31 A to B (p. 222)
- Compare Figure 11.32 A to B (p. 223)
- Compare Color plate 11.3 A to B

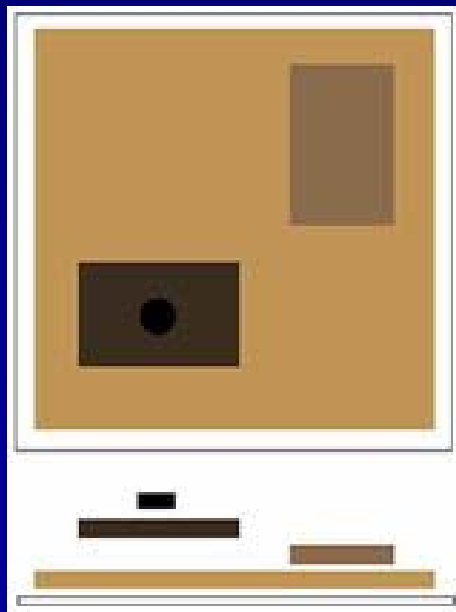
# How to organize map elements?

- Hierarchical organization
  - Goal is to achieve visual hierarchy
- Planar organization
  - Goal is to achieve balance

# Intellectual hierarchy

## Visual hierarchy

- Intellectual hierarchy: varying relative importance of map elements
- Visual hierarchy:



"Public speakers arrange their material to emphasize certain remarks and subordinate others. Professional photographers often focus the camera to provide precise detail in certain parts of the picture and leave the remainder somewhat blurred. ... Choreographers arrange the dancers so that some will stand out from the rest on the stage. Professional cartographers must go through similar activities in designing the map." (B. Dent)



# Achieving visual hierarchy

- See Figure 11.33 (p. 224)
- Heterogeneity
- Contour
- Articulation
- Interposition
- Differentiation of value

# Achieving balance

- See Figure 11.35
- Some maps are visually stable and others are not
- Balance can be thought of as a state of equilibrium
- Balance can be achieved by visually centering object in available space