

# Selecting an Appropriate Color Scheme

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# Selecting a Palette

<https://bl.ocks.org/mbostock/5577023>

- Categorical
- Sequential
- Diverging
- Continuous/quantitative

# Categorical Color Encoding

## Color Name Distance

														Salience	Name
<b>0.00</b>	1.00	1.00	1.00	0.96	1.00	1.00	0.99	1.00	0.19				.47	blue 65.3%	
1.00	<b>0.00</b>	1.00	0.98	1.00	1.00	1.00	1.00	0.97	1.00				.87	orange 92.2%	
1.00	1.00	<b>0.00</b>	1.00	1.00	1.00	1.00	1.00	0.70	0.99				.70	green 81.3%	
1.00	0.98	1.00	<b>0.00</b>	1.00	0.96	0.99	1.00	1.00	1.00				.64	red 79.3%	
0.96	1.00	1.00	1.00	<b>0.00</b>	0.95	0.83	0.98	1.00	0.97				.43	purple 52.5%	
1.00	1.00	1.00	0.96	0.95	<b>0.00</b>	0.99	0.96	0.96	1.00				.47	brown 60.5%	
1.00	1.00	1.00	0.99	0.83	0.99	<b>0.00</b>	1.00	1.00	1.00				.47	pink 60.3%	
0.99	1.00	1.00	1.00	0.98	0.96	1.00	<b>0.00</b>	1.00	0.99				.74	grey 83.7%	
1.00	0.97	<b>0.70</b>	1.00	1.00	0.96	1.00	1.00	<b>0.00</b>	1.00				.11	yellow 20.1%	
<b>0.19</b>	1.00	0.99	1.00	0.97	1.00	1.00	0.99	1.00	<b>0.00</b>				.25	blue 27.2%	
													Average	0.96	
														.52	

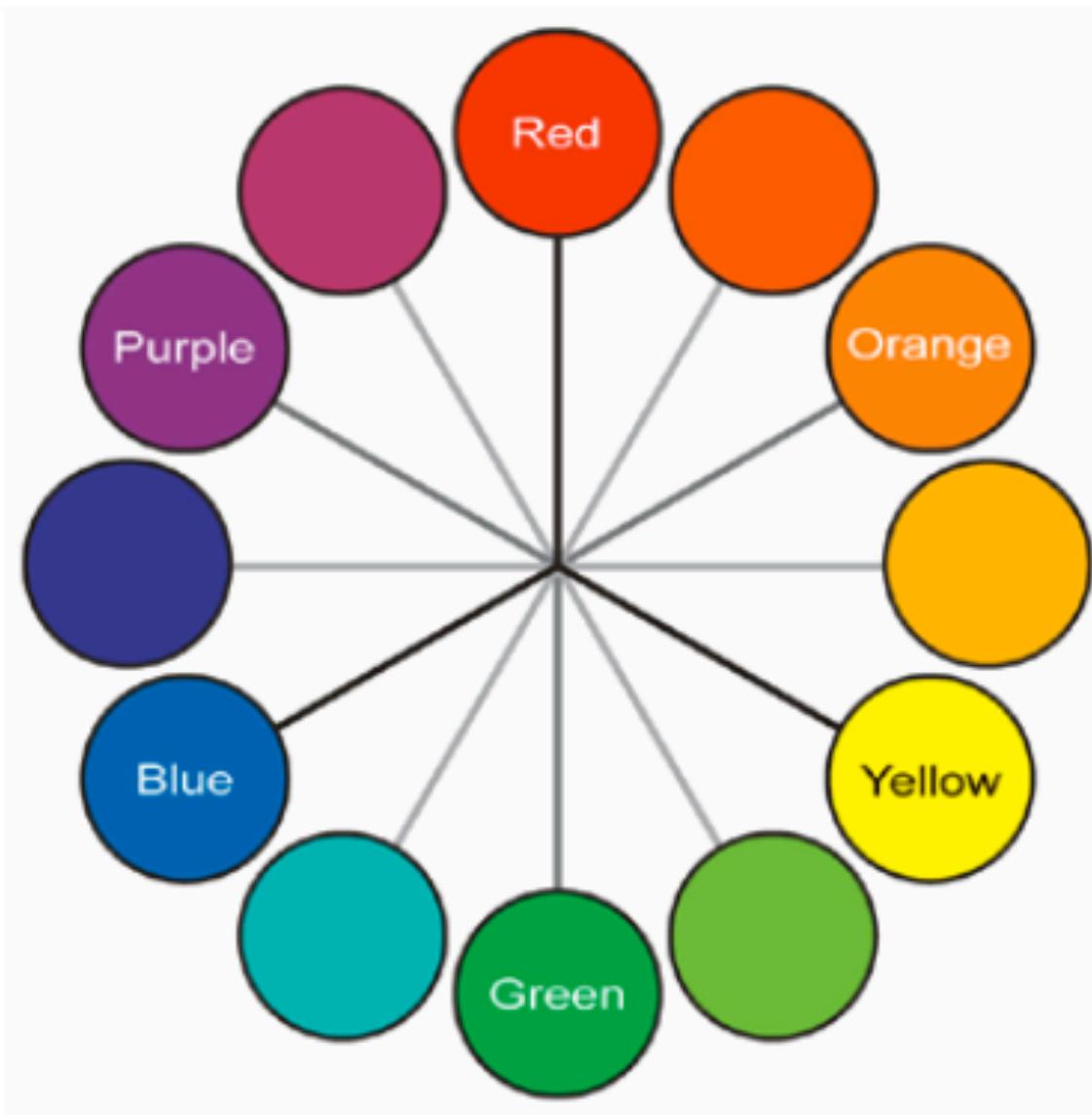
Tableau-10

## Color Name Distance

														Salience	Name
<b>0.00</b>	1.00	1.00	0.89	<b>0.08</b>	1.00	<b>0.19</b>	1.00	1.00	0.88				.44	blue 61.5%	
1.00	<b>0.00</b>	0.99	1.00	1.00	0.81	1.00	<b>0.78</b>	1.00	0.99				.21	red 21.1%	
1.00	0.99	<b>0.00</b>	1.00	0.98	0.99	1.00	1.00	<b>0.10</b>	1.00				.39	green 42.8%	
0.89	1.00	1.00	<b>0.00</b>	0.92	1.00	<b>0.80</b>	0.84	1.00	<b>0.31</b>				.42	purple 57.8%	
<b>0.08</b>	1.00	0.98	0.92	<b>0.00</b>	1.00	<b>0.21</b>	1.00	0.97	0.88				.24	blue 40.4%	
1.00	0.81	0.99	1.00	1.00	<b>0.00</b>	1.00	0.92	1.00	1.00				.28	orange 36.3%	
<b>0.19</b>	1.00	1.00	<b>0.80</b>	<b>0.21</b>	1.00	<b>0.00</b>	0.94	0.97	0.58				.16	blue 25.6%	
1.00	<b>0.78</b>	1.00	0.84	1.00	0.92	0.94	<b>0.00</b>	0.99	0.76				.10	pink 21.8%	
1.00	1.00	<b>0.10</b>	1.00	0.97	1.00	0.97	0.99	<b>0.00</b>	0.96				.21	green 30.8%	
0.88	0.99	1.00	<b>0.31</b>	0.88	1.00	0.58	0.76	0.96	<b>0.00</b>				.25	purple 22.7%	
													Average	0.86	
														.27	

