

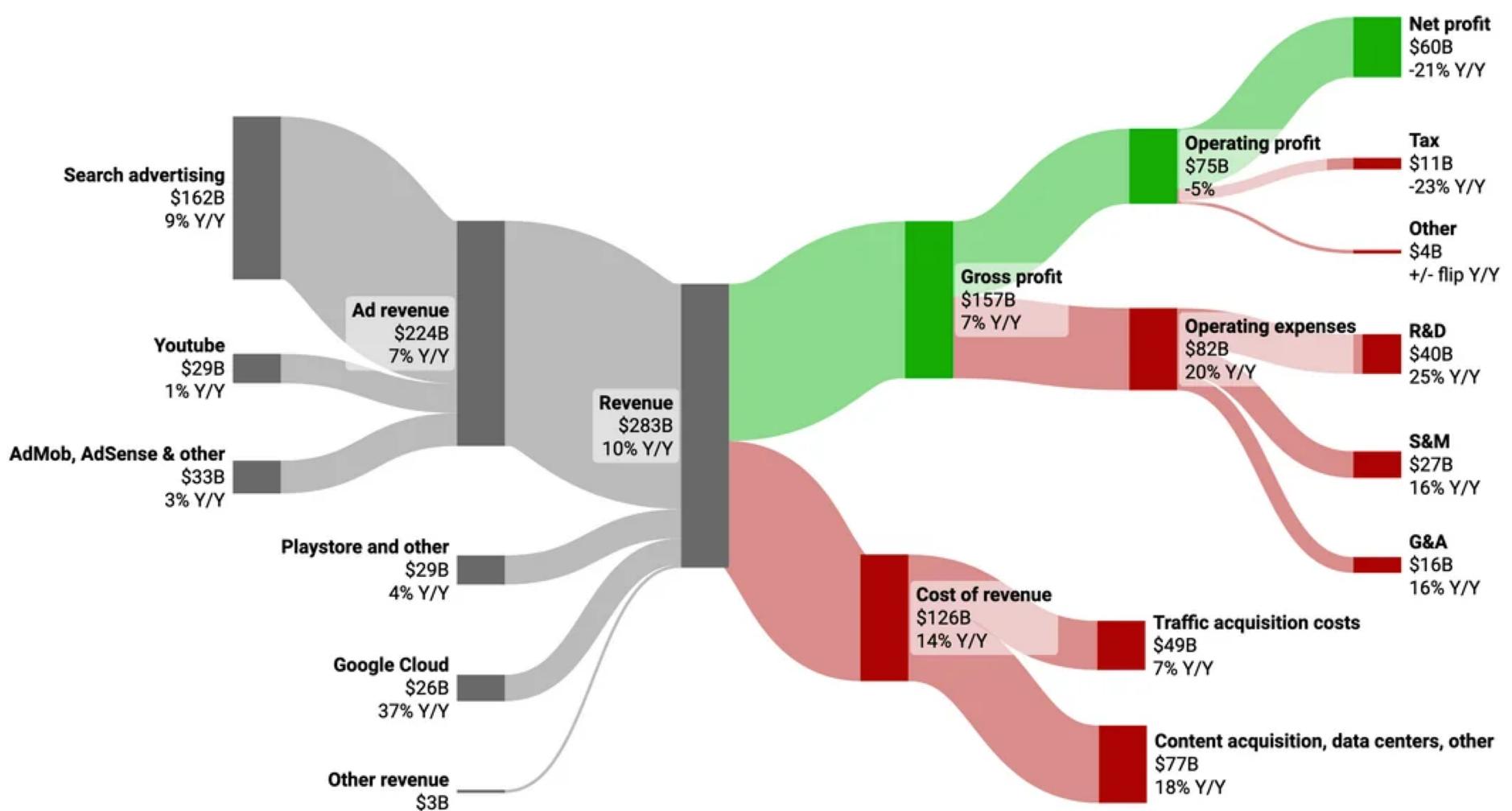
Data 227

Data Visualization & Communication

Readings

- Boreland, Taylor (2007) Rainbow Colormap (Still) Considered Harmful IEEE Computer Graphics and Applications
10.1109/MCG.2007.323435
- Segel & Heer (2010) Narrative Visualization: Telling Stories with Data
doi:10.1109/TVCG.2010.179
- Liu (2018) Somewhere Over the Rainbow: An Empirical Assessment of Quantitative Colormaps doi:10.1145/3173574.3174172

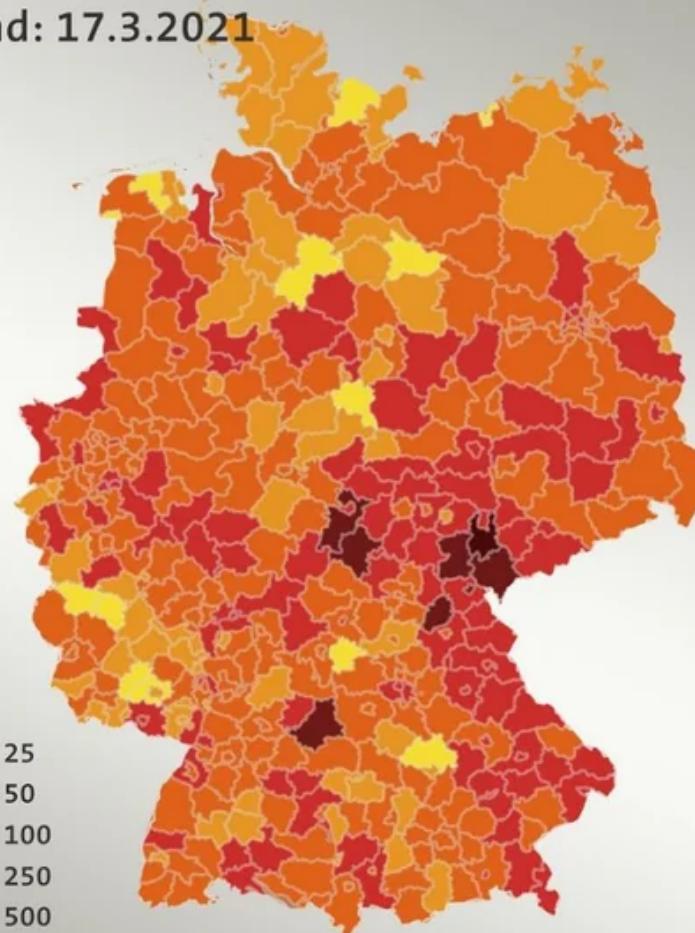
Alphabet FY22 Income Statement





7-Tage-Inzidenzen der Landkreise

Stand: 17.3.2021



Quelle: Robert Koch-Institut
© Maptiles / © openstreetmap.org



7-Tage-Inzidenzen der Landkreise

Stand: 9.4.2021



Quelle: Robert Koch-Institut
© Maptiles / © openstreetmap.org



New Covid cases in 7 days per 100.000 people

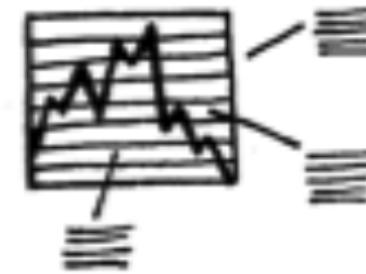
<https://www.instagram.com/p/CMh7JXuKRxX/>
<https://www.instagram.com/p/CNc5ooWIO8u/>

Narrative Visualization (case studies+ some theory)

