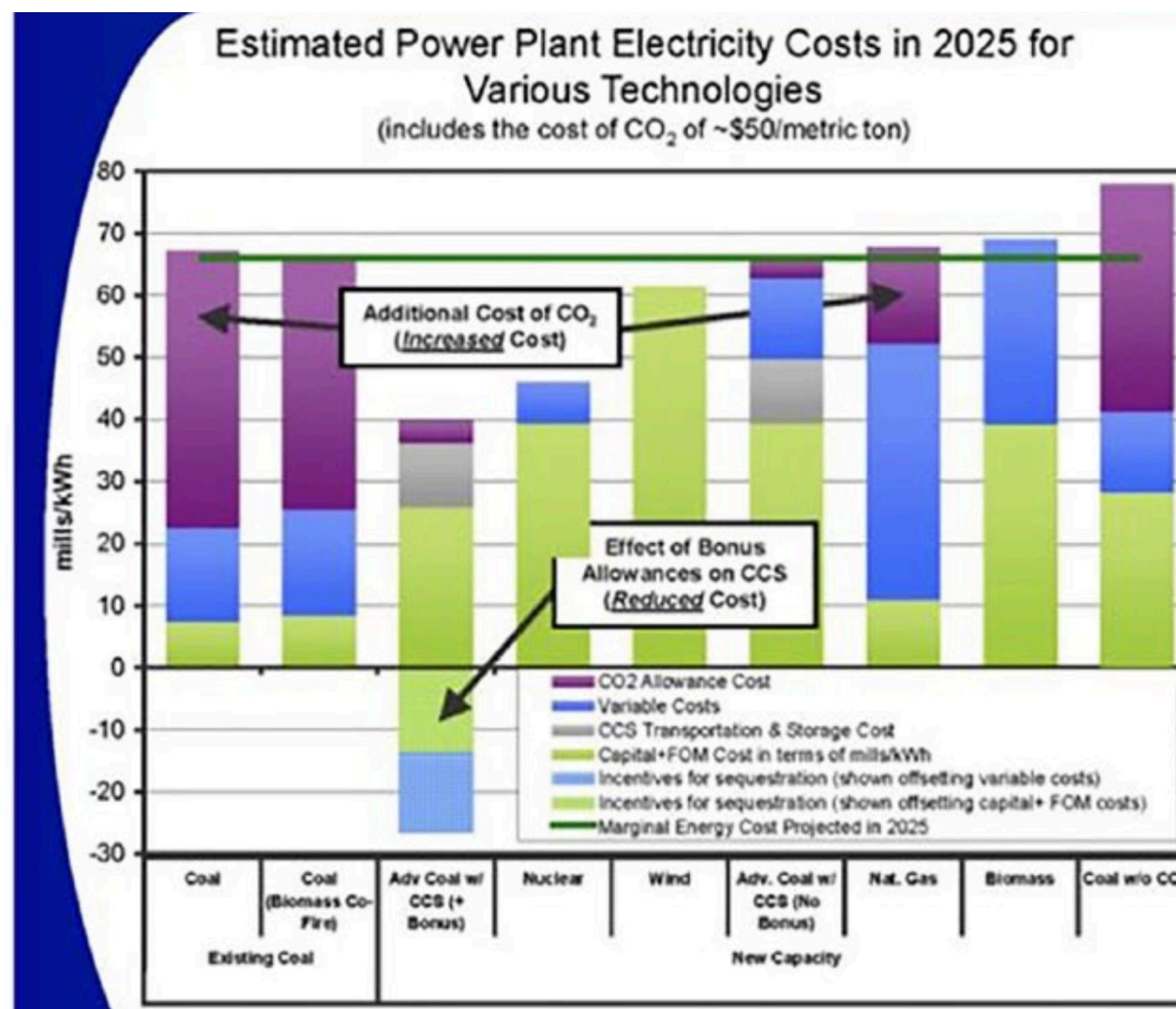


# PSYC 259: Principles of Data Science

Week 10: Graphics for communication

What makes visualizations  
effective?

# What makes this graph so bad?



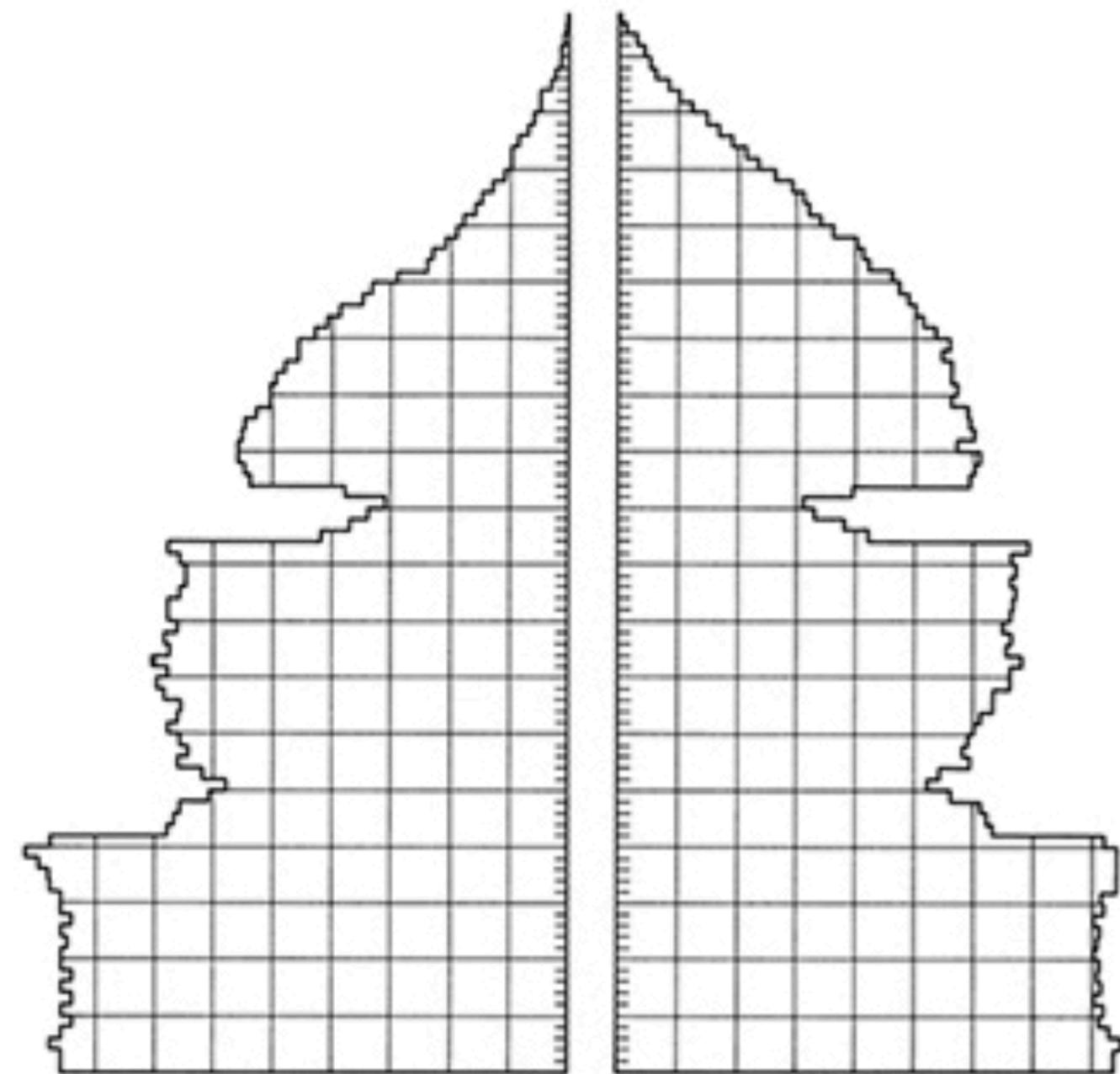
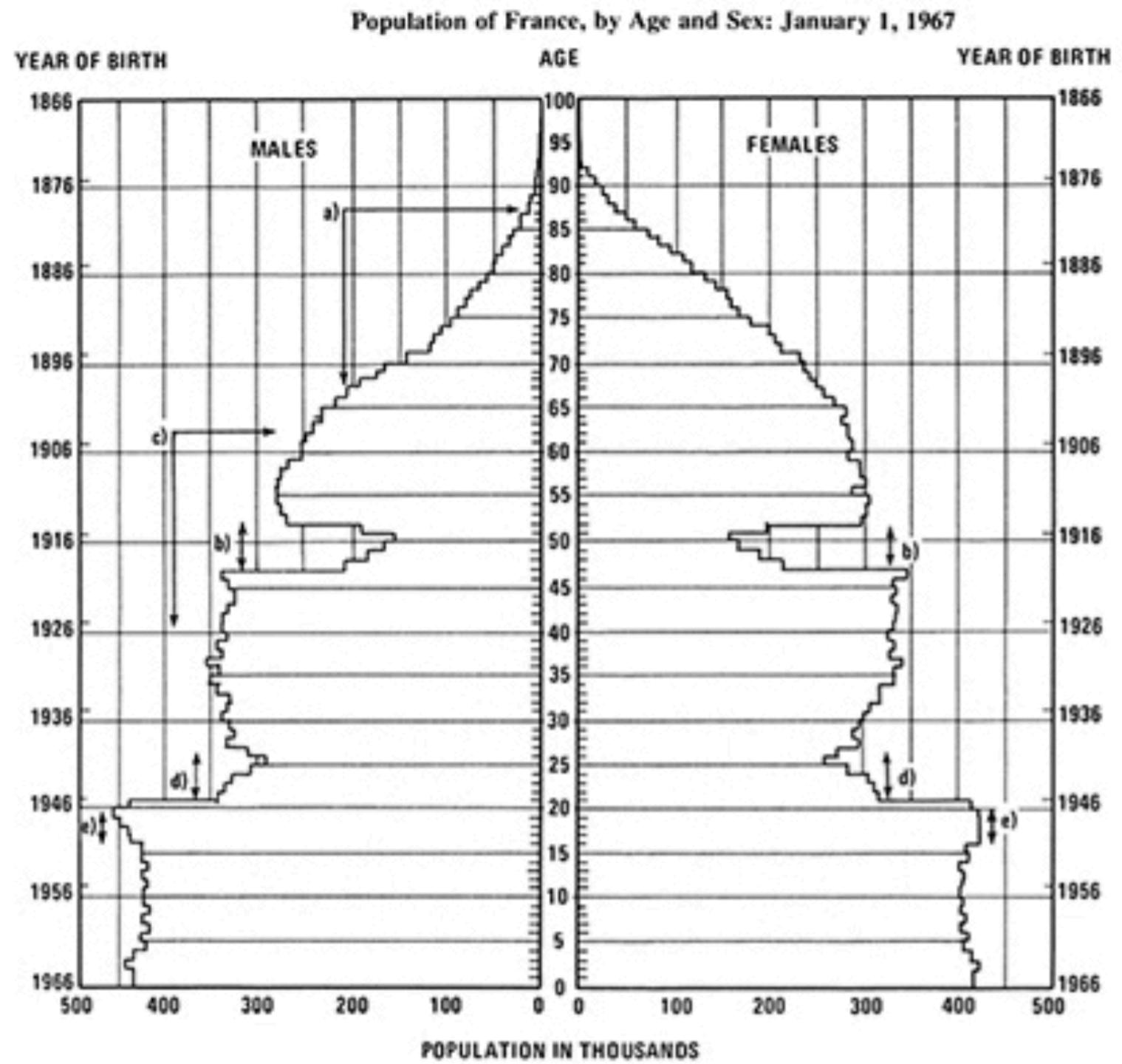
# Effective visualizations...

