

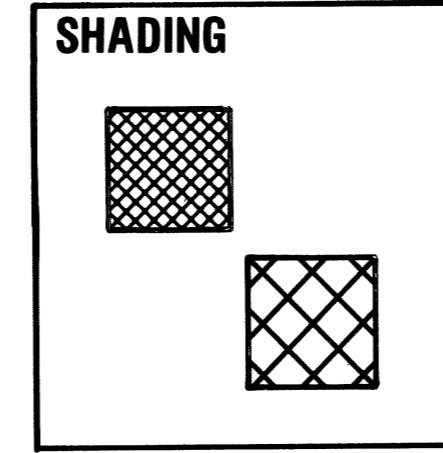
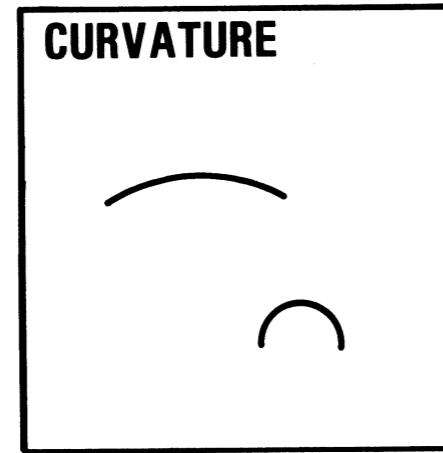
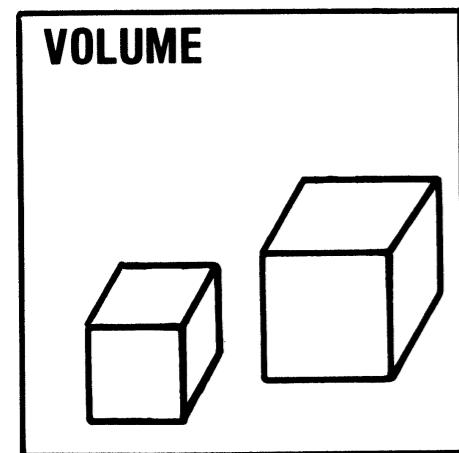
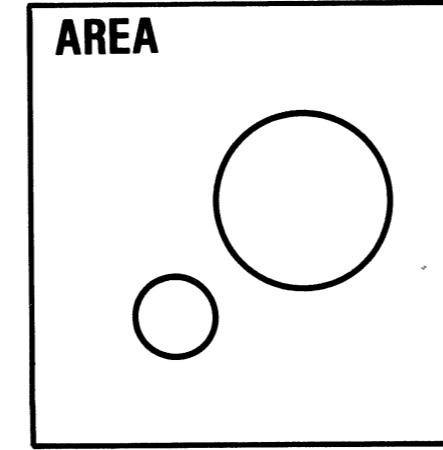
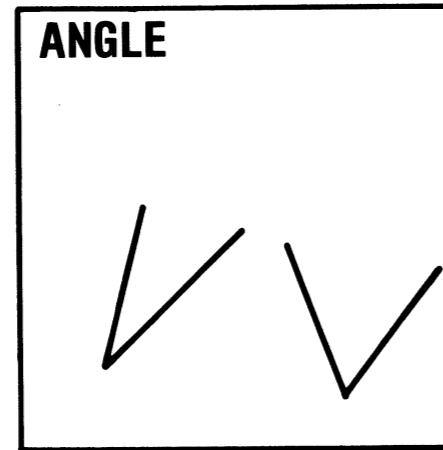
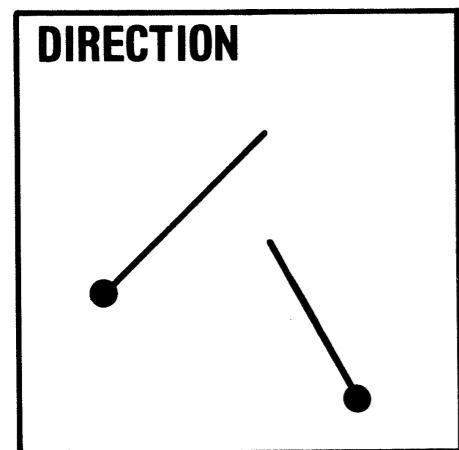
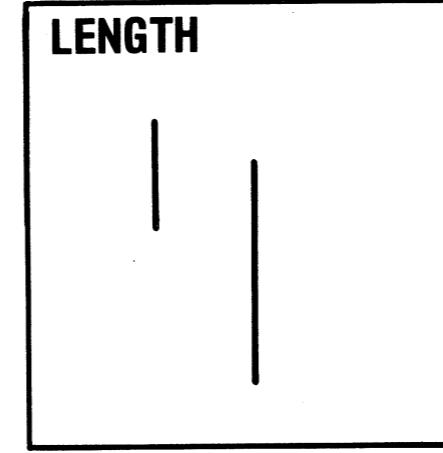
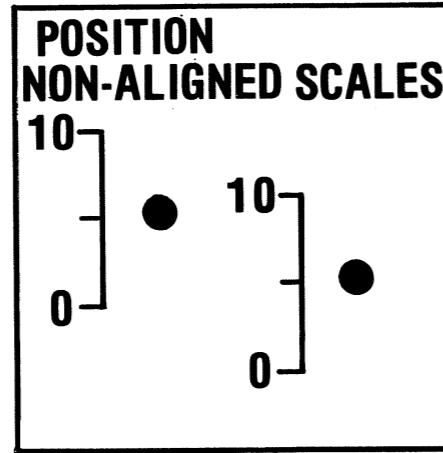
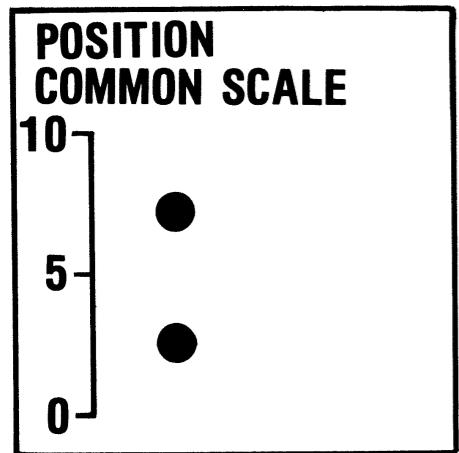
# **Examples**

MISM 95.868, Spring 2015, Mini 3

# What makes a good graphic?

- Subject of many, many books and conflicting opinions
  - Some potential for eruption of flame war
- General theme: “appearances matter”
  - Brain and visual system react to stimuli
  - Use this to promote understanding, not hinder it

# How we perceive information



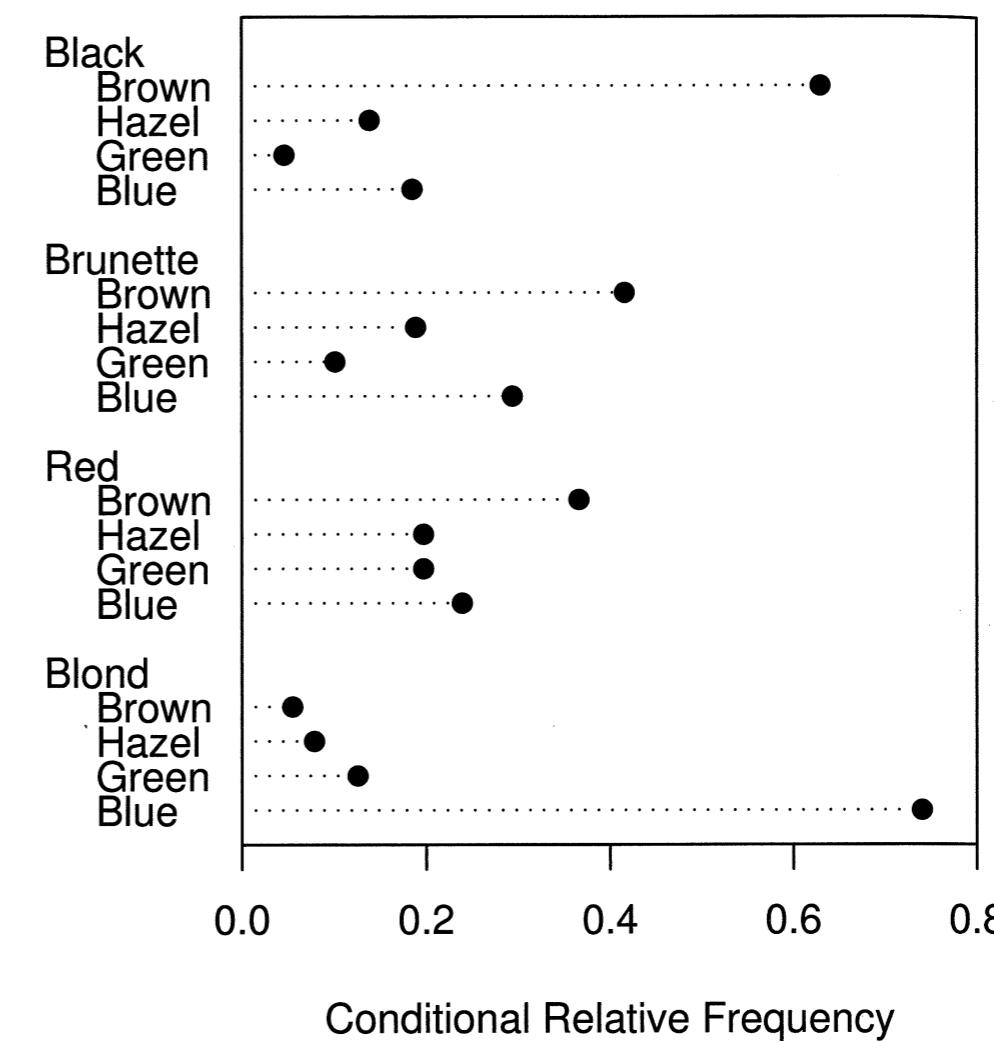
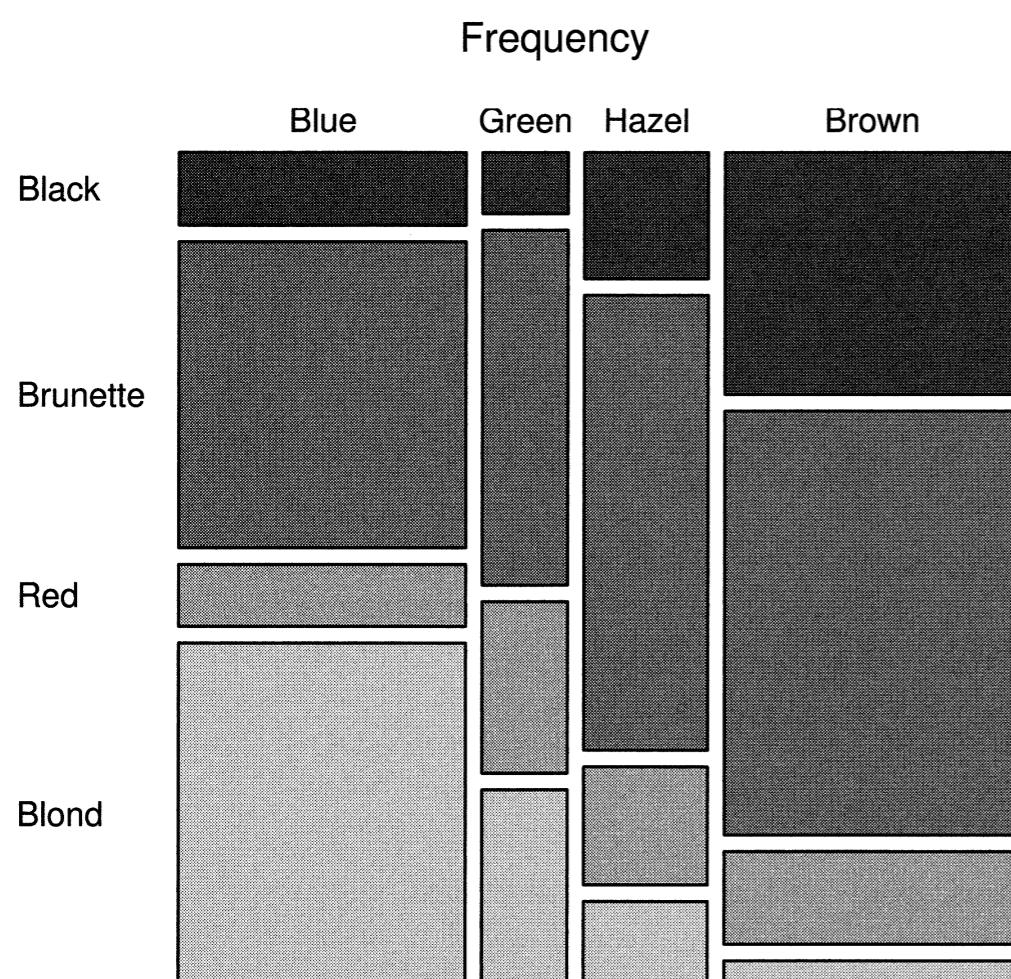
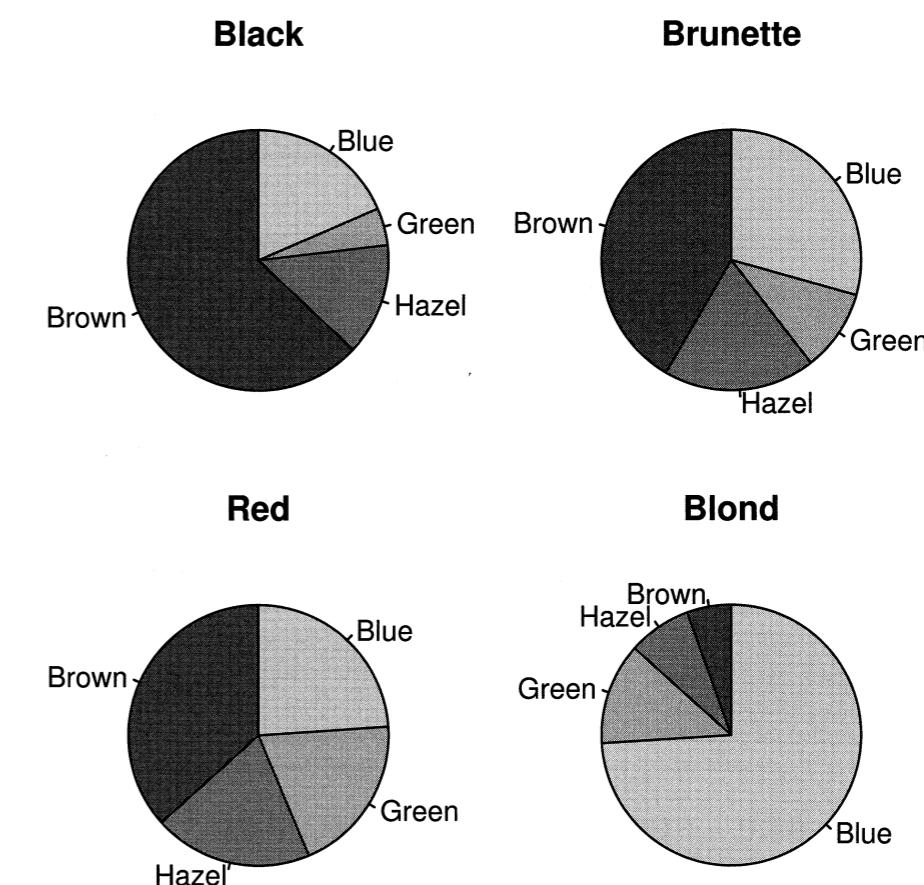
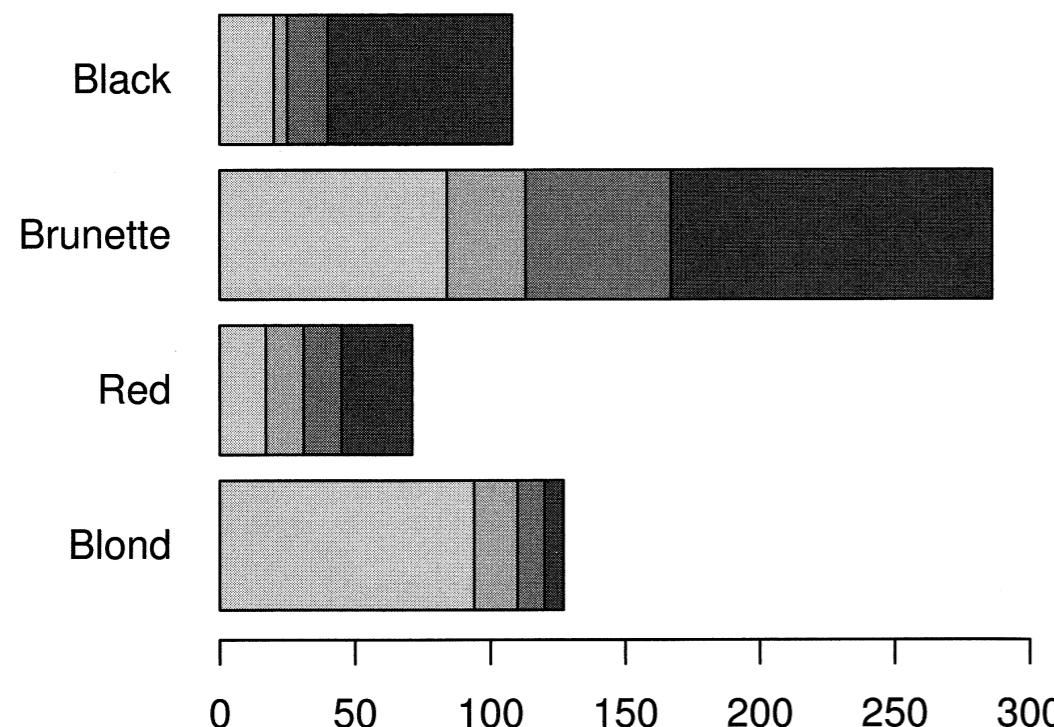
**COLOR SATURATION**