Seven Genres



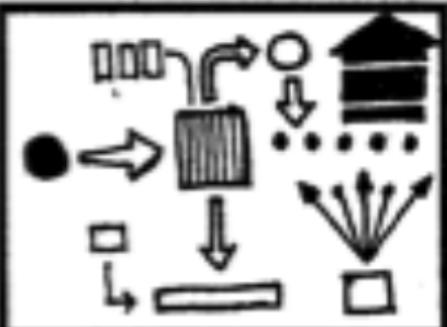
Magazine Style



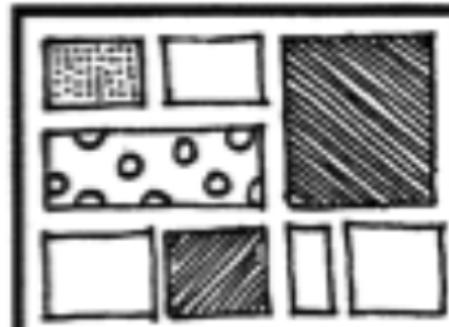
Annotated Chart



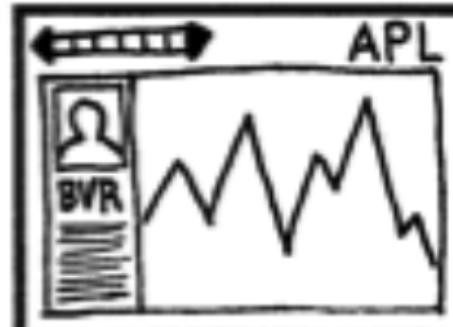
Partitioned Poster



Flow Chart



Comic Strip



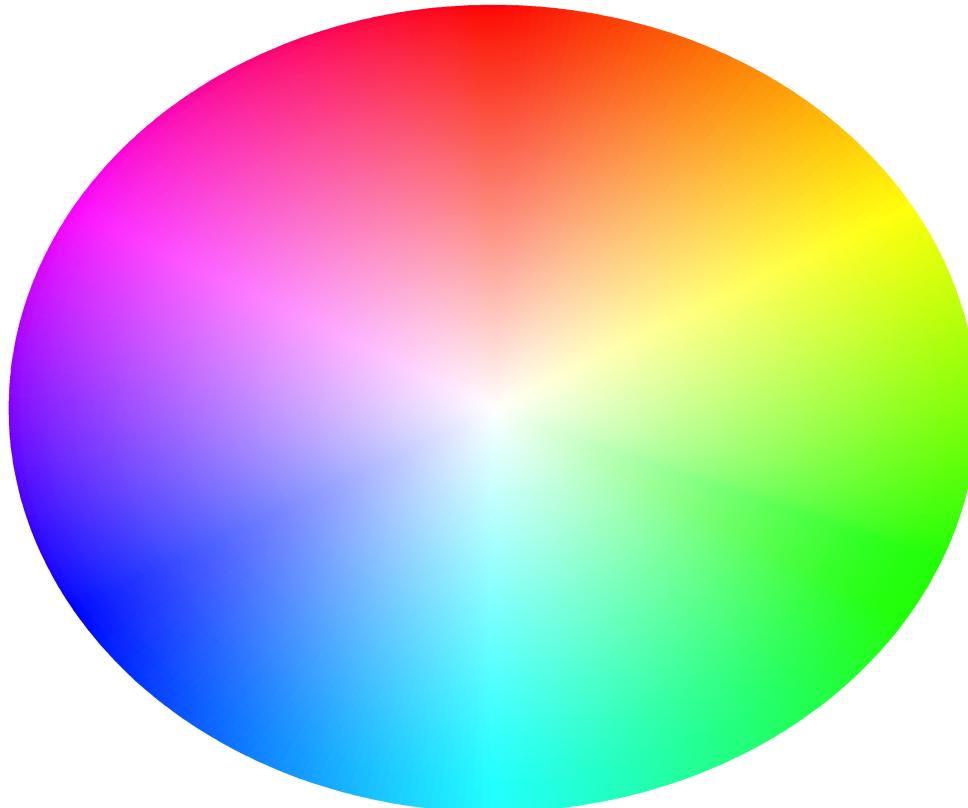
Slide Show



Film/Video/Animation

Some deceptive strategies

- Inappropriate juxtaposition [dual-axis graph]
- Count the wrong things [swap numbers that matter for numbers that are easy to obtain]
- Encourage bad comparisons [take numbers out-of-context, provide bad context]
- Post-hoc reporting about the extremity of the extremes
- Study and report on the wrong things. Report audience-engaging matters that are irrelevant for decisionmaking. (moral panics?)



Visualization Viewpoints

Editor:
Theresa-Marie Rhyne

Rainbow Color Map (Still) Considered Harmful

David Borland
and Russell M.

Research has shown that the rainbow color map is rarely the optimal choice when displaying data with a pseudocolor map. The rainbow color map con-

mercials, weather forecasts, and even the IEEE Visualization Conference 2006 call for papers, just to name a few. The problem with this wide use of the rain-

- Rainbow is not perceptually ordered: the ordering is not completely universal or obvious. (empirical)
- Luminance varies up and down in response to data.
- Hues lead to perception of bands of color with sharp boundaries (not in the data)
- For historical reasons, "jet" is a popular default rainbow colormap.

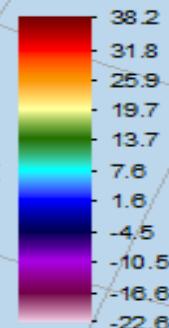
Editor:
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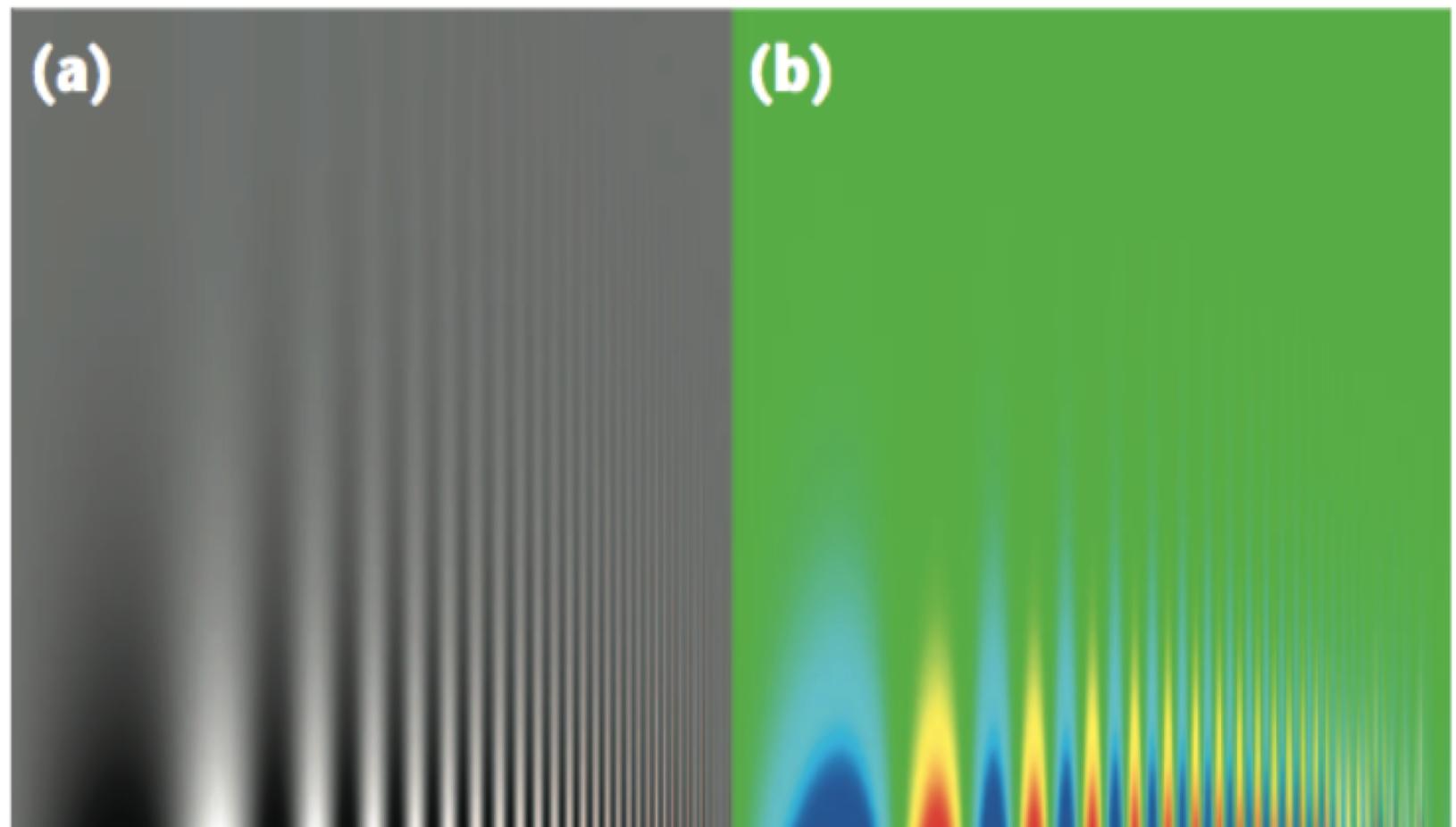
Daymet V3
Average Daily
Maximum Temperature
2012