- 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

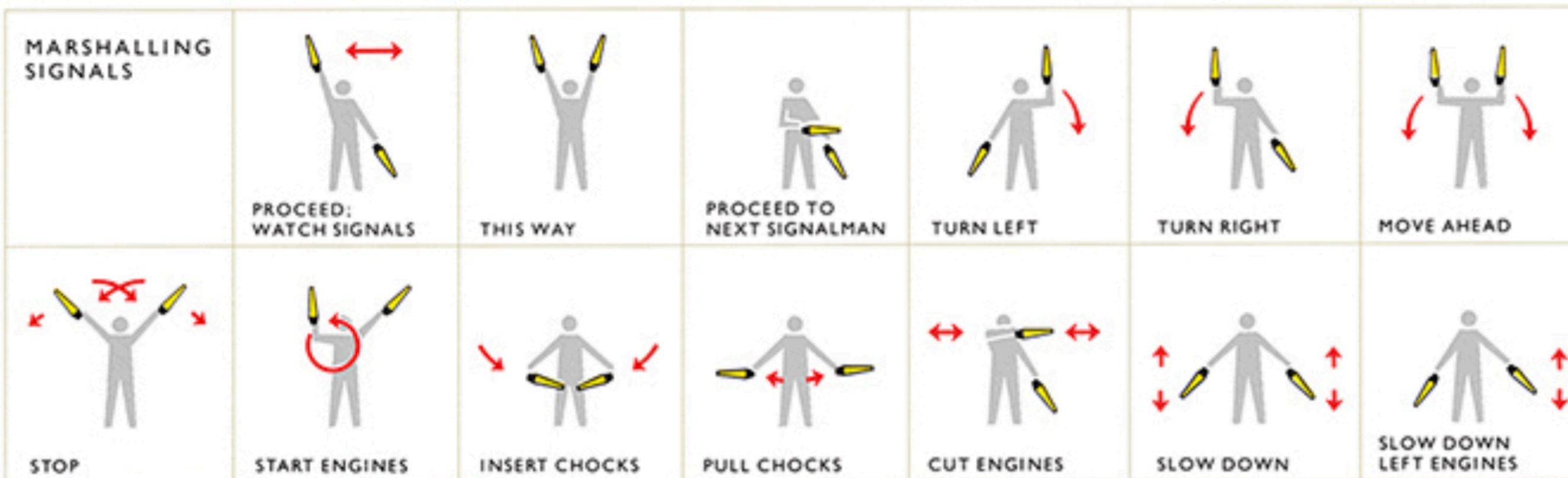
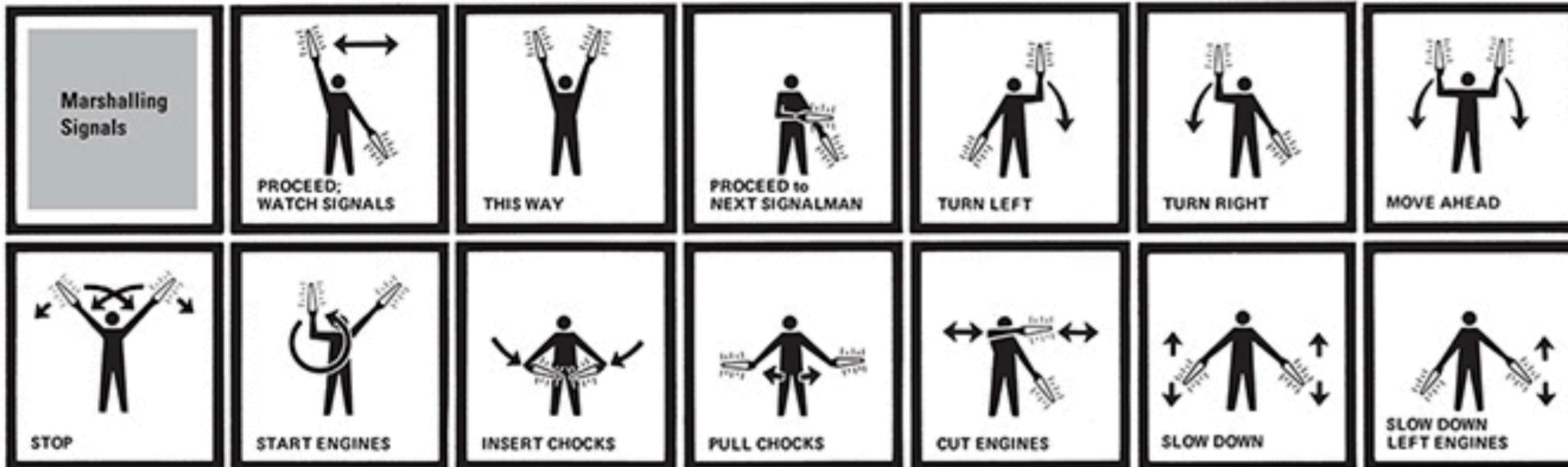
THE interior decoration of graphics generates a lot of ink that does not tell the viewer anything new. The purpose of decoration varies—to make the graphic appear more scientific and precise, to enliven the display, to give the designer an opportunity to exercise artistic skills. Regardless of its cause, 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

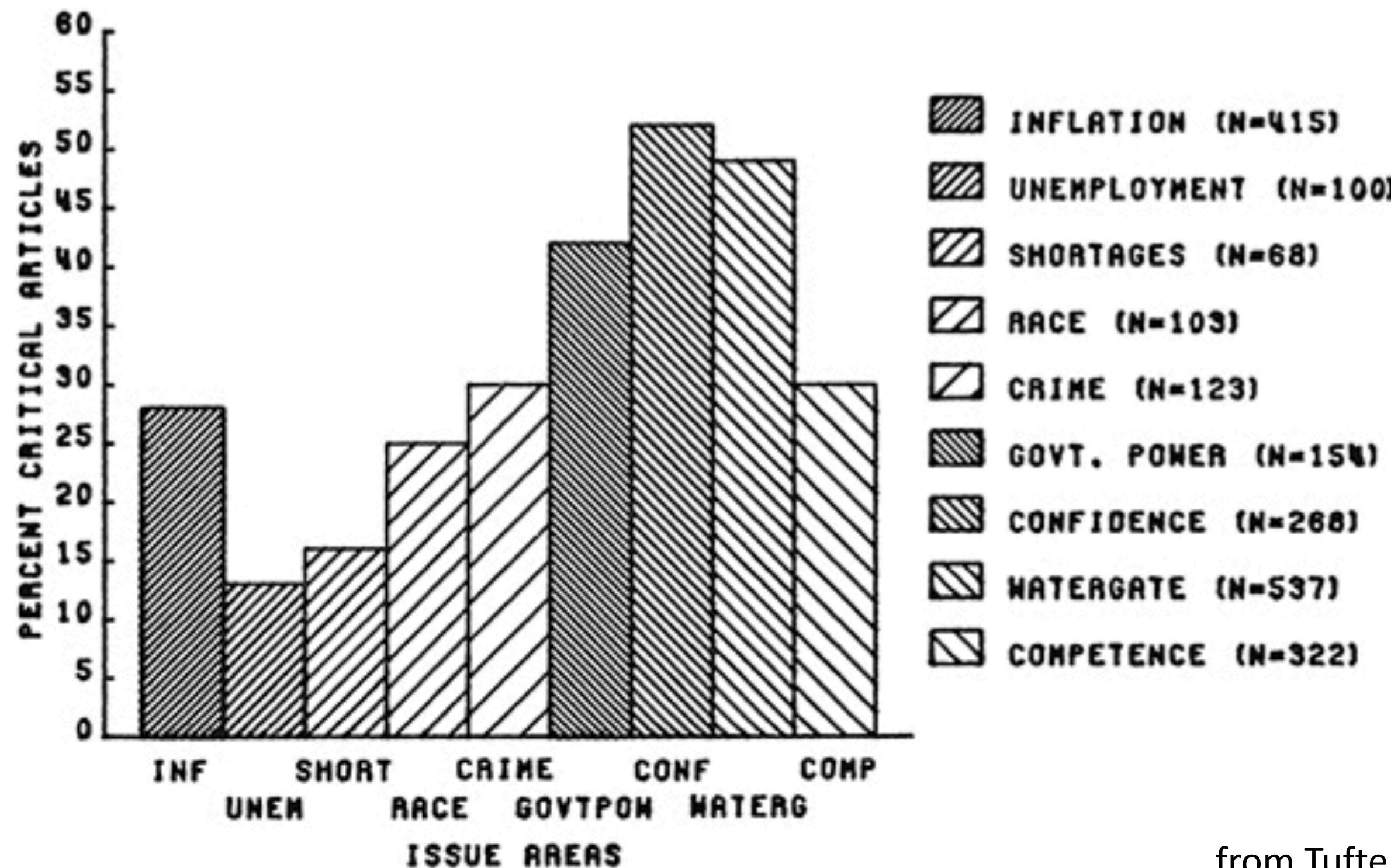


from Tufte Chartjunk website

# Emphasize the right information

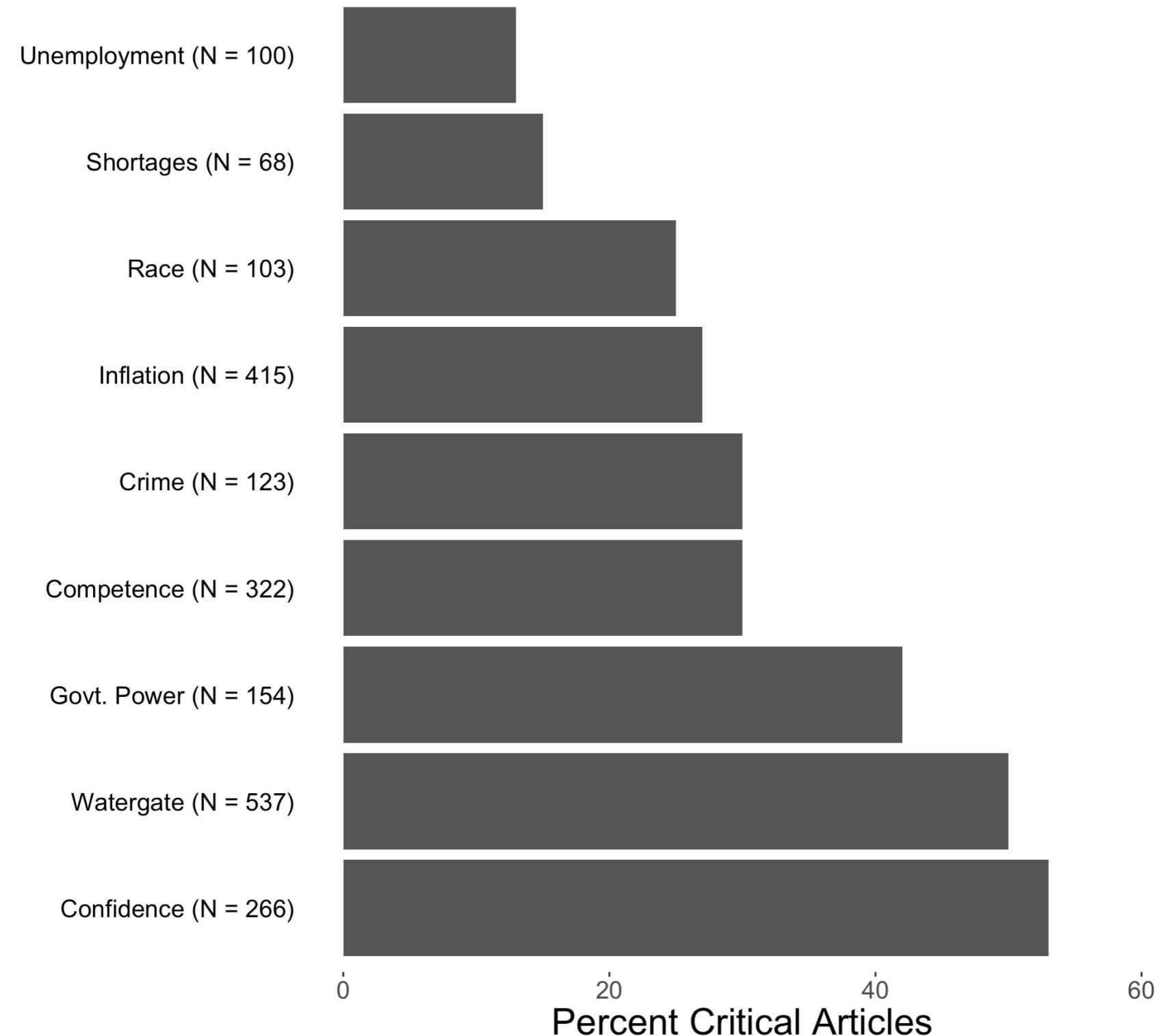
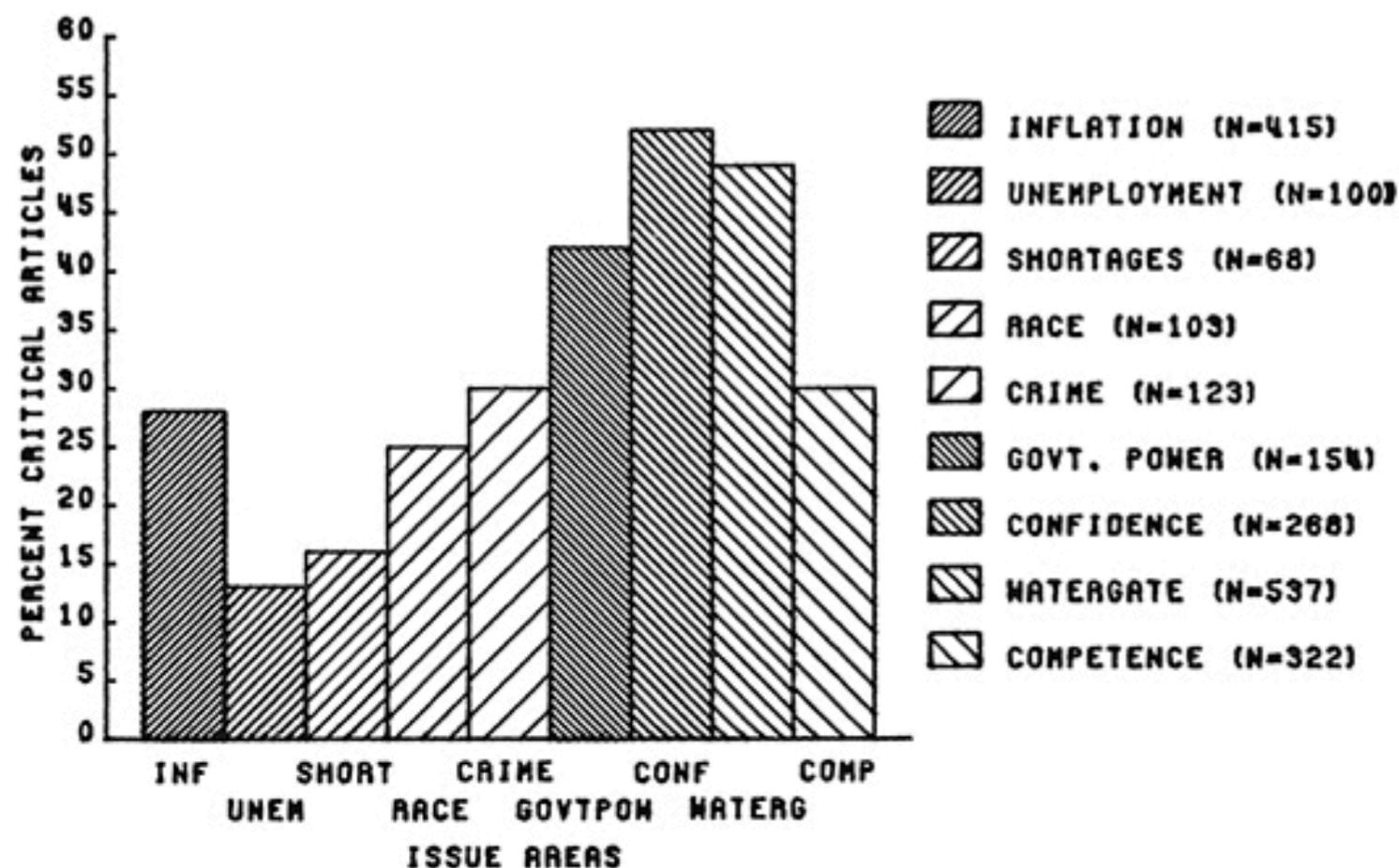