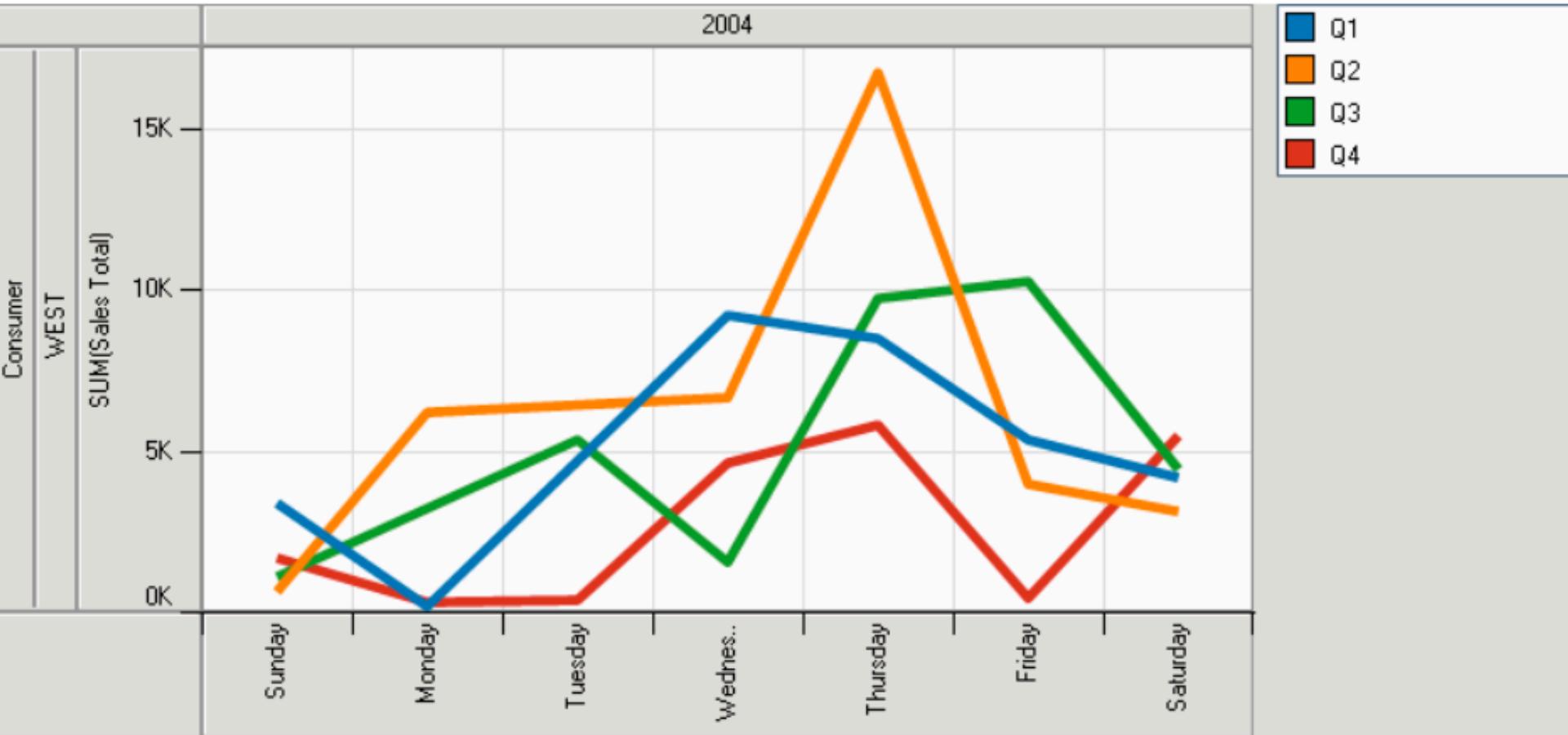
Excel-10

<http://vis.stanford.edu/color-names/analyzer/>



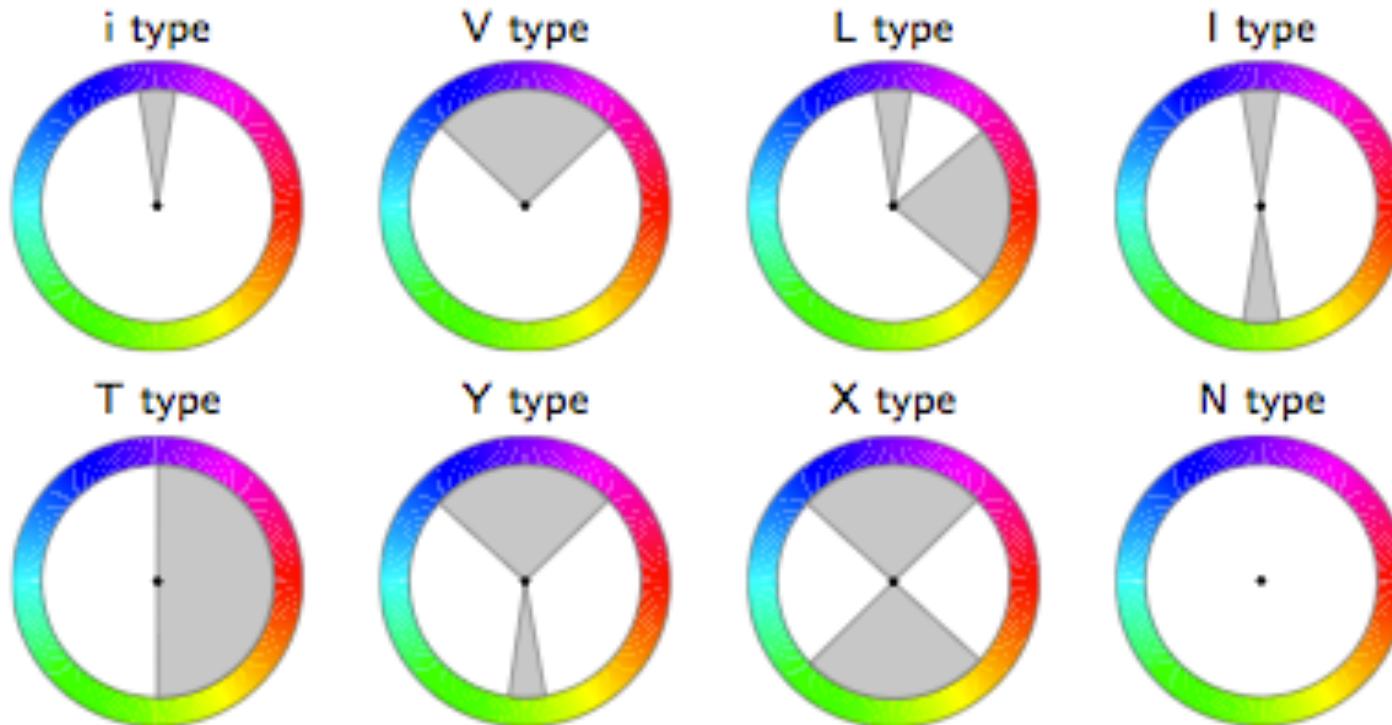
Source: Stone, M. (2016). *A field guide to digital color*. CRC Press.

# Maximized Hue Separation



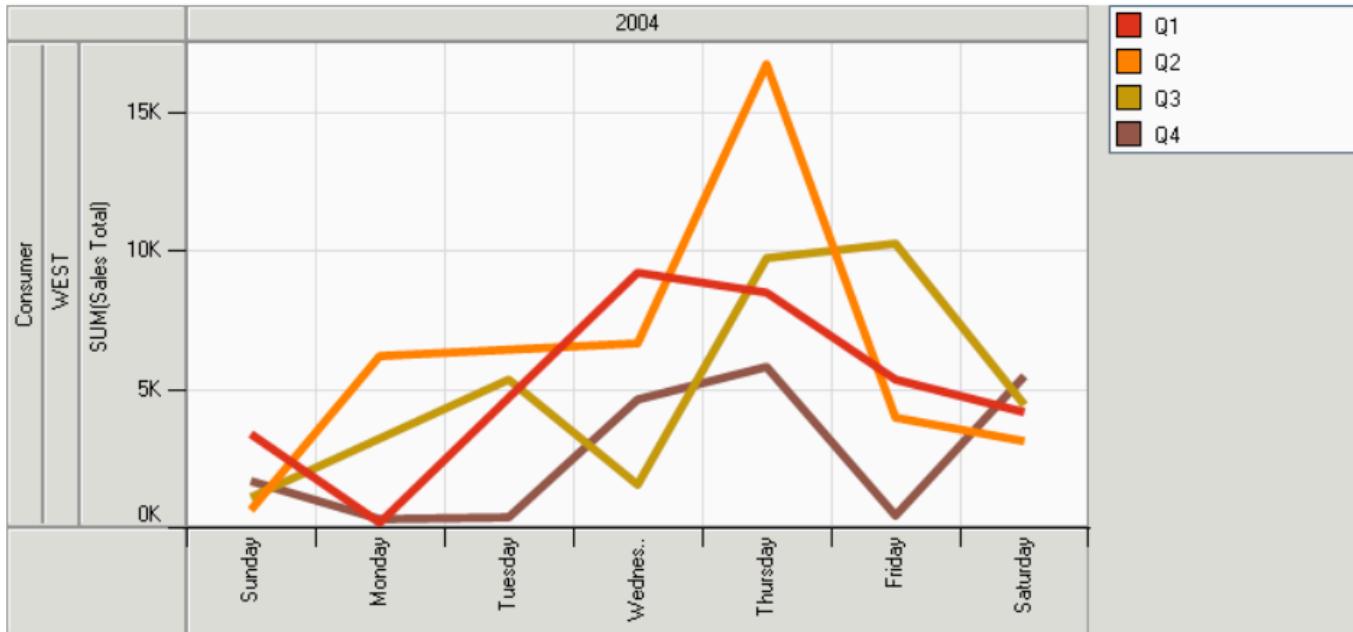
Source: Stone, M. (2006). *Choosing colors for data visualization*. Business Intelligence Network, 2.