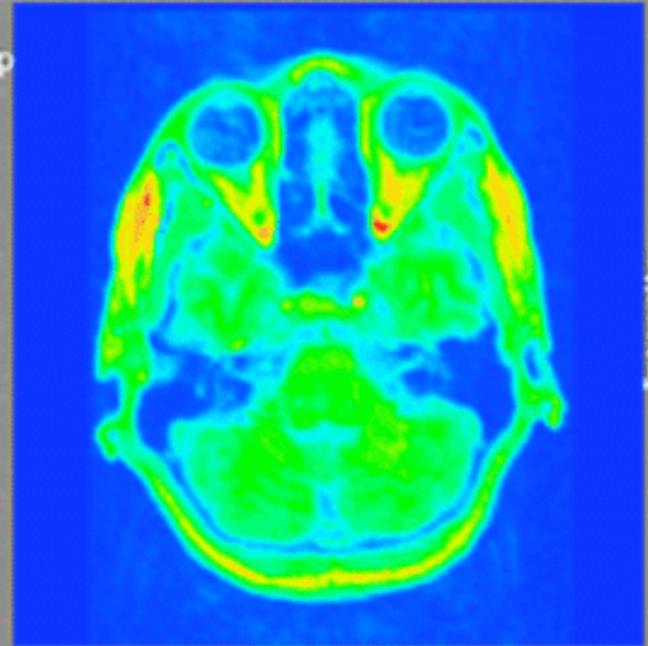
Map Projection: Lambert Conformal Conic
Central Meridian: 100 degrees W

160°W

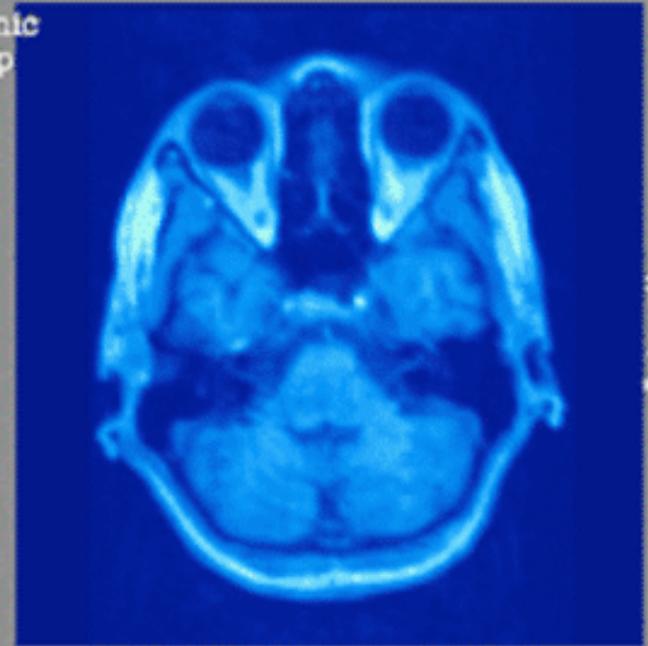
Obscuring - apparent changes only at color boundaries



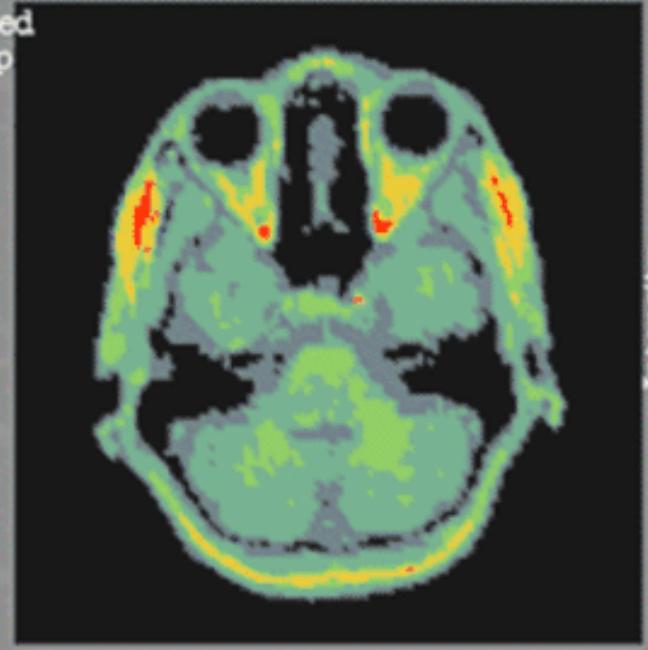
Default
Colormap



Isomorphic
Colormap



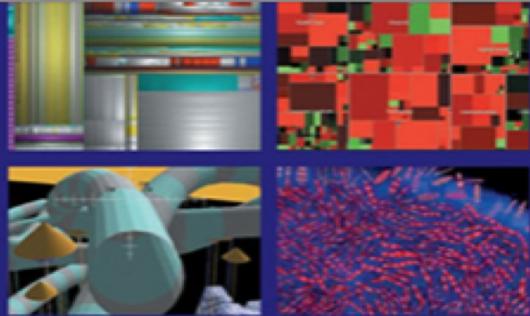
Segmented
Colormap



Highlighting
Colormap



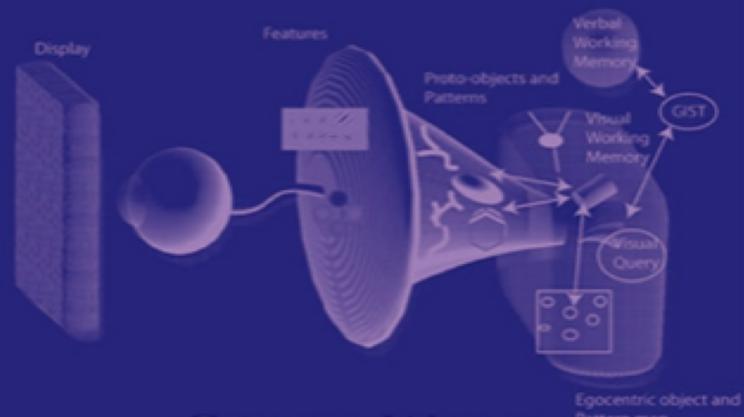
Rogowitz & Treinish, How Not to Lie with Visualization (1996)



SECOND EDITION

INFORMATION VISUALIZATION

PERCEPTION FOR DESIGN



COLIN WARE



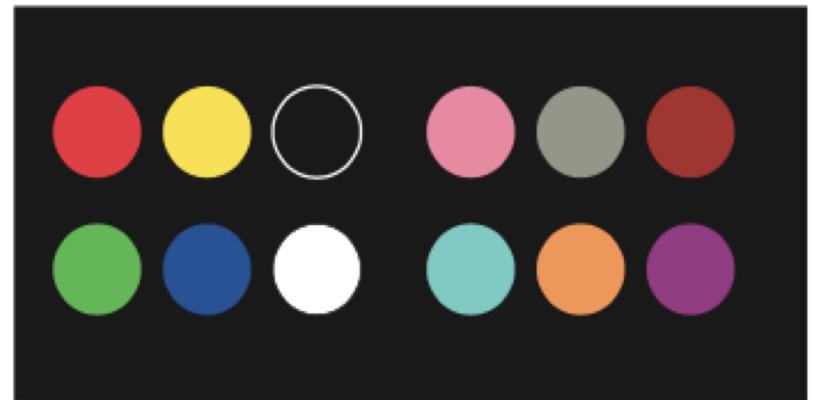
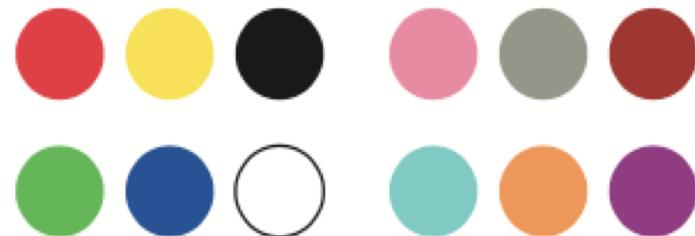
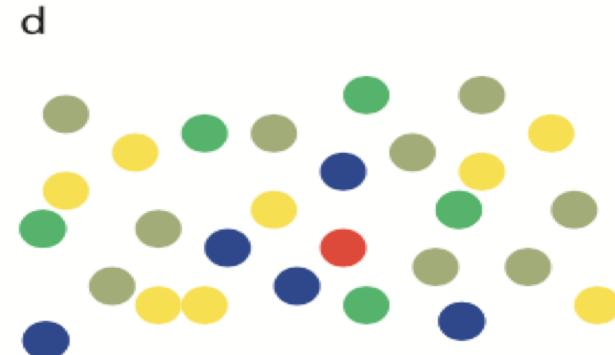
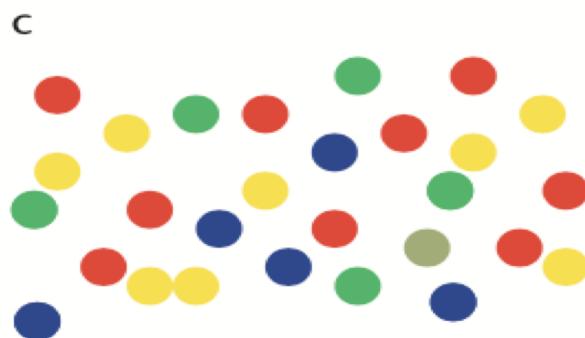
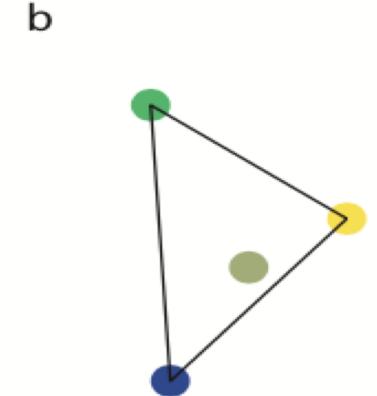
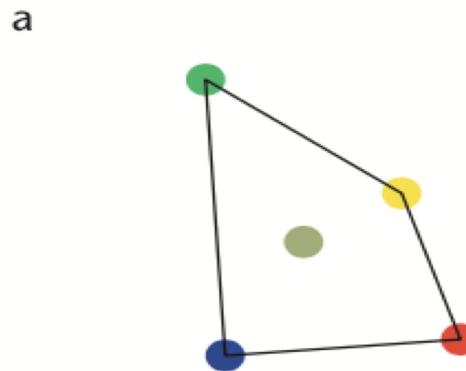


Figure 4.21 A set of 12 colors for use in labeling. The same colors are shown on a white and a black background.

