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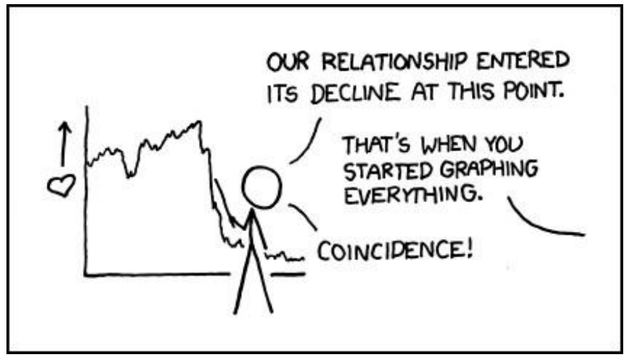
THE UNIVERSITY OF UTAH

Visualization for Data Science
DS-4630 / CS-5630 / CS-6630

How to Critique a Vis

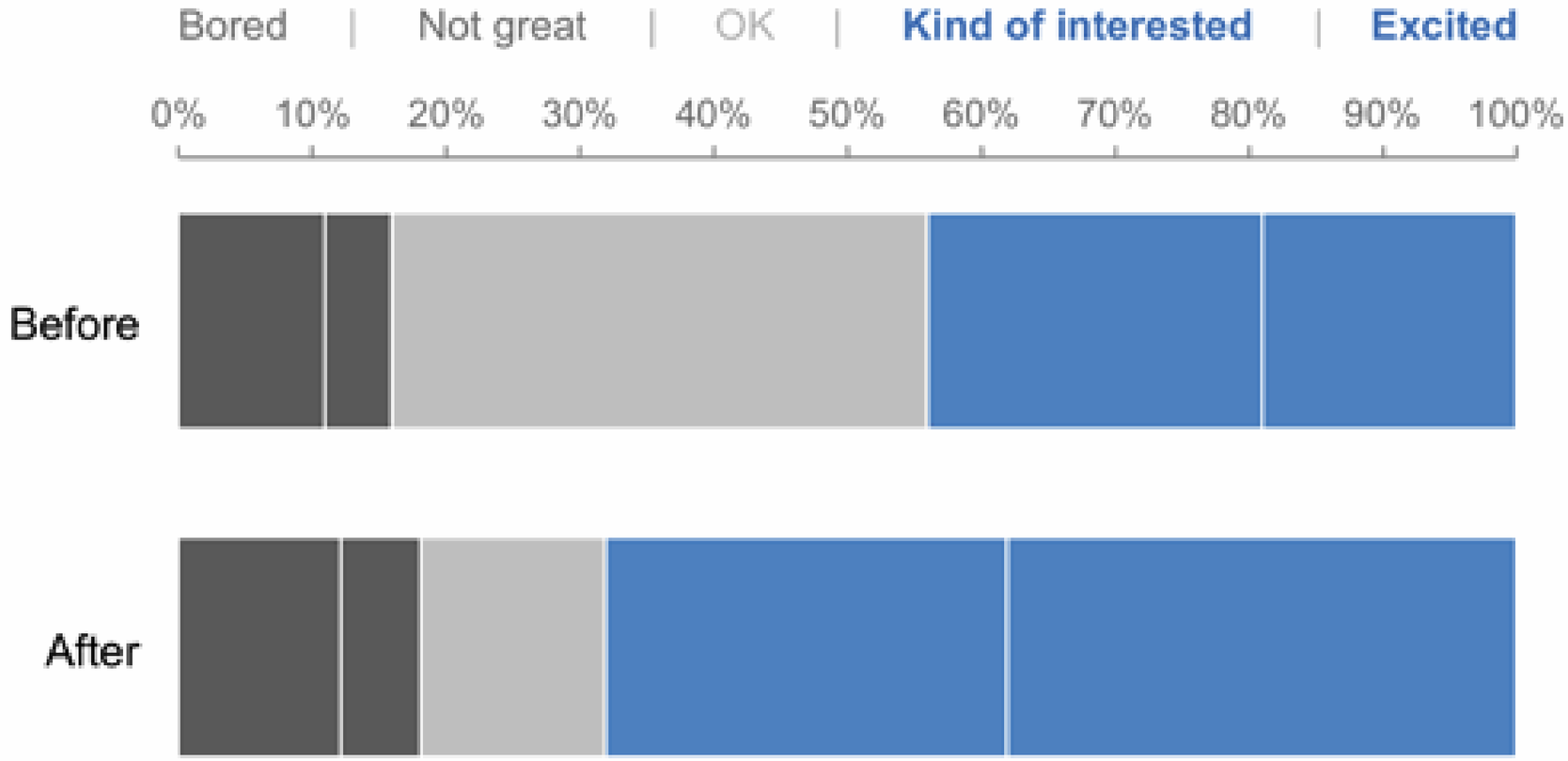


[xkcd]