# Emphasize the right information (pattern distracts from length)

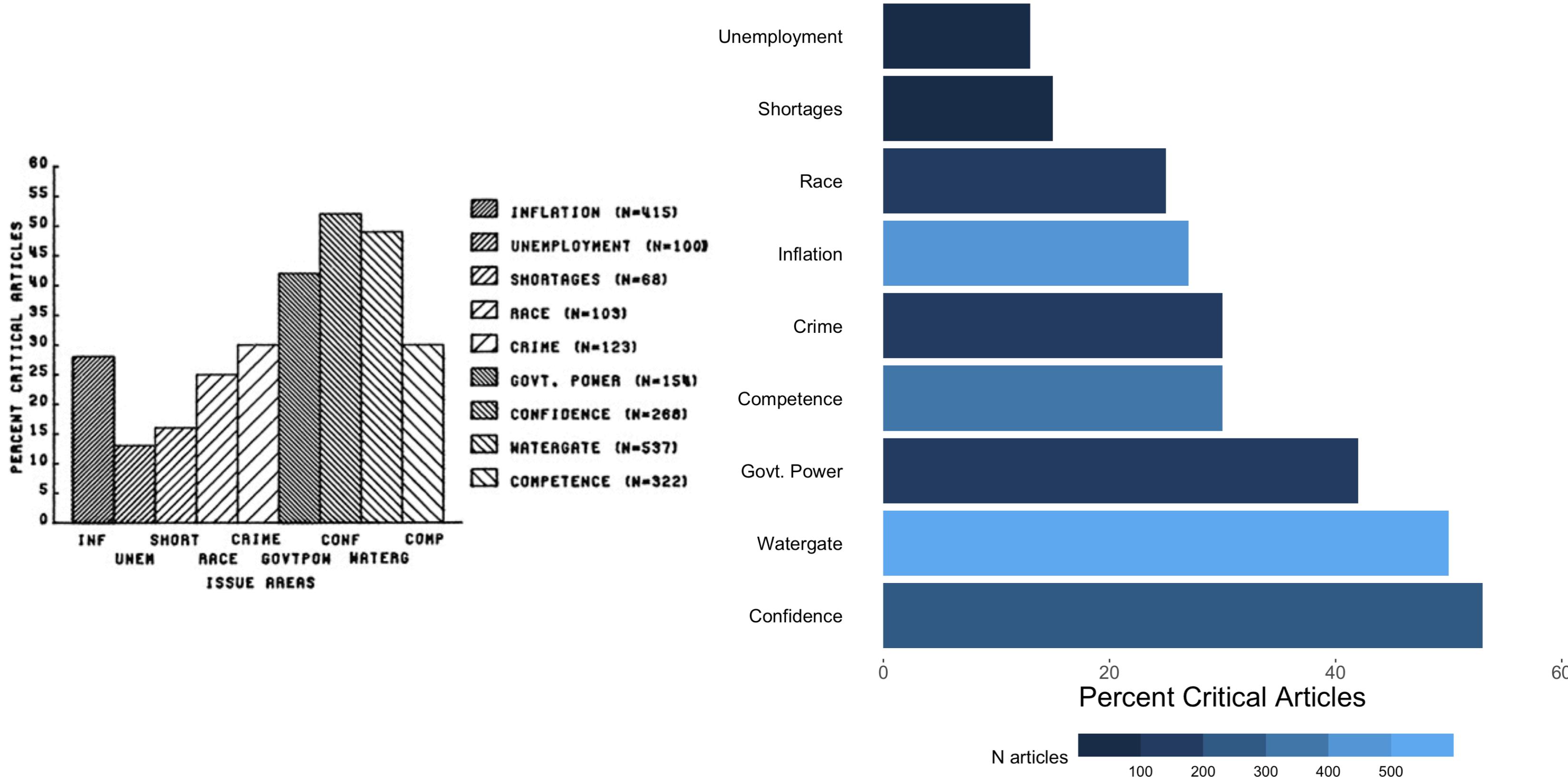


from Tufte Chartjunk website

# Emphasize the right information



# Emphasize the right information



# Don't make the reader work

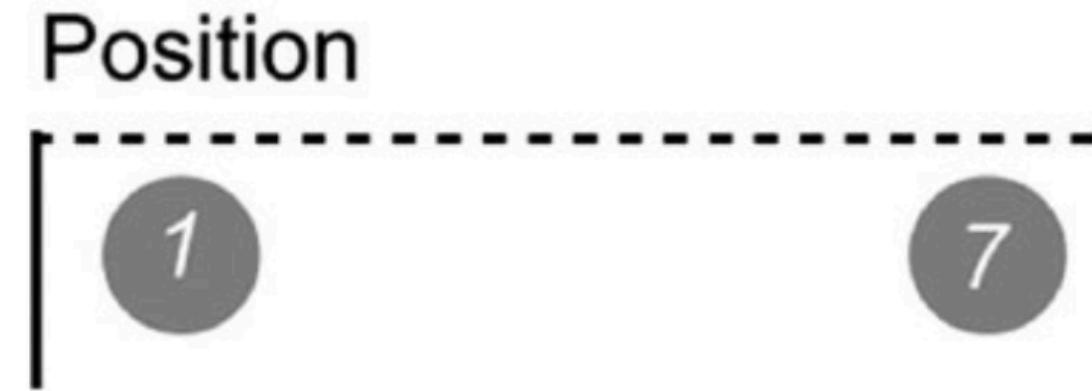
72	50	64	18	23	47	48	67
64	87	61	18	40	64	88	15
17	31	78	41	56	87	42	33
63	37	59	15	11	55	30	63
55	48	49	22	22	56	66	61
48	21	79	34	45	84	57	50
21	94	54	12	28	20	94	19
80	37	50	64	54	31	38	74

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

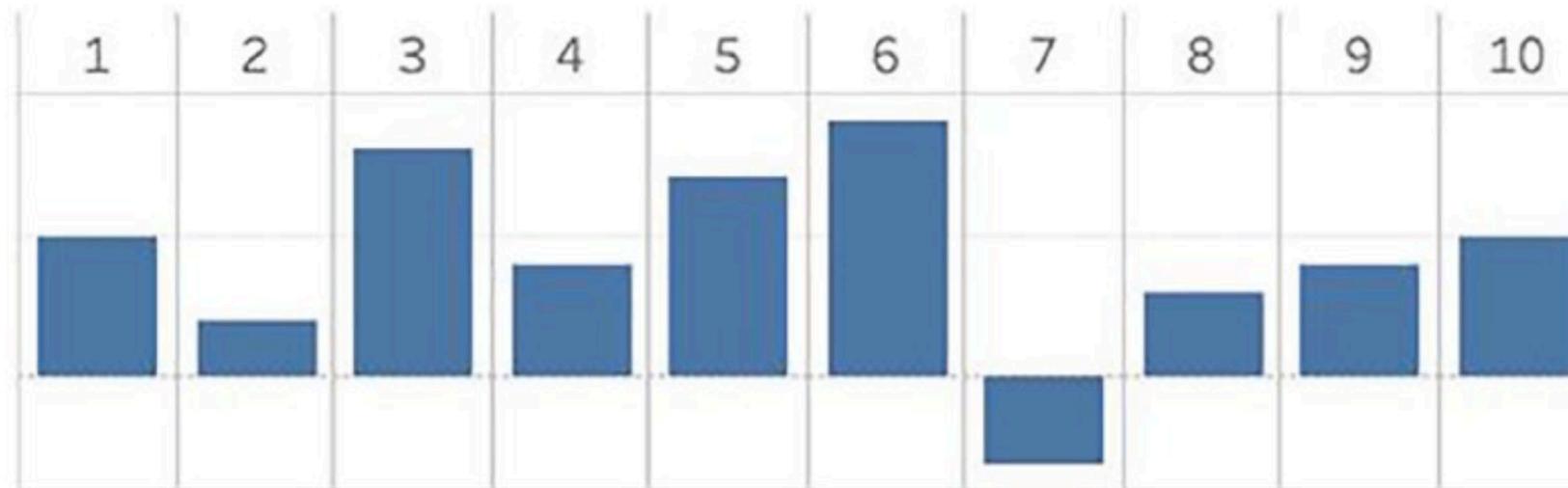
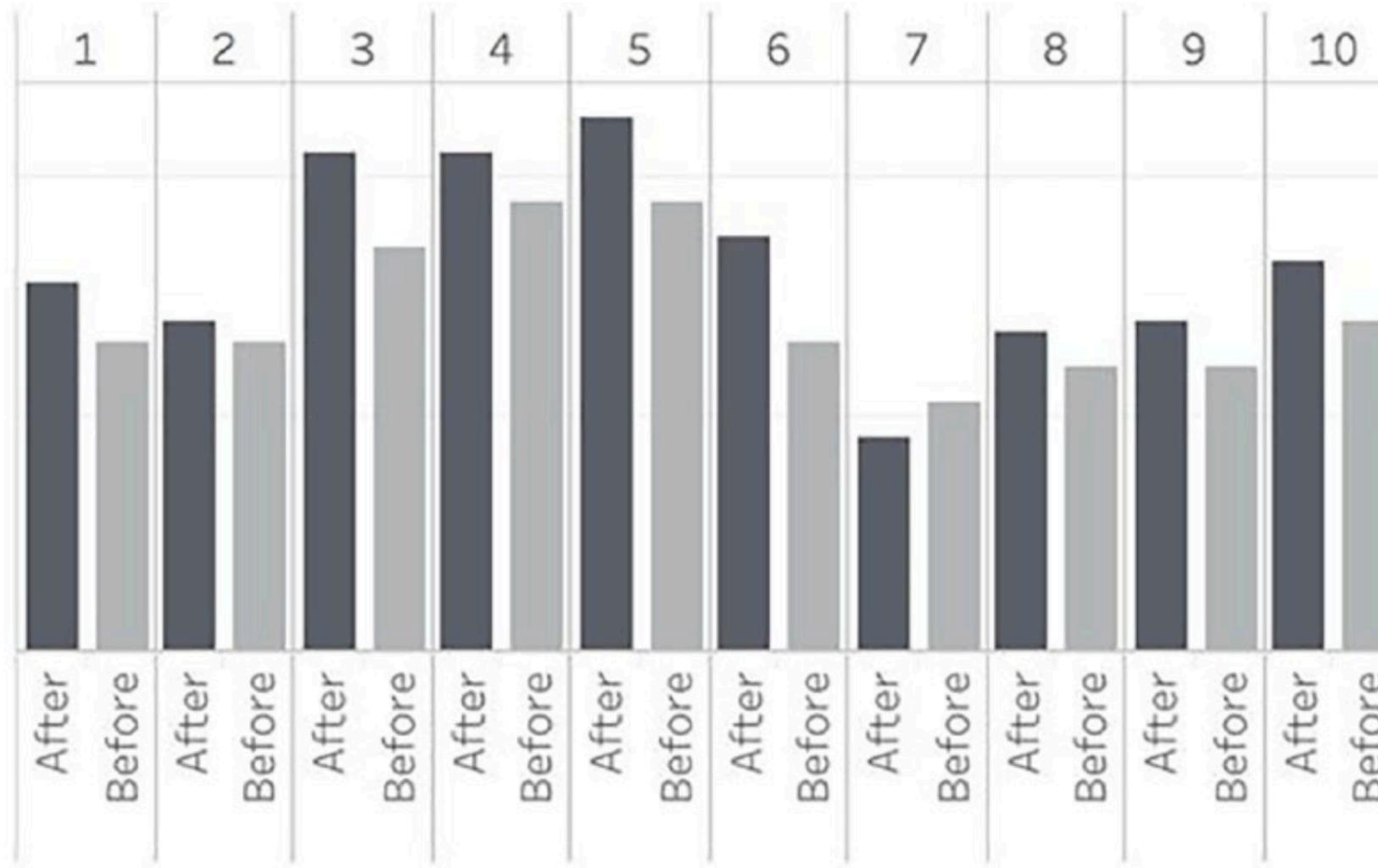
## Use the right visual features!



