Introduction to Thematic Mapping

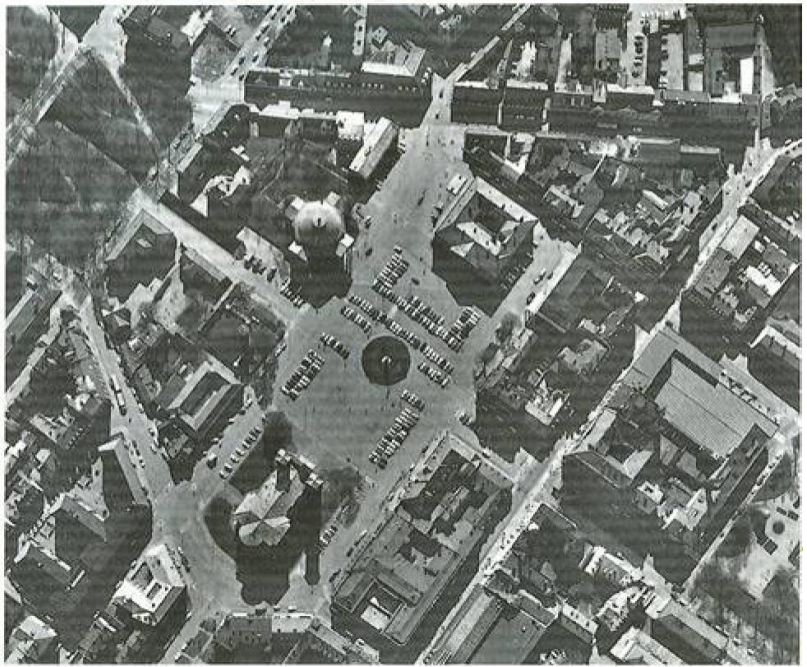
GEOG380 Fall 2018

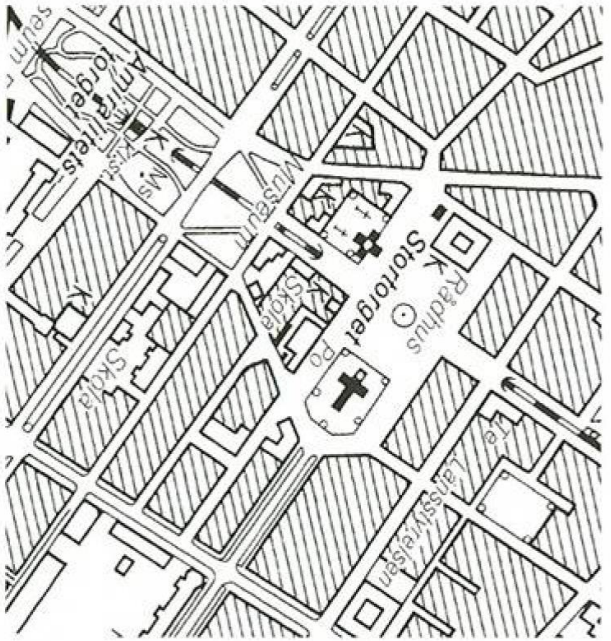
Outline

- What is a map?

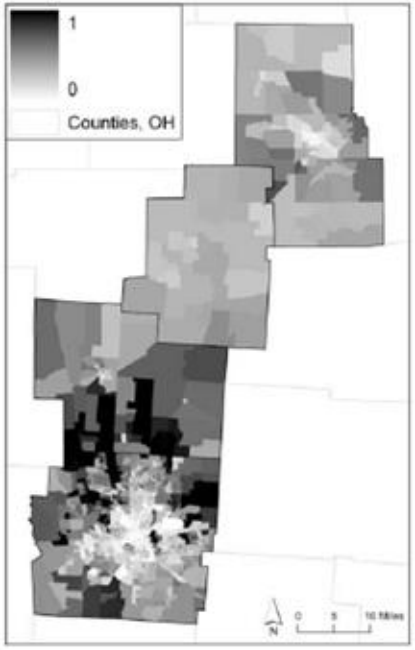
- Thematic mapping
  - Types of thematic map
  - Ways of using maps for thematic representation of space