- Major ways we perceive differences in a chart
- To which modes are we most visually attuned?

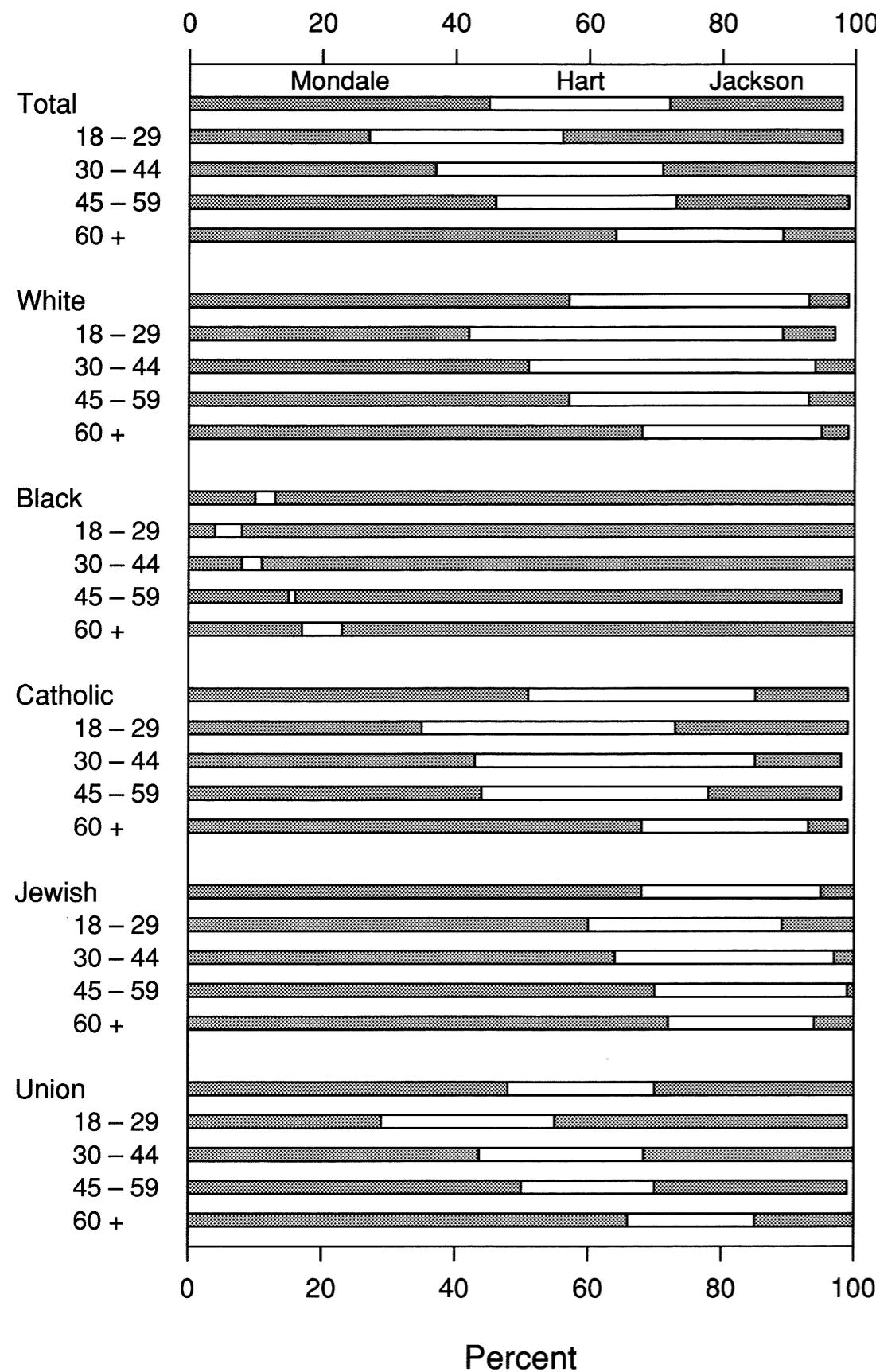
<http://woodgears.ca/eyeball>

# Experimental results

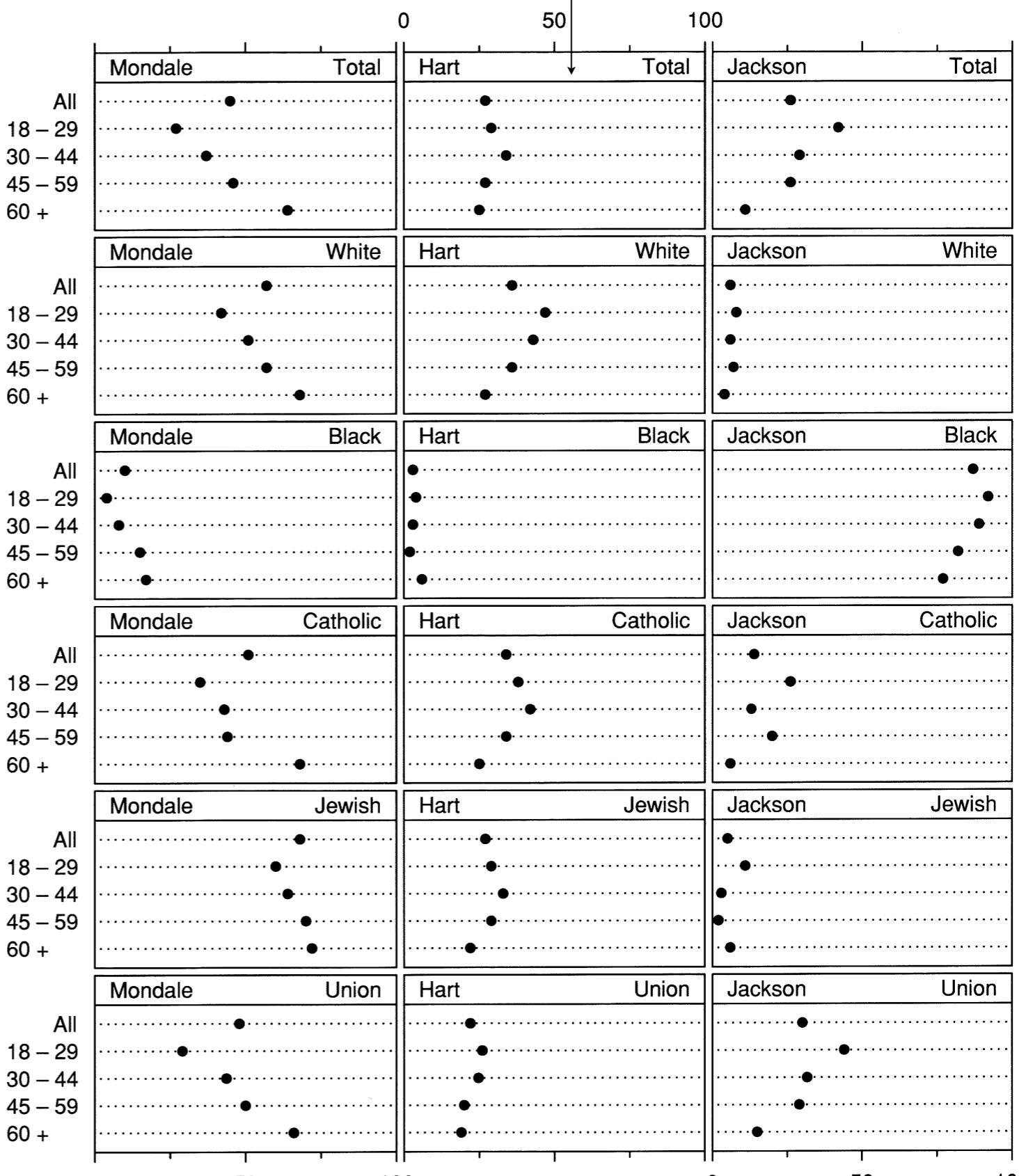
- Participants were asked to estimate the size of one magnitude against another
- Modes were ranked in this order of accuracy:
  - 1. Position along a common scale
  - 2. Position along nonaligned scales
  - 3. Length, direction, angle
  - 4. Area
  - 5. Volume
  - 6. Shading, color
- **Position along a common scale is the best visualization**



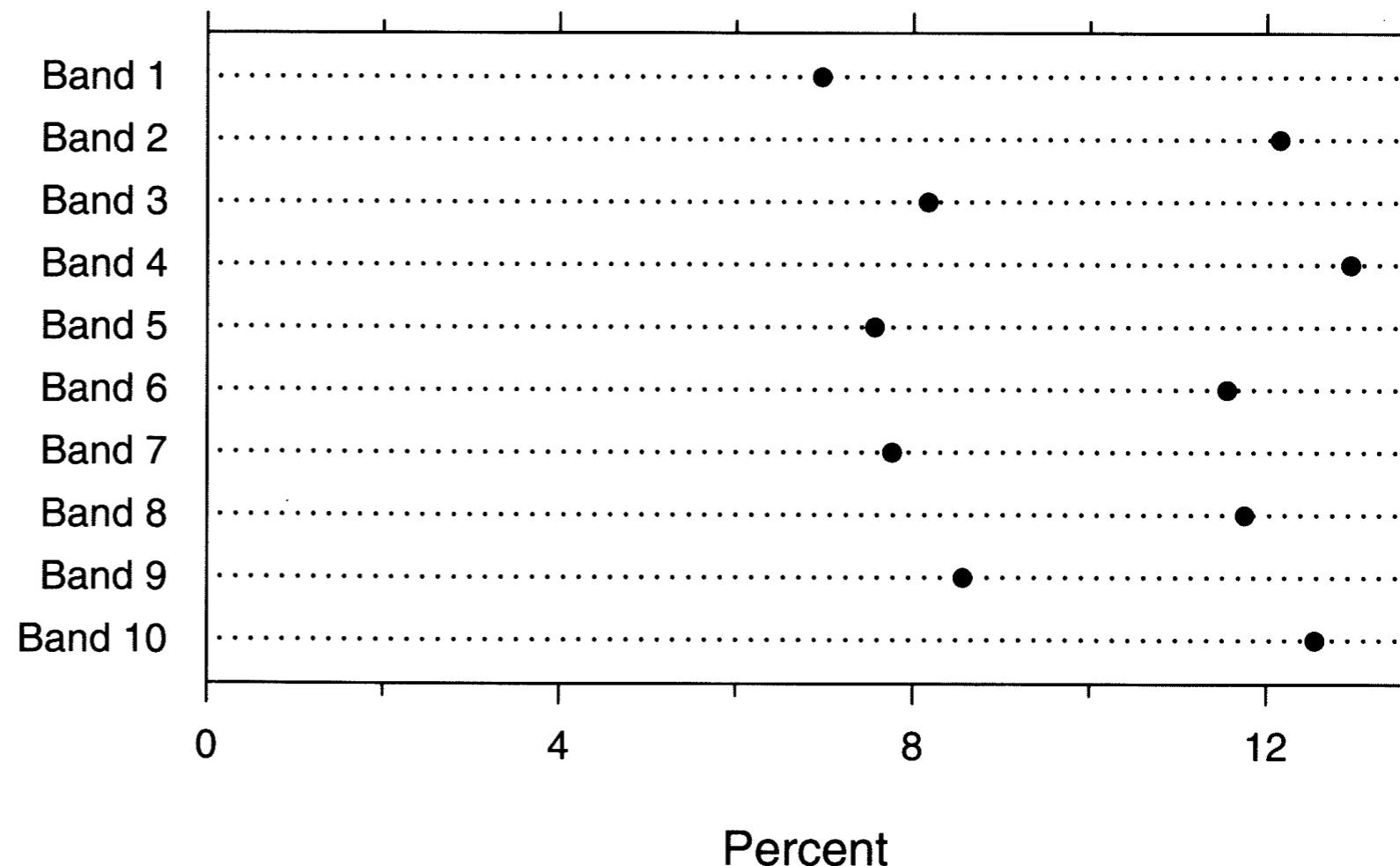
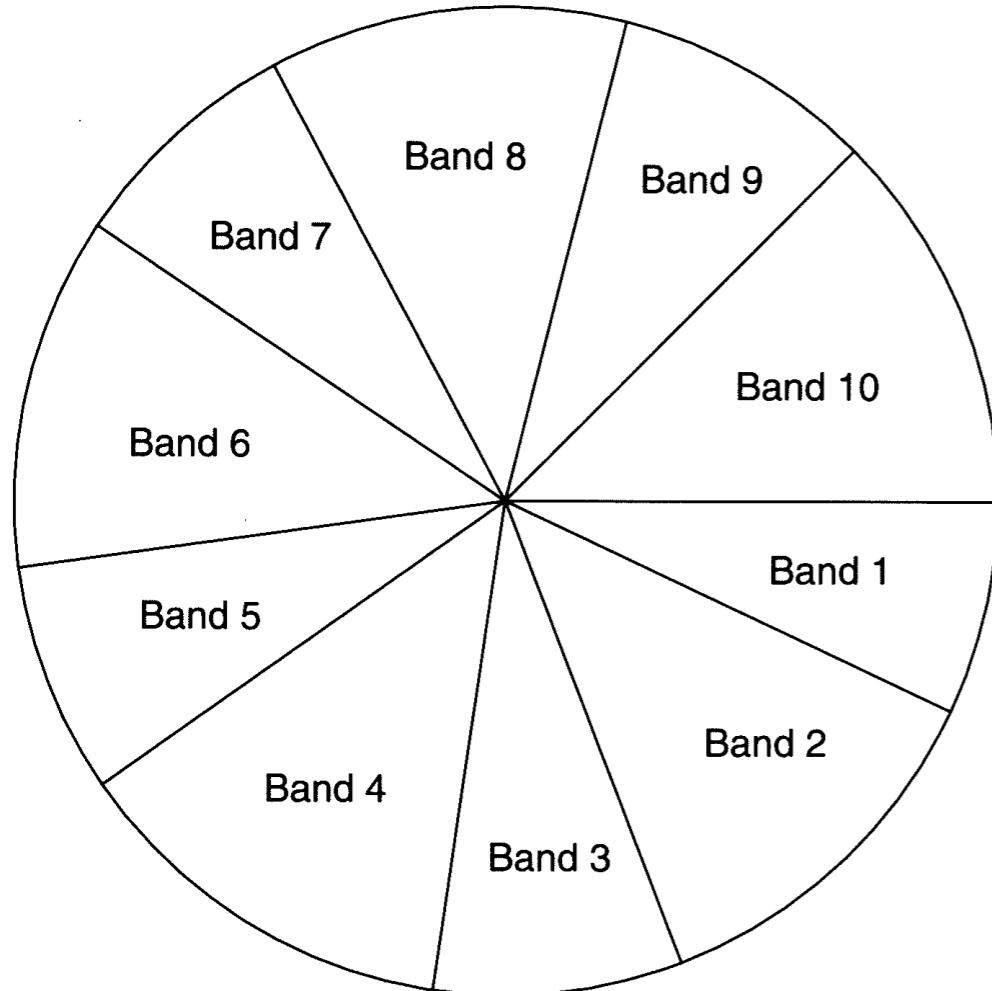
# Length vs. position



