

Today

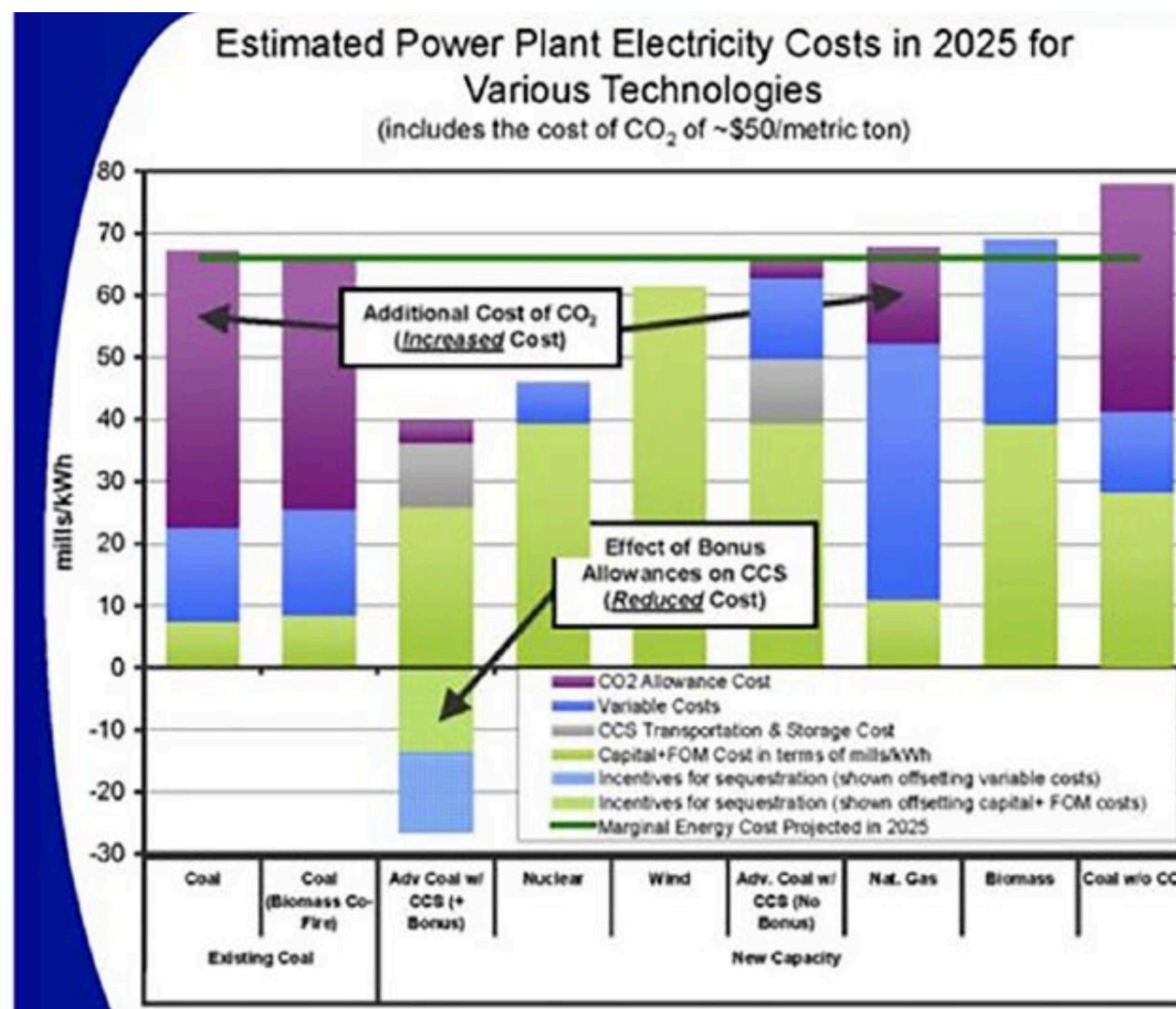
1. Graphics lecture and tutorial
2. Break
3. Breakout groups
 - a. Work on R Markdown homework
 - b. Final project questions

PSYC 259: Principles of Data Science

Week 9: Graphics for communication

What makes visualizations
effective?

What makes this graph so bad?



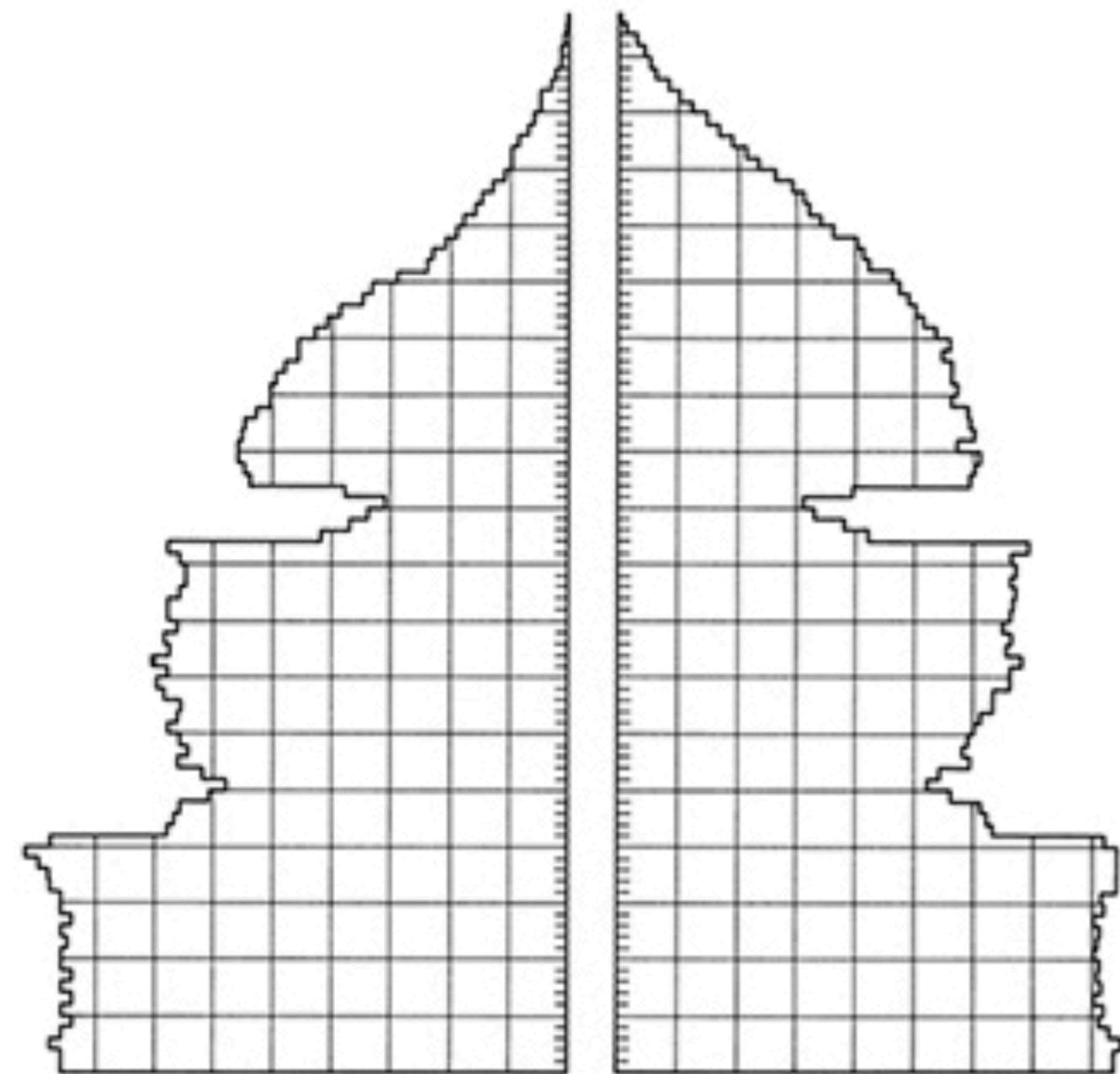
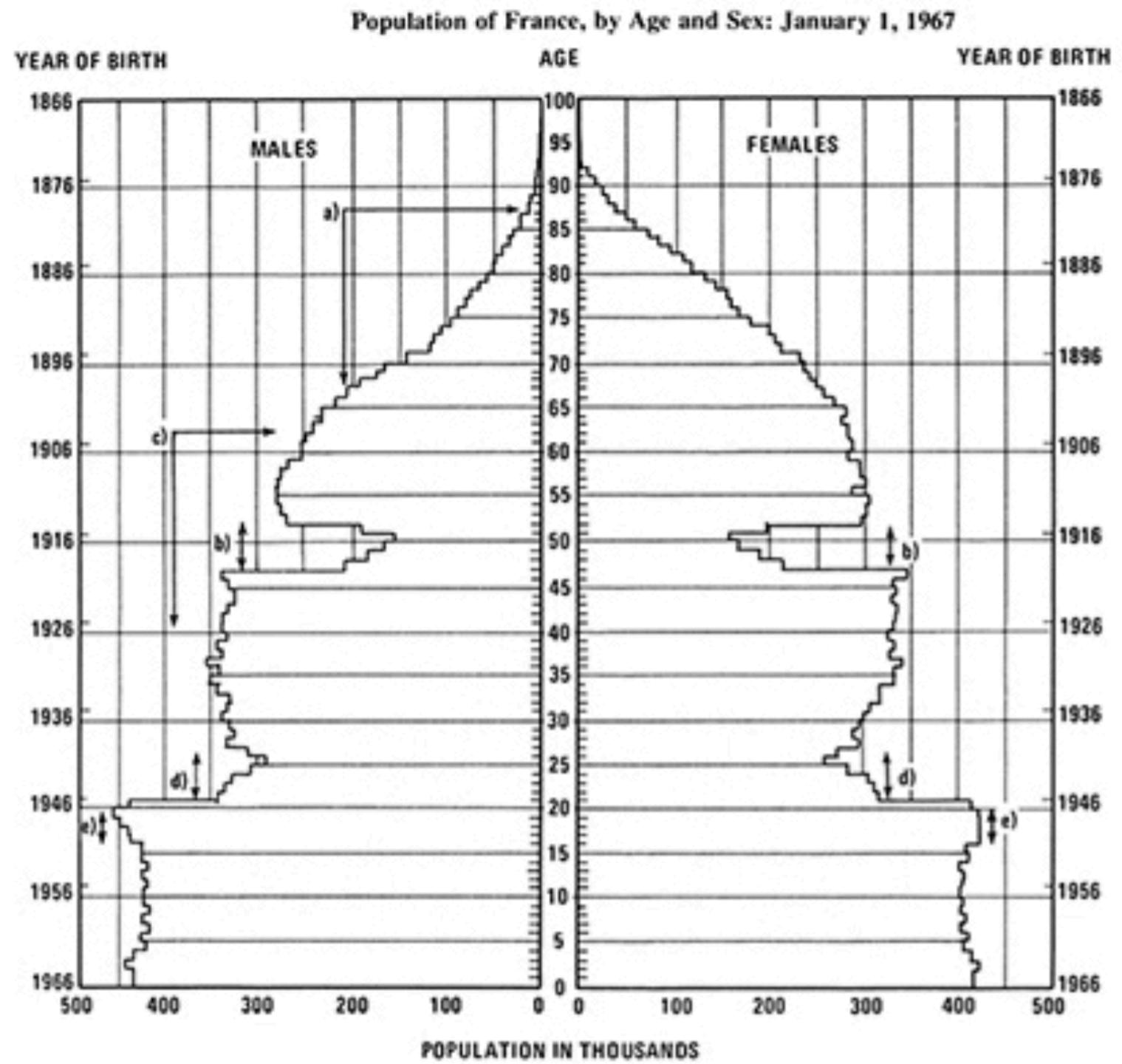
Effective visualizations...