Intensity

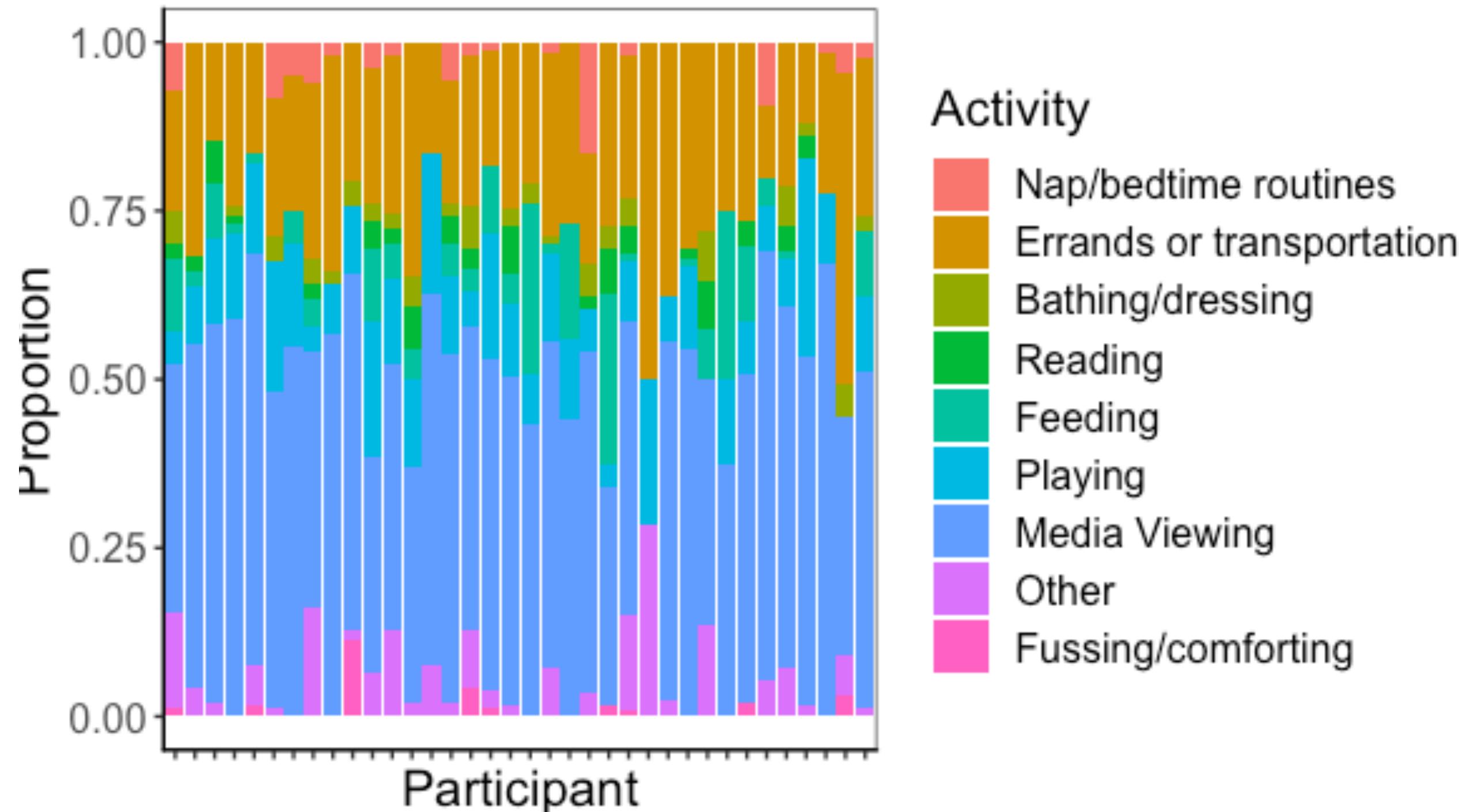


# Don't make the reader work

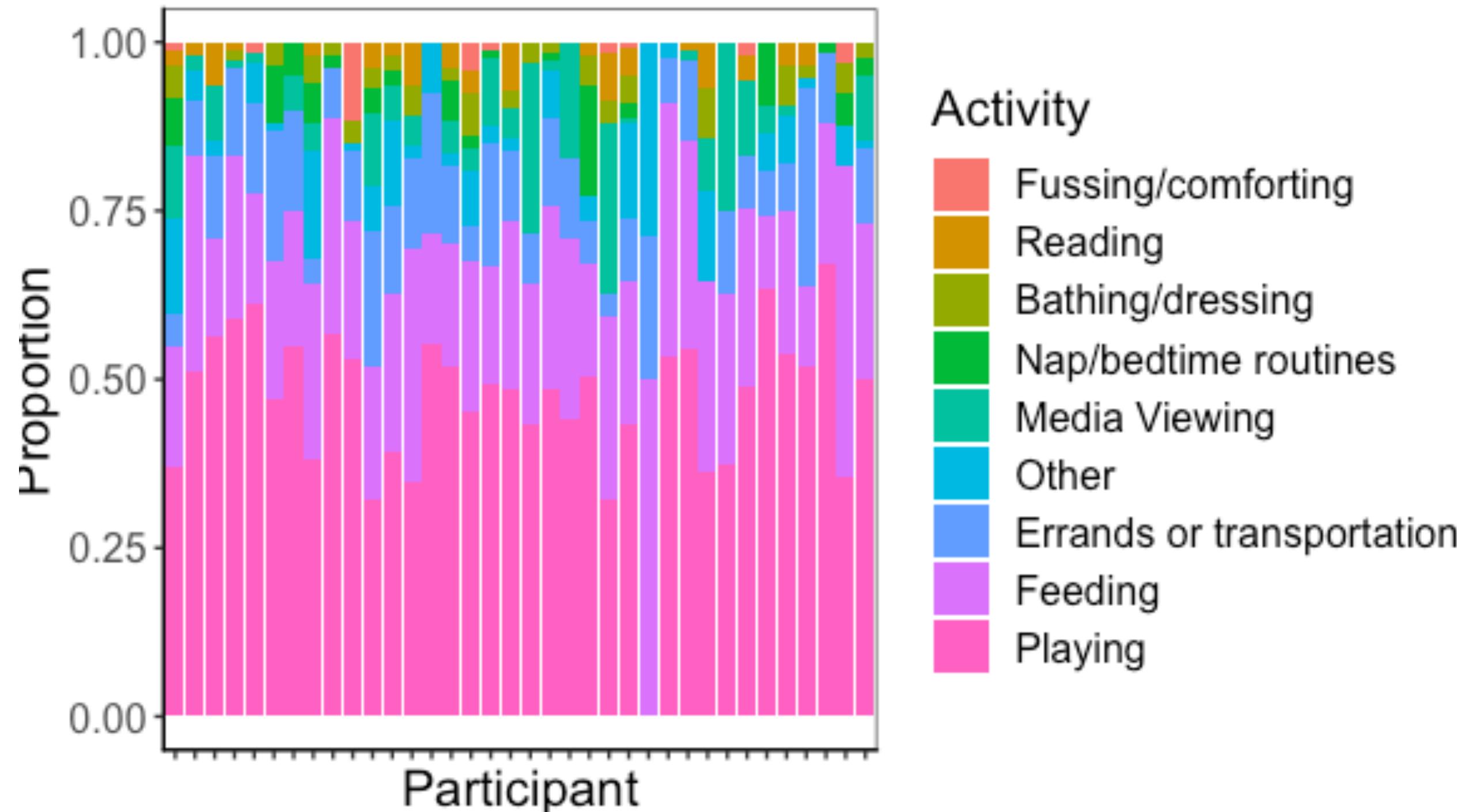


from Zacks & Franconeri (2020)