Age pattern visible for Hart voters



# Angle vs. position



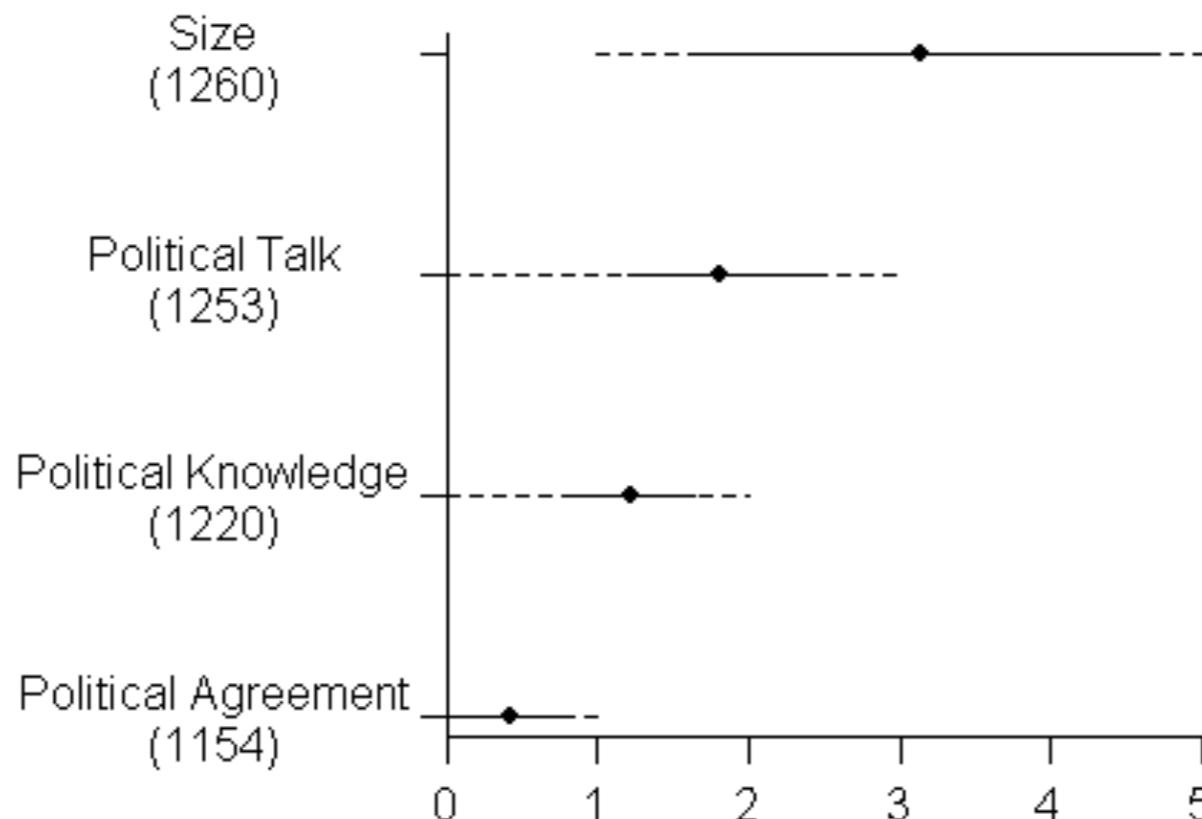
- Clustering of values is visible in left hand chart

# Tables work better as graphs

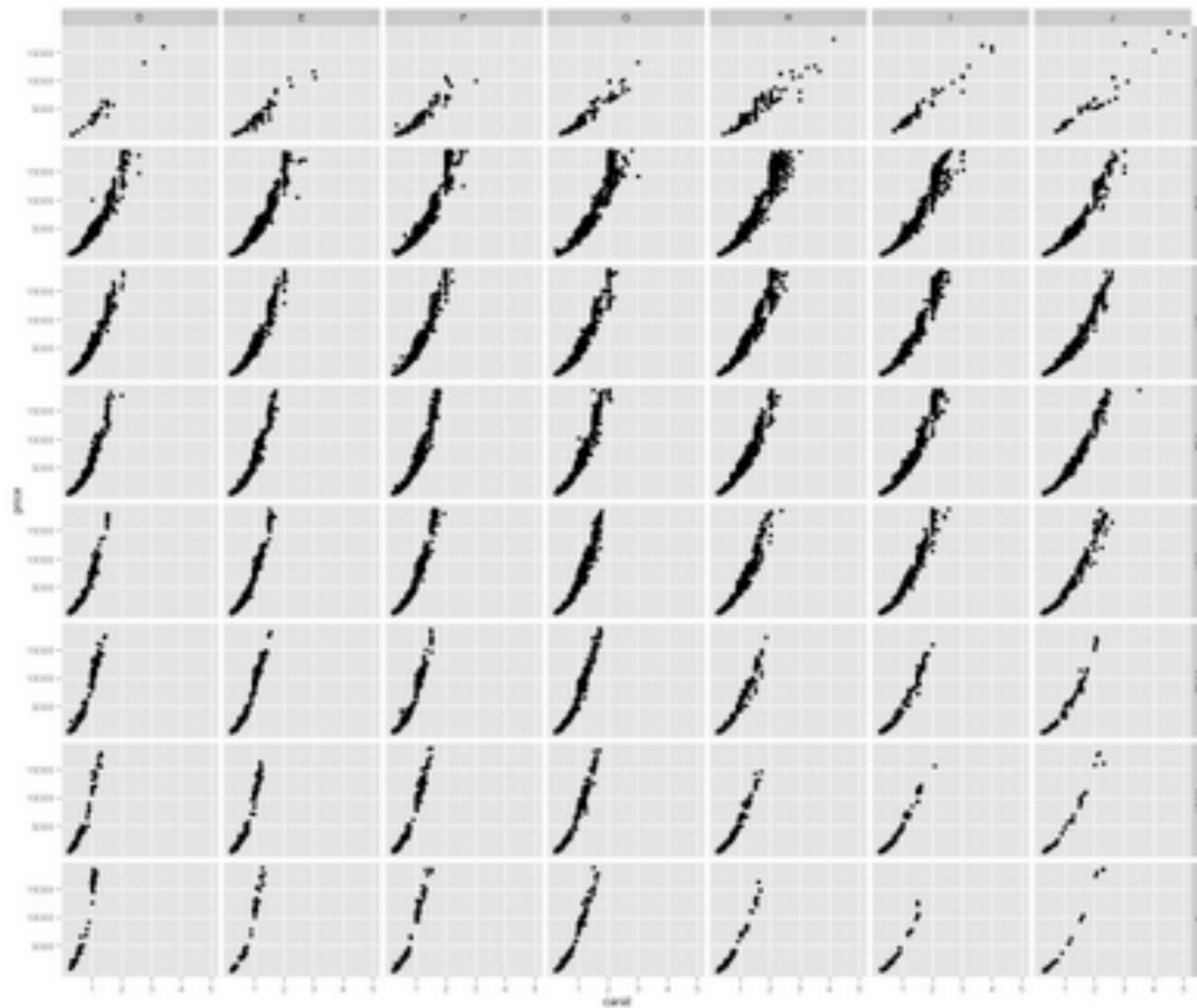
	Mean	Standard Deviation	Min	Max	N
Panel A: Descriptive Statistics					
Size <sup>a</sup>	3.13	1.49	1	5	1260
Political Talk	1.82	0.61	0	3	1253
Political Agreement	0.43	0.41	0	1	1154
Political Knowledge	1.22	0.42	0	2	1220

<sup>a</sup>When respondents who report having *no network* are included the mean of this variable drops to 2.57 with a standard deviation 1.81 ( $n = 1537$ ).

## Our Graph

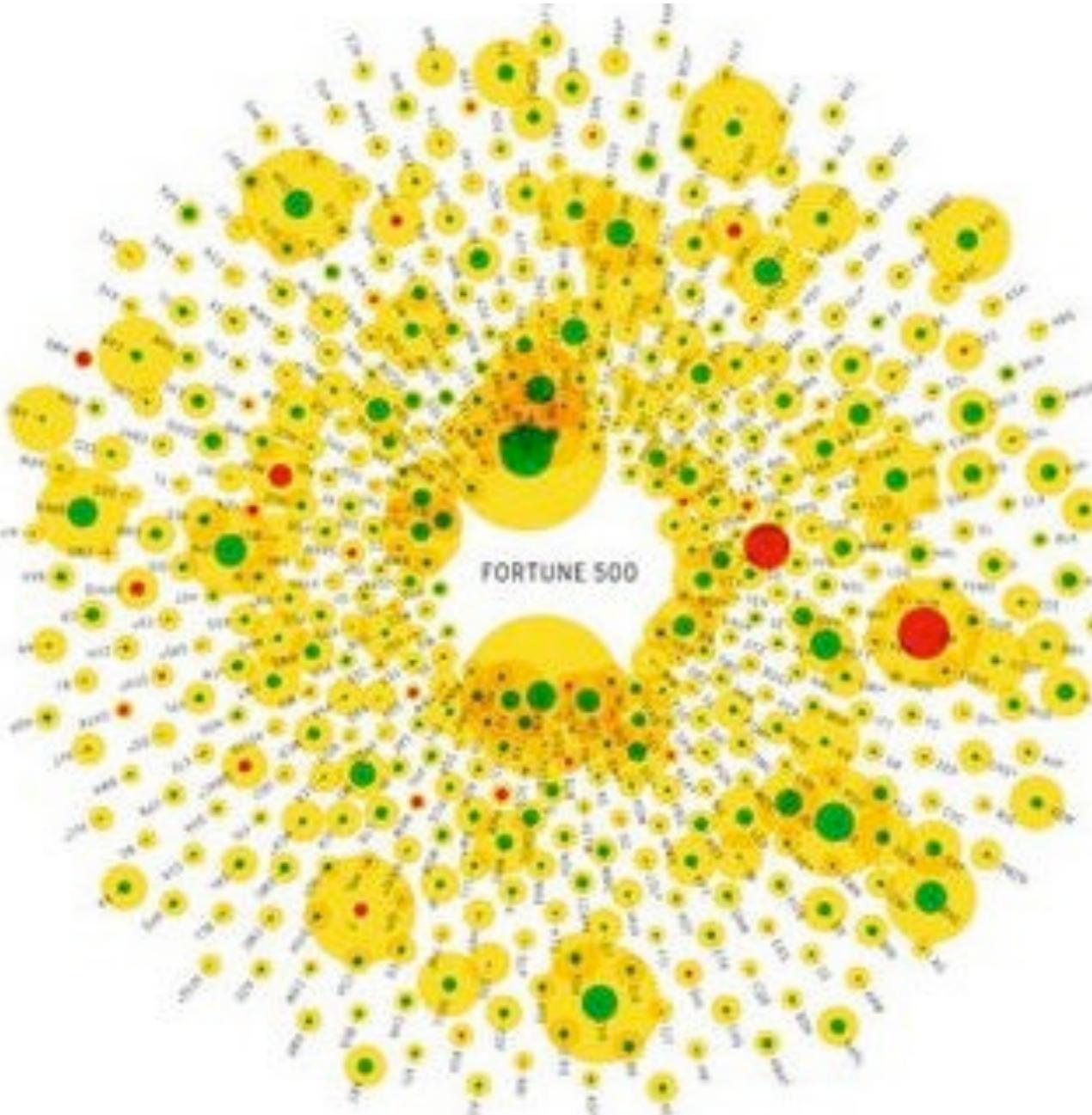


- Small multiples are useful for adding categorical dimension to any plot

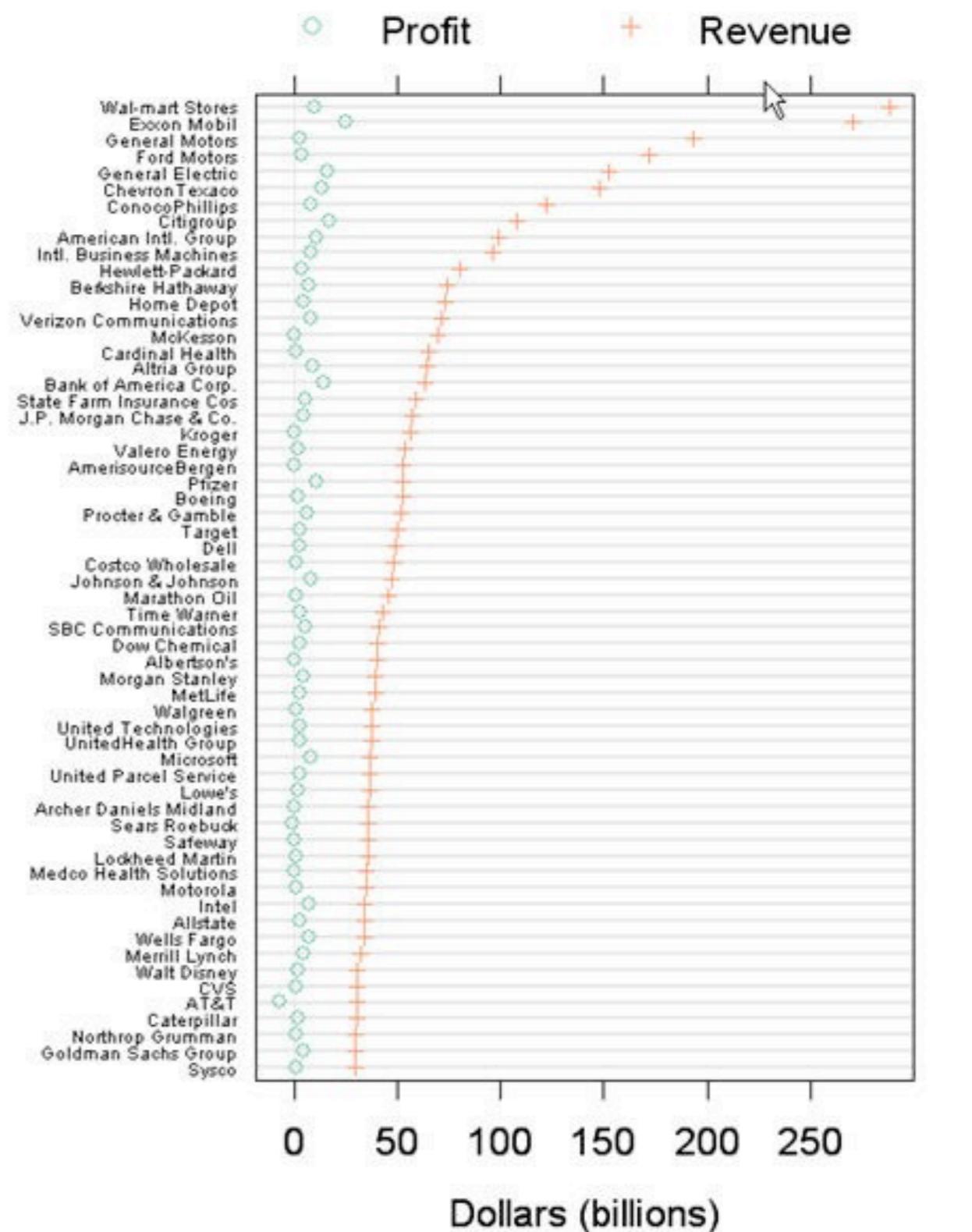


# When art precedes function

- Which is more eye-catching?
- Which is more functional?