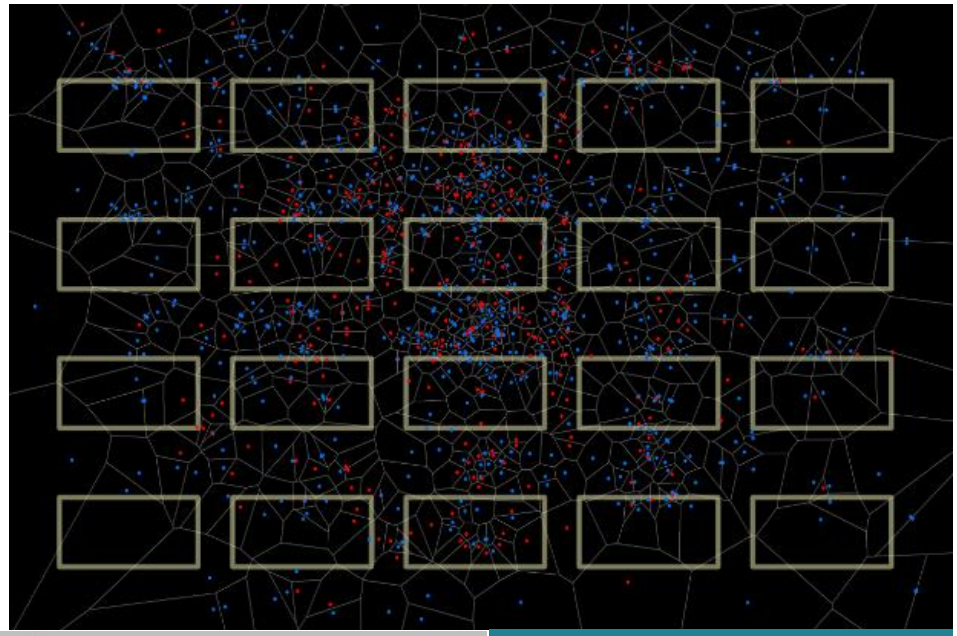
The map – an image of reality

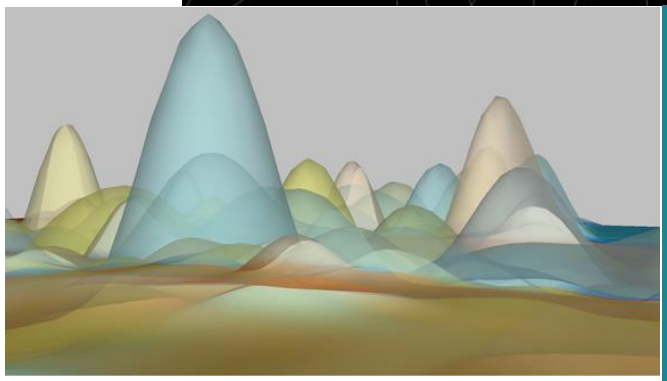


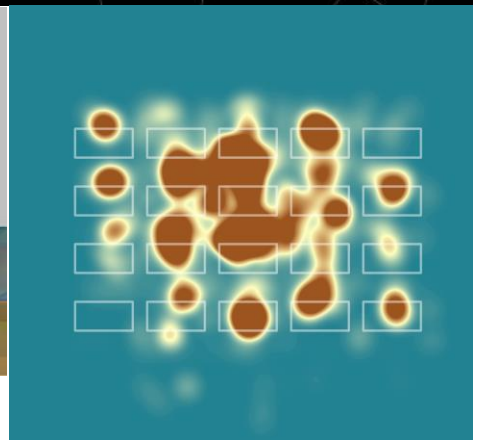


Or, image of some spatial concepts



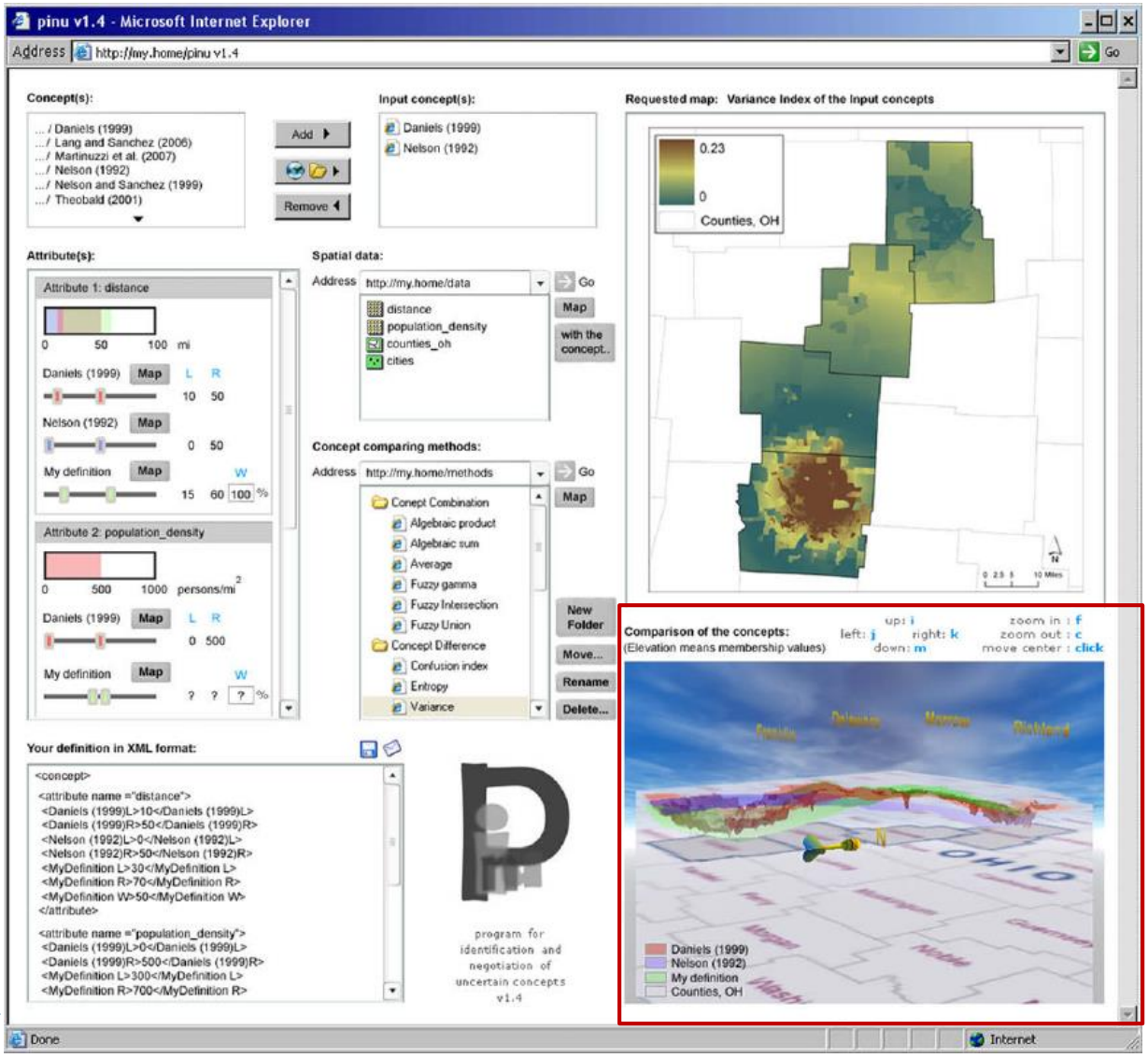






(Source: Ban and Ahlqvist 2009)

…Or image of virtual spatial-concepts, too

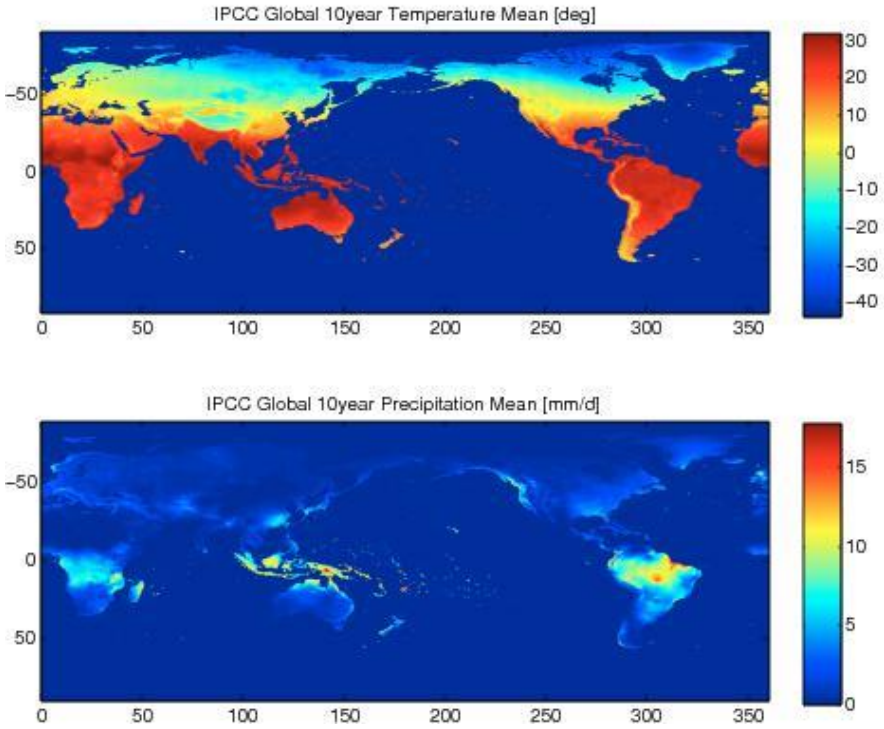


(Source: Ban and Ahlqvist 2009)