# Harmonic Colors

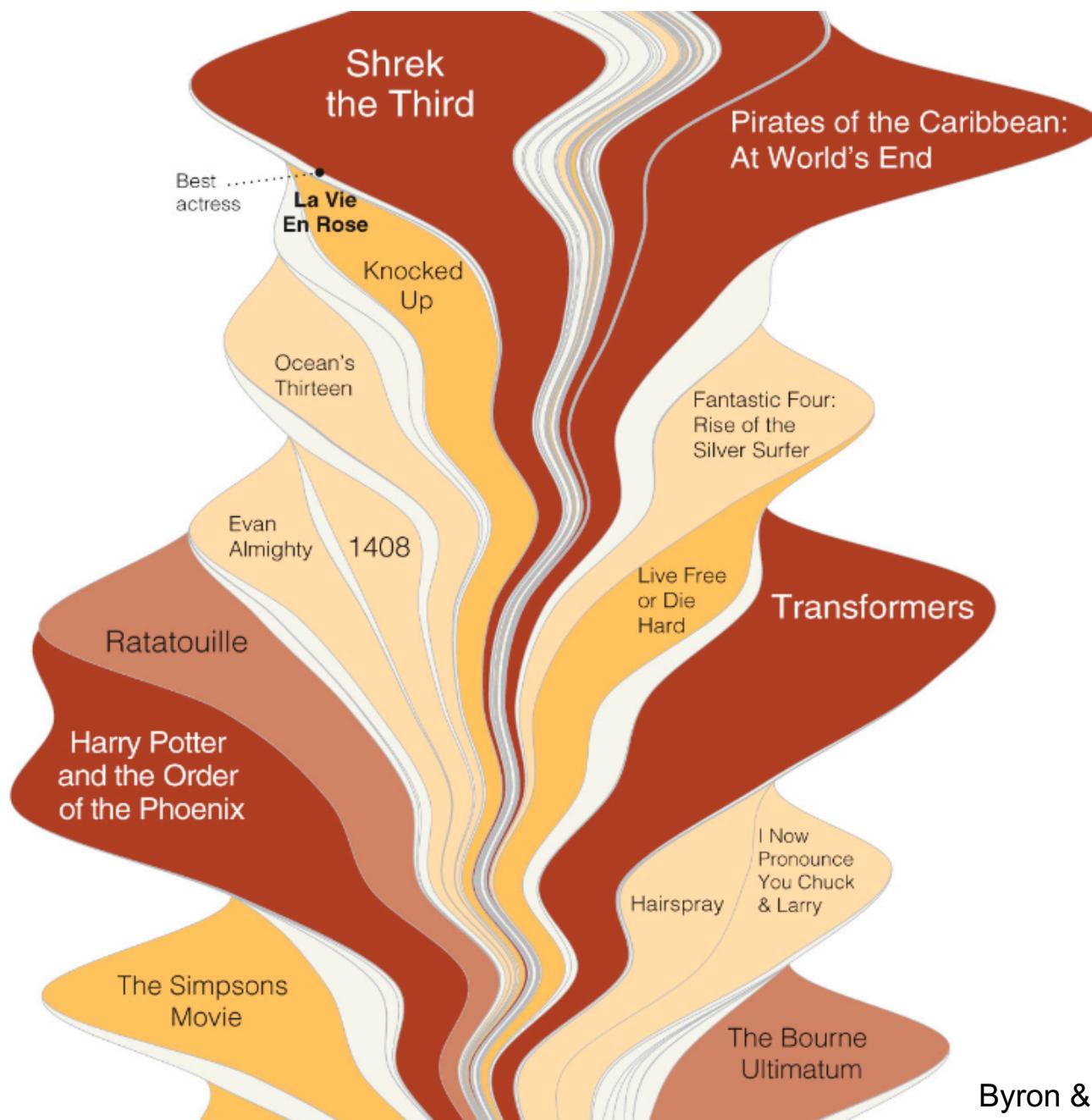


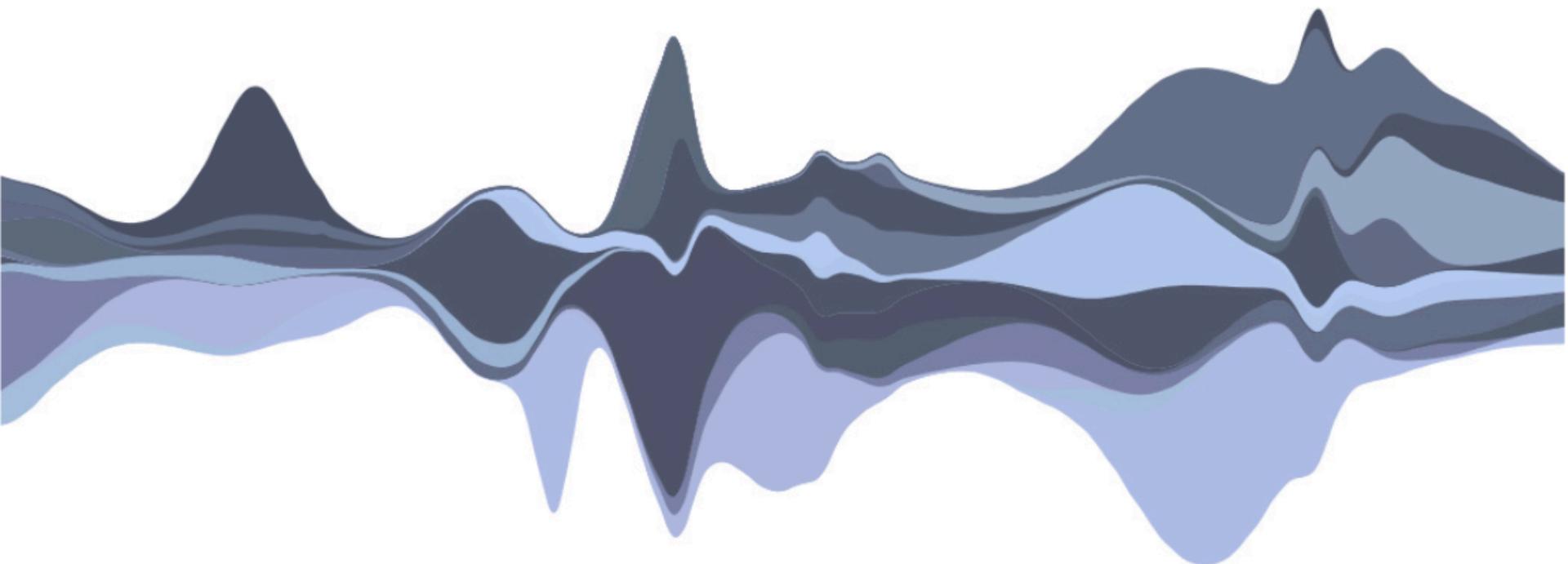
Source: Cohen-Or, D., Sorkine, O., Gal, R., Leyvand, T., & Xu, Y. Q. (2006, July). Color harmonization. In *ACM Transactions on Graphics (TOG)* (Vol. 25, No. 3, pp. 624-630). ACM.

# Analogous, Still Distinct



Source: Stone, M. (2006). *Choosing colors for data visualization*. Business Intelligence Network, 2.





Source: Byron, L., & Wattenberg, M. (2008). Stacked graphs—geometry & aesthetics. *IEEE Transactions on Visualization and Computer Graphics*, 14(6).



*Accents*



*Paired*

Source: Harrower, M., & Brewer, C. A. (2003). ColorBrewer.org: an online tool for selecting colour schemes for maps. *The Cartographic Journal*, 40(1), 27-37.

