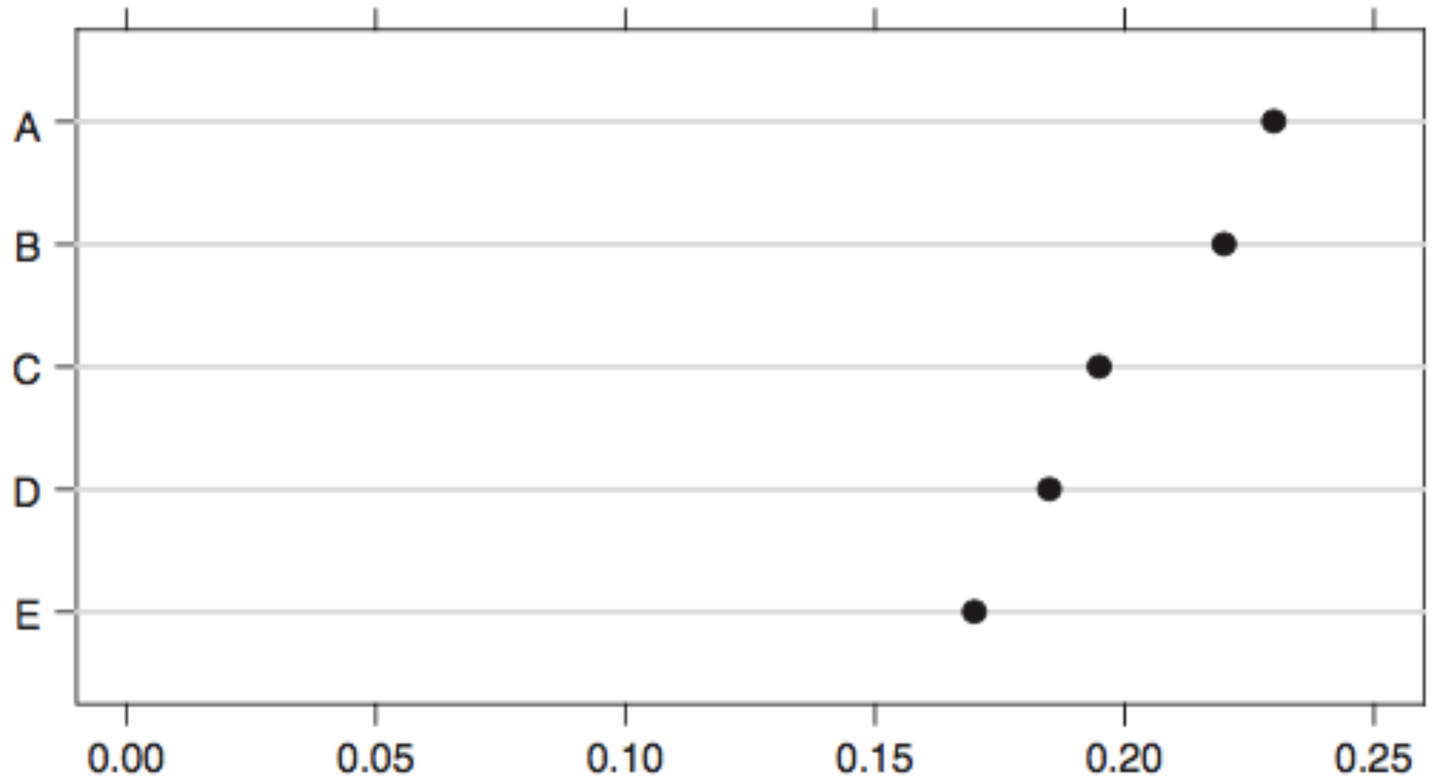
# Graphical Perception

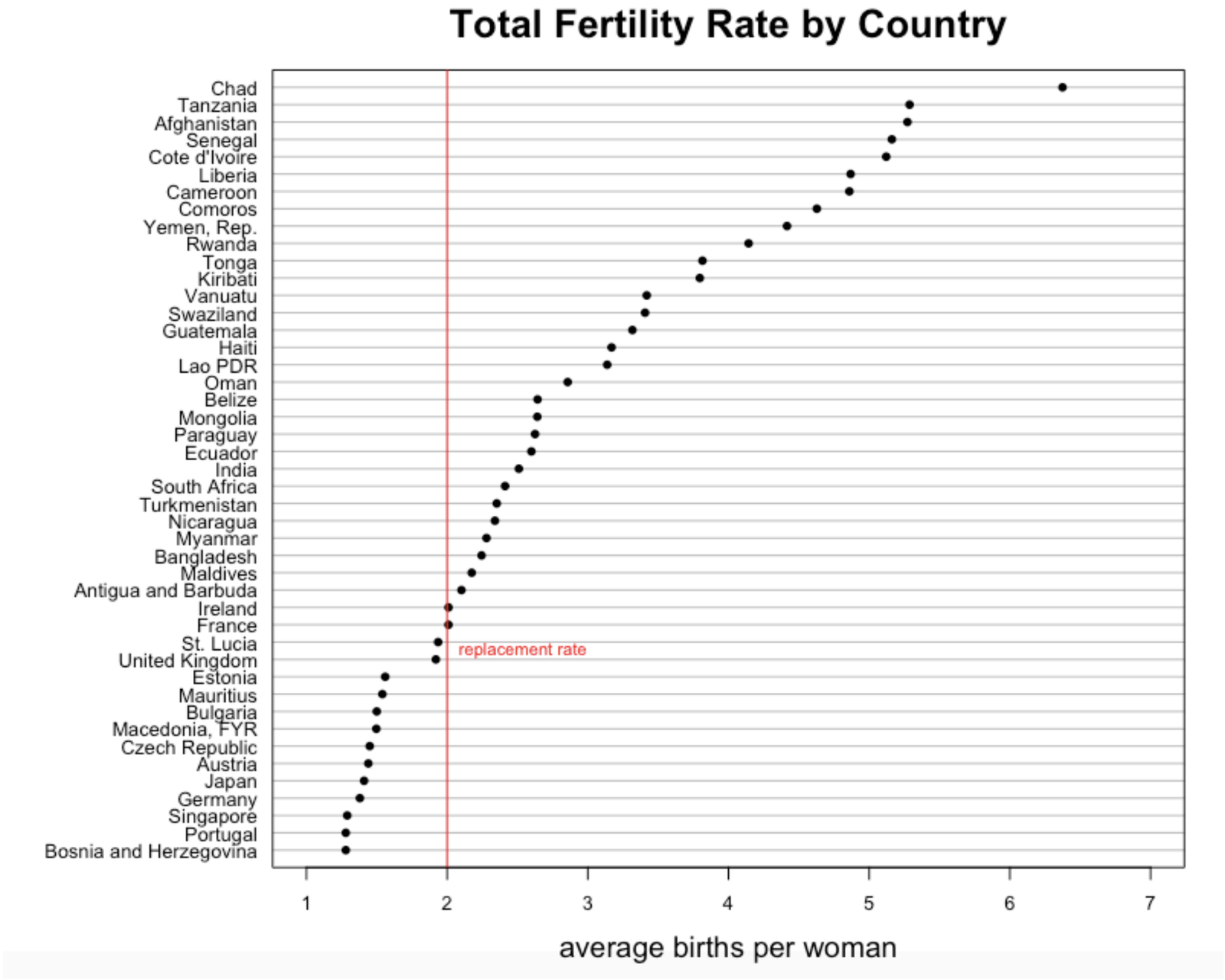
# Ordered Elementary Tasks

1. Position along a common scale
2. Position along identical, nonaligned scales
3. Length
4. Angle / Slope
5. Area
6. Volume
7. Color hue / Color saturation / Density

