

Data Visualization Types: The Basics

Introduction to Data Visualization

The Graduate Center at CUNY | Summer 2018

May 31, 2018

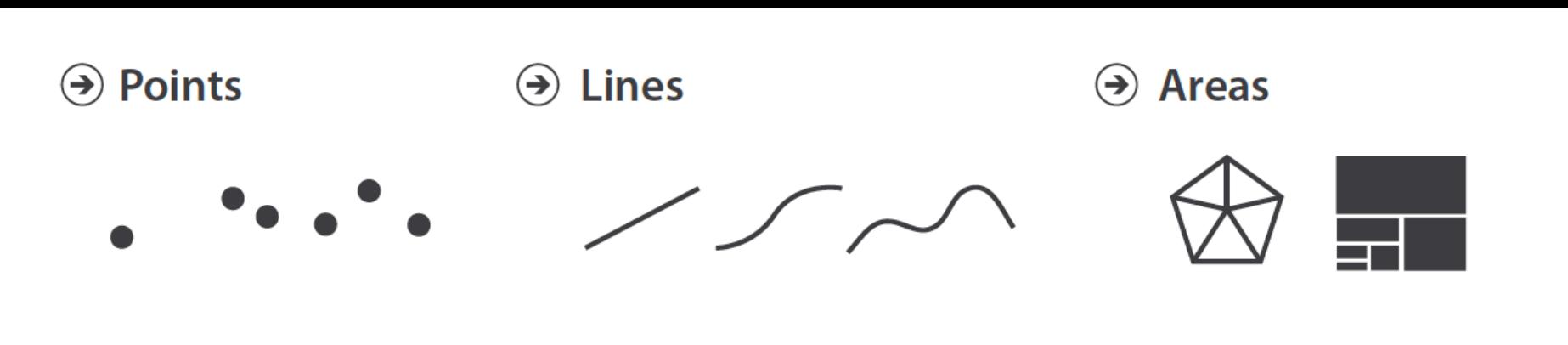
5 minute reflection

In recent years, there has been an explosion of visualizations, but for the most part, they fall back to a few familiar types. How many different chart types can you think of? As you make this list, do you notice any patterns or features they have in common?

Three ingredients Three ways

Shapes

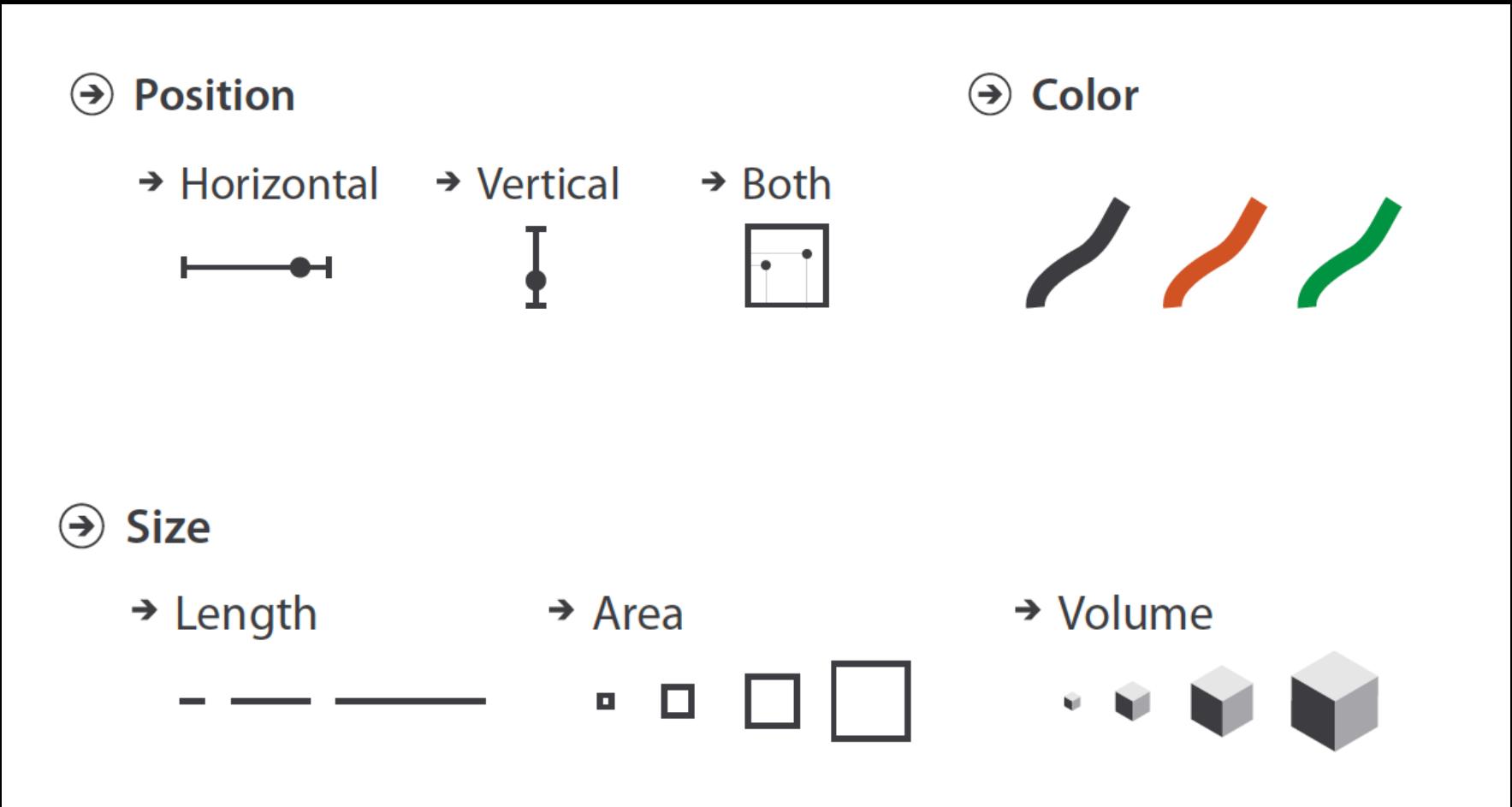
- Points
- Lines
- Areas



Three ingredients Three ways

Shapes

- Position
- Color
- Scale (size)



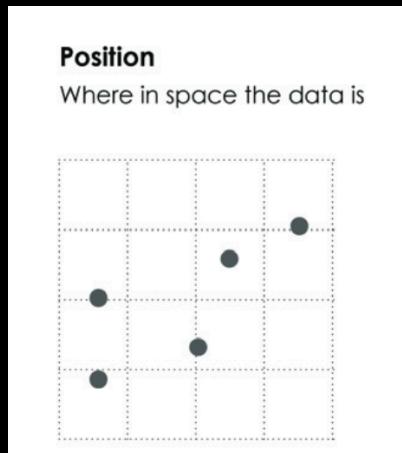
Four Essential Features

- Title
- Scale (linear, logarithmic, or custom)
- Coordinate System (cartesian, polar, geographic, or custom)
- Context/Sources