In principle, the CIE luv and lab color spaces estimate how discriminable color pairs are; in practice, discriminability can be thwarted by collections of nearby colors:



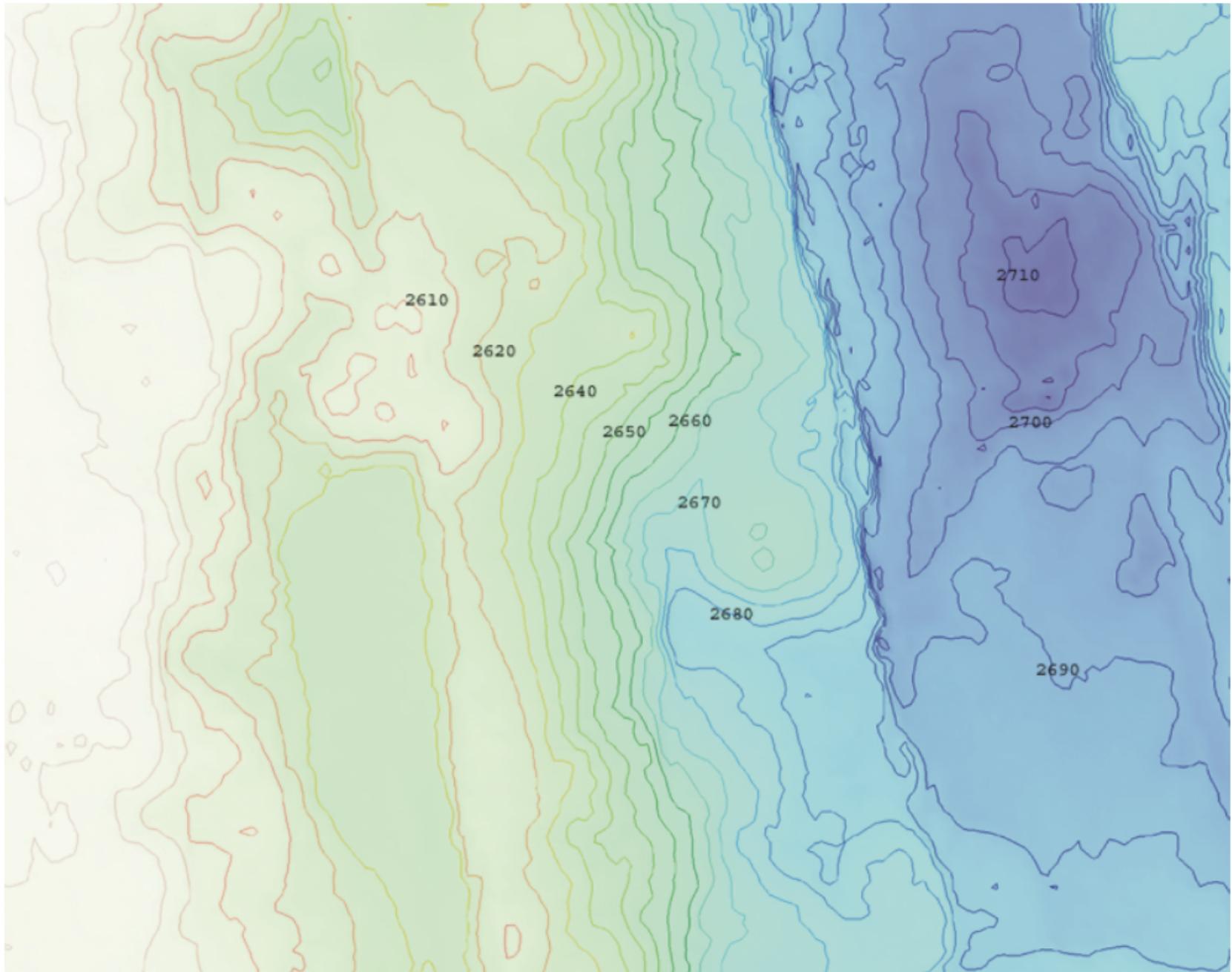


Figure 4.28 A map containing both contours and a pseudocolor sequence. *Data, courtesy of Dana Yoerger at the Woods Hole Oceanographic Institution, represents a section of the Juan de Fuca Ridgecrest in the northeastern Pacific Ocean.*

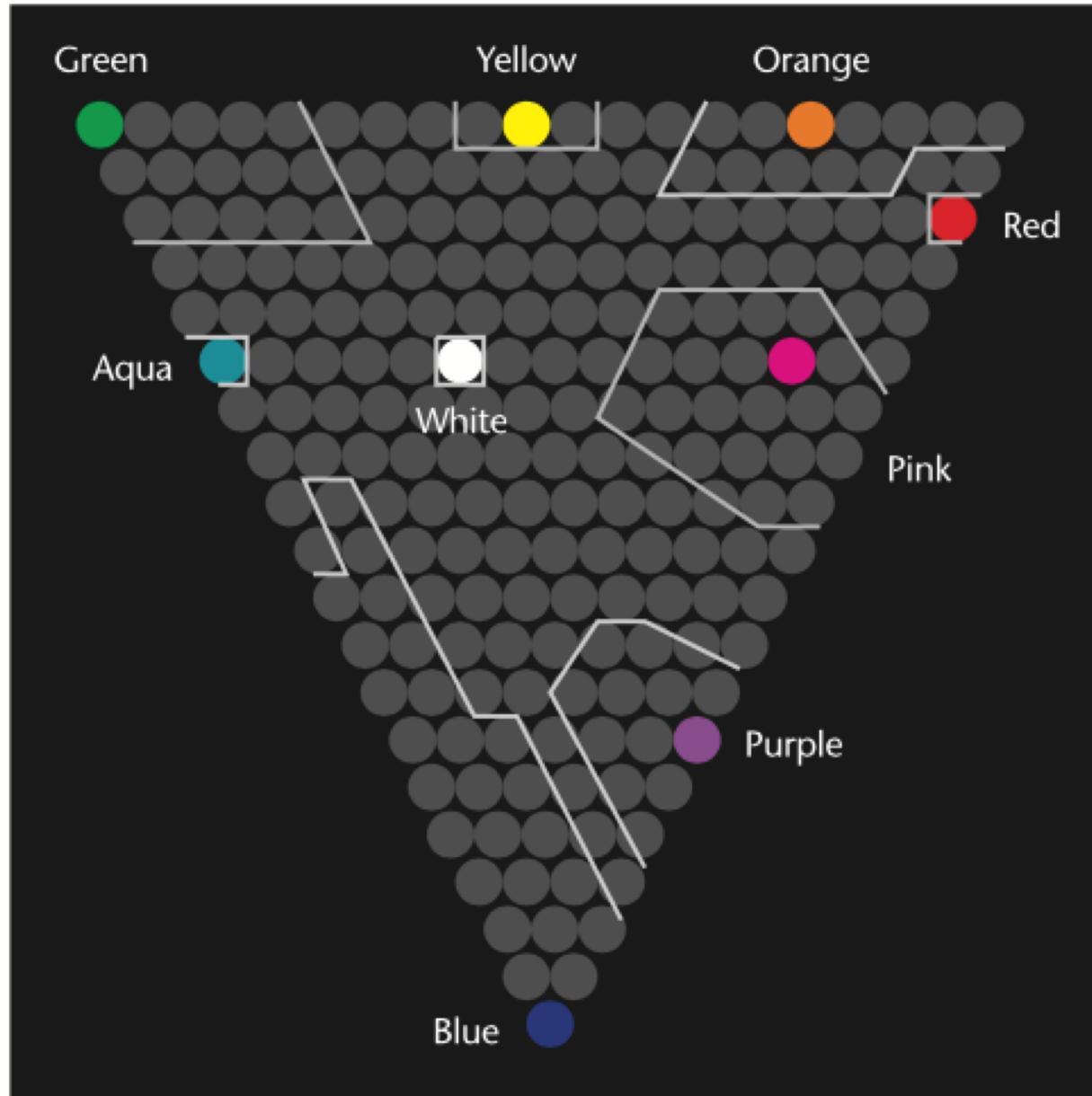


Figure 4.12 The results of an experiment in which subjects were asked to name 210 colors produced on a computer monitor. Outlined regions show the colors that were given the same name with better than 75% probability.