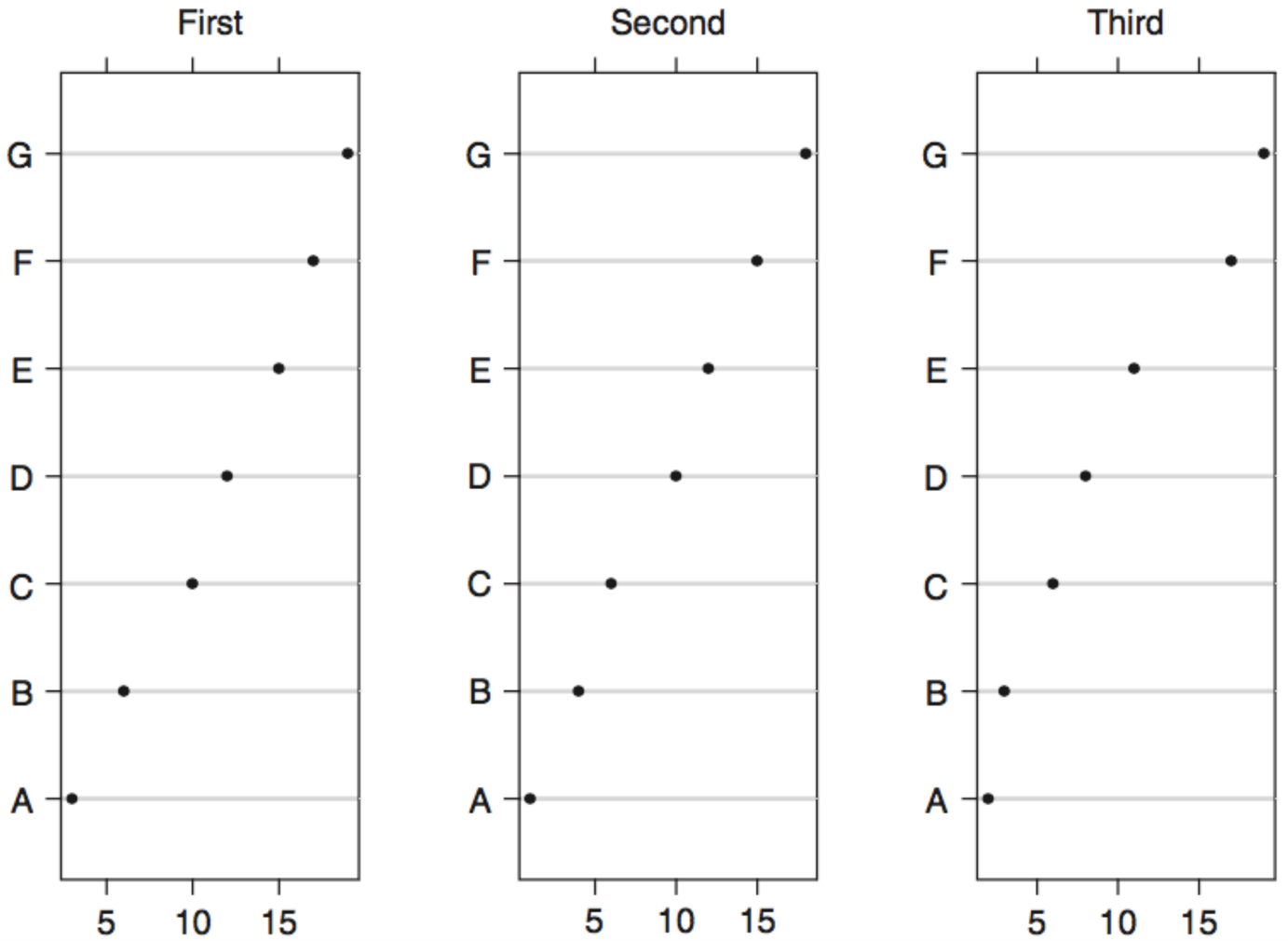
# 1. Position along a common scale



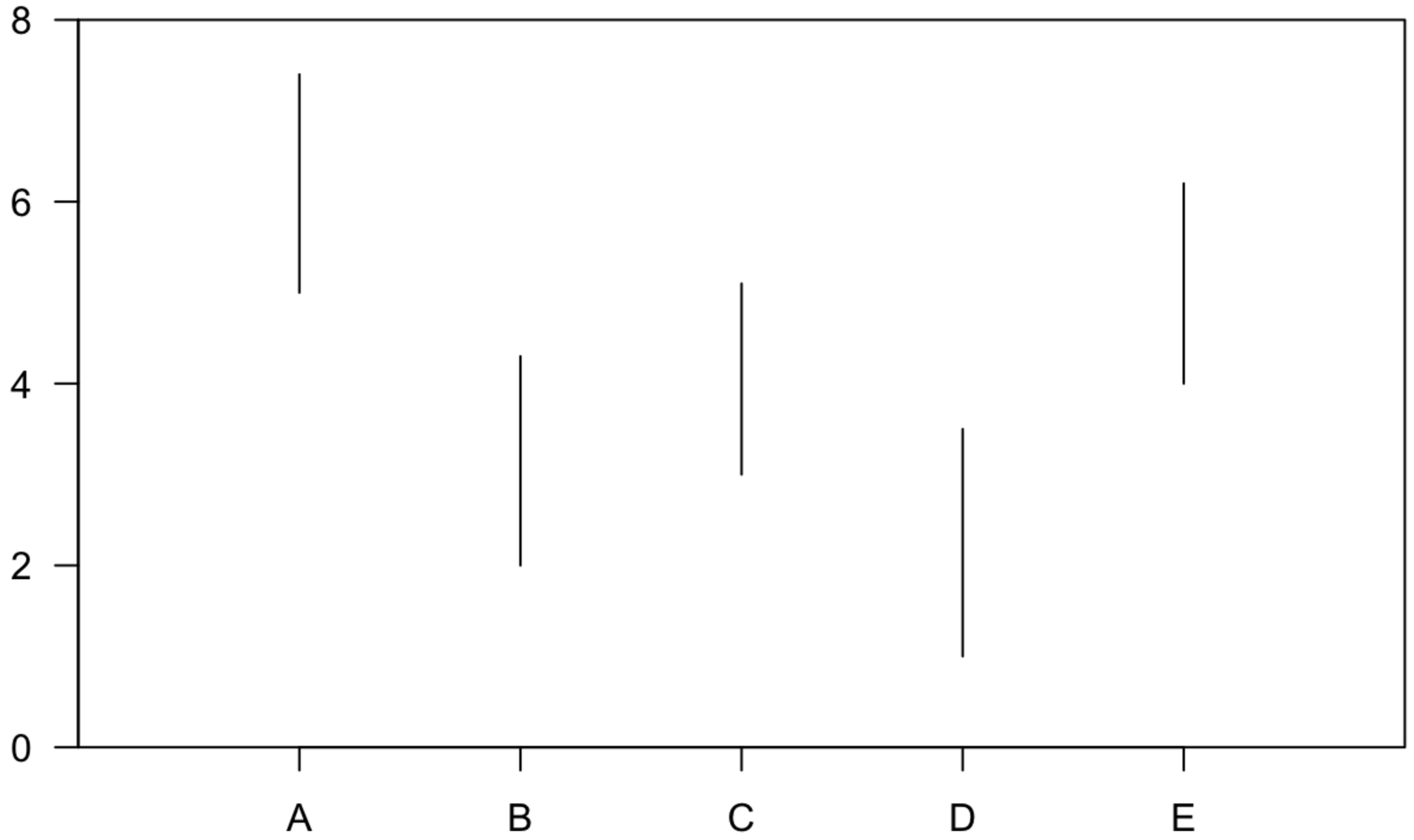