Visual Cues for Quantitative Data

1. Position
2. Length
3. Angle
4. Direction
5. Shape
6. Area / Volume
7. Color: Hue & Saturation/Intensity

Position

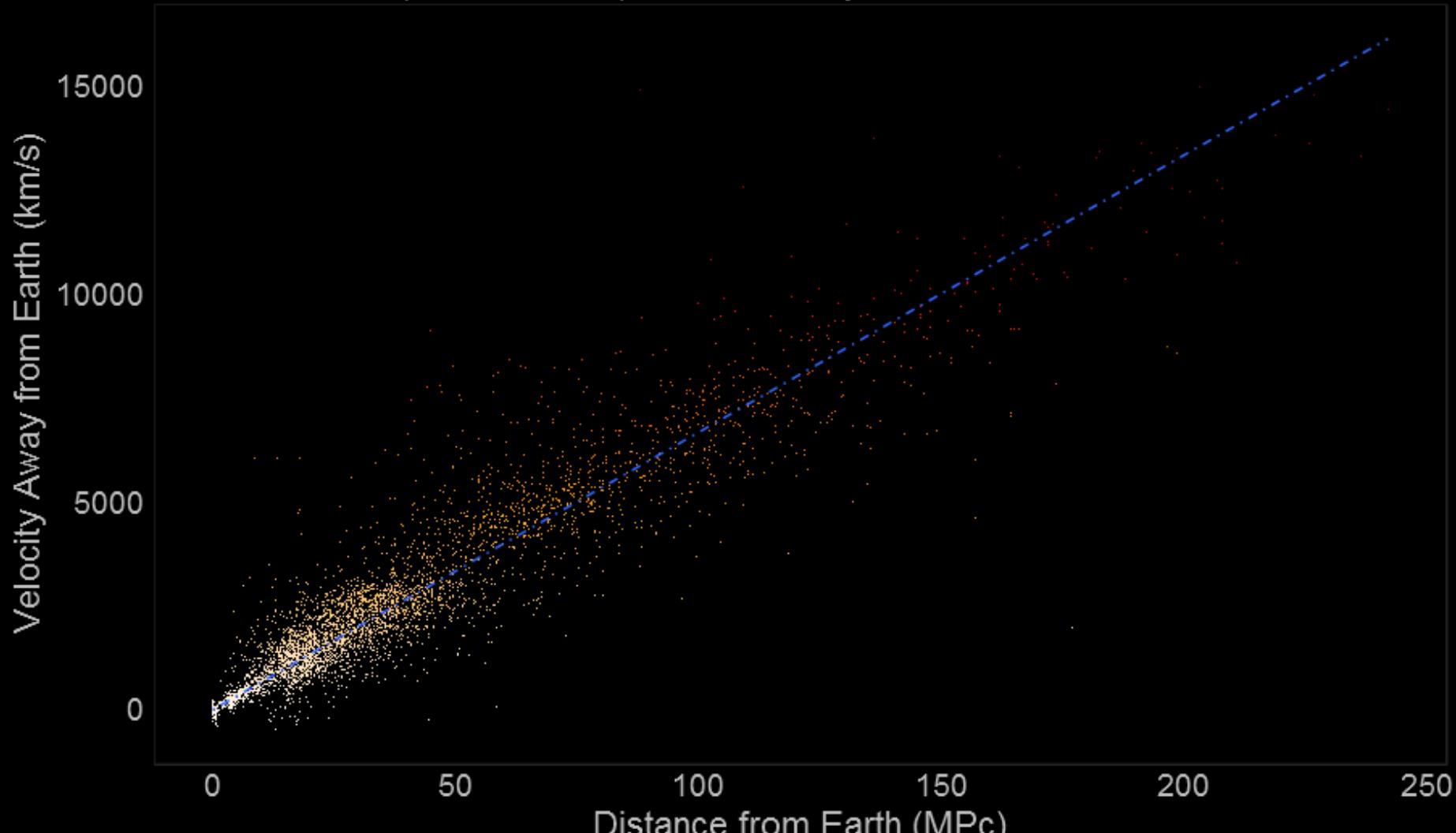


Yau 2013

[https://github.com/
zonination/galaxies](https://github.com/zonination/galaxies)

The Expanding Universe

The inverse of the slope of this line is equal to 13.77 billion years



created by /u/zonination

Length

Length

How long the shapes are



Yau 2013

Women are more likely than men to engage in literary culture, regardless of social class.

See responses by
Gender

Men

Women

Type of author
International authors

Which authors have you read and liked?
Authors are ranked from "highbrow" to "lowbrow"

Virginia Woolf

Men

Women

Don DeLillo

Men

Haruki Murakami

Men

Women

Jane Austen

Men

Women

Margaret Atwood

Men

Women

Dave Eggers

Men

Women

Amy Tan

Men

Women

Ian Rankin

Men

Women

Jodi Picoult

Men

Women

Stephen King

0% 5% 10% 15% 20% 25% 30% 35% 40% 45% 50% 55% 60% 65%

Percentage of respondents

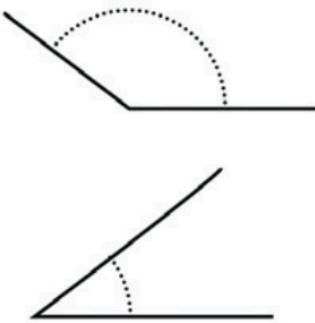
Source: Australian Cultural Fields project

<https://public.tableau.com/en-us/s/gallery/cultural-tastes-gender-class-and-age>

