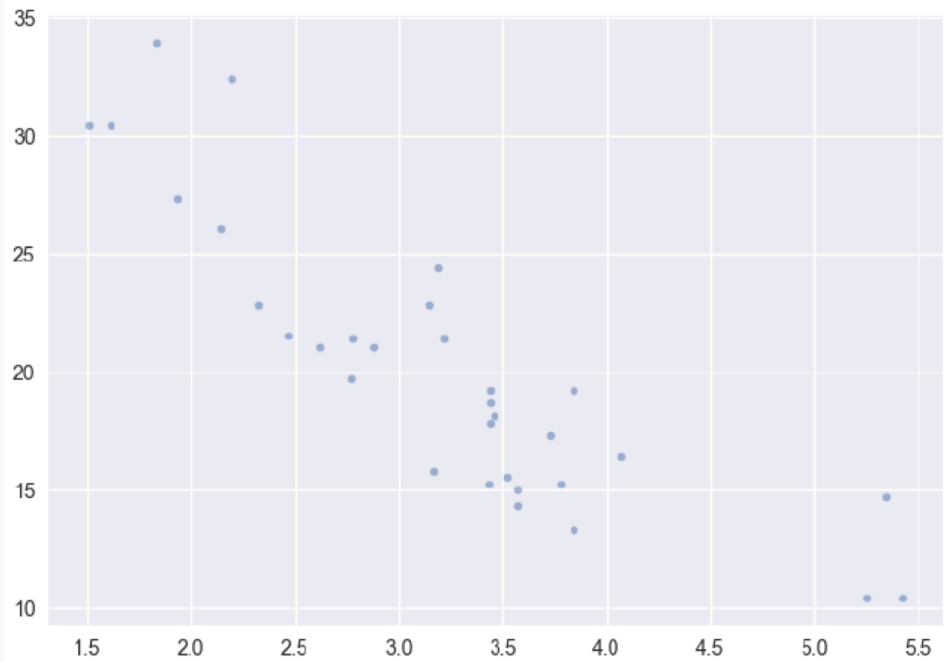
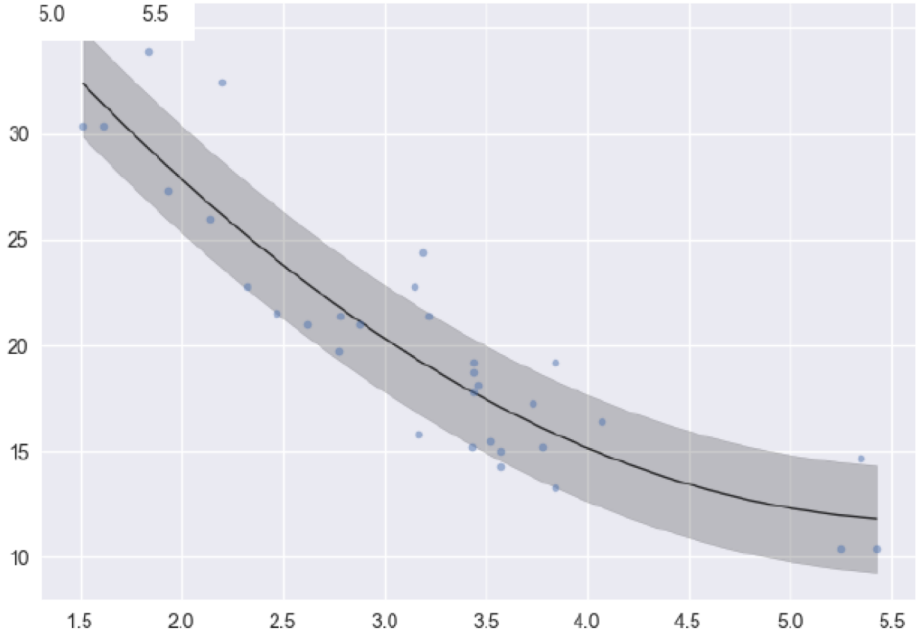
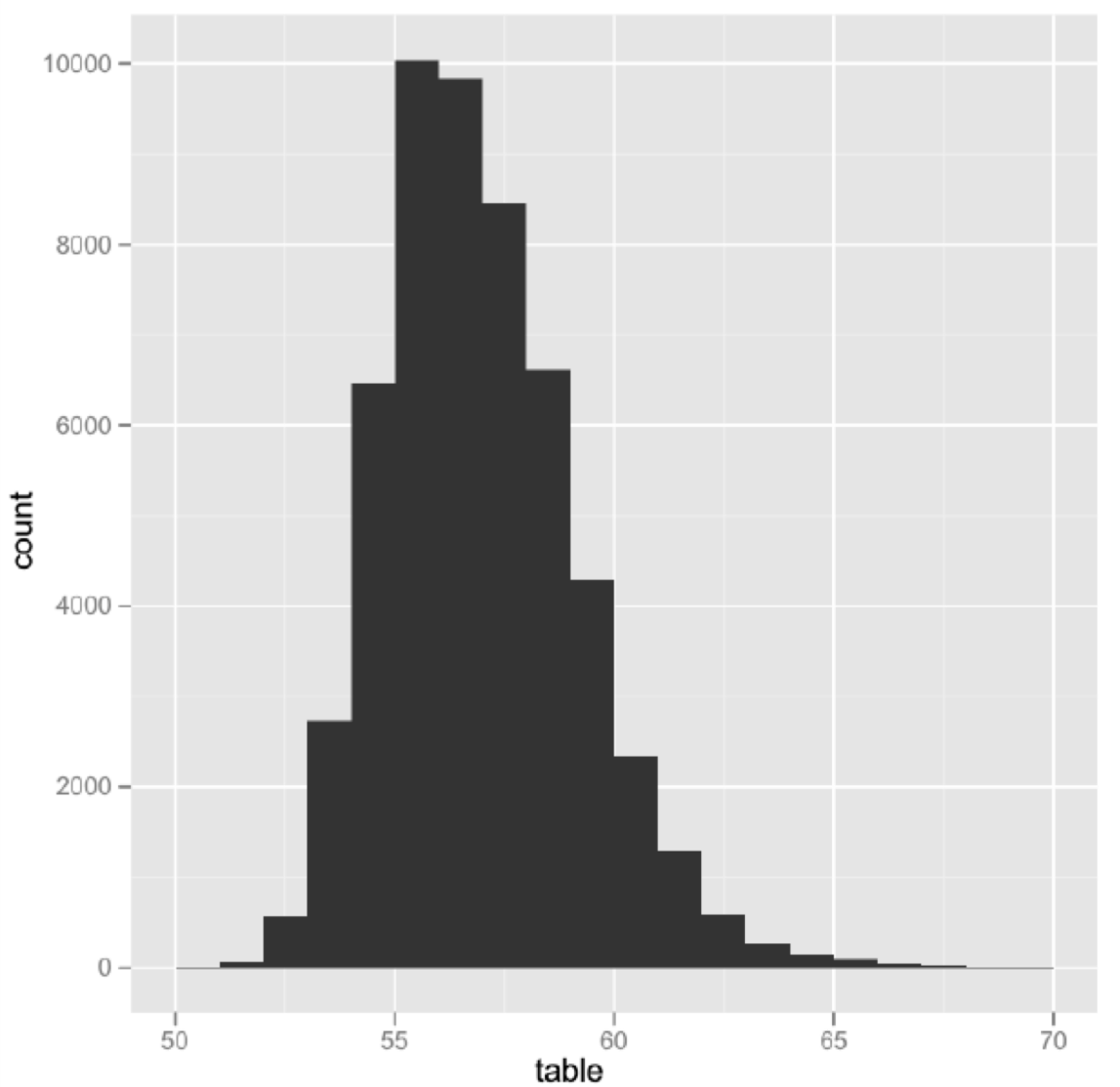
Displays: trends

