

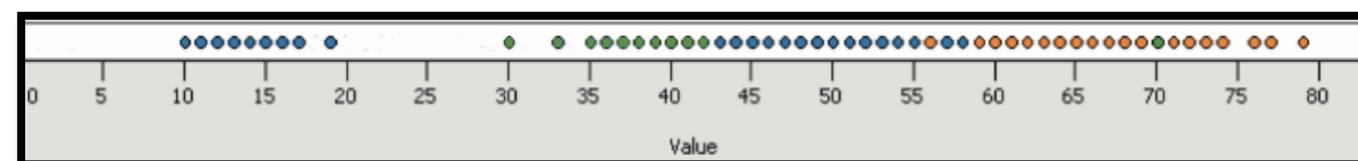
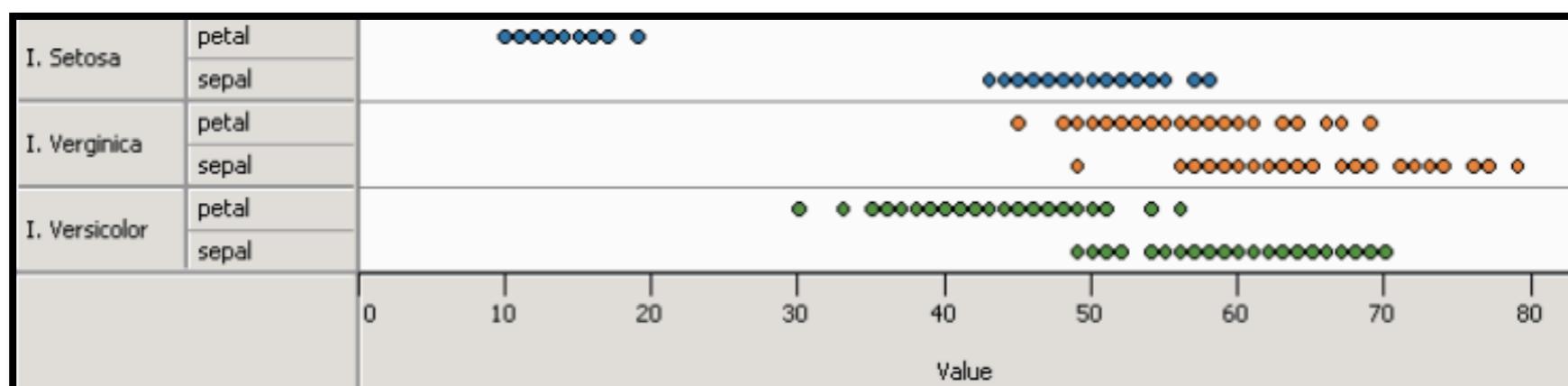
lecture 09: design principles

