Web Mapping: Finding the Balance

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Our Goals

- Enable people to make brilliant maps quickly and with confidence.
- Simplify the map authoring experience.
- Data driven workflows = the right choices at the right time.
- Bake the expertise into the tools.
Open Questions

• How much of the map making process can we automate?

• How much about your data can we infer at author-time?

• What cartographic rules can be rewritten?

• Offload tedium and expertise to the software
Today

- Offering the Best Data-Driven Choices
- Automating Multiscale Thematic Maps
- Harmonizing Colors in a Tile-Based World
- Classed AND Unclassed (not versus!)
- New kinds of Color Ramps / Stories
- Automating Dot Density Maps across Scales
Our Expectations of Technology

Don’t make me think. Don’t waste my time. I just want it to work.

Steve Krug (2000)
The Simplest User Experience Wins
The Simplest User Experience Wins

- What are the core controls that ALL authors need
- What are the controls only ADVANCED authors need
- What can we just do for the author – fewer buttons, not more
21st Century Cartography

Smart Defaults

Baking-in the Expertise

Technology Partnership
Technology Partnership
Defaults Matter
Success?

You should love the defaults (even if you are an expert)

You should succeed (even if you’re not an expert)
I have some data, I don't know much about GIS or cartography, can you help me?
Problem #1

Given my data, what kind of maps are appropriate?
Solution: Matching Data to Maps

- Thematic data present?
- Level of Measurement?
- Points / Lines / Areas?
Solution:
Data-Driven Choices

Visual options +
See your map in 1 or 2 clicks!
What story do you want to tell...

Show Me Where
Show Me What
Show Me When
Show Me How Much
#1 Why This Matters

There is no single best way to represent data

AND, changing the map type, changes the story you tell
Problem #2

20 Zoom Levels are great! But…

• How many do you need?
• What are the absolute limits?
• How to draw?
#2

Automating Multiscale Thematic Maps

suggested scale range
#2 Example
#2 Solution
#2 Demo

| Points | Lines | Polygons |
Problem #3

Color makes or breaks a map...

..and most data sits on tiles, making it even more difficult.
New Schemes Needed

- Reduced Transparency
- Not Clash with Tiles
- Remain Legible
Diverging Choropleth

National Geographic

Areas Lines Points

Primary Color Scheme | Border Color | Fill Opacity
--- | --- | ---
div-orange-yellow-blue-light | rgba(153,153,153,1.0) @ 0.5px | 0.80

Unclassed Ramp

Classed Ramps

Other Diverging Choropleth 1

Other Diverging Choropleth 2

Other Diverging Choropleth 3
**Dark Basemaps**

- **Primary Color Scheme**: cat-light
- **Stroke Color**: rgba(26, 26, 26, 1.0) @ 1 px
- **Size**: 8 px

**Streets**

- **Primary Color Scheme**: seq-yellow-orange-red
- **Border Color**: rgba(153, 153, 153, 1.0) @ 0.5 px
- **Fill Opacity**: 0.80

**Unclassed Ramp**

**Classed Ramps**
Group Similar Choropleth

All Basemaps

Primary Color Scheme | Border Color | Fill Opacity
--- | --- | ---
rainbow | rgba(153,153,153,1.0) @ 0.5px | 0.80

spectral

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elevation-warm-humid

precipitation

bathymetry
Problem #4

Classification is a product of limited technology, and hard to explain, and hard to defend (but it still has a useful role!)

Let the data speak for itself!
Perceptual Issues

- Limited Visual Discrimination
- Simultaneous Contrast
- Ebbinghaus Illusion
The Ebbinghaus Illusion: How does this affect map reading?
We’re pretty terrible at reading maps!
Matching with a legend is hard!
#4 Solutions

Interactivity +

“Bounded” Unclassed and Proportional Symbol
#4

‘Bounded’ Ramps
#4

‘Bounded’ Sizes
‘Bounded’ Sizes
ave - stddev

ave + stddev
National park and monument visitor count in 2013
Problem #5

Tiles
+ Opacity
+ Interactivity =
New Opportunities
Highlight Choropleth

**Streets**

<table>
<thead>
<tr>
<th>Areas</th>
<th>Lines</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

**Primary Color Scheme**
highlight-orange

**Border Color**
rgba(153,153,153,1.0) @ 0.5px

**Unclassed Ramp**

**Classed Ramps**

Other Highlight Choropleth 1: Fade to Transparent

Other Highlight Choropleth 2: Fade to Gray

Other Highlight Choropleth 3: Fade to Gray
Topographic

**Areas**  Lines  Points

Primary Color Scheme  Border Color
extremes-orange  rgba(153,153,153,1.0) @ 0.5px

Unclassed Ramp

Classed Ramps

Other Extremes Choropleth 1: Fade to Transparent

Other Extremes Choropleth 2: Fade to Gray

Other Extremes Choropleth 3: Fade to Gray
#5 Demo

US Median Age

HIGHLIGHT | EXTREMES
Problem #6

Dot Density is hard to get right, and…

…much harder across multiple map scales

Too Small  Good  Too Large
#6

Example
#6 Example
#6
Example

![Map interface with人口分布数据](image)

- **SHOW**
  - Population 0 - 10 Years
  - Population 11 - 20 Years
  - Population 21 - 30 Years

- **ZOOM LEVEL**
  - Countries: 200
  - States / Provinces: 180
  - Counties: 170
  - Metro Area: 160

- **DOT SIZE**
  - Countries: 200
  - States / Provinces: 170
  - Counties: 160
  - Metro Area: 150

- **TRANSPARENCY**
  - 100%

- **VISIBLE RANGE**
  - 50%

- **GLOBE**
  - CITY

Show densest location: Dots should just start to coalesce
#6

Making Awesome Dot Density Maps Automatically!

LA County Asian Population
Online Demos

LA County Asian Population

US Median Age: HIGHLIGHT | EXTREMES

National park and monument visitor count in 2013

Zoom Levels Points | Lines | Polygons
Thank you!

Please fill out the session survey

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