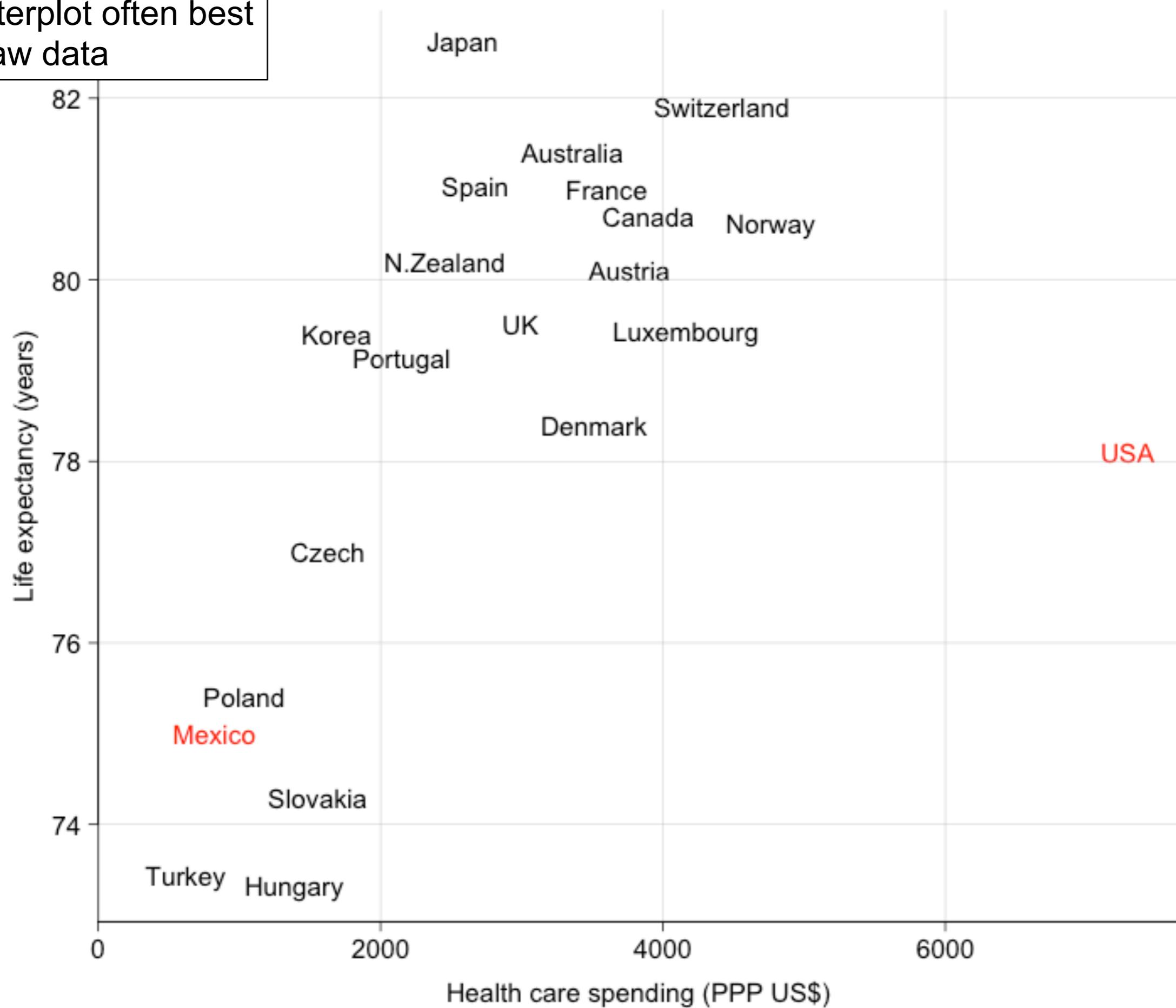
Superposed Plot of Revenues and Profits



## (From National Geographic)

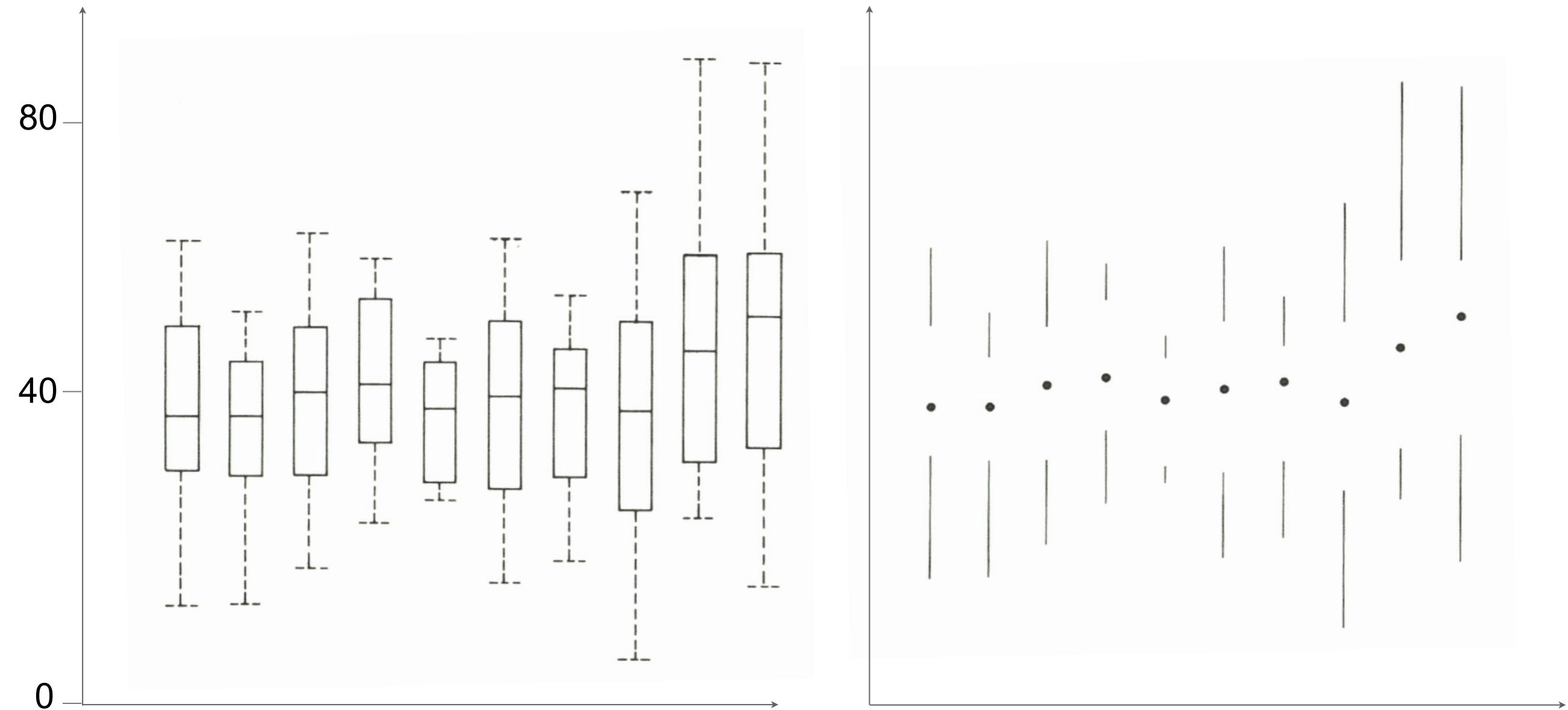


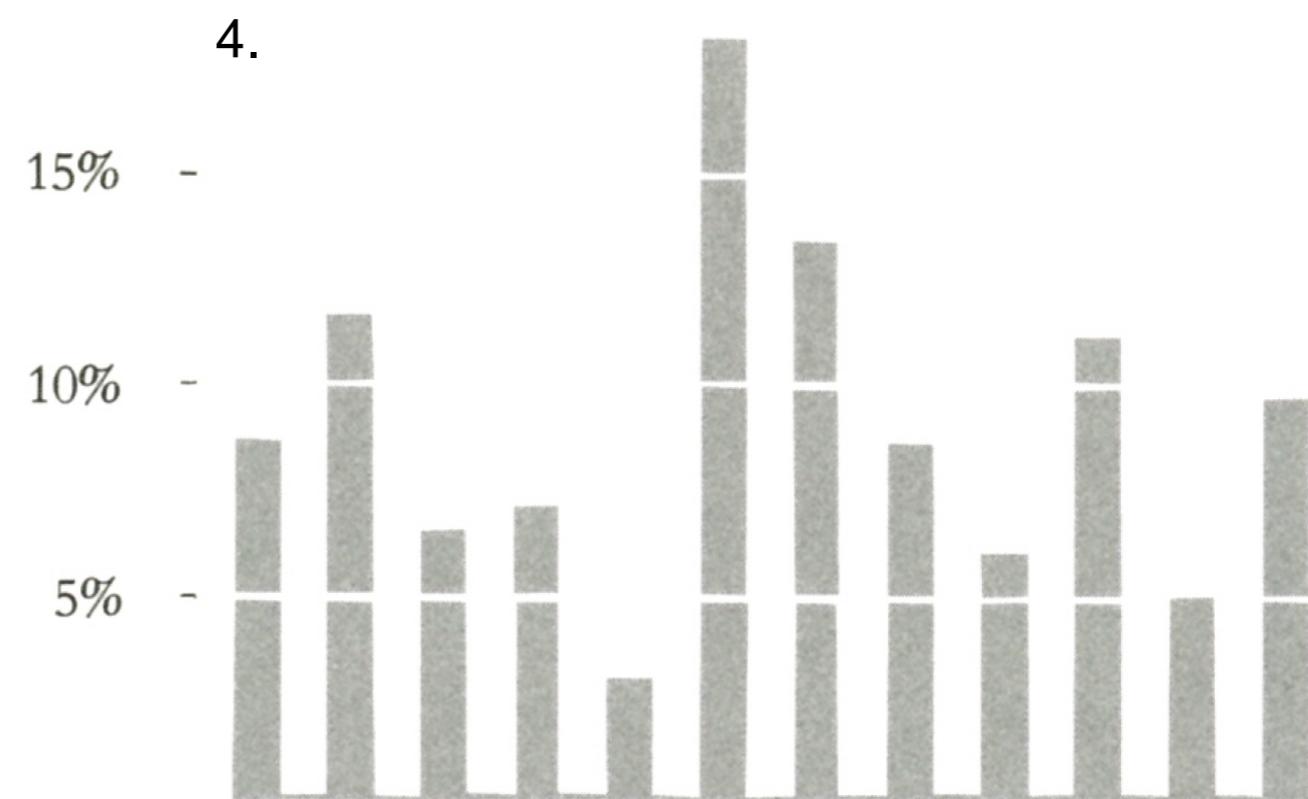
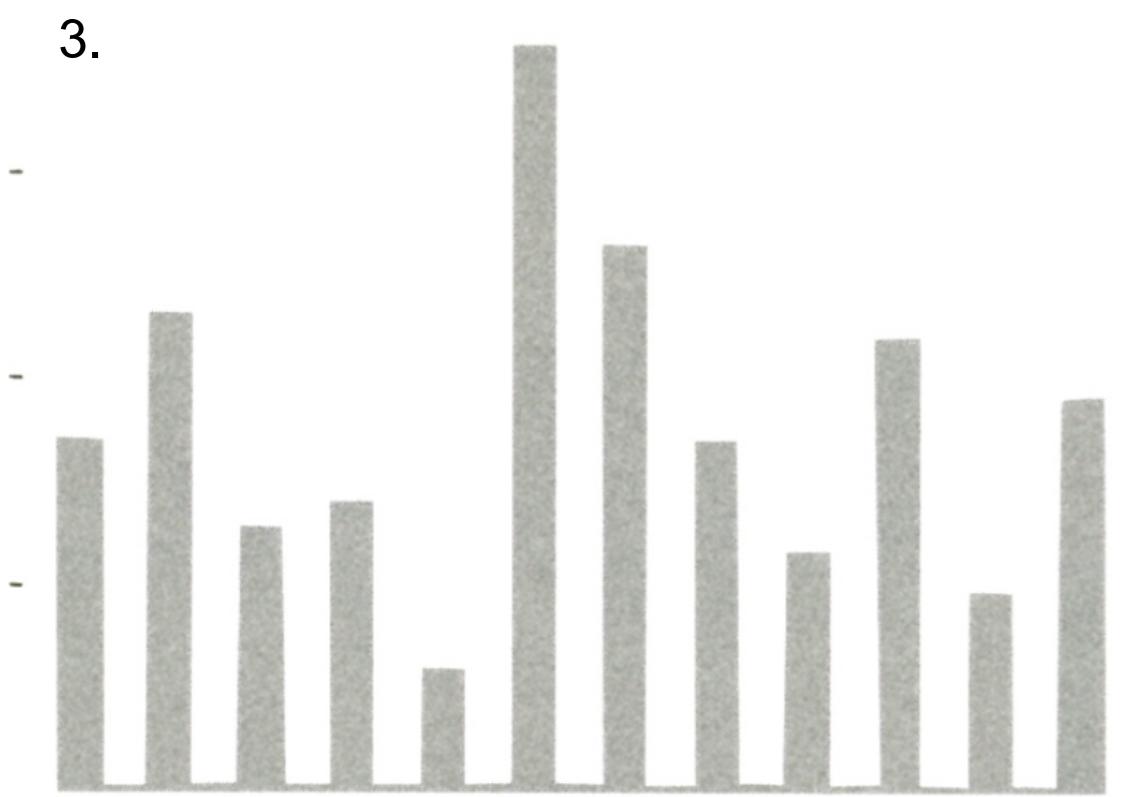
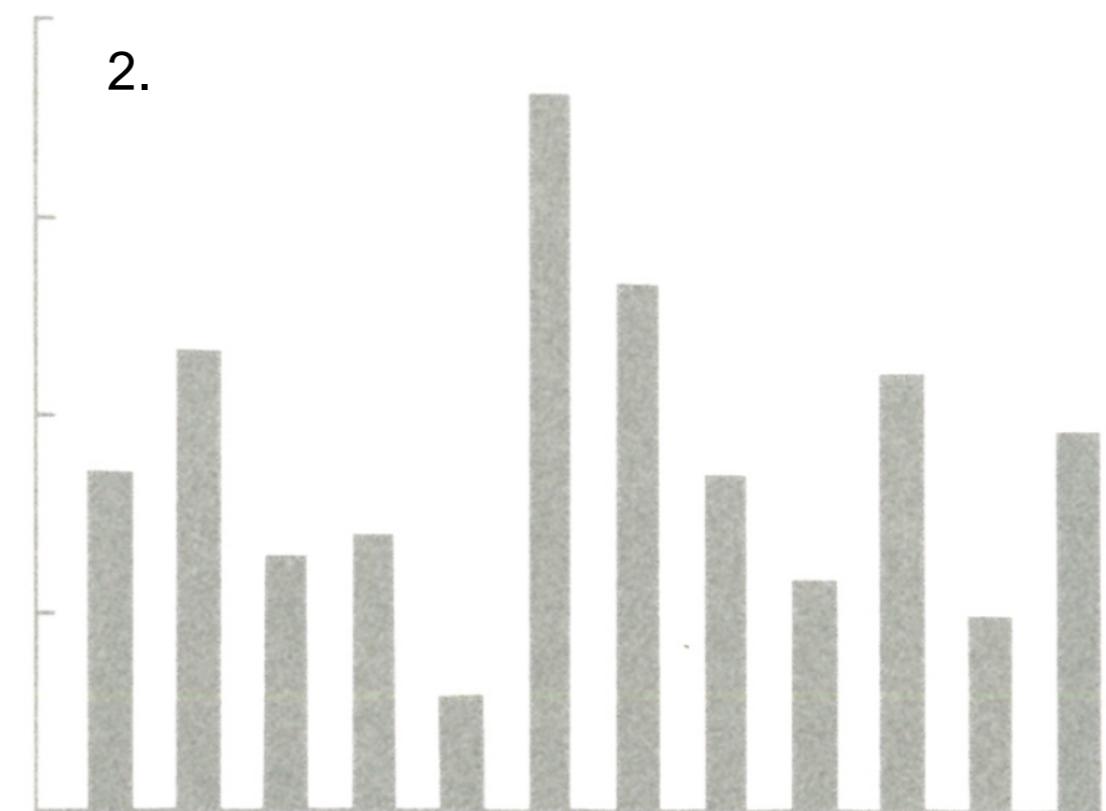
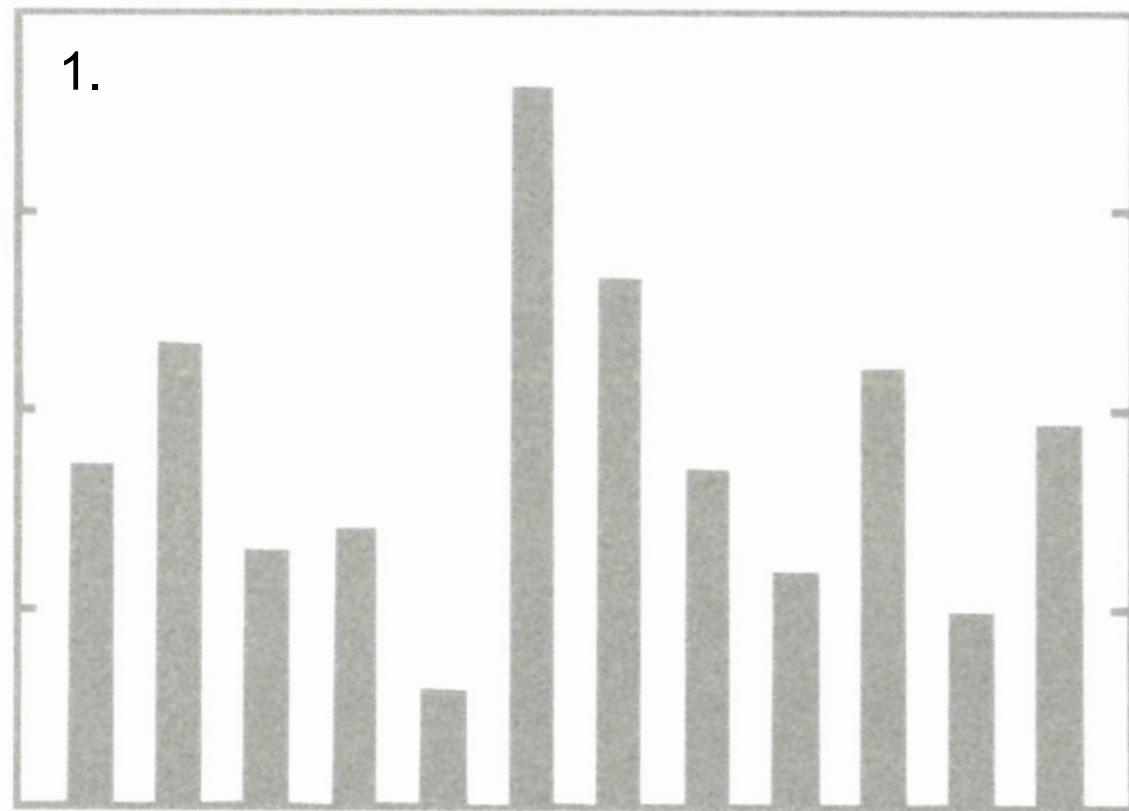
Scatterplot often best  
for raw data