1. Identify Data, Tasks / Intentions

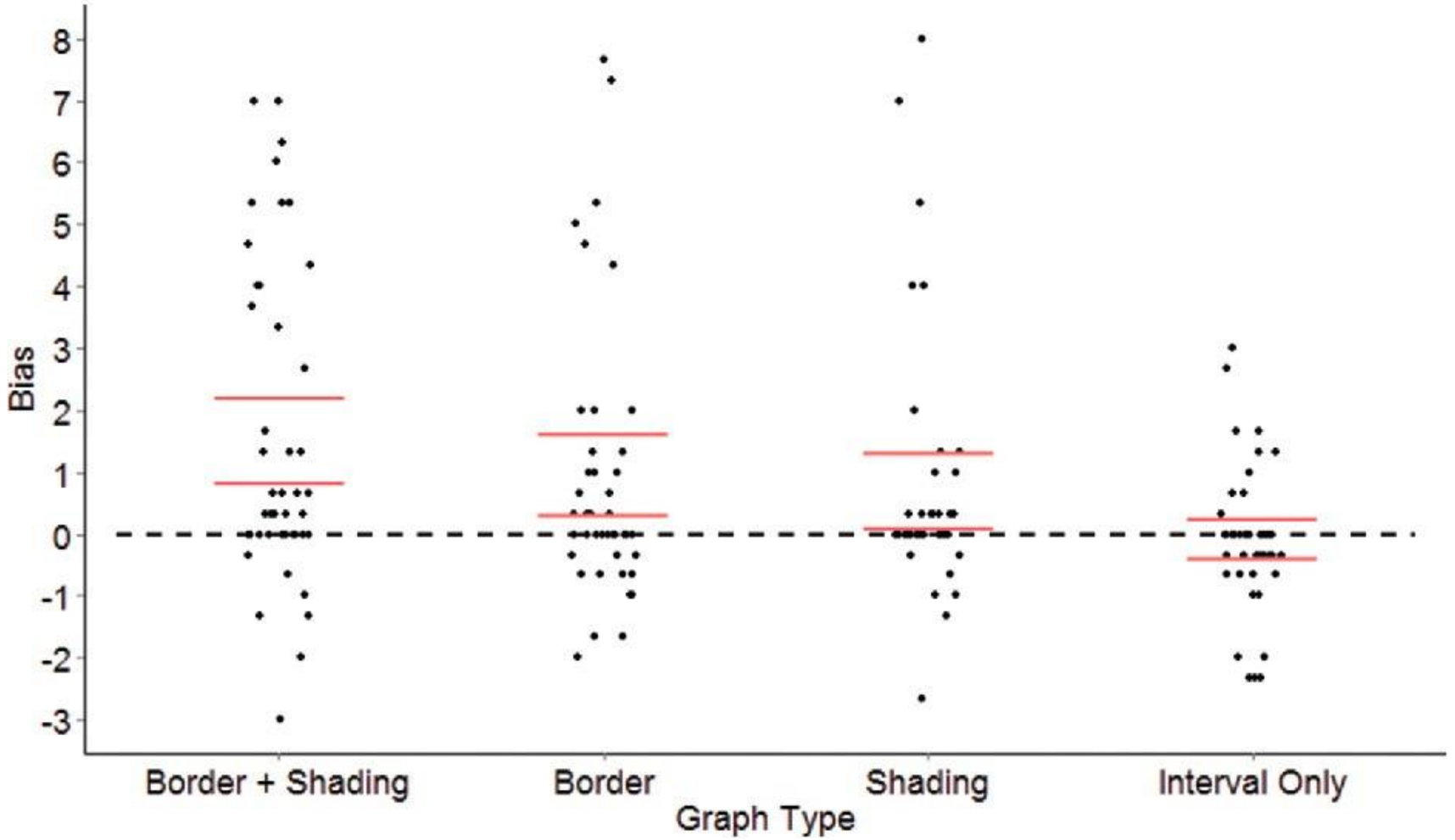
- E.g., quantitative, time-series -> change over time qualitative labels (often supplementary) quantitative, two conditions -> compare
- ….

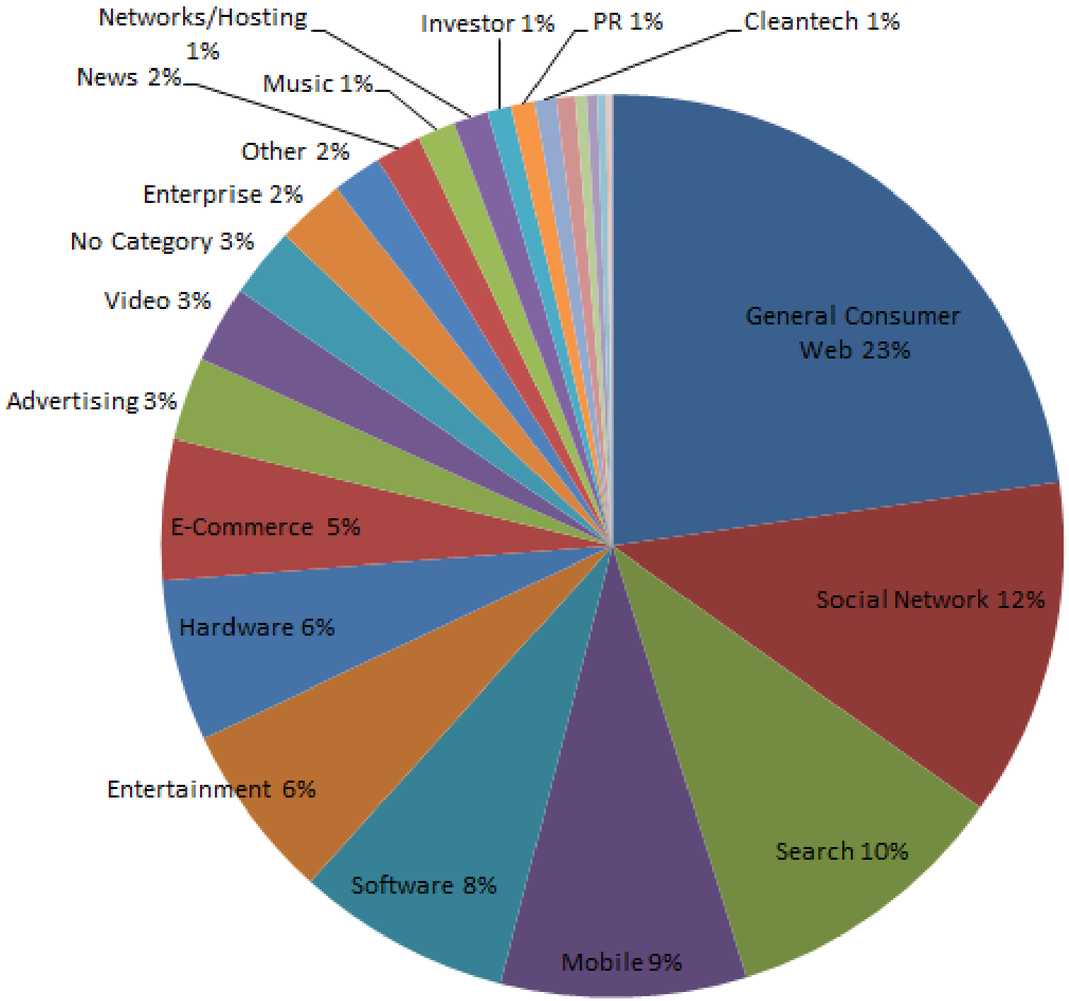
How do you feel about science?