Angle

Angle

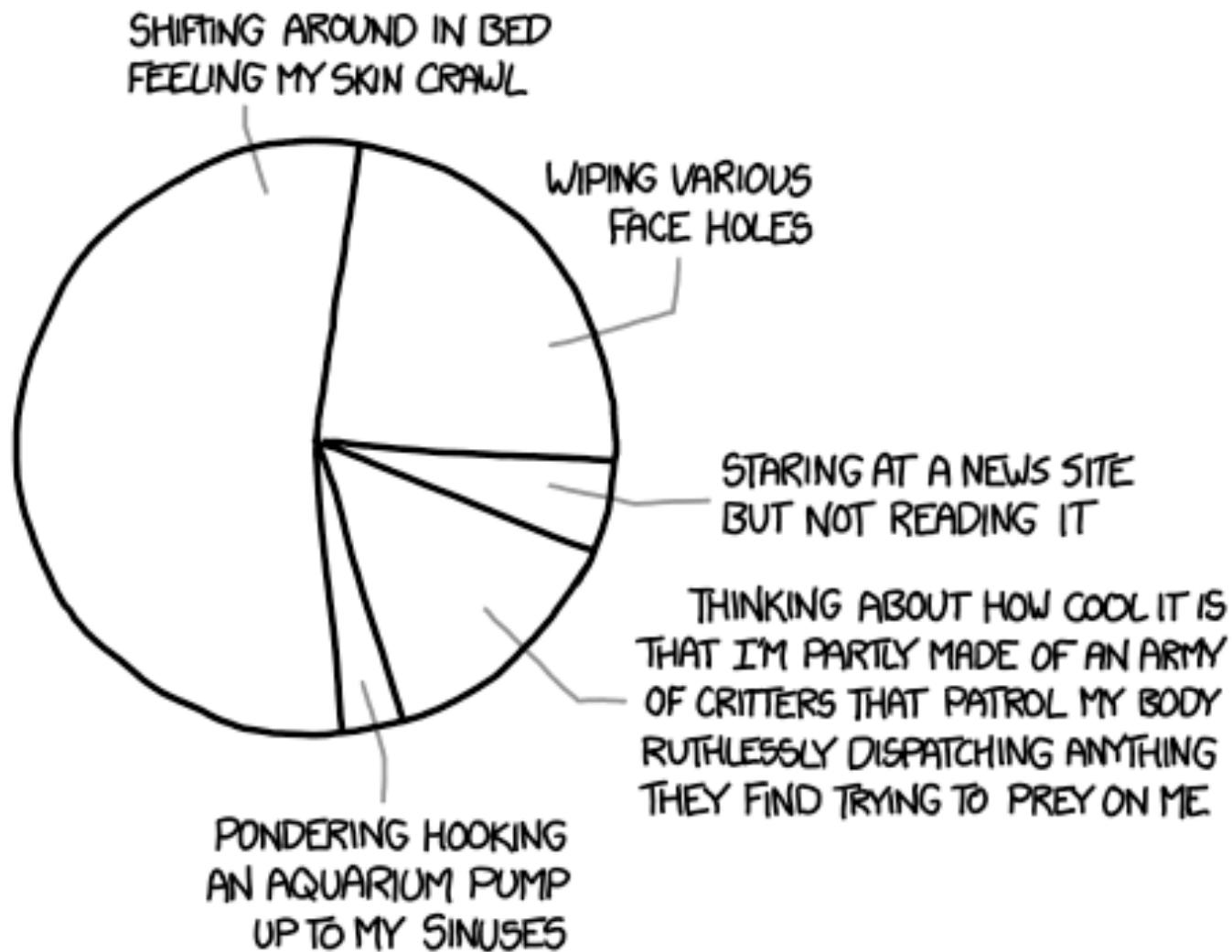
Rotation between vectors



Yau 2013

<https://xkcd.com/1157>

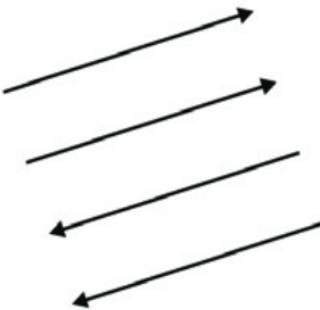
ACTIVITIES WHILE SICK:



Direction

Direction

Slope of a vector in space

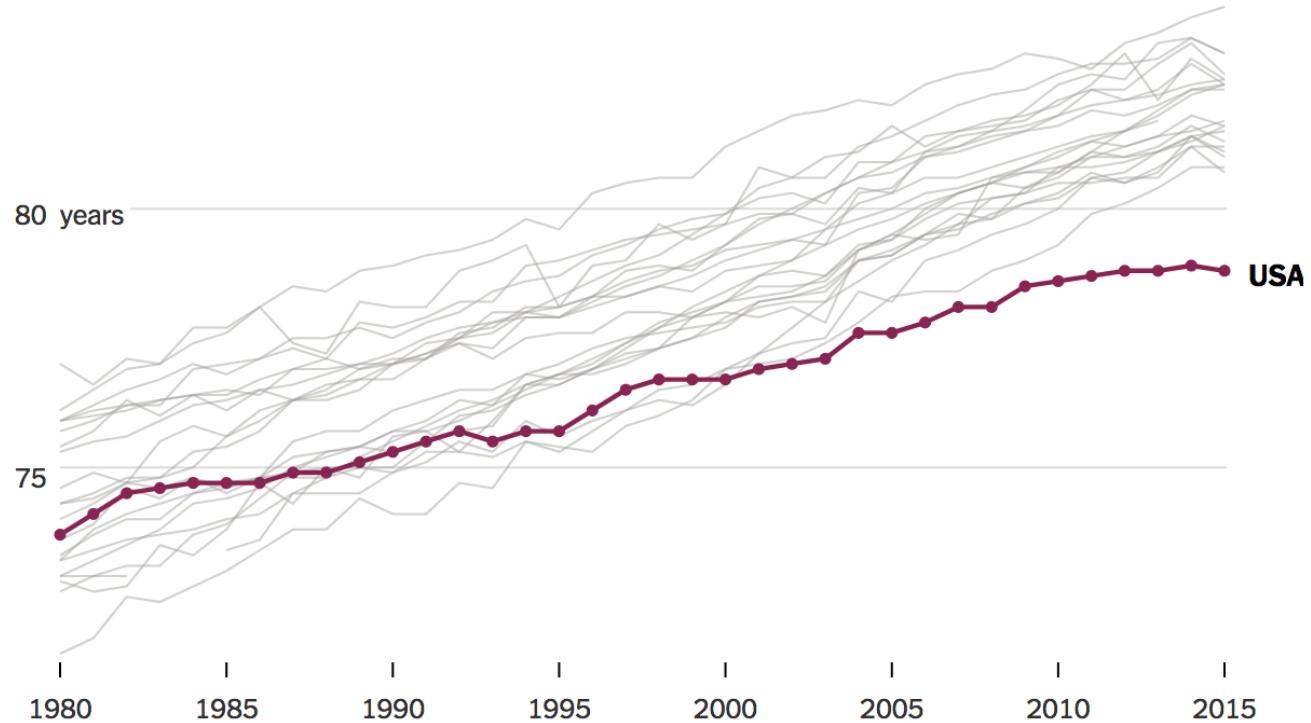


Yau 2013

[https://www.nytimes.com/2018/05/14/
upshot/medical-mystery-health-spending-1.html](https://www.nytimes.com/2018/05/14/upshot/medical-mystery-health-spending-1.html)

Falling Behind

In life expectancy, the United States went from middle of the pack of peer nations in 1980 to below average.



The list of peer nations in the chart, ordered by life expectancy based on 2015 result: Japan (83.9), Switzerland, Spain, Italy, Australia, France, Luxembourg, Norway, Sweden, Canada, New Zealand, Finland, the Netherlands, Iceland, Ireland, Austria, Portugal, Belgium, Britain, Denmark, Germany (80.7). The U.S. is at 78.8.

Source: National Research Council

Shapes

Panama Papers The Power Players ⓘ



Sigmundur Davíð Gunnlaugsson
Prime minister of Iceland (2013–present); Member of Parliament (2009–present); Chairman of the Progressive Party (2009–present)

Related countries
Iceland
Luxembourg
Virgin Islands, British

Sigmundur Davíð Gunnlaugsson is the prime minister of Iceland. A former journalist and radio personality, Gunnlaugsson helped lead a campaign against bank bailouts after the Icelandic financial crisis in 2008 and became chairman of the Progressive Party shortly thereafter. He entered parliament in 2009 and led the Progressives to victory in 2013, becoming at age 38 the nation's youngest prime minister. His wife, Anna Sigurlaug Pálsdóttir, is the daughter of a wealthy Toyota dealer in Iceland.