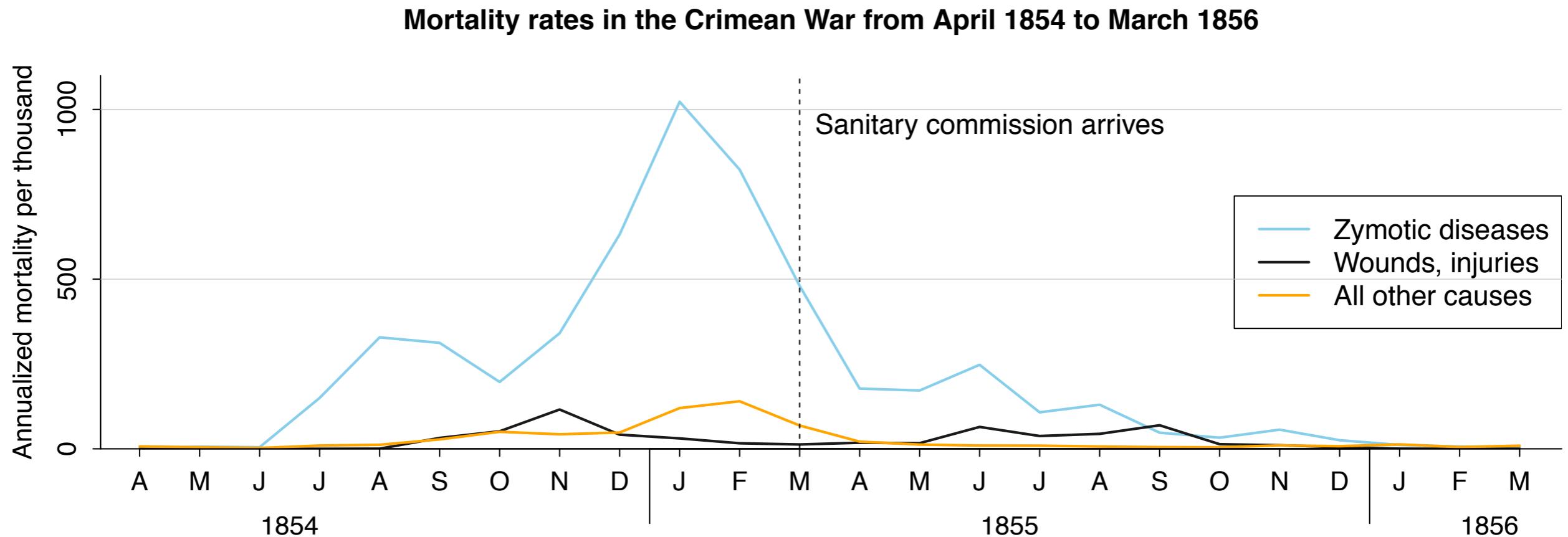
# Tufte-style minimalism

- Minimalist symbols gives same information
  - facilitates comparisons - “let the data speak”

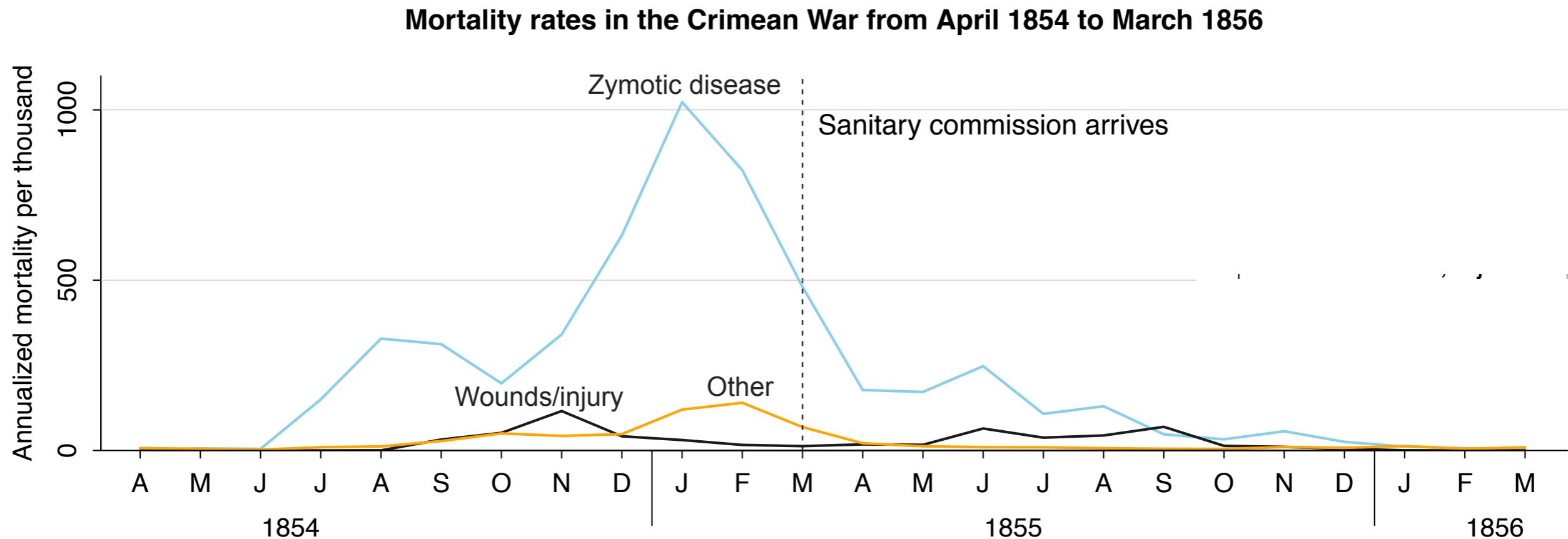




# Label the data, avoid legends

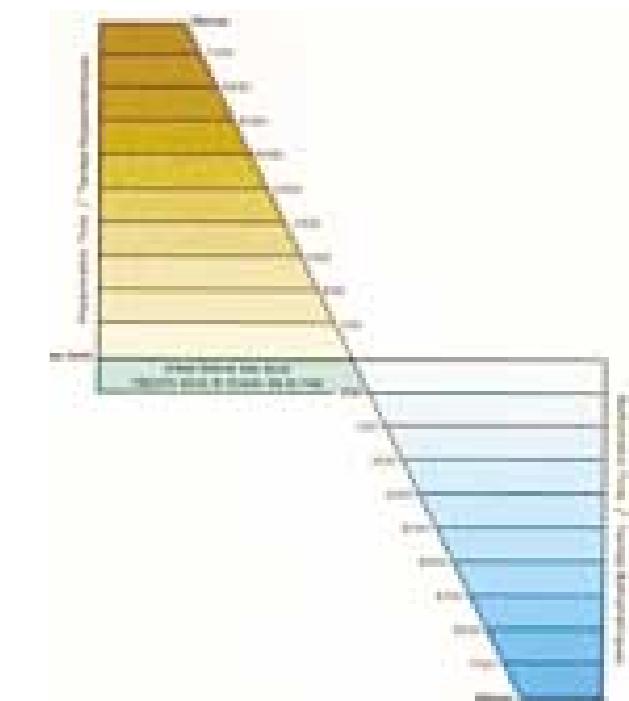
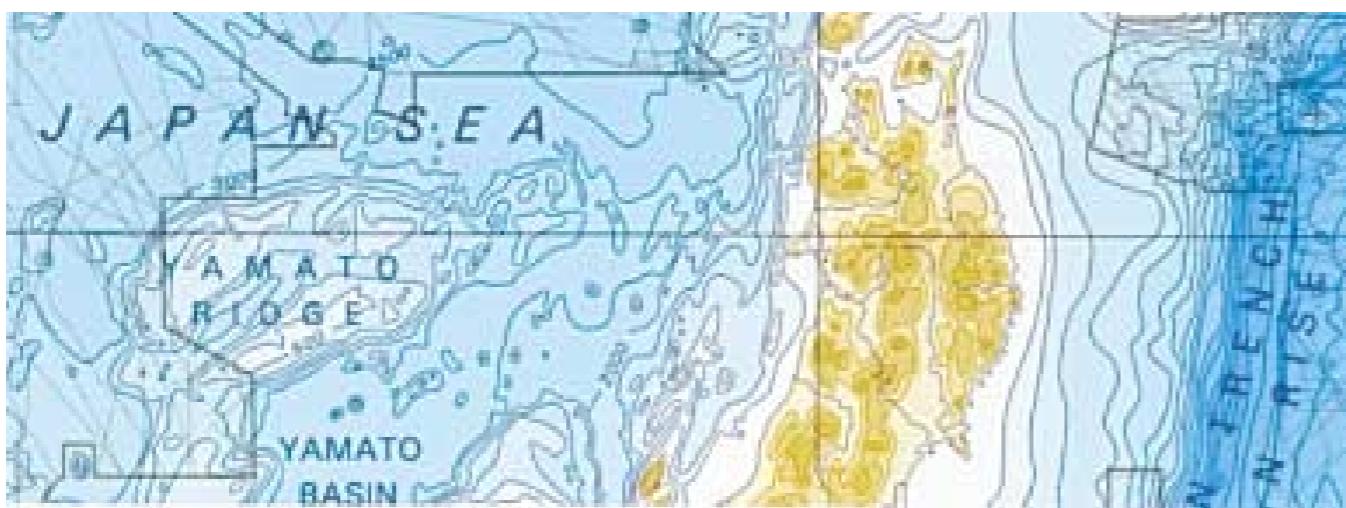
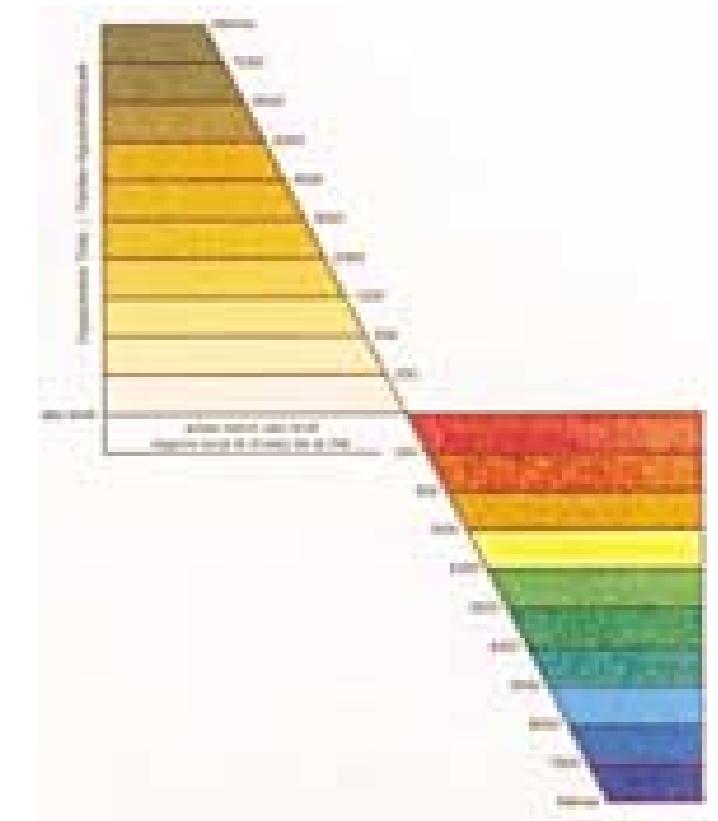
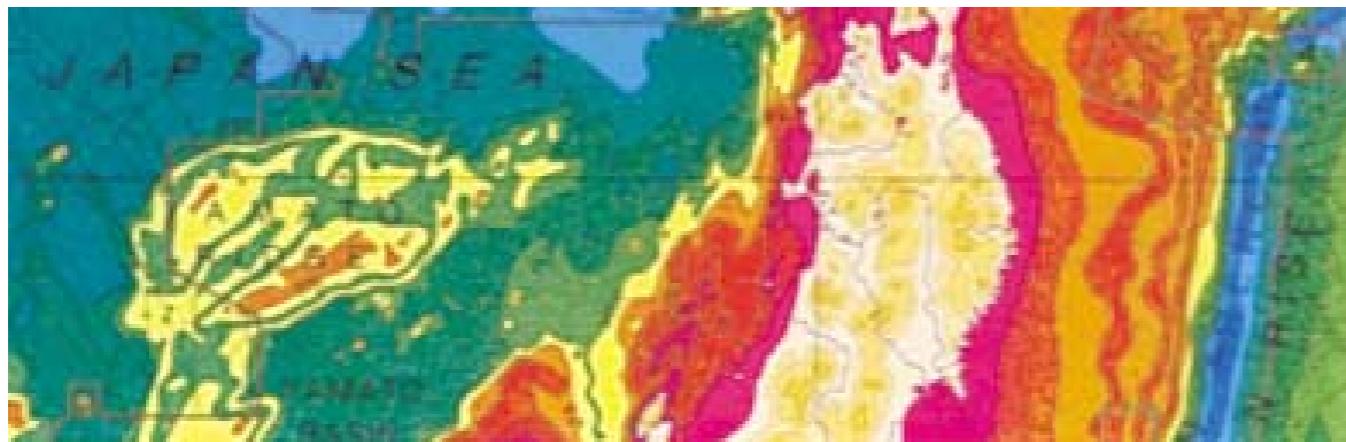