Displays: trends

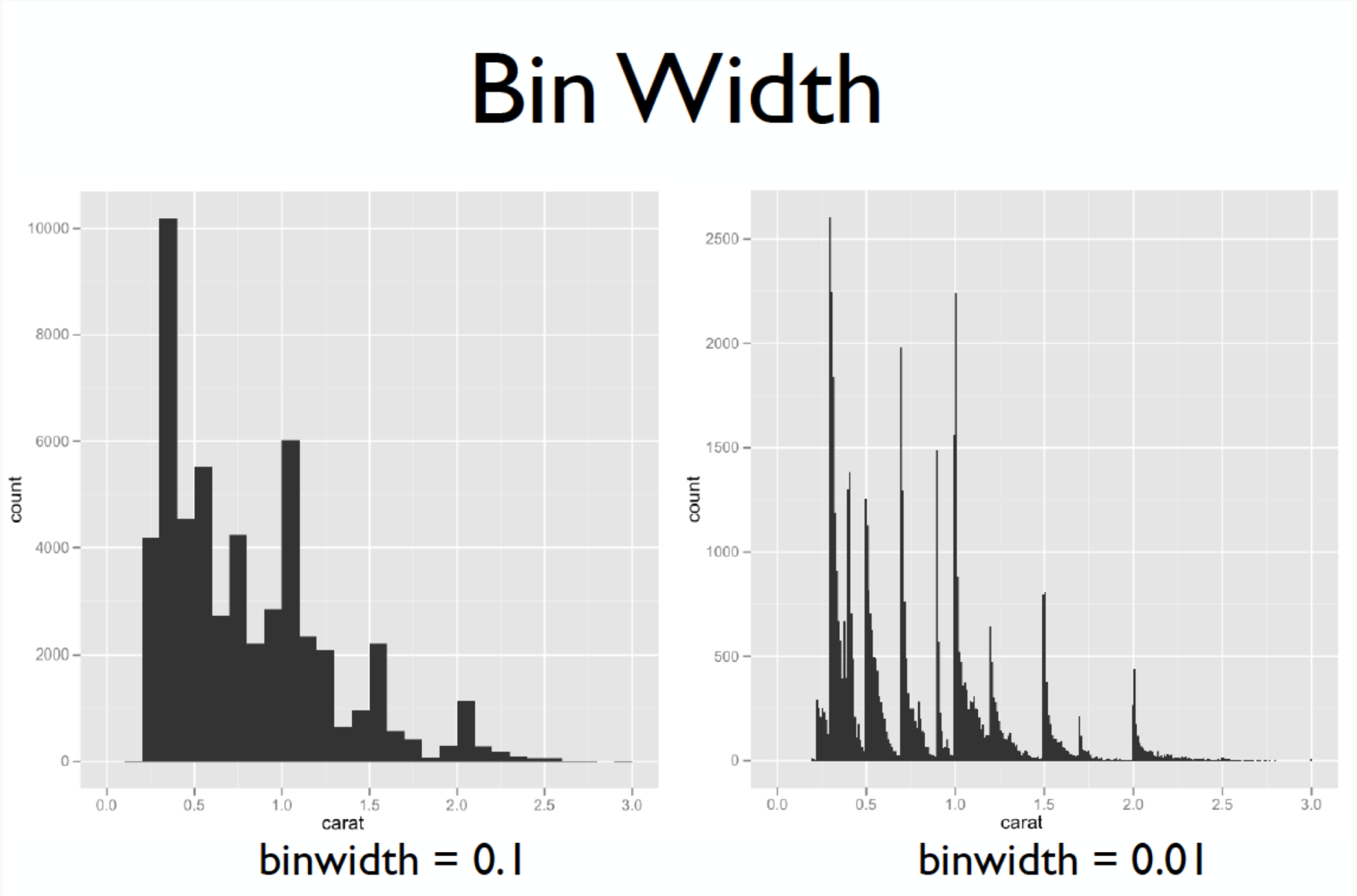




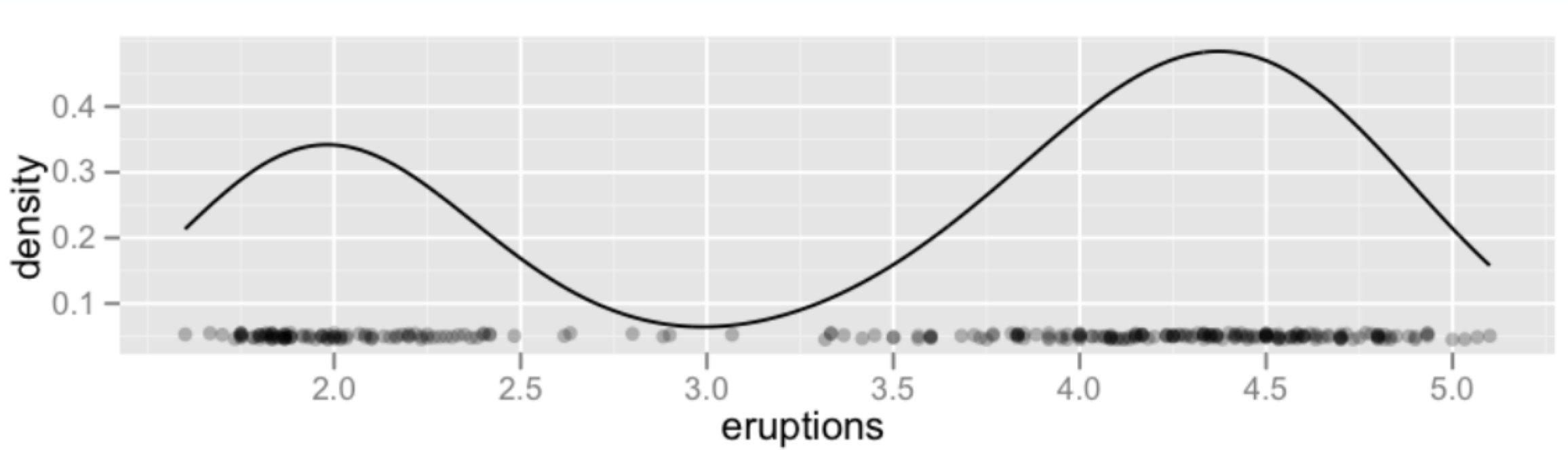
Displays: distributions



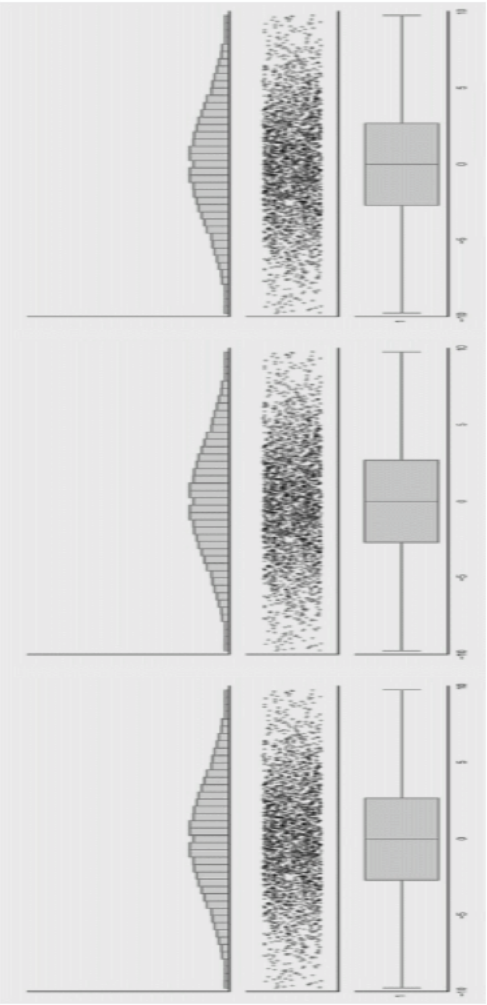
Displays: distributions



Displays: density plots

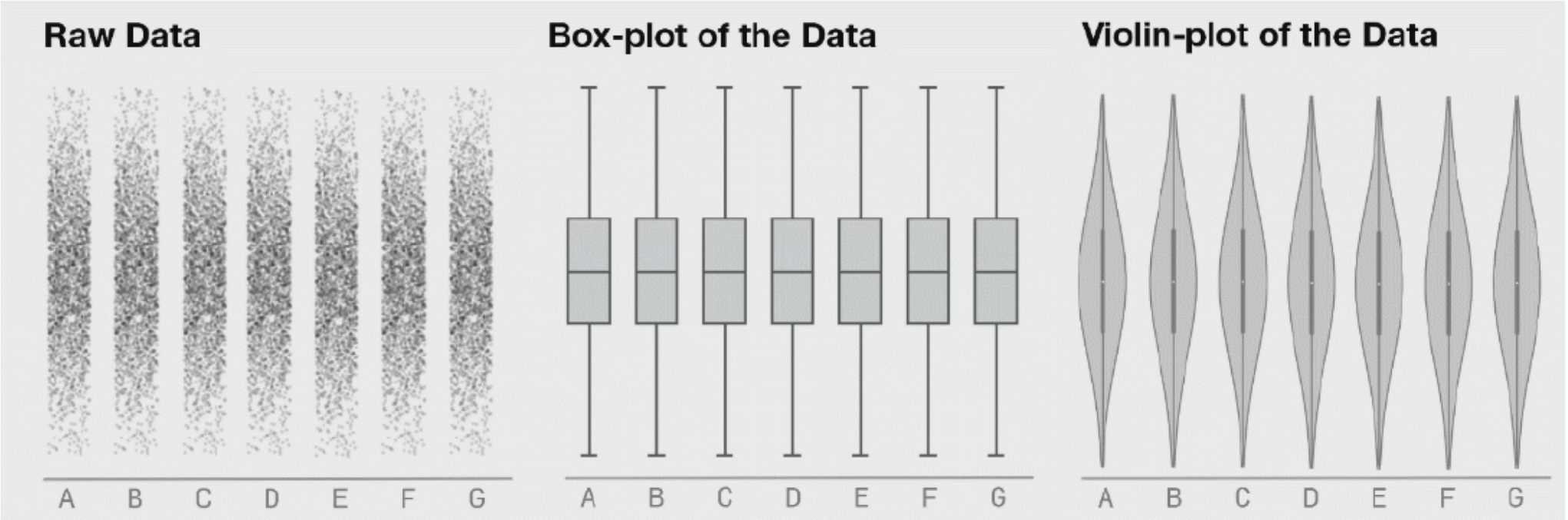


Displays: density plots

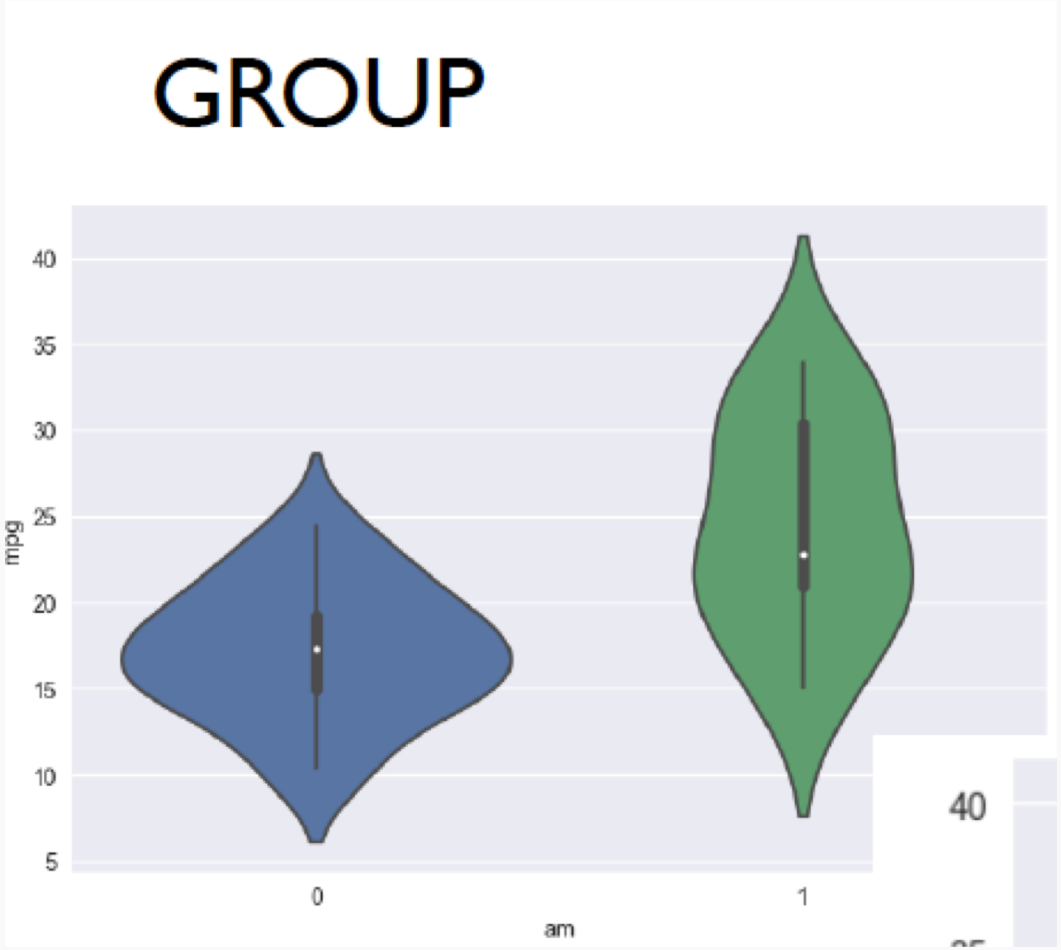


https://
www.autodeskresearch.com/
publications/samestats

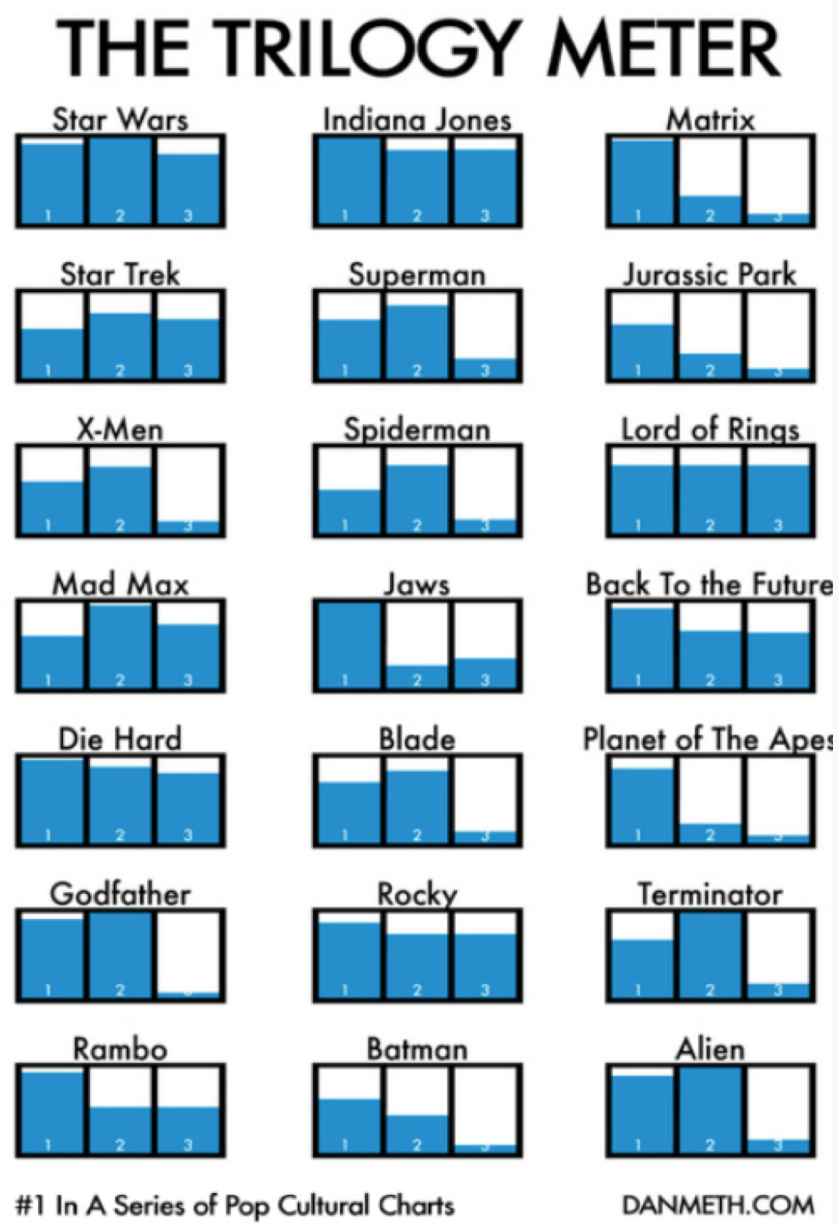
Displays: density plots



Displays: density plots

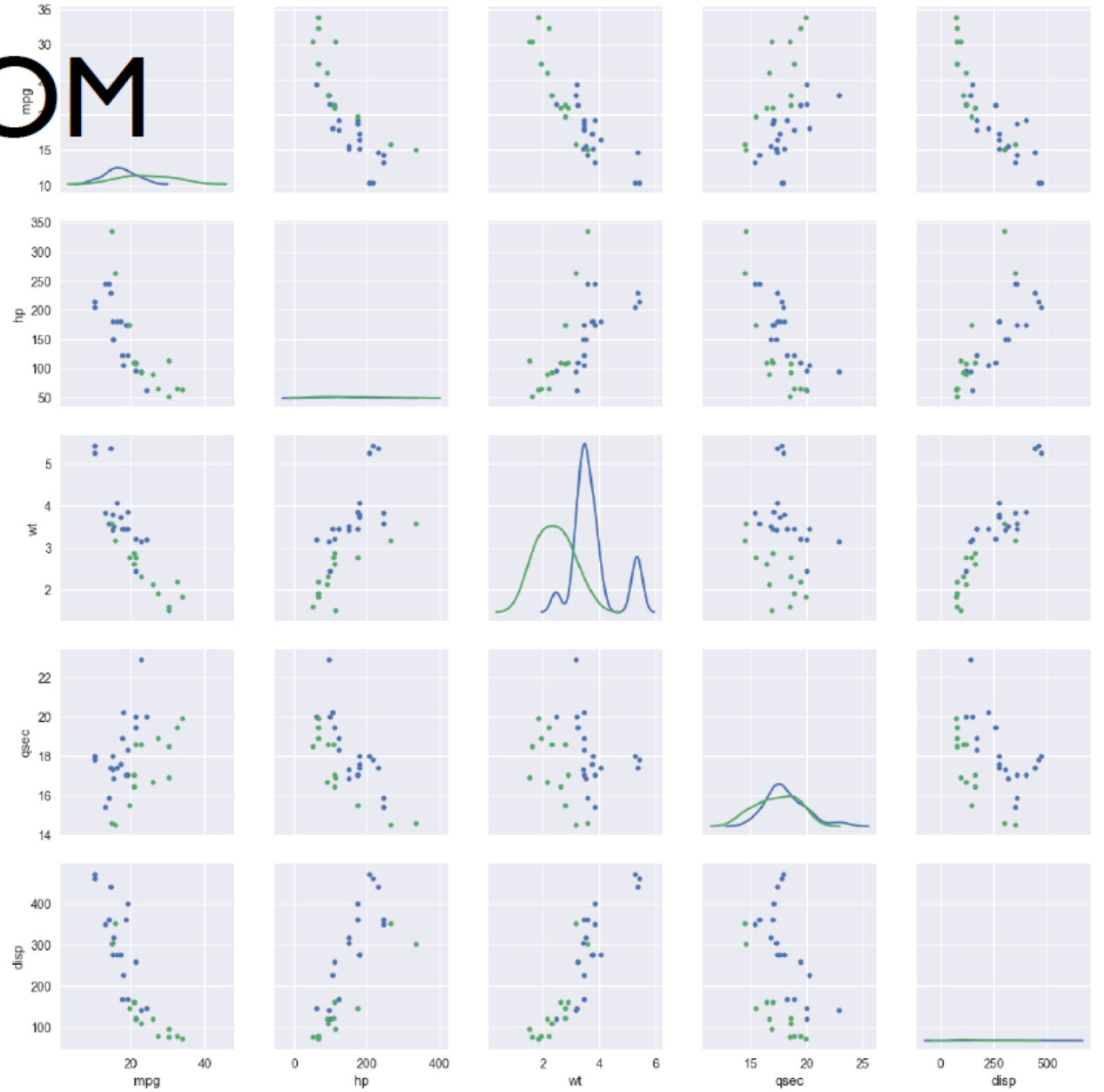


Displays: small multiples



Displays: scatter plot matrix

SPLOM



Displays: hands-on exercise

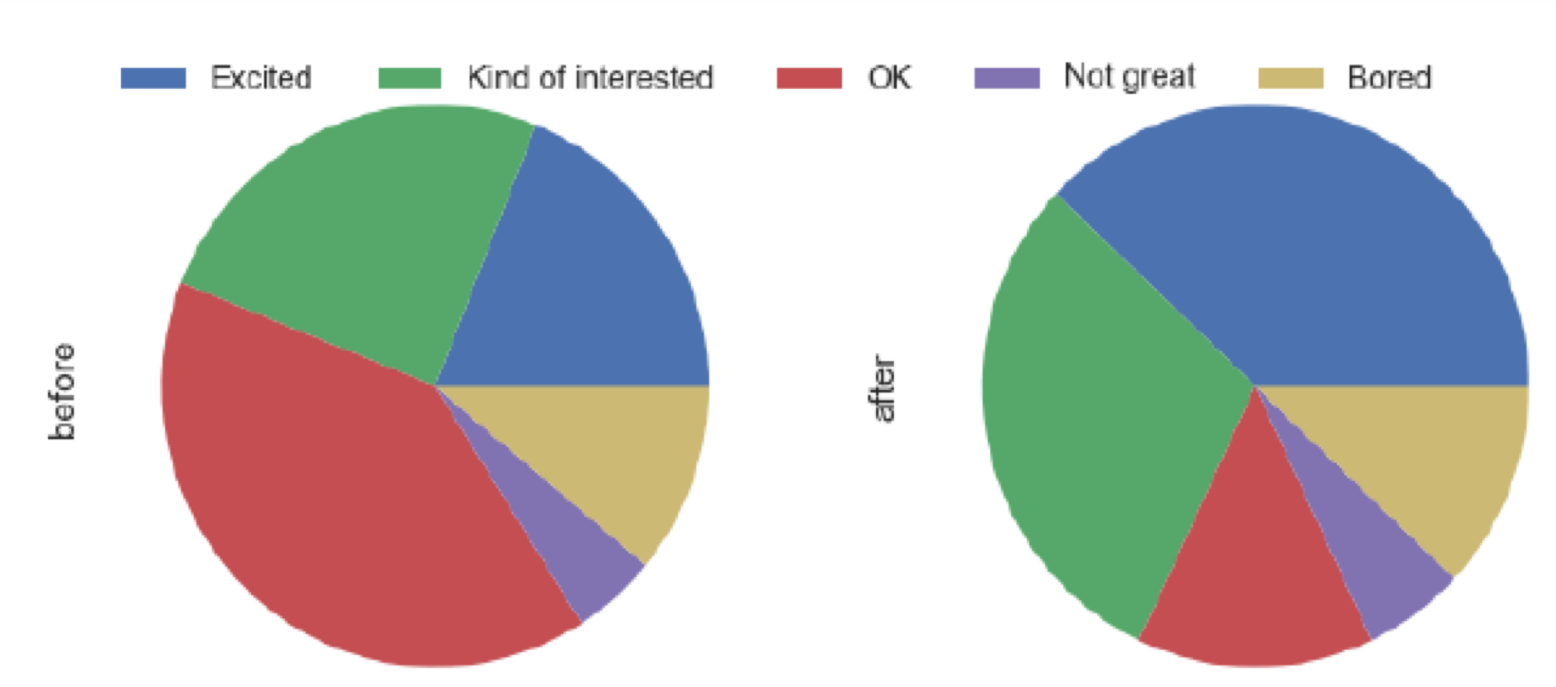
How do you feel about doing science?

Table

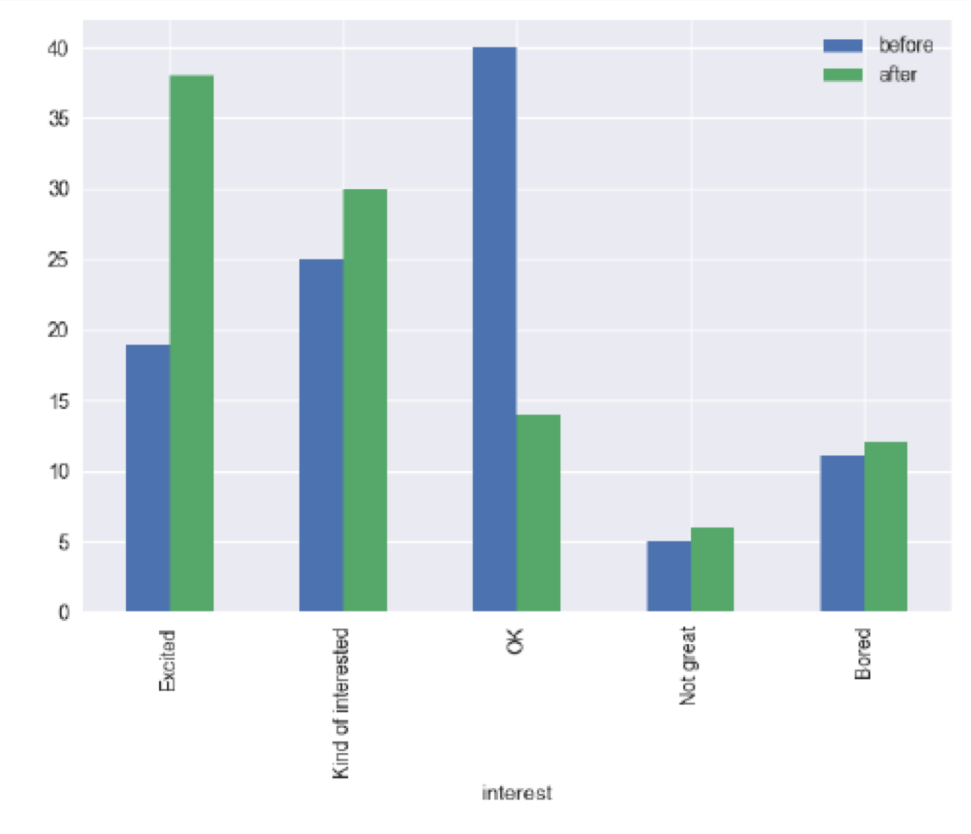
Interest	Before	After
Excited	19	38
Kind of interested	25	30
OK	40	14
Not great	5	6
Bored	11	12