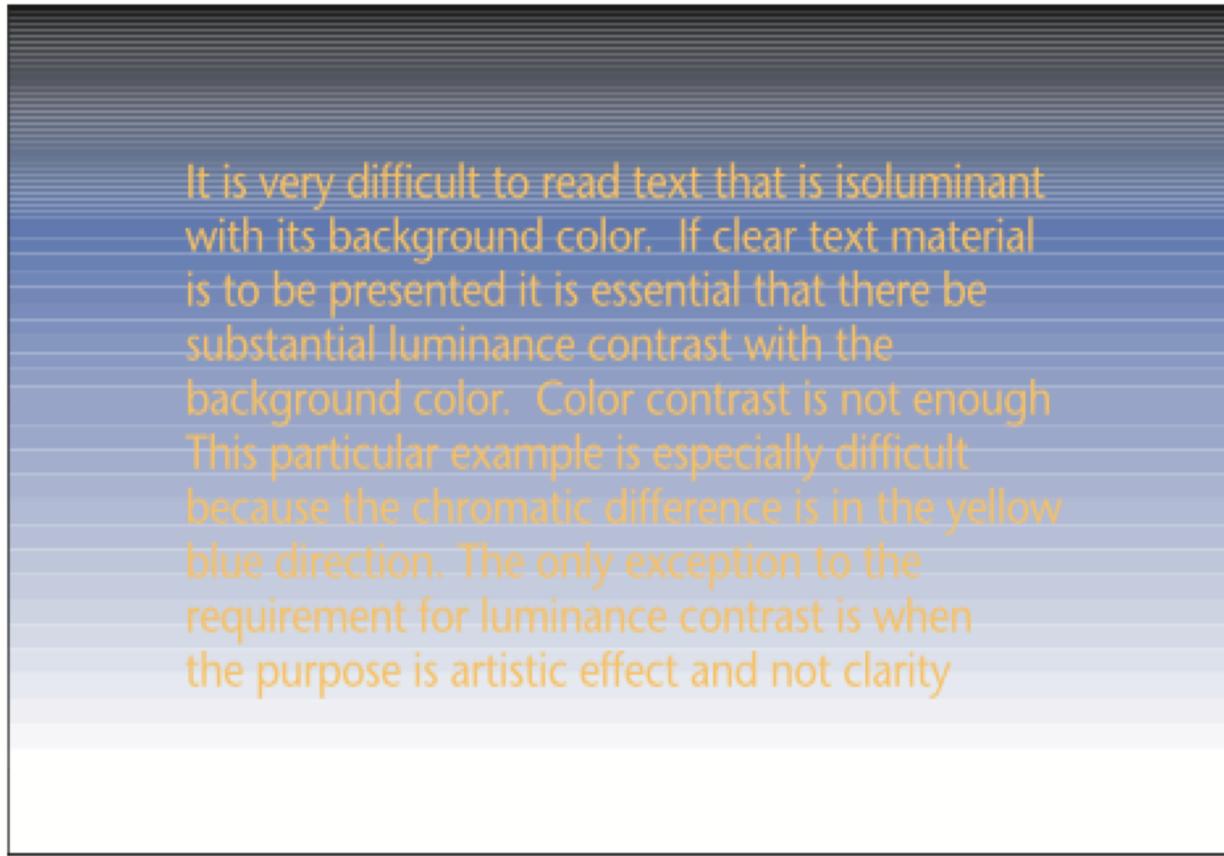


Figure 4.13 Yellow text on a blue gradient. Note how difficult it is to read the text where luminance is equal, despite a large chromatic difference.

L



R



Which is brighter?

(134, 134, 134)



(128, 128, 128)



Which is brighter?

Luminance channel dominates

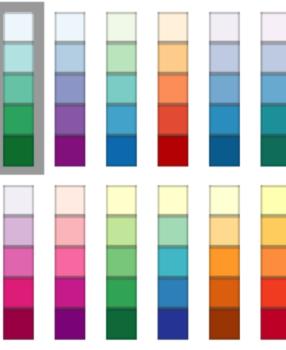
- Better resolution for fine detail in luminance channel than in red-green and blue-yellow
- Stereoscopic vision locks onto luminance
- Always separate foreground from background by luminance, never just by color
- Small symbols should have saturated colors; large areas of fill should have desaturated colors.
- Use diverging colormaps where appropriate

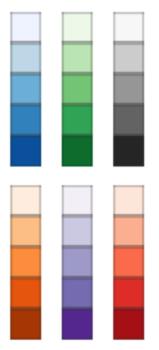
Number of data classes: 8 how to use | updates | downloads | credits

Nature of your data:

sequential diverging qualitative

Pick a color scheme:

Multi-hue: 

Single hue: 

Only show:

colorblind safe print friendly photocopy safe

Context:

roads cities borders

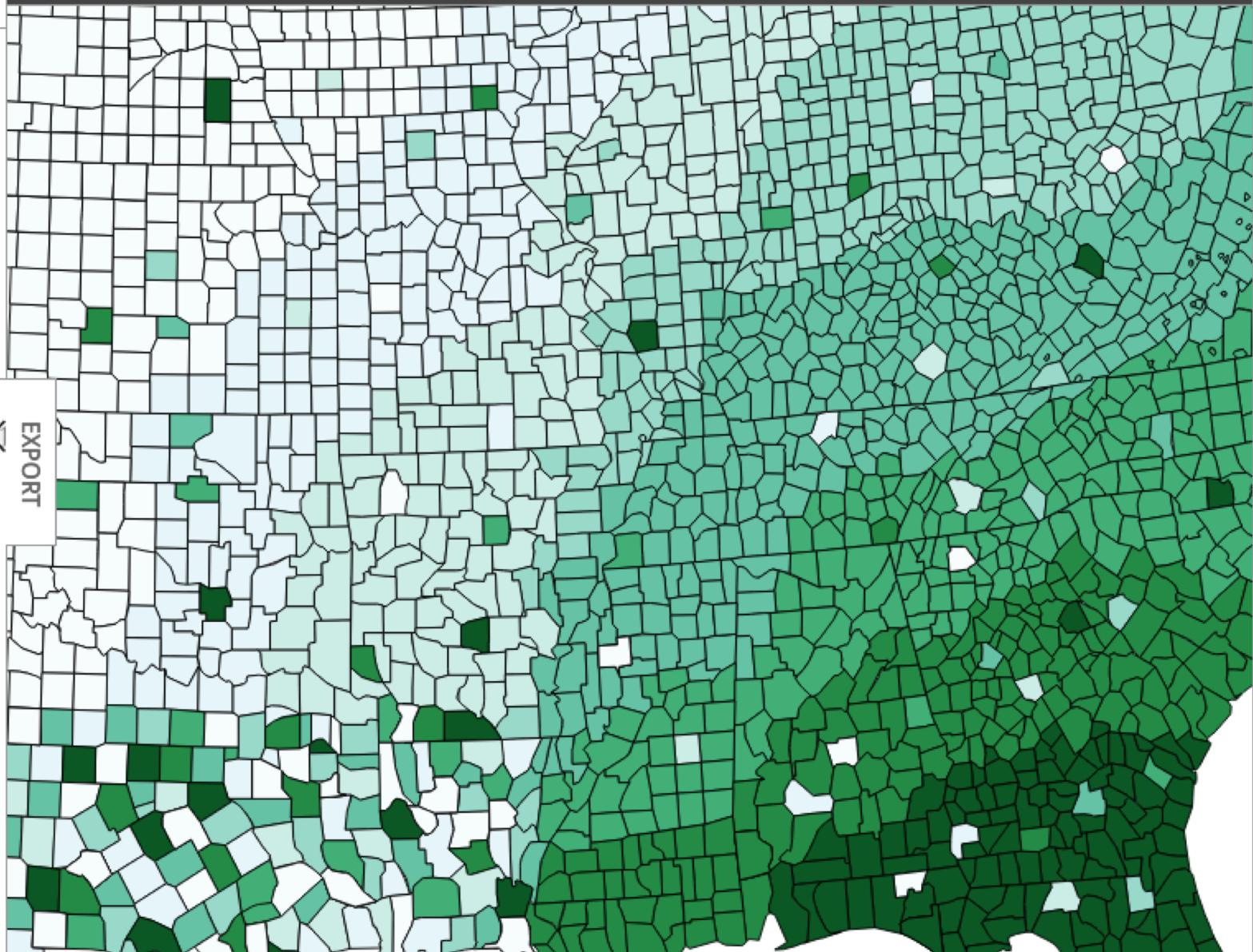
Background:

solid color terrain

8-class BuGn    

EXPORT

	#f7fcfd
	#e5f5f9
	#ccece6
	#99d8c9
	#66c2a4
	#41ae76
	#238b45
	#005824



Color Name Distance

0.00	1.00	1.00	1.00	0.96	1.00	1.00	0.99	1.00	0.19
1.00	0.00	1.00	0.98	1.00	1.00	1.00	0.97	1.00	
1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.70	0.99	
1.00	1.00	1.00	0.00	1.00	0.96	0.99	1.00	1.00	
0.96	1.00	0.98	1.00	0.00	0.95	0.83	0.98	1.00	0.97
1.00	1.00	1.00	1.00	0.96	0.95	0.99	0.96	0.96	1.00
1.00	1.00	1.00	0.99	0.83	0.99	0.00	1.00	1.00	
0.99	1.00	1.00	1.00	0.98	0.96	1.00	0.00	1.00	0.99
1.00	0.97	0.70	1.00	1.00	0.96	1.00	1.00	0.00	1.00
0.19	1.00	0.99	1.00	0.97	1.00	1.00	0.99	1.00	0.00

Tableau-10

Average 0.96

.52

Color Name Distance

0.00	1.00	1.00	0.89	0.08	1.00	0.19	1.00	1.00	0.88
1.00	0.00	0.99	1.00	1.00	0.81	1.00	0.78	1.00	0.99
1.00	0.99	0.00	1.00	0.98	0.99	1.00	1.00	0.10	1.00
0.89	1.00	1.00	0.00	0.92	1.00	0.80	0.84	1.00	0.31
0.08	1.00	0.98	0.92	0.00	1.00	0.21	1.00	0.97	0.88
1.00	0.81	0.99	1.00	1.00	0.00	1.00	0.92	1.00	1.00
0.19	1.00	1.00	0.80	0.21	1.00	0.00	0.94	0.97	0.58
1.00	0.78	1.00	0.84	1.00	0.92	0.94	0.00	0.99	0.76
1.00	1.00	0.10	1.00	0.97	1.00	0.97	0.99	0.00	0.96
0.88	0.99	1.00	0.31	0.88	1.00	0.58	0.76	0.96	0.00

Excel-10

Average 0.86

.27

Salience Name

.47	blue 65.3%
.87	orange 92.2%
.70	green 81.3%
.64	red 79.3%
.43	purple 52.5%
.47	brown 60.5%
.47	pink 60.3%
.74	grey 83.7%
.11	yellow 20.1%
.25	blue 27.2%

Color Name Distance

0.00	0.42	1.00	1.00	1.00	1.00	1.00	1.00	0.92	0.97
0.42	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.94
1.00	1.00	0.00	0.33	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	0.33	0.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	1.00	1.00	0.00	0.97	0.90	1.00	0.84	1.00
1.00	1.00	1.00	1.00	0.97	0.00	0.96	0.93	1.00	1.00
1.00	1.00	1.00	1.00	0.90	0.96	0.00	0.44	1.00	1.00
0.92	0.95	1.00	1.00	0.84	1.00	1.00	1.00	0.00	0.61
0.97	0.94	1.00	1.00	1.00	1.00	1.00	1.00	0.61	0.00
0.97	0.94	1.00	1.00	1.00	1.00	1.00	1.00	0.61	0.00

ColorBrewer-Q10

Average 0.94

.49

Color Name Distance

0.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.97
0.97	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	0.00	0.37	0.20	0.38	0.82	0.99	0.43	0.43
1.00	1.00	0.37	0.00	0.59	0.53	0.77	0.95	0.23	0.23
1.00	1.00	0.20	0.59	0.00	0.44	0.85	0.99	0.36	0.27
1.00	1.00	0.38	0.53	0.44	0.00	0.19	0.96	0.14	0.24
1.00	1.00	0.82	0.77	0.85	0.19	0.00	0.97	0.22	0.30
0.99	1.00	0.99	0.95	0.99	0.96	0.97	0.00	0.68	0.80

The Economist

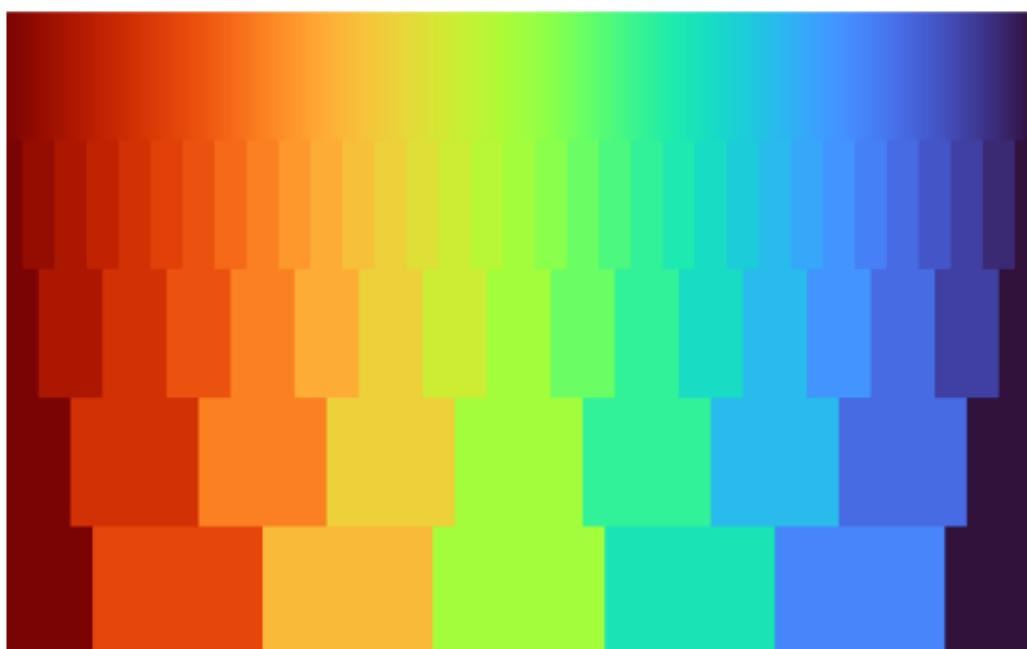
Average 0.82

.33

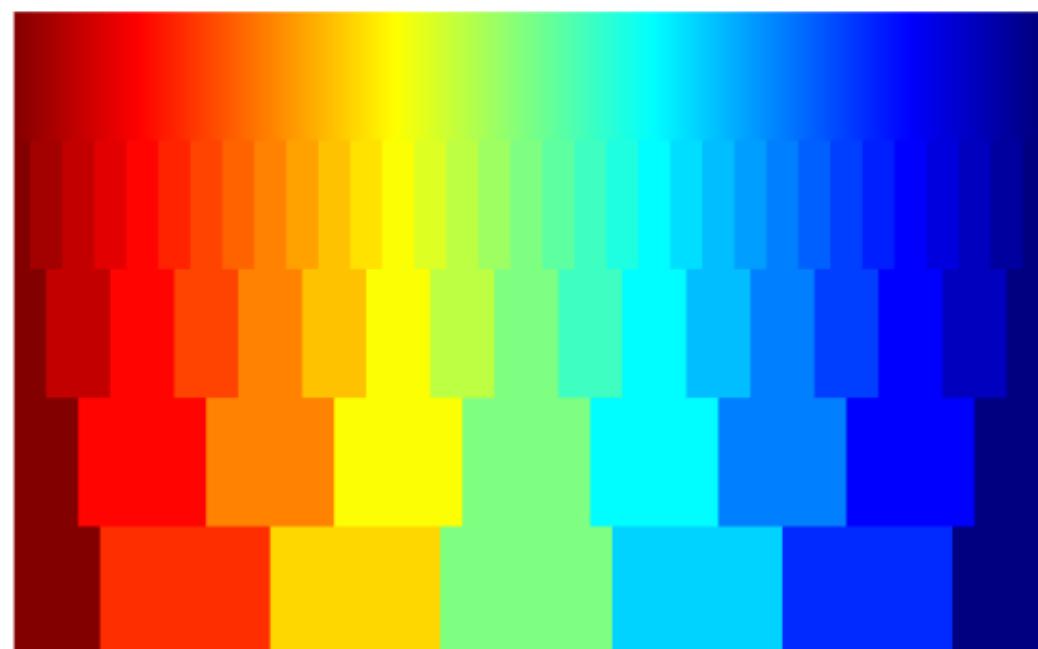
Figure 8. Name-based characterization of qualitative color palettes. Matrices show all pairwise color-name distances; bar charts show salience scores for each color. Salience scores below 0.2 indicate colors with a high degree of naming confusion. The Tableau-10 palette provides the best color salience and minimal name overlap. Palettes from Excel and The Economist exhibit higher name overlap and diminished saliency.