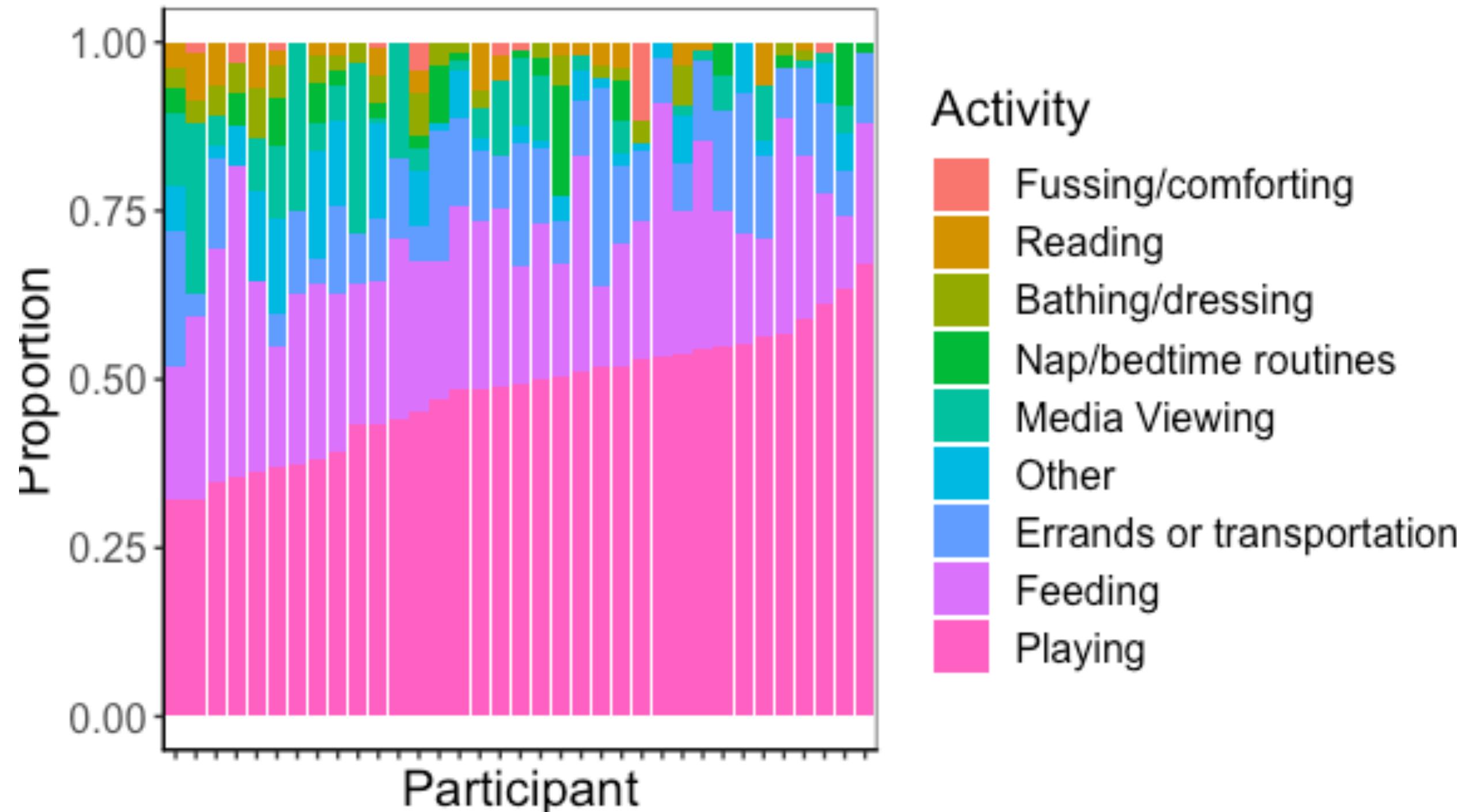
# Don't make the reader work



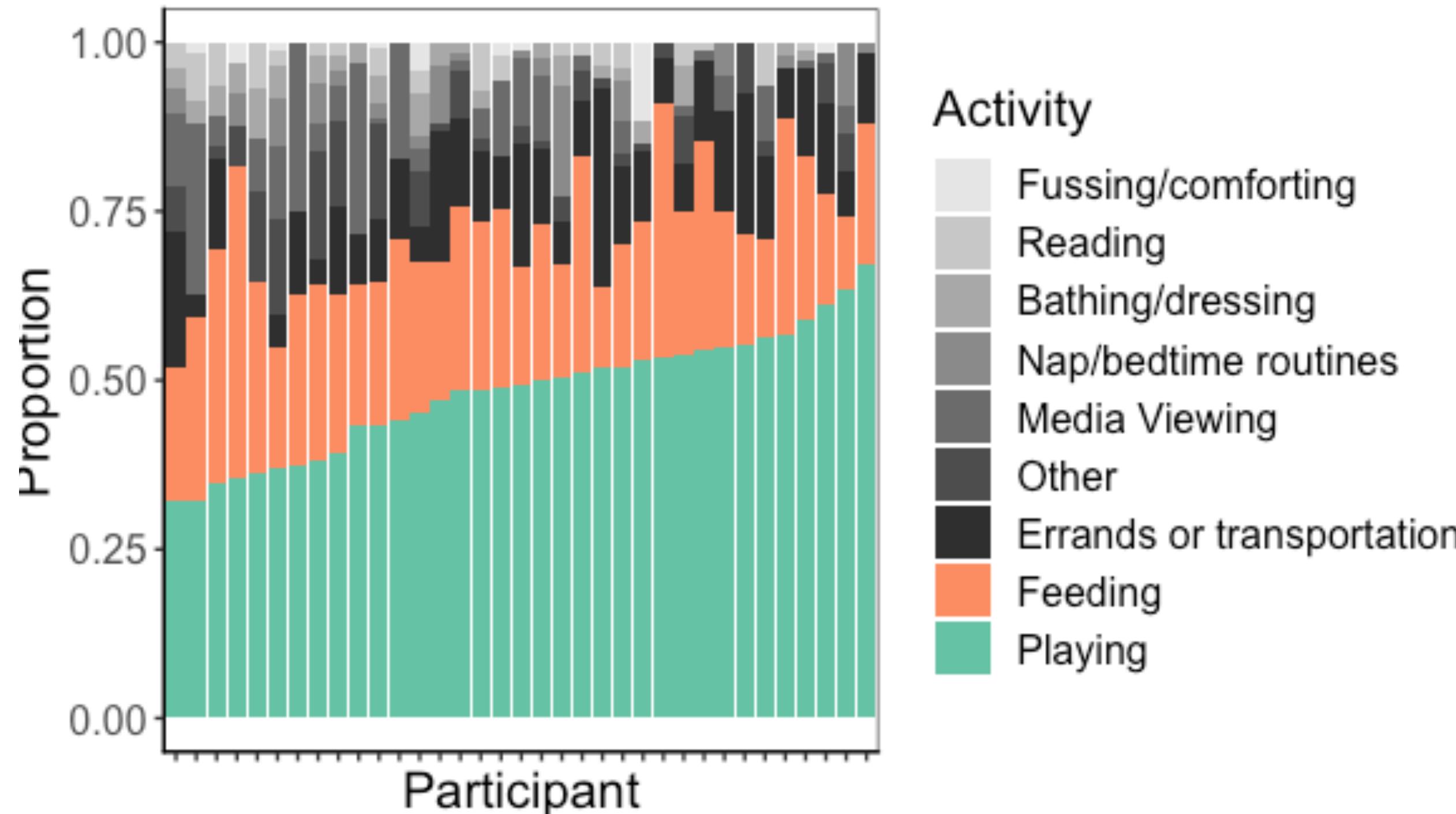
# Don't make the reader work



# Don't make the reader work



# Don't make the reader work



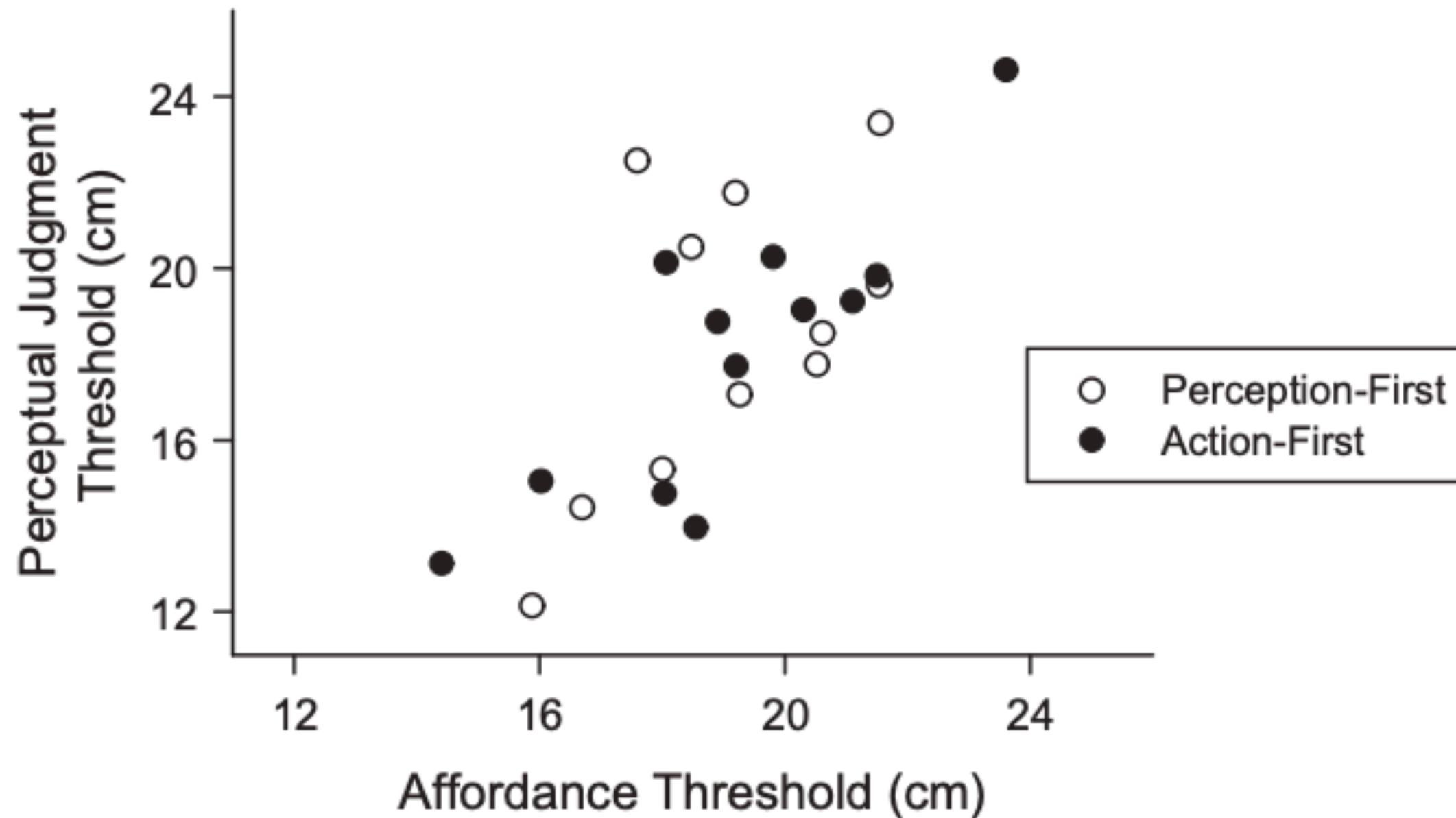