Data courtesy of Cole Nussbaumer

Displays: exercise options

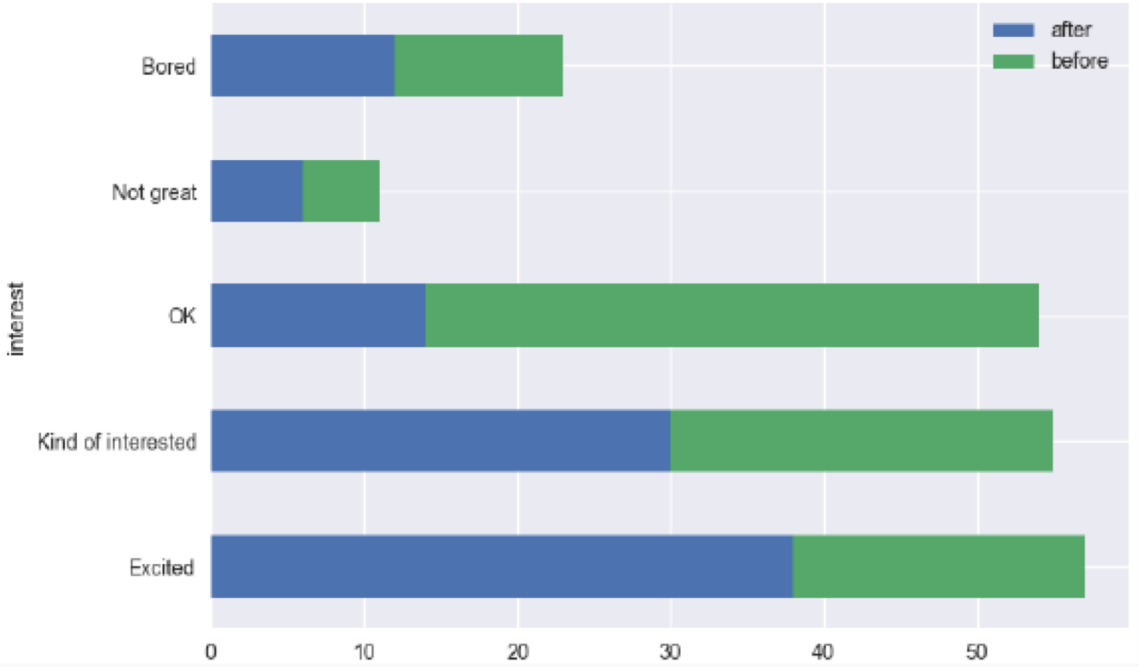


Displays: exercise options

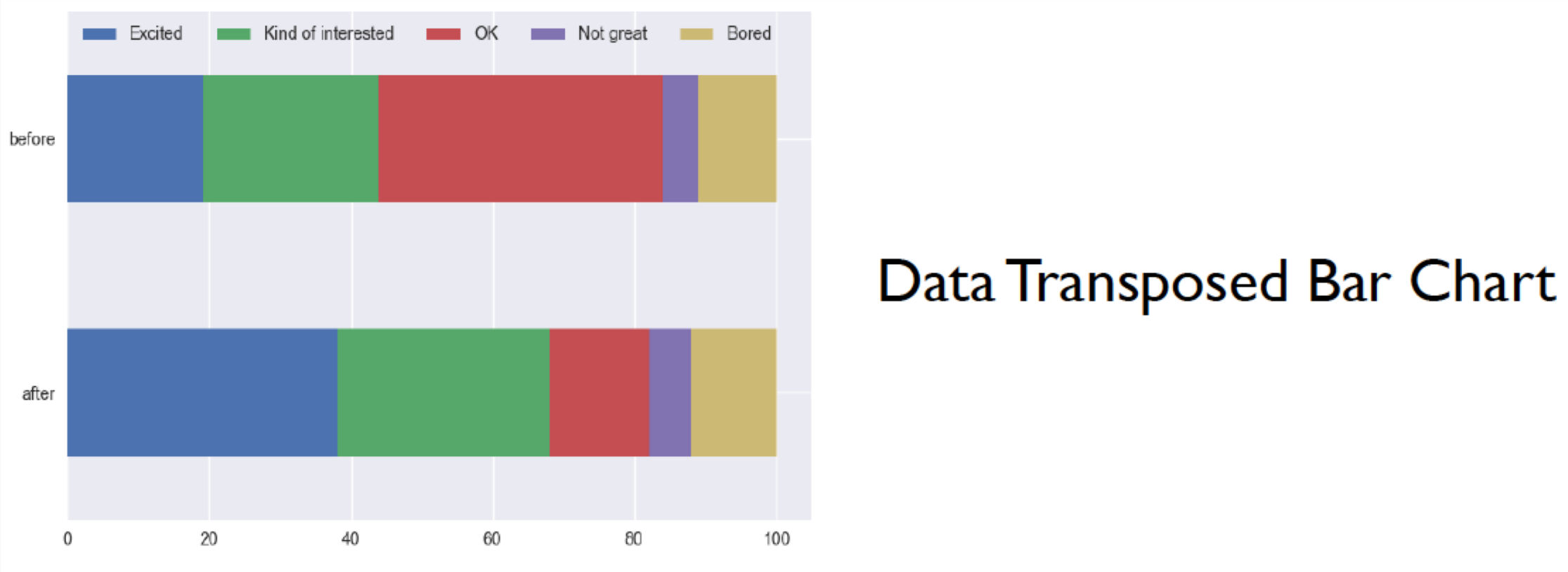


Displays: exercise options

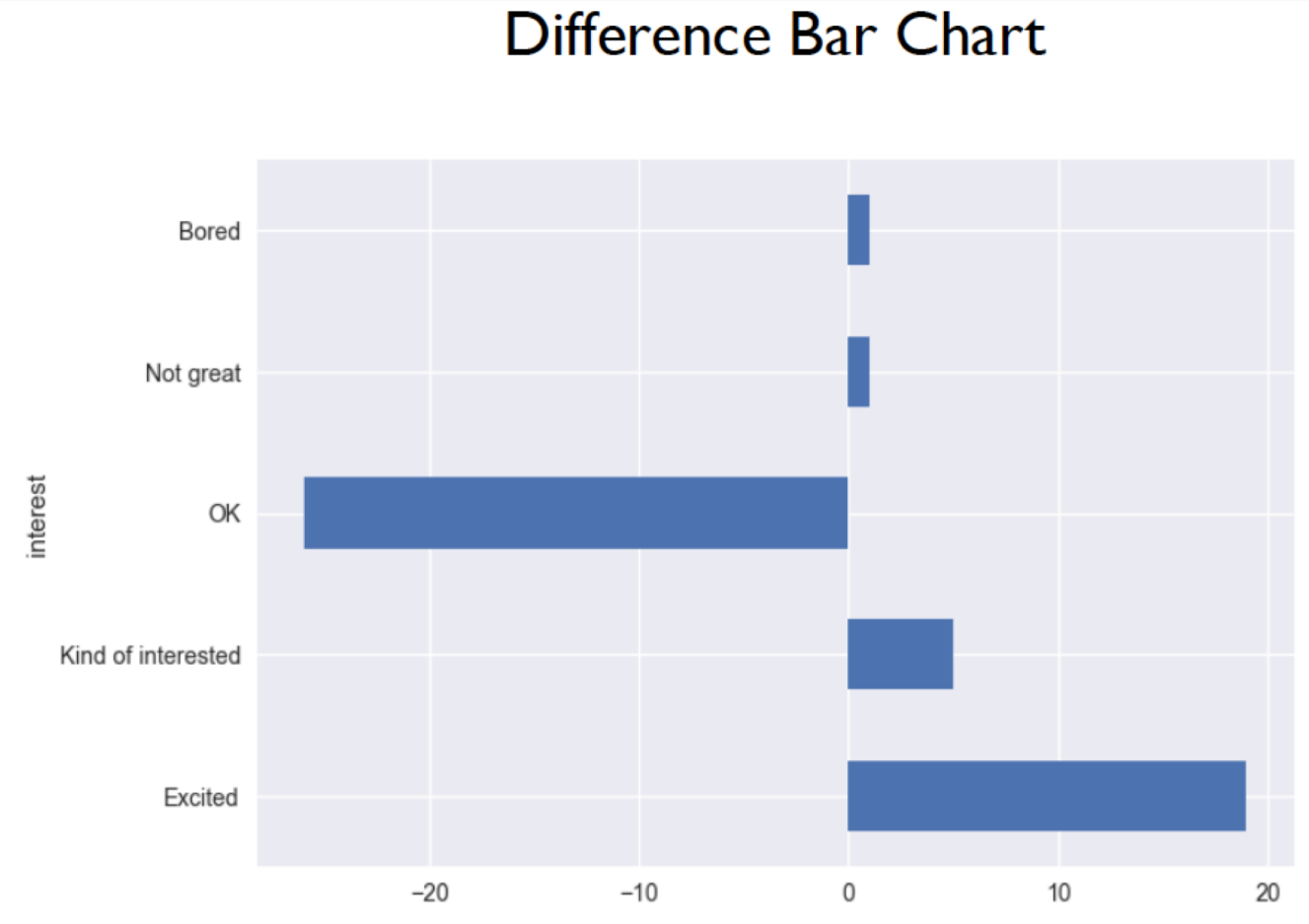
Stacked bar, not very useful



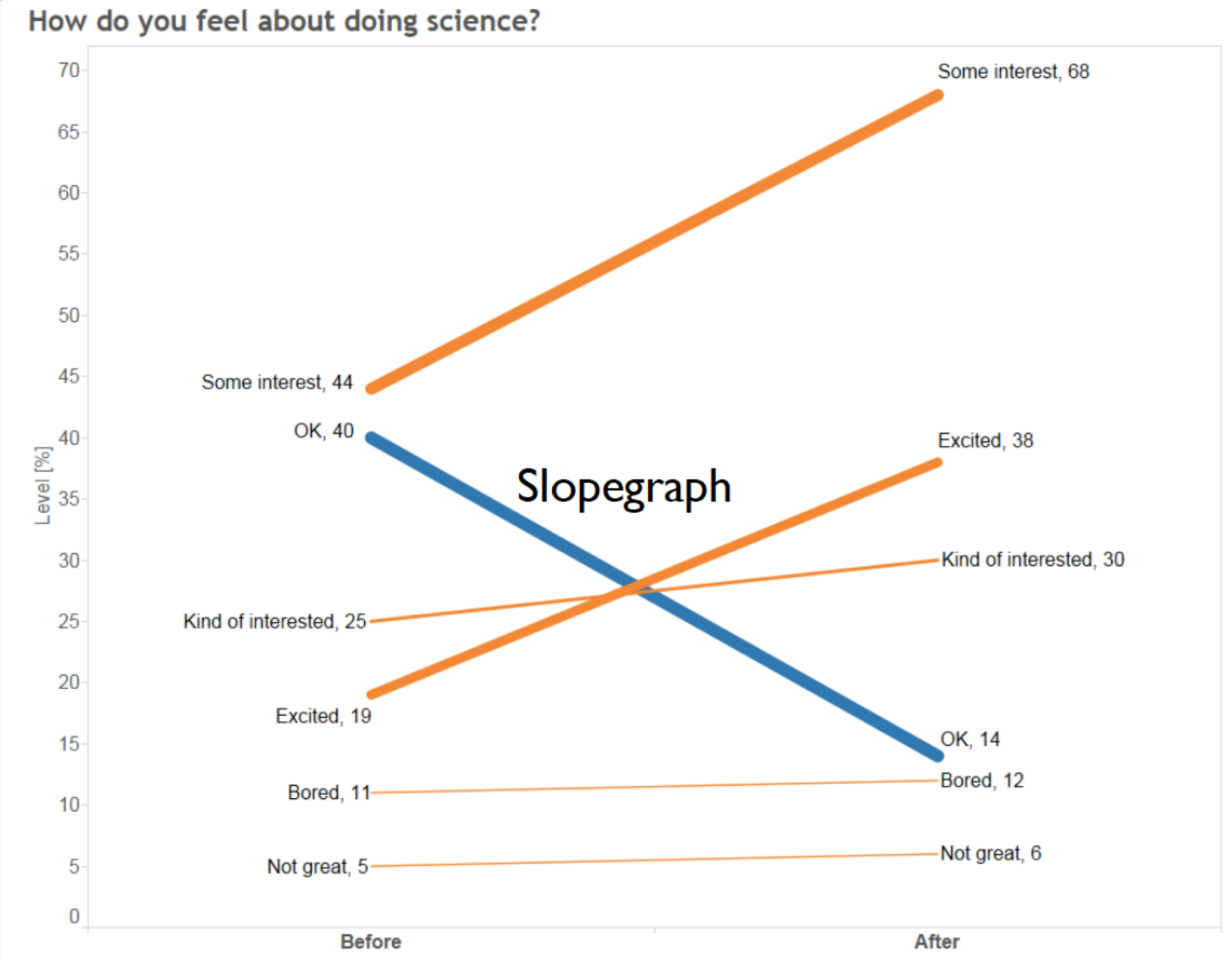
Displays: exercise options



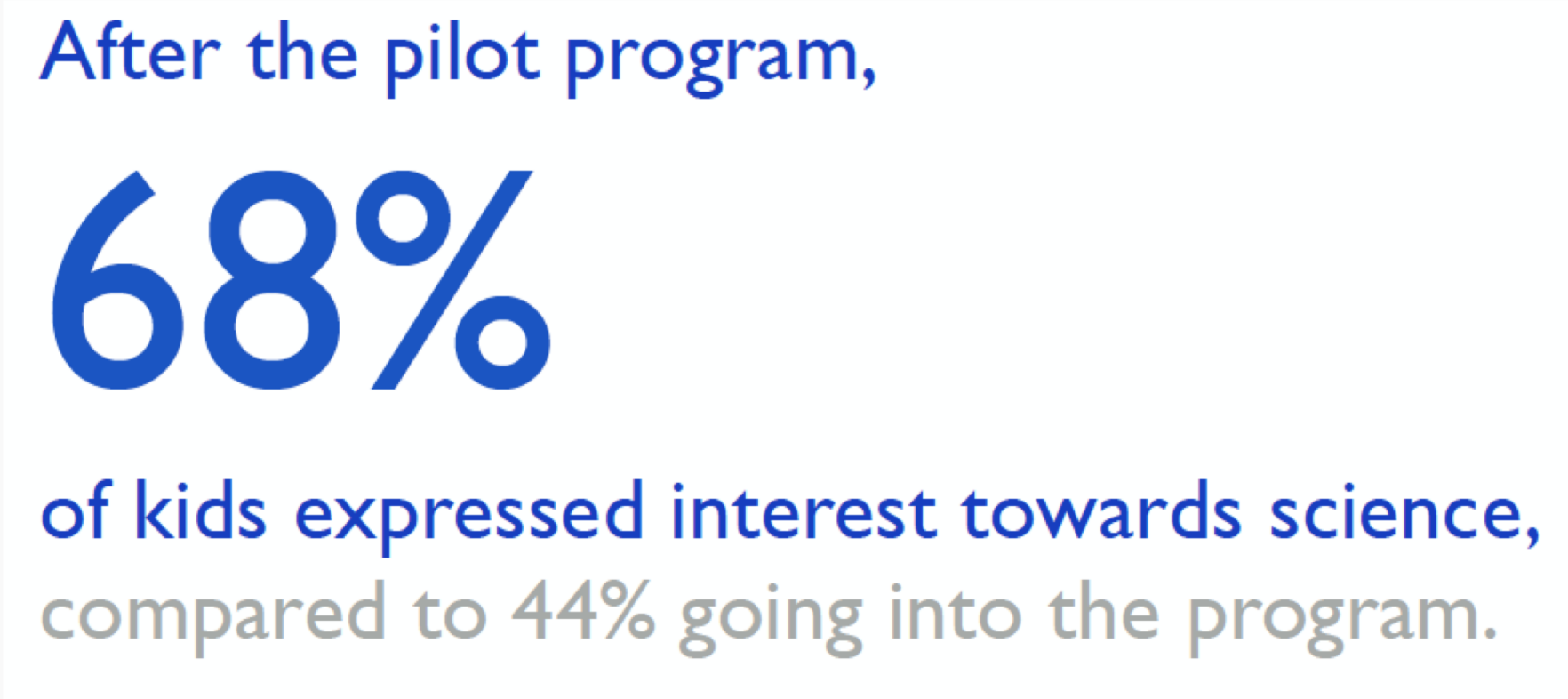
Displays: exercise options



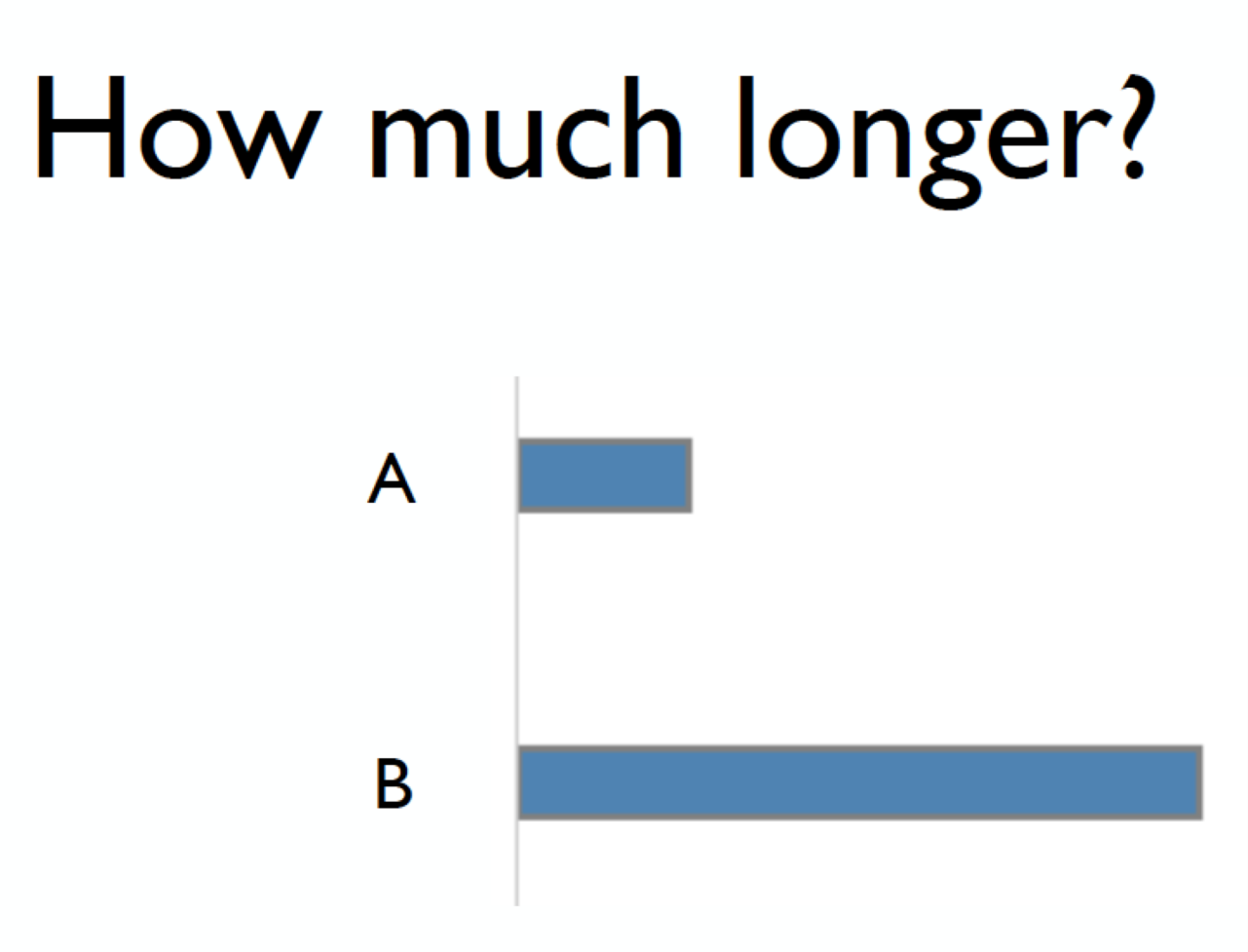
Displays: exercise options



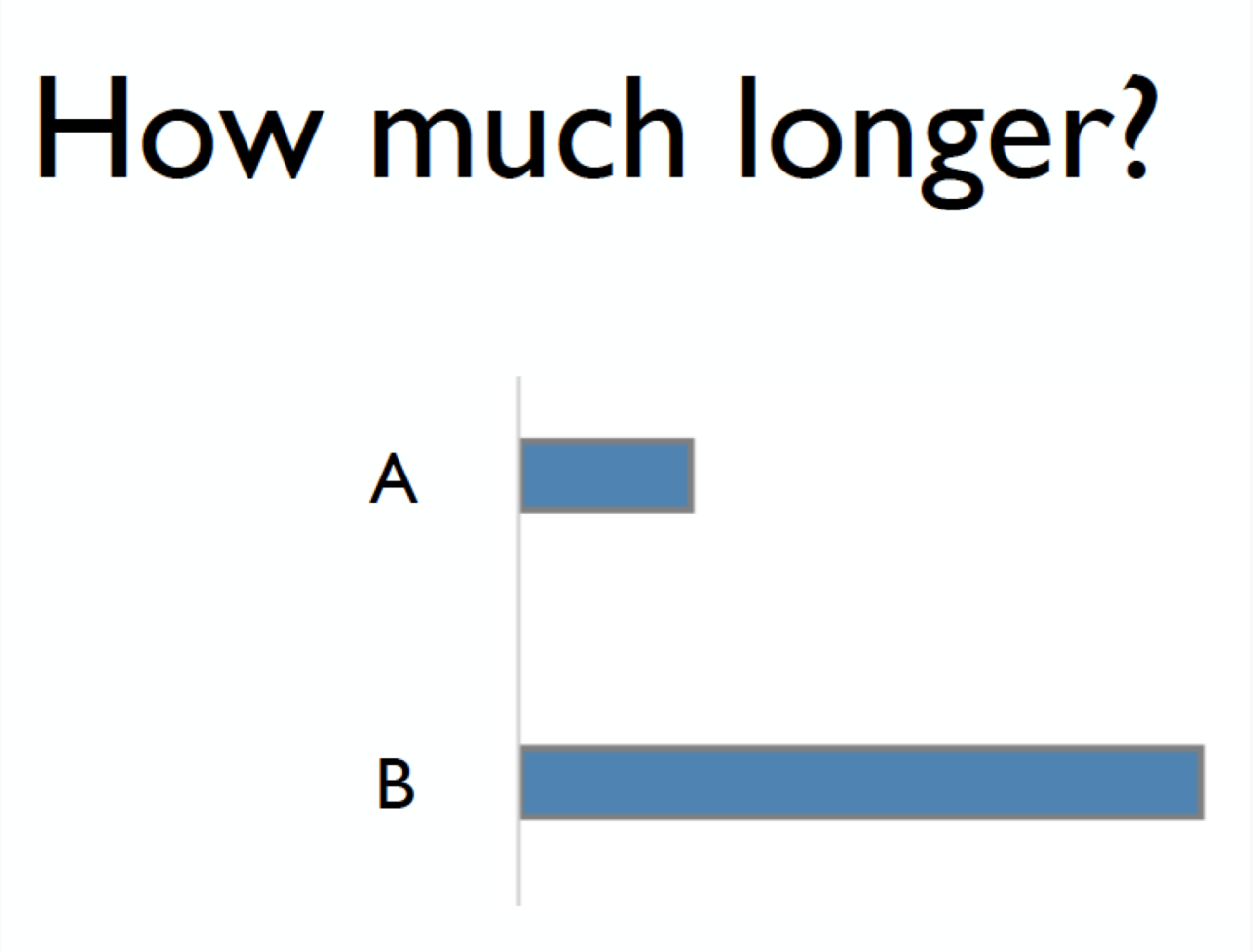
Displays: exercise options



Displays: perceptual effectiveness

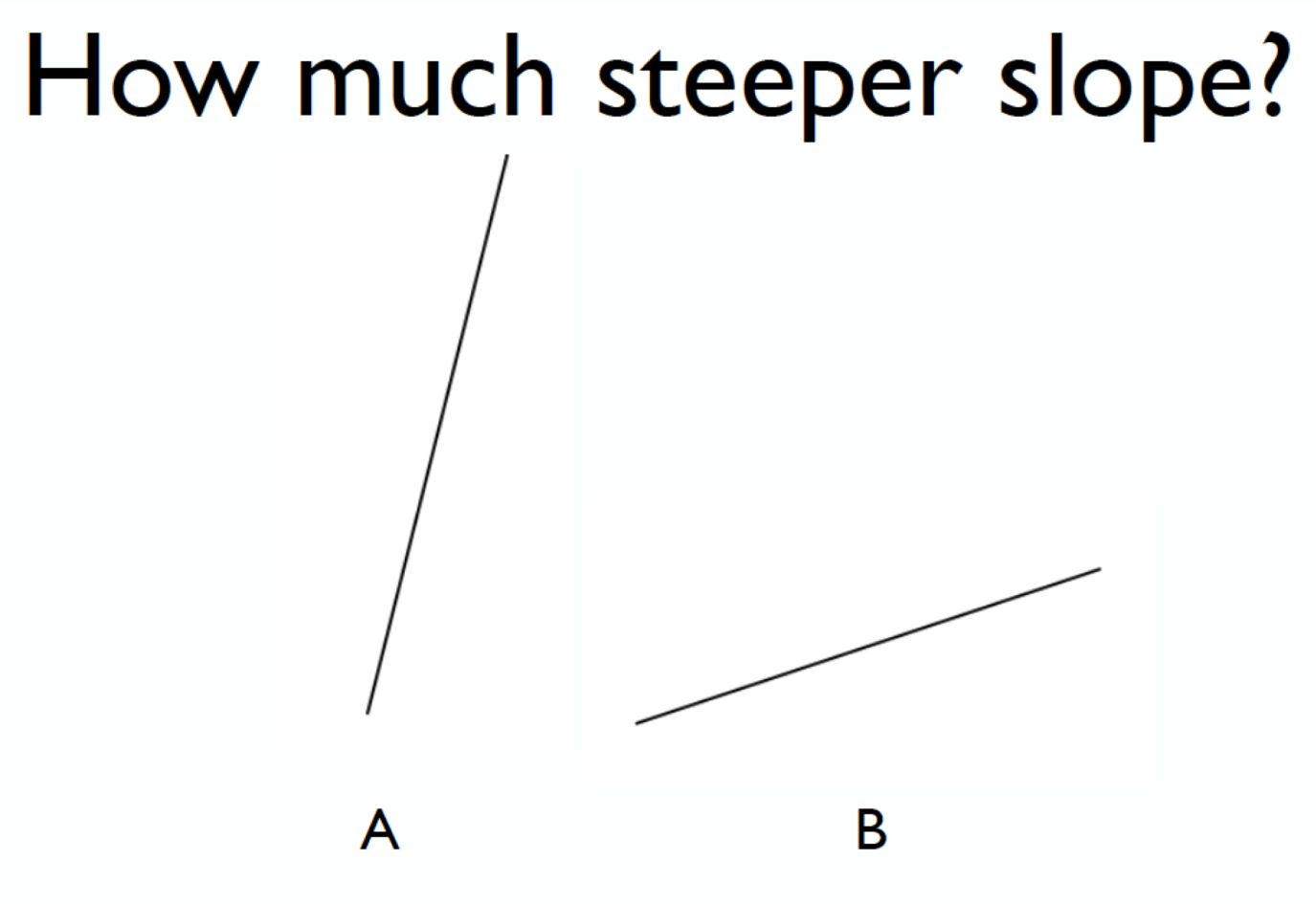


Displays: perceptual effectiveness

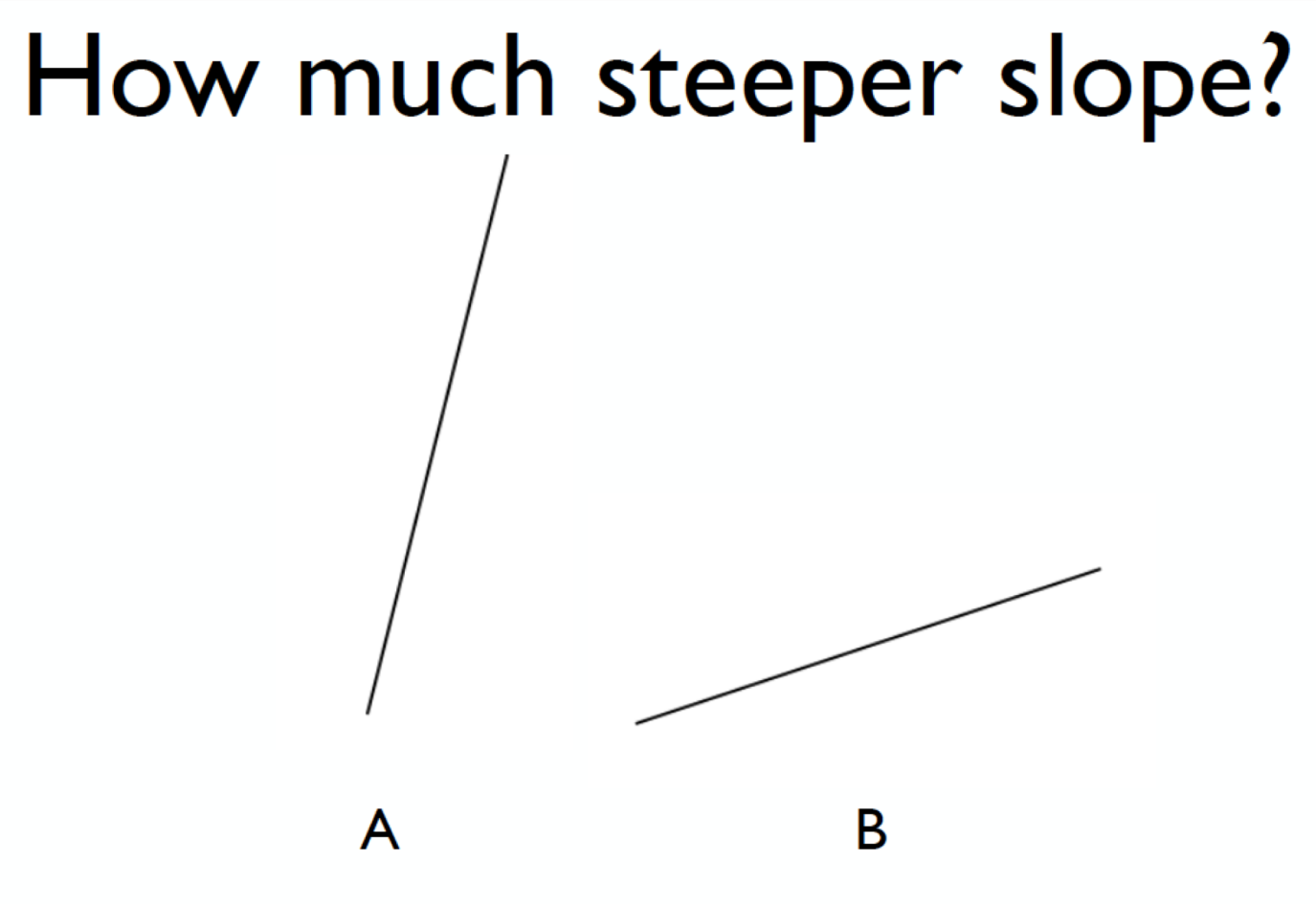


4x

Displays: perceptual effectiveness

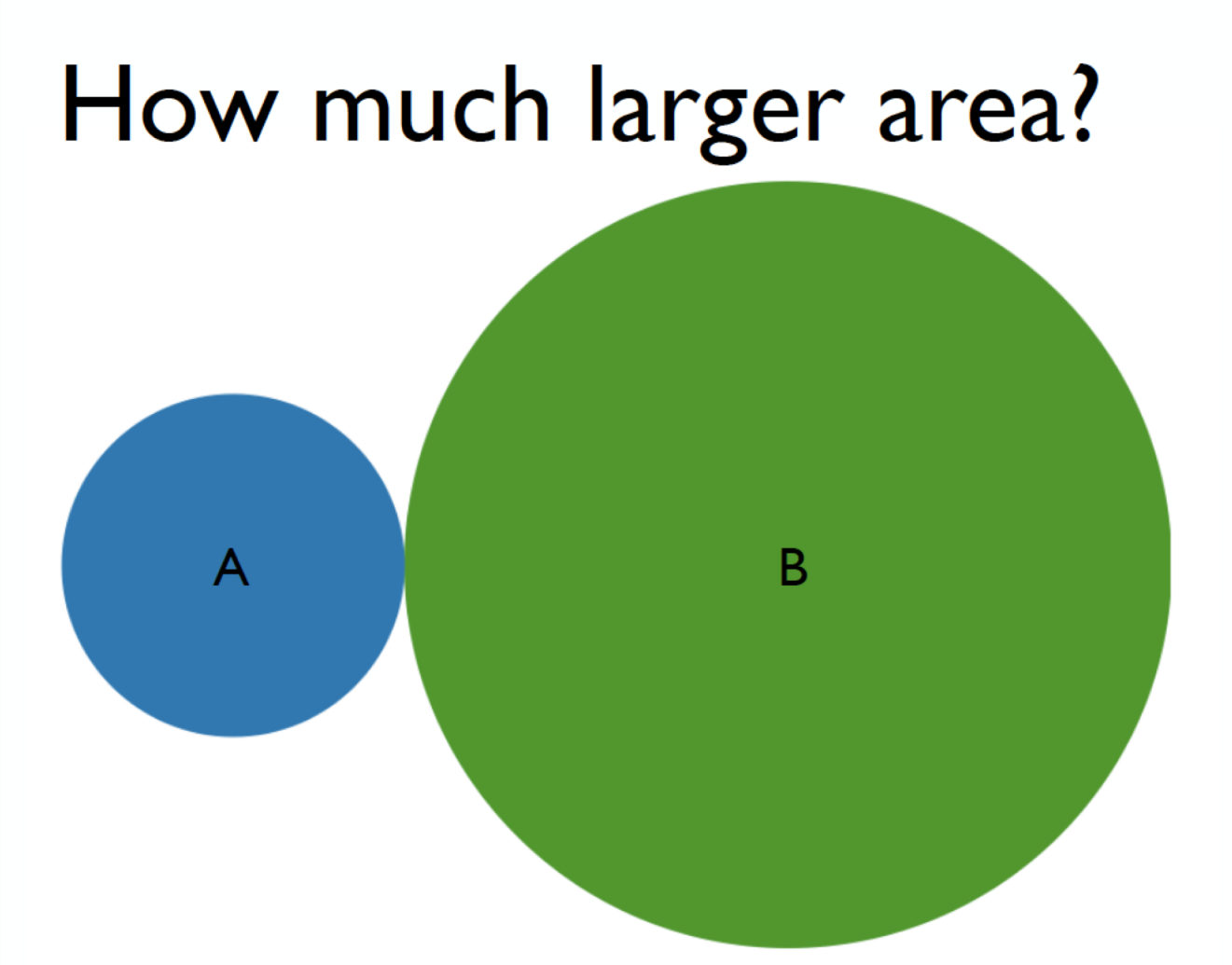