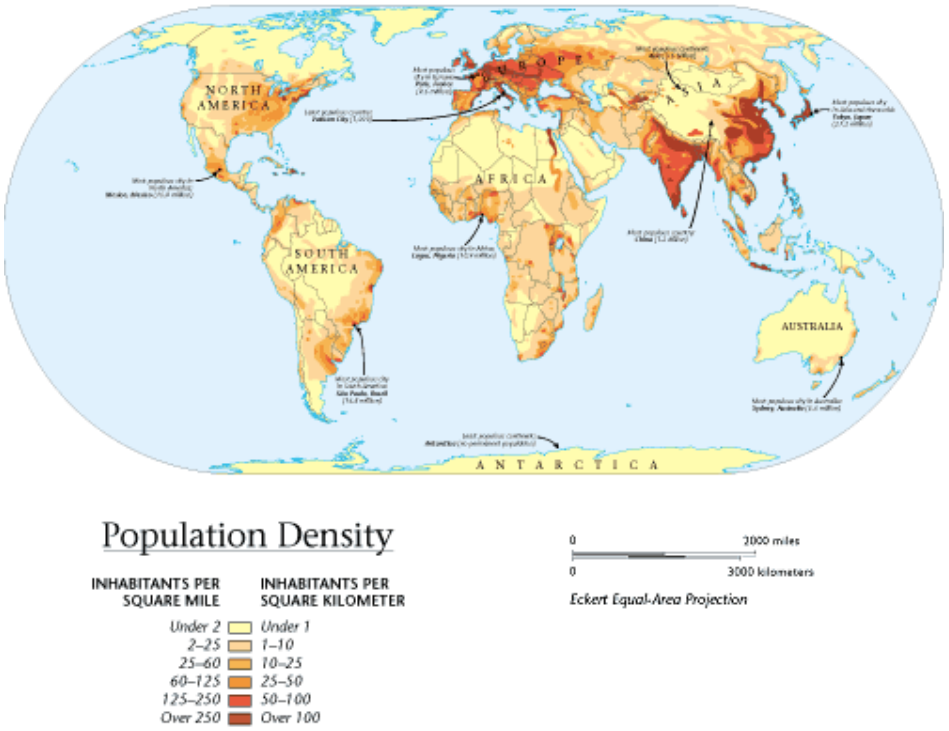
Thematic Mapping

- Maps showing particular themes

Global temperature and precipitation



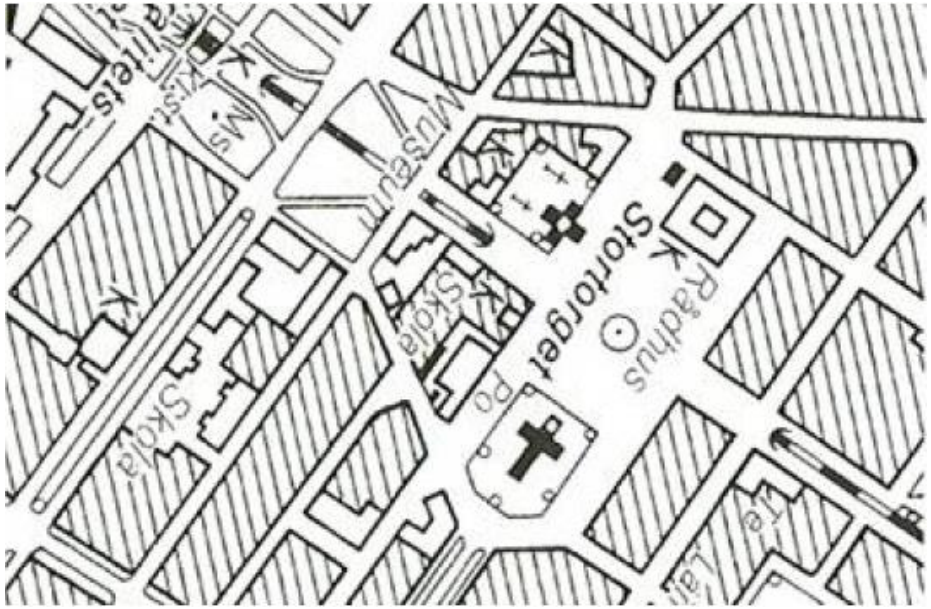
Population density



(source: http://www.mathworks.com/matlabcentral/fileexchange/14874, http://www.nationalgeographic.com/xpeditions/activities/03/popup/population.html)

Traditional views on cartographic communication

- A mostly-linear process from A to Z
- Maps seen as a final step that may be improved



Step 1
Consider what the real-world distribution of the phenomenon might look like

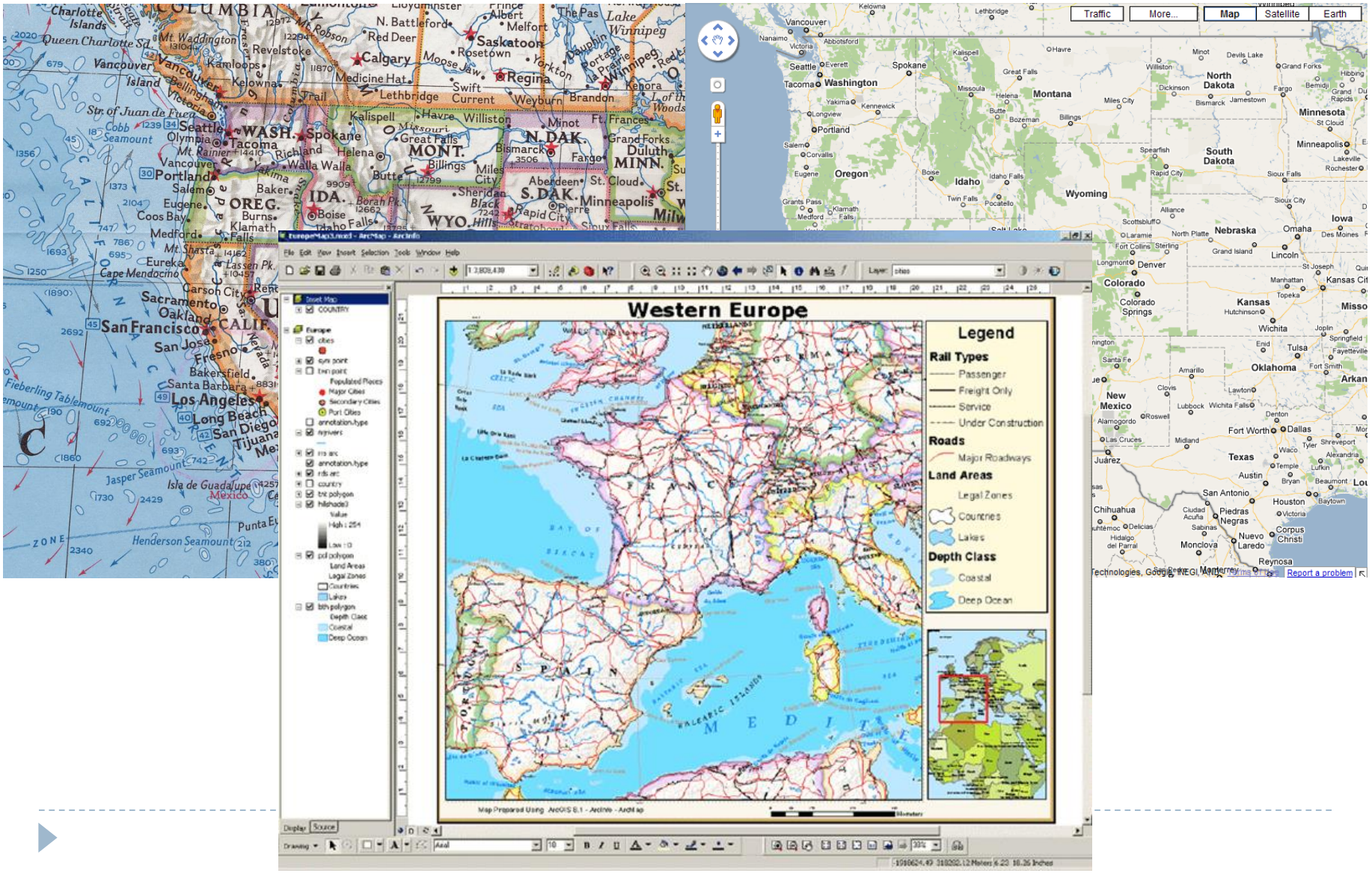
Step 2
Determine the purpose of the map and its intended audience

Step 3
Collect data appropriate for the map's purpose

Step 4
Design and construct the map

Step 5
Determine whether users find the map useful and informative

Maps & GIS, is there a difference?

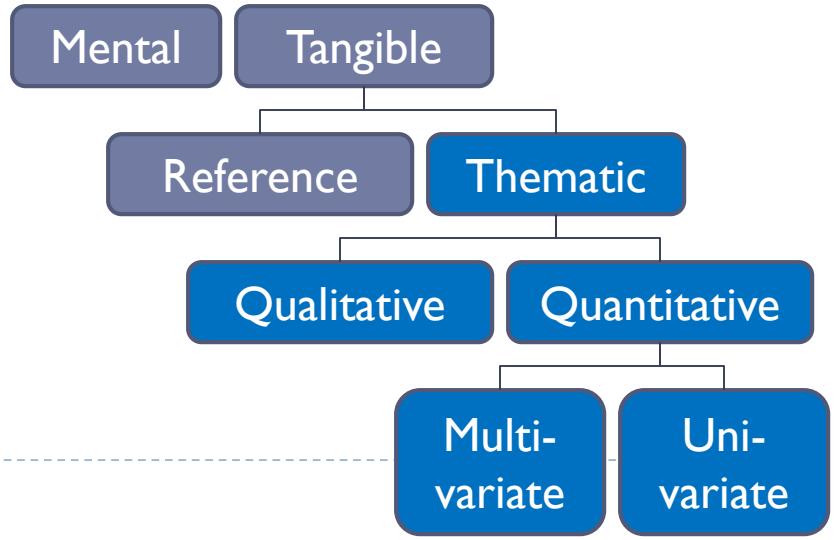


Maps as a model of the world

- Regardless of media (image, map, GIS database) we do not collect the *real* thing
- Abstraction and information reduction are a necessity
- Cartography has a long tradition of doing this, and GIS initially followed this tradition
- Current GIS practice is directed towards a "holistic" database, but still employs a cartographic model that is simplified Information