**data ink > non-data ink!**

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

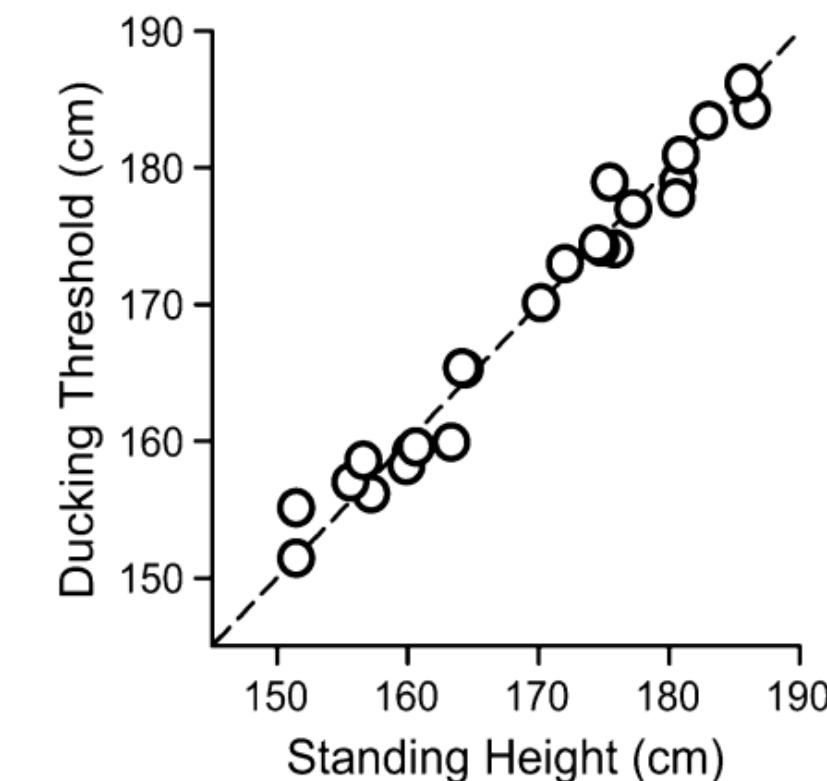
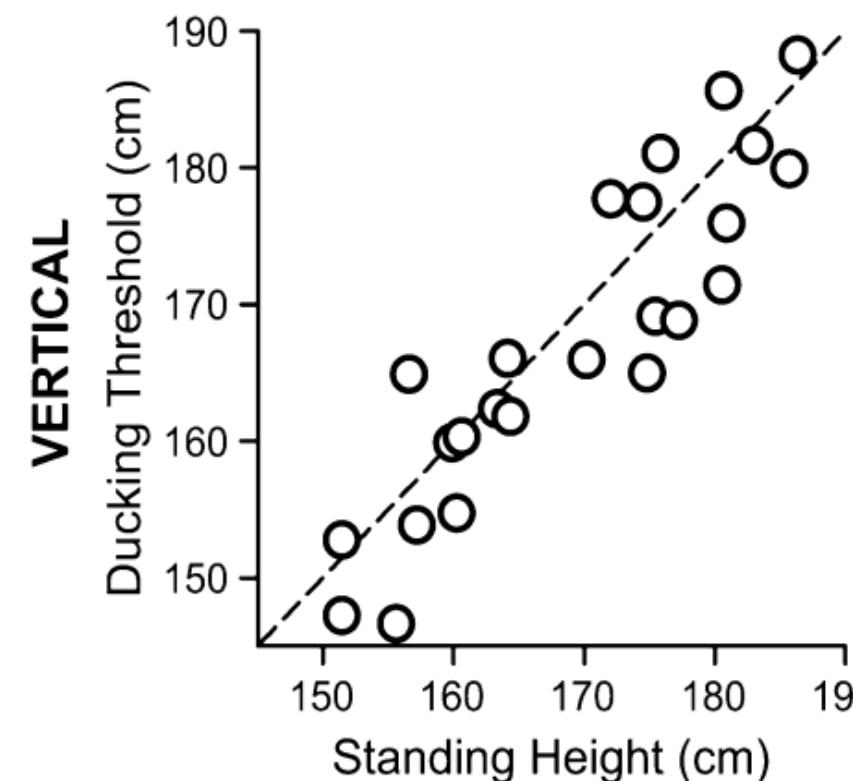
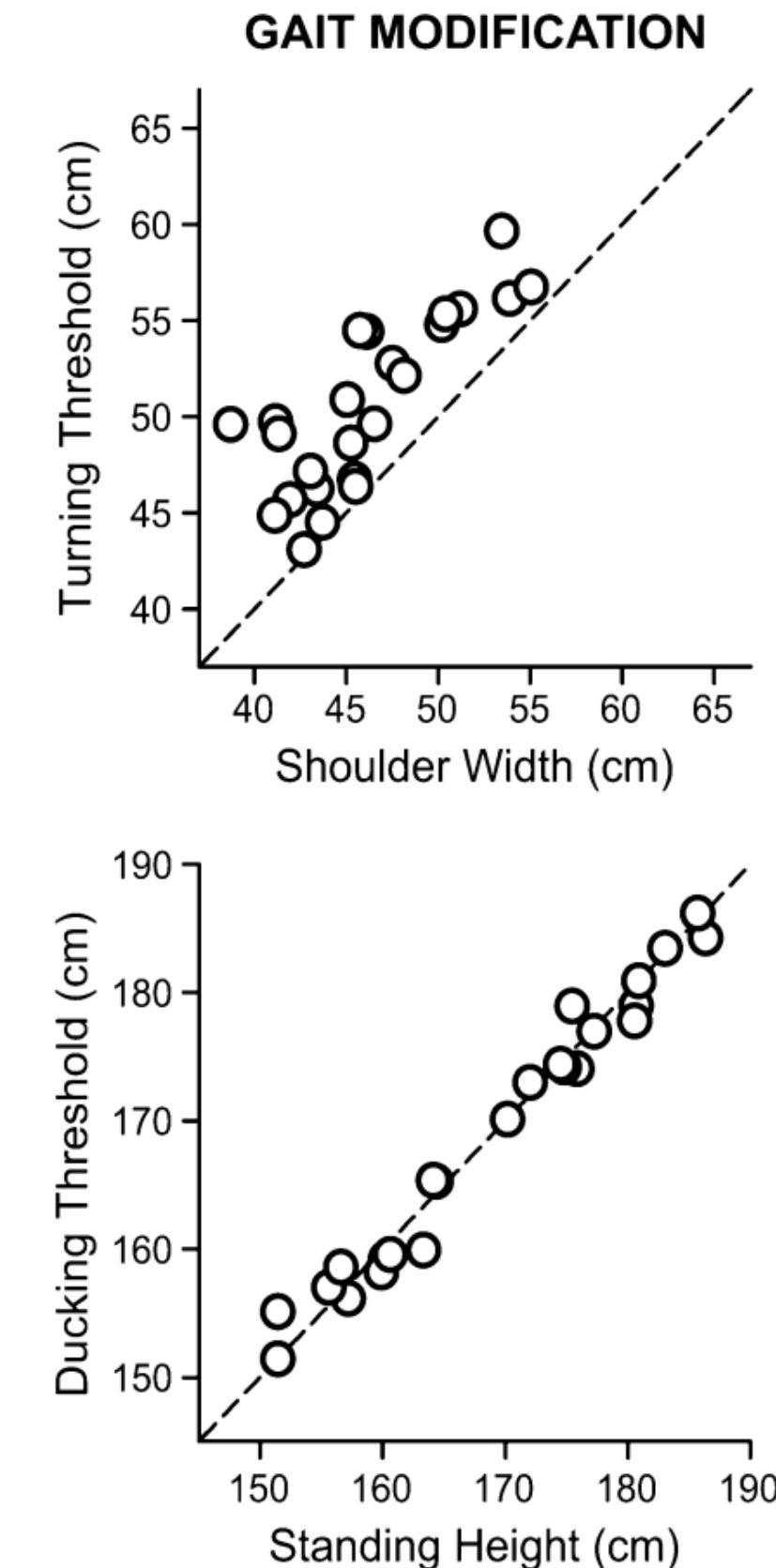
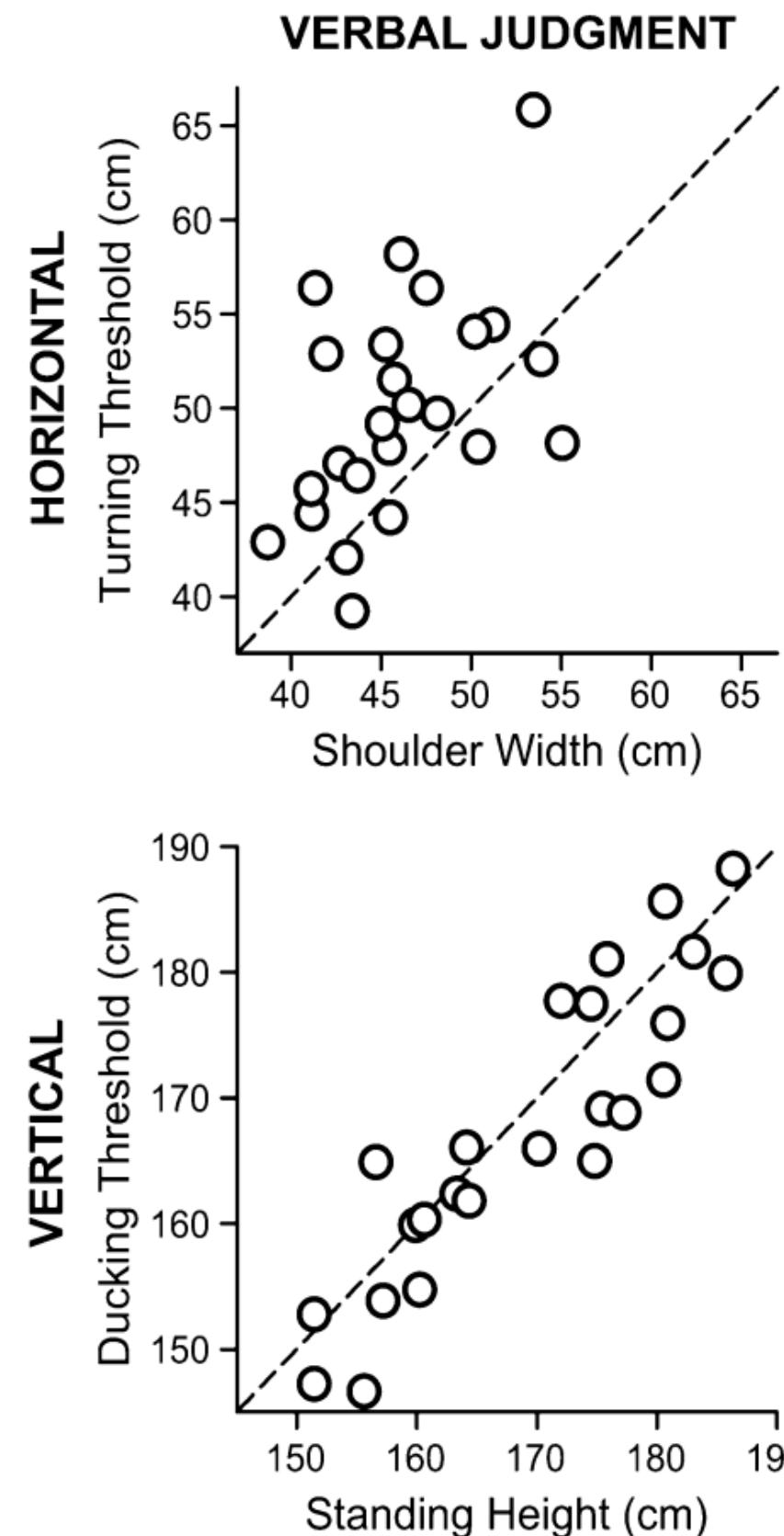
**group/sort data to facilitate comparison**