Inside the Mossack Fonseca data » Offshore company held millions of dollars worth of bonds in Iceland banks that failed [Read more...](#)

Offshore glossary ⓘ

I had ever owned an offshore company in a television interview in March, son said no. "Myself? No. Well, the Icelandic companies I have worked with had is with offshore companies, even the — what's it called? The worker's unions. So ve been through such arrangements, but I have always given all of my assets my family up for taxes. A spokesman said in a subsequent statement that "the ister and his wife have adhered to Icelandic law, including declaring all assets, and income in Icelandic tax returns since 2008."

Shapes

Symbols as categories

Explore the data: **Sigmundur Davíð Gunnlaugsson**

```
graph TD; SD[Sigmundur David Gunnlaugsson] --- WINTRIS[WINTRIS INC.]; SD --- LI[LUXEMBOURG INTERNATIONAL CONSULTING S.A. (INTERCONSULT)]; WINTRIS --- AS[Anna Sigurlaug Palsdottir]; WINTRIS --- SG[Sigmundur David Gunnlaugsson]; LI --- SG
```

Category

- Company
- Officer
- Address
- Client

Category

- Officer
- Address
- Company
- Client

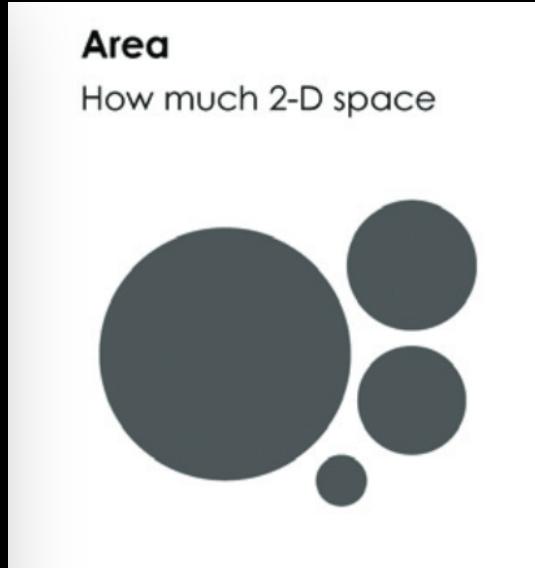
Type

- Is officer of
- Registered addr...
- Registered

Yau 2013

<https://projects.icij.org/panama-papers/power-players/#49>

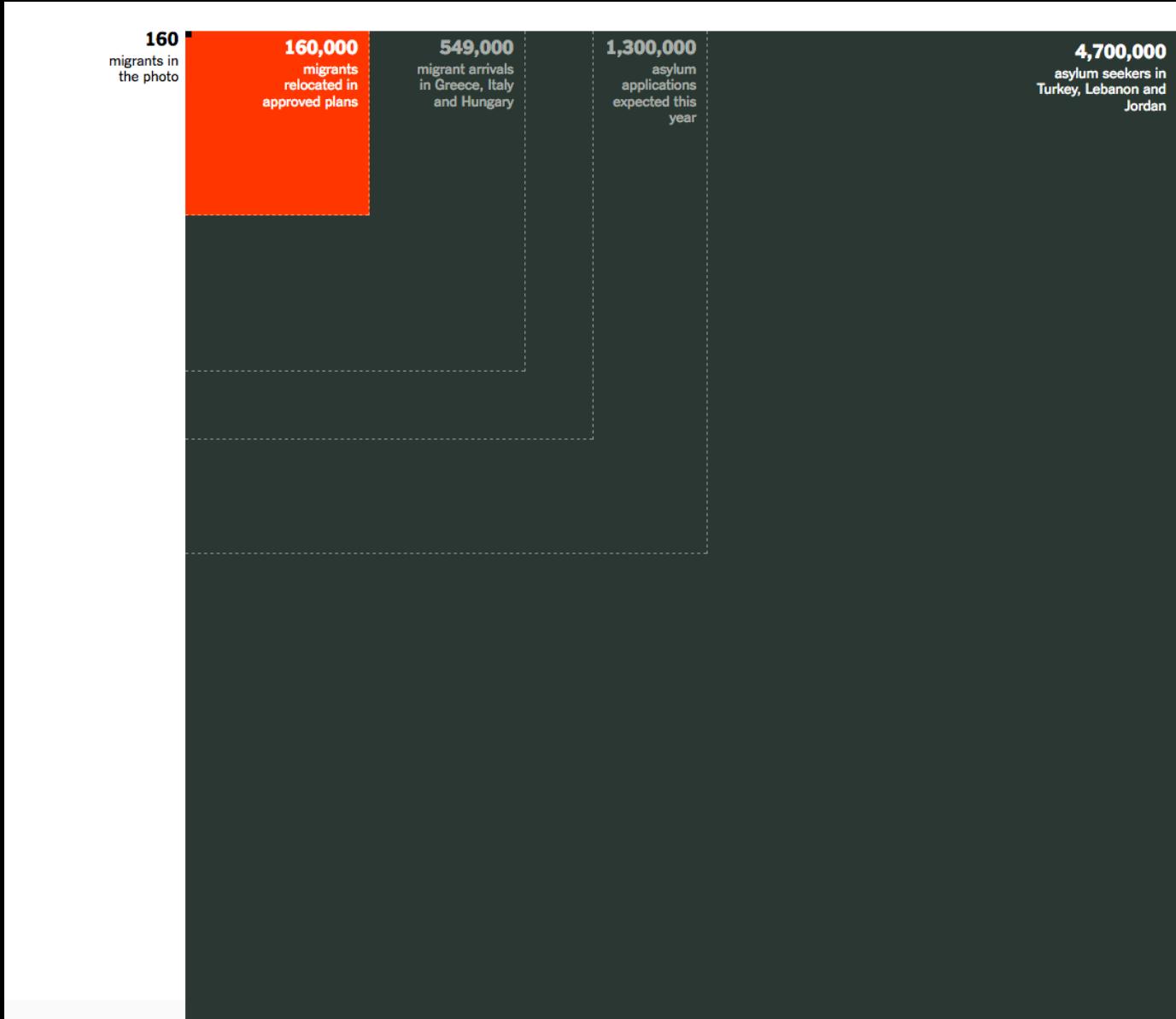
Area



Yau 2013

<https://www.nytimes.com/interactive/2015/09/10/world/europe/scale-of-migrant-crisis-in-europe.html>

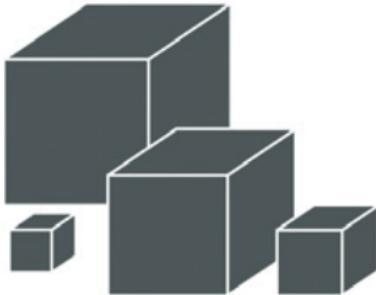
The Scale of the Migrant Crisis, From 160 to Millions