Color Naming Models for Color Selection, Image Editing and Palette Design
Heer, J. and Stone, M. CHI 2012

<https://ai.googleblog.com/2019/08/turbo-improved-rainbow-colormap-for.html>

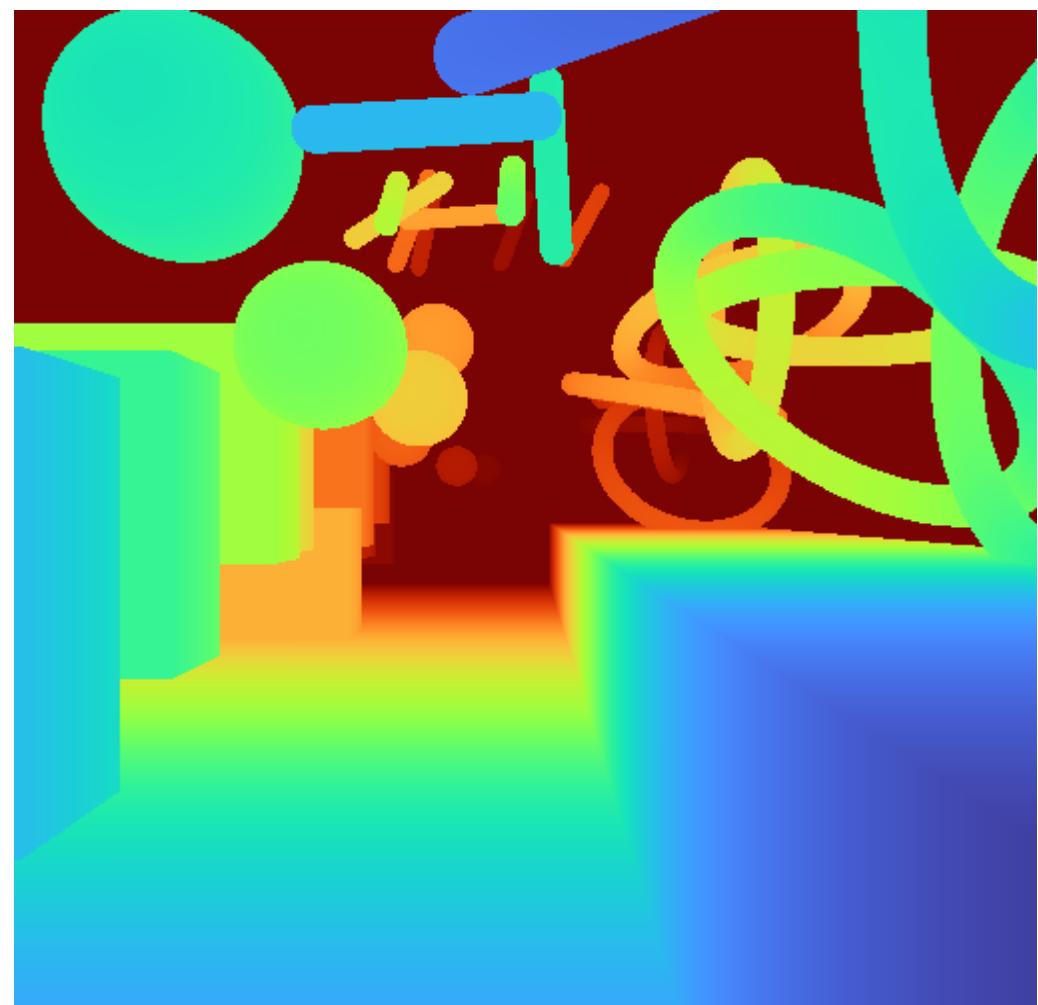
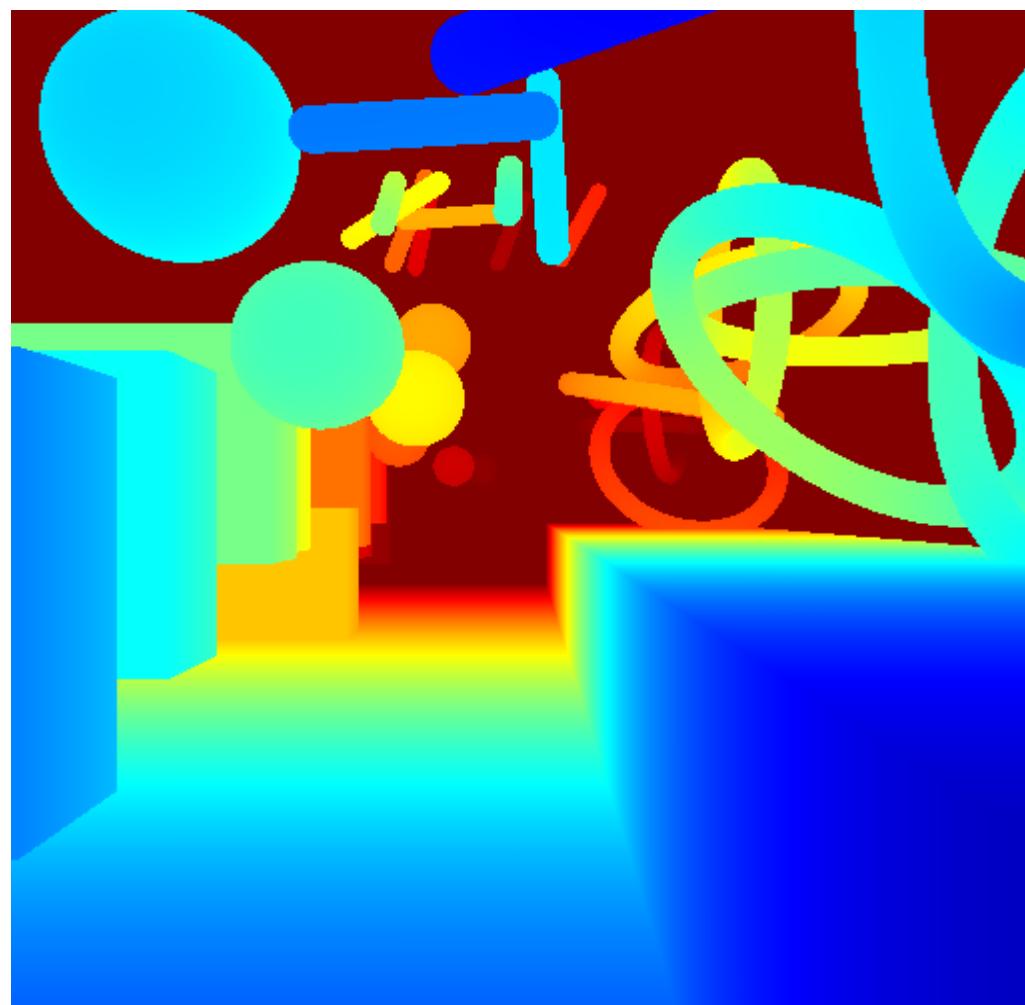