- Emphasize the right information
- Don't make the reader work
- Don't mislead or distort
- Use consistent style
- Follow conventions
- Look nice

Emphasize the right information

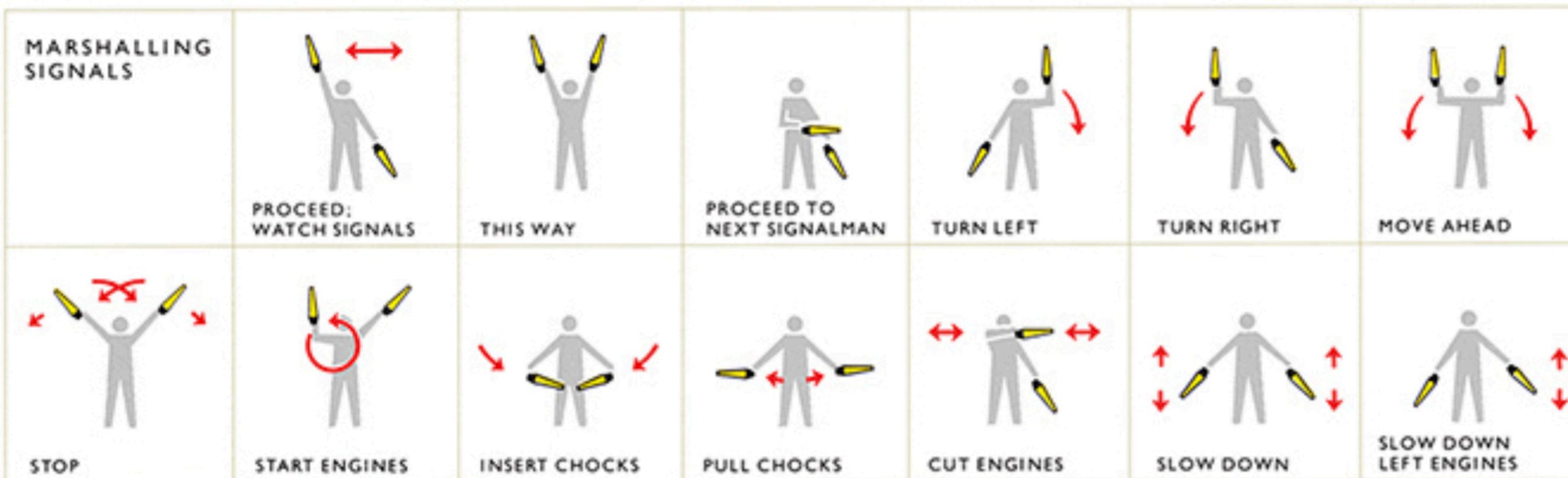
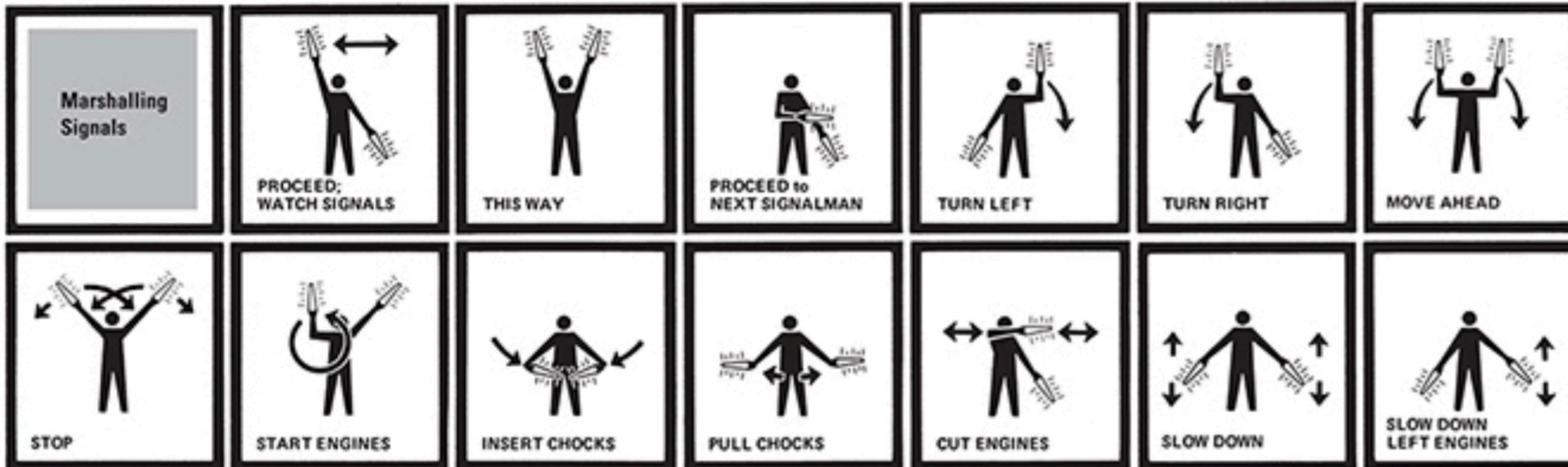
THE interior decoration of graphics generates a lot of ink that does not tell the viewer anything new. The purpose of decoration varies—to make the graphic appear more scientific and precise, to enliven the display, to give the designer an opportunity to exercise artistic skills. Regardless of its cause, it is all non-data-ink or redundant data-ink, and it is often chartjunk. Graphical decoration, which prospers in technical publications as well as in commercial and media graphics, comes cheaper than the hard work required to produce intriguing numbers and secure evidence.

Emphasize the right information

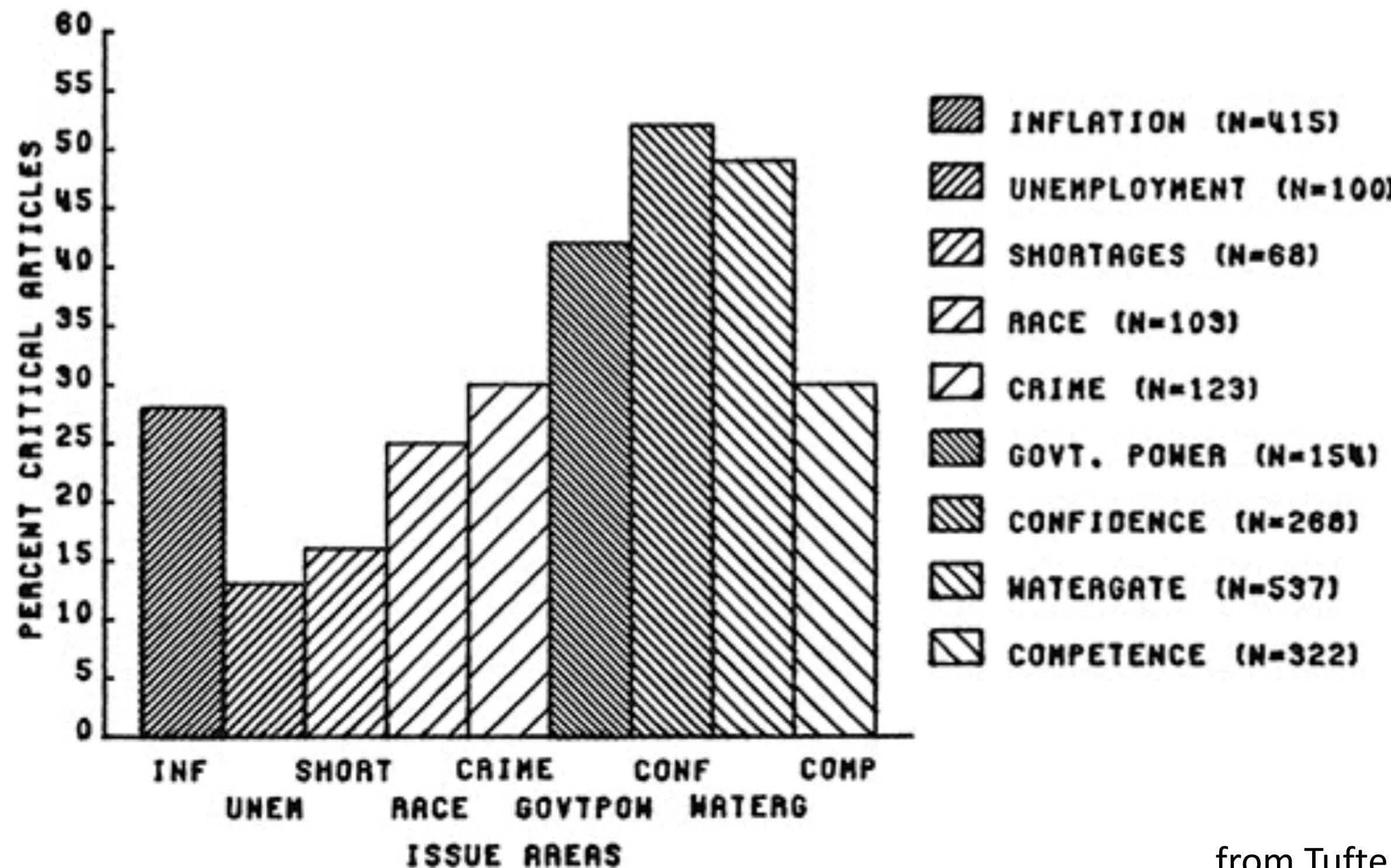


from Tufte Chartjunk website

Emphasize the right information

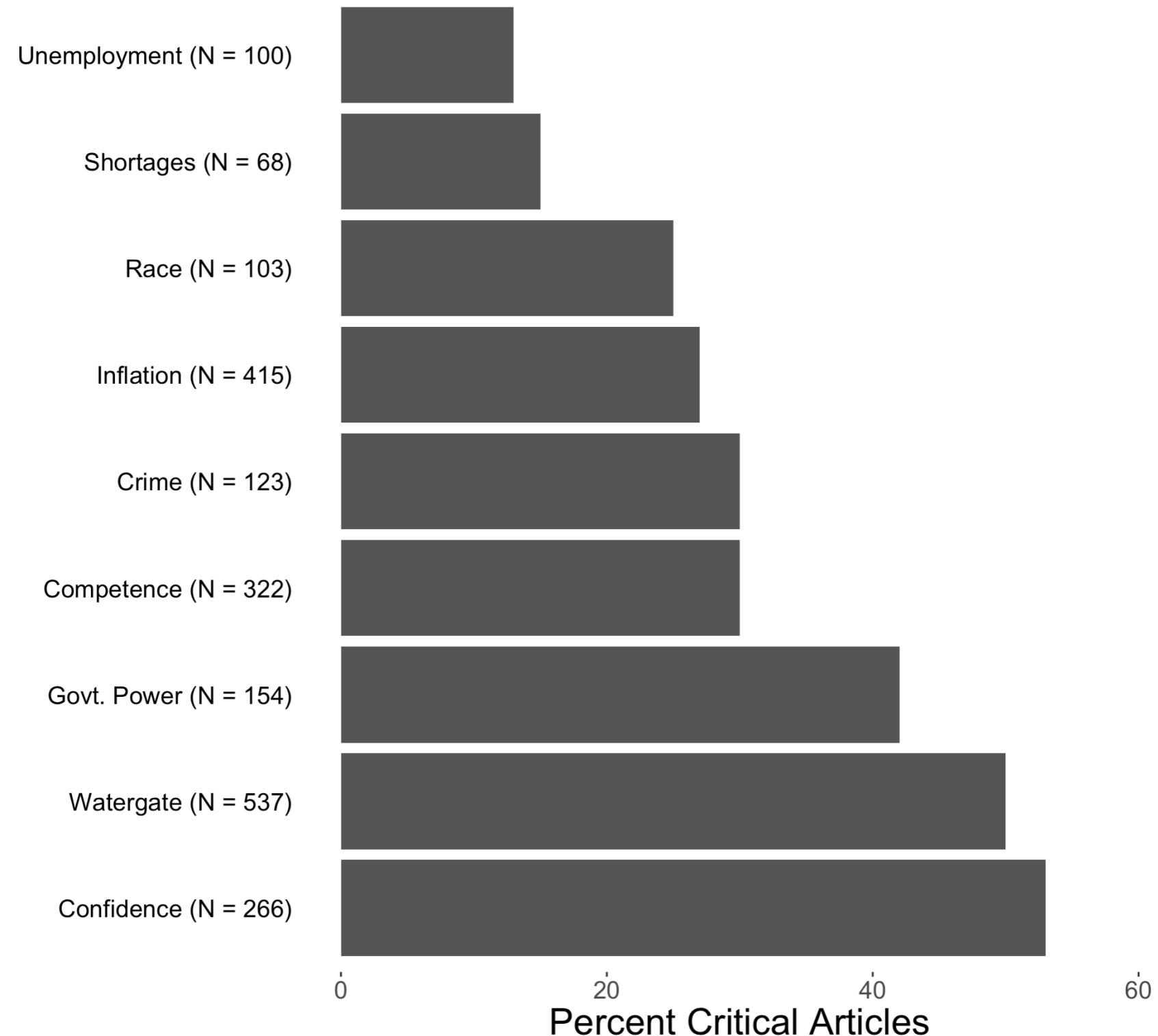
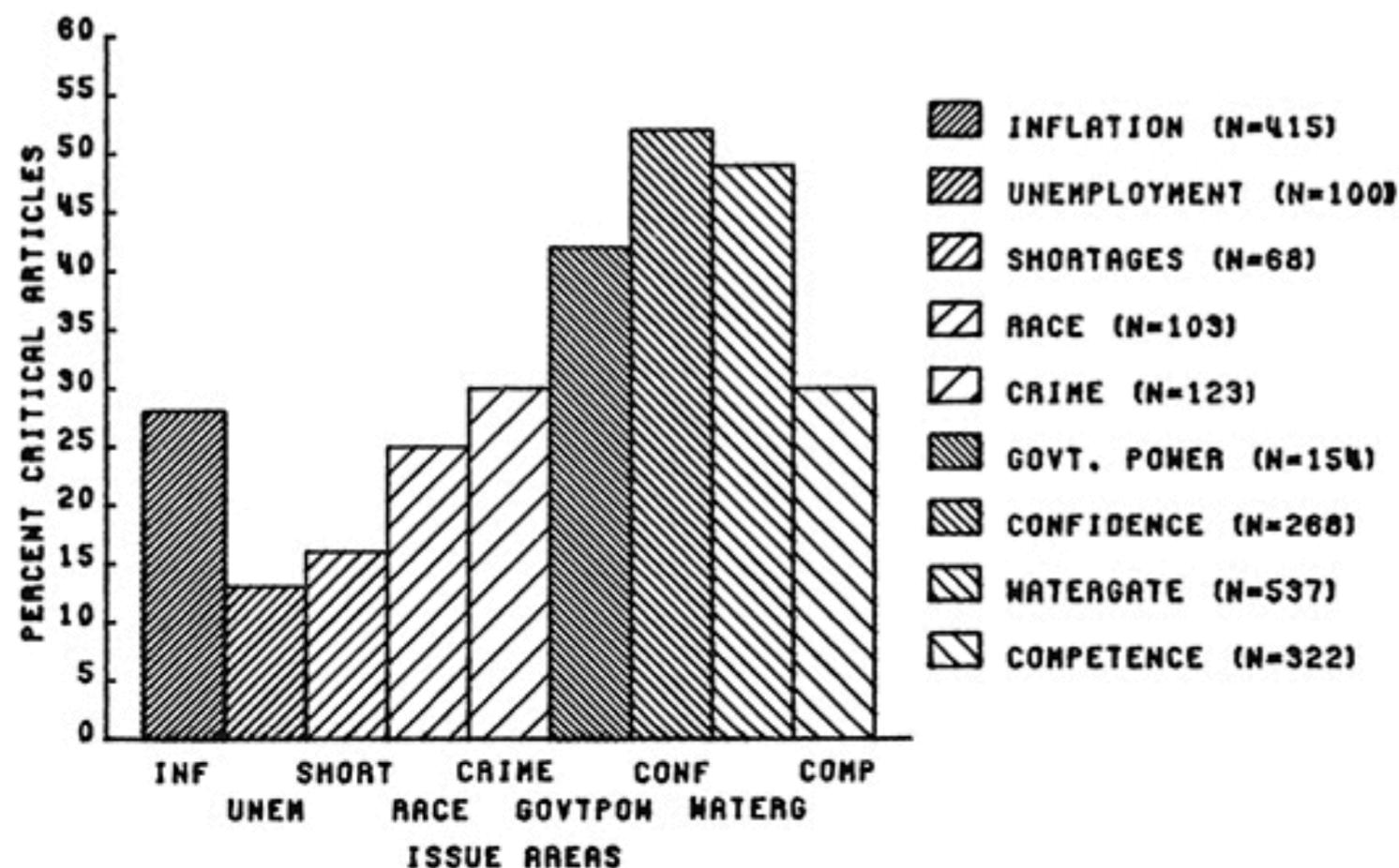