October 16, 2017

Principle 1: expressiveness

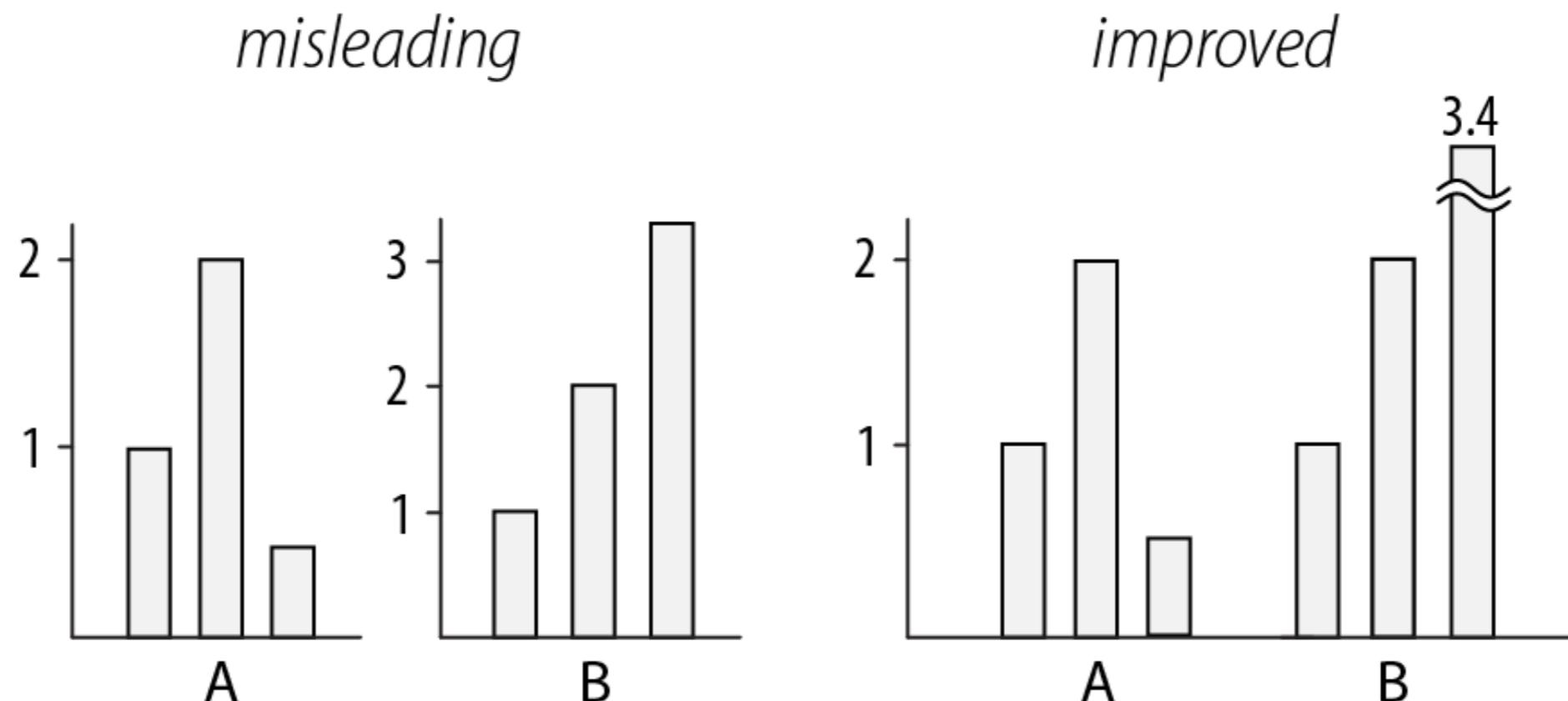
Encode all the facts

Encode only the facts



Principle 2: consistency

Use consistent axes when comparing charts

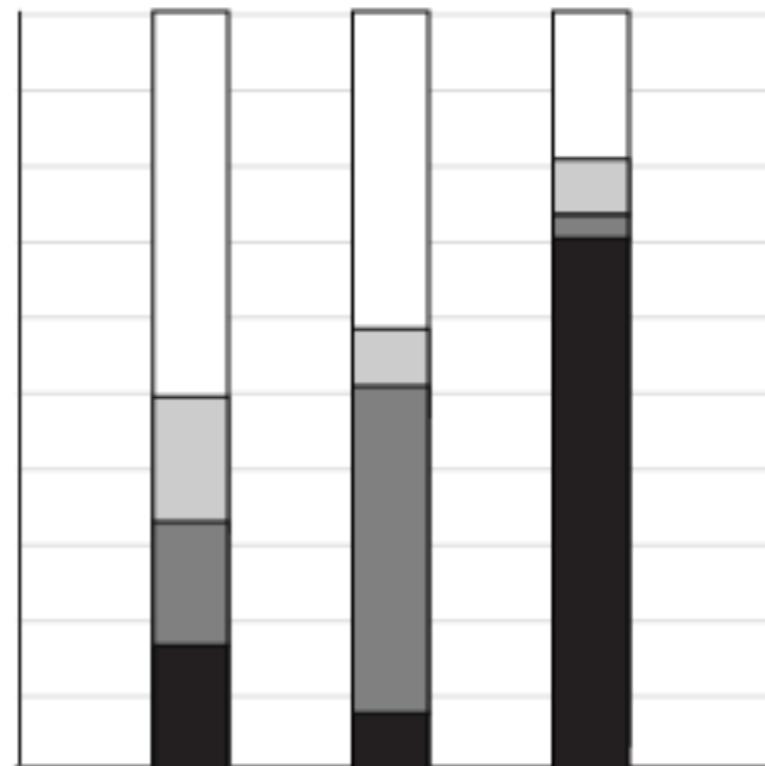


Raina SZ, et al. (2005) Evolution of base-substitution gradients in primate mitochondrial genomes. *Genome Res* 15: 665-673.

M. Krzynski, behind every great visualization is a design principle, 2012

Principle 2: consistency

A note on legends: order items according to appearance



consistent inconsistent

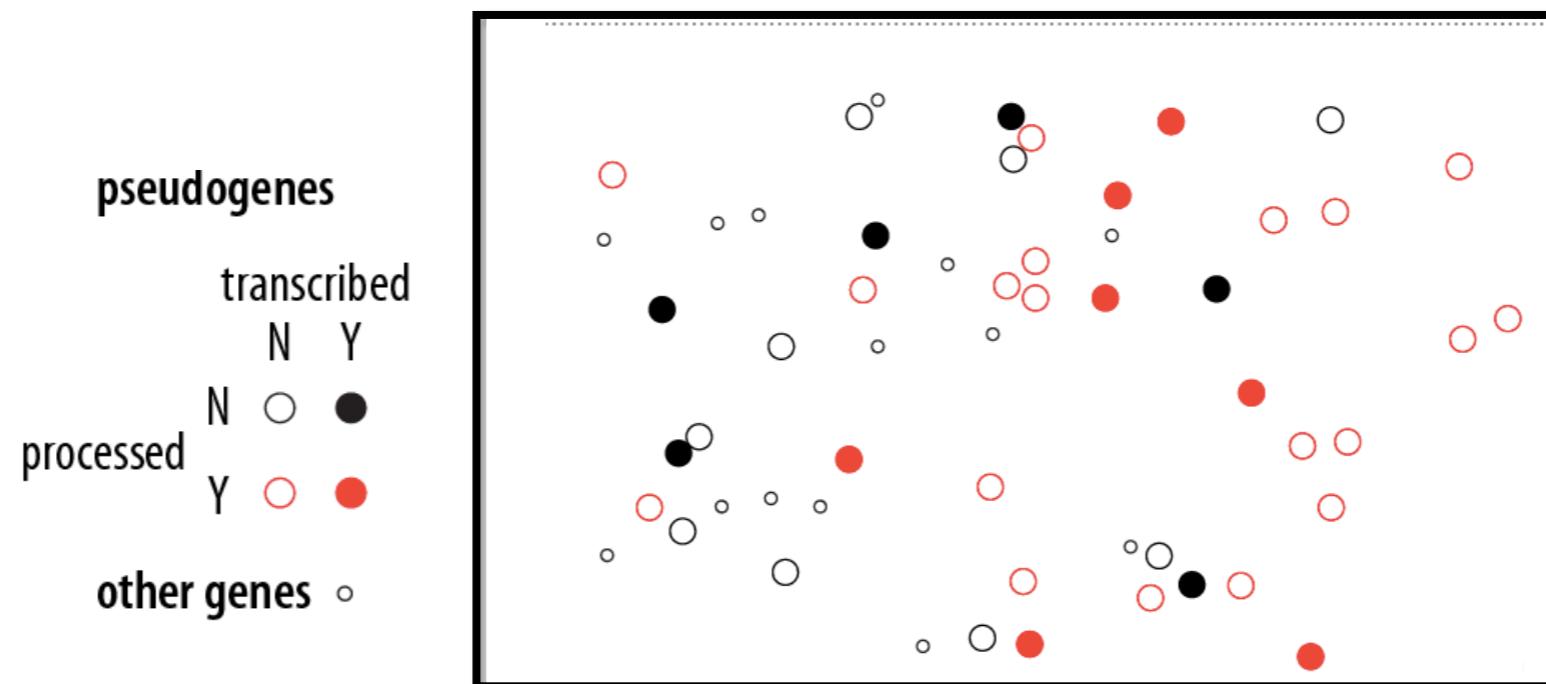
- | | |
|-----|-----|
| □ A | ■ A |
| ■ B | ■ B |
| ■ C | ■ C |
| ■ D | □ D |

