Data Symbolization

- Simplifying reality requires cartographers to use symbols to represent features.
- This can be performed upon raster and vector (points, lines, and polygons) data.
- Symbolization can emphasize a visual connection to reality or be abstract.

https://www.e-education.psu.edu/maps/l5_p3.html
# Data Symbolization

<table>
<thead>
<tr>
<th>Feature Type</th>
<th>Size</th>
<th>Pattern Texture</th>
<th>Color Lightness</th>
<th>Color Saturation</th>
<th>Graphic Element</th>
<th>Orientation</th>
<th>Color Hue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Point</td>
<td>Small Low</td>
<td>Coarse Low</td>
<td>Light Low</td>
<td>Pale Low</td>
<td>• Spring</td>
<td>• Live Tree</td>
<td>• Live Tree</td>
</tr>
<tr>
<td></td>
<td>Large High</td>
<td>Fine High</td>
<td>Dark High</td>
<td>Intense High</td>
<td>• House</td>
<td>• Dead Tree</td>
<td>• Dead Tree</td>
</tr>
<tr>
<td>Line</td>
<td>Medium High</td>
<td>Medium High</td>
<td>Medium High</td>
<td>Medium High</td>
<td>National Border</td>
<td>National Border</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low High</td>
<td>Low High</td>
<td>Low High</td>
<td>Low High</td>
<td>Trail</td>
<td>State Border</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>Section Line</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>High Medium</td>
<td>High Medium</td>
<td>High Medium</td>
<td>High Medium</td>
<td>Concrete Road</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td>High Medium</td>
<td>Medium High</td>
<td>Medium High</td>
<td>Medium High</td>
<td>Gravel</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low Medium</td>
<td>Low Medium</td>
<td>Low Medium</td>
<td>Low Medium</td>
<td>Sand</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>High Medium</td>
<td>Medium High</td>
<td>Medium High</td>
<td>Medium High</td>
<td>Orchard</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low Medium</td>
<td>Low Medium</td>
<td>Low Medium</td>
<td>Low Medium</td>
<td>Field Crop</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Water</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Size Scaling Tips

- too small and it will be hard to see patterns (top left)
- too large and it will cause overlapping symbols (top right)
- Ideally you want a slight overlap in the most crowded area of the map (bottom)
Pattern Texture Tips

• Can mimic the real world
• Shading & color intensity can indicate importance
• Can also be used in multivariate symbology – e.g. to show uncertainty
Choosing Color Tips

• Colors on maps should correspond to the type of data
  • **qualitative vs. quantitative**

• Three major color schemes:
  • qualitative (categories)
  • sequential (less > more)
  • diverging (above/below)

[Diagram showing types of color schemes: Discrete Classes, Sequential, Diverging]

https://morphocode.com/tag/cartography/
Qualitative Color Example

Does this make sense for the data?

https://www.futurelearn.com/courses/maps-geospatial-revolution/0/steps/30211
Sequential Color Example

Does this make sense for the data?

https://www.futurelearn.com/courses/maps-geospatial-revolution/0/steps/30211
Diverging Color Example

Does this make sense for the data?

https://www.futurelearn.com/courses/maps-geospatial-revolution/0/steps/30211
## Color Lightness Tips

![Color Lightness Tips Diagram](image)

**Brightness Difference Values**
- ✓ Acceptable Brightness Difference (125 or greater)

<table>
<thead>
<tr>
<th>Text Color</th>
<th>Background Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow</td>
<td>Y-W 29</td>
</tr>
<tr>
<td>Orange</td>
<td>O-W 104</td>
</tr>
<tr>
<td>Red</td>
<td>R-W 79</td>
</tr>
<tr>
<td>Green</td>
<td>G-W 105</td>
</tr>
<tr>
<td>Cyan</td>
<td>C-W 76</td>
</tr>
<tr>
<td>Magenta</td>
<td>M-W 150</td>
</tr>
<tr>
<td>Blue</td>
<td>B-W 226</td>
</tr>
<tr>
<td>Indigo</td>
<td>I-W 113</td>
</tr>
<tr>
<td>Violet</td>
<td>V-W 188</td>
</tr>
<tr>
<td>Brown</td>
<td>B-R 153</td>
</tr>
<tr>
<td>Black</td>
<td>Bk-W 255</td>
</tr>
</tbody>
</table>

**Introduction » Maps & Data » Making Maps » Software » Exercise » Discussion**
Shape Tips

- Consider what can/can’t be discerned at different scales
- A person can only handle so many unique shapes in a single map

A

Geometric

B

Mimetic

C

Pictographic

D

Exercise » Discussion

Introduction » Maps & Data » Making Maps » Software » Exercise » Discussion
Size, Shape, & Color Example

Mimetic Proportional  
Geometric Proportional  
Geometric Graduated

Santa Rosa  Napa  Fairfield  
San Rafael  Martinez  
San Francisco  Oakland  
Redwood City  San Jose

Size: 60,000 - 860,000  
100,000 - 480,000
Map Design Example
Text On Maps Tips

• Designing text on maps is a major aspect of cartography

• Choosing fonts and positioning labels can be a daunting task
Map Layout Design Example

• One of the first steps in mapmaking is to develop a balanced layout

• Maps, title, legend, scale bar, text, etc. all need relative positioning and sizing

• Goal is to design the general layout to support your design questions

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