Emphasize the right information (pattern distracts from length)

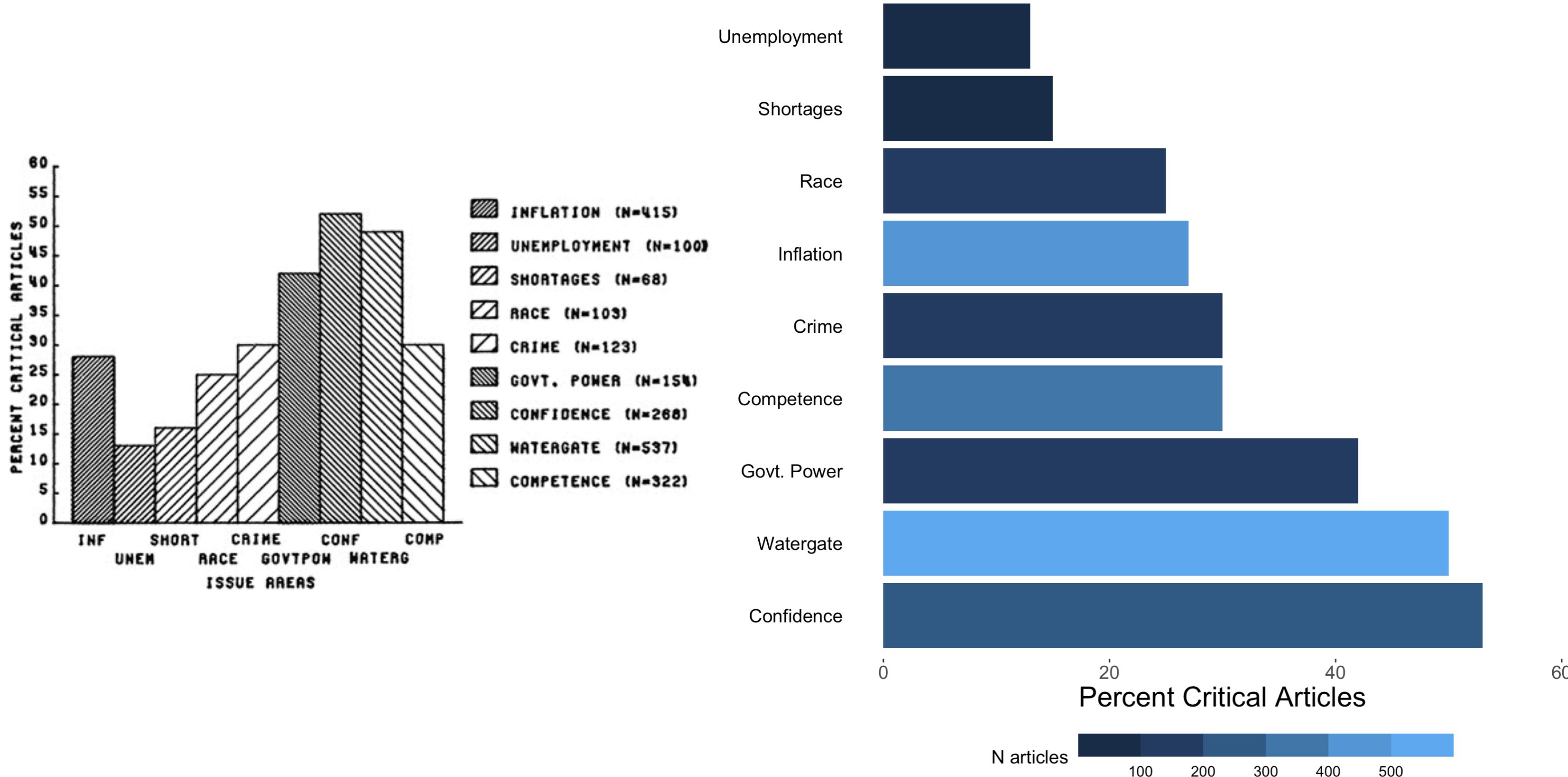


from Tufte Chartjunk website

Emphasize the right information



Emphasize the right information



Don't make the reader work

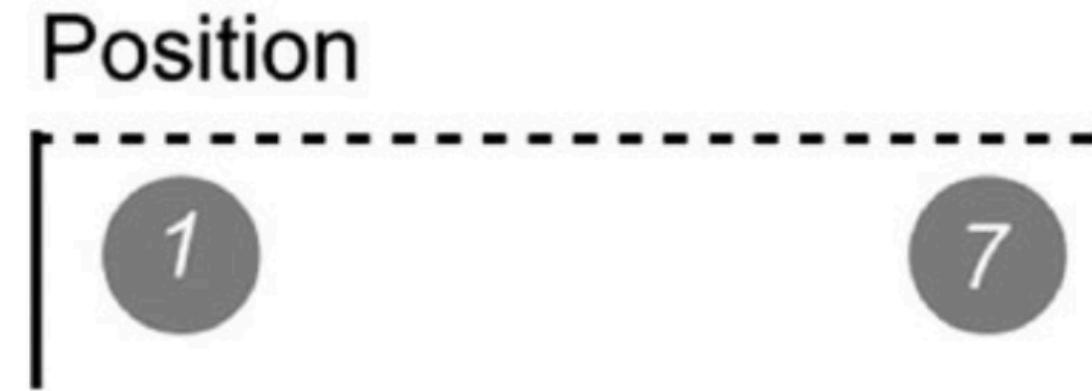
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64	87	61	18	40	64	88	15
17	31	78	41	56	87	42	33
63	37	59	15	11	55	30	63
55	48	49	22	22	56	66	61
48	21	79	34	45	84	57	50
21	94	54	12	28	20	94	19
80	37	50	64	54	31	38	74

72	50	64	18	23	47	48	67
64	87	61	18	40	64	88	15
17	31	78	41	56	87	42	33
63	37	59	15	11	55	30	63
55	48	49	22	22	56	66	61
48	21	79	34	45	84	57	50
21	94	54	12	28	20	94	19
80	37	50	64	54	31	38	74

from Zacks & Franconeri (2020)

Don't make the reader work

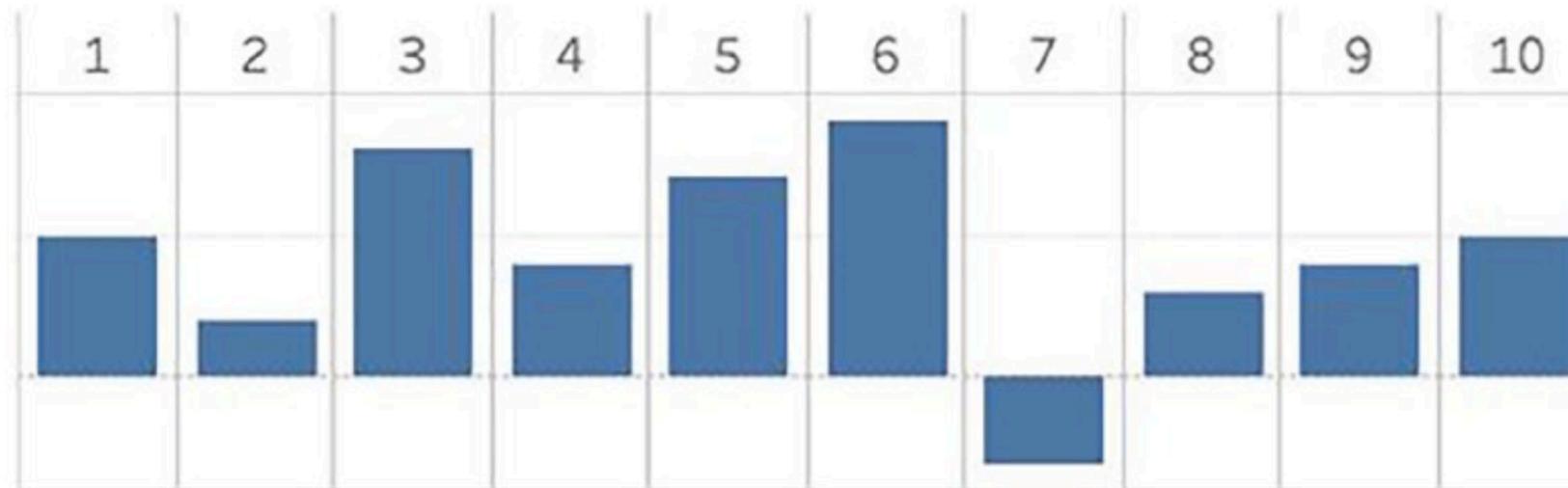
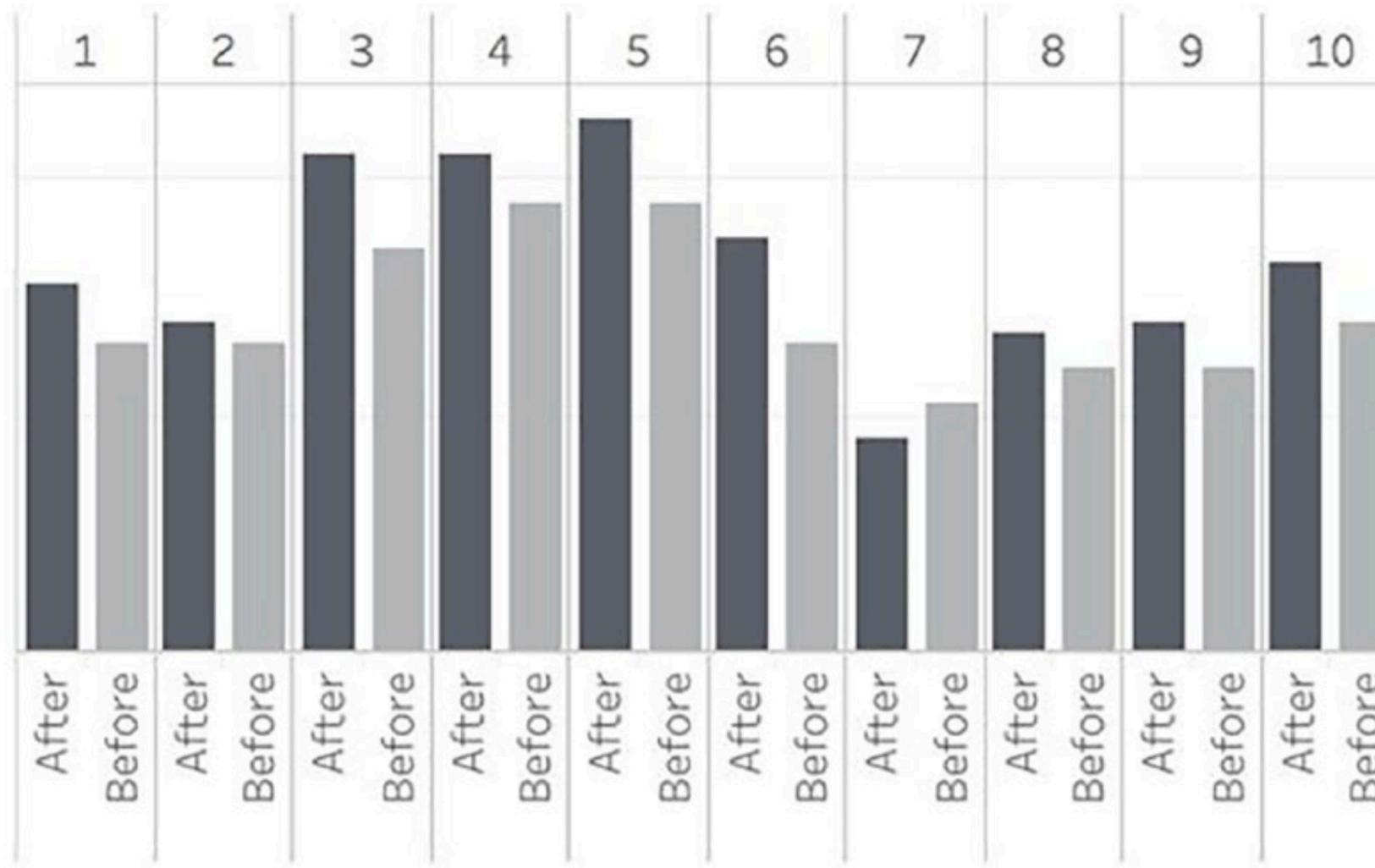
Use the right visual features!