Displays: perceptual effectiveness

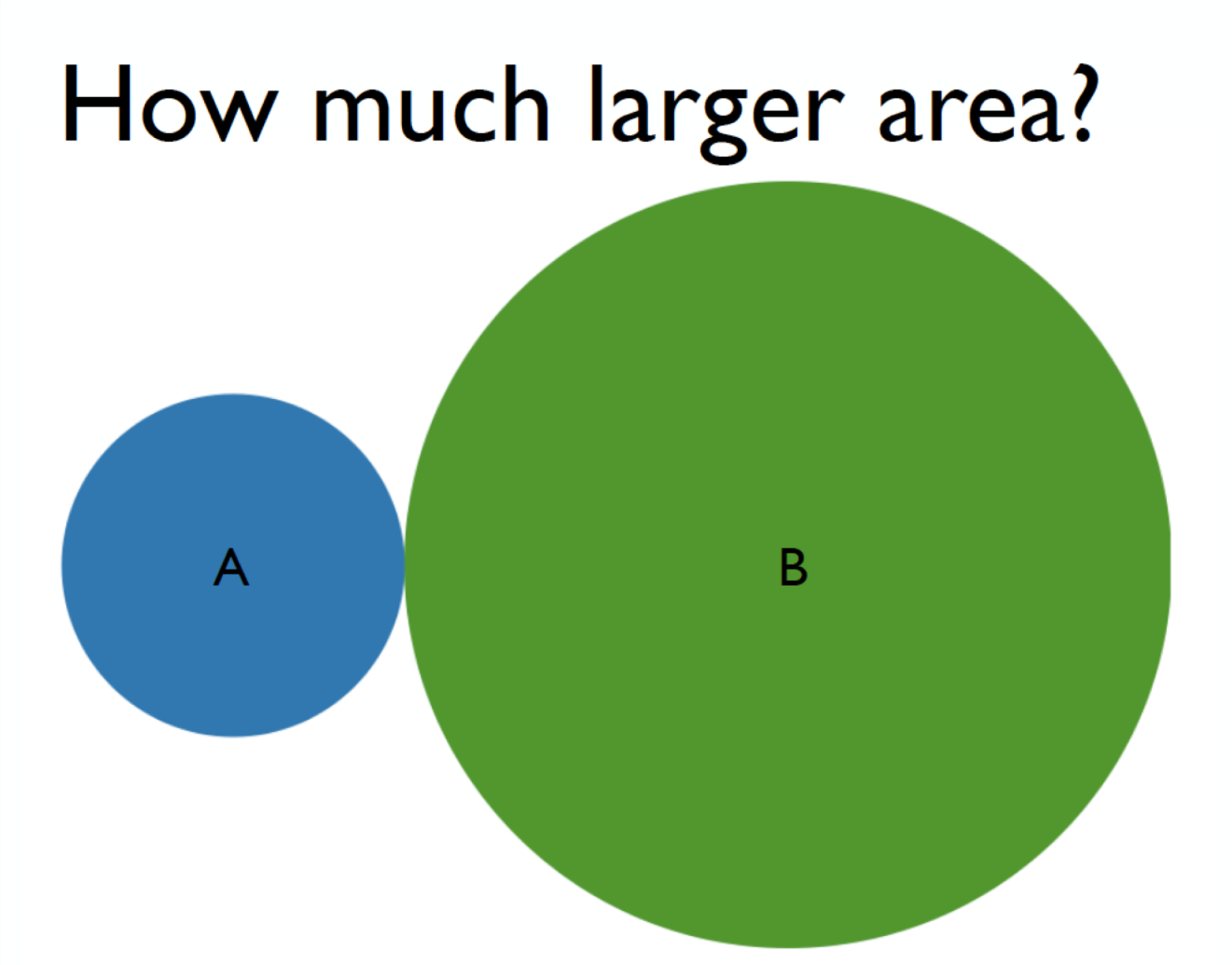


4x

Displays: perceptual effectiveness

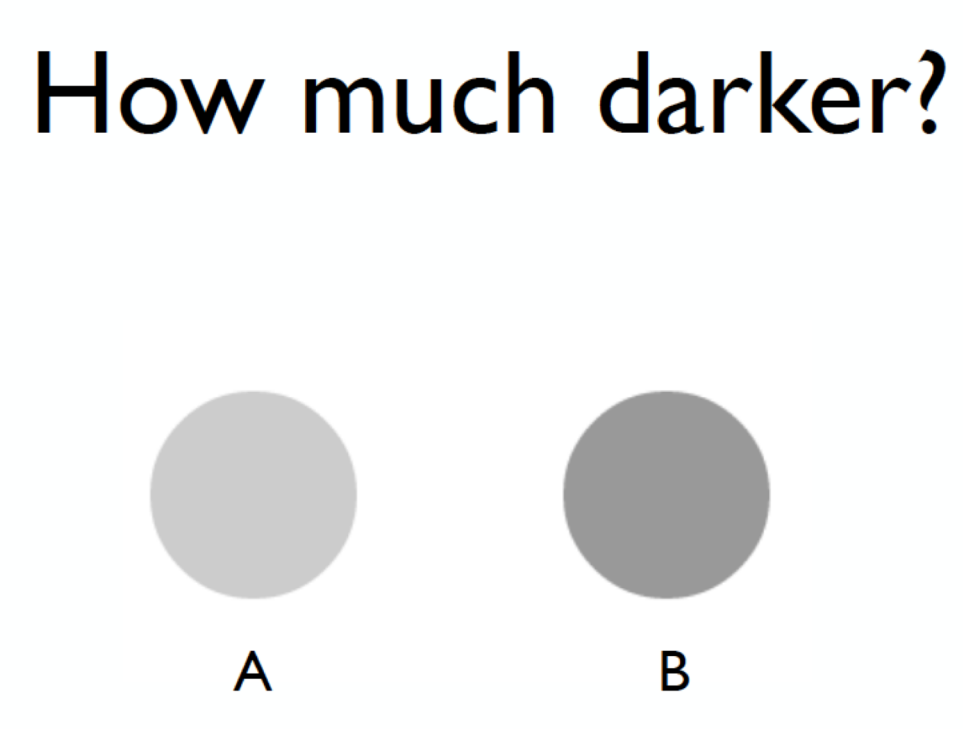


Displays: perceptual effectiveness

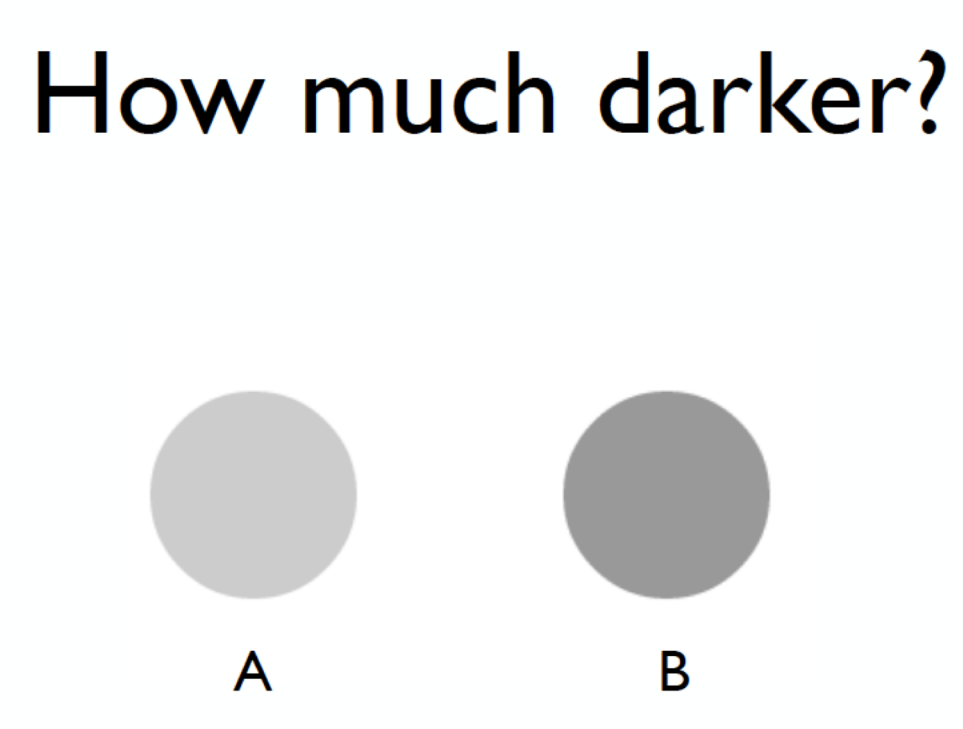


10x

Displays: perceptual effectiveness

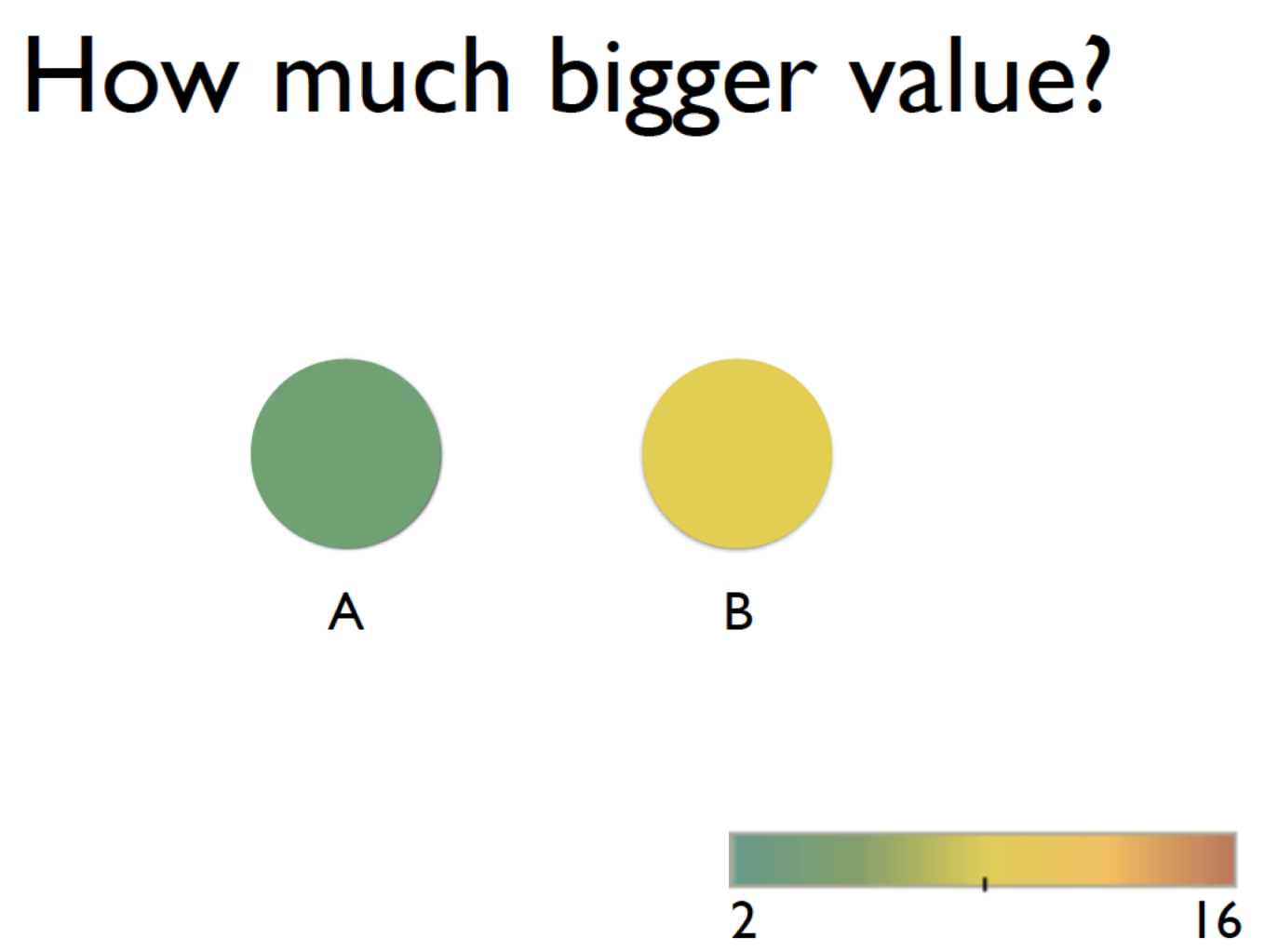


Displays: perceptual effectiveness

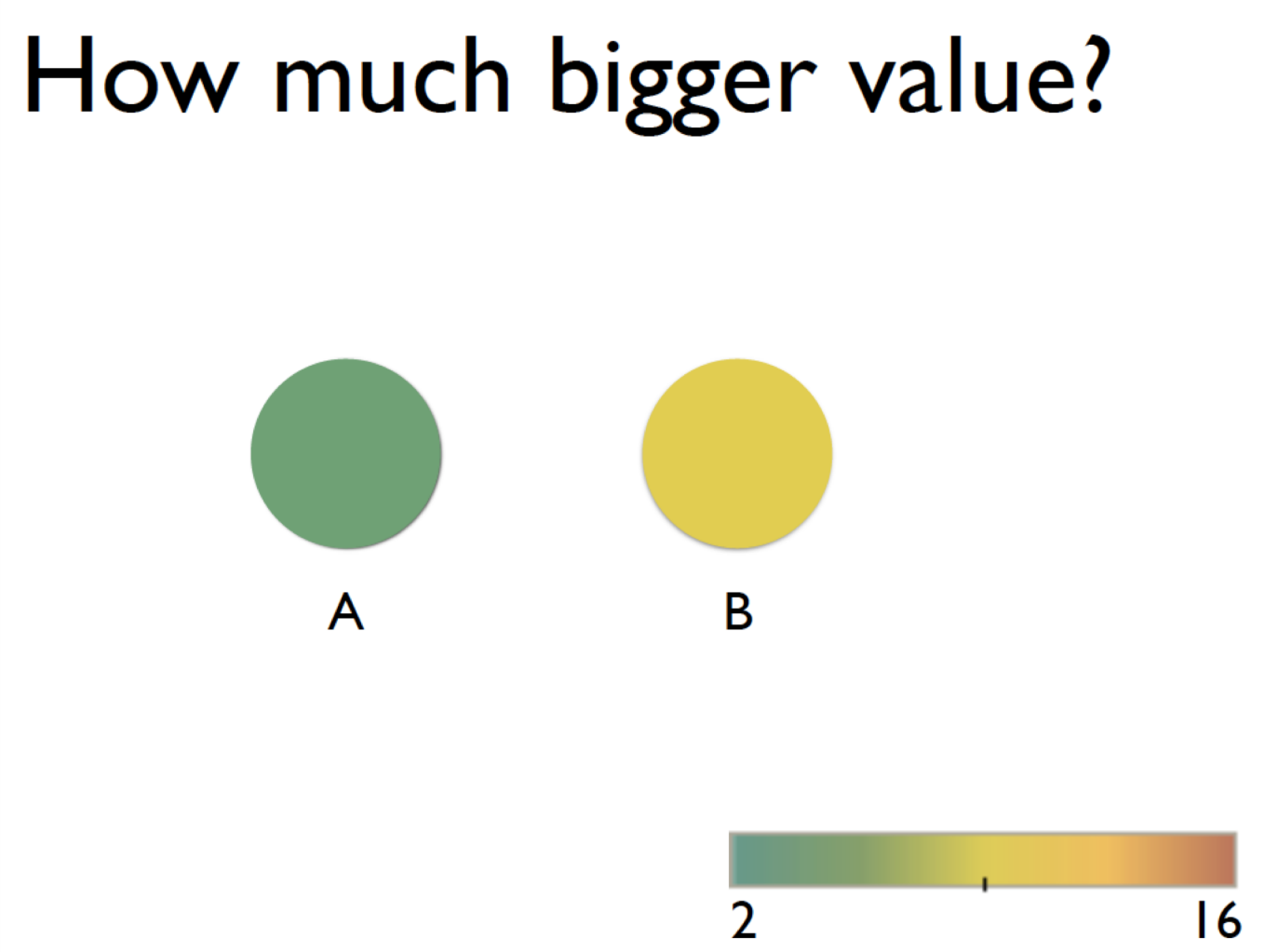


2x

Displays: perceptual effectiveness

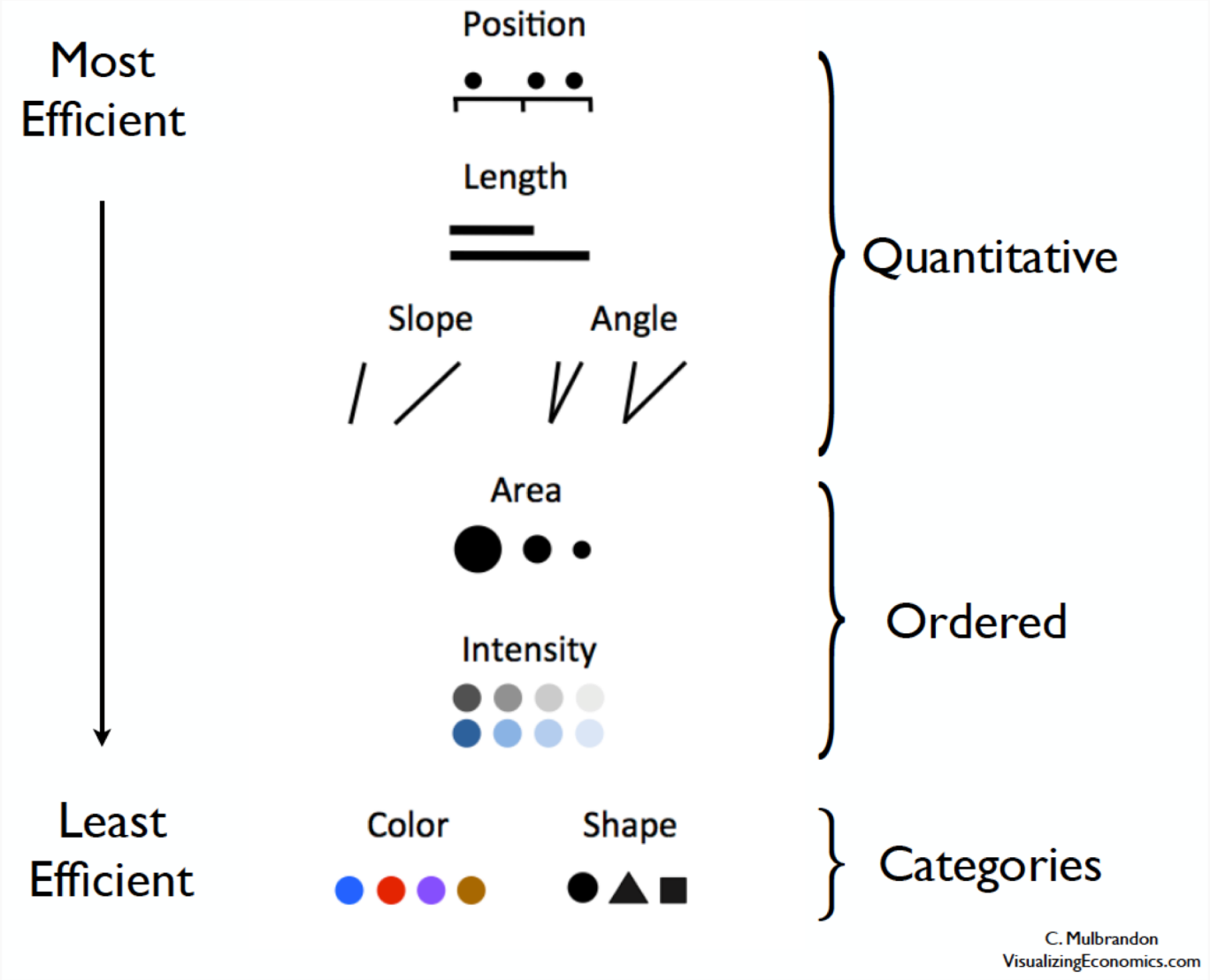


Displays: perceptual effectiveness

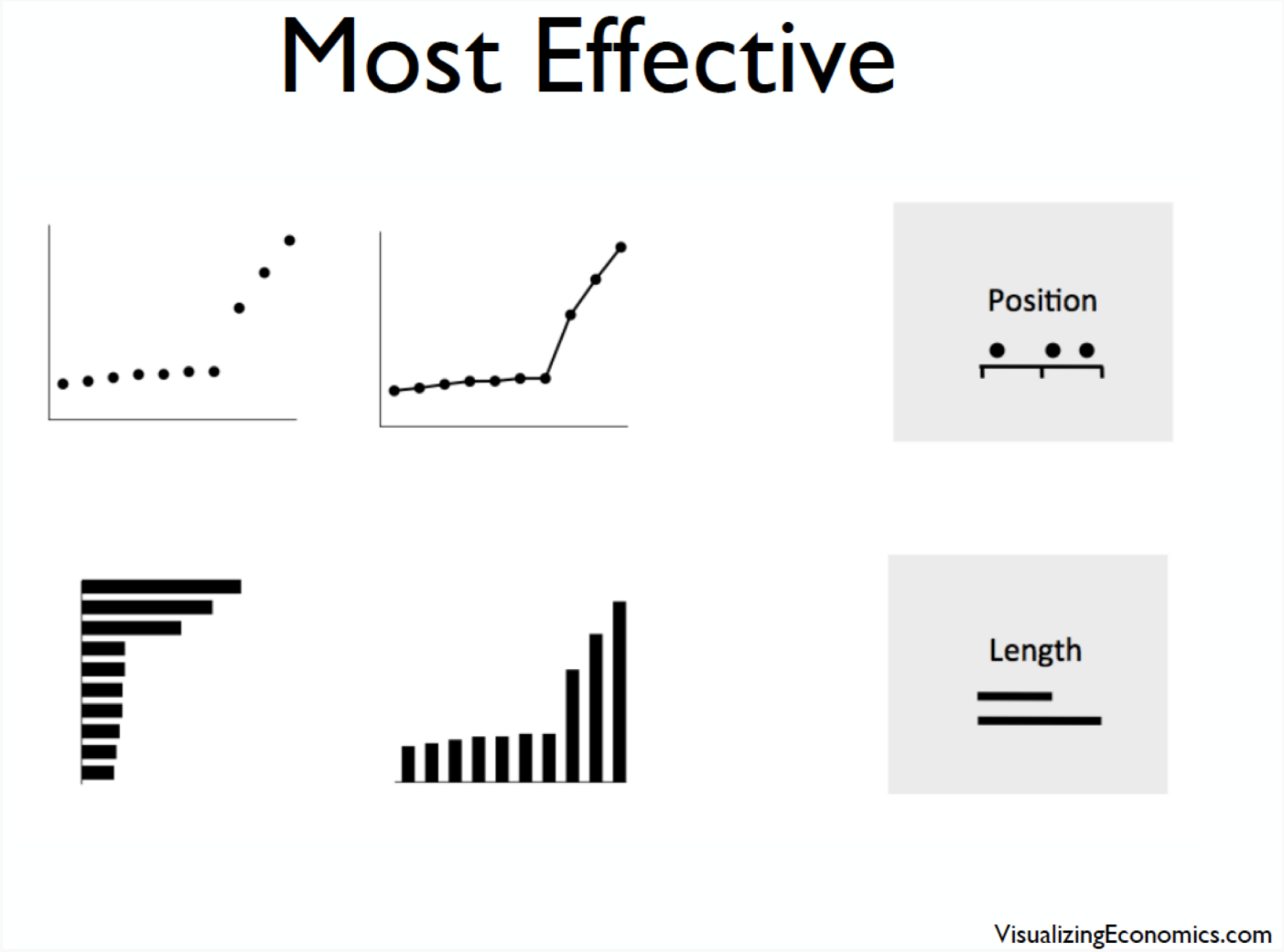


4x

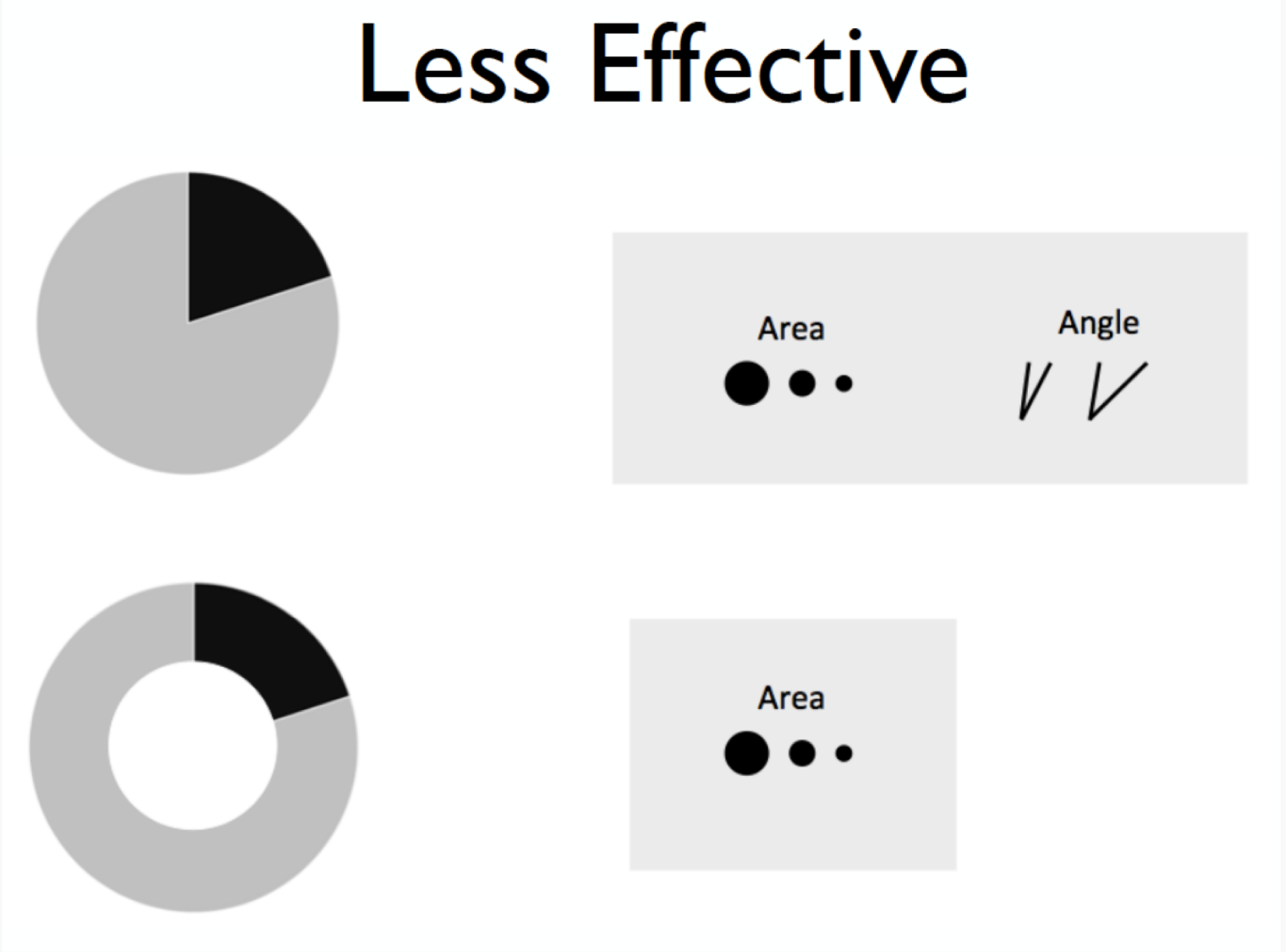
Displays: perceptual effectiveness



Displays: perceptual effectiveness



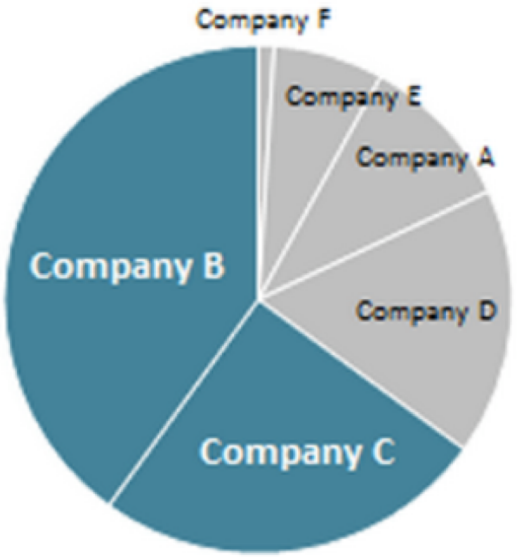
Displays: perceptual effectiveness

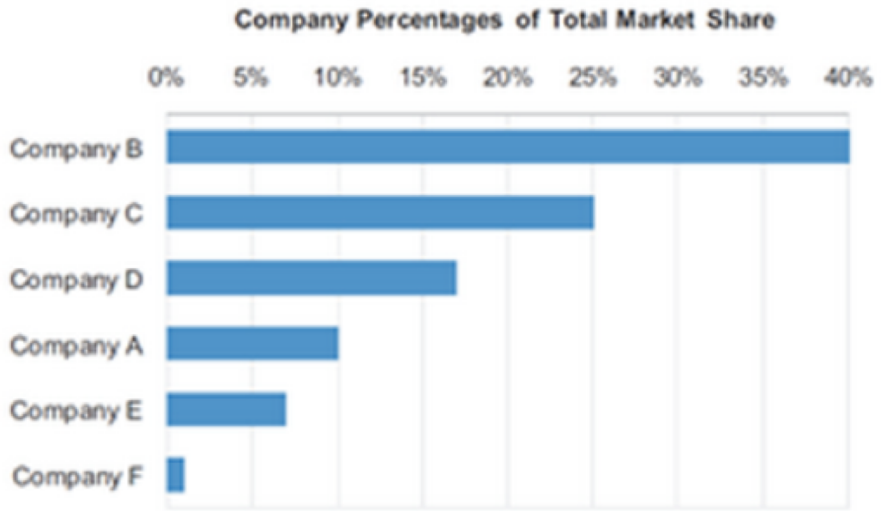