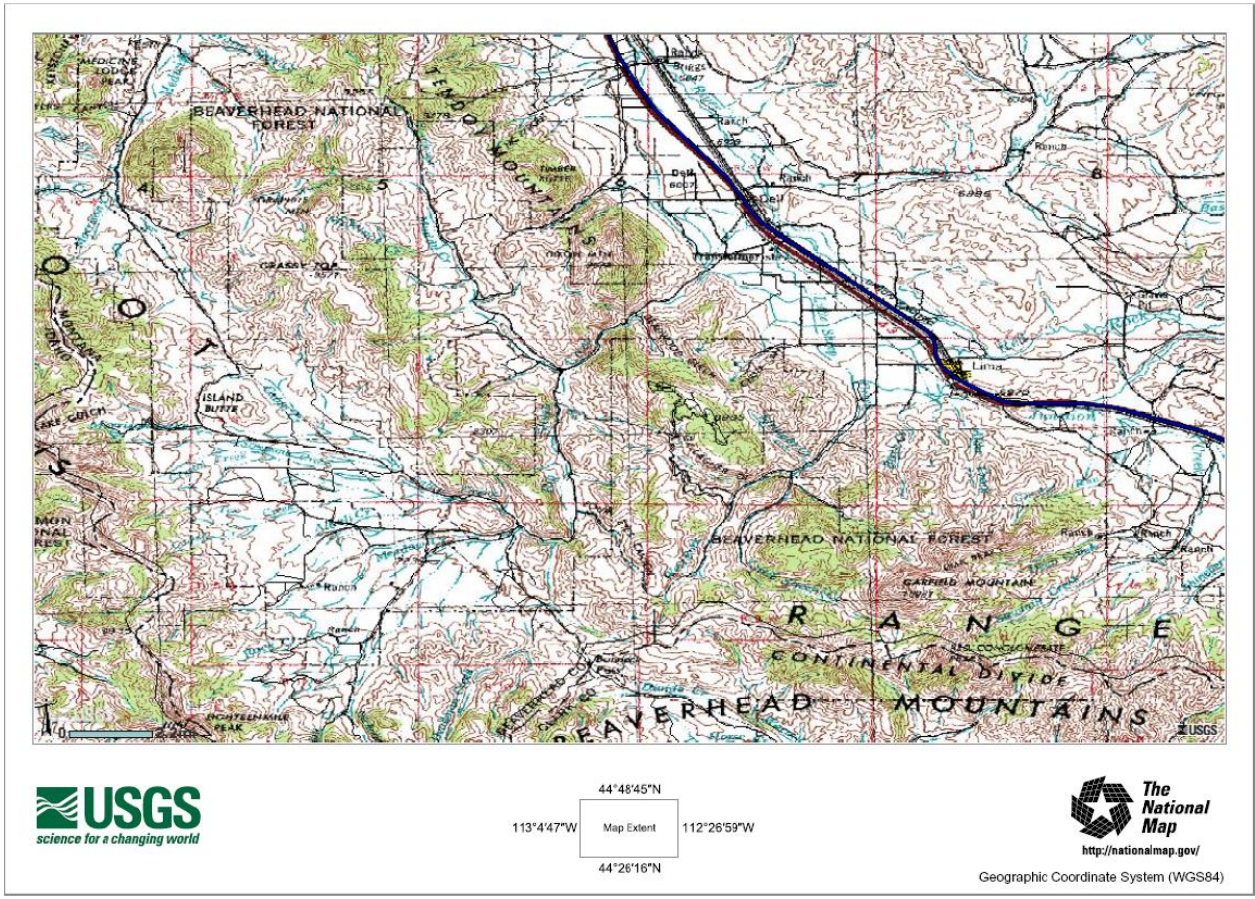
Thematic Maps

- Maps with special purposes
  - Specific/general information
  - Can compare spatial/temporal patterns
- Concentrate on the distribution of a single attribute or the relationships among several attributes of spatial phenomena
  - Vs. general (reference) maps
    - Normally do not include topographic maps
- Traditionally in small scales (e.g., country unit)
  - Recently in large scales (e.g., county unit)