Volume

Volume

How much 3-D space



Yau 2013

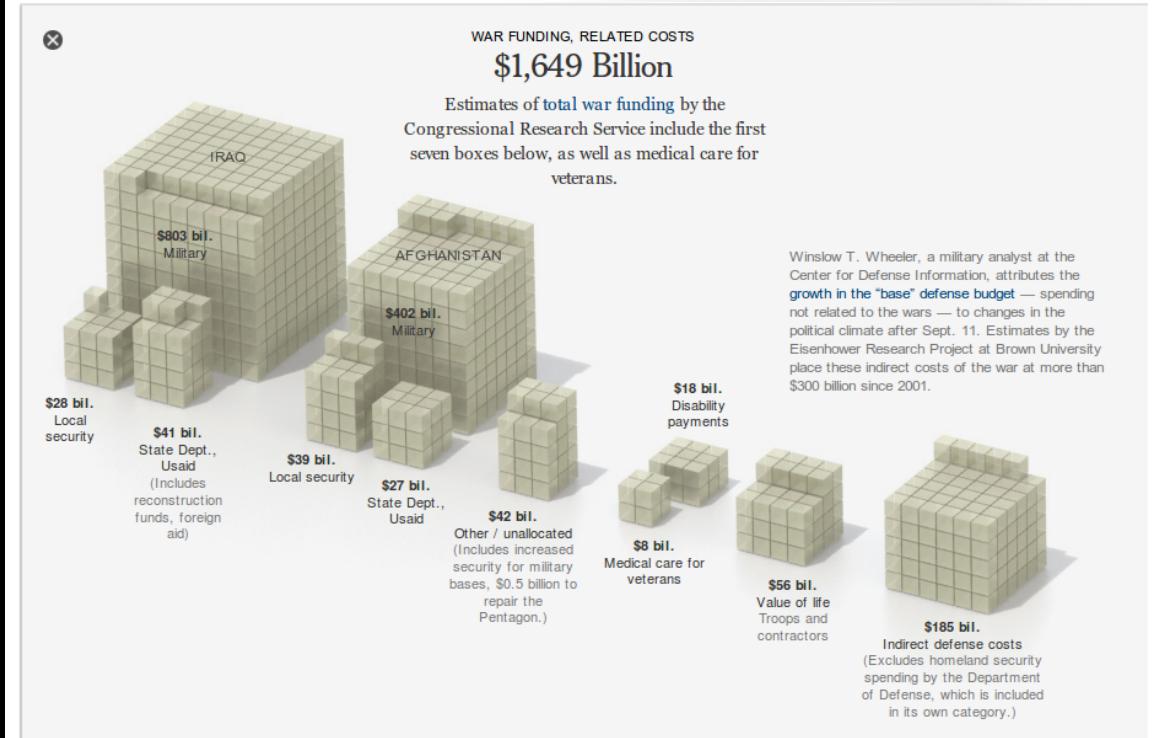
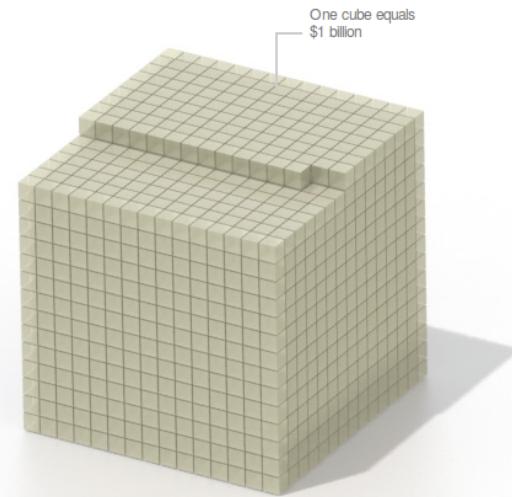
<https://archive.nytimes.com/screenshots/www.nytimes.com/interactive/2011/09/08/us/sept-11-reckoning/cost-graphic.jpg>

One 9/11 Tally: \$3.3 Trillion

By SHAN CARTER and AMANDA COX Published: September 8, 2011

Al Qaeda spent roughly half a million dollars to destroy the World Trade Center and cripple the Pentagon. What has been the cost to the United States? In a survey of estimates by The New York Times, the answer is \$3.3 trillion, or about \$7 million for every dollar Al Qaeda spent planning and executing the attacks. While not all of the costs have been borne by the government — and some are still to come — this total equals one-fifth of the current national debt. All figures are shown in today's dollars.

[RELATED ARTICLE: The Price of Lost Chances »](#)



Color: Hue & Saturation

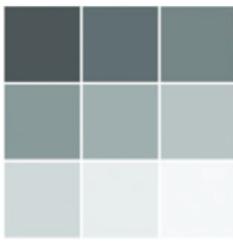
Color hue

Usually referred to as color



Color saturation

Intensity of a color hue

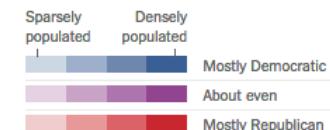


Yau 2013

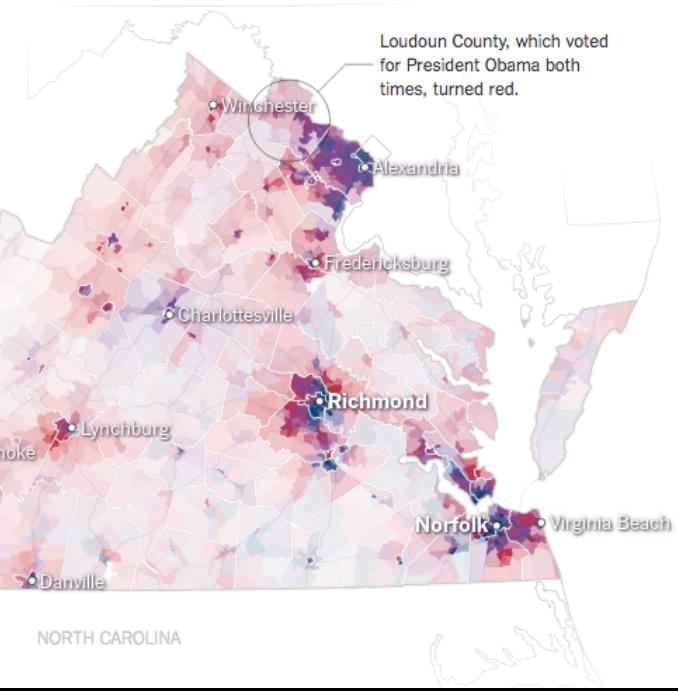
The Most Detailed Maps You'll See From the Midterm Elections*

By Amanda Cox, Mike Bostock, Derek Watkins, and Shan Carter Nov. 6, 2014 04:03 PM

Virginia



- Dem. Mark Warner 49.2%
 Rep. Ed Gillespie 48.4%



Mr. Warner lost the southwest, which he won by large margins in 2008.