2. Identify Marks, Channels

- Mark: encodes “existence” of item
- point, line, shape, …
- Channels: encodes “magnitude of dimension associated with an item”
- positizion, size, saturation, color, …


Bias
8
7
6
5
4
3
2
1
0
-1
-2
-3
Border + Shading
Border
Shading
Interval Only
Graph Type

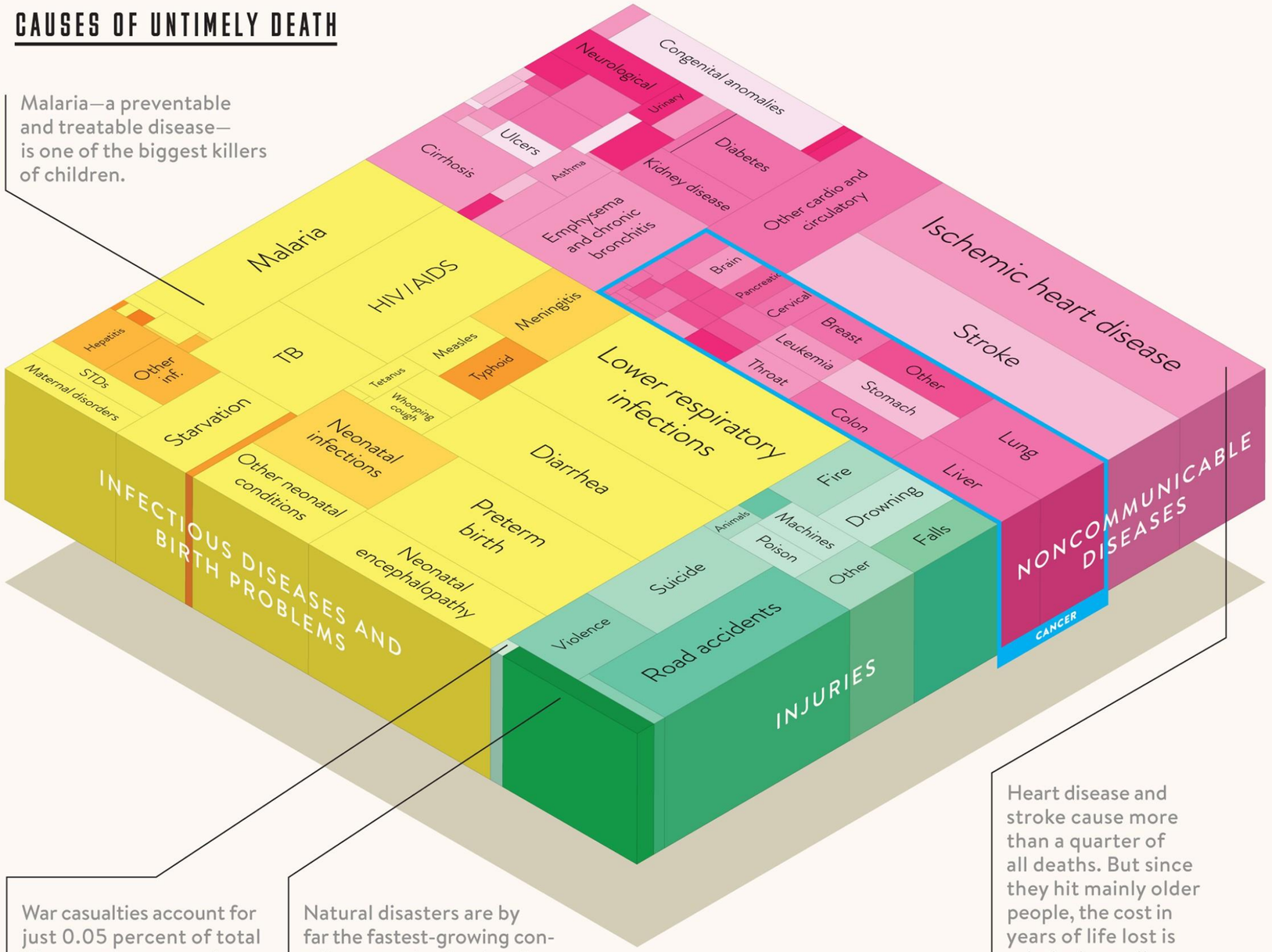


Share of coverage on TechCrunch

Cole Nussbaumer

www.storytellingwithdata.com/2011/07/death-to-pie-charts.html

CAUSES OF UNTIMELY DEATH



ANNUAL % CHANGE (2005 TO 2010)