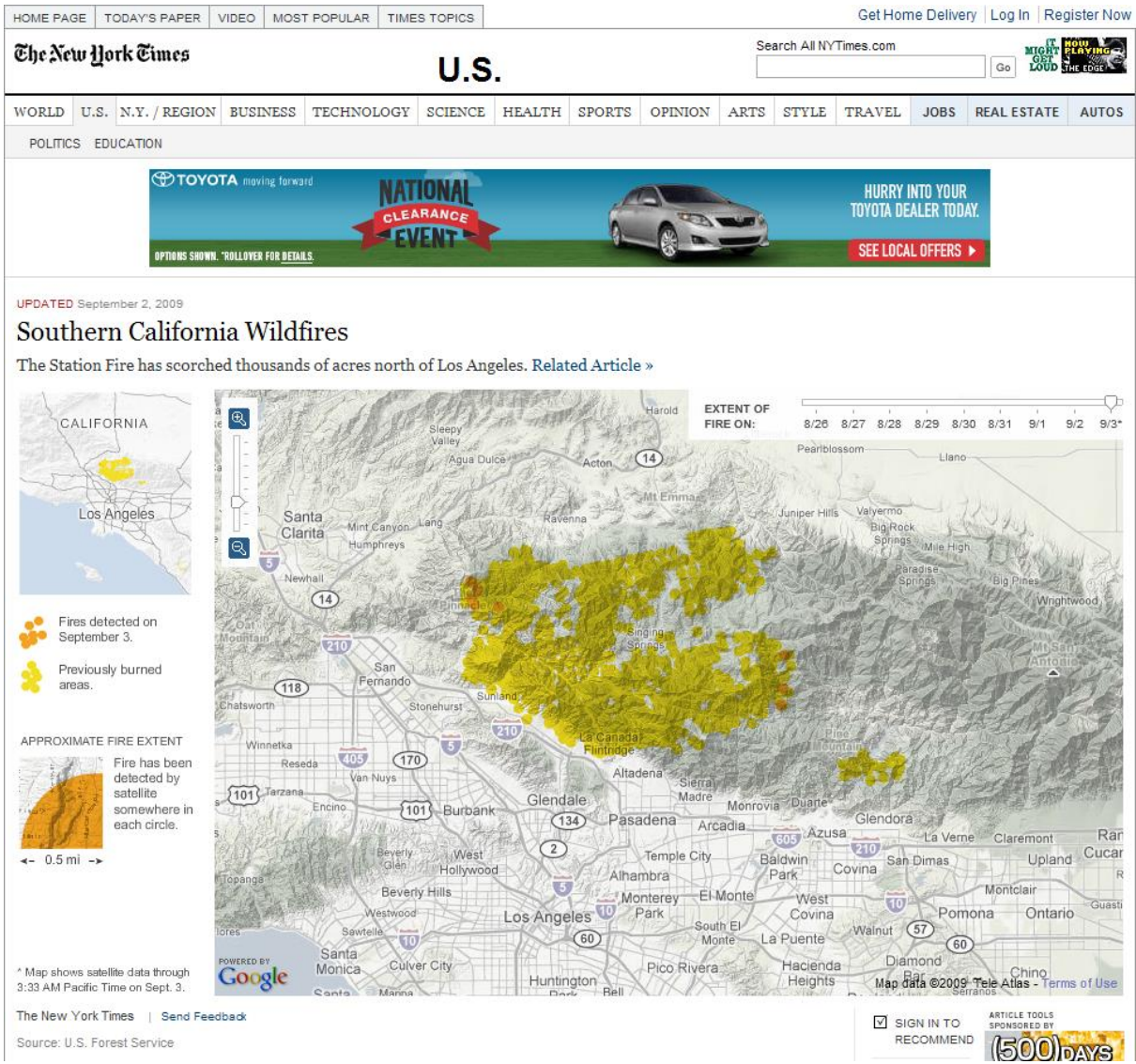
General (reference) maps

- Location
- Topography
- Hydrography
- Transportation
- Settlements
- Etc…



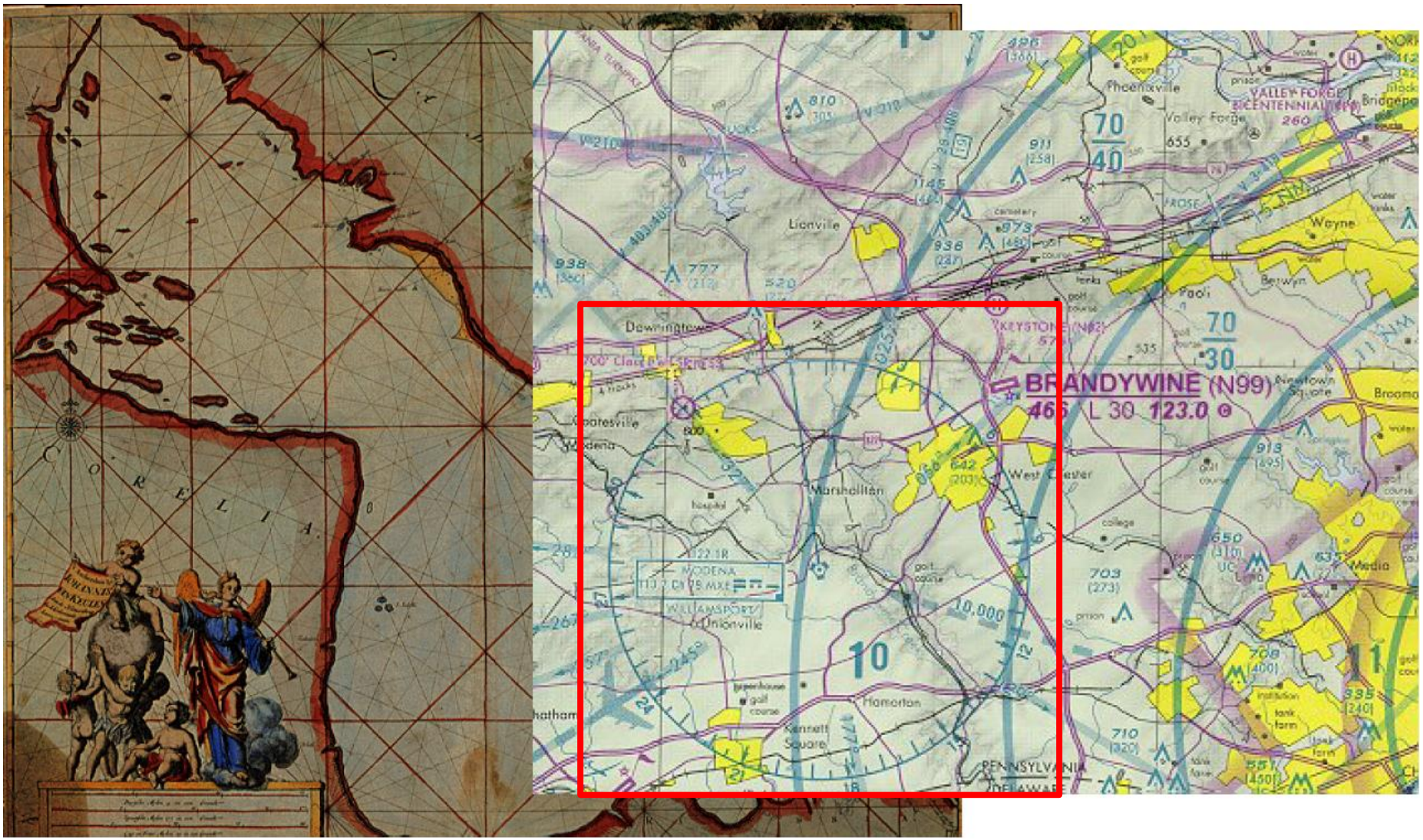
Thematic maps

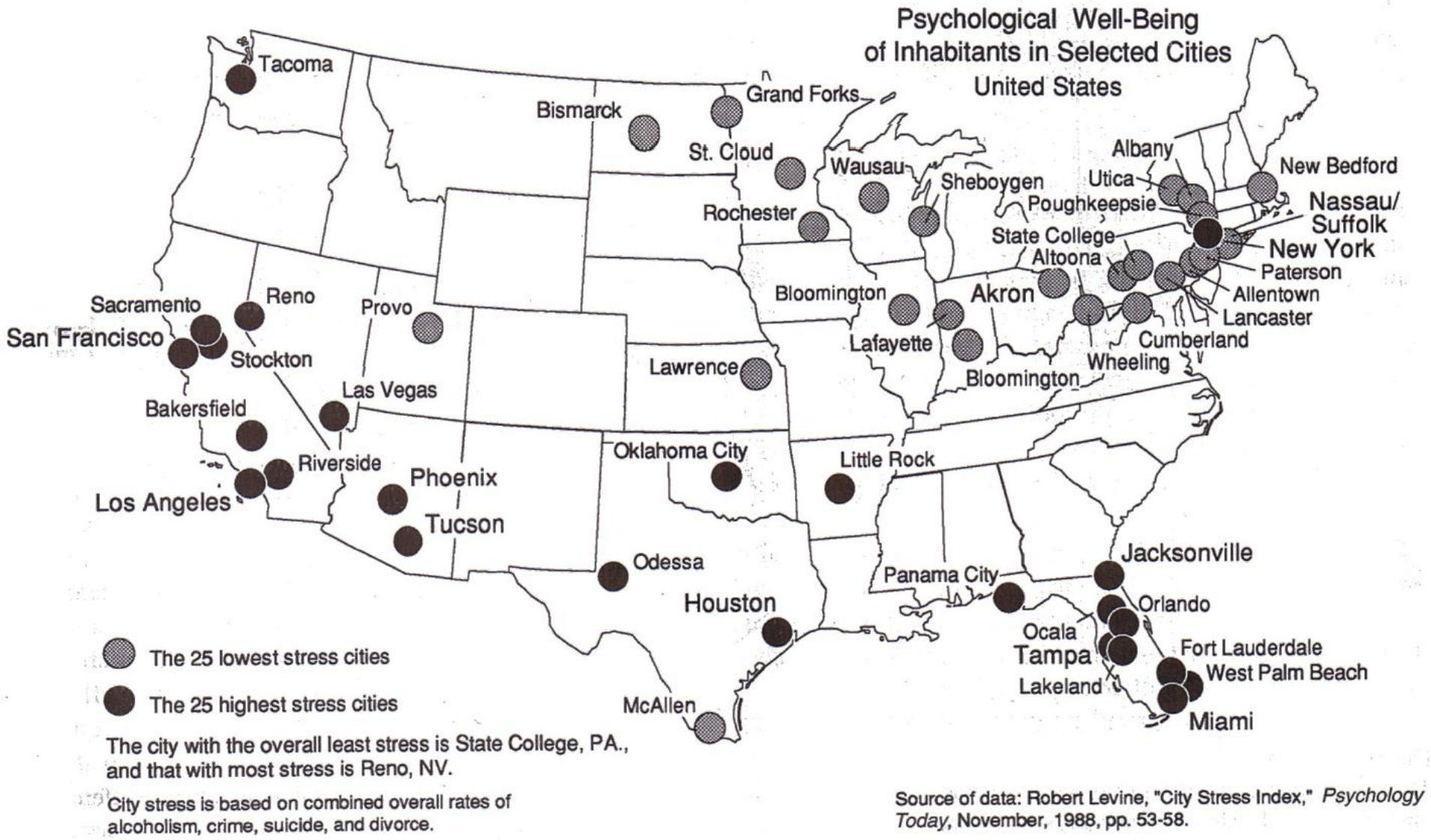
- Special purposes
- Generally show a single topic
  - Univariate maps
- Sometimes several topics
  - Multivariate maps
- Numeric/statistical data



(9/2/2009)