# Semantically Resonant Colors

## Car Color (4.7)

Red  
Silver  
Black  
Green  
Brown  
Blue



## Food (3.6)

Sour Cream  
Blue Cheese Dressing  
Porterhouse Steak  
Iceberg Lettuce  
Onions (Raw)  
Potato (Baked)  
Tomato



## Features (3.2)

Speed  
Reliability  
Comfort  
Safety  
Efficiency



## Activities (2.7)

Sleeping  
Working  
Leisure  
Eating  
Driving



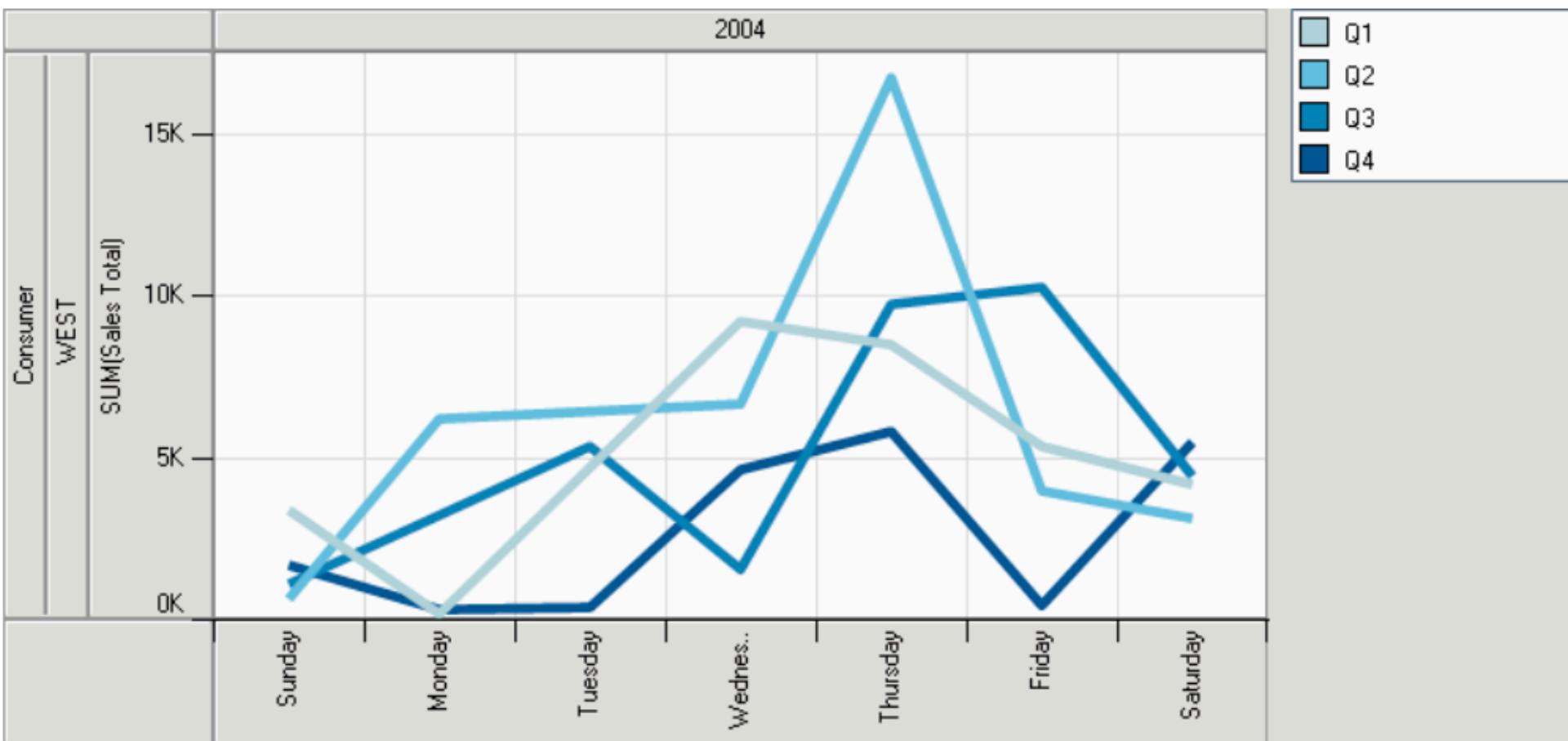
# Ordinal/Sequential Color Schemes

# Classification Methods

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- Manual or defined interval
- Equal interval
- Quantile
- Natural breaks (Jenks)
- Geometrical interval
- Standard deviation

# Sequential Encoding



Source: Stone, M. (2006). *Choosing colors for data visualization*. Business Intelligence Network, 2.

Number of data classes: 5

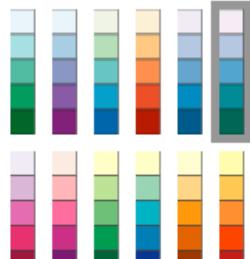
Nature of your data:  sequential  diverging  qualitative

how to use | updates | downloads | credits

# COLORBREWER 2.0

color advice for cartography

Pick a color scheme:

Multi-hue: 

Single hue: 

Only show:

- colorblind safe
- print friendly
- photocopy safe

Context:

- roads
- cities
- borders

Background:

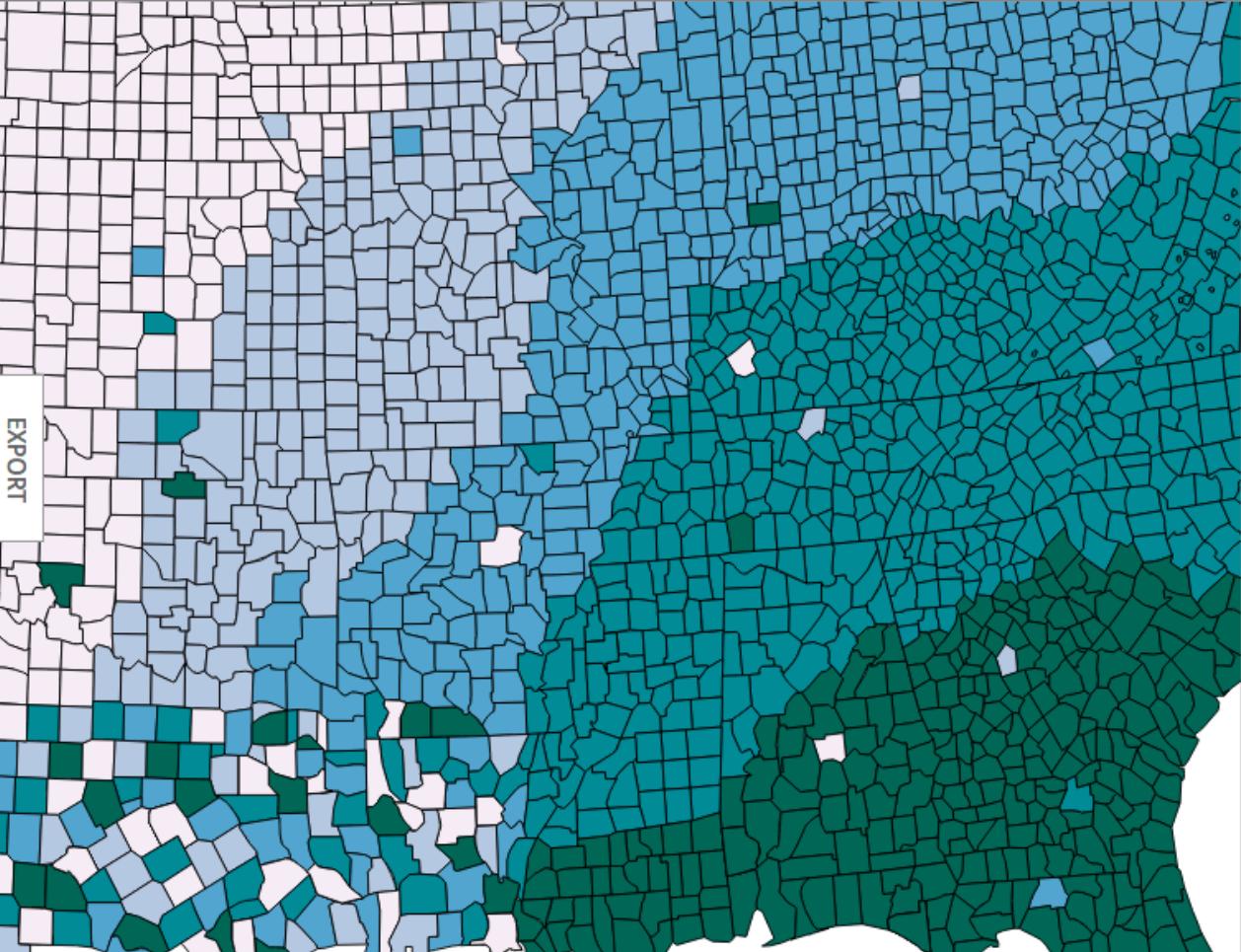
- solid color
- terrain

color transparency

5-class PuBuGn

HEX

#f6eff7
#bdc9e1
#67a9cf
#1c9099
#016c59



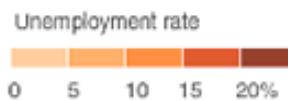
© Cynthia Brewer, Mark Harrower and The Pennsylvania State University