INFECTIOUS DISEASES/BIRTH PROBLEMS

INJURIES

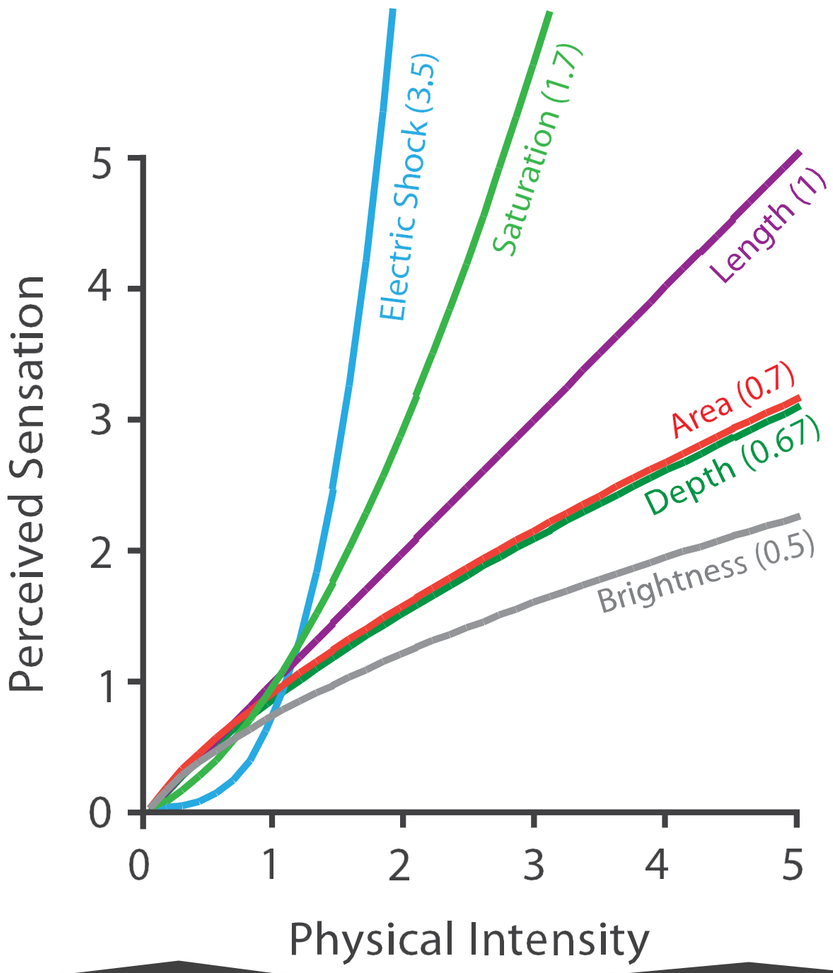
NONCOMMUNICABLE DISEASES

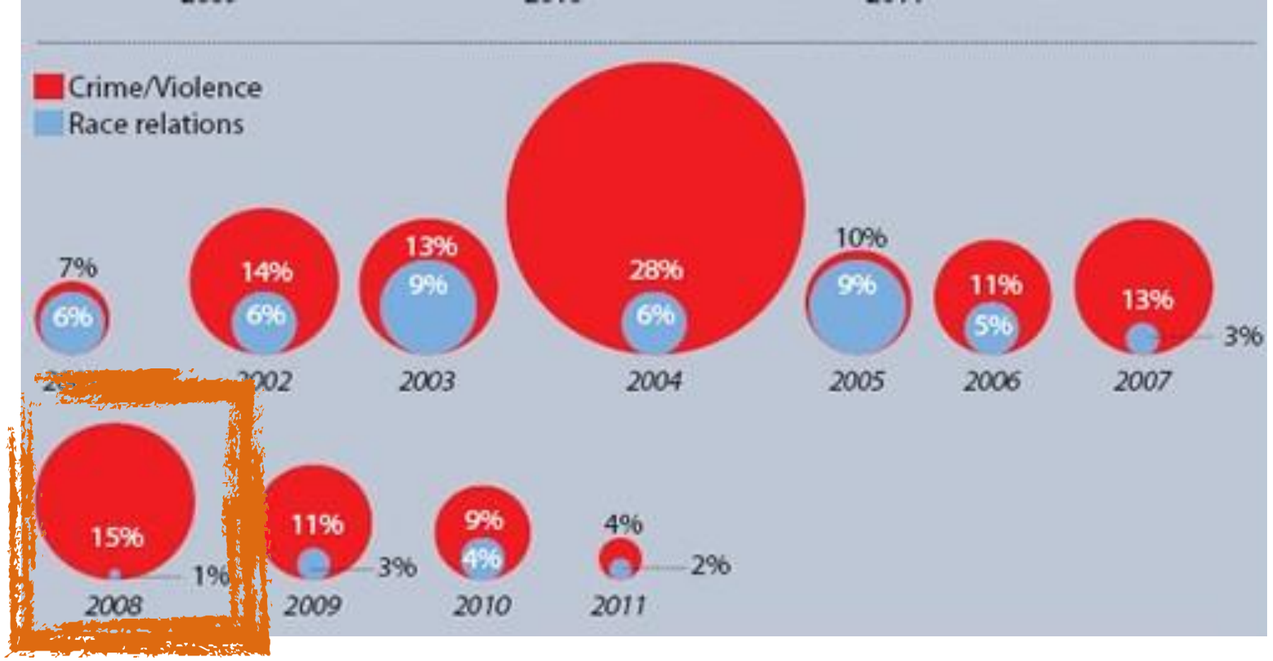
−3% −2% −1% 0% 1% 2% 3%

3. Is Effectiveness Principle Followed?

- Use the Best Visual Channel Available for the Most Important Aspect of your Data
- Are all visual channels appropriate?

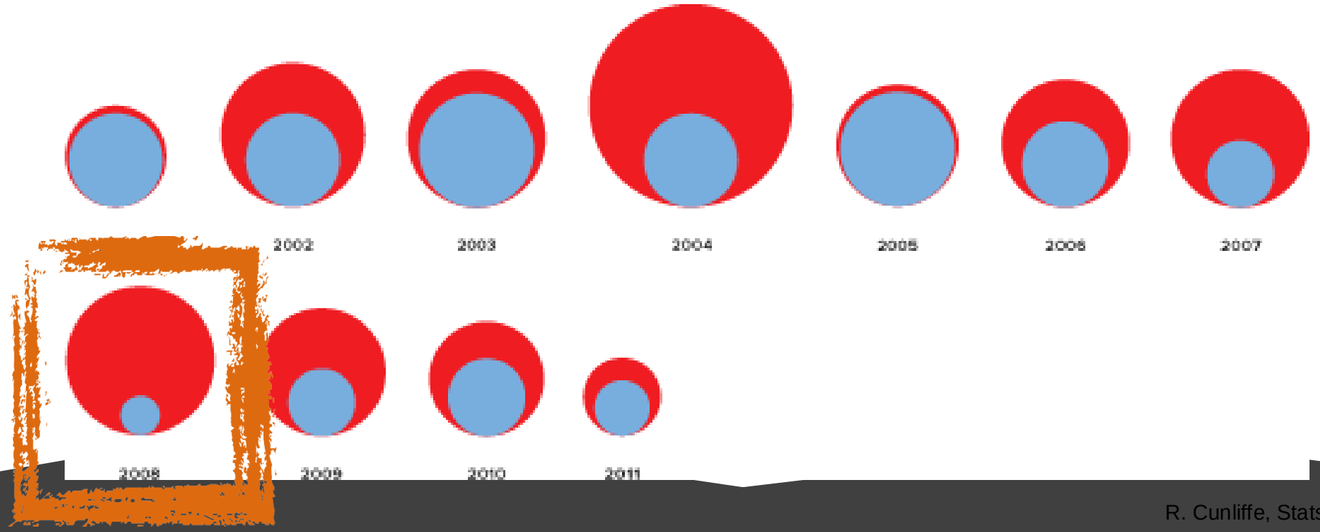
Steven's Psychophysical Power Law: $S = I^N$