Intensity

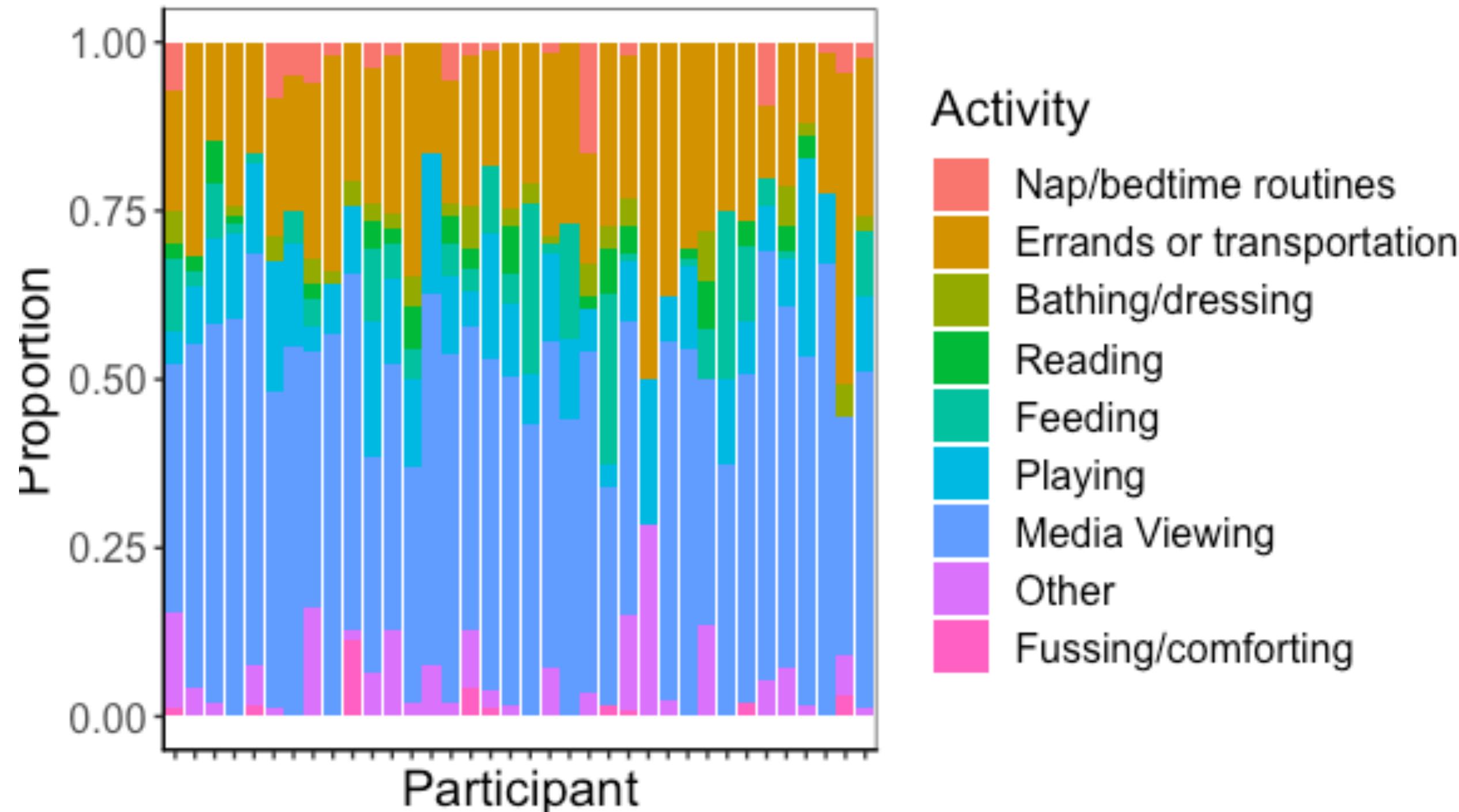


Don't make the reader work

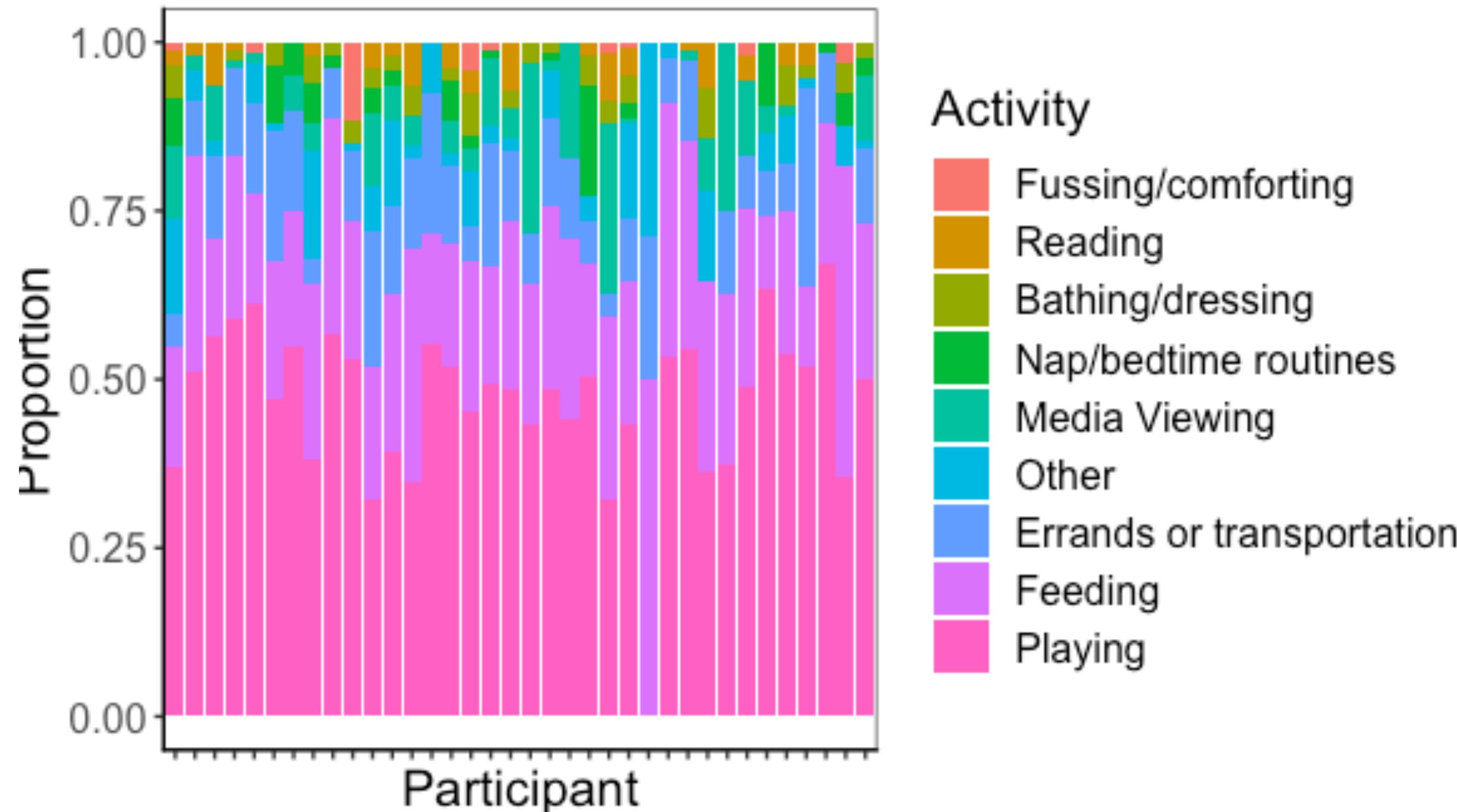


from Zacks & Franconeri (2020)