Source code and feedback

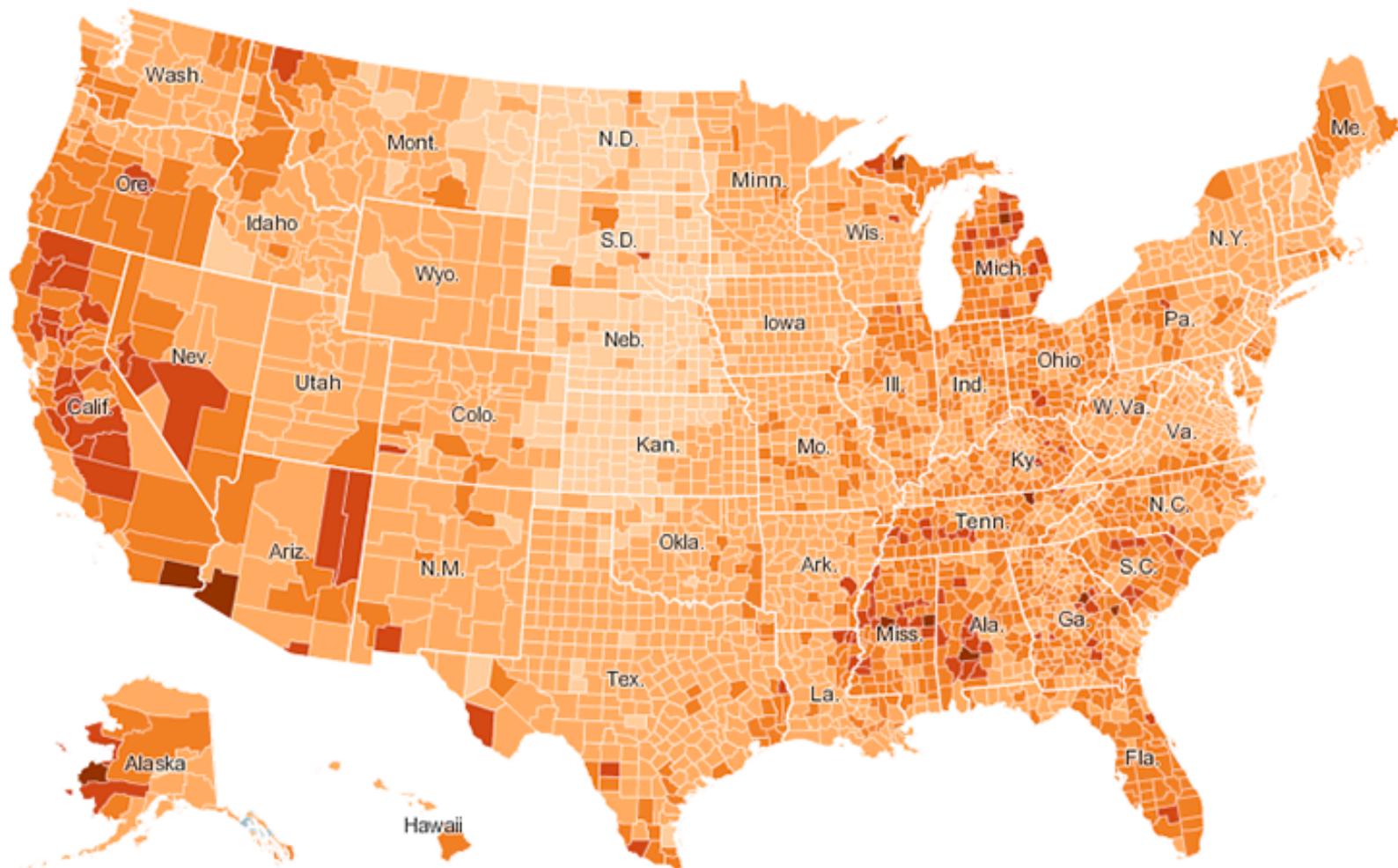
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axismaps

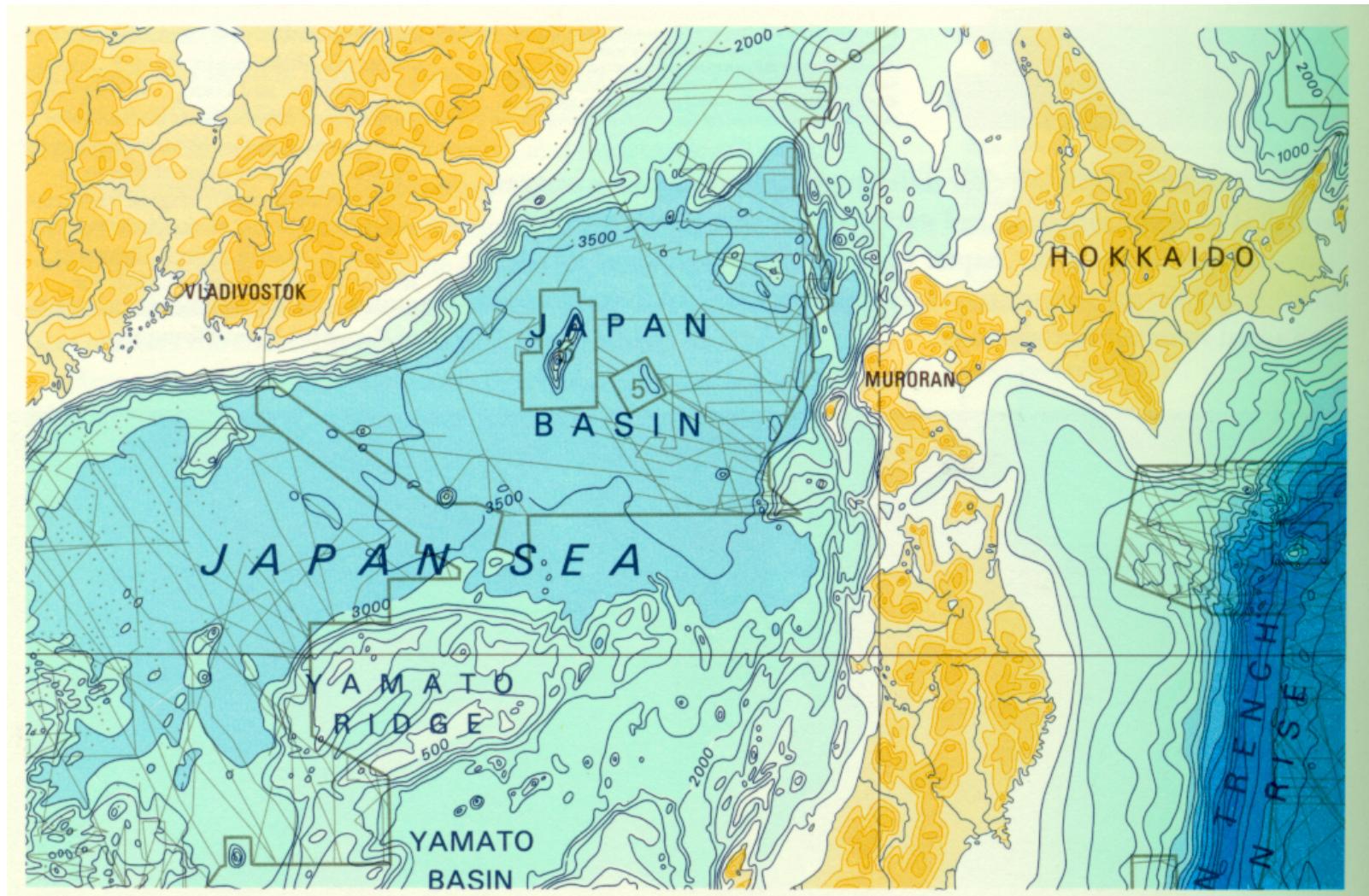


June '10 unemployment rate: **9.6%**  
One-year change: -0.1 pct. pts.