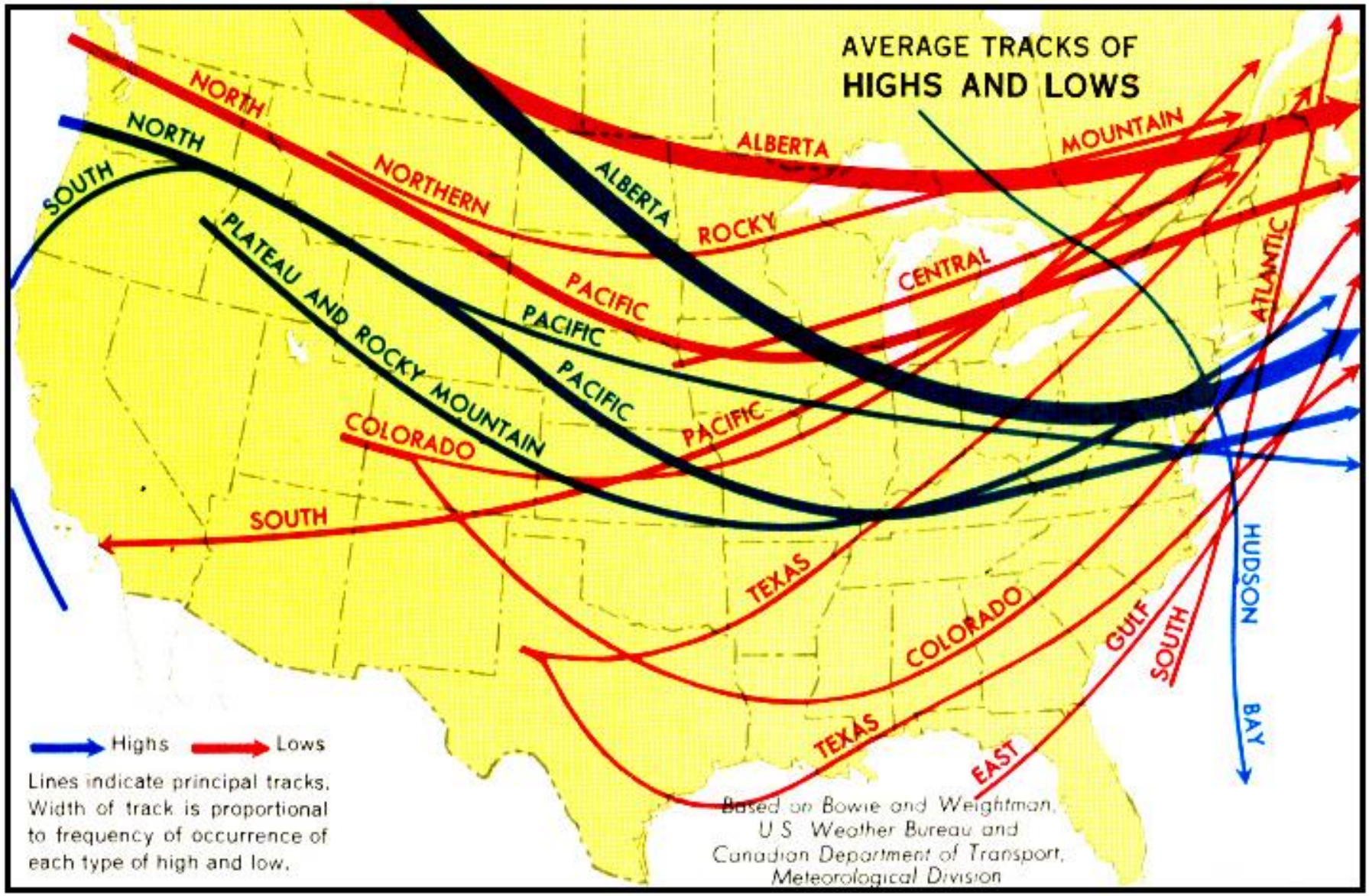
Charts in thematic mapping





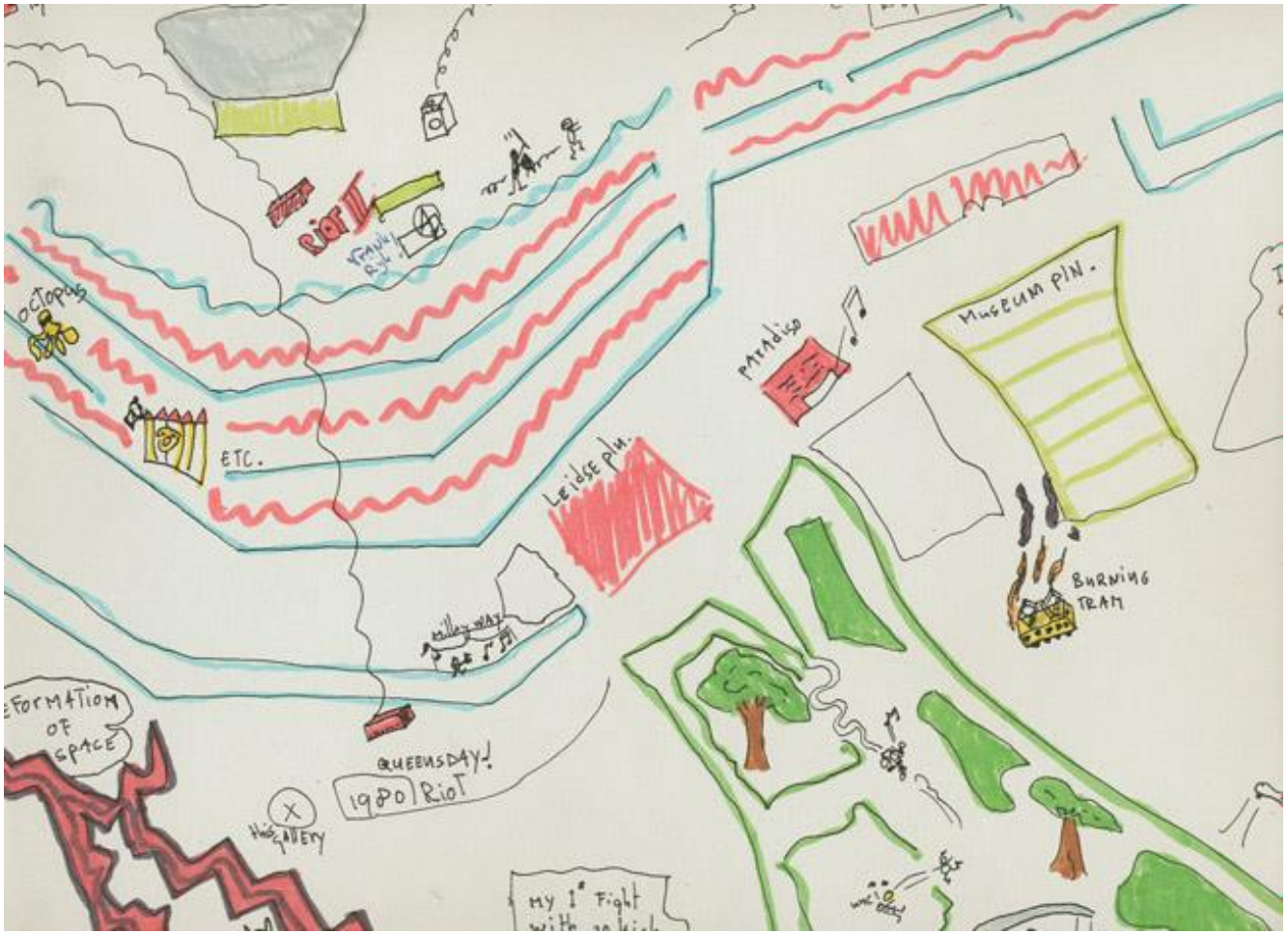
- Thematic maps can be useful to show the spatial distribution and pattern of features (variables) for comparison

More examples of thematic maps (e.g., temperature)