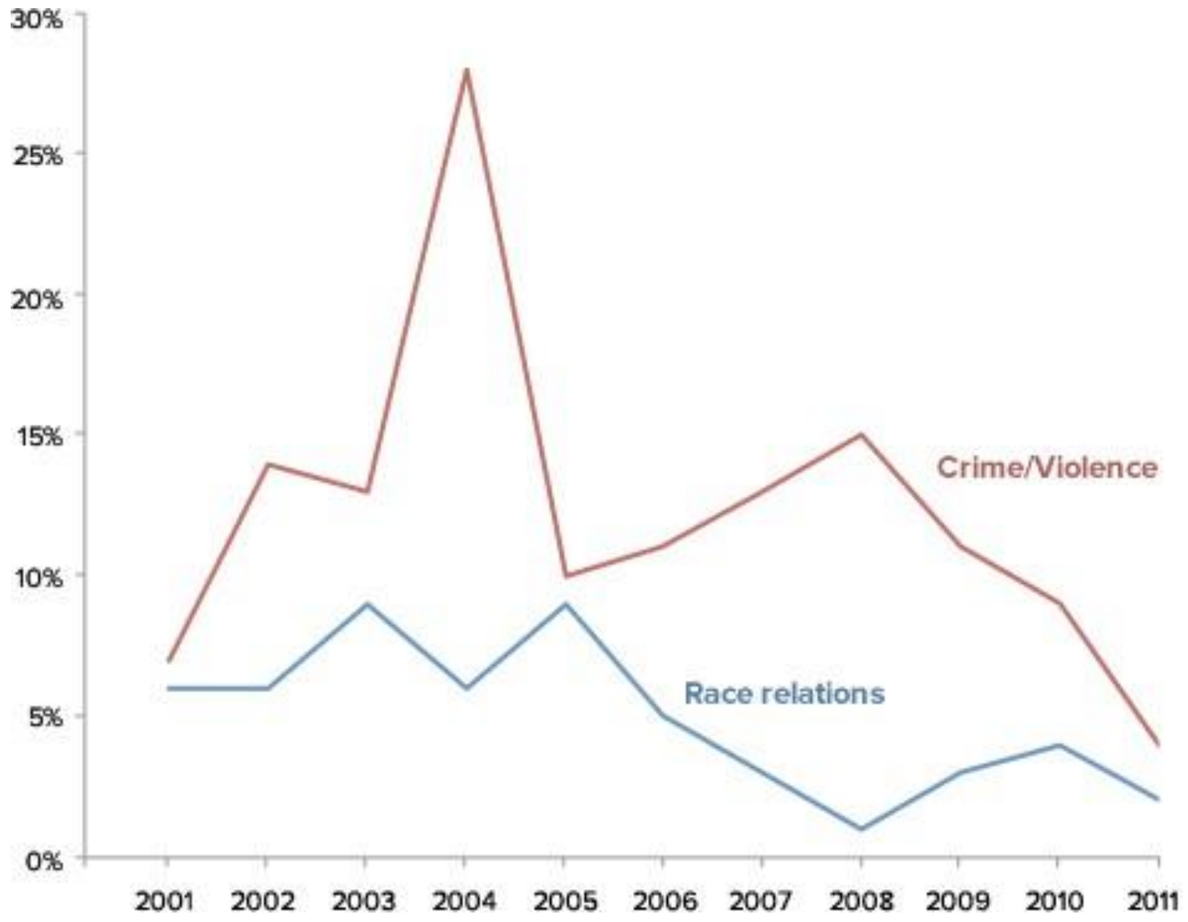




Quantity encoded by diameter, not area!

Fixing that:



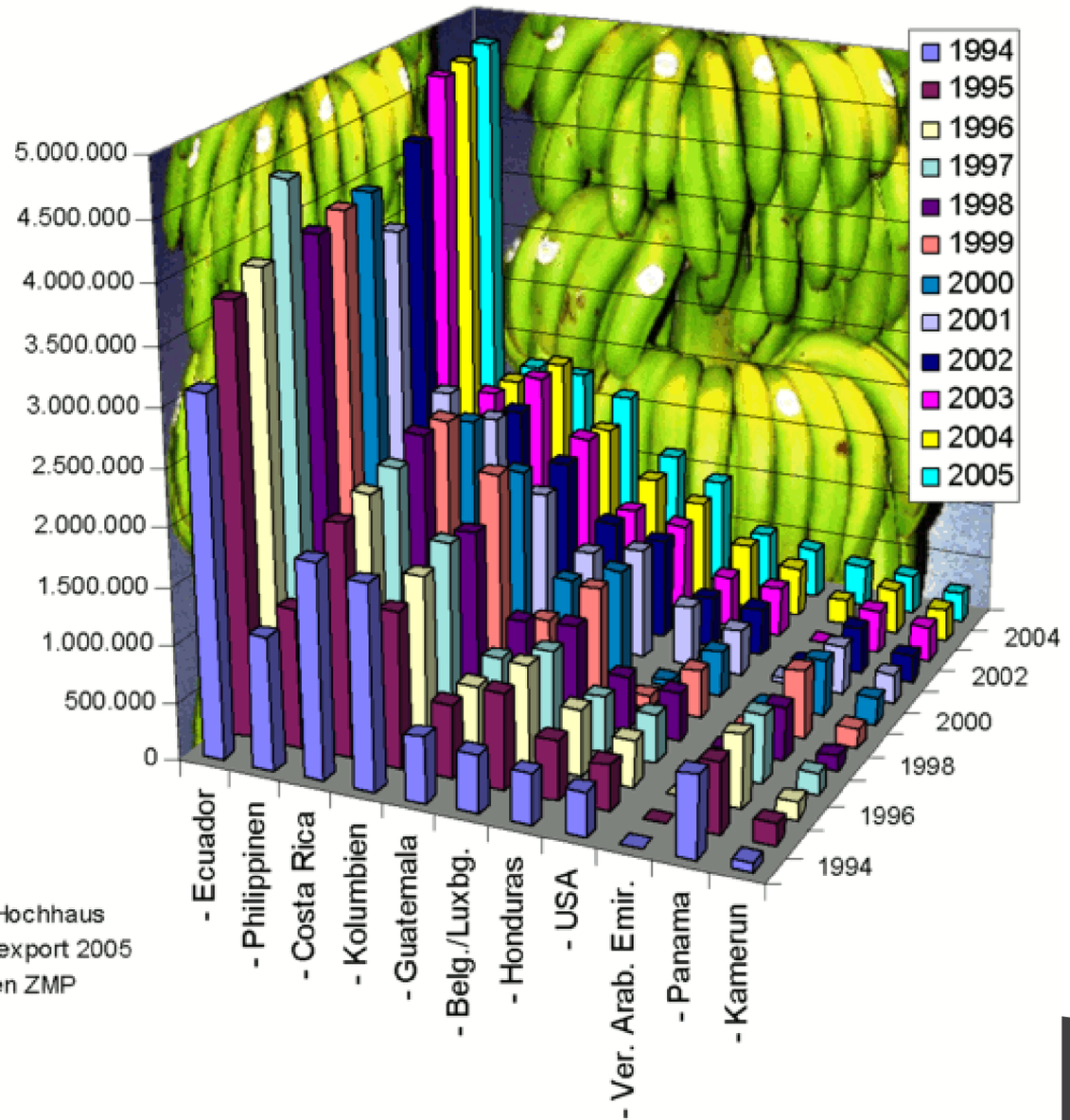


R. Cunliffe, Stats Chat

4. Is the Expressiveness Principle Followed?

- The visualization should show all of the data, and only the data
- If there are violations, are they justified (useful chart junk)?