*A univariate choropleth map of unemployment rates in the United States. Source: [The New York Times](#).*

# Discontinuous Colors With Contours



# Diverging Color Schemes

Number of data classes: 5

Nature of your data:  sequential  diverging  qualitative

Pick a color scheme:

Only show:  colorblind safe  print friendly  photocopy safe

Context:  roads  cities  borders

Background:  solid color  terrain  color transparency

5-class RdBu        
#ca0020  
#f4a582  
#f7f7f7  
#92c5de  
#0571b0

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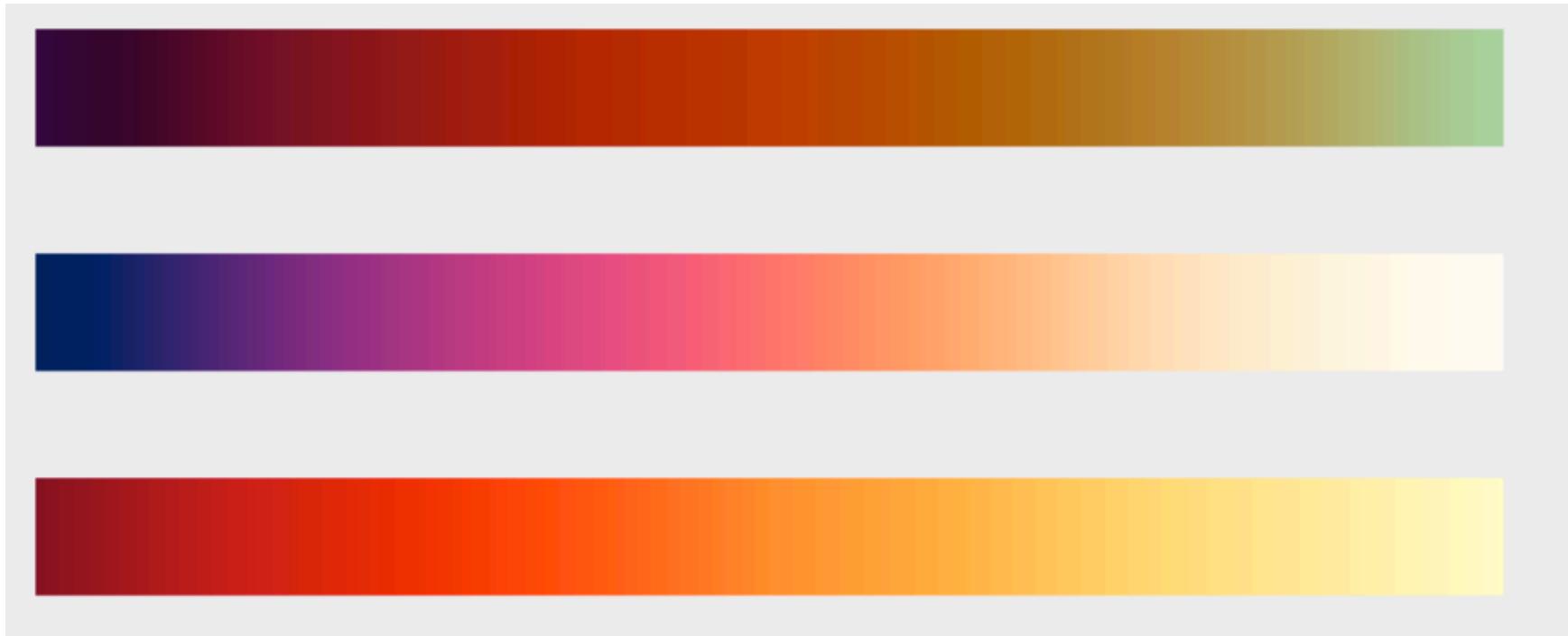
<http://colorbrewer2.org/>

axismaps

# Continuous/Quantitative Color Schemes



Source: <http://earthobservatory.nasa.gov/blogs/elegantfigures/2013/08/>



Source: <http://earthobservatory.nasa.gov/blogs/elegantfigures/2013/08/>

# Areas to Consider

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## Categorical:

- Distinctive
- Consider harmonious groupings
- Pairings or representations

## Sequential:

- Limit hue, use luminance and saturation
- Higher values to darker

## Diverging:

- Use when data have a meaningful midpoint
- Use white/gray neutral for midpoint
- More saturated for endpoints

## Continuous:

- Beware the rainbow
- Use saturation and luminance

# Tools

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Colorbrewer: <http://colorbrewer2.org/>

Chroma.js: <http://gka.github.io/palettes>

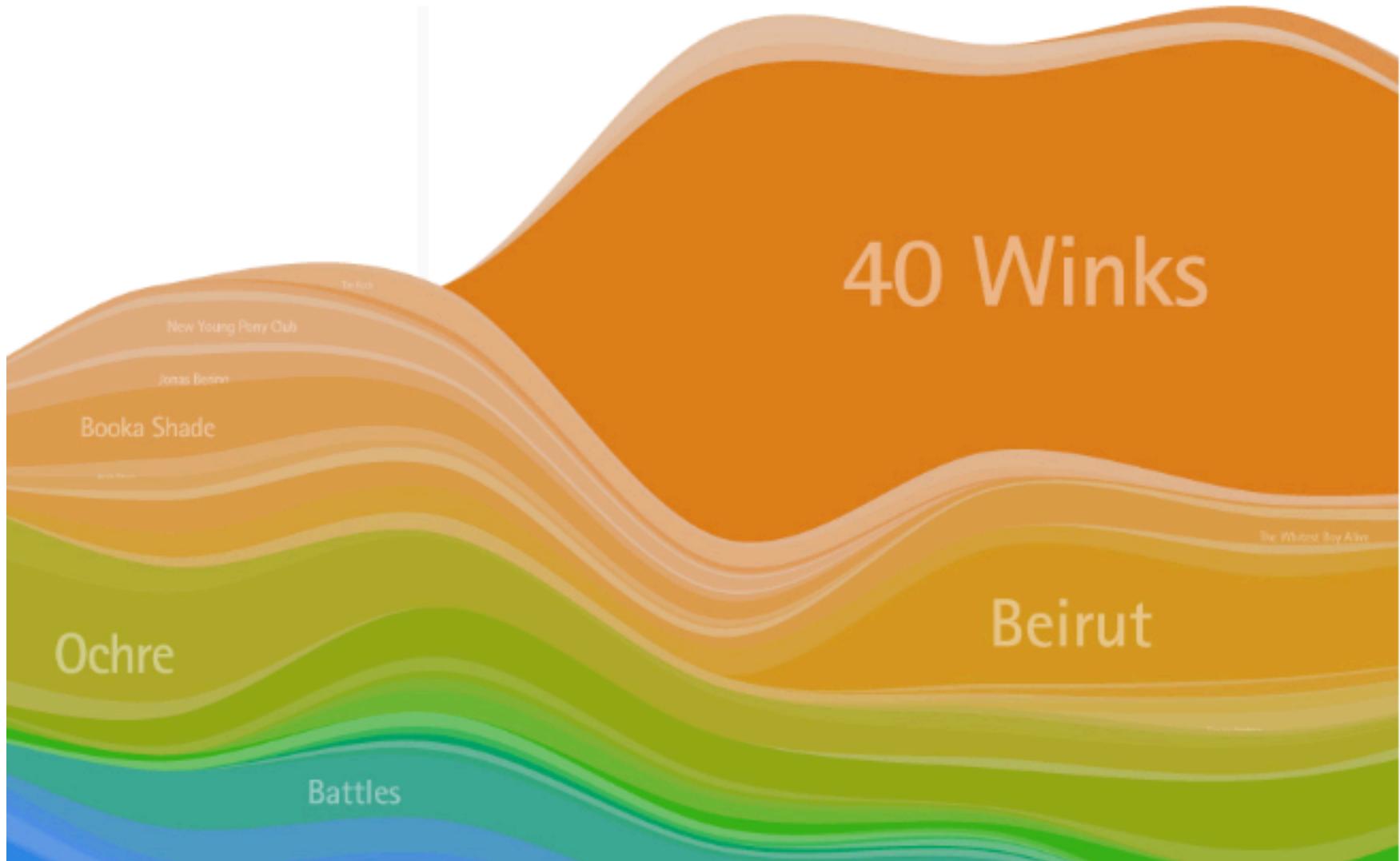
D3 built-ins: <https://github.com/d3/d3-color>