Or, qualitative thematic maps

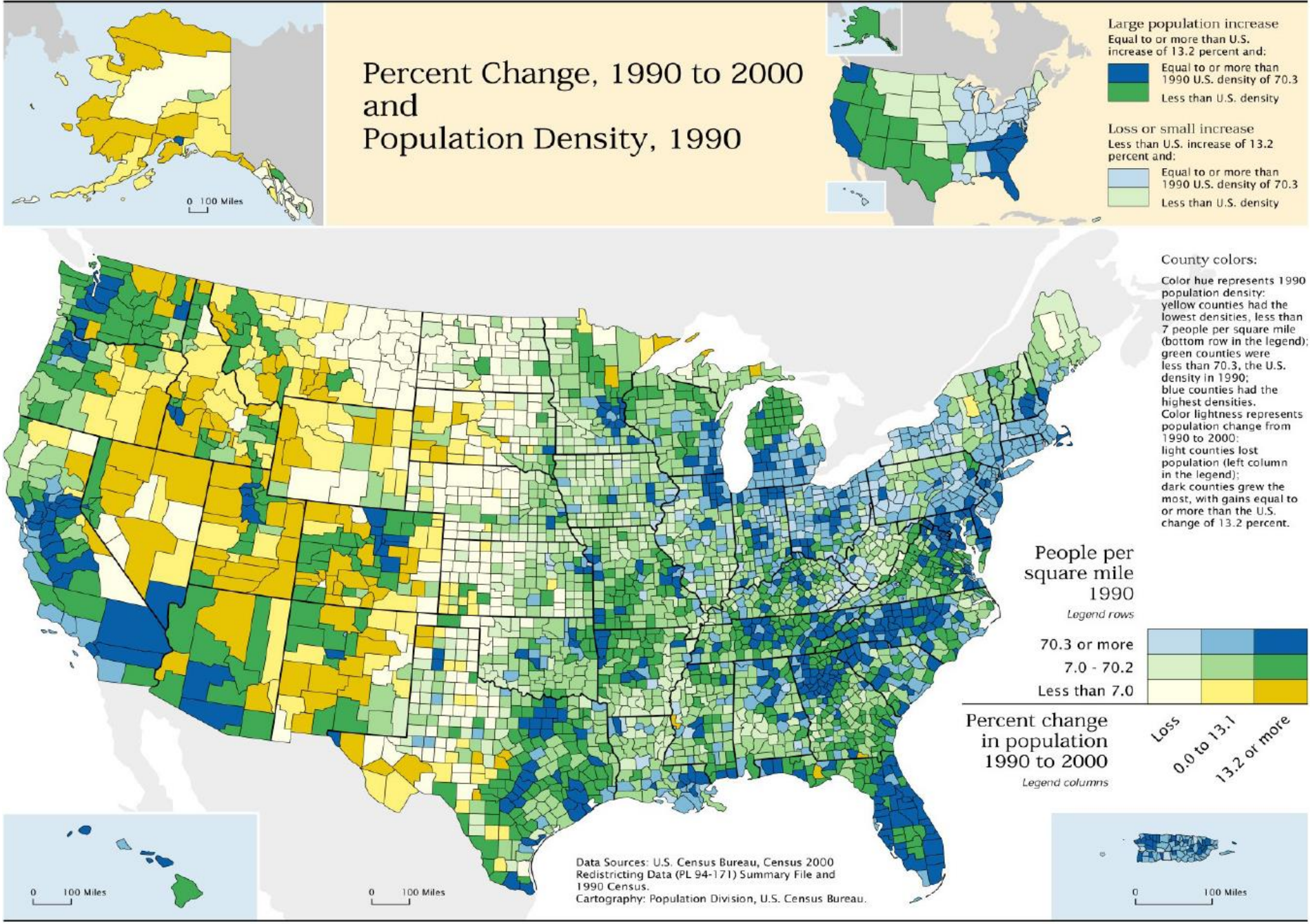
- Mental map of Stephen in Amsterdam, Netherlands



- (source: http://fasica.altervista.org/adam/adam_en.htm)

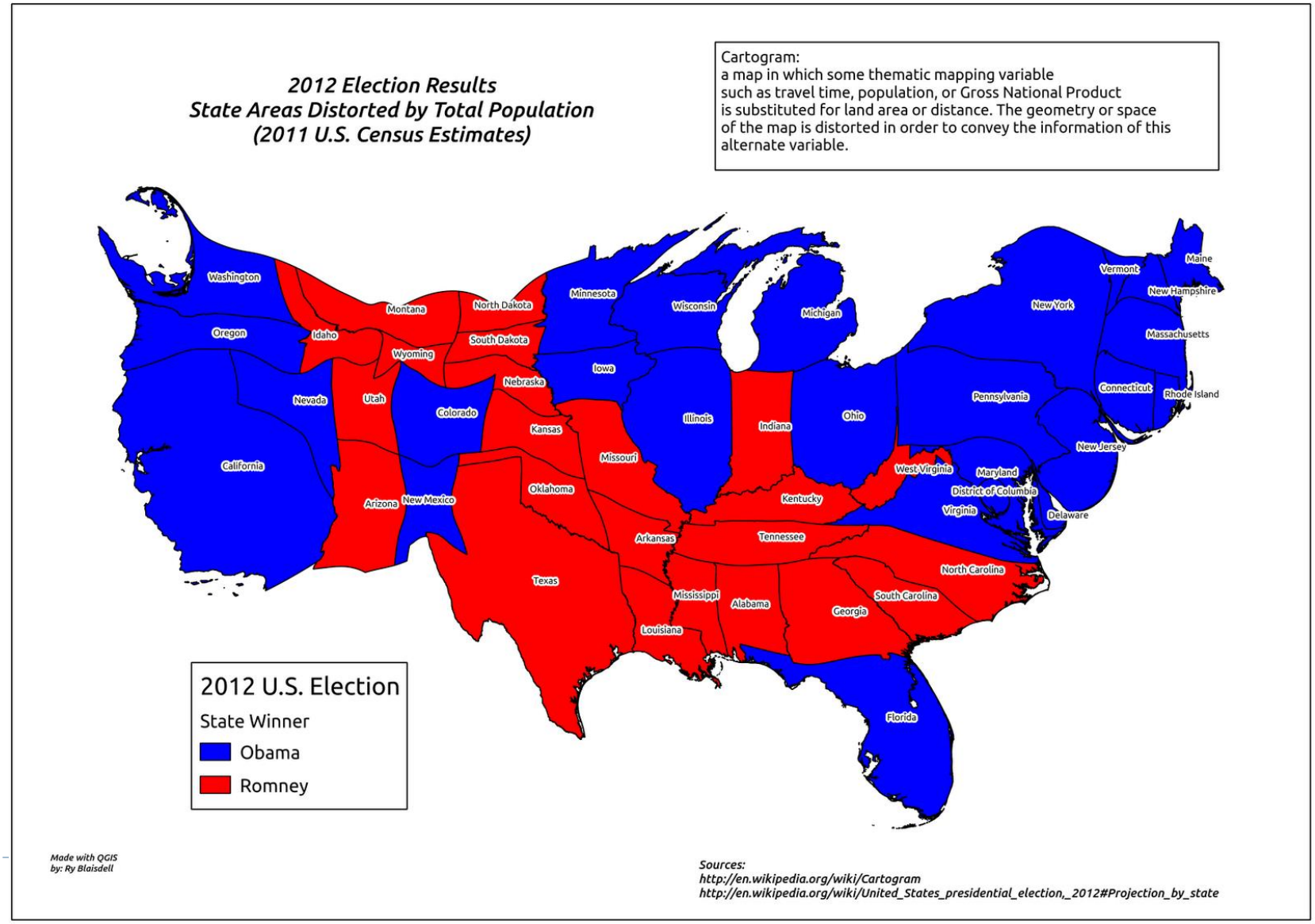
Activity

- Make a group with 3~5 people around you.
- Draw a mental map for a part of campus (5 minutes).
- Find the areas in your mental map from Google Maps and compare with yours.
- How do they look similar or different from each other?
- Take a picture of your group's mental map and send it to hyowon.ban@csulb.edu by tonight so that it can be shared in class.
- Not to be graded