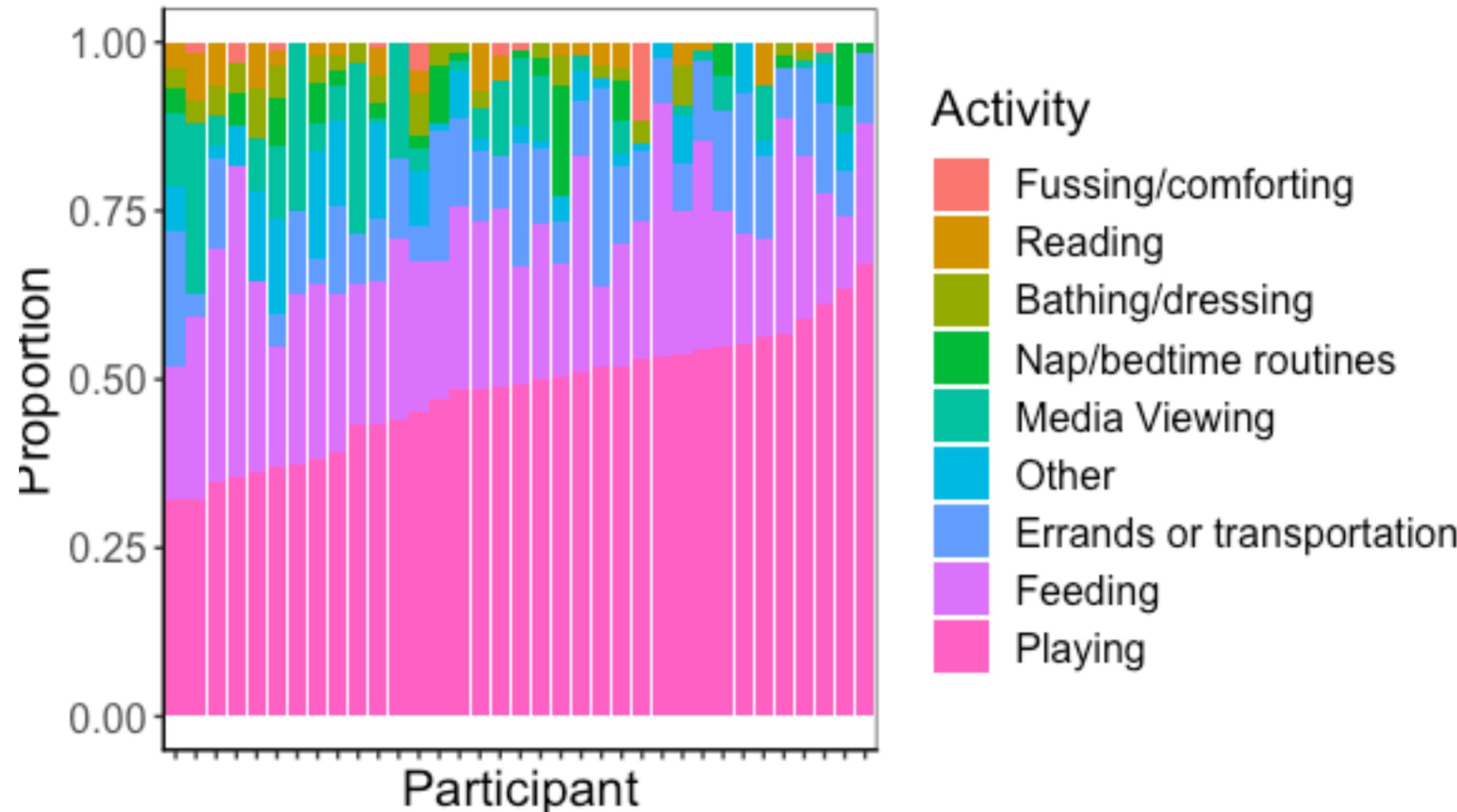
Don't make the reader work



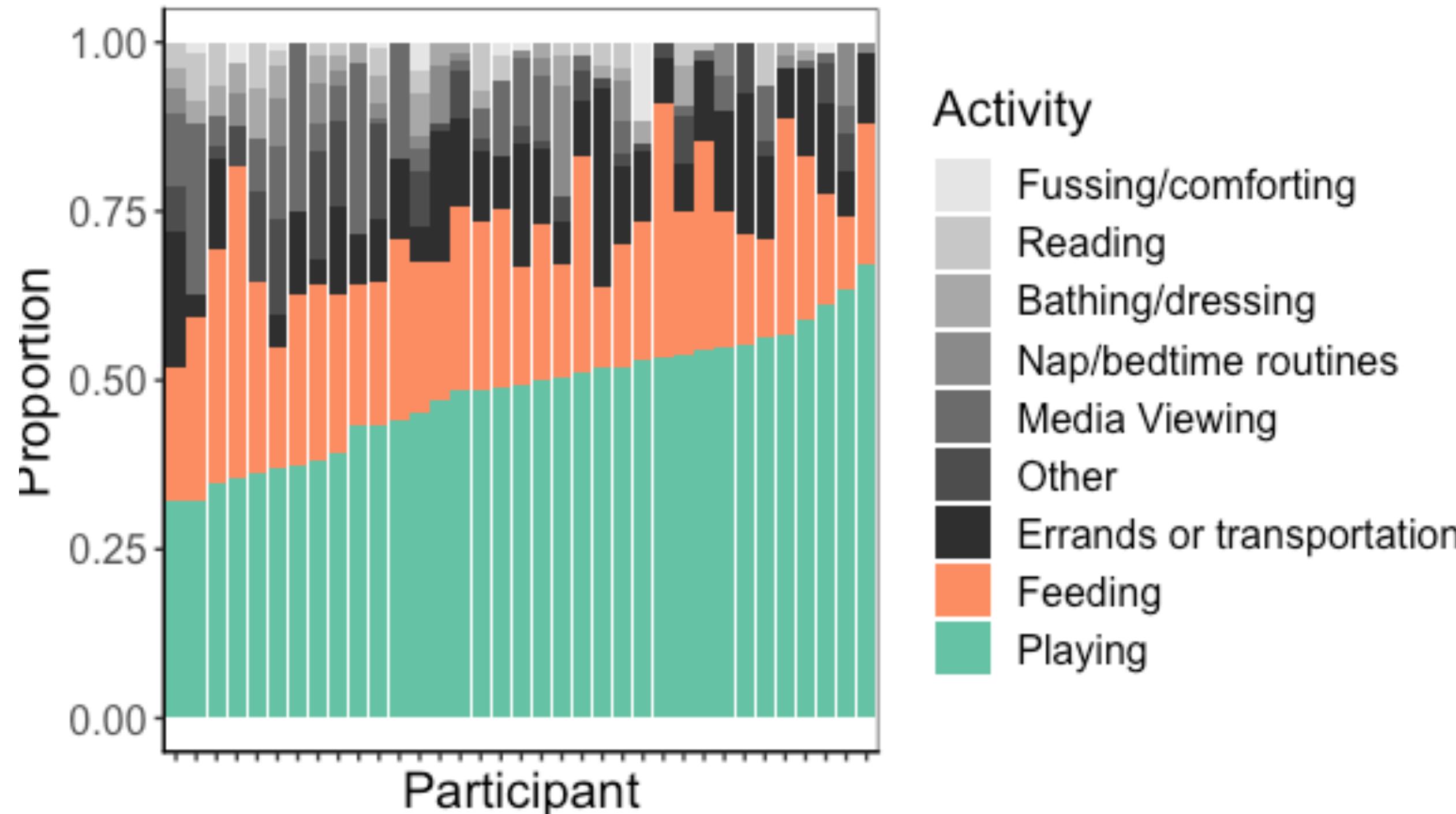
Don't make the reader work



Don't make the reader work



Don't make the reader work



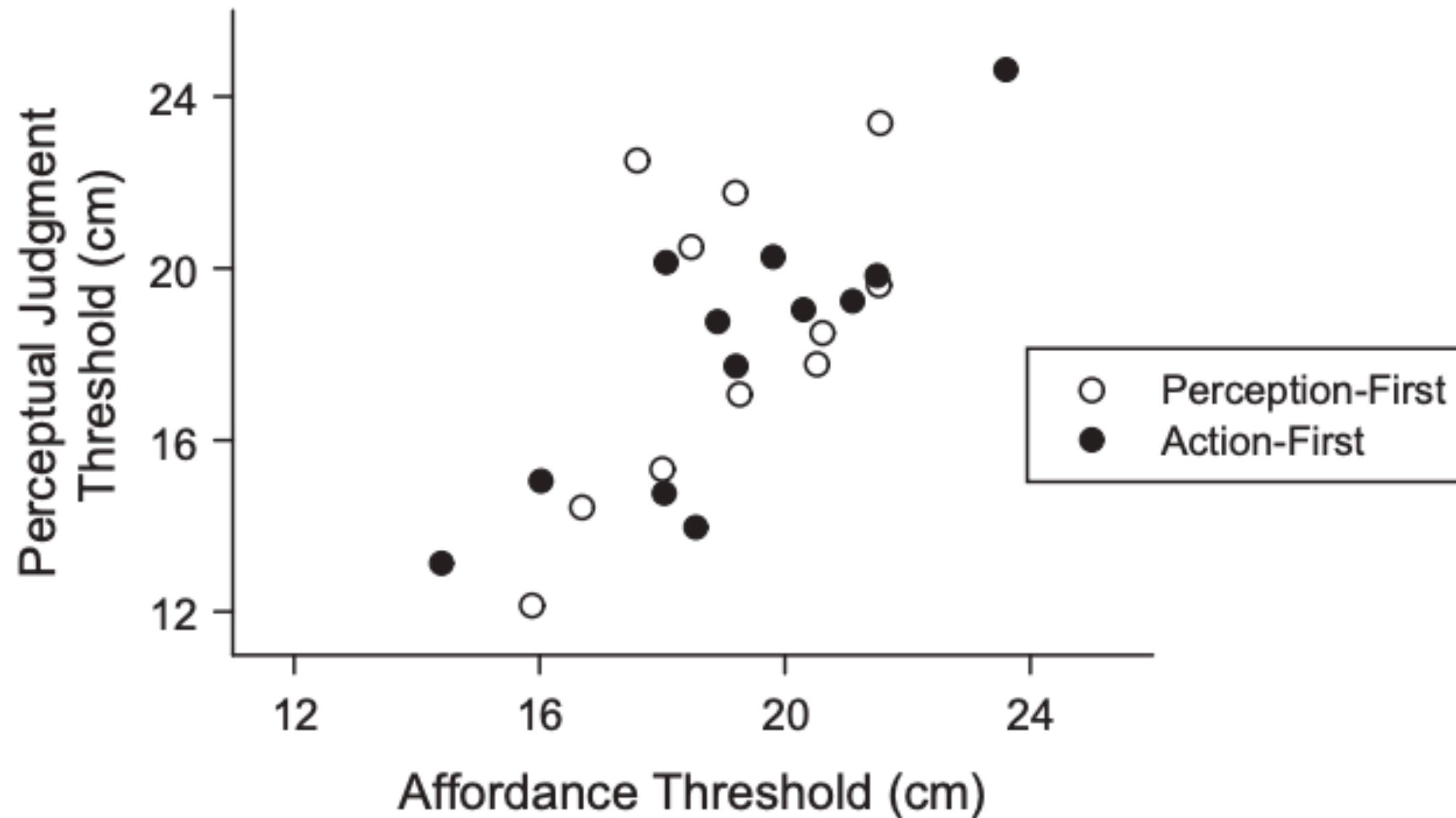
data ink > non-data ink!

**use color and contrast to draw the eye
to important comparisons**

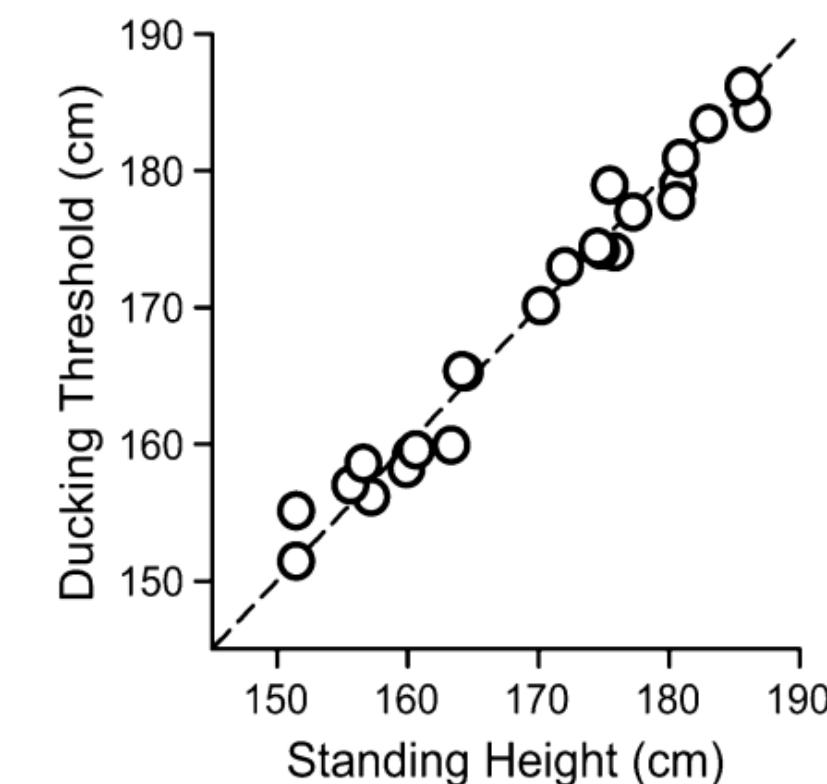
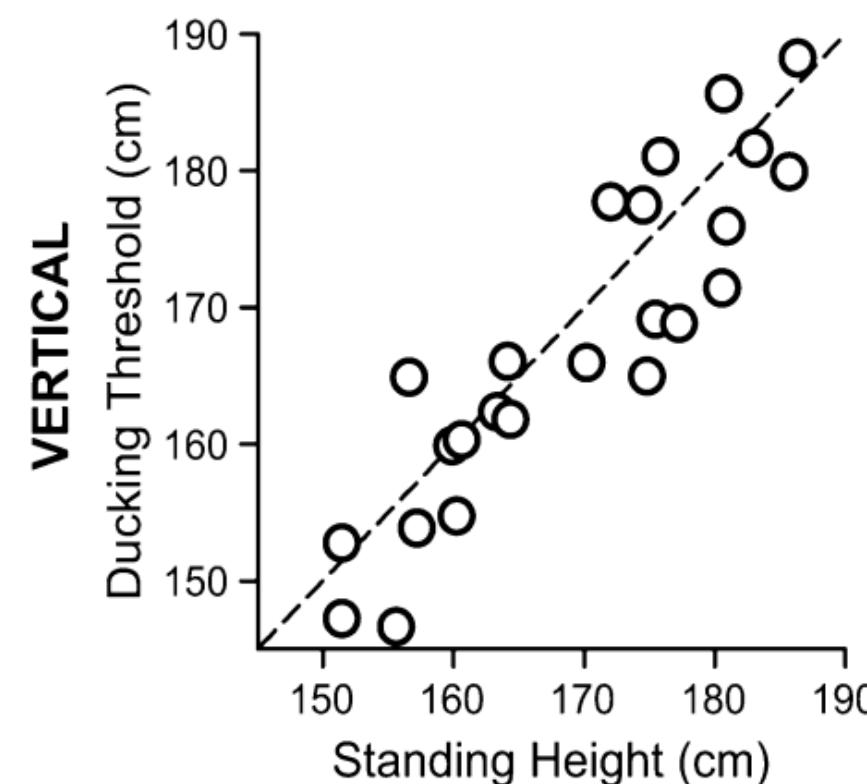
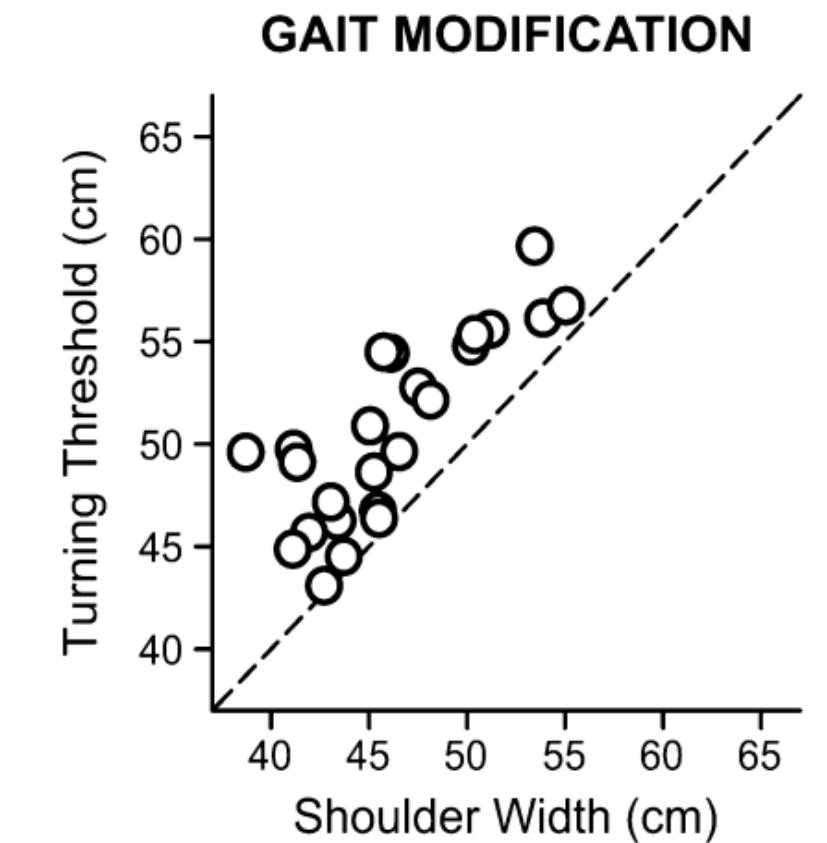
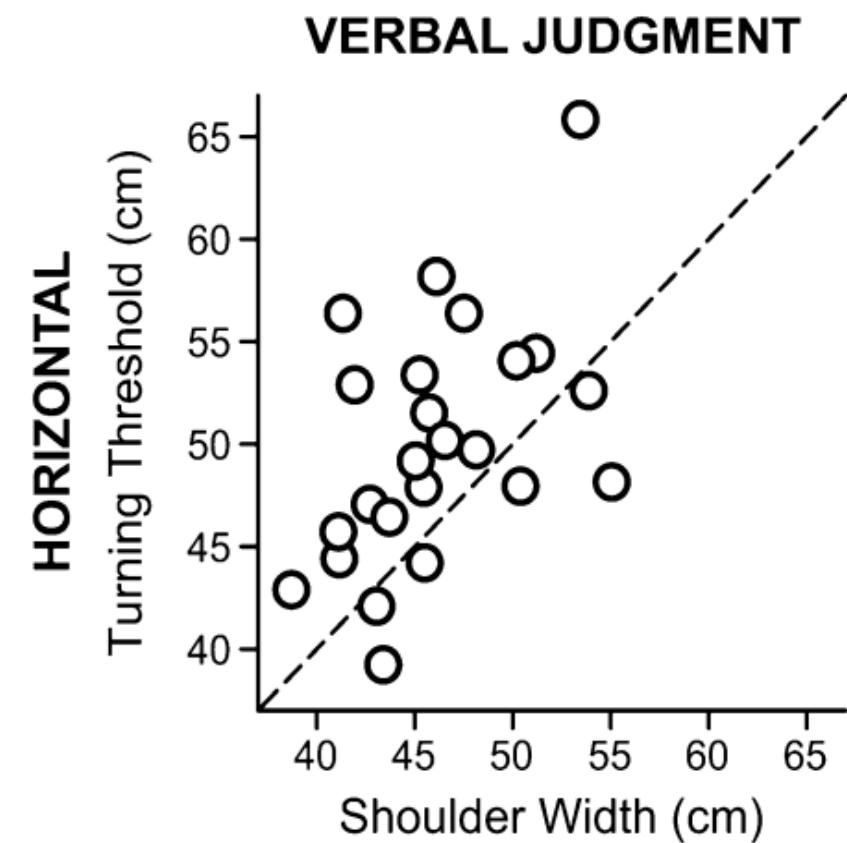
group/sort data to facilitate comparison