Adobe: <https://color.adobe.com/create/color-wheel>

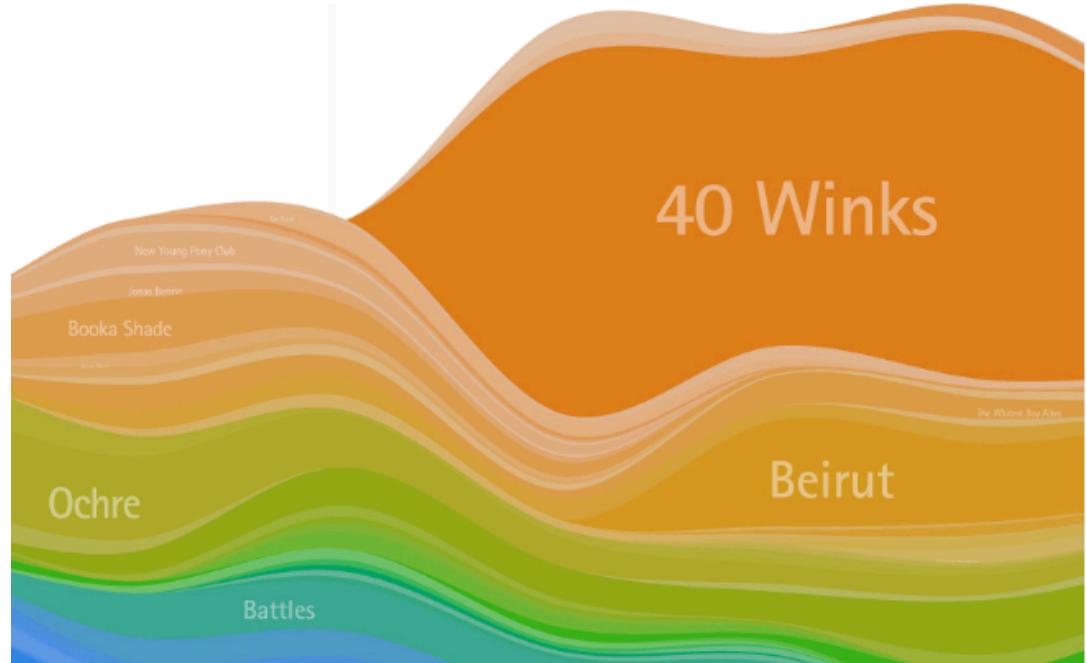
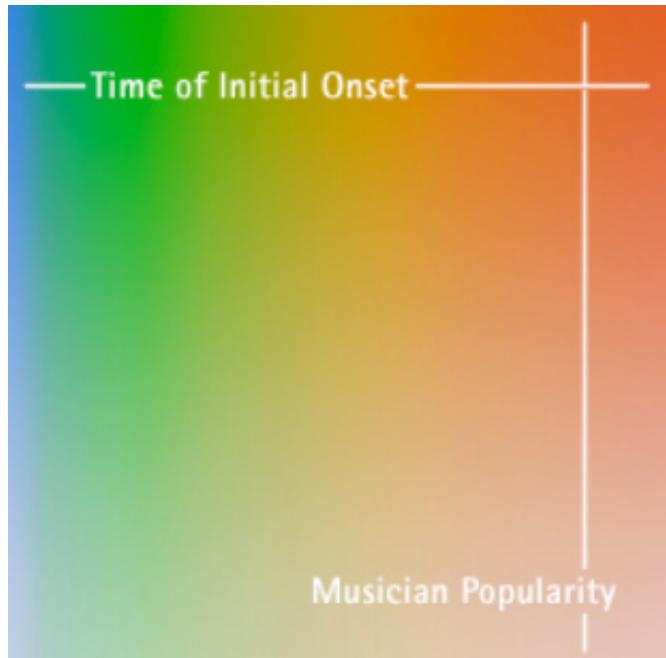
# Berkeley

SCHOOL OF  
INFORMATION

# Additional Cases

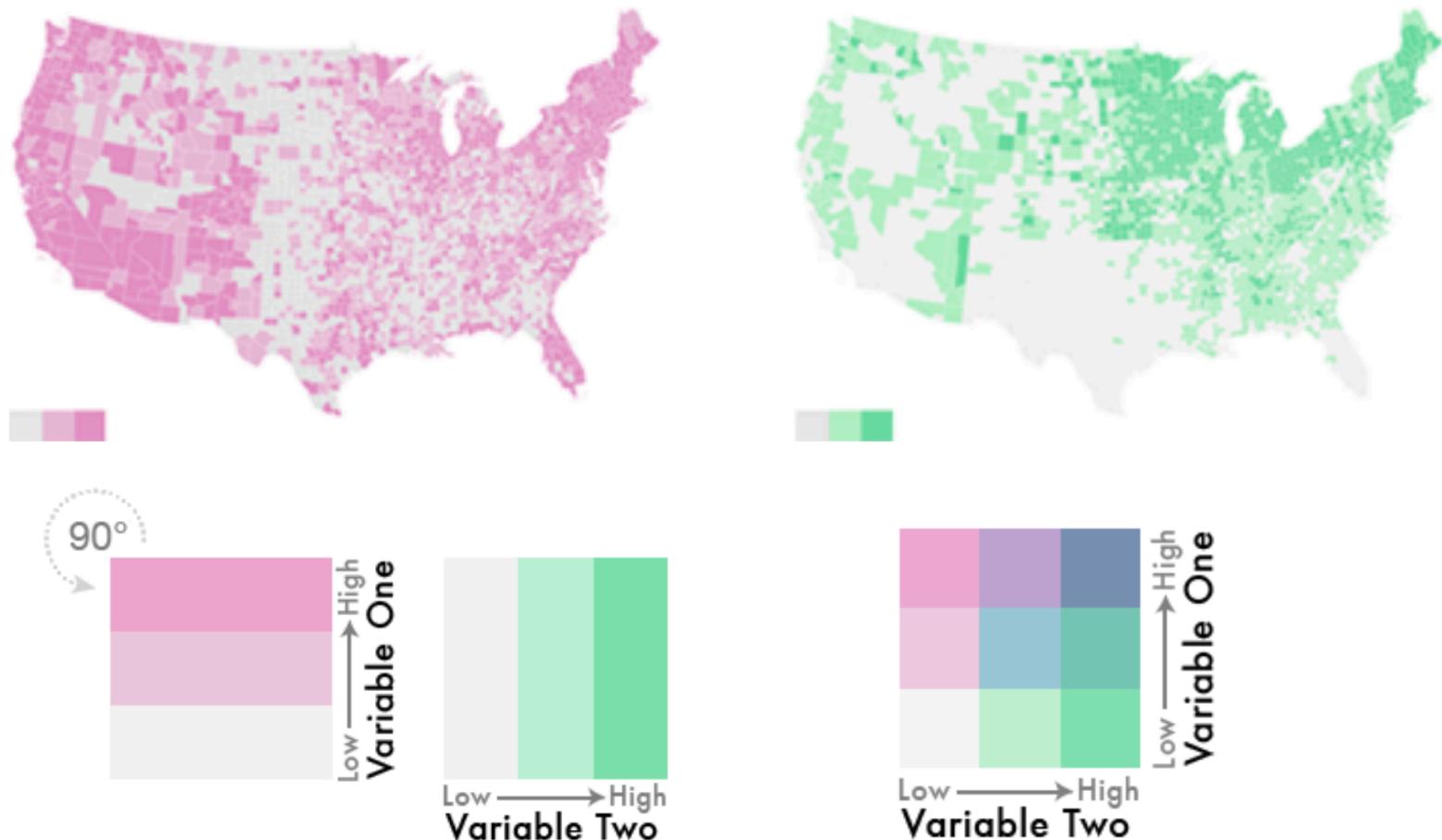


Source: Byron, L., & Wattenberg, M. (2008). Stacked graphs—geometry & aesthetics. *IEEE Transactions on Visualization and Computer Graphics*, 14(6).