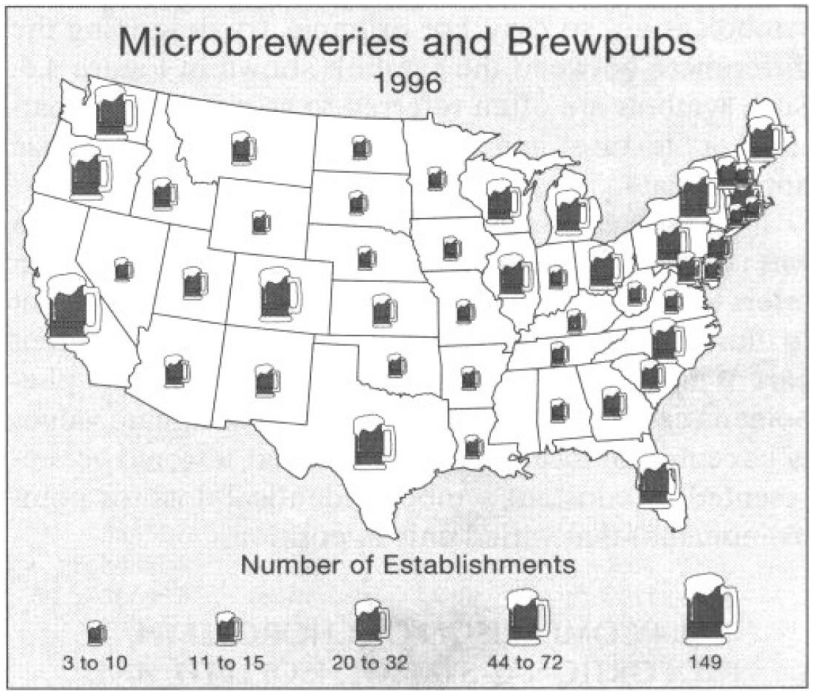


- A multivariate thematic map

Cartogram


2012 Election Results
State Areas Distorted by Total Population
(2011 U.S. Census Estimates)
Cartogram:
a map in which some thematic mapping variable
such as travel time, population, or Gross National Product
is substituted for land area or distance. The geometry or space
of the map is distorted in order to convey the information of this
alternate variable.
Washington
Oregon
California
Nevada
Idaho
Montana
Wyoming
Utah
Arizona
Colorado
New Mexico
North Dakota
South Dakota
Nebraska
Kansas
Oklahoma
Texas
Minnesota
Iowa
Missouri
Arkansas
Louisiana
Wisconsin
Illinois
Michigan
Indiana
Ohio
Kentucky
Tennessee
Mississippi
Alabama
Georgia
Florida
South Carolina
North Carolina
Virginia
West Virginia
Pennsylvania
New York
Maryland
District of Columbia
Delaware
New Jersey
Connecticut
Rhode Island
Massachusetts
Vermont
New Hampshire
Maine
2012 U.S. Election
State Winner
Obama
Romney
Made with QGIS
by: Ry Blaisdell
Sources:
http://en.wikipedia.org/wiki/Cartogram
http://en.wikipedia.org/wiki/United_States_presidential_election,_2012#Projection_by_state

Symbology for thematic maps

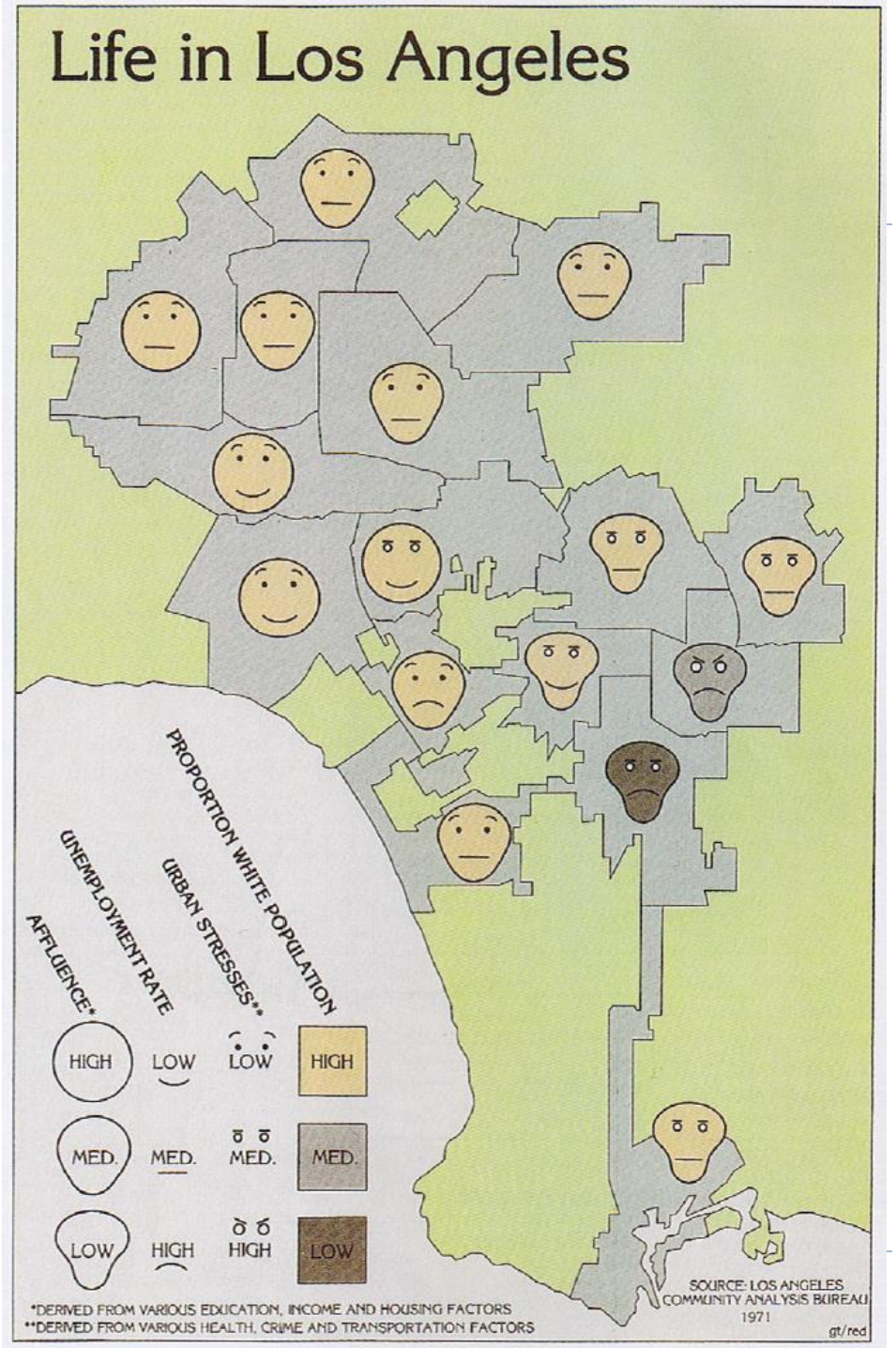


- Microbreweries and Brewpubs (1996)

  (source: unknown)

- "The Best Bear State" by Jim (May 19, 2010)

  (source: http://beerandwhiskeybros.com/2010/05/19/the-best-beer-state/)



- Multivariate thematic map using multiple symbols using Chernoff faces (Chernoff, 1973)

- Do you agree?
- A map in this year…?

Chernoff, H. (1973). The Use of Faces to Represent Points in K-Dimensional Space Graphically. *Journal of the American Statistical Association*, American Statistical Association, 68(342), 361–368.

Summary

- Thematic mapping
  - Types of thematic maps
  - Things to consider when producing a thematic map

- Mental maps review (next time)

ArcGIS Practice

- To get started with digital mapping using software
  - BeachBoard > Class Resources > ArcGIS Practice.pdf, LA_2010_shapefiles.zip

- How to add data on ArcMap
  - BeachBoard > Class Resources

Until next time…

- Make sure that you can do all things mentioned in the ArcGIS Practice.pdf to add, reorder, change symbology, and save your work as a MXD file in ArcMap
  - They are essential to do the labs!

- Readings
  - Slocum et al. (2009), Ch. 1 and 3

- Another application of mapping:
  "The Known Universe" by AMNH (American Museum of Natural History)
  - http://www.youtube.com/watch?v=17jymDn0W6U
  - "The Known Universe takes viewers from the Himalayas through our atmosphere and the inky black of space to the afterglow of the Big Bang. Every star, planet, and quasar seen in the film is possible because of the world's most complete four-dimensional map of the universe, *the Digital Universe Atlas* that is maintained and updated by astrophysicists at the American Museum of Natural History."