# Cleveland dot plot



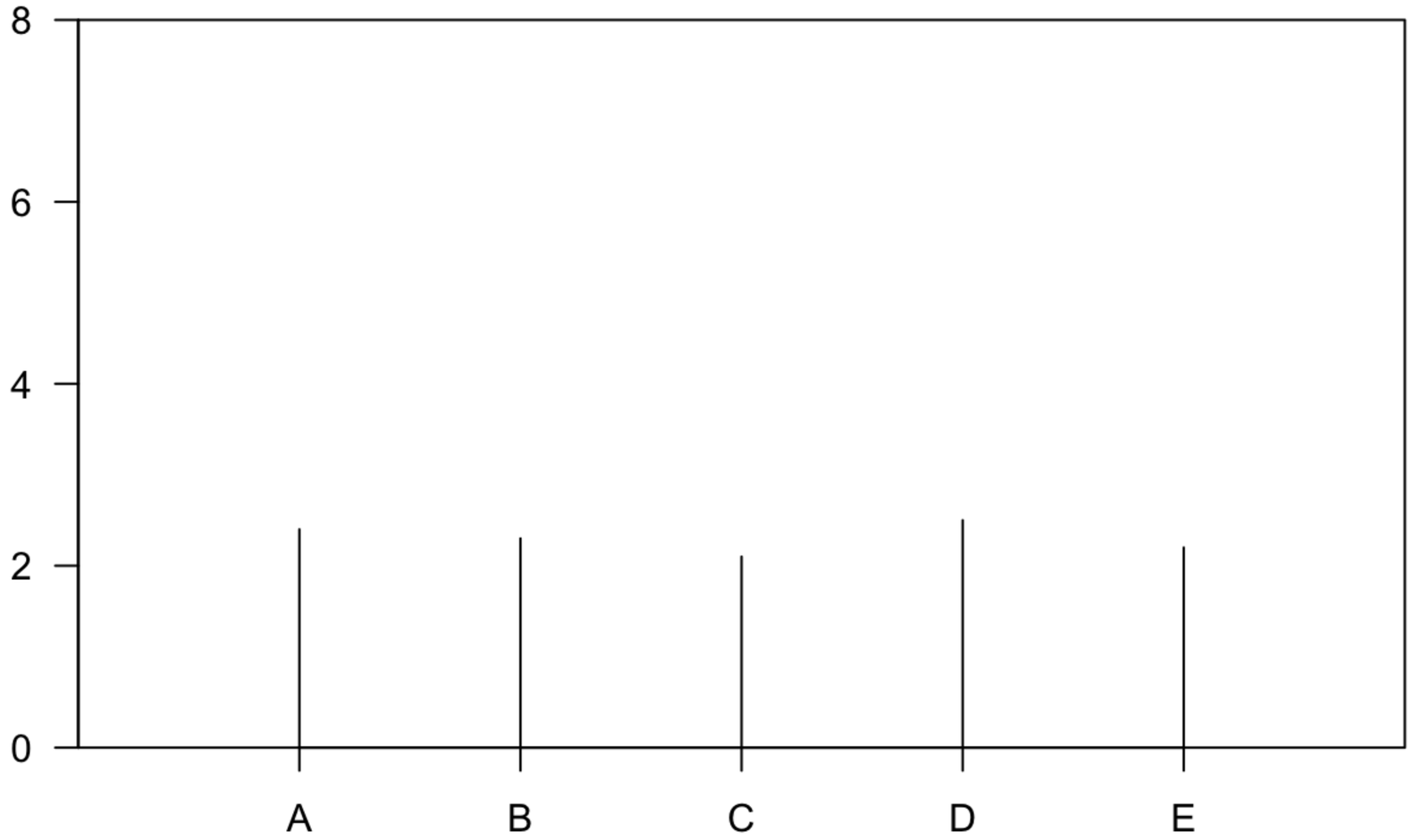
# 2. Position along identical, nonaligned scales