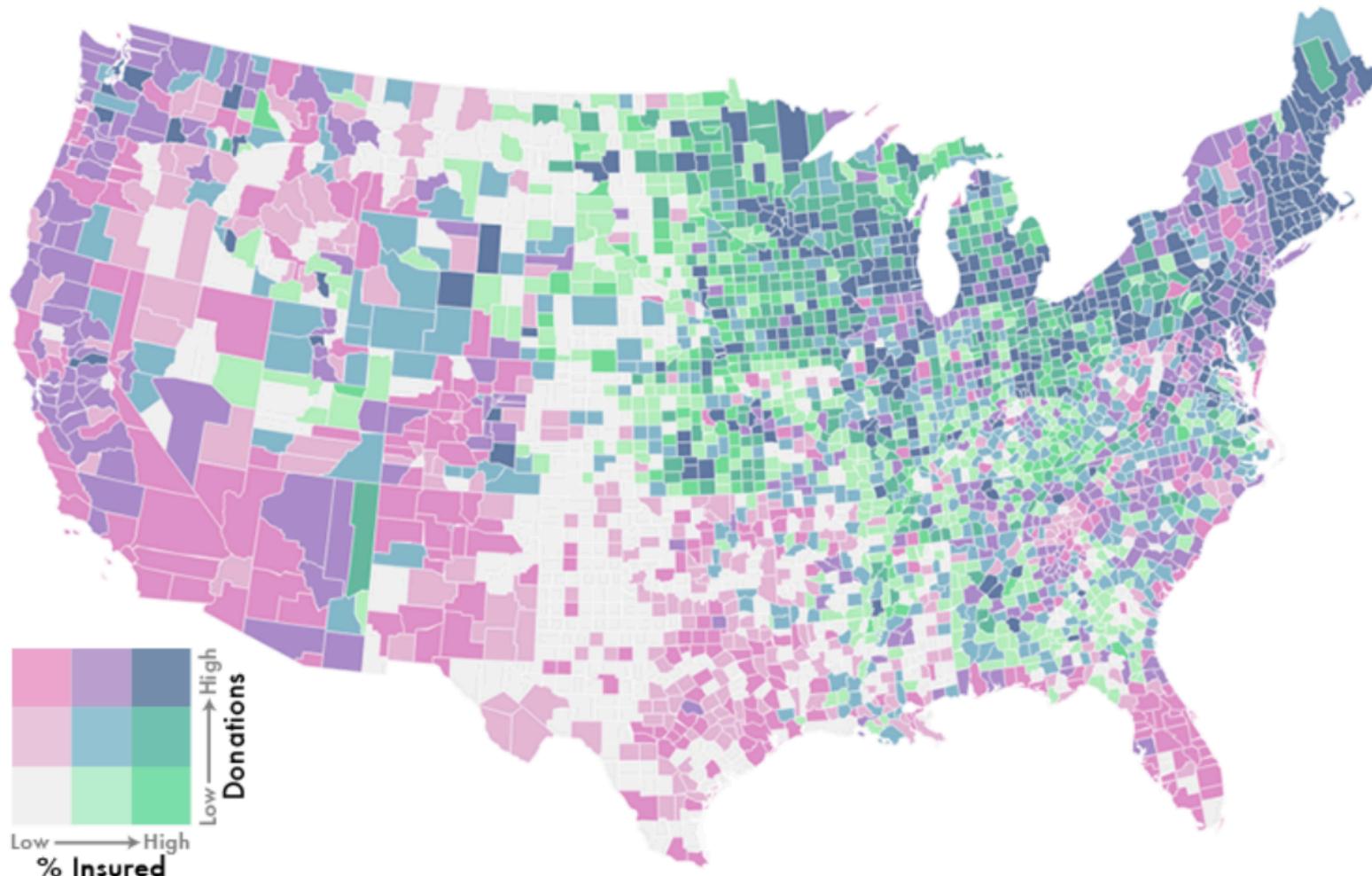
Source: Byron, L., & Wattenberg, M. (2008). Stacked graphs—geometry & aesthetics. *IEEE Transactions on Visualization and Computer Graphics*, 14(6).

# Diverging Bivariate

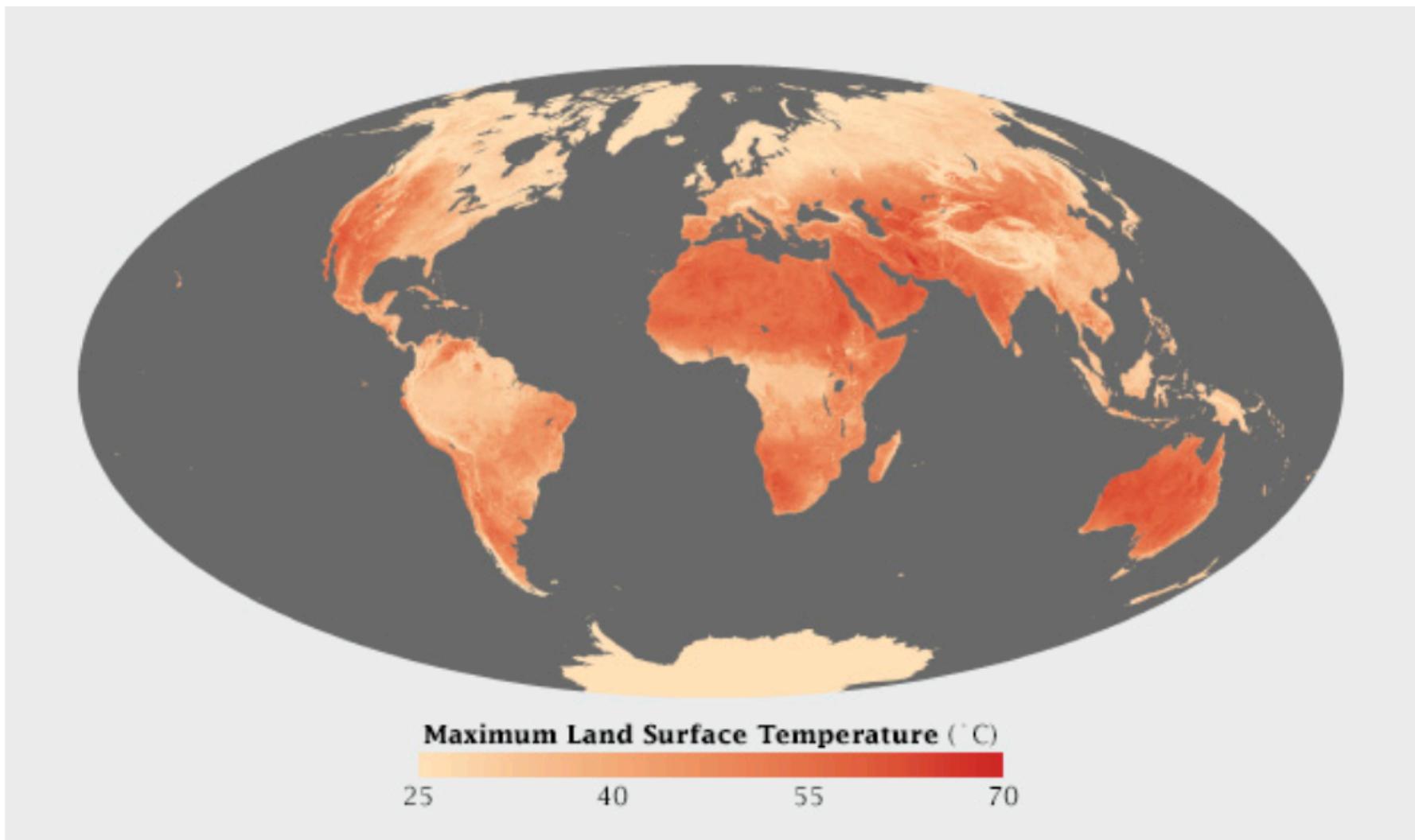


Source: <http://www.joshuastevens.net/cartography/make-a-bivariate-choropleth-map/>

# Diverging Bivariate



Source: <http://www.joshuastevens.net/cartography/make-a-bivariate-choropleth-map/>



Source: <http://earthobservatory.nasa.gov/blogs/elegantfigures/2013/08/>