M. Krzynski, behind every great visualization is a design principle, 2012

Principle 2: consistency

Visual variation should reflect and enhance the underlying variation in the data

Avoid visually similar encodings for independent variables



Principle 2: consistency

Uniform size and alignment reduces visual complexity and aids interpretation

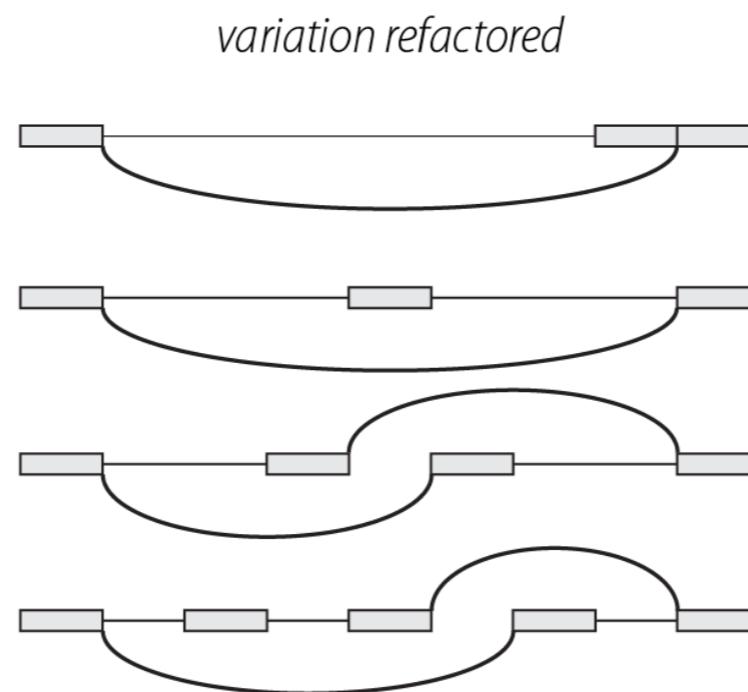


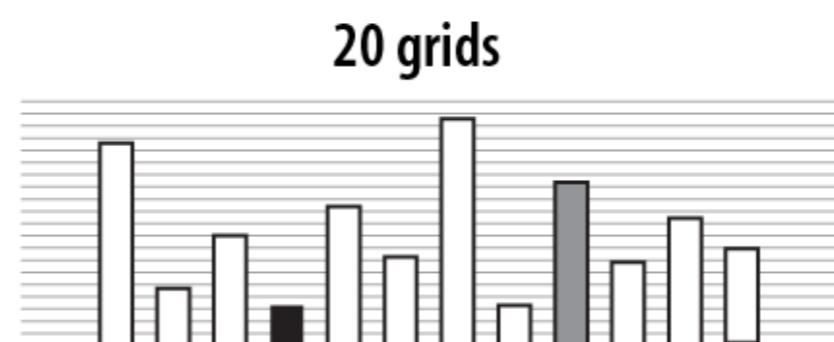
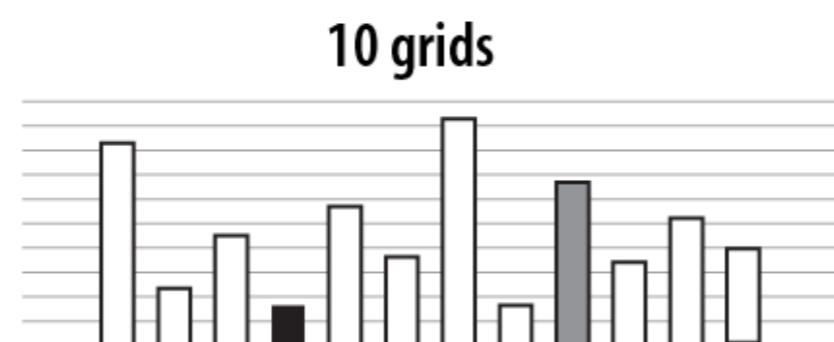
Fig. 1: Sharov AA et al. (2005) Genome-wide assembly and analysis of alternative transcripts in mouse. *Genome Res* 15: 748-754.
Fig. 2: M. Krzwiniski, behind every great visualization is a design principle, 2012