Remove
to improve
(the **data-ink** ratio)

Don't mislead or distort
(ugh...this one is mine)

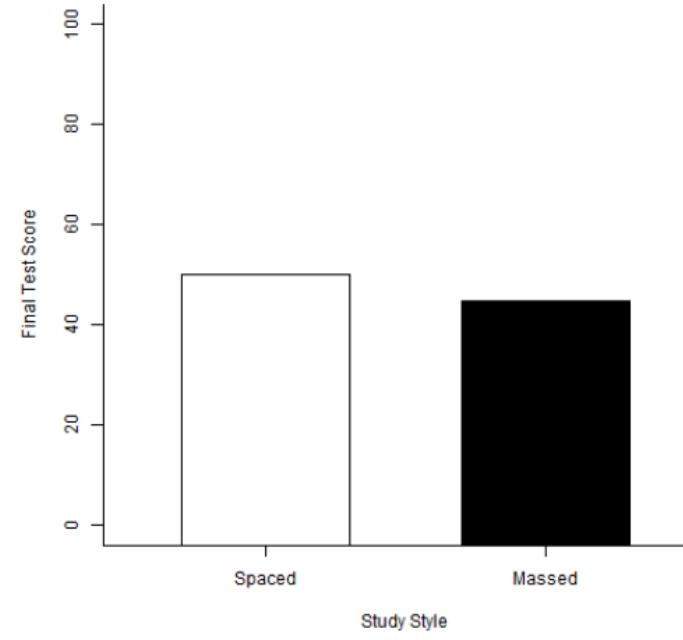


Don't mislead or distort (aspect ratio)

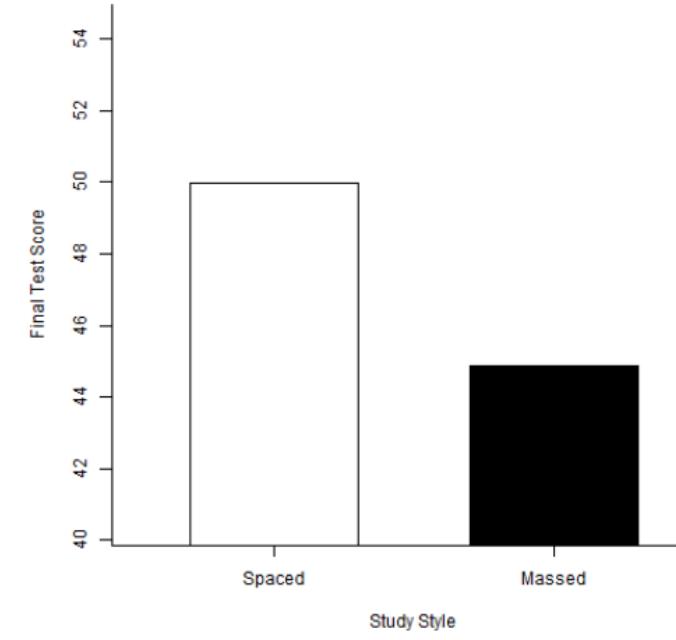


Don't mislead or distort (ranges)

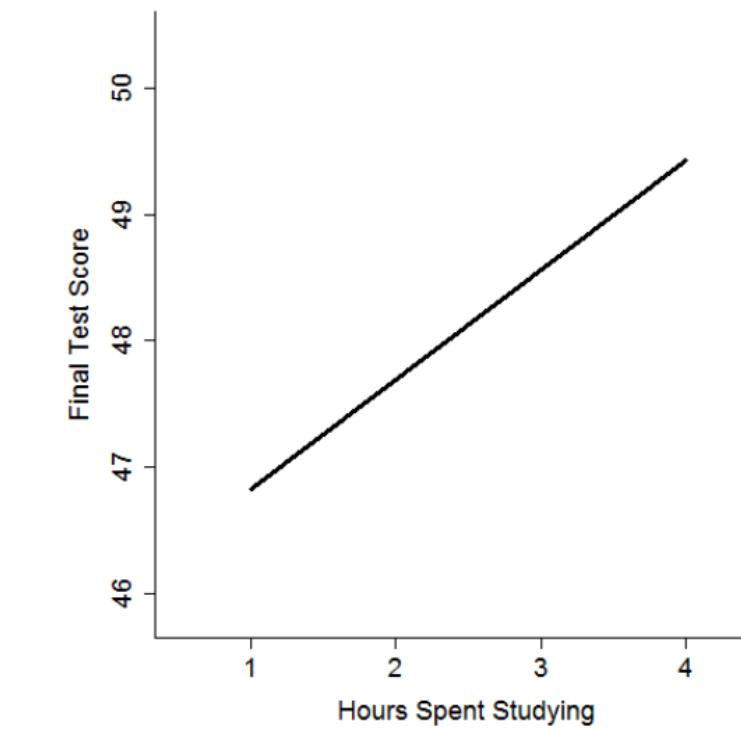
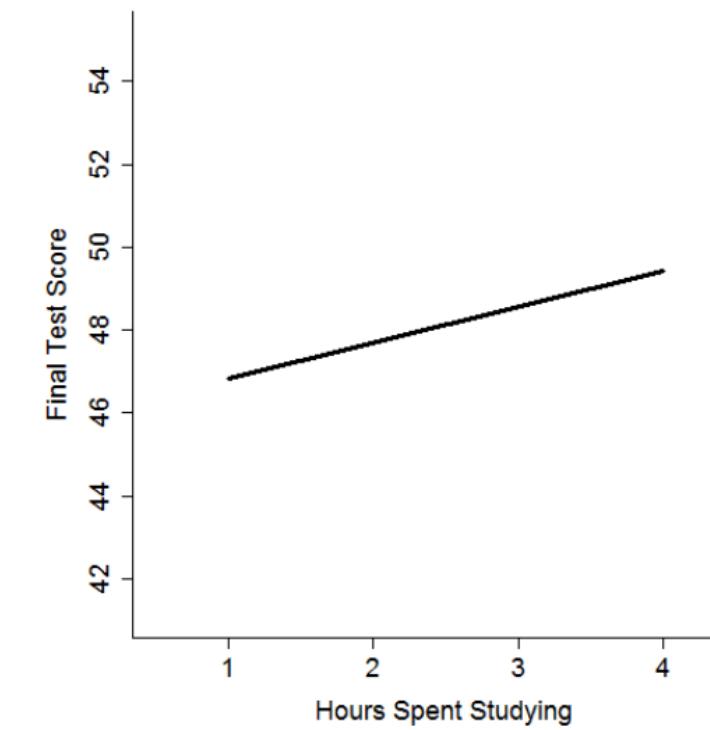
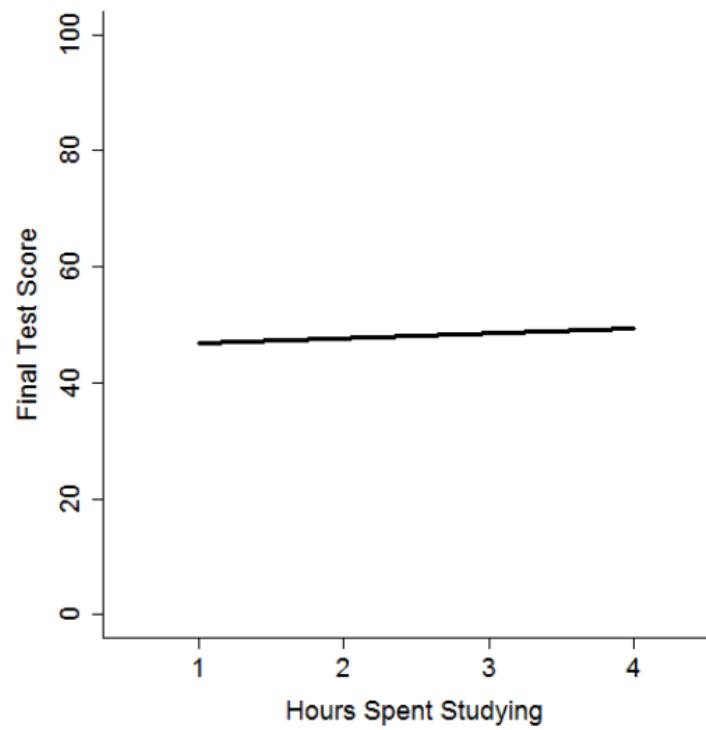
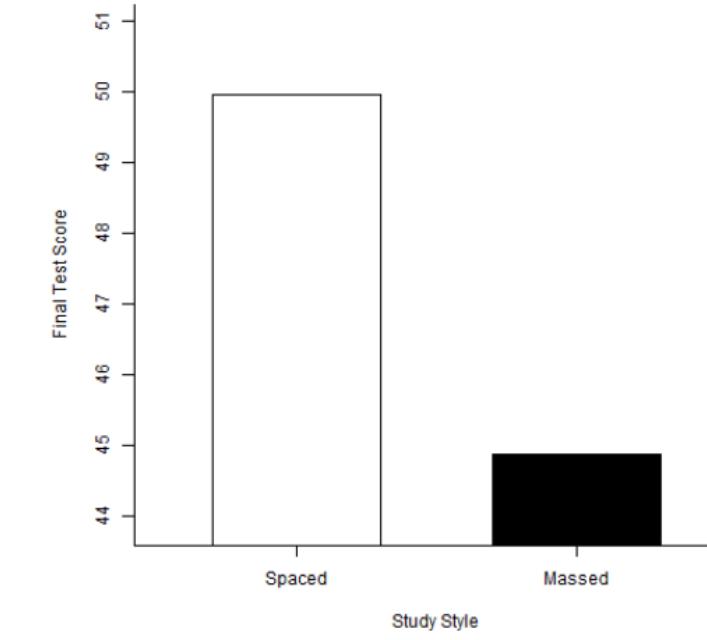
Full



Standardized



Minimal



Use consistent style (ugh...also me)

traversing through the doorway and infants did not vary greatly in size. Body mass index, a measure of body proportion that takes both height and weight into account, correlated with threshold opening width in the entrapment condition, $r(13) = .66, p = .008$, but not in the falling condition, $r(12) = -.04, p = .99$. Presumably, thresholds in the falling condition depended more on walking skill than on body dimensions. Indeed, three infants managed to navigate openings less than 10 cm in width by holding onto the moving wall with their hands to keep balance. Infants with earlier walking onsets tended to navigate smaller openings; however, the correla-