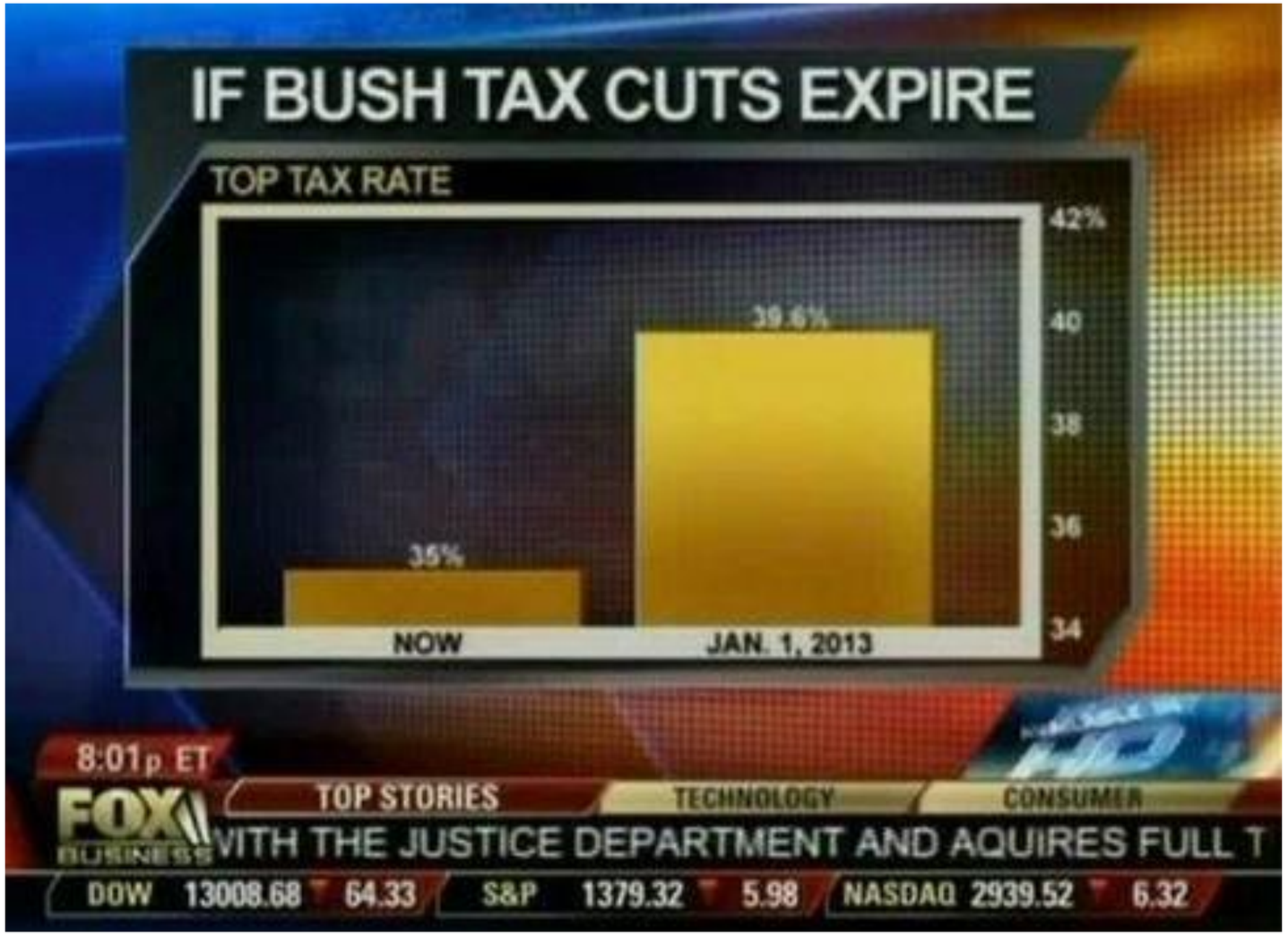
Export von Bananen in Tonnen von 1994-2005