Principle 3: importance ordering

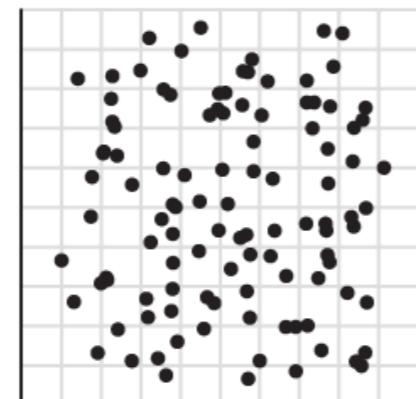
Avoid unnecessary containment and repetition

Navigational aids shouldn't compete with data

Avoid: heavy axes, error bars

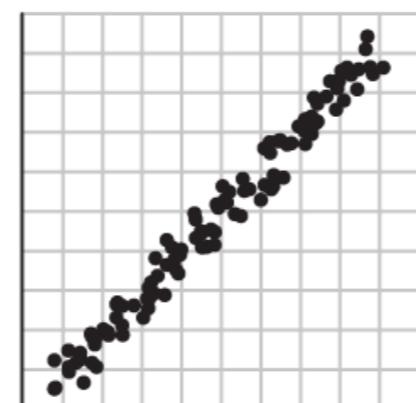


highest useable



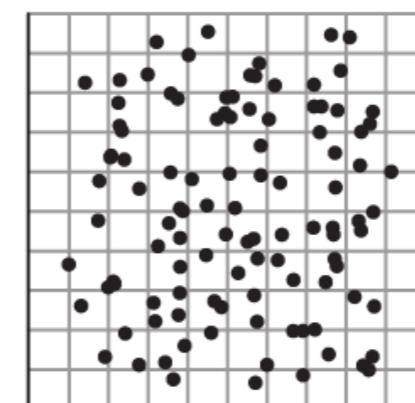
15%

darkest useable



25%

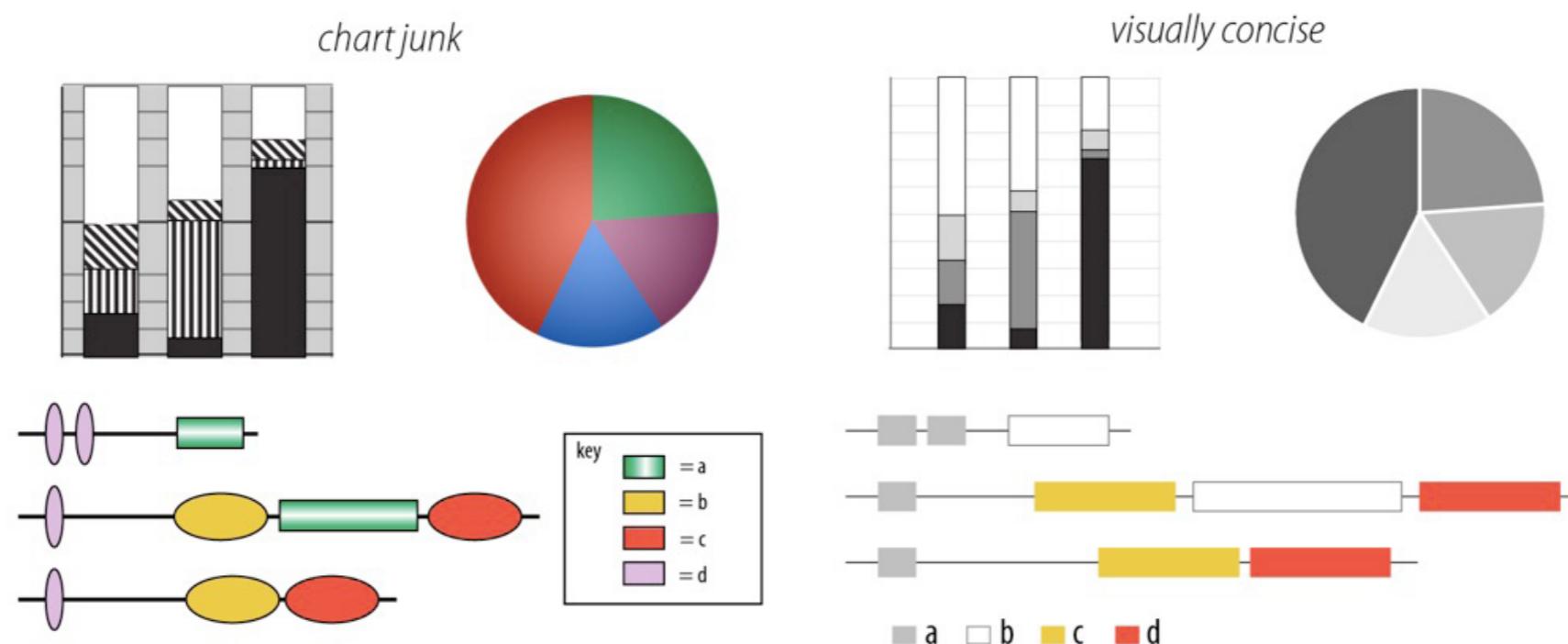
dense



45%

Principle 3: importance ordering

Simplify, simplify, simplify



Sharov AA, et al (2006) Genome Res 16: 505-509.
Peterson J, et al. (2009) Genome Res 19: 2317-2323.
Thomson NR, et al. (2005) Genome Res 15: 629-640.
DB, Ko MS (2005) Genome Res 15: 748-754.