Displays: perceptual effectiveness

Pie vs. Bar Charts

65% of the market is controlled by companies B and C





Lecture Outline

- EDA Refresher
- Effective Visualization
  - Graphical Integrity
  - Scope
  - Displays
  - Sensible Design
- Communication
  - Motivation
  - Key Considerations

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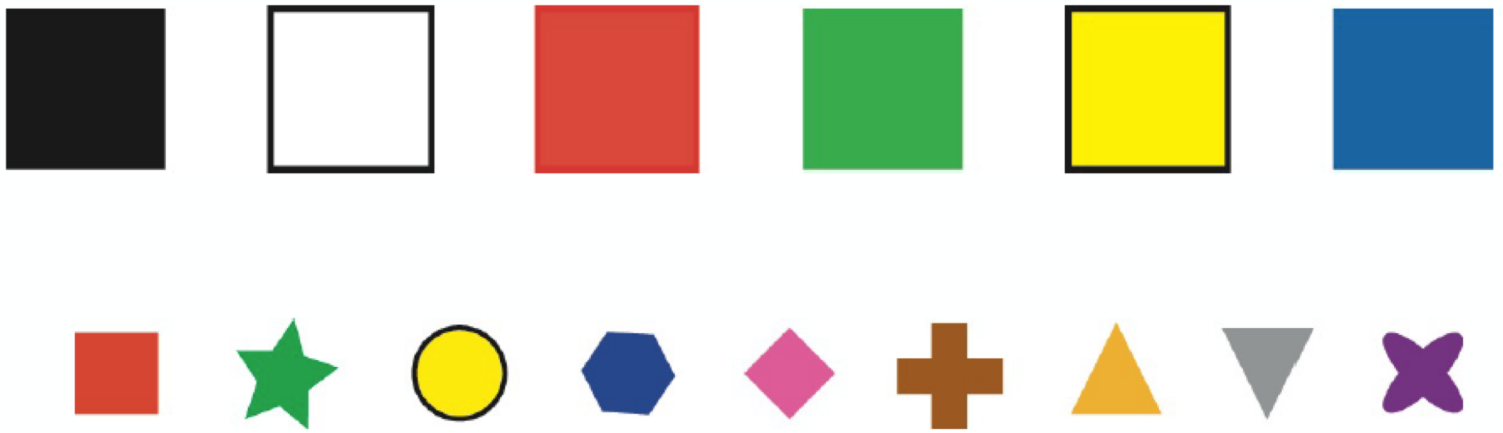
Sensible Design: colors

Colors for Categories

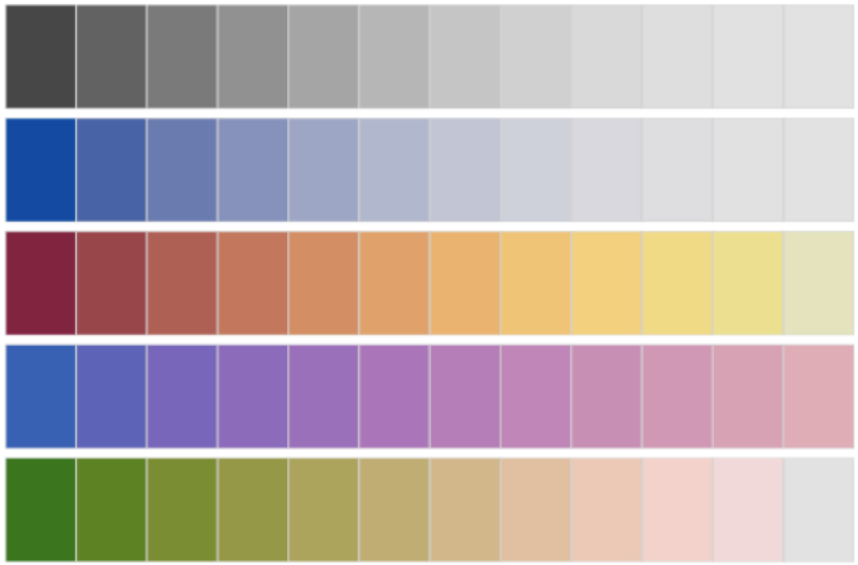
Do not use more than 5-8 colors at once



Sensible Design: colors

Colors for Ordinal Data

Vary luminance and saturation



Zeilis et al, 2009, "Escaping RGBland: Selecting Colors for Statistical Graphics"

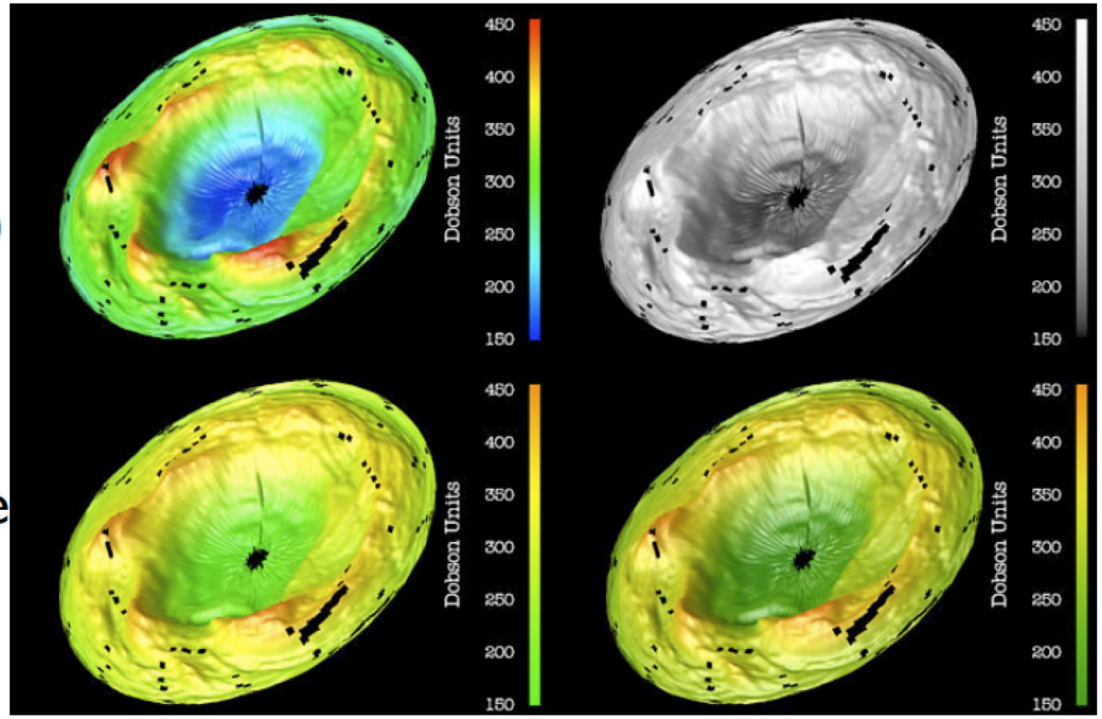
Sensible Design: colors

Colors for Quantitative Data

Hue (Rainbow)