<https://www.nytimes.com/interactive/2014/11/04/upshot/senate-maps.html>

Chart Types

- <https://datavizcatalogue.com/>
- <http://rethinkingvis.com/#all>

Perception Ranking

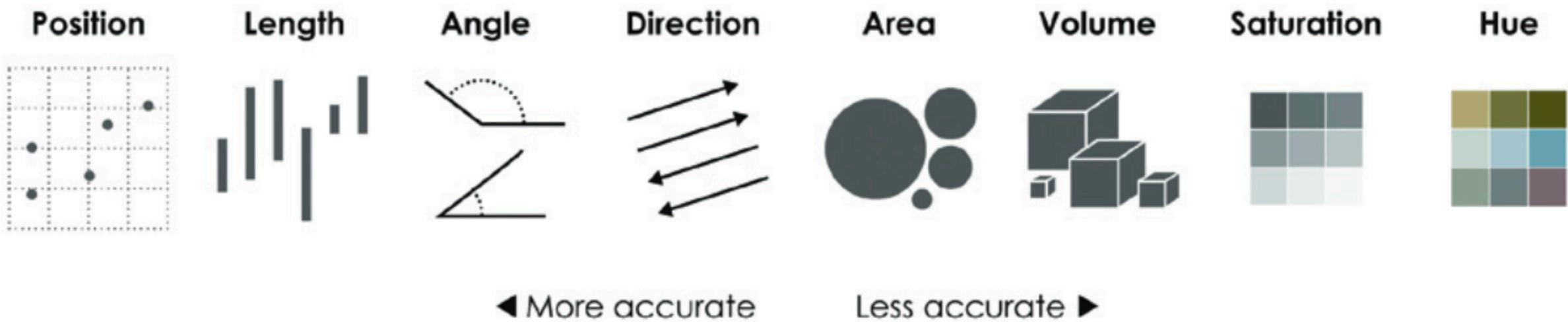
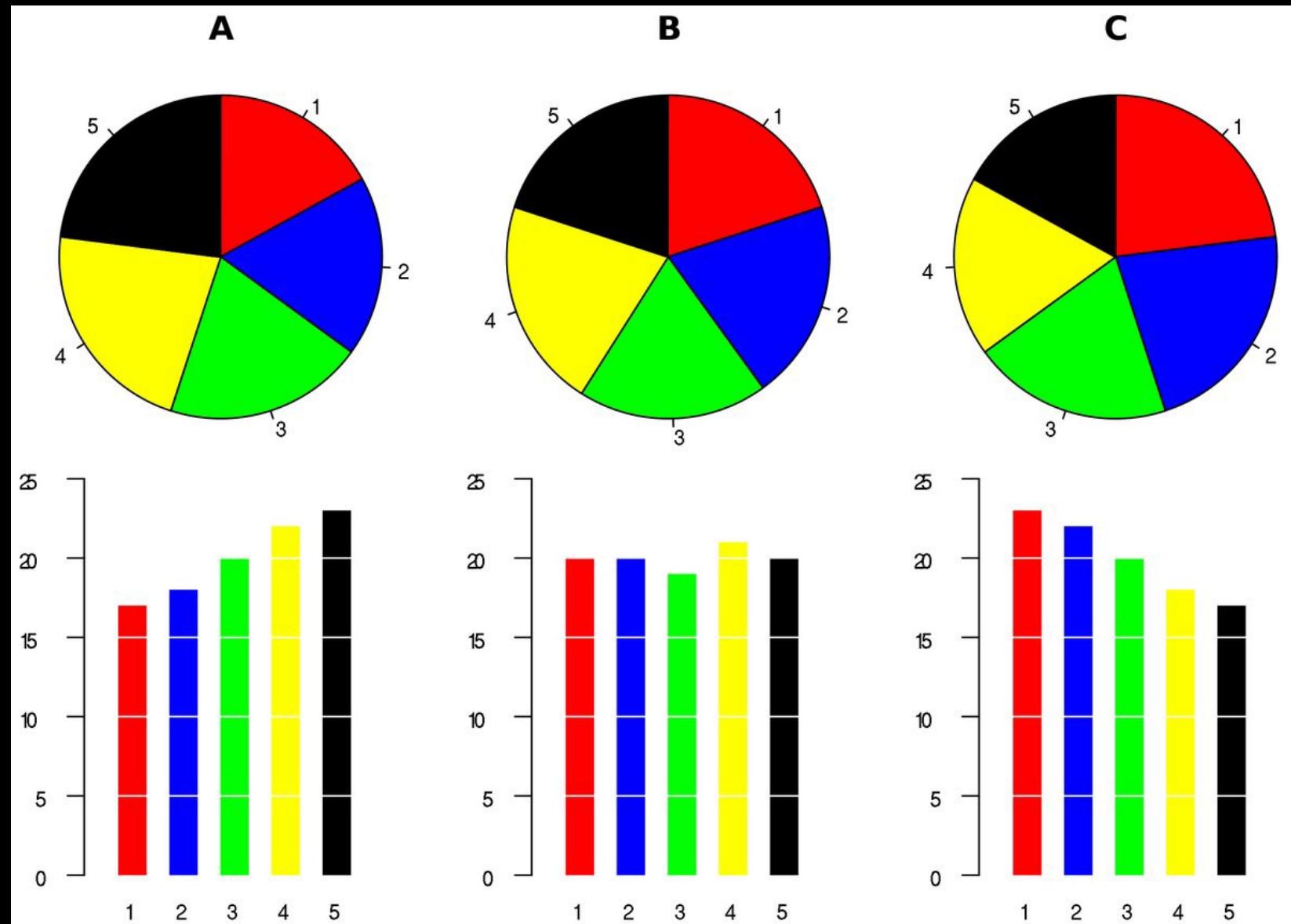


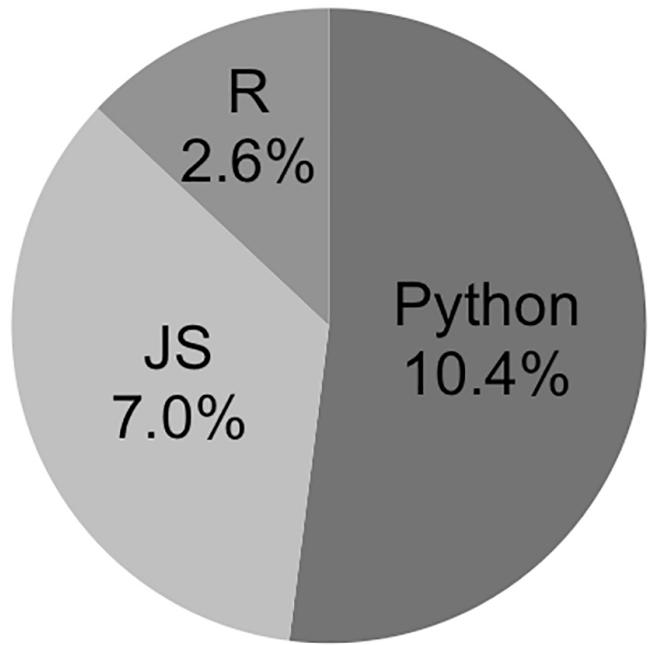
FIGURE 3-12 Visual cues ranked by Cleveland and McGill