M. Krzynski, behind every great visualization is a design principle, 2012

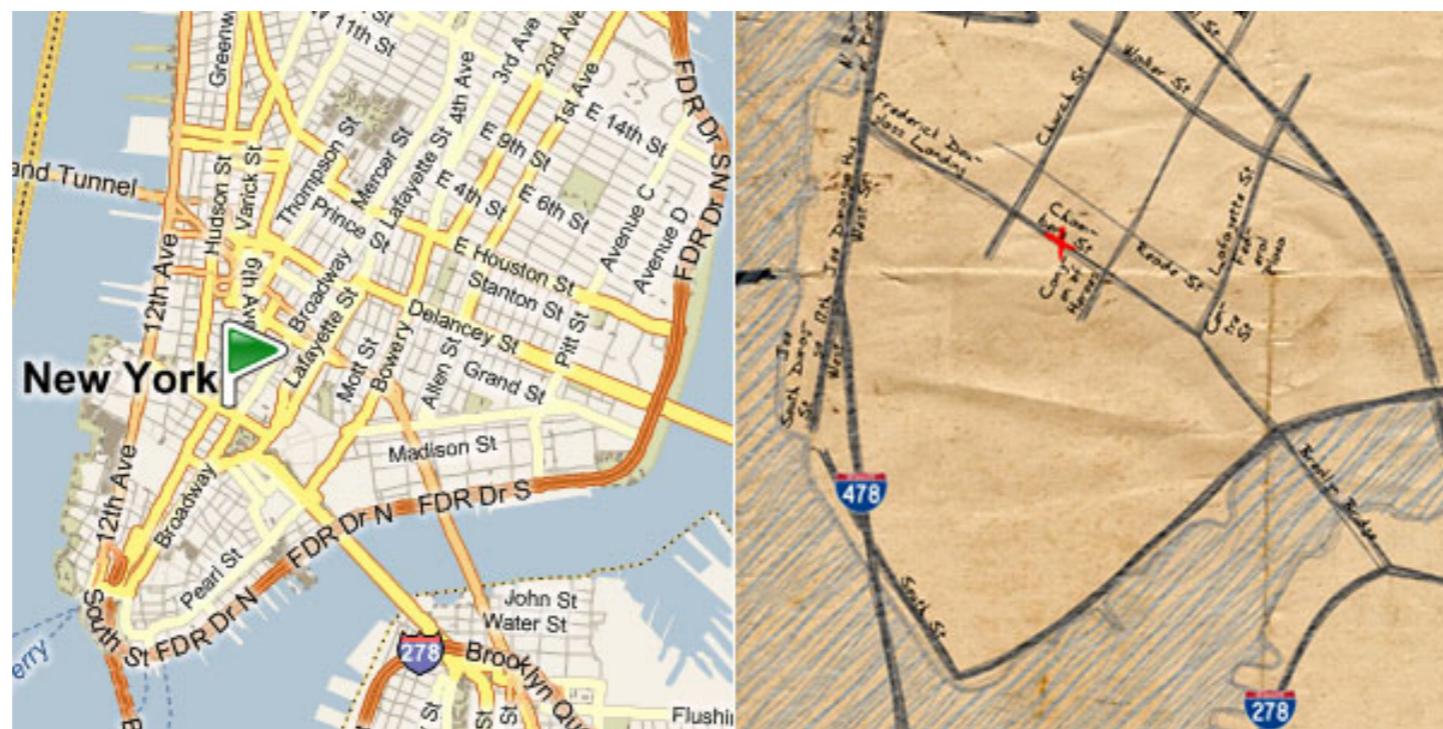
Tufte and the data-ink ratio

data-ink ratio = data ink / total ink used to print the graphic

= proportion of a graphic's ink devoted to the non-redundant display of data-information

= 1 - proportion of a graphic that can be erased

Familiar example: maps



Mini “lab”: What’s wrong with this picture?

During this lab, we will critique some professionally-made visualizations using these principles

Try to think about the following questions:

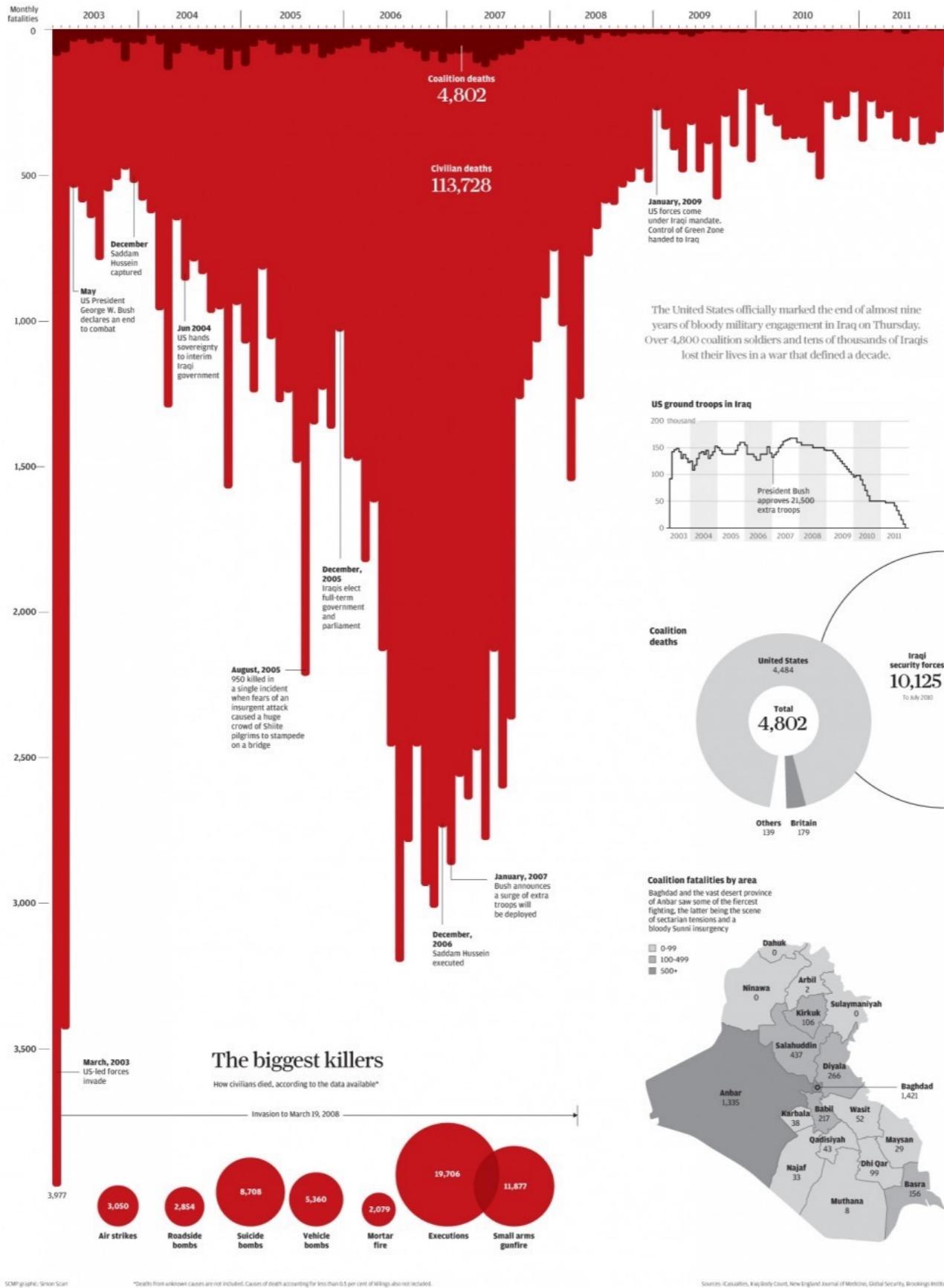
- What is the first thing you notice about the visualization?
- What is the point the visualization is trying to make?
- Who is the intended audience?
- What is the visualization doing well?
- What problems do you see with the visualization design?
- Why do you think the designer made those choices?