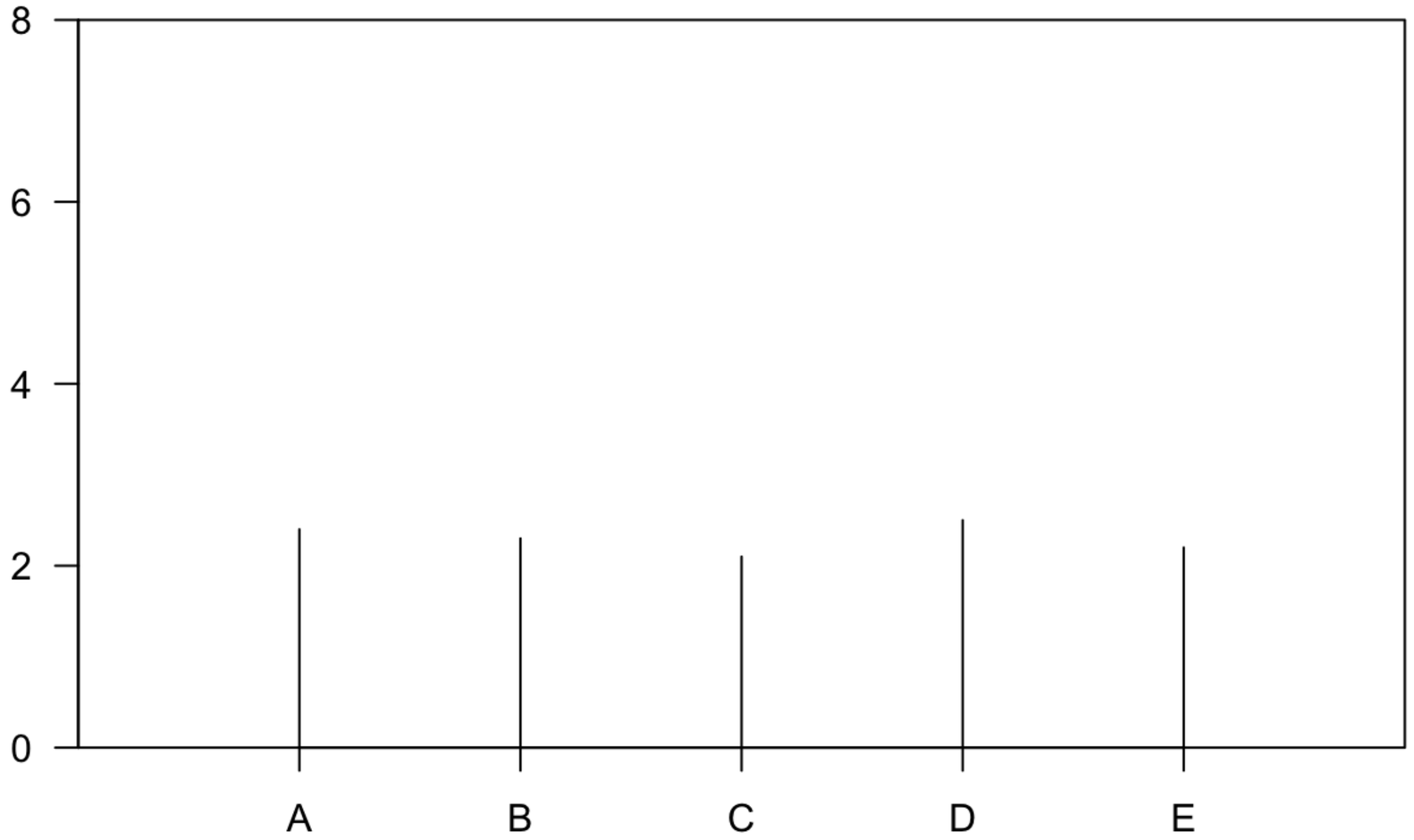
# 3. Length



# 3. Length



# 3. ~~Length~~ position along