Use maps and spreadsheet together and separately to explore data.

I. Exploring Data

Look at highs, lows, and means first

1) Which cities have remained in the top ranks in all periods of U.S. history?

   1790-Baltimore, New York, Philadelphia, Providence, Newport, Salem, Marblehead, Boston, Charleston, Brooklyn

   1840--New Orleans, Cincinnati, and Albany for the first time

2) From period to period, which cities appeared and disappeared from the list of highest ranked cities?

3) In each period (and through the whole span of analysis) which regions held the greatest number of highly ranked cities?

4) What states and regions lack ranked cities and in which periods?

5) How is the pattern of city rank related to territorial expansion in each period and to patterns of statehood?

II. How to use maps to visualize and explore patterns

1) Queries (yield temporary displays of results)

2) Create additional layers to show data in different time periods. These layers can then be used to create a map layout. Layouts for maps of particular periods can be saved as ArcGIS project (.mxd) files.

3) Saving query sets to shape files (making permanent files for ease of later mapping)

III) Different types of maps and map symbols show different properties of the data

1) The U.S. urban system file contains information on city population for each decade 1790-1990 as well as a ranked list of the 100 (sometimes fewer) largest cities

2) Mapping city population helps to understand how U.S. population was growing and where it was distributed. But because the largest 1-10 cities became so much larger than others, they tend to dominate map and make it difficult to see where other important economic and demographic shifts were taking place in the U.S.
3) Mapping city rank helps to show where the most important areas of population and economic change were located without being distracted by overall growth of U.S. population. But, again, displaying rank alone will downplay the dominance of some of the largest cities in the U.S.

4) Proportional symbol ("unclassed") maps create symbols in direct areal proportion to the data value being mapped.

- Easier to see overall distribution of data from high to low.
- Harder to pick out some patterns such as locations of top 10 or 20 cities
- Hard sometimes to find symbol sizes that will work on map without lots of overlap
- Hard to make comparisons from period to period since U.S. population is increasing in each period.

5) Graduated symbol ("classed") maps group the underlying data in classes and then assign a symbol to each class.

- Easier to pick out cities by size category
- Easier to set symbols that don't overlap excessively
- Easier to use a ranging/classification method that allows comparisons
- Harder to see absolute differences in underlying data distribution

*Using the quantile method (4 or 5) categories allows for the easiest comparisons among periods.*

IV. Use color wisely

1) Cindy Brewer's ColorBrewer allows selection of effective color to show contrasts and sequences.

http://www.personal.psu.edu/faculty/c/a/cab38/ColorBrewer/ColorBrewer.html

V. Regional comparisons

1) Regional comparisons can be made by selecting cities by location

VI. Comparing rank to proximity to major rivers and water bodies.
Proportional Symbol and Graduate Symbol Maps

What are they good for?

Key Decisions

I) What type of symbol is to be used.

- 2-dimensional: circles, squares, bars, etc.
- 3-dimensional: spheres, cubes, etc.
- One can also display multivariable information at points using histograms, pie charts, etc.

Note: There are strengths and weaknesses involved in the choice of shape. Flannery scaling, etc.

II) Should the Data be Classed or Unclassed

- Classed data means the cities are placed in groups (i.e. smallest, largest) and each group receives a symbol, or
  There are a number of systematic ways to class (or range) data

- Unclassed data means that it is displayed in true proportion to the values. The symbol for a rank of 100 would be 100 times the area of the symbol for 1.
  These sorts of map are usually referred to as "Proportional Symbol" maps

There are two methods available: true proportions and what I would call "constrained" proportions.

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