# Label the data, avoid legends

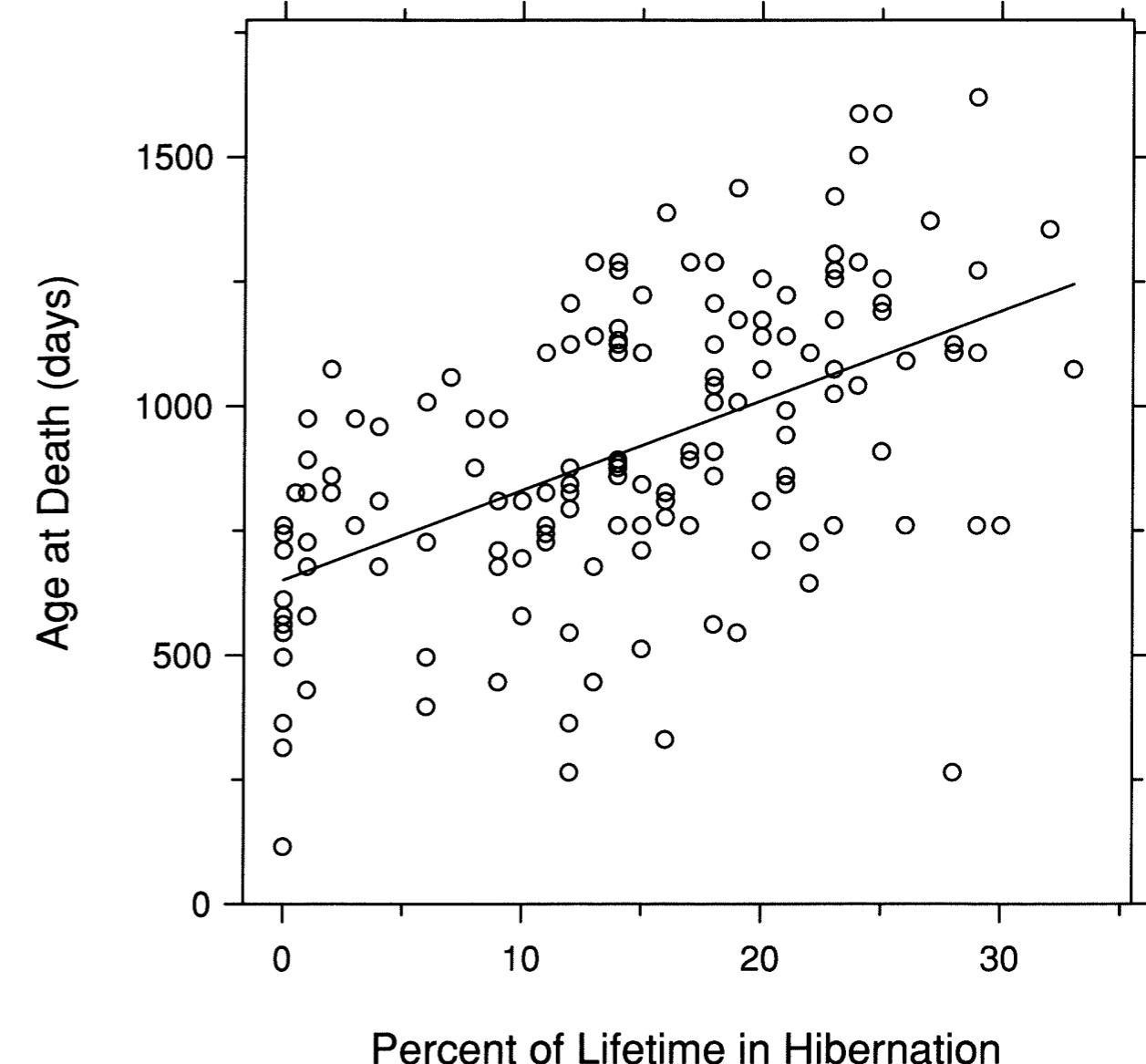
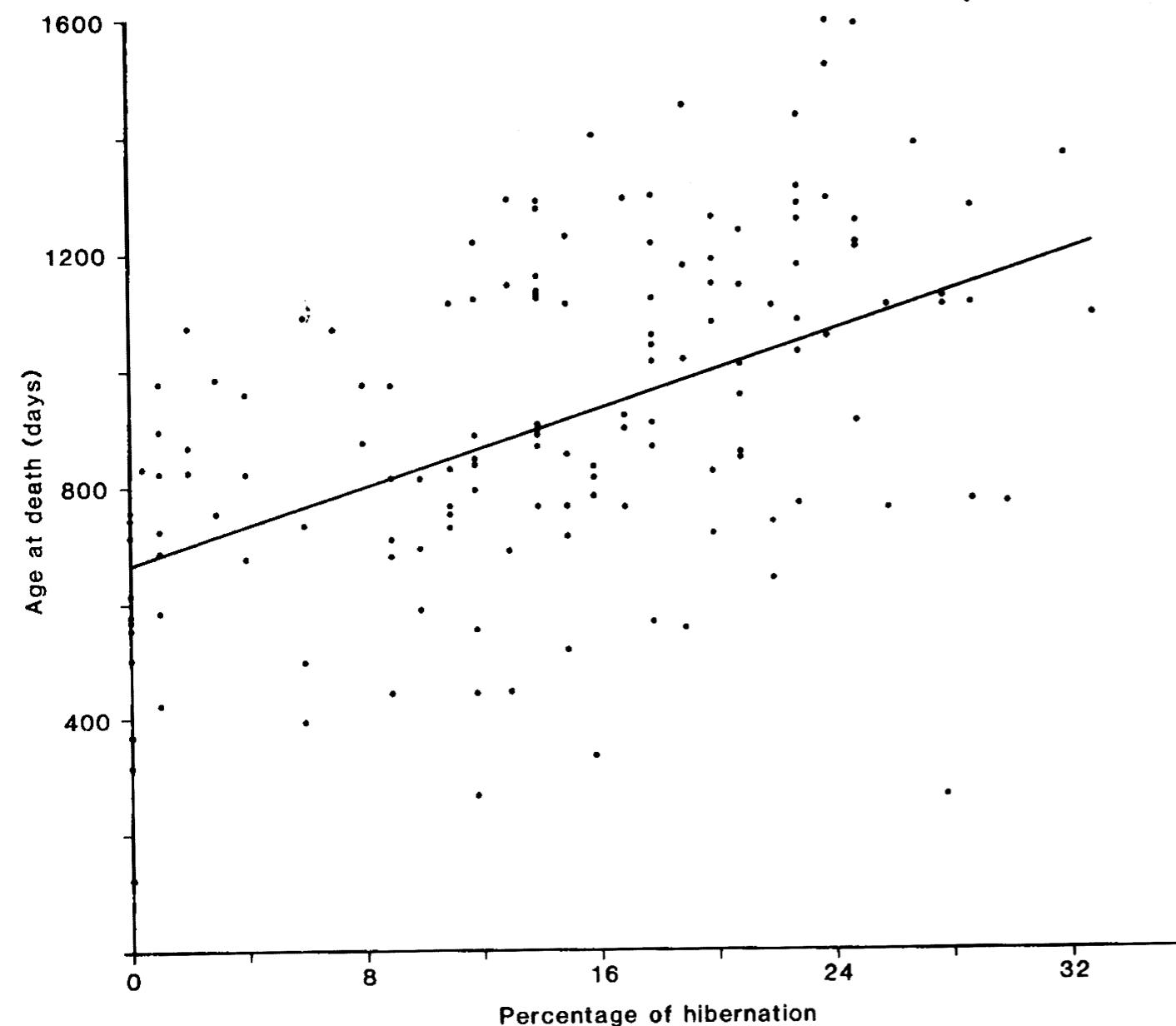


- With some exceptions of course
  - Whatever is easiest to read

# Avoid ridiculous color schemes

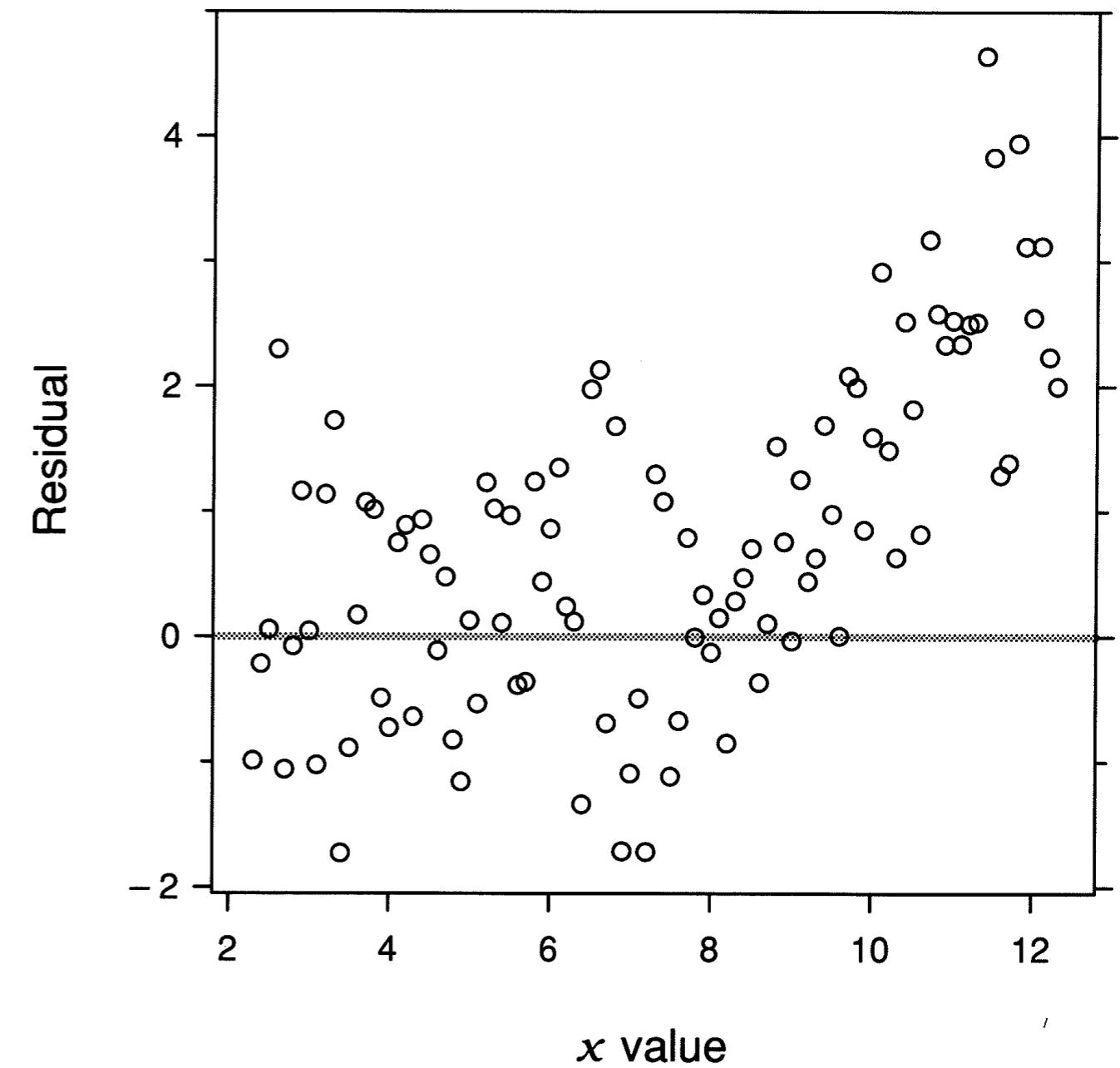
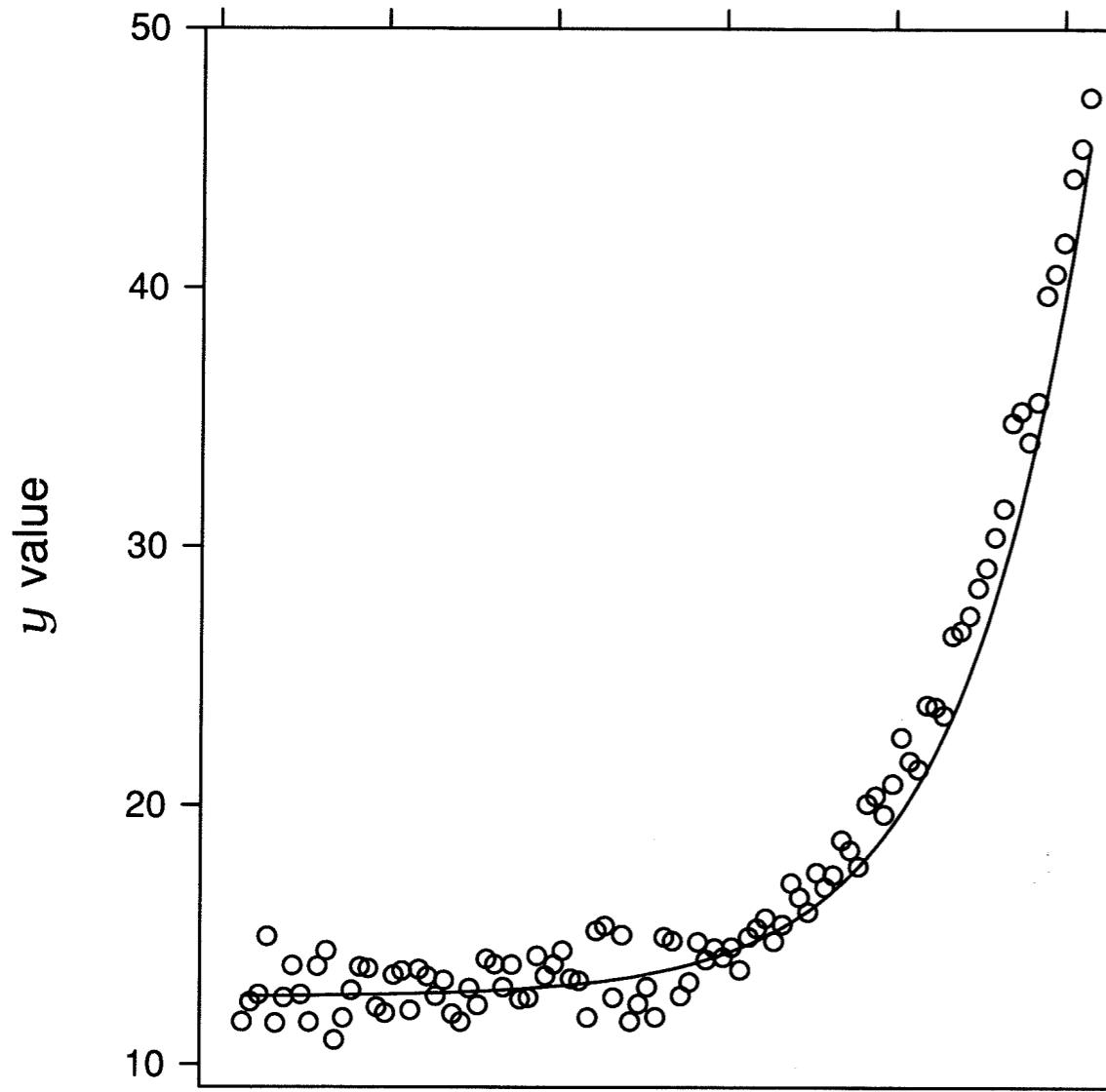