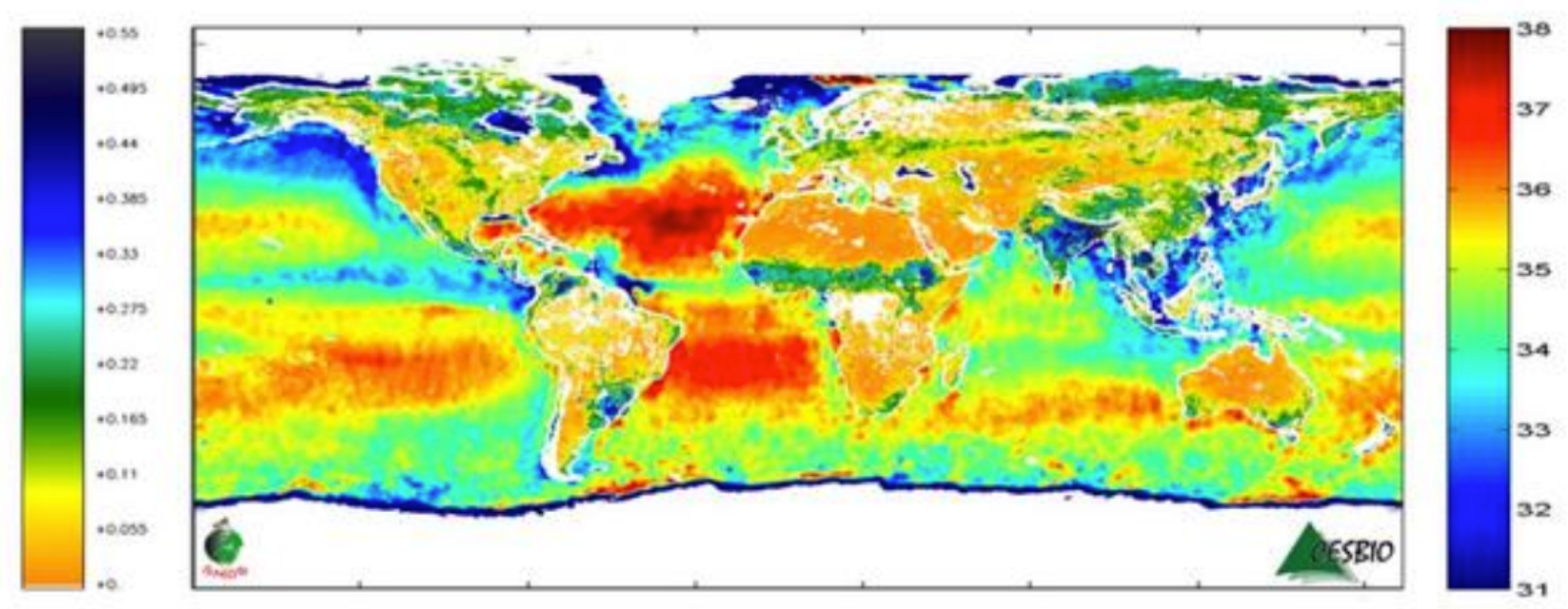
Luminance

Luminance & Hue

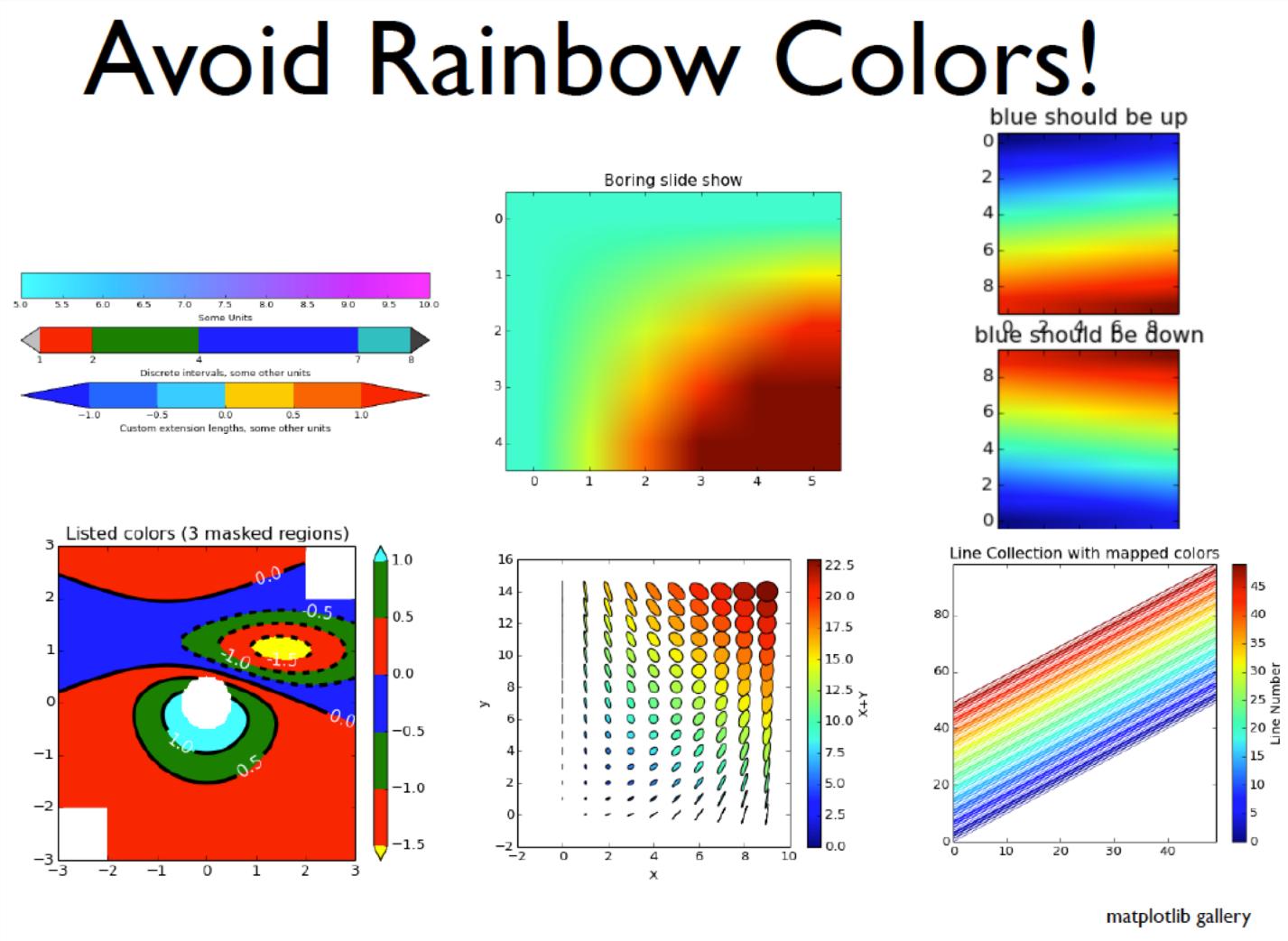


Rogowitz and Treinish, Why should engineers and scientists be worried about color?

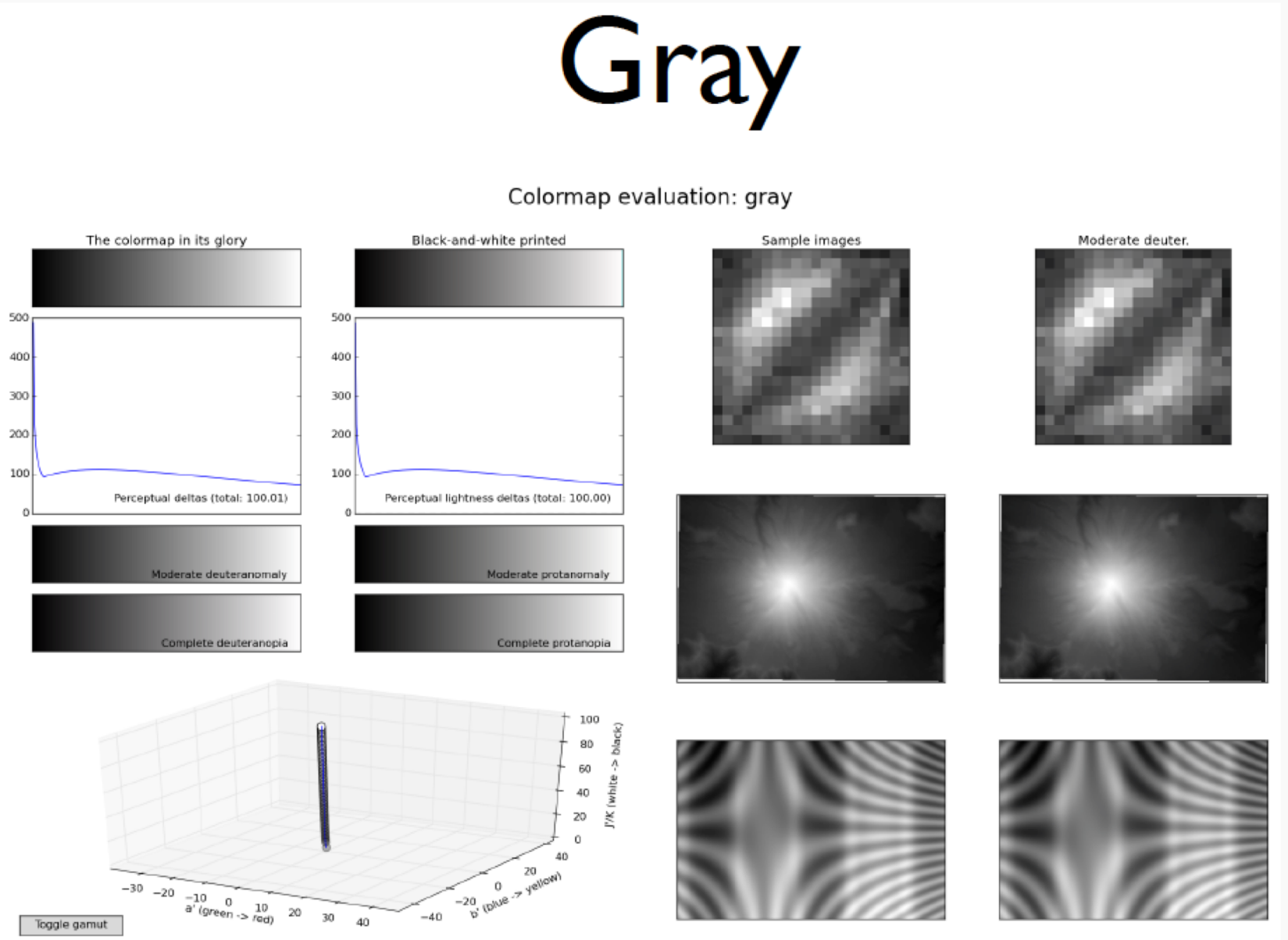
Sensible Design: colors



Sensible Design: colors

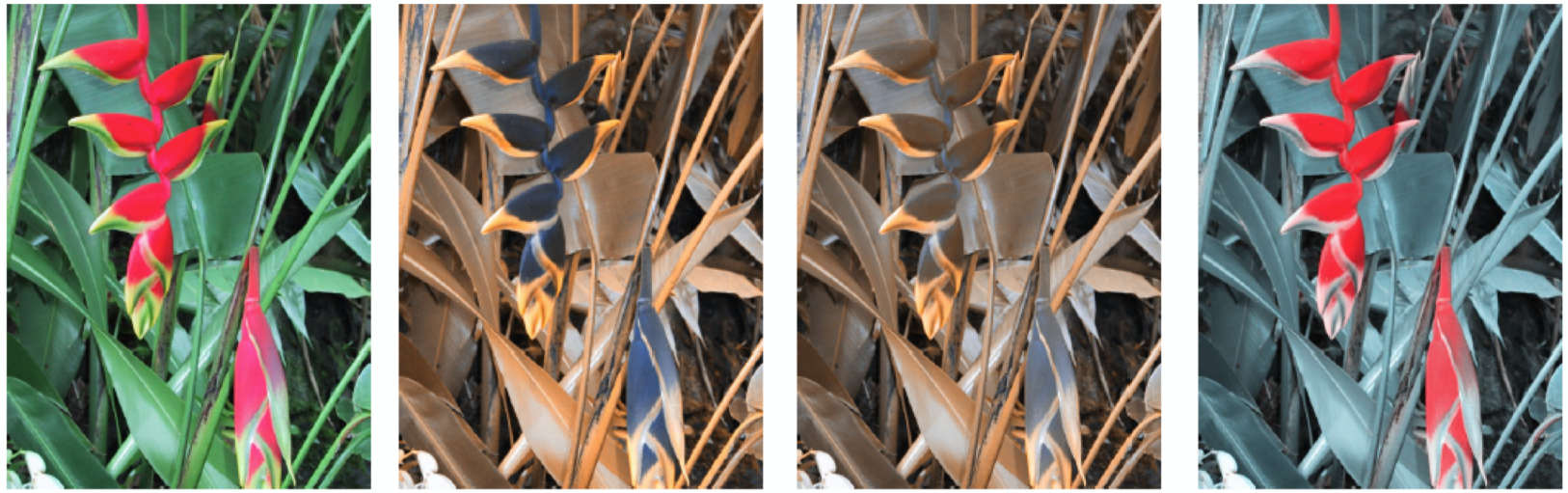


Sensible Design: colors



Sensible Design: colors

Color Blindness

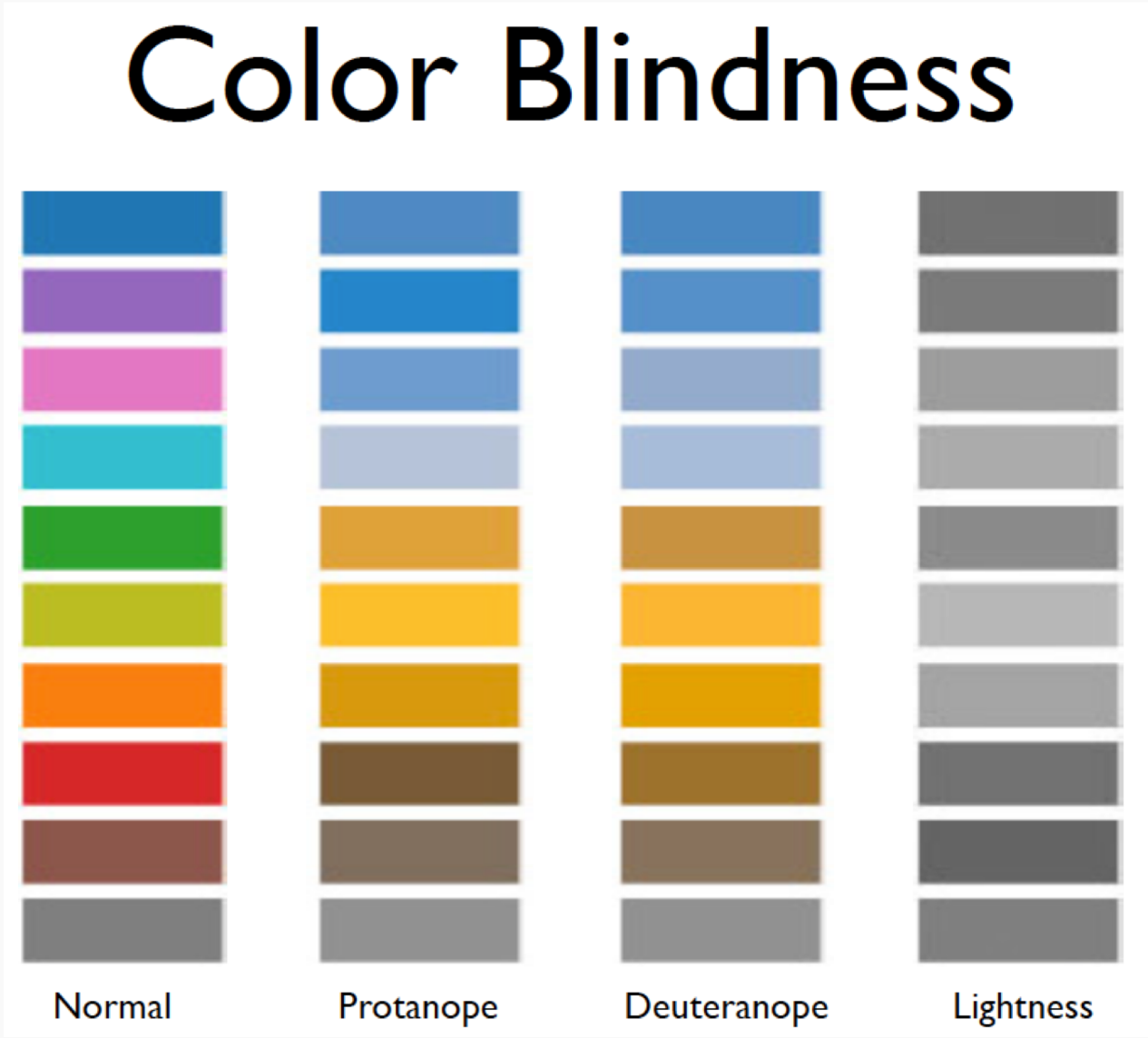


Protanope Deuteranope Tritanope

Red / green deficiencies

Blue / Yellow deficiency

Sensible Design: colors

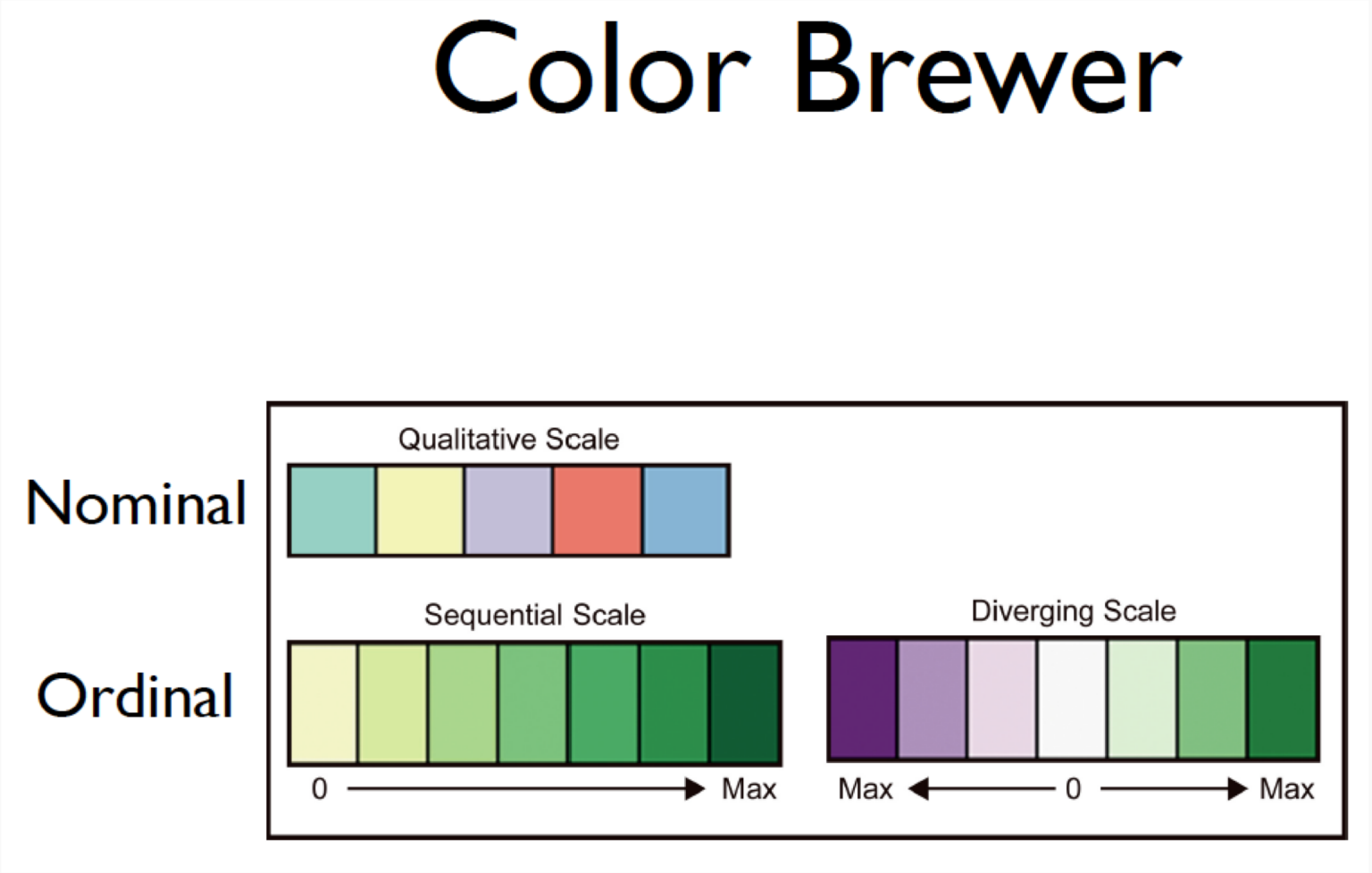


Sensible Design: colors

Great sites for selecting color schemes:

- http://colorbrewer2.org
- https://coolors.co/

Sensible Design: colors



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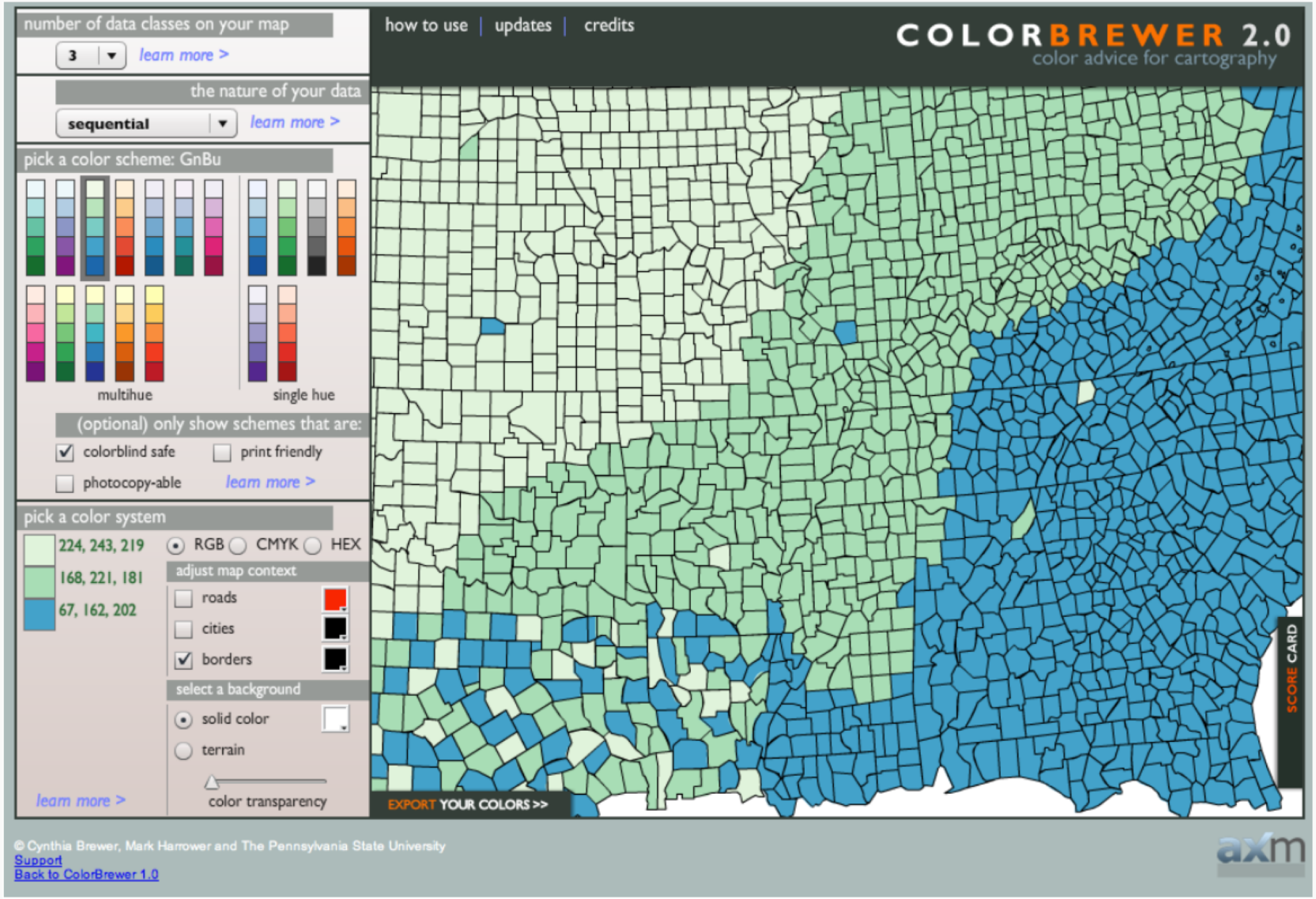
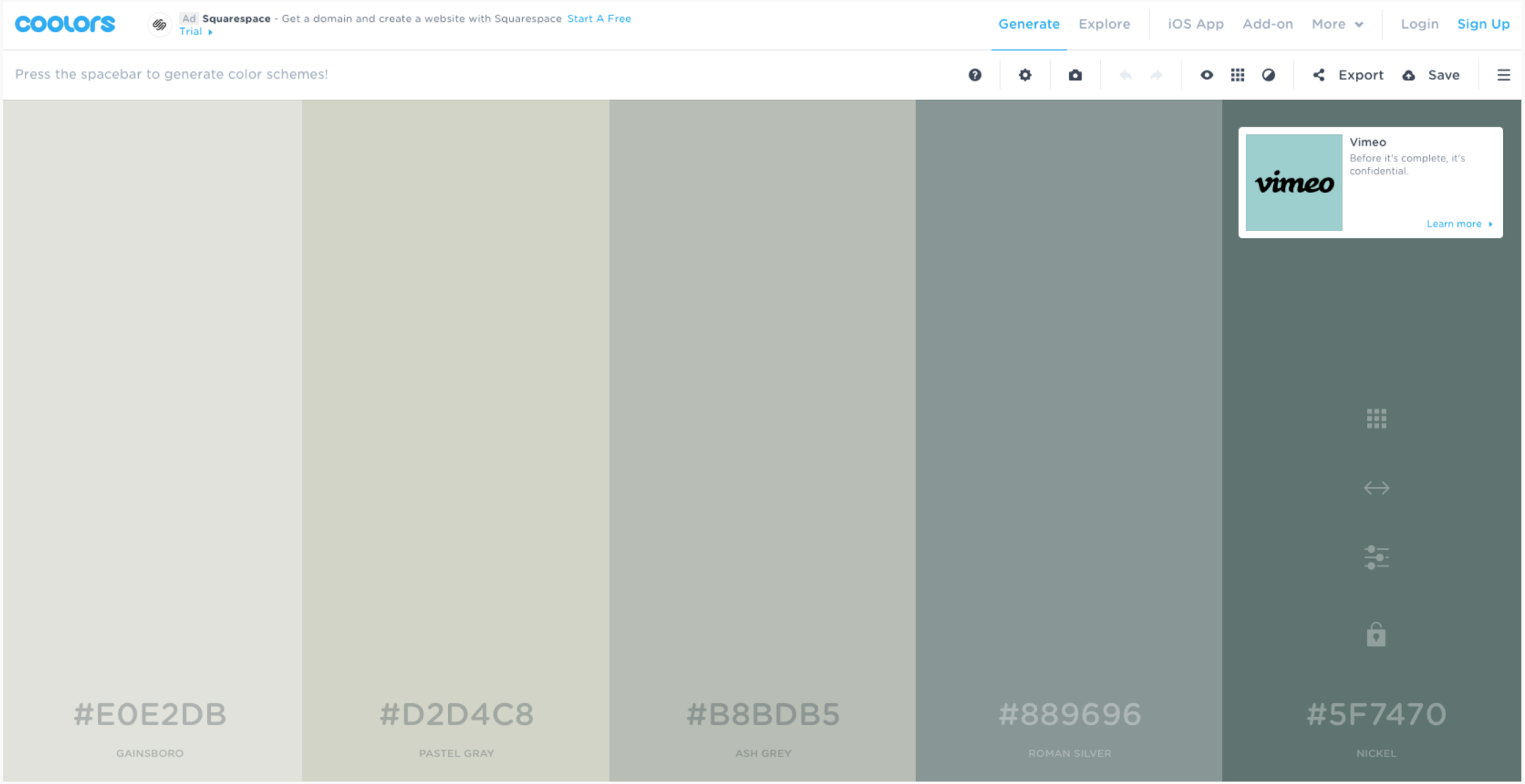
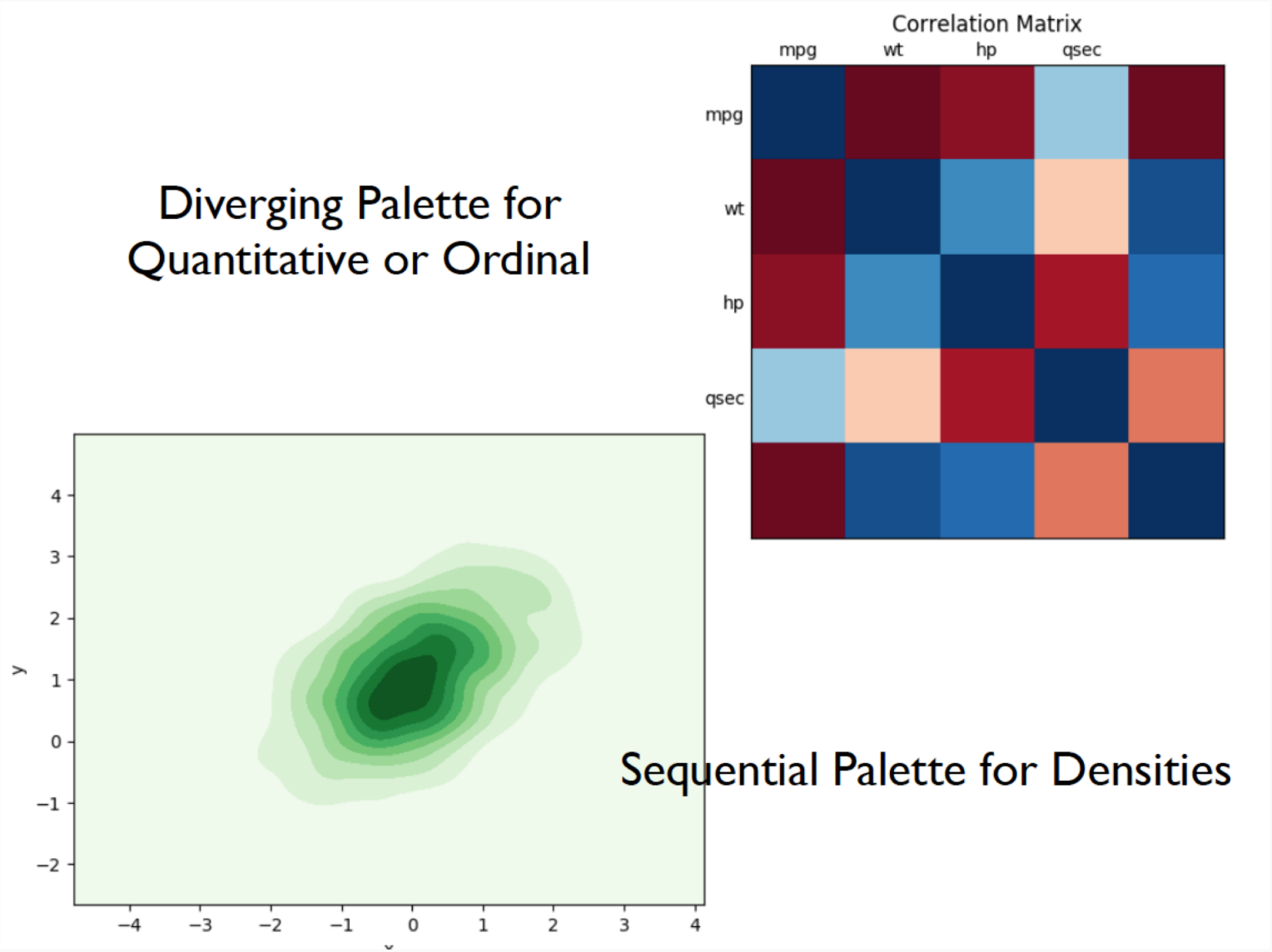


Sensible Design: colors



Sensible Design: colors



Sensible Design: fonts

How much do you trust this text?

How much do you trust this text?

How much do you trust this text?

How much do you trust this text?

Sensible Design: intuitive

The everyday items that are designed the best are the ones that we never have to think about how to use/interact with it.

Can you think of examples?

Sensible Design

Lesson: design matters

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Analysis vs Communication

Analyze (Exploratory)

- Explore the data
- Assess a situation
- Determine how to proceed
- Decide what to do

Communicate (Explanatory)

- Present data and ideas
- Explain and inform
- Provide evidence and support
- Influence and persuade

The Persuasive Power of Data Visualization

Anshul Vikram Pandey
New York University

Anjali Manivannan
New York University

Oded Nov
New York University

Margaret L. Satterthwaite
NYU School of Law, satterth@exchange.law.nyu.edu

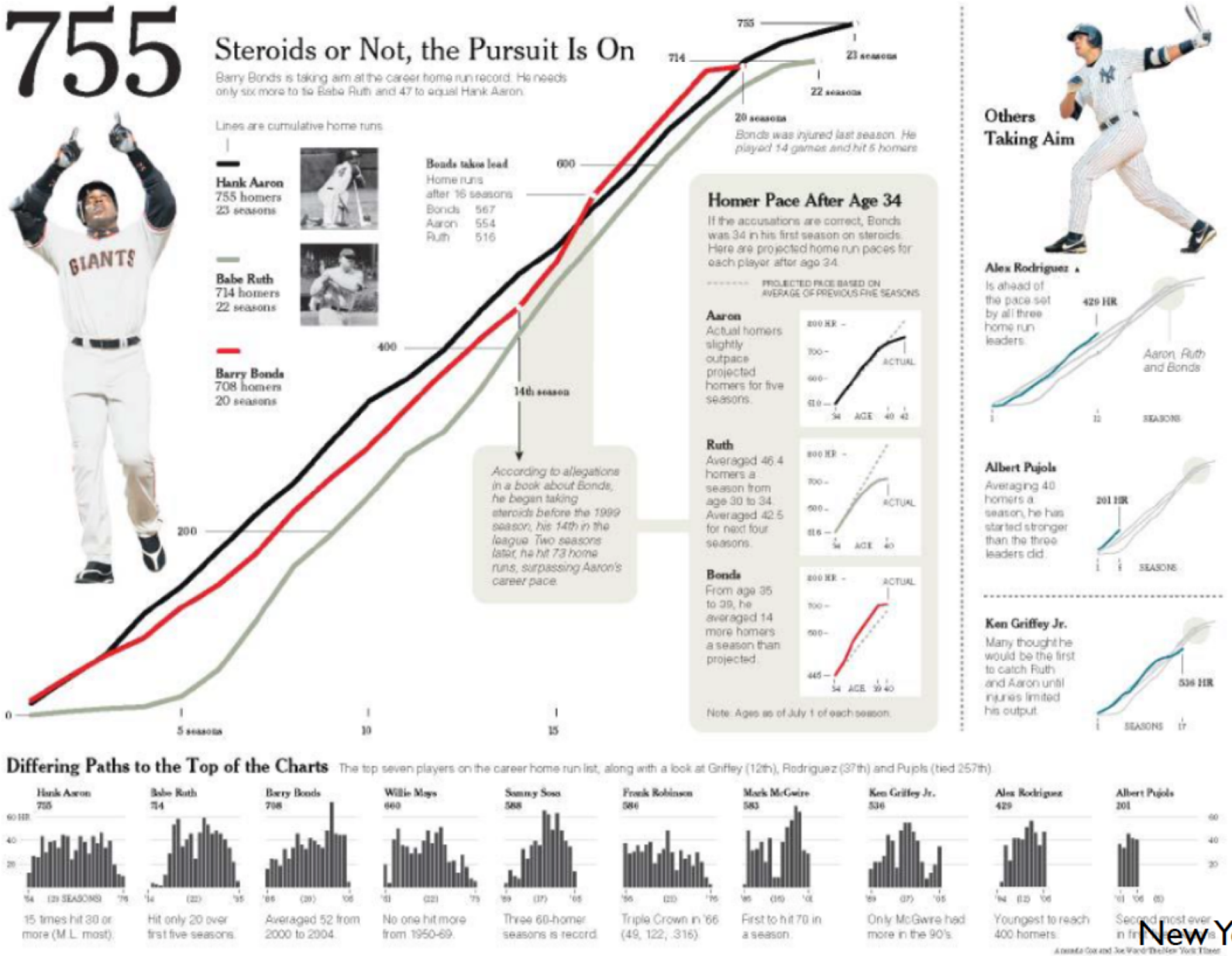
Enrico Bertini
New York University

After looking into common effects in attitude formation and change we searched for specific mentions to the graphical appearance of charts as a driver for persuasion. Some of the comments we collected seem to back up the findings we found in our results. Some participants explicitly mention the charts as being the main reason for their change: "*I already knew that increased incarceration didn't lower crime, but I wasn't sure of the statistics. To see it on the graphs is really eye opening.*"; "*I was influenced by the bar graph showing the reasons why the survey respondents played video games.*"; "*I would not know exact numbers on this issue - the graphs gave a visual and helped identify the numbers*"; "*Seeing the graphs conflicted with my previous opinion, so I feel like I need to reevaluate my stance in a way.*"

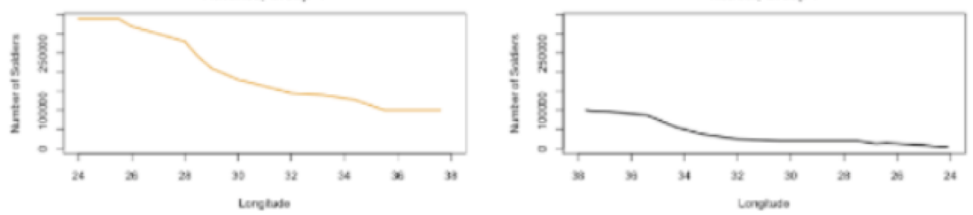
It is also important to mention that the graphical appearance of charts is not the only factor that has a strong impact on people's attitude. In our collected feedback, we found numerous references to statistics and numbers, suggesting that mere exposure to data does have a persuasive effect – maybe at least partially due to the increased sense of objectivity evidence supported by numbers carries. We found comments like: "*It was concrete data that seemed compelling.*; "*Seeing numbers is a good indicator of change rather than just reading what someone has to say*"; "*It showed a large amount of different sources, which made it more credible*". More research is needed to disentangle what kind of specific effects each of these components have on persuasion.

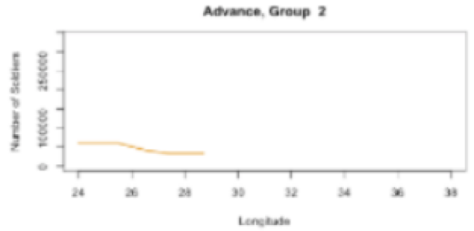
http://lsr.nellco.org/cgi/viewcontent.cgi?article=1476&context=nyu_plltwp