Pick one of the visualizations I've selected, or
go to

<https://www.informationisbeautifulawards.com/>

and find an example you like

Iraq's bloody toll

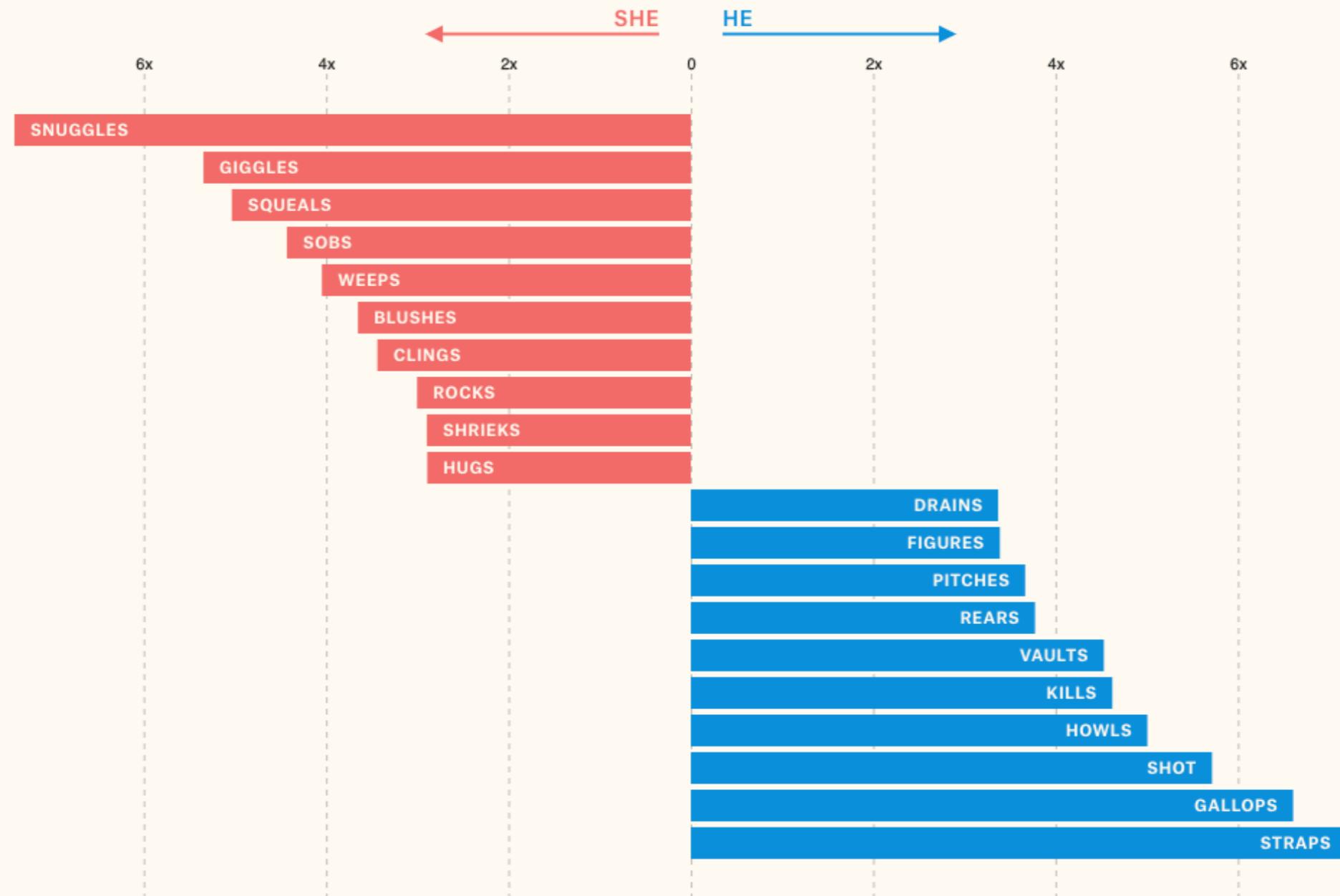


<http://www.scmp.com/infographics/article/1284683/iraqs-bloody-toll>

<http://www.visualisingdata.com/2014/04/the-fine-line-between-confusion-and-deception/>

The most used words for women vs. men

Likelihood that certain words appear after “she” vs. “he” in screen direction.



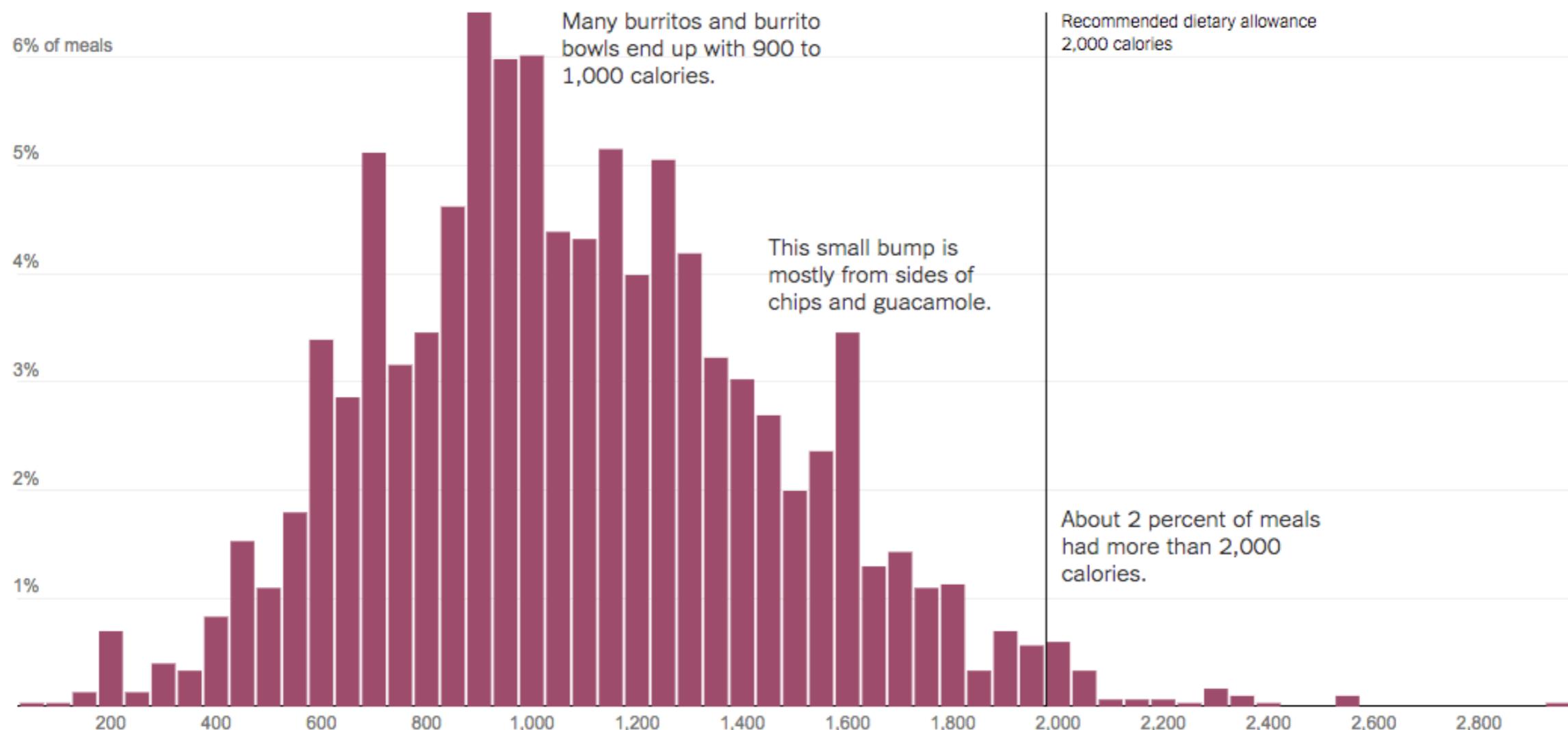
These are the most extreme examples. There is a high likelihood that women will snuggle, giggle, squeal, and sob, relative to men. Conversely, men are more likely to strap, gallop, shoot, howl, and kill.