# Visually prominent graphics



- Plot on right is easier to read
  - Also note data was occluded by y axis previously

# Make visual comparisons easy 1

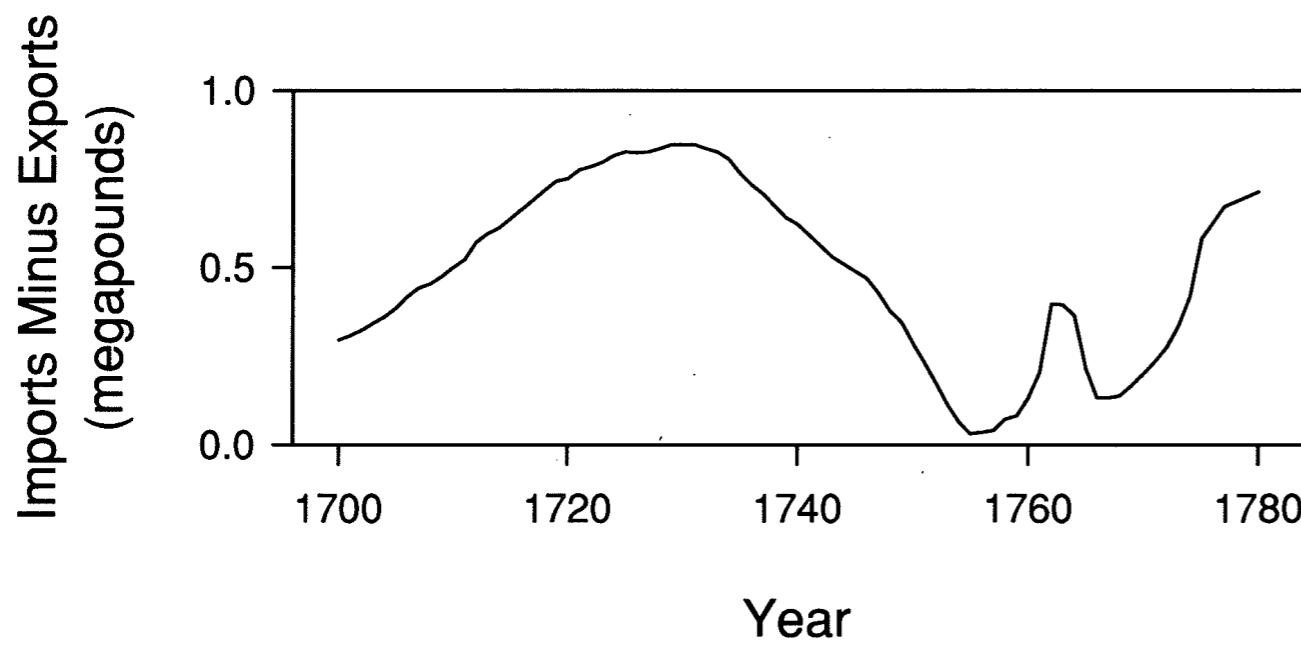


- Residuals look larger for small  $x$ -values, but in fact opposite is true

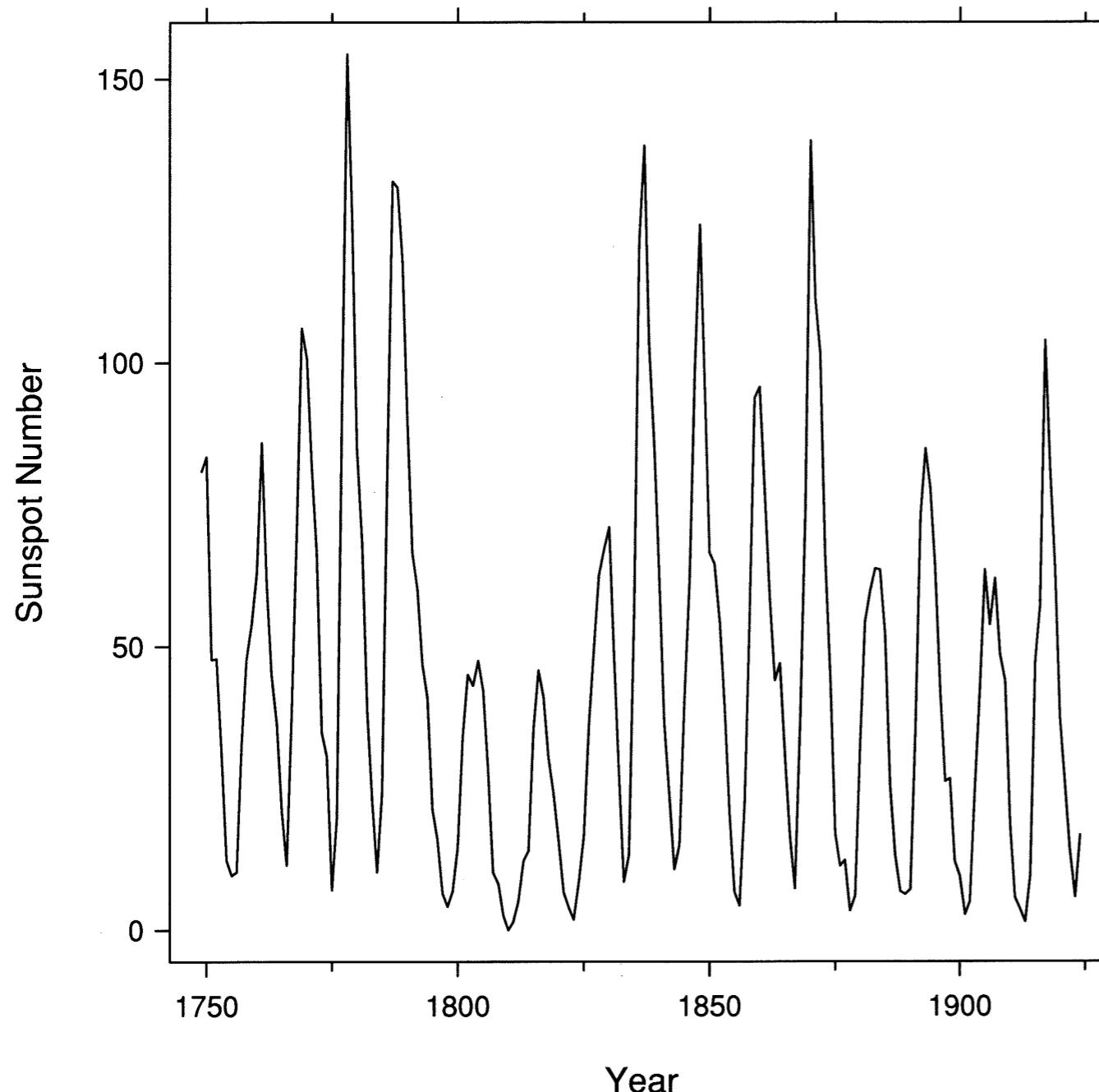
# Make visual comparisons easy 1



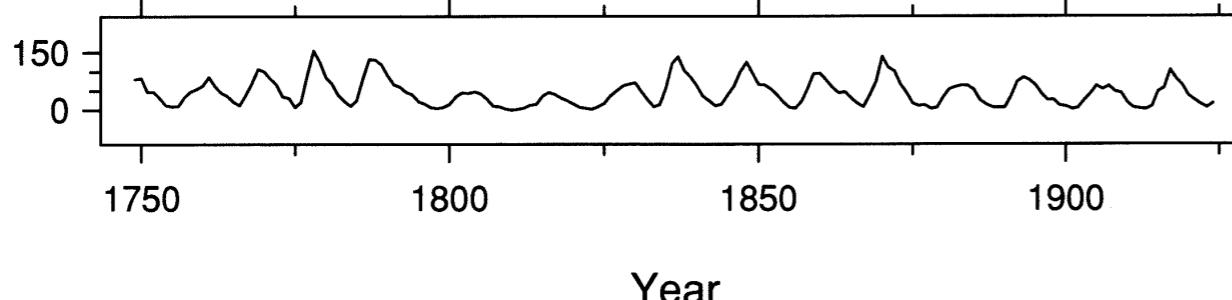
- If difference is important, a good idea is to plot differences separately when overlaying curves



# Make visual comparisons easy 2

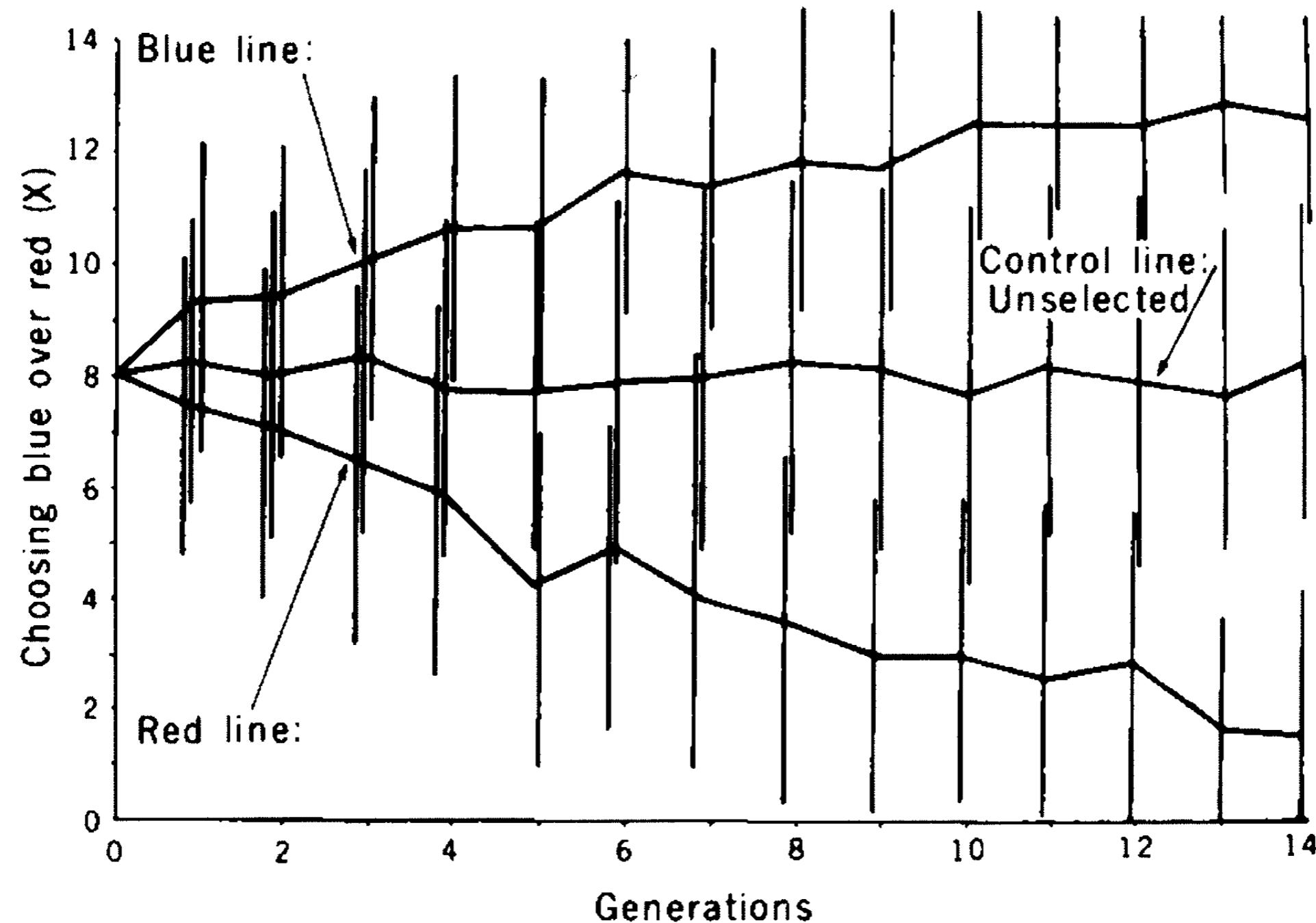


- Aspect ratio affects our perception of curvature
- “Banking to 45 degrees” is easiest to judge curvature