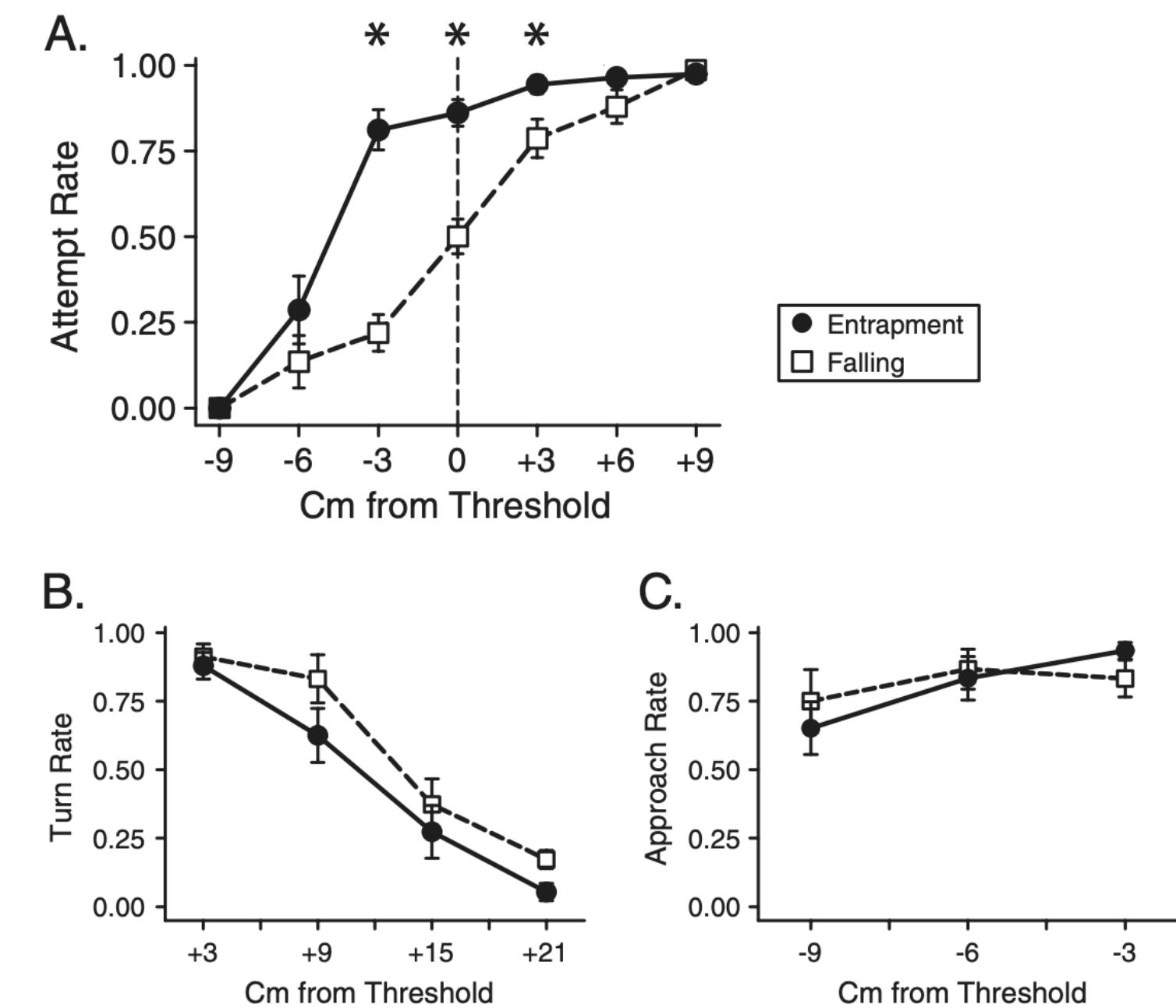
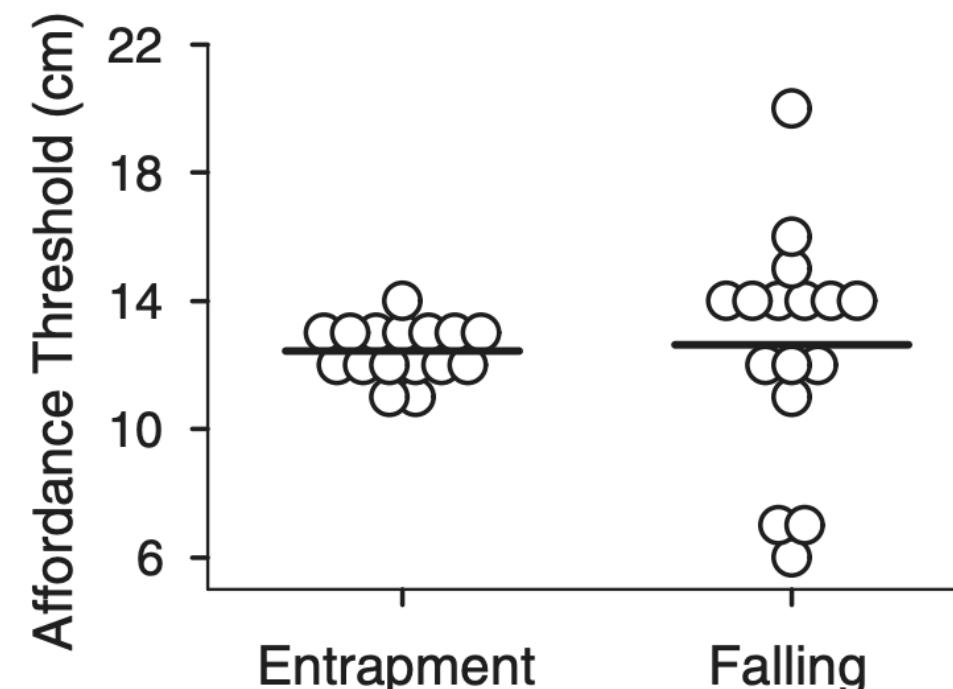
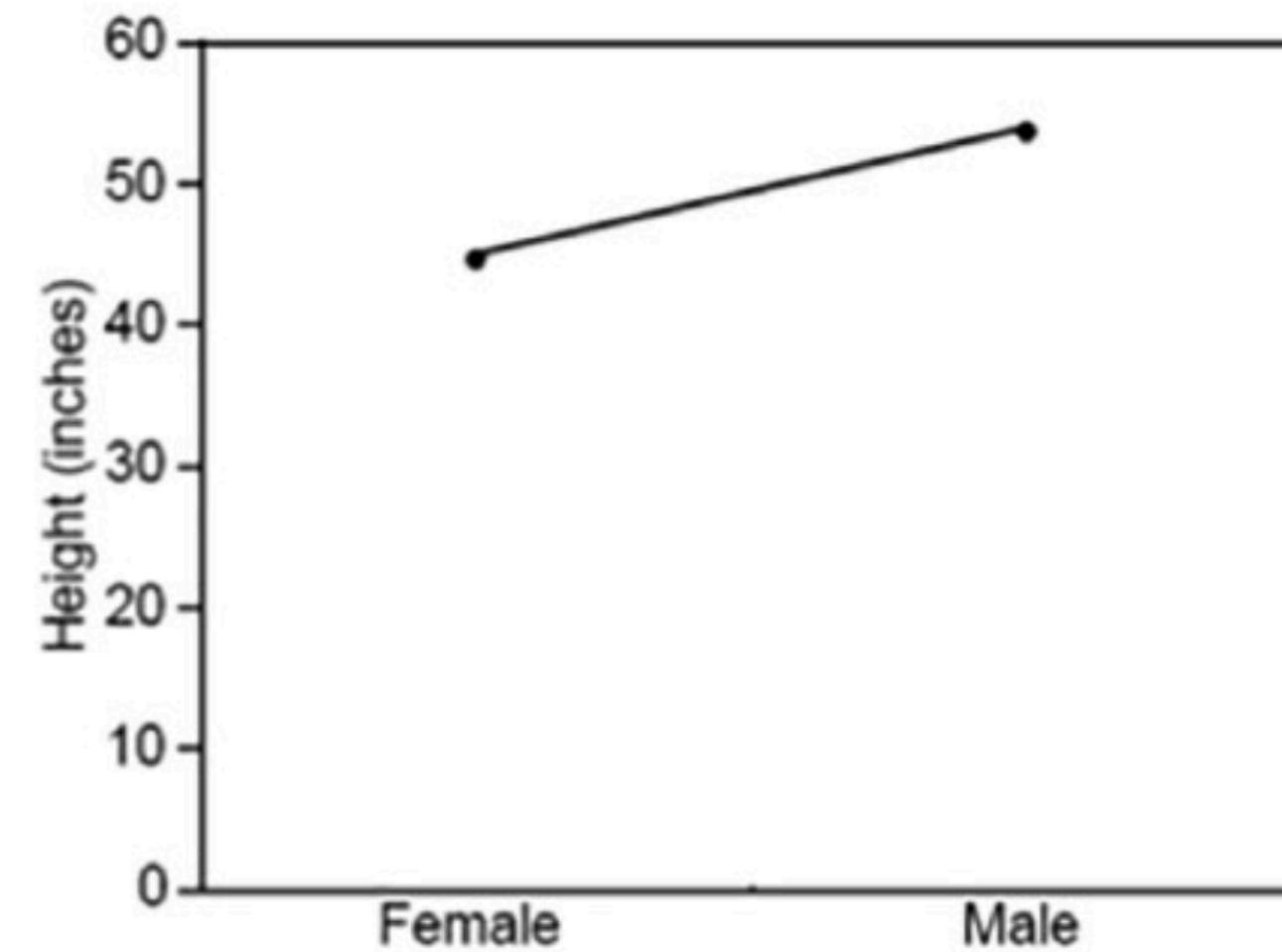
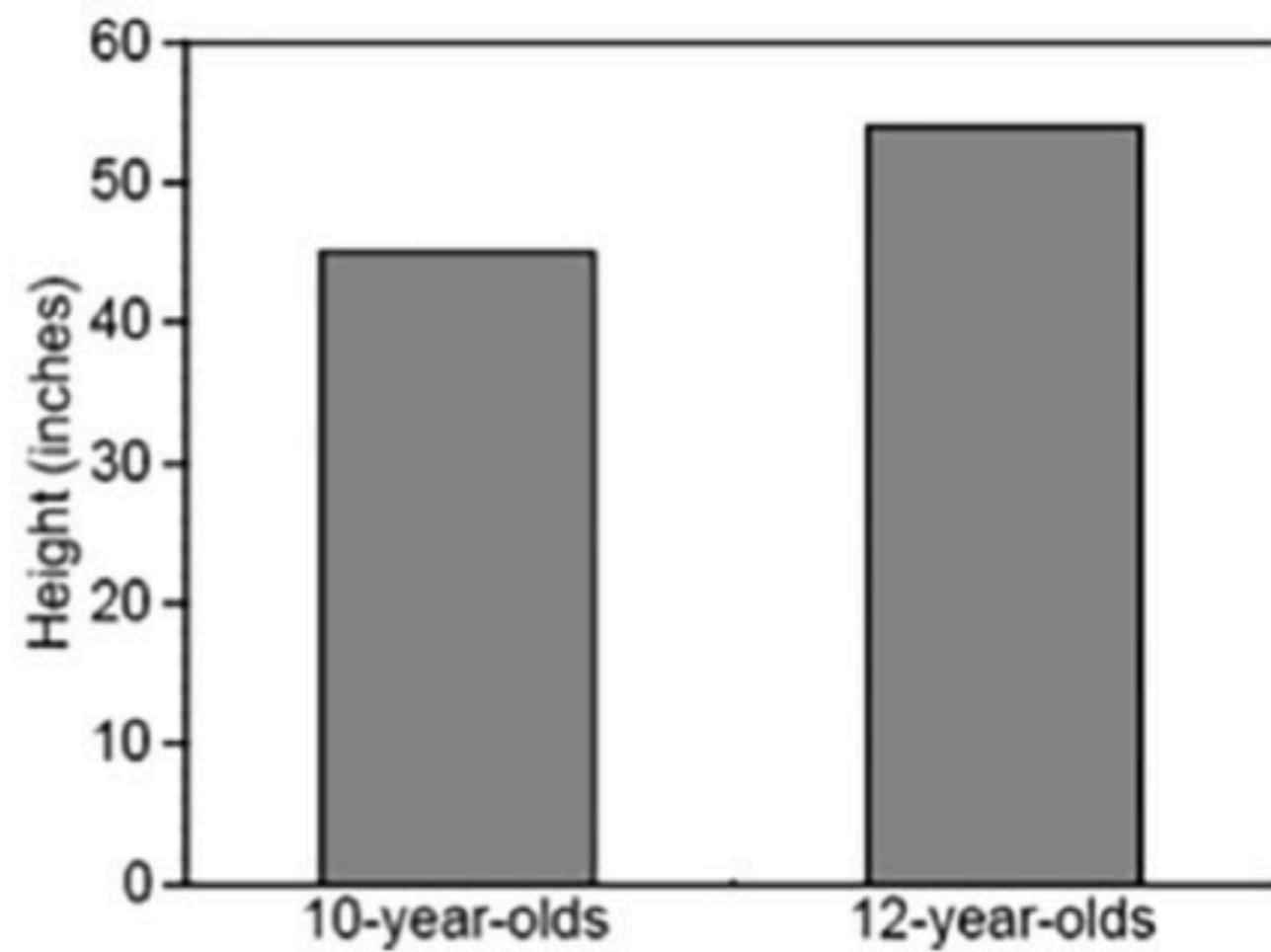