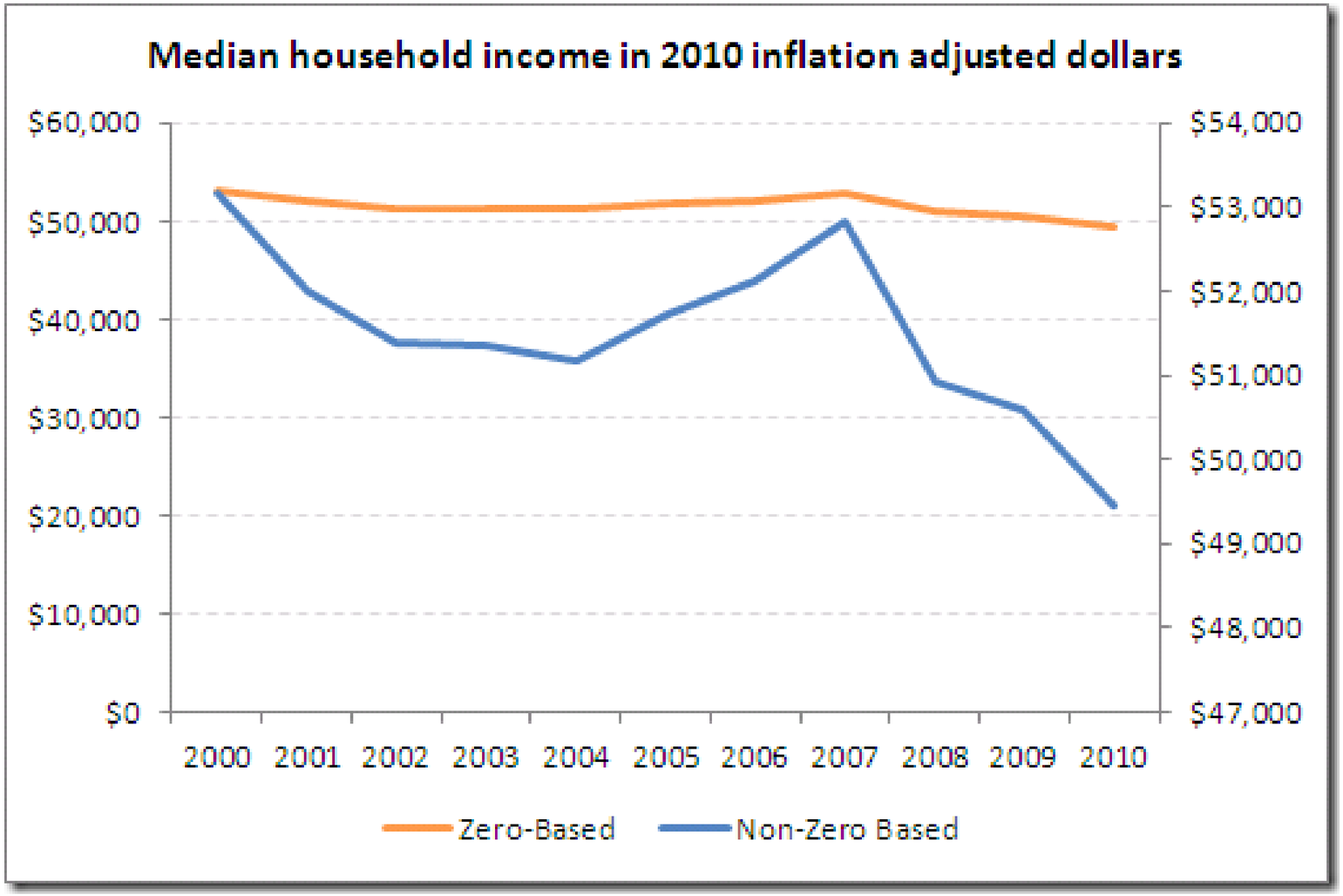


Dr. Hochhaus
Banexport 2005
Daten ZMP

5. Scales

- Are the scales appropriate?

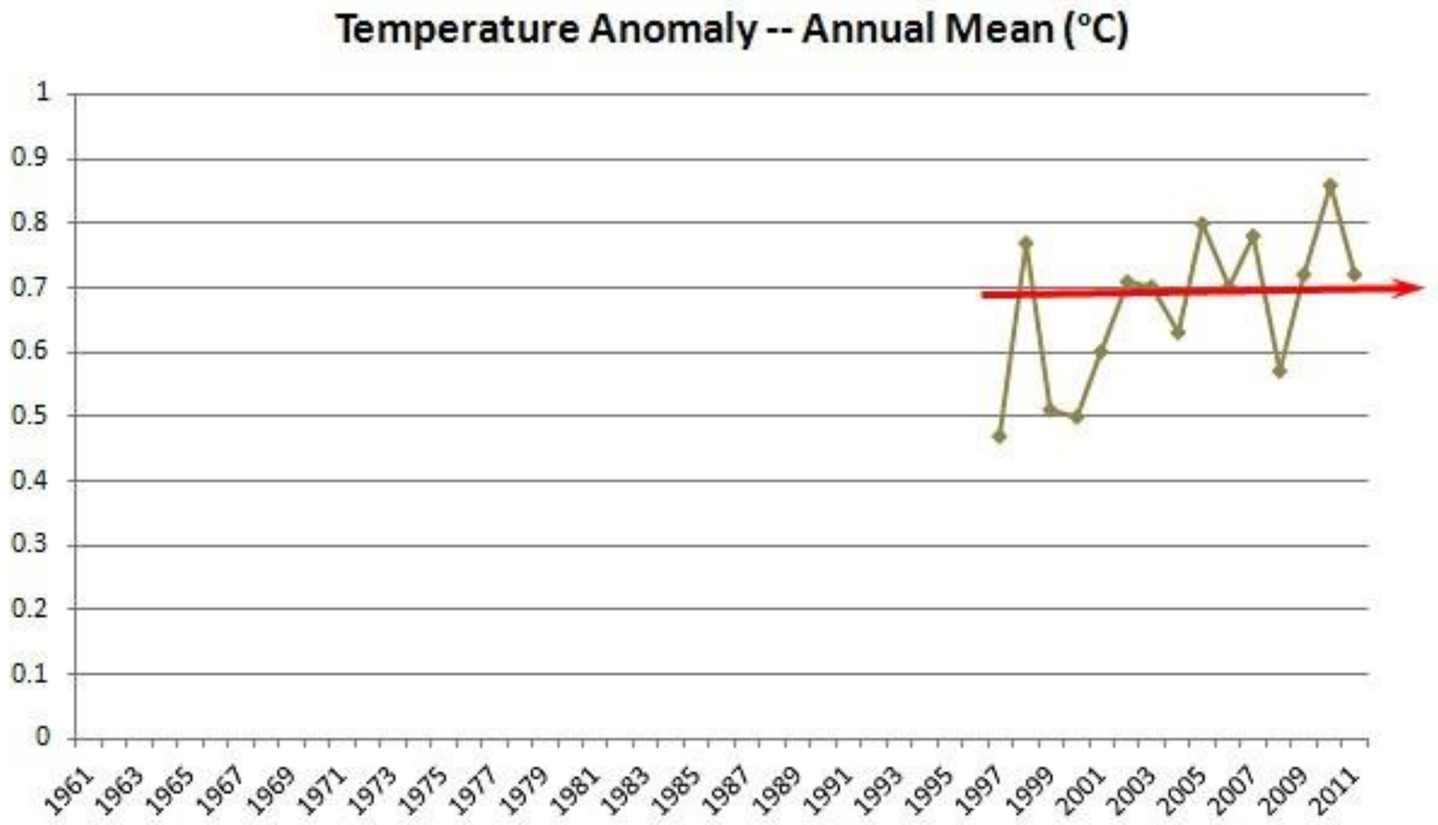

IF BUSH TAX CUTS EXPIRE
TOP TAX RATE
42%
40
38
36
34
39.6%
35%
NOW
JAN. 1, 2013
8:01p ET
FOX BUSINESS
TOP STORIES
TECHNOLOGY
CONSUMER
VITH THE JUSTICE DEPARTMENT AND AQUIRES FULL T
DOW 13008.68 64.33
S&P 1379.32 5.98
NASDAQ 2939.52 6.32


Median household income in 2010 inflation adjusted dollars
$60,000
$50,000
$40,000
$30,000
$20,000
$10,000
$0
$54,000
$53,000
$52,000
$51,000
$50,000
$49,000
$48,000
$47,000
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010
Zero-Based
Non-Zero Based