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

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

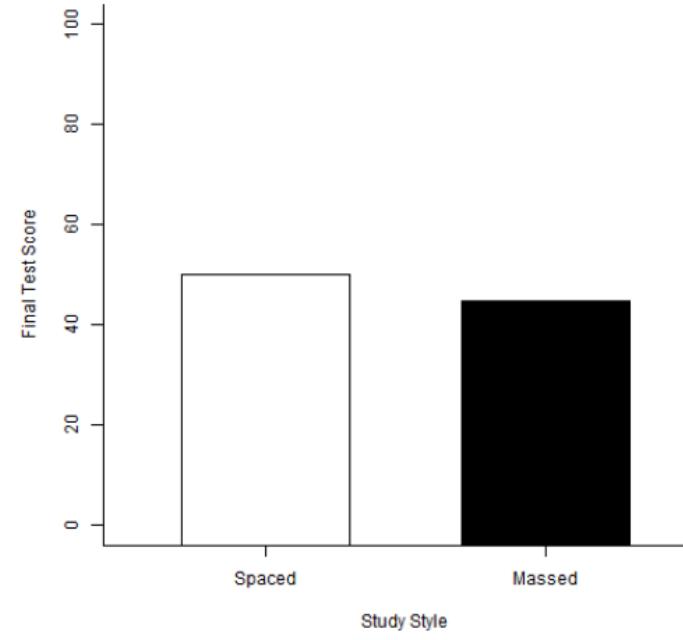


# Don't mislead or distort (aspect ratio)

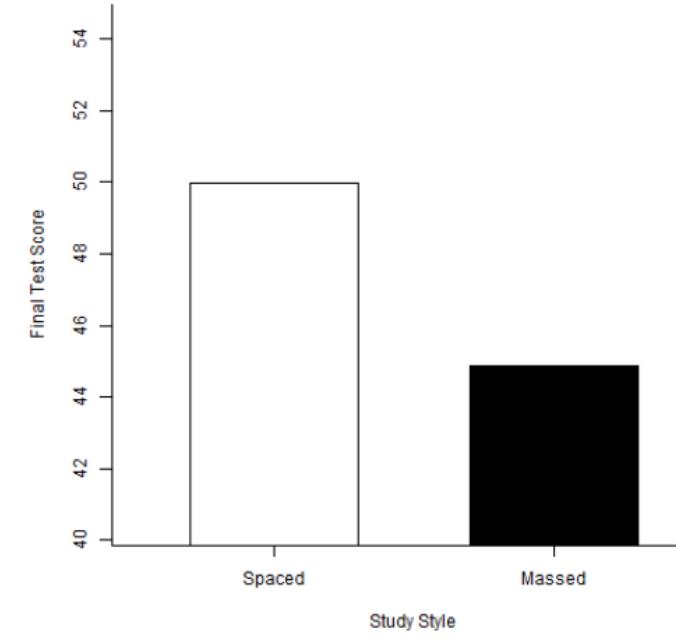


# Don't mislead or distort (ranges)

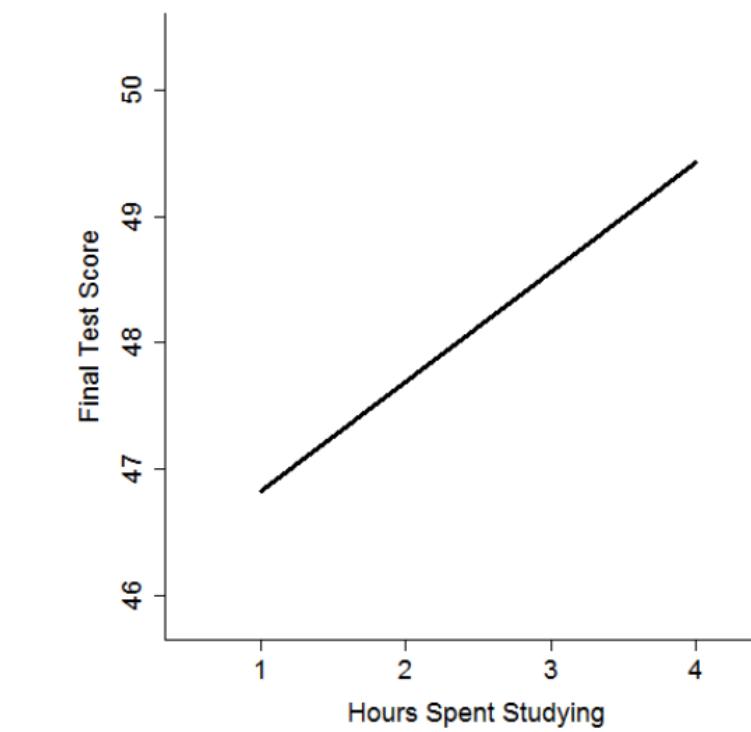
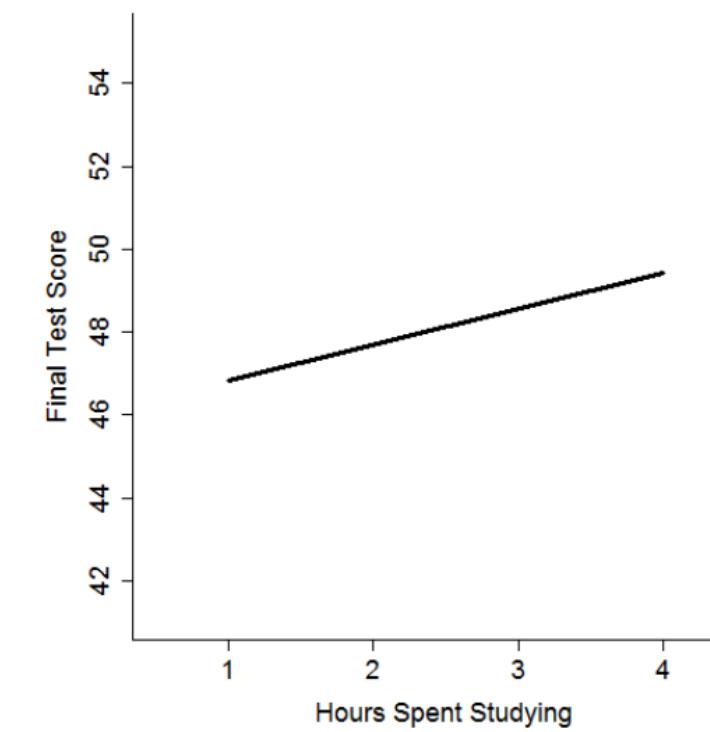
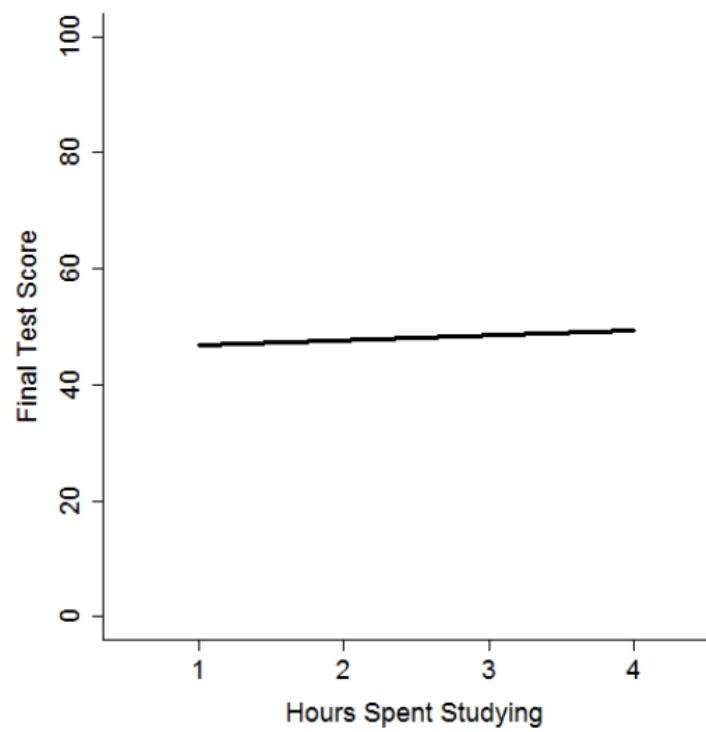
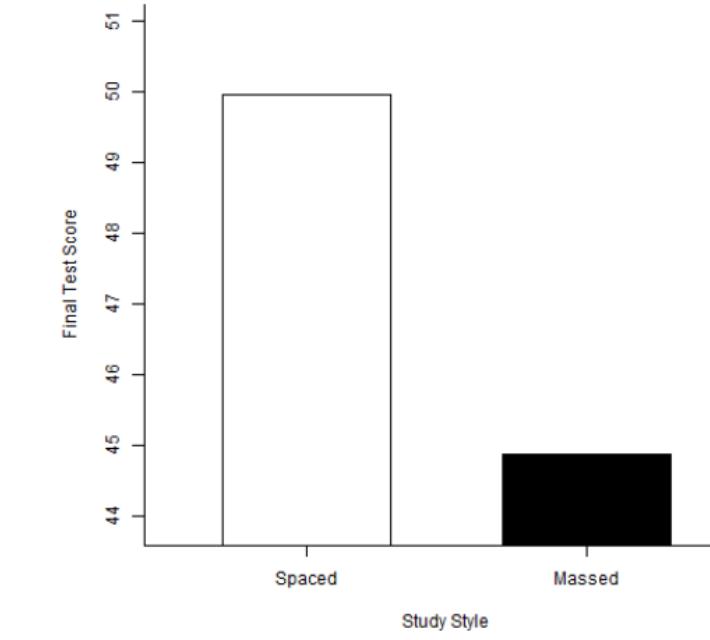
Full



Standardized

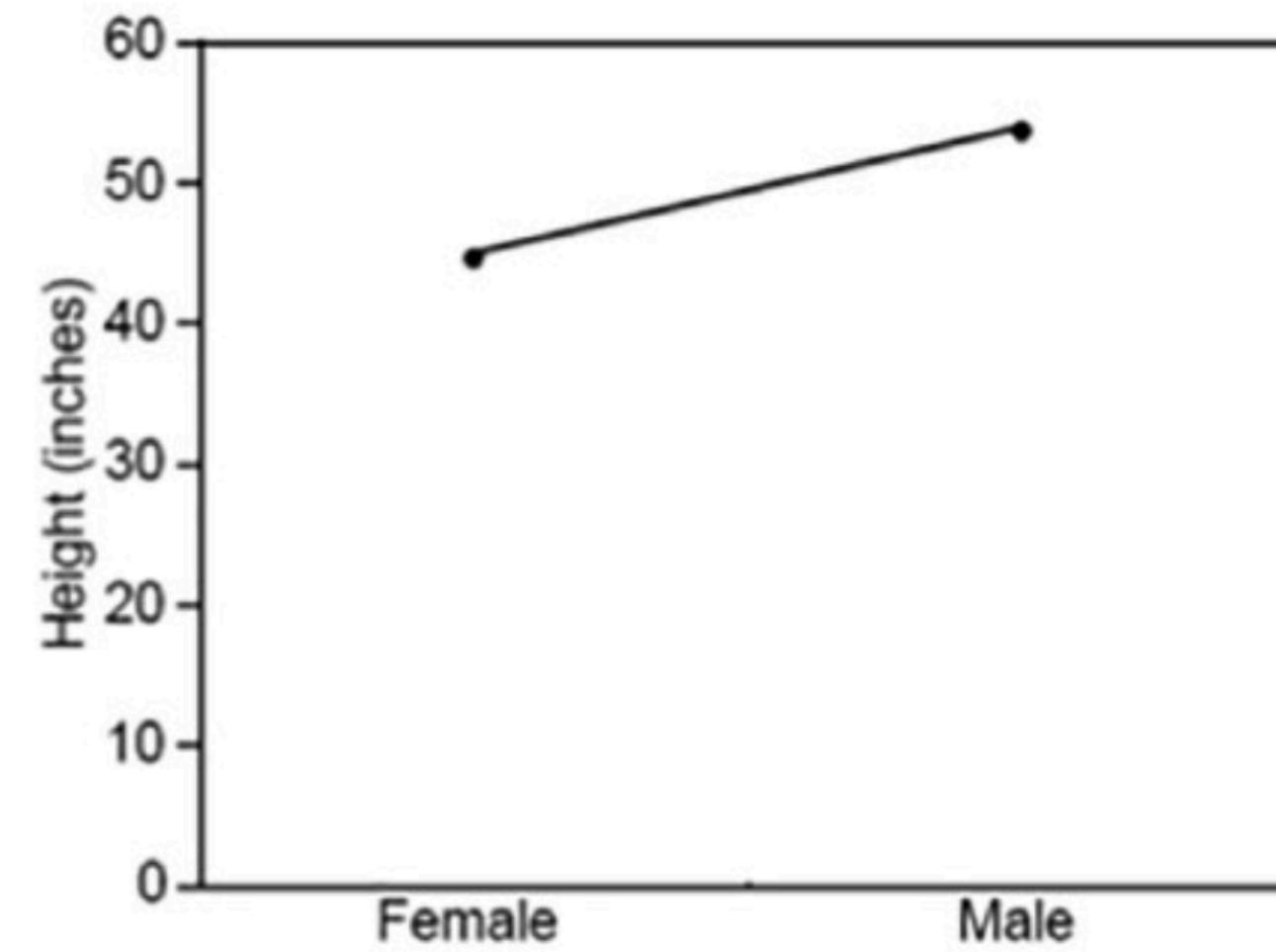
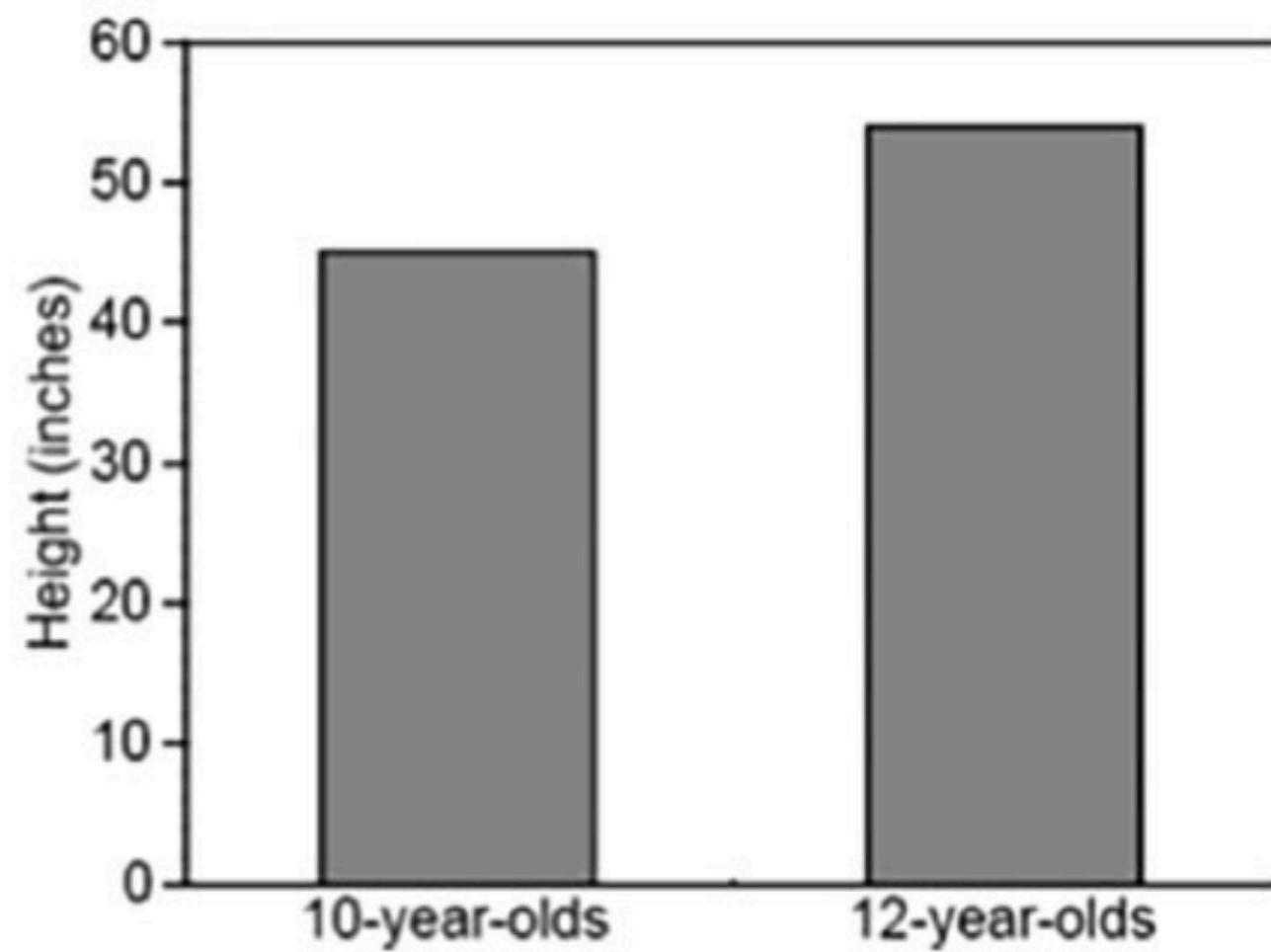