Pie Chart vs. Bar Chart

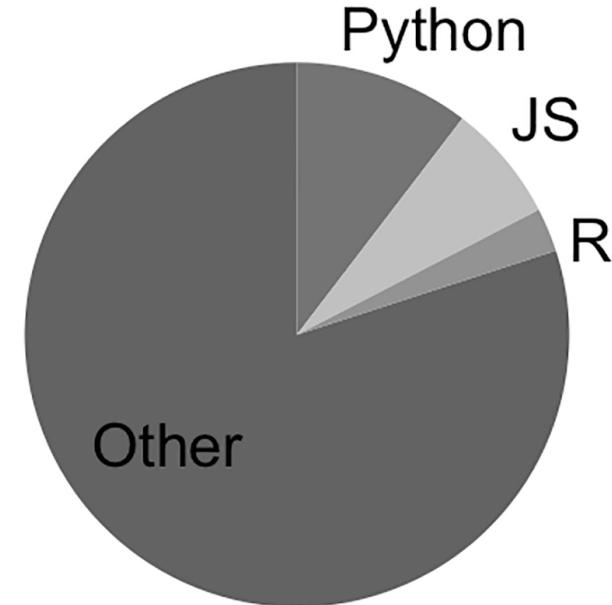


More on Pie Charts

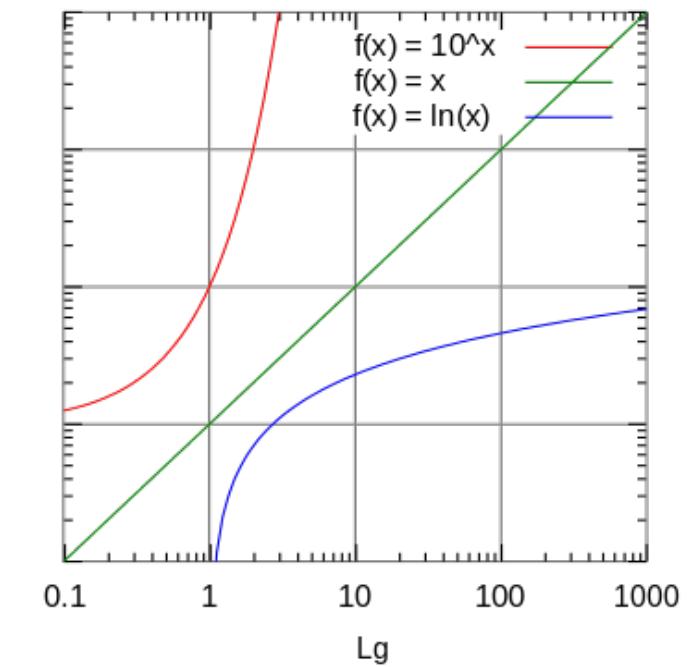
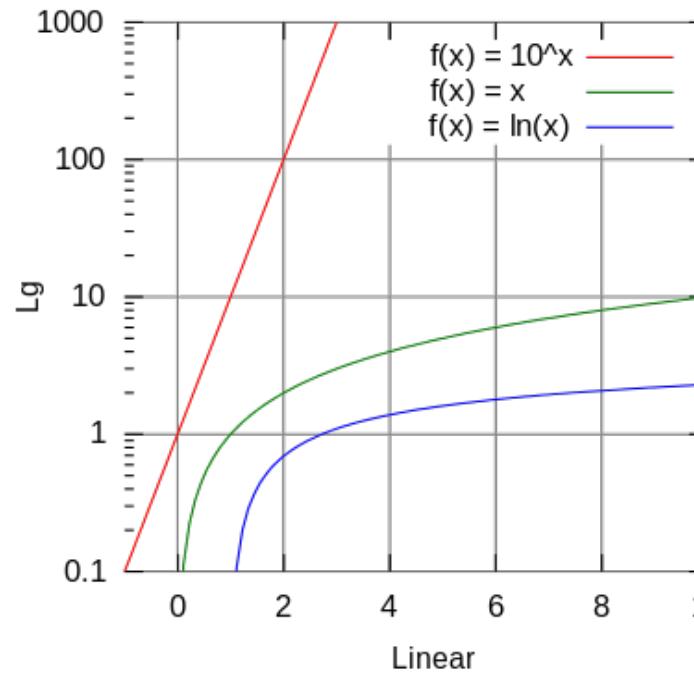
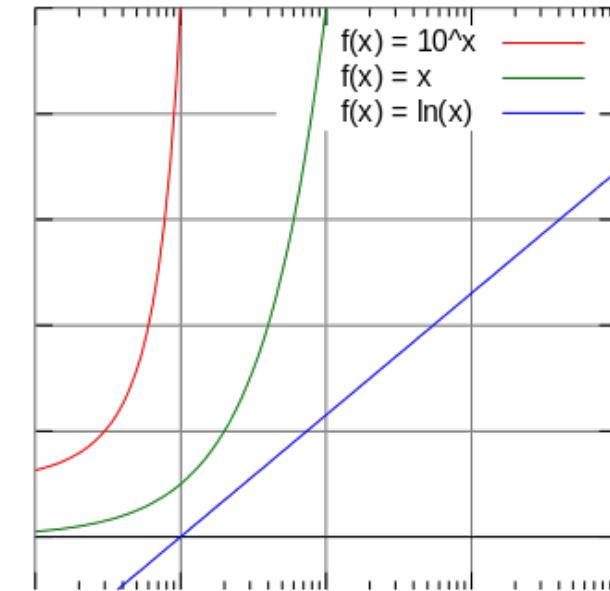
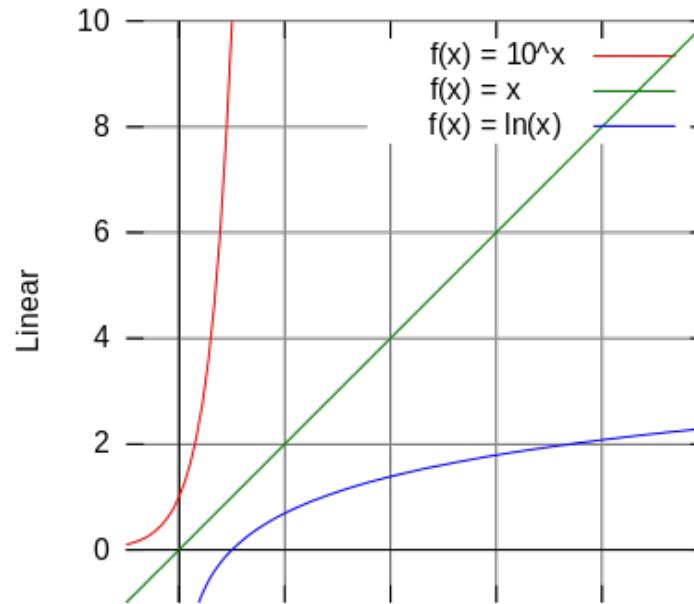
Google tutorial searches