Google “Turbo” colormap



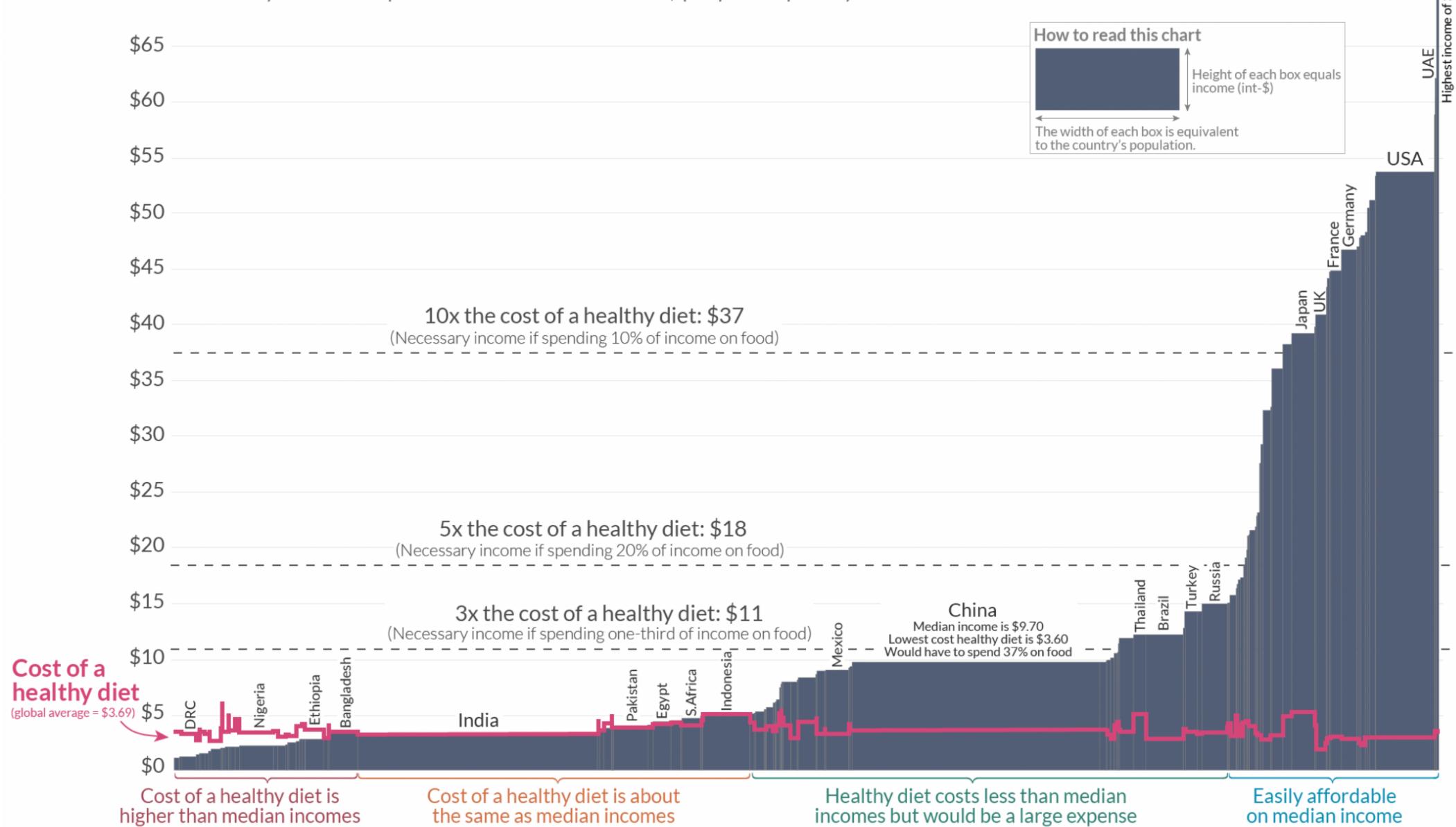
Matlab “jet” colormap

<https://ai.googleblog.com/2019/08/turbo-improved-rainbow-colormap-for.html>



How does the cost of a healthy diet compare to daily median incomes?

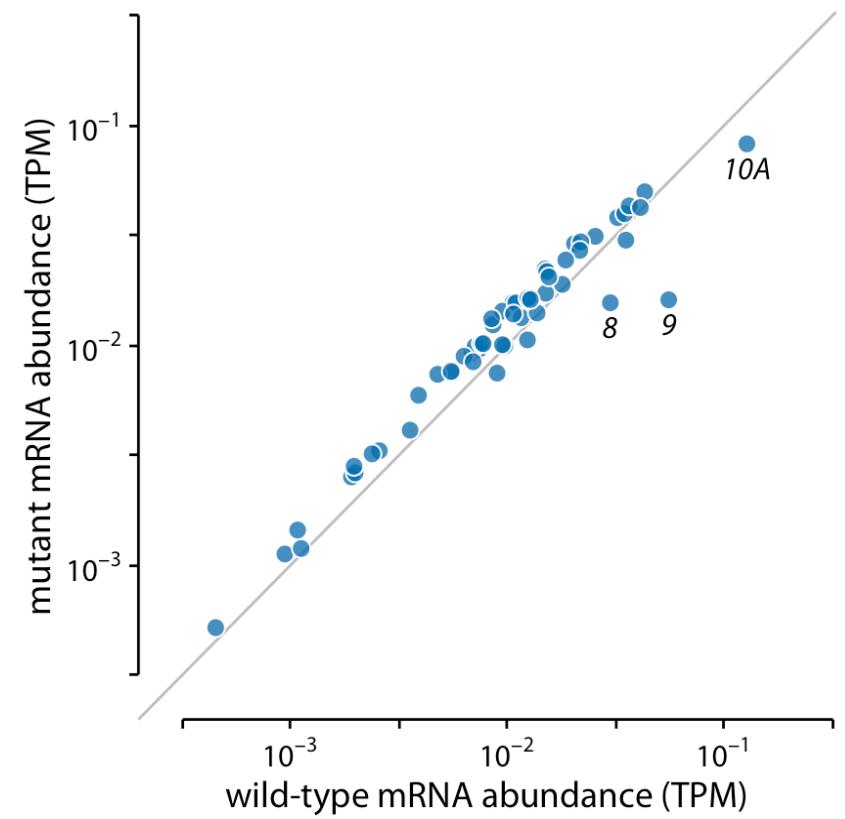
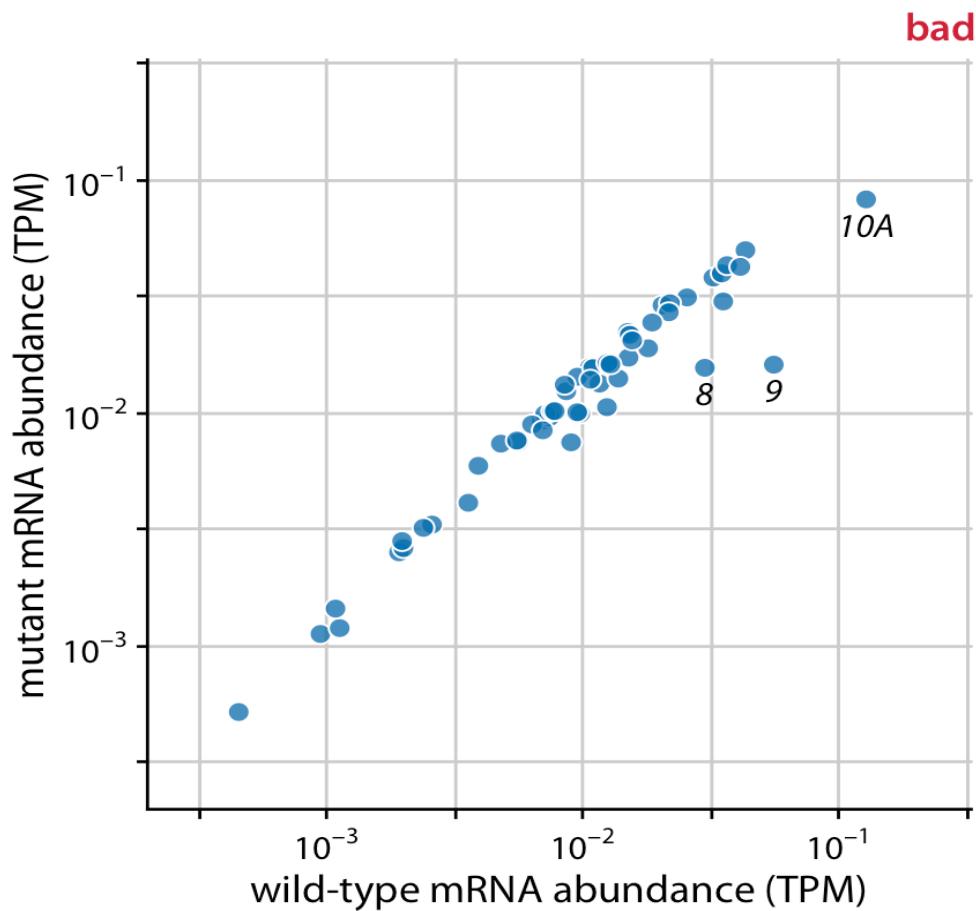
The cost of a healthy diet is the lowest cost set of items that would meet requirements for food-based dietary guidelines. These come from national governments or public health agencies, and are defined based on regionally representative guidelines. Median incomes and dietary costs are expressed in 2017 international-\$ per person per day.



Writing captions/titles:

- "This is a scatterplot" -- This is the alt text.
- Caption / title does not need to tell us the graph type.
- WHAT is being plotted? "Weights"?
- What is the scope of the thing being plotted?
Geographical, temporal constraints. "Birth weight? of whom?" For CDC, that means YEAR and US.
- Data source statement.
- Captions can (optionally) include interpretation; the publisher's tradition will tell you whether to write 500 word captions or 50 word captions.

Provide context



One percent of US Counties...

One Percent of U.S. Counties Account for Bulk of COVID-19 Deaths

While the death toll in the U.S. from COVID-19 continues to increase, a significant proportion of those deaths have occurred in just a handful of counties.