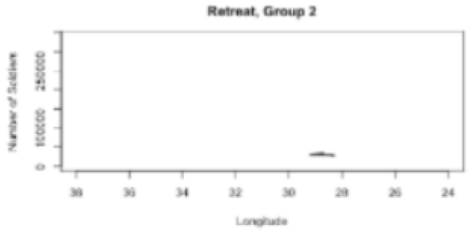
Communicate

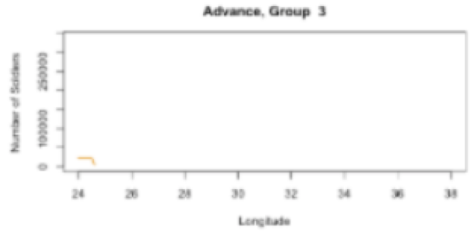


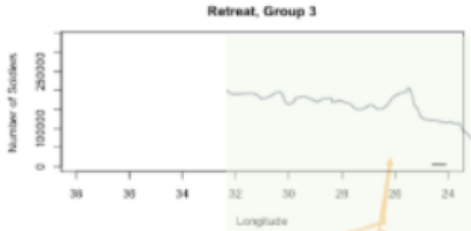
Napoleon's March to Russia



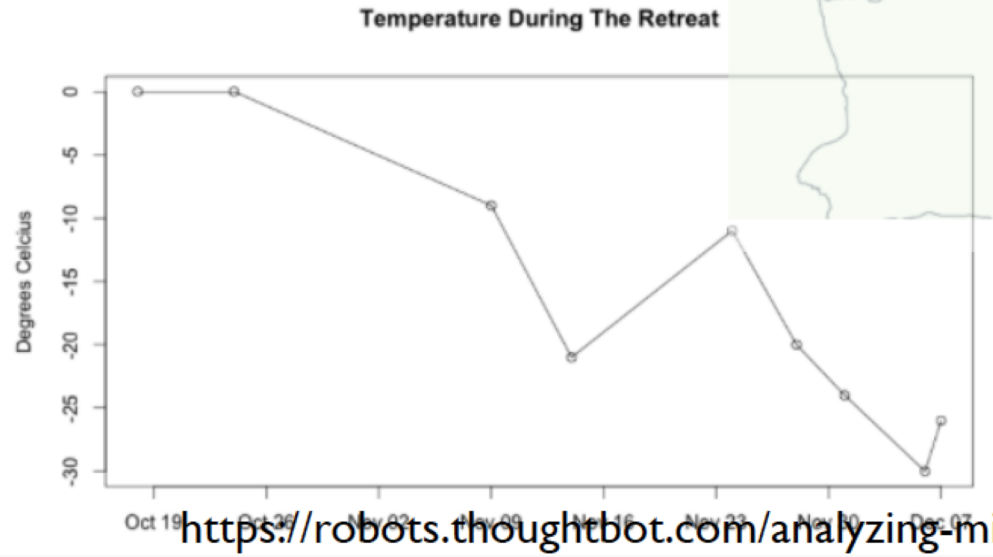






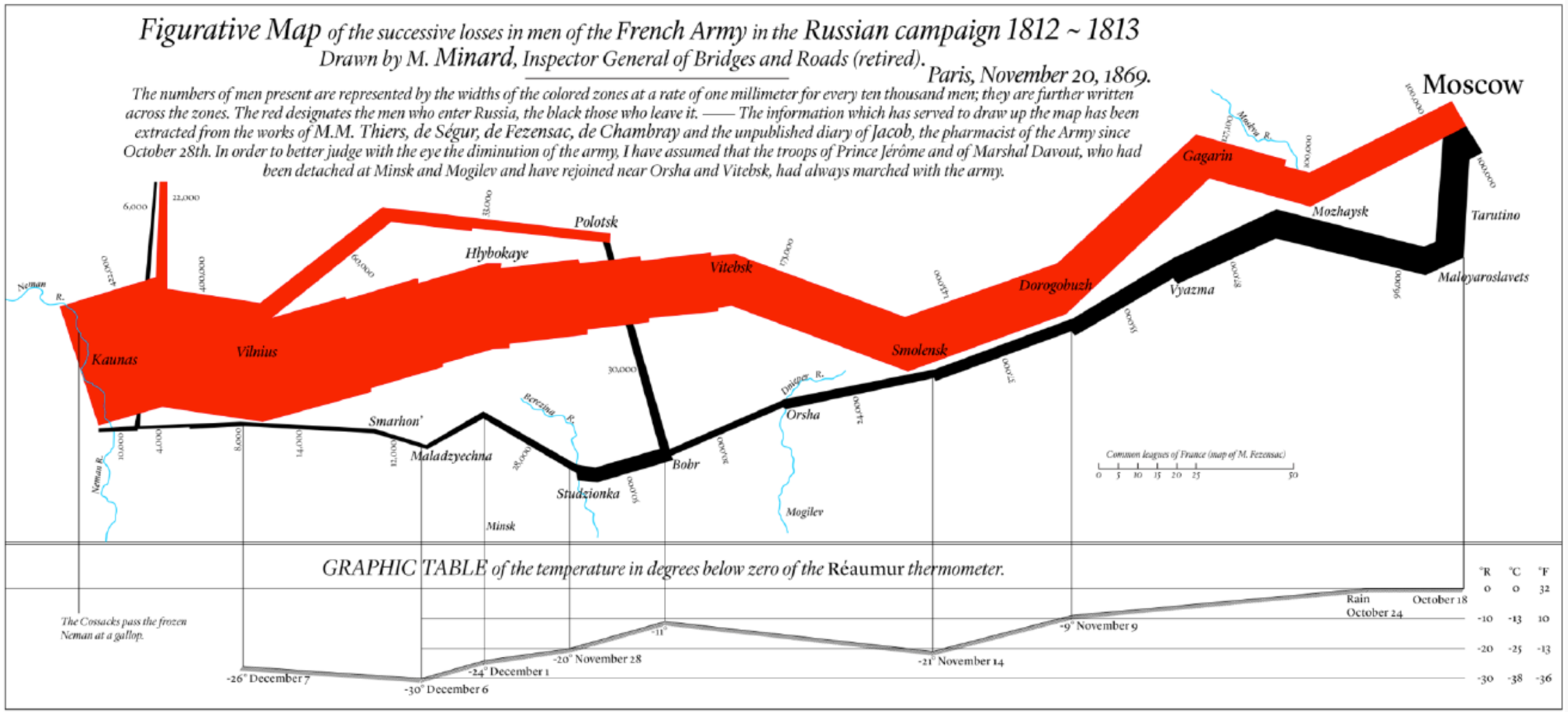


Next, the temperature experienced by his troops when winter settled in on the return trip.



https://robots.thoughtbot.com/analyzing-minards-visualization-of-napoleons-1812-march

Minard's Graphic on Napoleon's Russia Campaign



Lecture Outline

- EDA Refresher
- Effective Visualization
  - Graphical Integrity
  - Scope
  - Displays
  - Sensible Design
- Communication
  - Motivation
  - Key Considerations

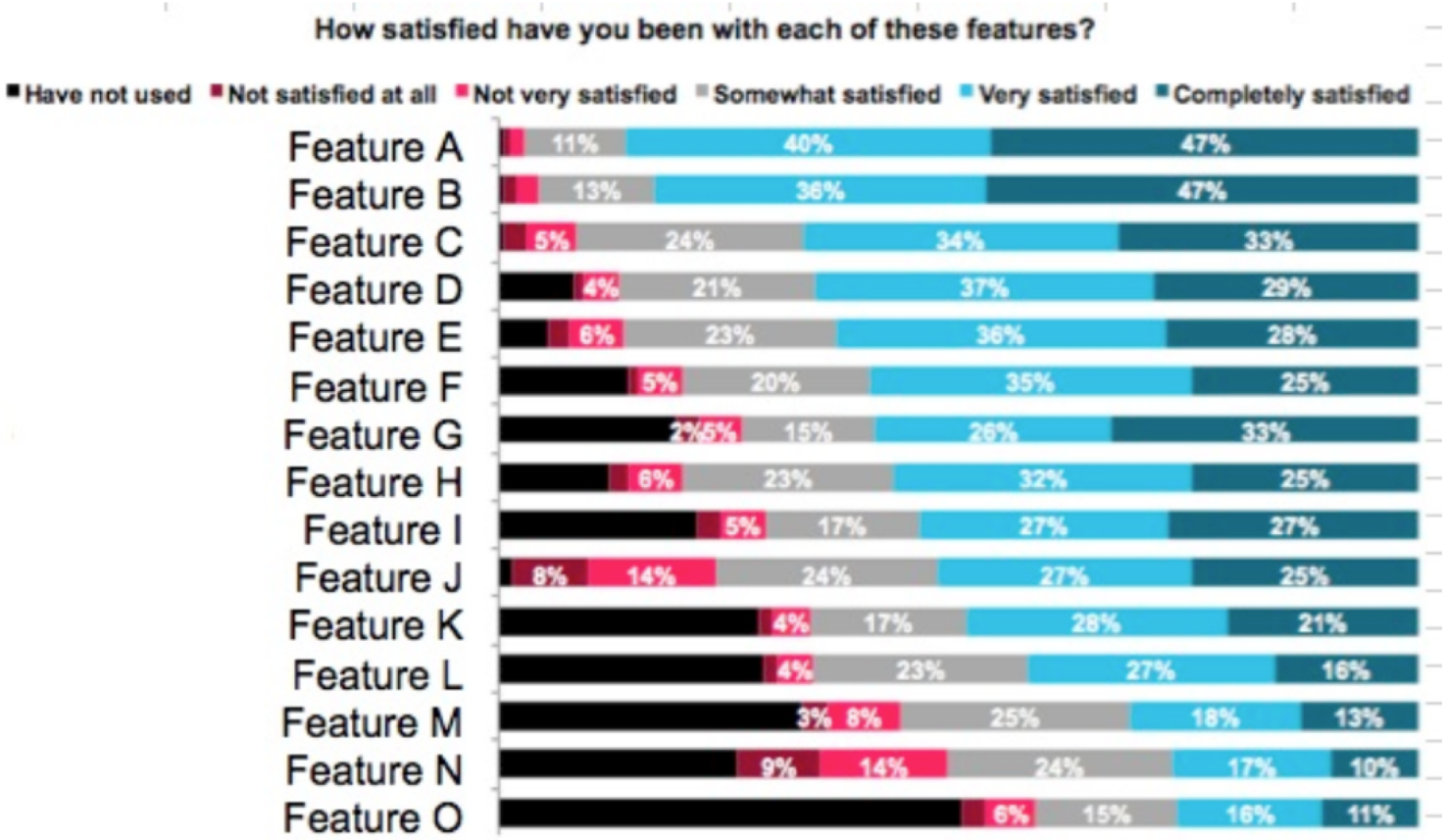
Key Considerations

- Who is your **audience**
- What questions are you answering?
- Why should the audience care?
- What are your major insights and surprises?
- What change do you want to affect?

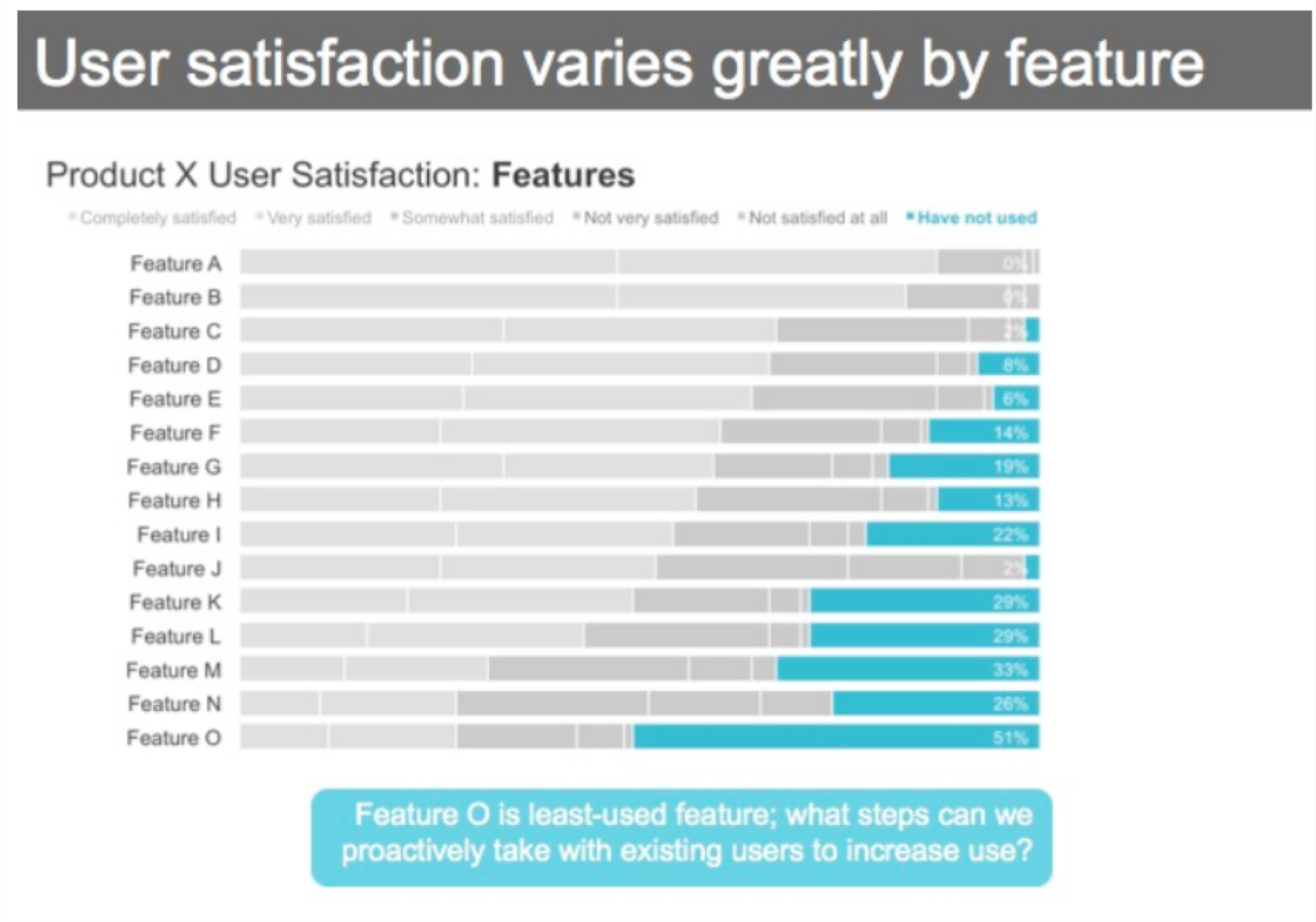
Don't Make Them Think!

- Your audience does not want to spend cognitive effort on things you know and can just show them
- Lead them through the major steps of your story
- Point out interesting key facts and insights using captions and annotations

Don't Bury the Lead



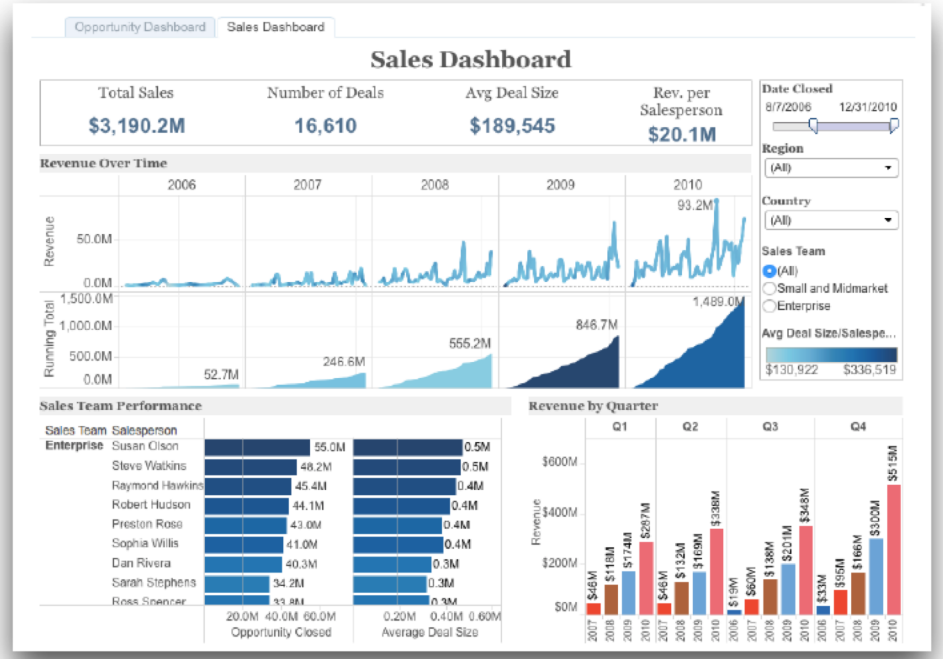
Communication



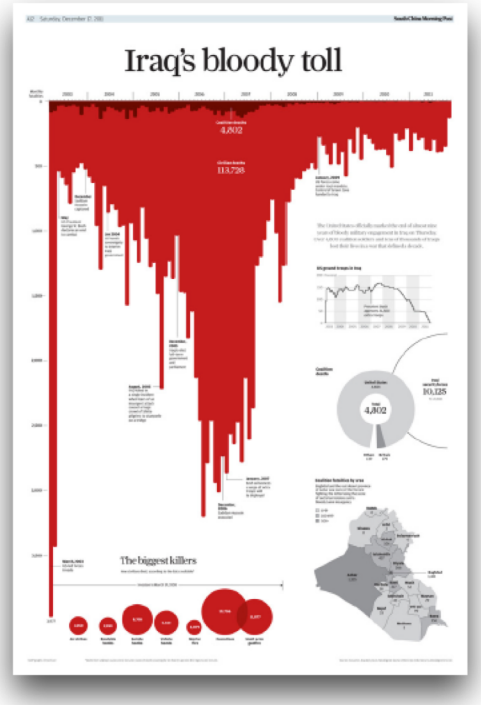
Communication

What is the message?

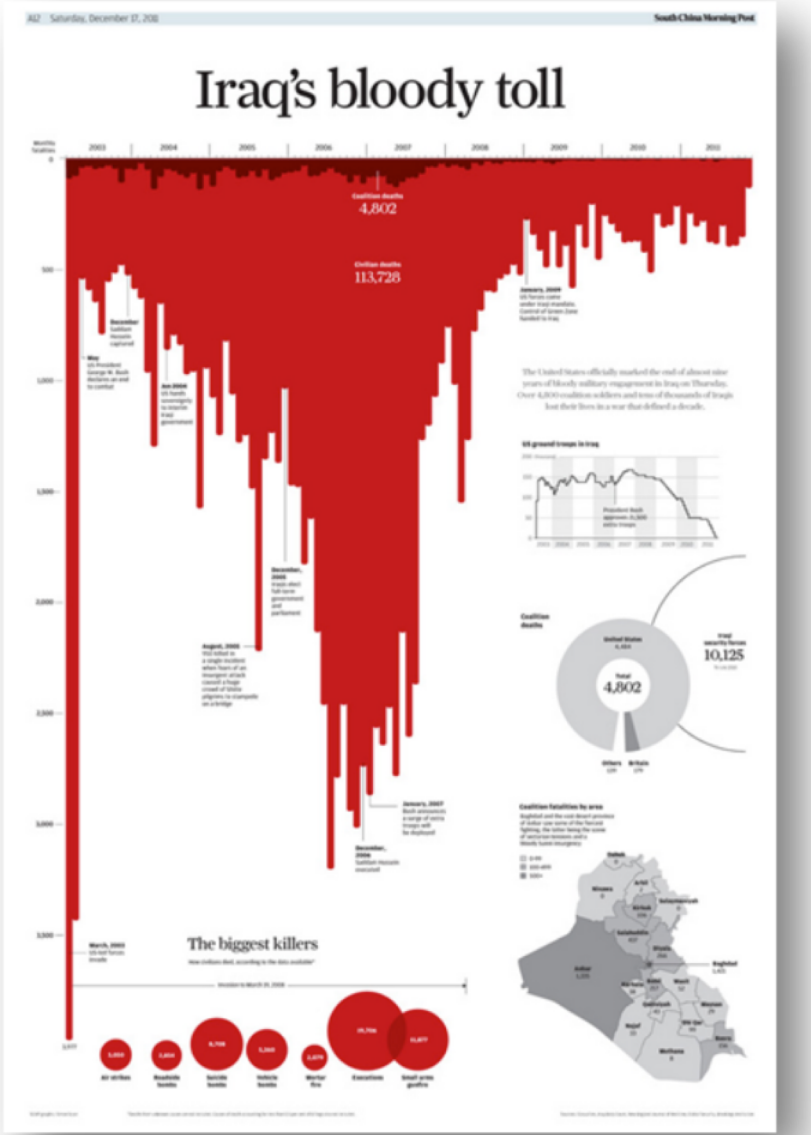
Exploratory
Neutral

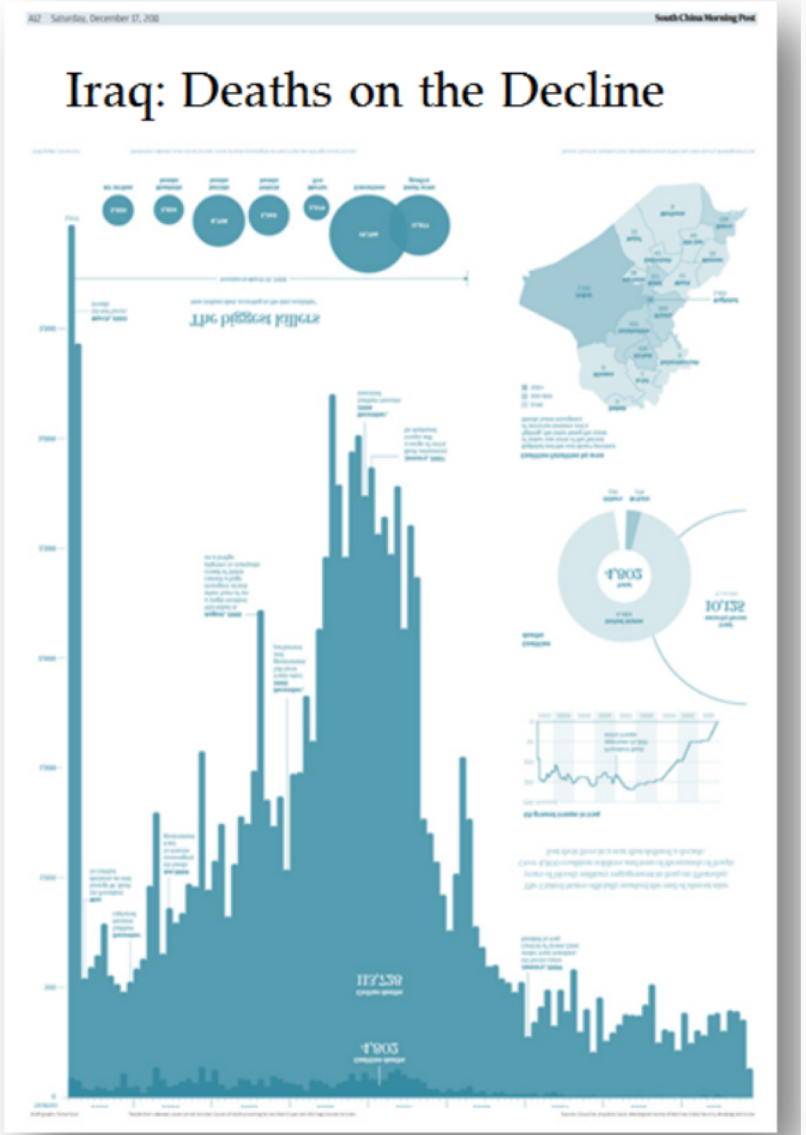


Explanatory
Opinionated



Communication





Andy Cotgreave, Tableau

Final Takeaways

- How you choose to display your data greatly influences how people interpret the data
- Humans are visual, *emotional* creations; make graphs that don't make others feel confused, insulted, etc
- Your graphs should illicit good feelings and effectively convey your narrative