a common scale



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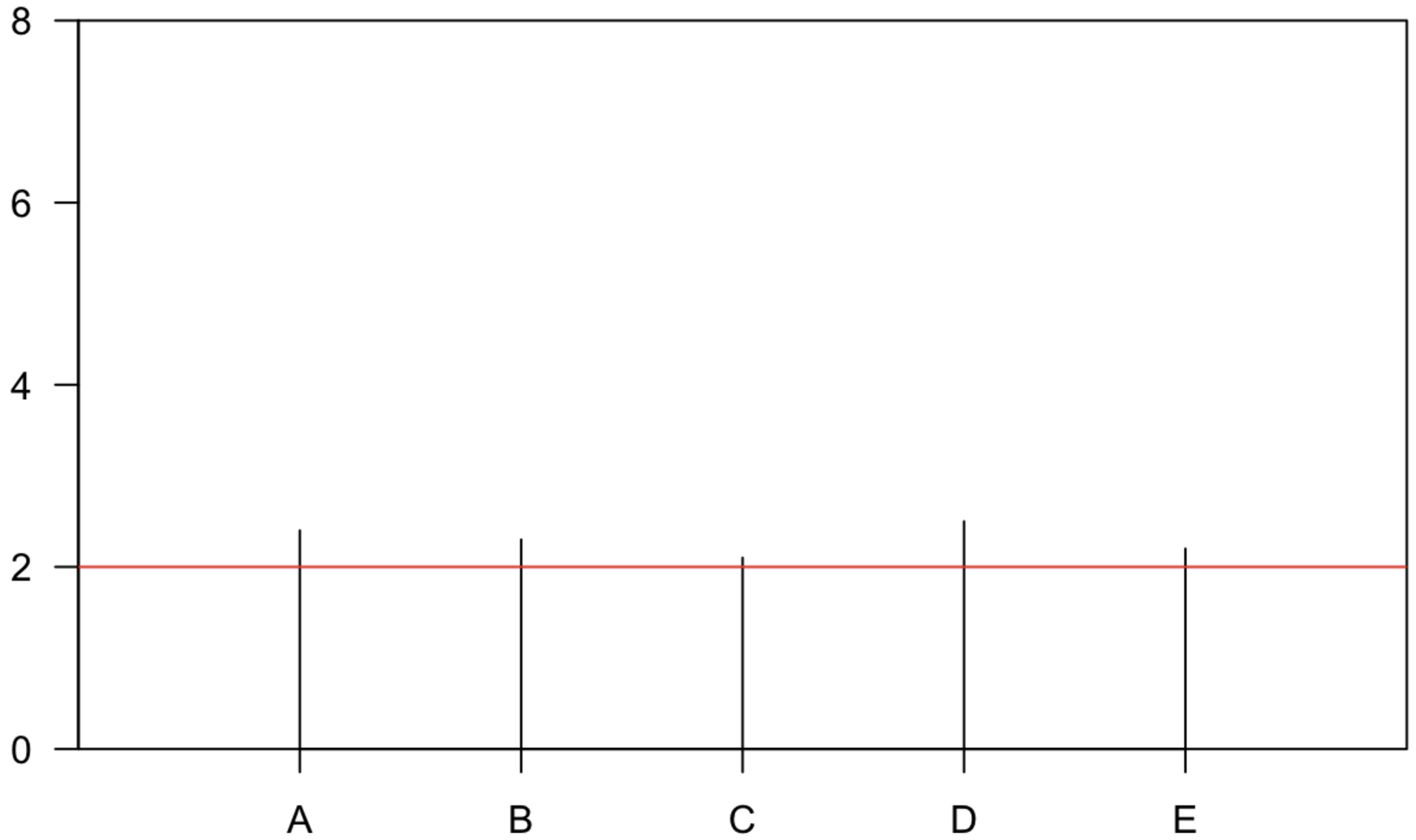