6. Context

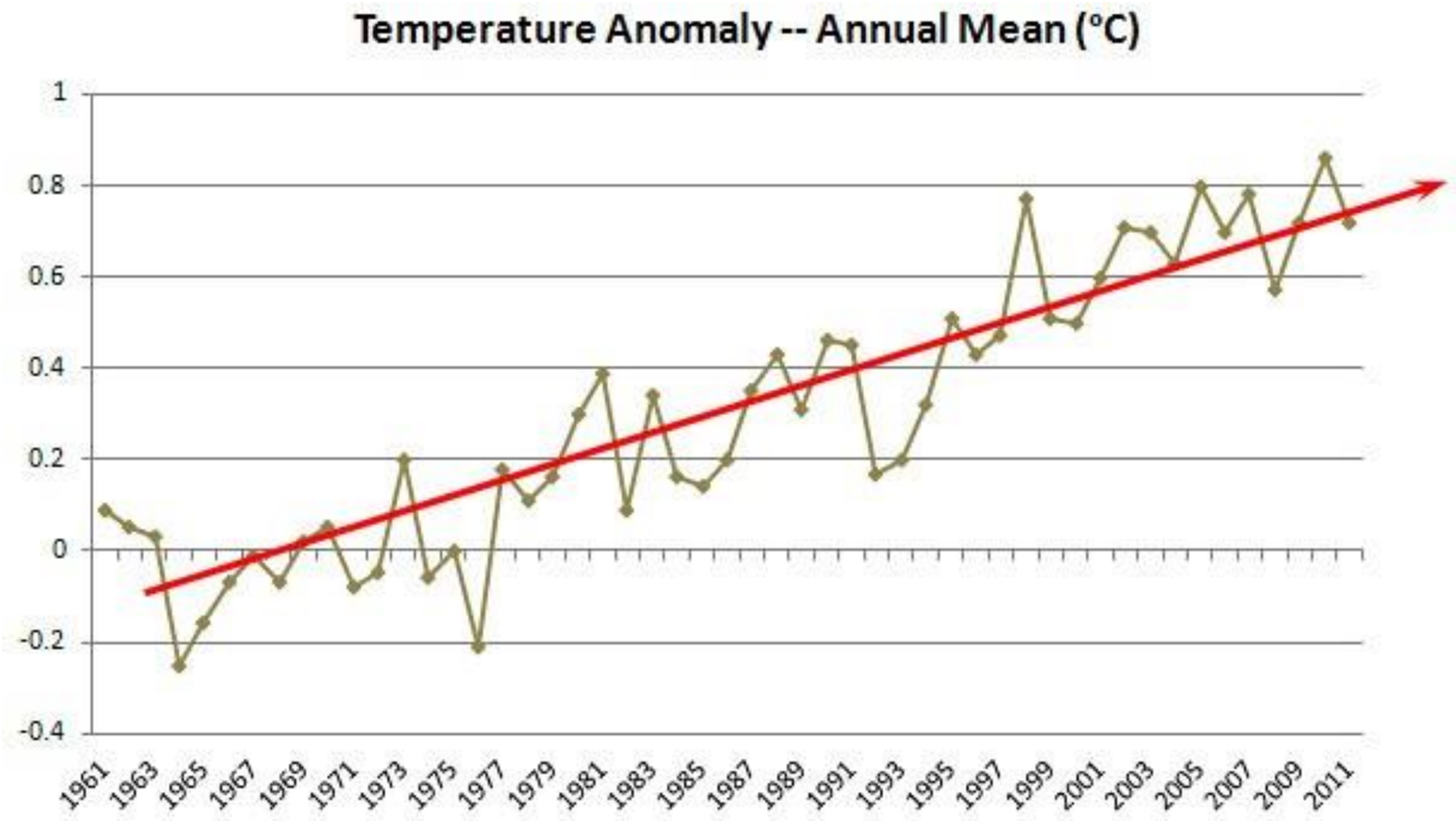
- Is the data shown in the appropriate context

Global Warming?



Mother Jones

Global Warming - Frame the Data



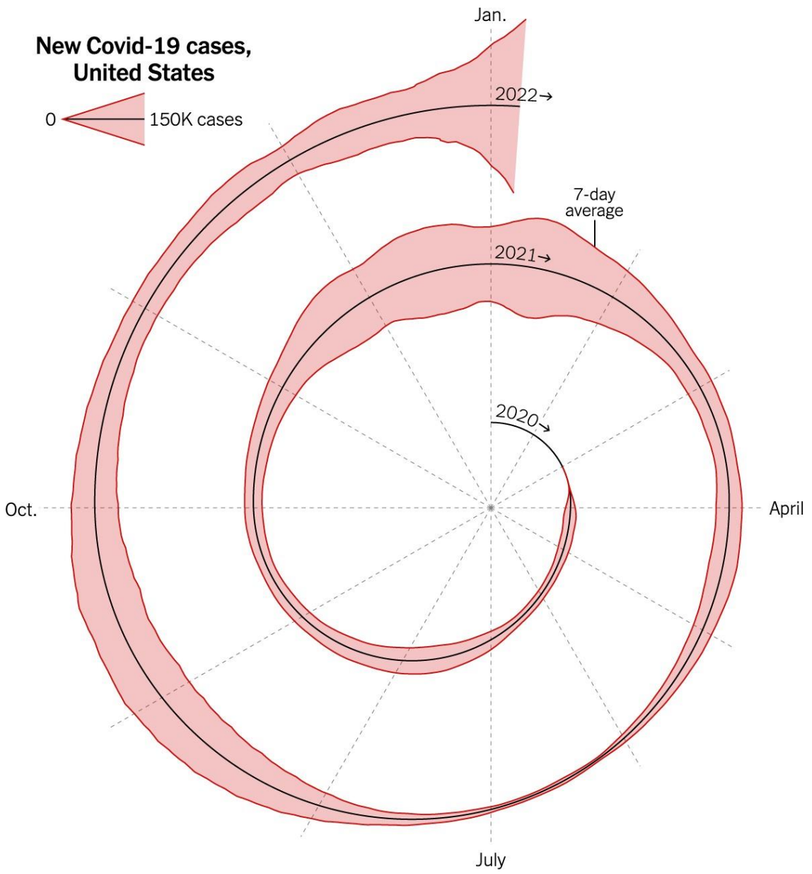
Mother Jones

7. Would derived data be better?

- E.g., show change instead of absolute values Show distribution instead of data points

8. Other Guidelines

- No Unjustified 3D
- Time progresses linearly
- Perception: color, colorblindness, shadows, etc. Use of gestalt principles
- Use of popout
- Use of interaction / animation Appropriate legends, labels

Design Critique: COVID Spiral

1. What is the data shown in this visualization?
2. What might be the intention of the author?
3. What are the marks, what are the channels?
4. Is the Effectiveness Principle Followed? (best visual channel used?)
5. Is the Expressiveness Principle Followed? (just data, or also useful embellishments?)
6. Are the scales / legends appropriate?
7. Is the context appropriate?
8. Is the spiral layout appropriate?
9. What about color?
10. Why do you like / dislike this visualization?
11. Can you suggest any improvements? How would you redesign it?