Google tutorial searches



Scales – Linear vs. Logarithmic



Scales – Logarithmic

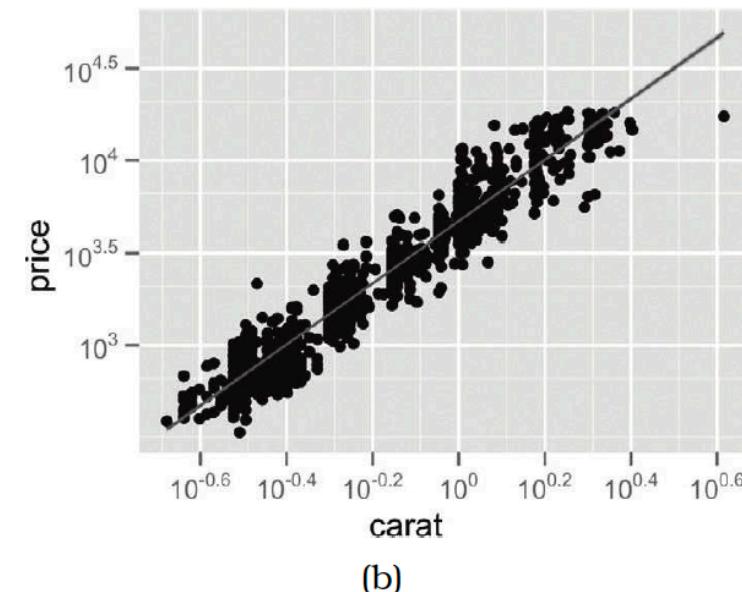
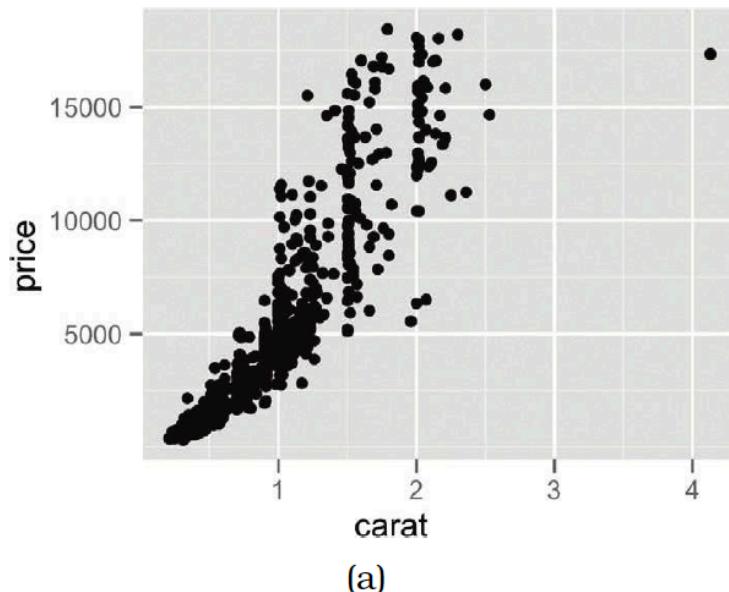


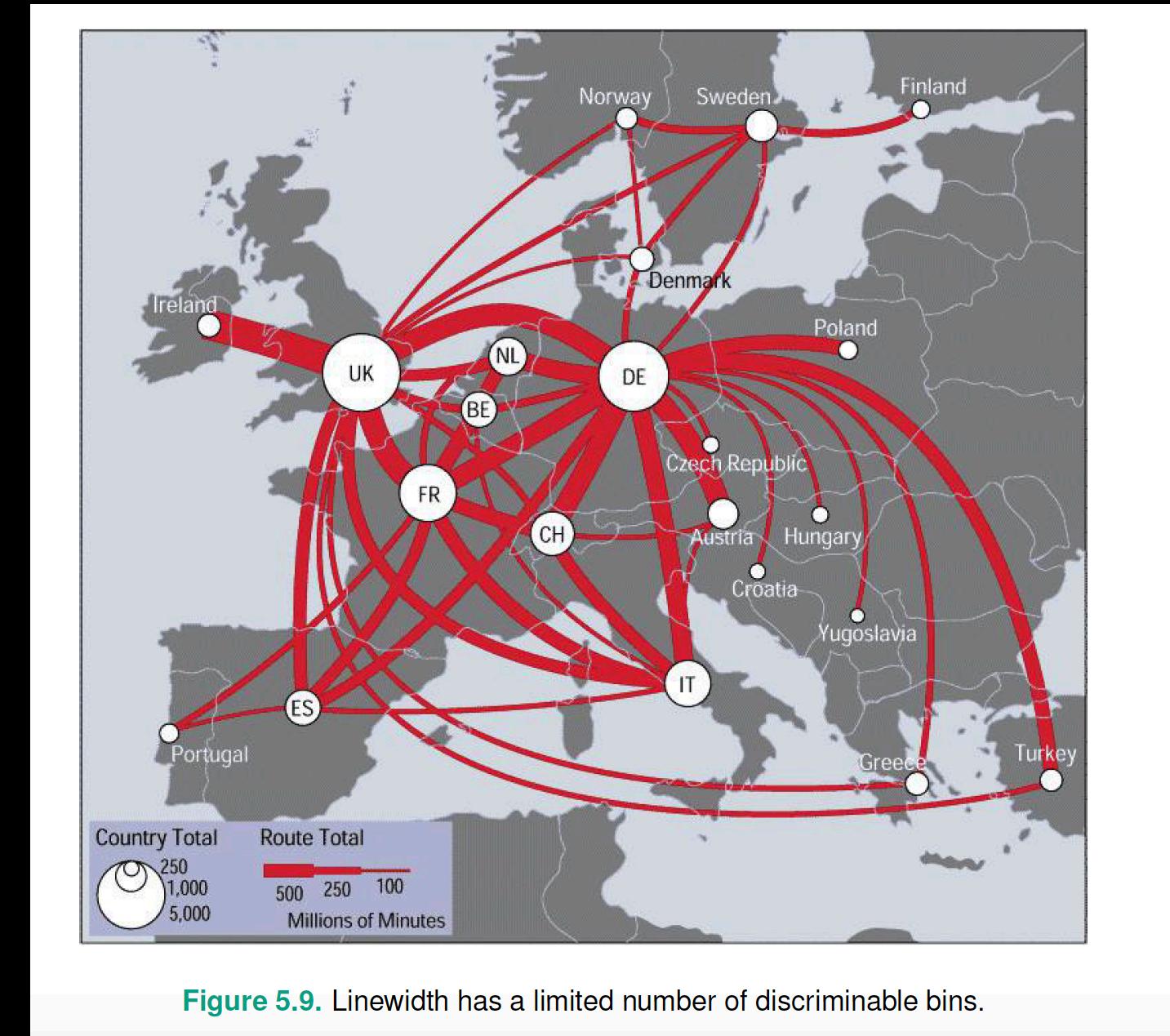
Figure 7.3. Scatterplots. (a) Original diamond price/carat data. (b) Derived log-scale attributes are highly positively correlated. From [Wickham 10, Figure 10].

Bins and Breaks

- Bins: the number of categories
- Breaks: How those categories are split up

Bins

- 3 line widths
- 3 areas



Breaks

- Equal Intervals
- Quantiles
- Standard Deviation
- Jenks



Features

- For each visualization, identify the:
 - Visual Cues employed
 - Scale
 - Coordinate System