Let's now examine the 800 most commonly used pronoun pairs in screen direction.

At Chipotle, How Many Calories Do People Really Eat?

By KEVIN QUEALY, AMANDA COX and JOSH KATZ FEB. 17, 2015

Most meals have more than 1,000 calories and almost a full day's worth of sodium. [RELATED ARTICLE](#)



Dissecting a Trailer: The Parts of the Film That Make the Cut

How scenes from five of the nine best picture nominees were reassembled to promote the films.

Silver Linings Playbook

“Silver Linings Playbook” follows the standard model for trailers, according to Bill Woolery, a trailer specialist in Los Angeles who once worked on trailers for movies like “The Usual Suspects” and “E.T. the Extra-Terrestrial.” While introducing the movie’s story and its characters, the trailer largely follows the order of the film itself.



NameVoyager: Explore baby names and name trends letter by letter

Looking for the perfect baby name? [Sign up for free](#) to receive access to our expert tools!

Baby Name > Am

Both Boys Girls

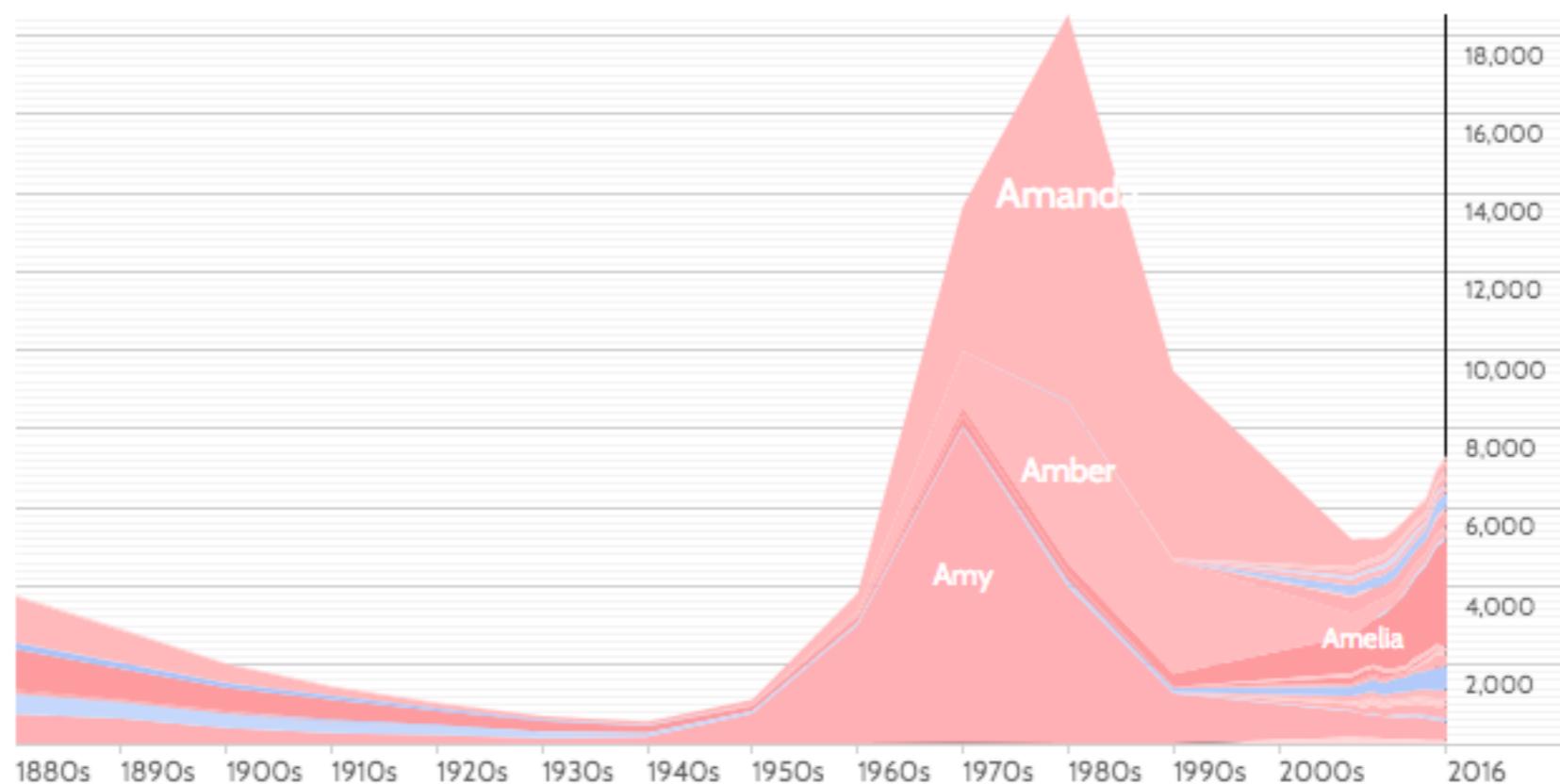
boys 1000 500 100 25 1

girls 1000 500 100 25 1

Current rank:

per million births

Names starting with 'AM' per million babies



Click a name graph to view that name. Double-click to read more about it.

[enlarge](#)

Question to ponder: should visualizations be immediately readable, or should you need to study them?