Figure 4. Infants' rates of (A) attempts, (B) prospective turning, and (C) approach behaviors in entrapment (filled circles) and falling (open squares)

Follow conventions



from Zacks & Franconeri (2020)

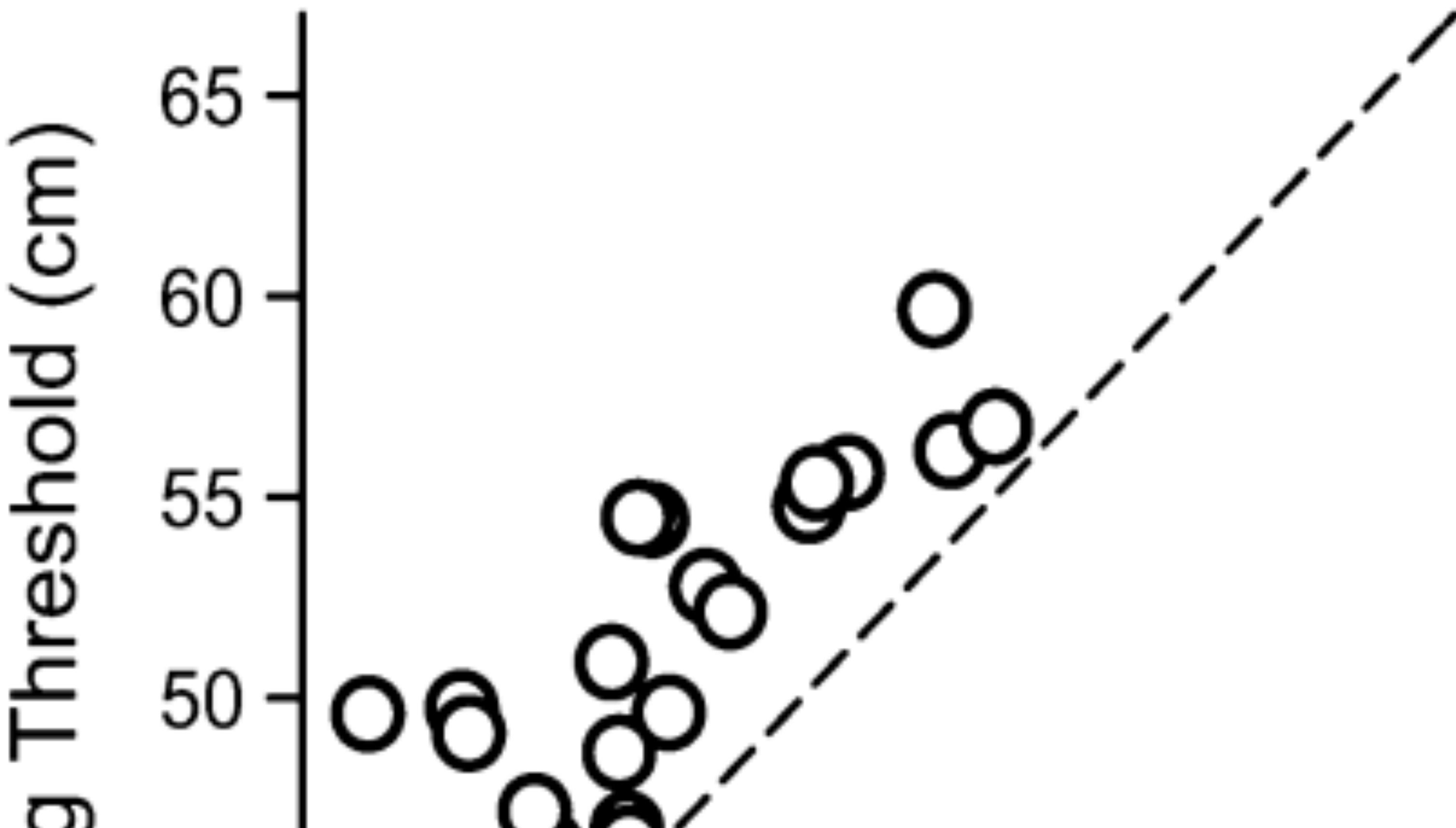
**carefully consider axes limits
and their relative size (aspect ratio)**

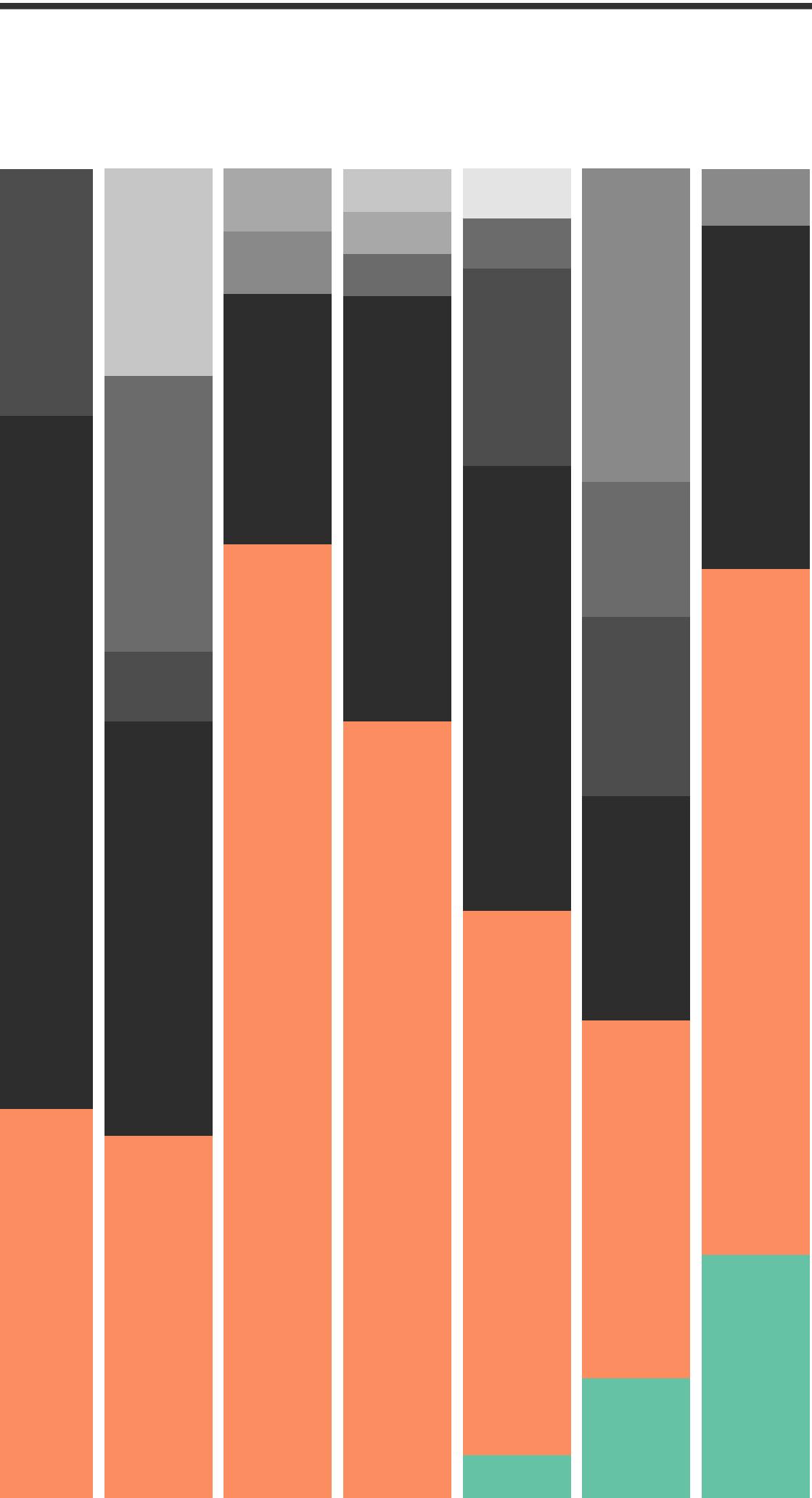
**map graphical elements to be consistent
with the field/your other figures**

A quick note about image formats

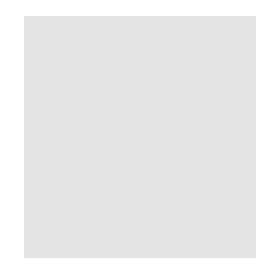
- Bitmap graphics (.bmp, .jpg, .png) contain a map of values for each pixel
 - Look good at the size they were intended to be viewed
 - Look distorted when resized
 - Only use for photos
- Vector graphics (.eps, .svg) represent an image as a series of equations
 - Scale perfectly to any size
 - Ideal for graphs

GAIT MODIFICATION

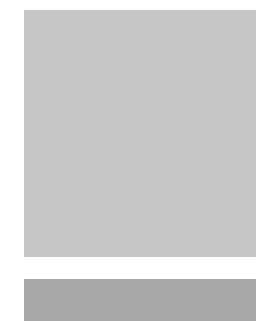




Activity



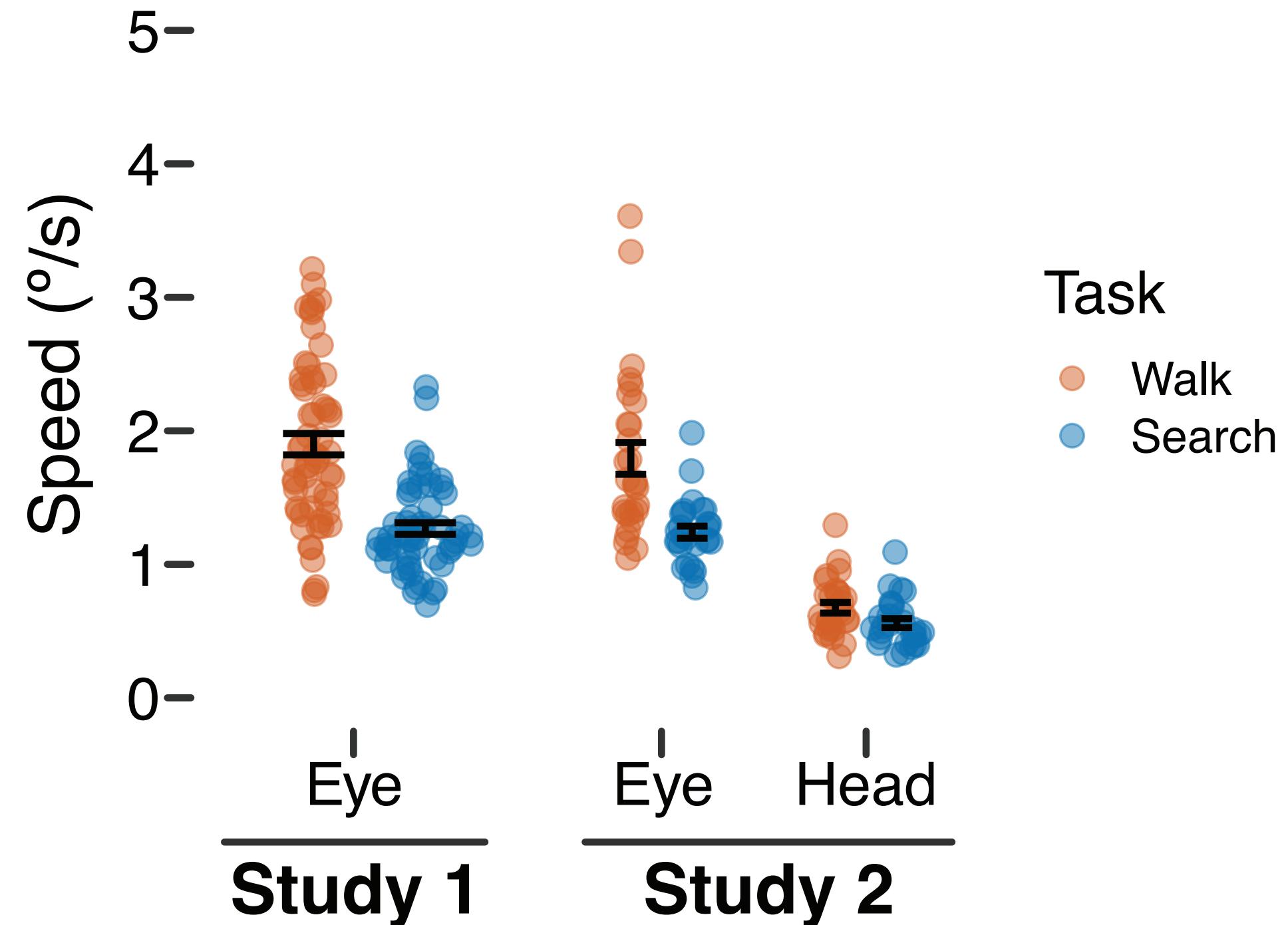
Fussing/comforting



Reading

A quick note about image formats

- `ggsave()` can export either format
- Vector graphics software like Adobe Illustrator and Inkscape (free) can edit `.eps` to give you more flexibility



ggplot tutorial #2

What we've covered so far

- Frequency bar graphs and histograms, scatter plots, boxplots
- Mapping aesthetics for x & y
- Facets
- Reference lines
- Saving plots

What we will cover today

- Mapping additional variables
- Using multiple datasets (raw data and summarized data)
- Summary statistics and error bars
- Controlling the theme and palette
- Interactive plots (plotly) and animated plots (ganimate)