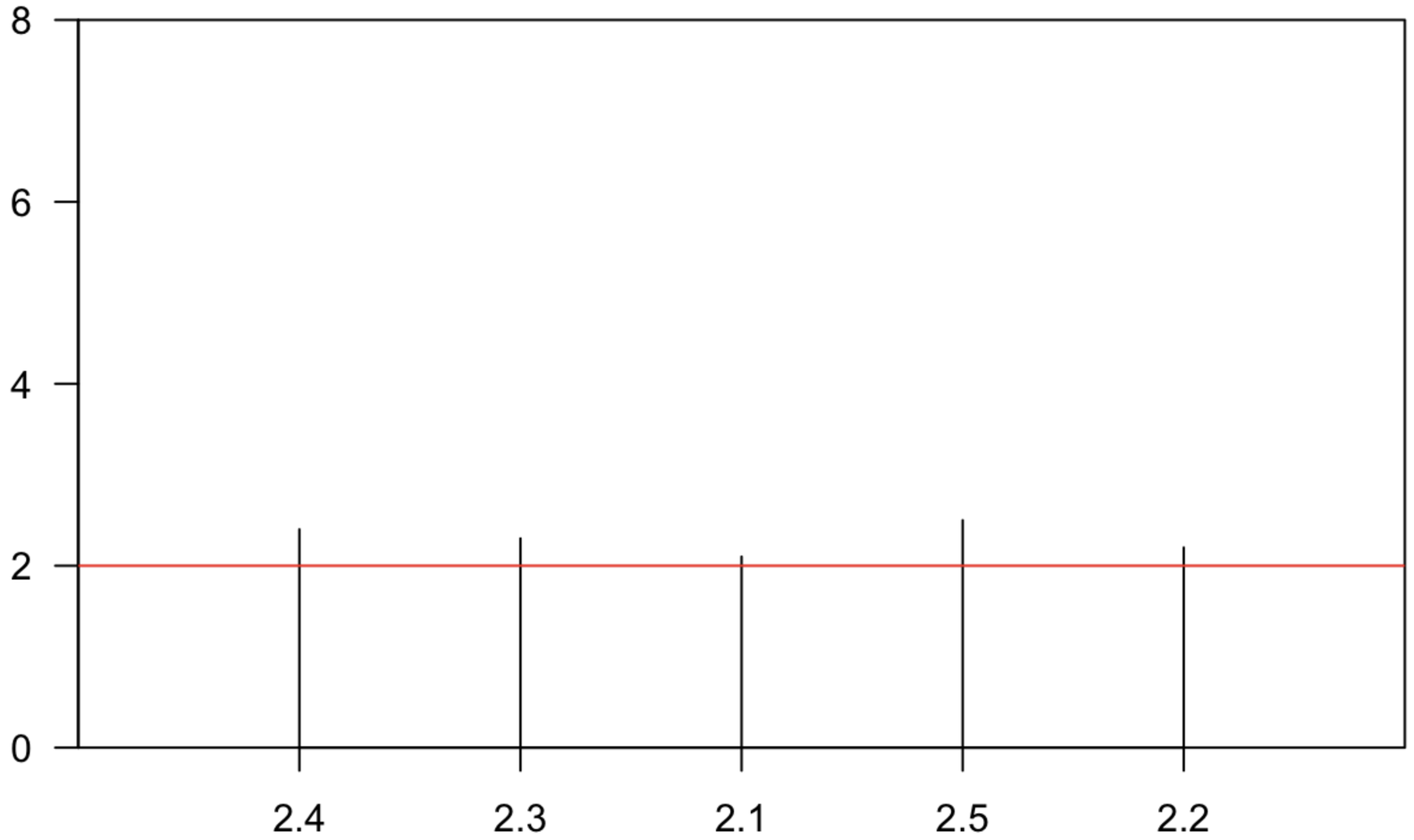
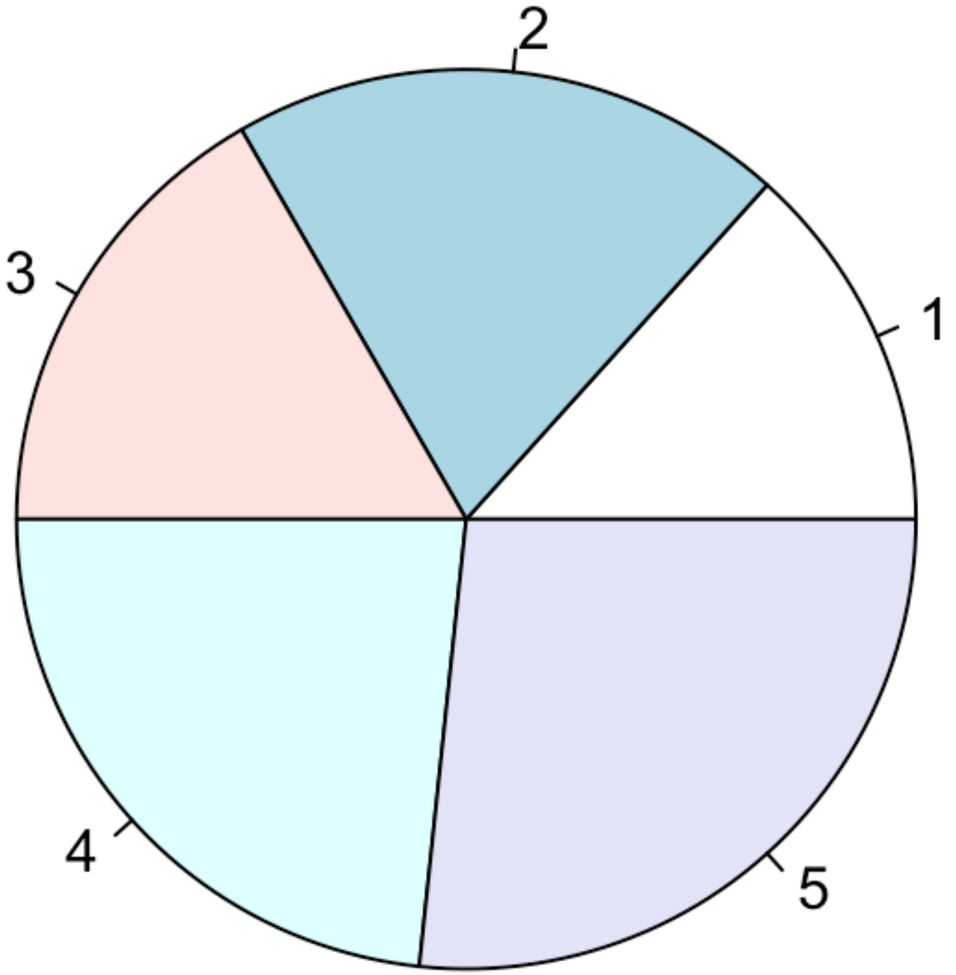