Minimal



from Witt (2019)

# Follow conventions



from Zacks & Franconeri (2020)

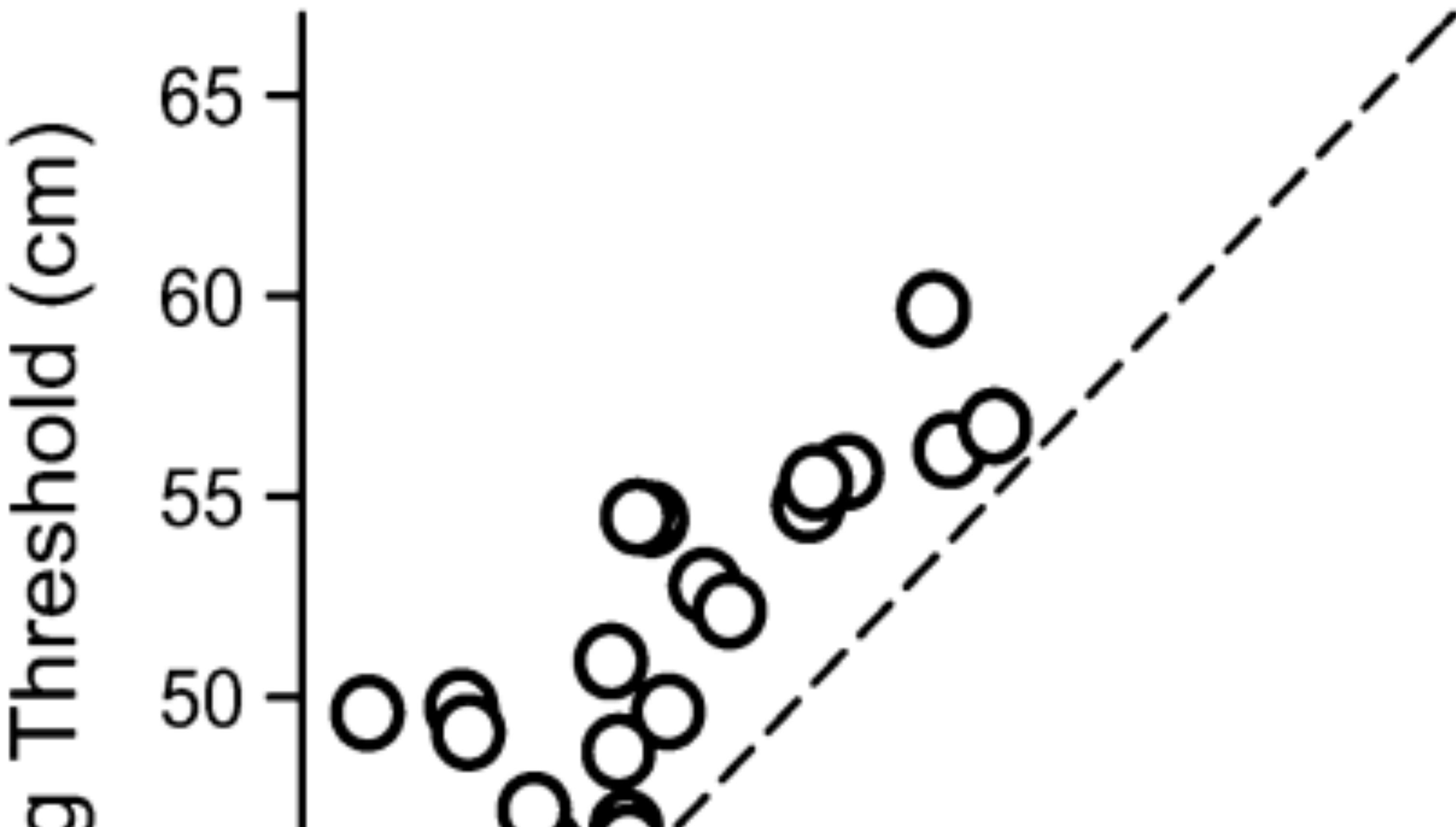
**carefully consider axes limits  
and their relative size (aspect ratio)**

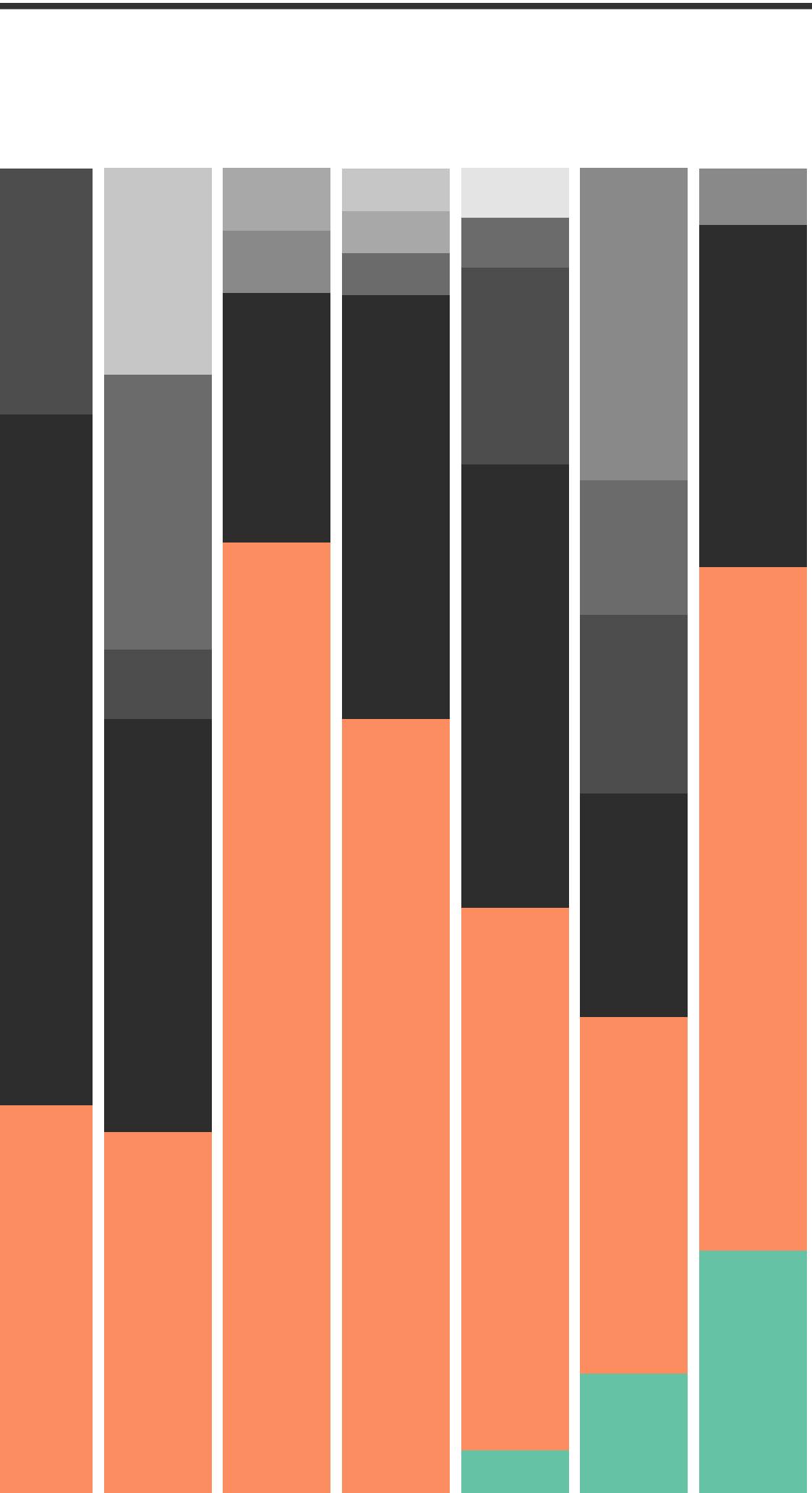
**map graphical elements to be consistent  
with the field/your other figures**

# A quick note about image formats

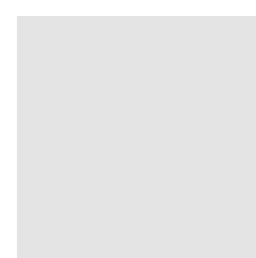
- Bitmap graphics (.bmp, .jpg, .png) contain a map of values for each pixel
  - Look good at the size they were intended to be viewed
  - Look distorted when resized
  - Only use for photos
- Vector graphics (.eps, .svg) represent an image as a series of equations
  - Scale perfectly to any size
  -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

# GAIT MODIFICATION





# Activity



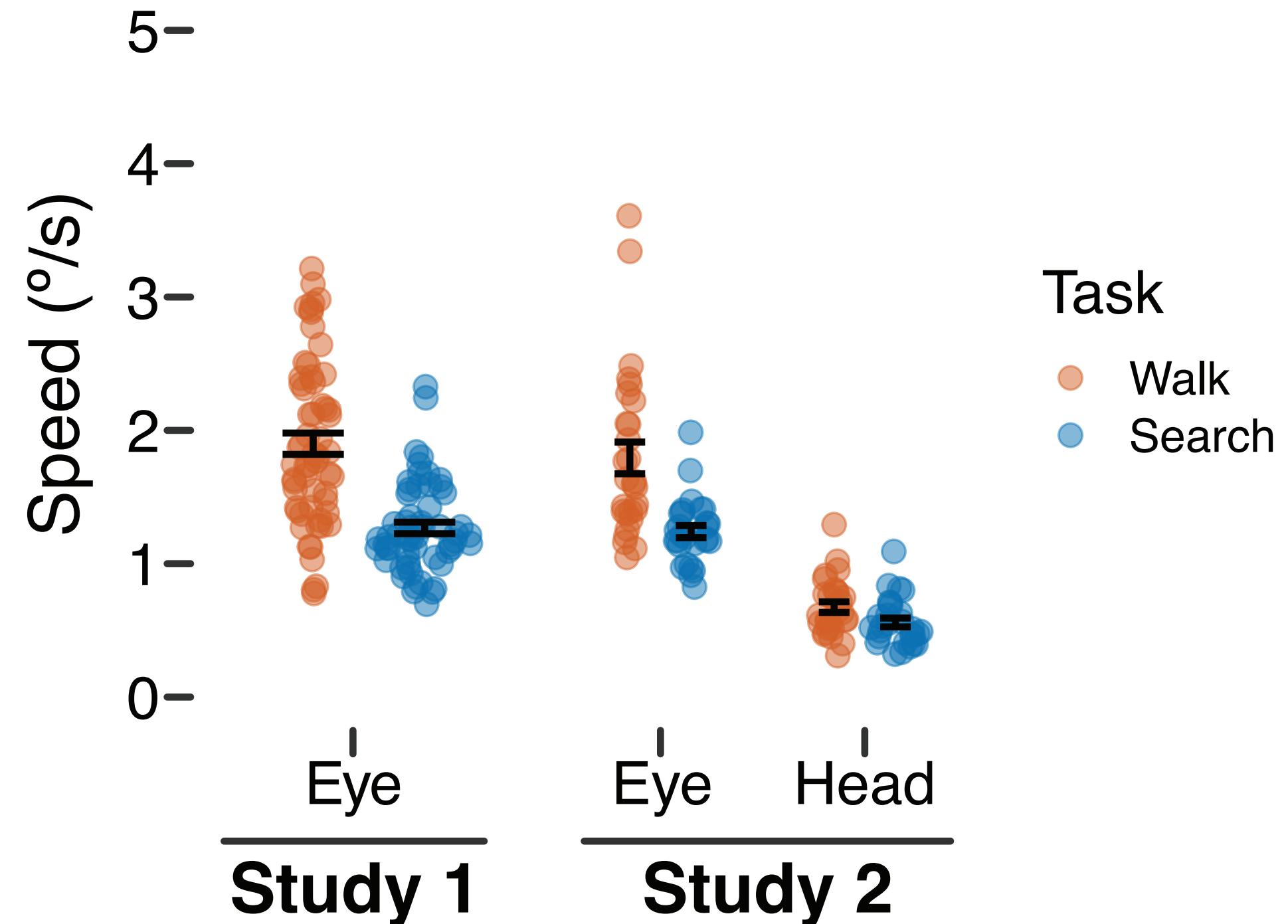
Fussing/comforting



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)