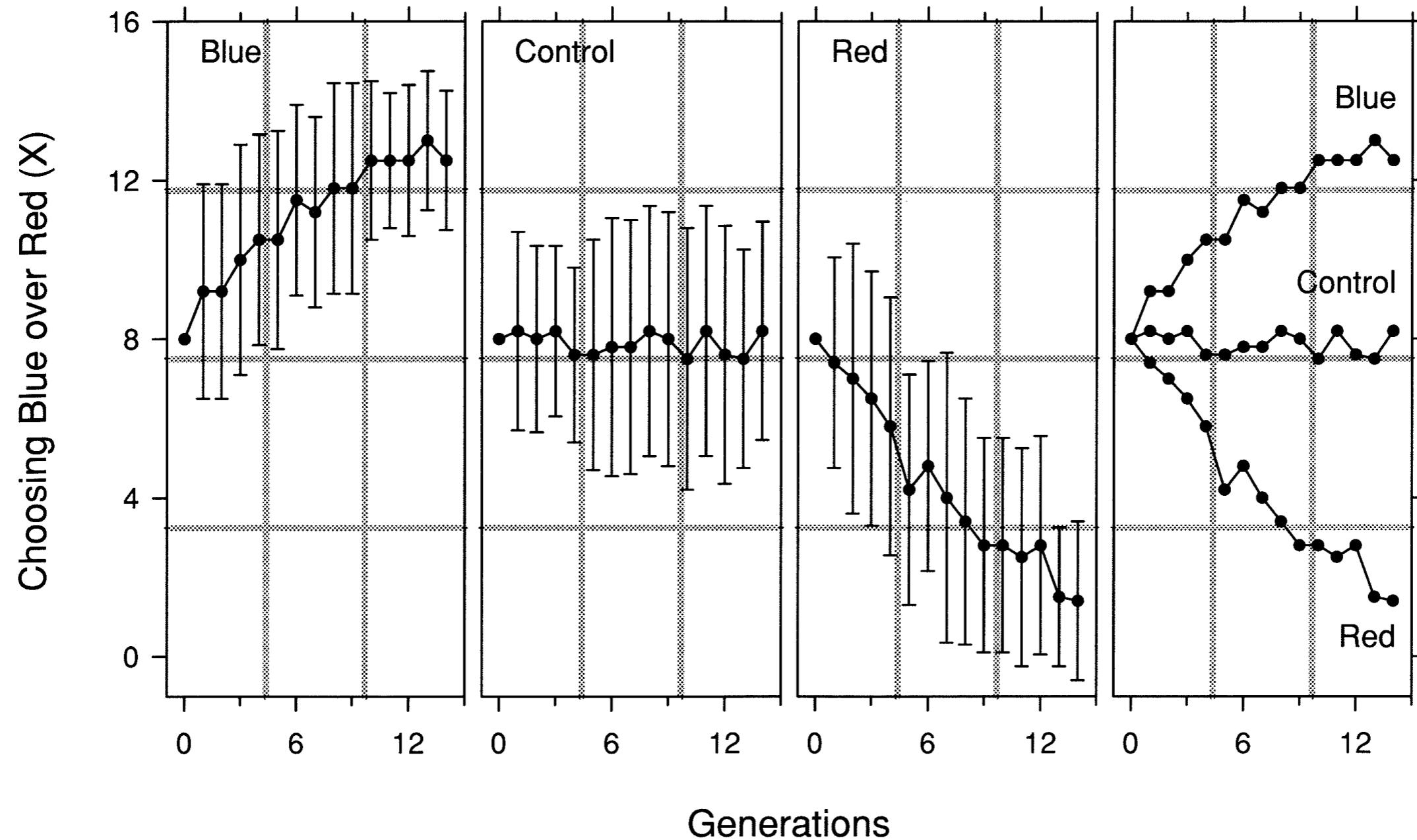
This one is better for detecting curvature

# Avoid clutter 1



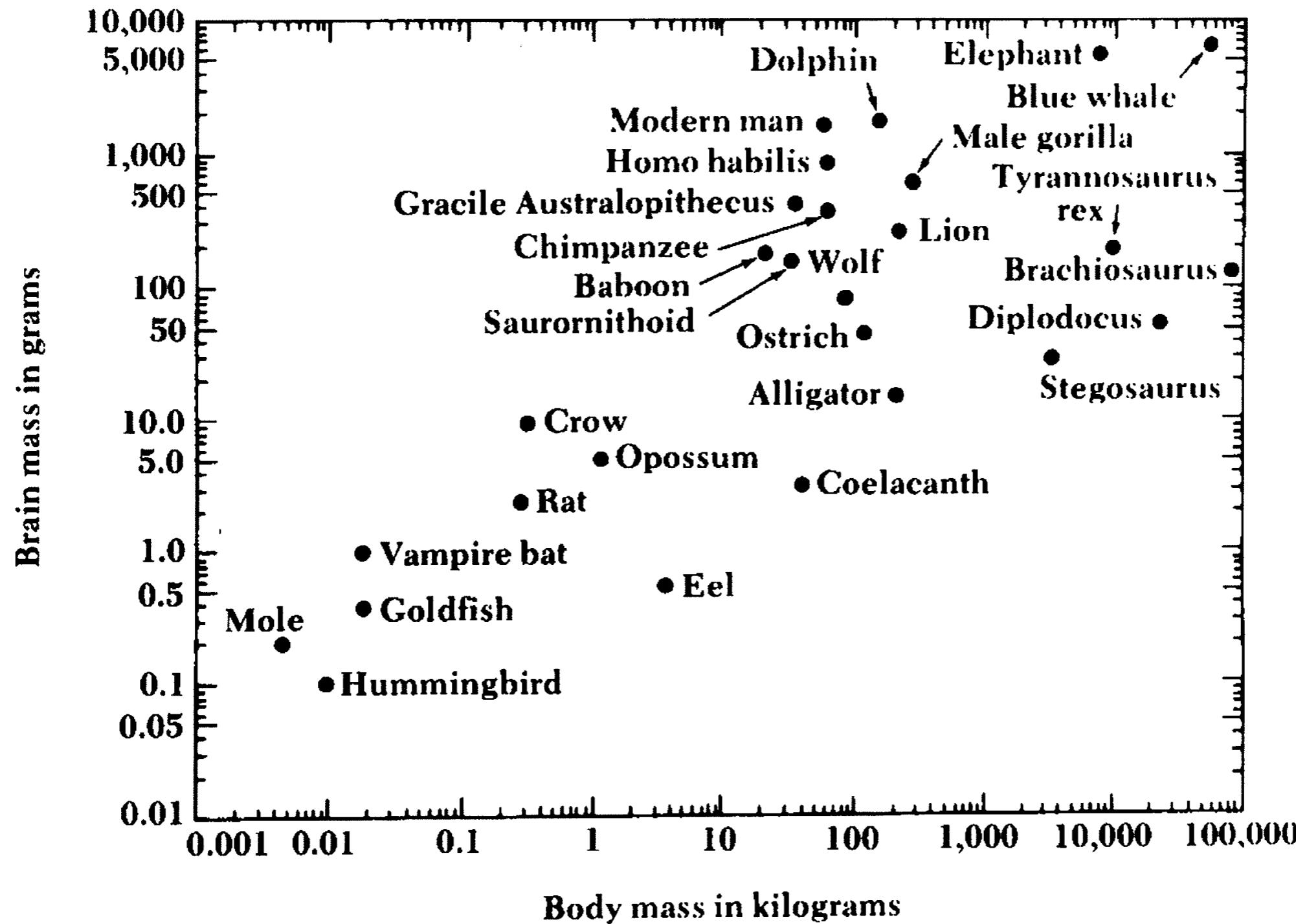
- This plot is cluttered

# Avoid clutter 1



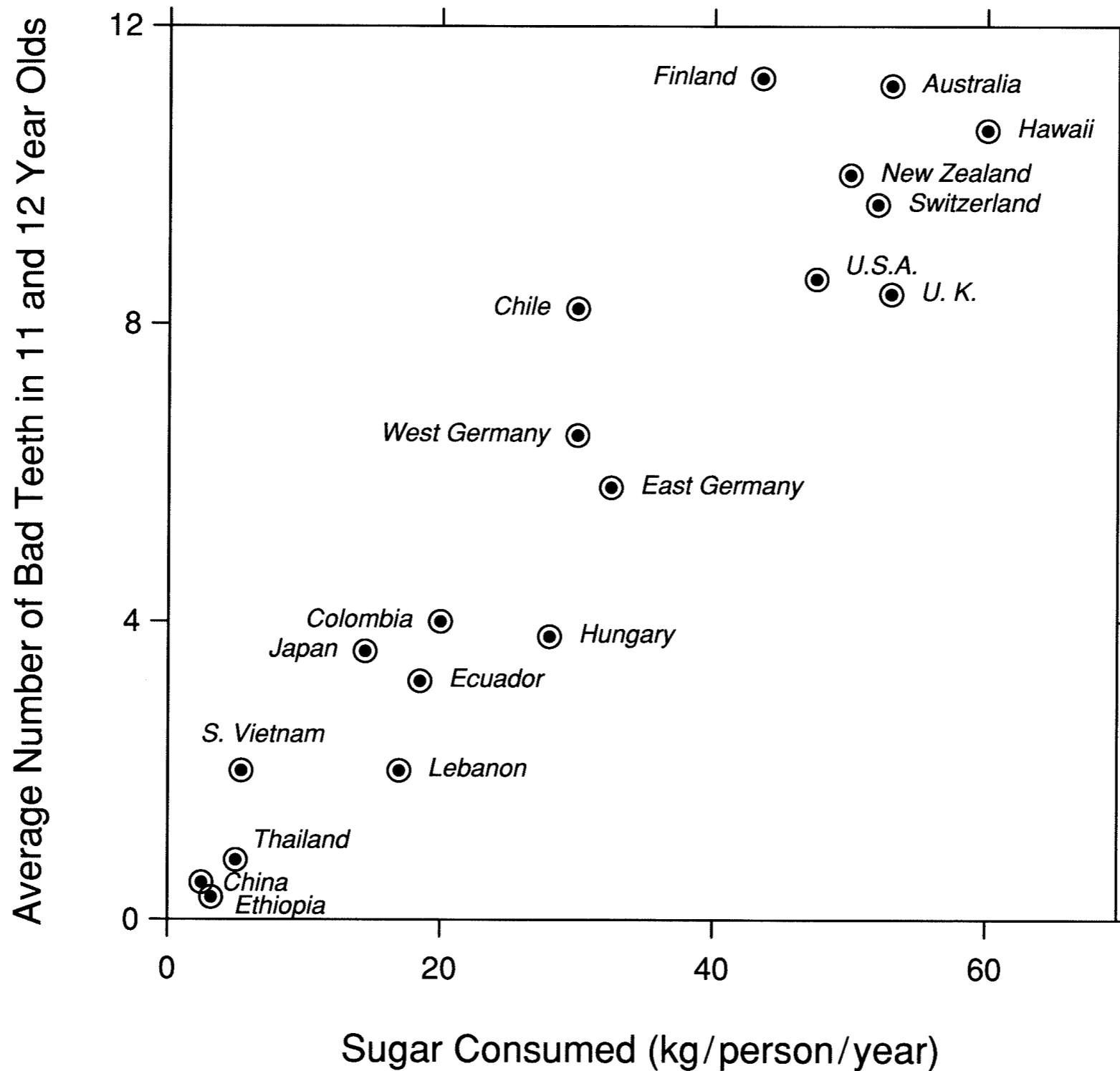
- Improved version separates the plots

# Avoid clutter 2



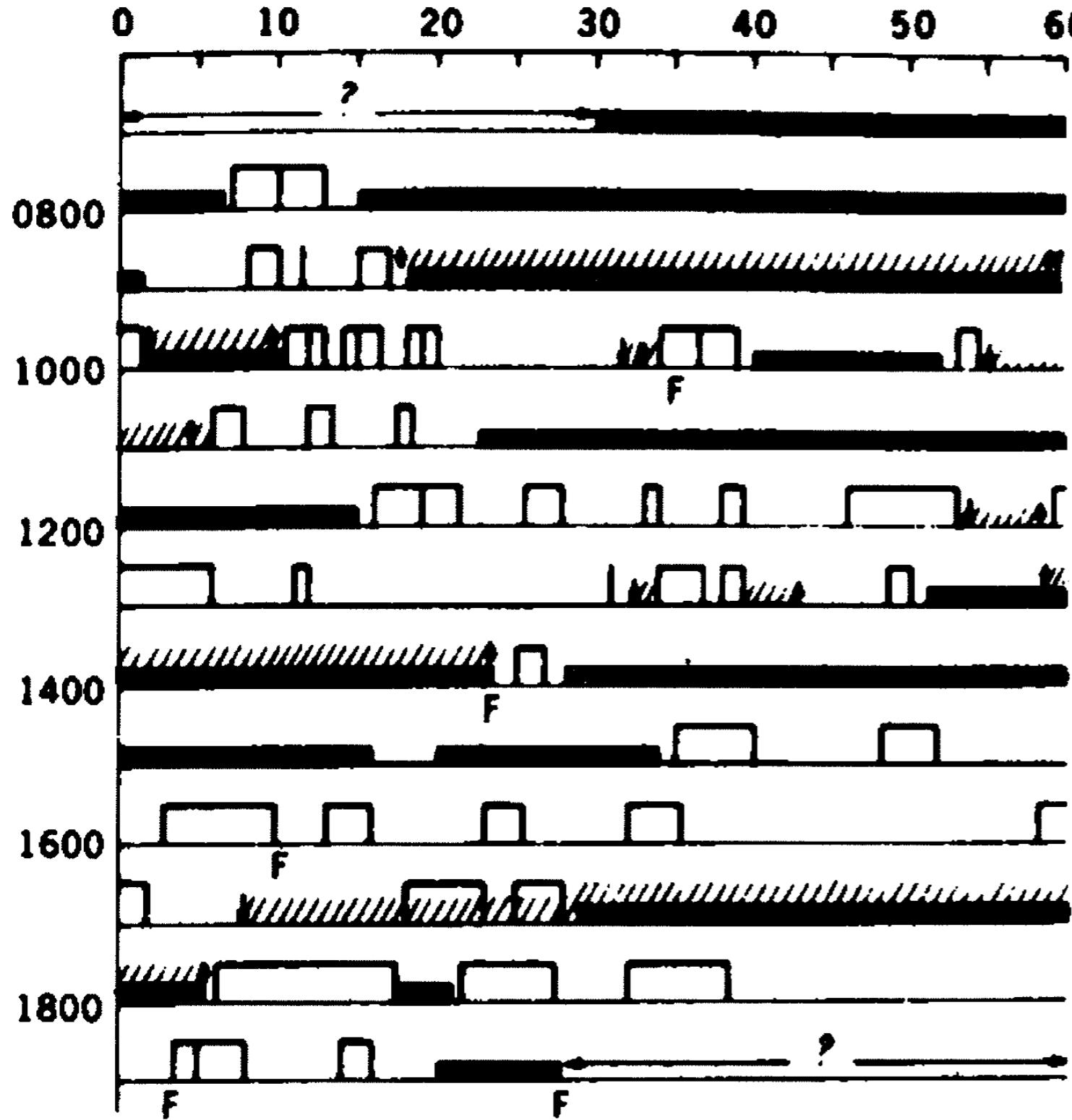
- The labels obscure the data

# Avoid clutter 2



- Labels and symbols were chosen to minimize clutter

# Example of poor visualization



- Recorded activities of tribal mother
- Legend:
  - Open bars and vertical lines: nursing
  - Closed bars: baby is sleeping
  - Hatching: baby held by mother
  - Arrows for picking up and setting down
  - Labels 'F': Fretting

# Improved design