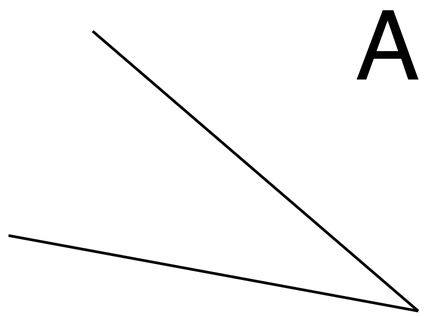
# 3. ~~Length~~ position along a common scale

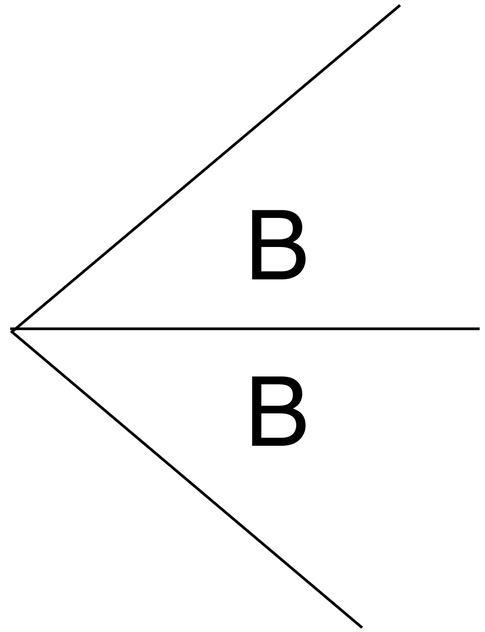


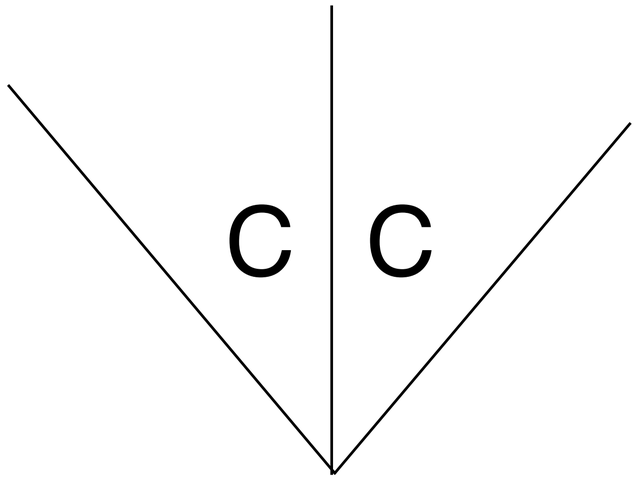
# 4. Angle

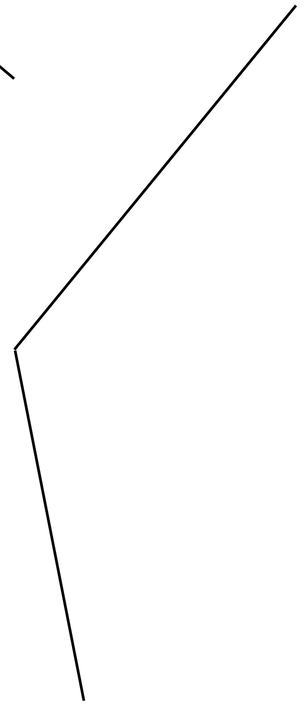


# 4. Angle

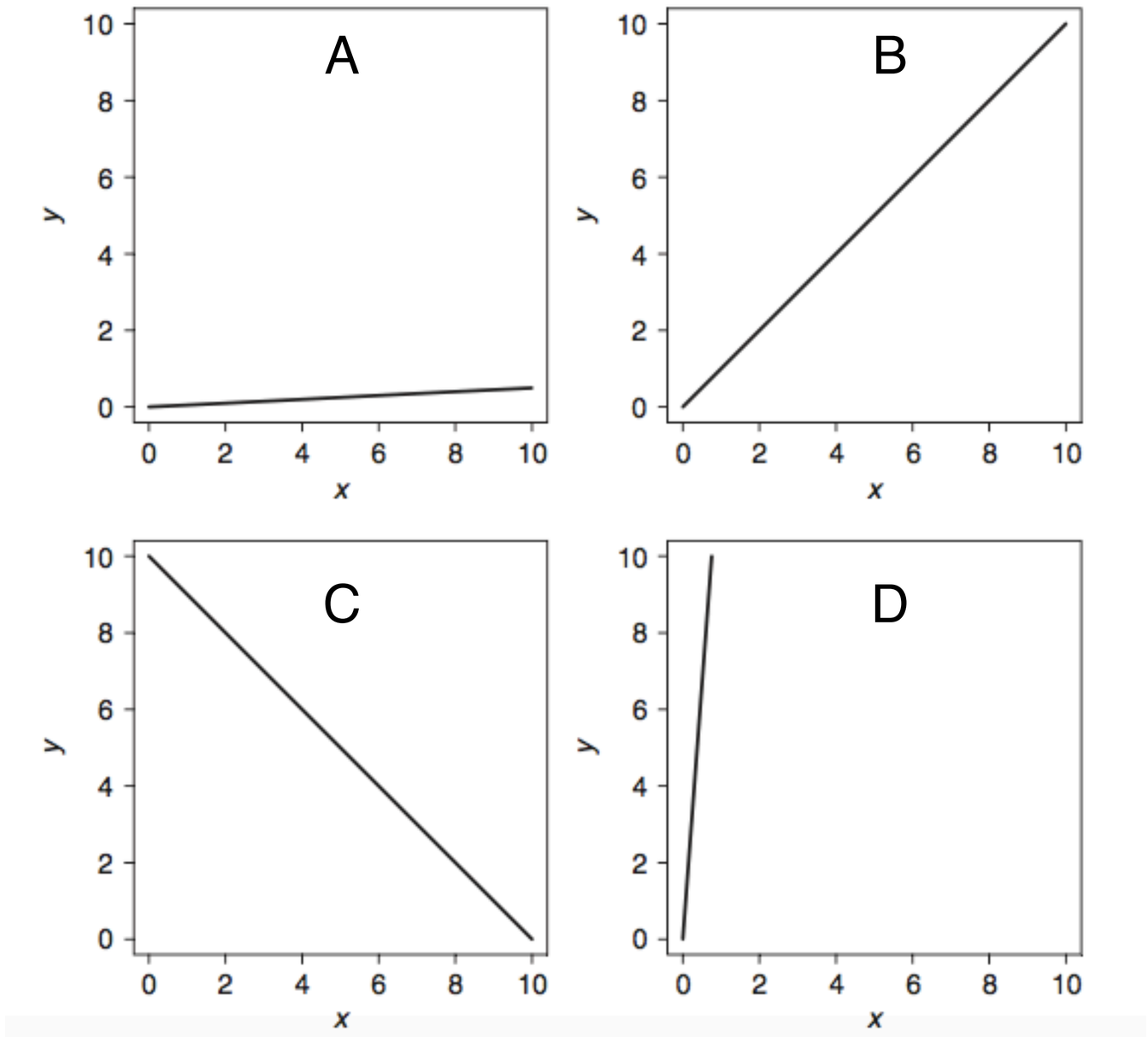


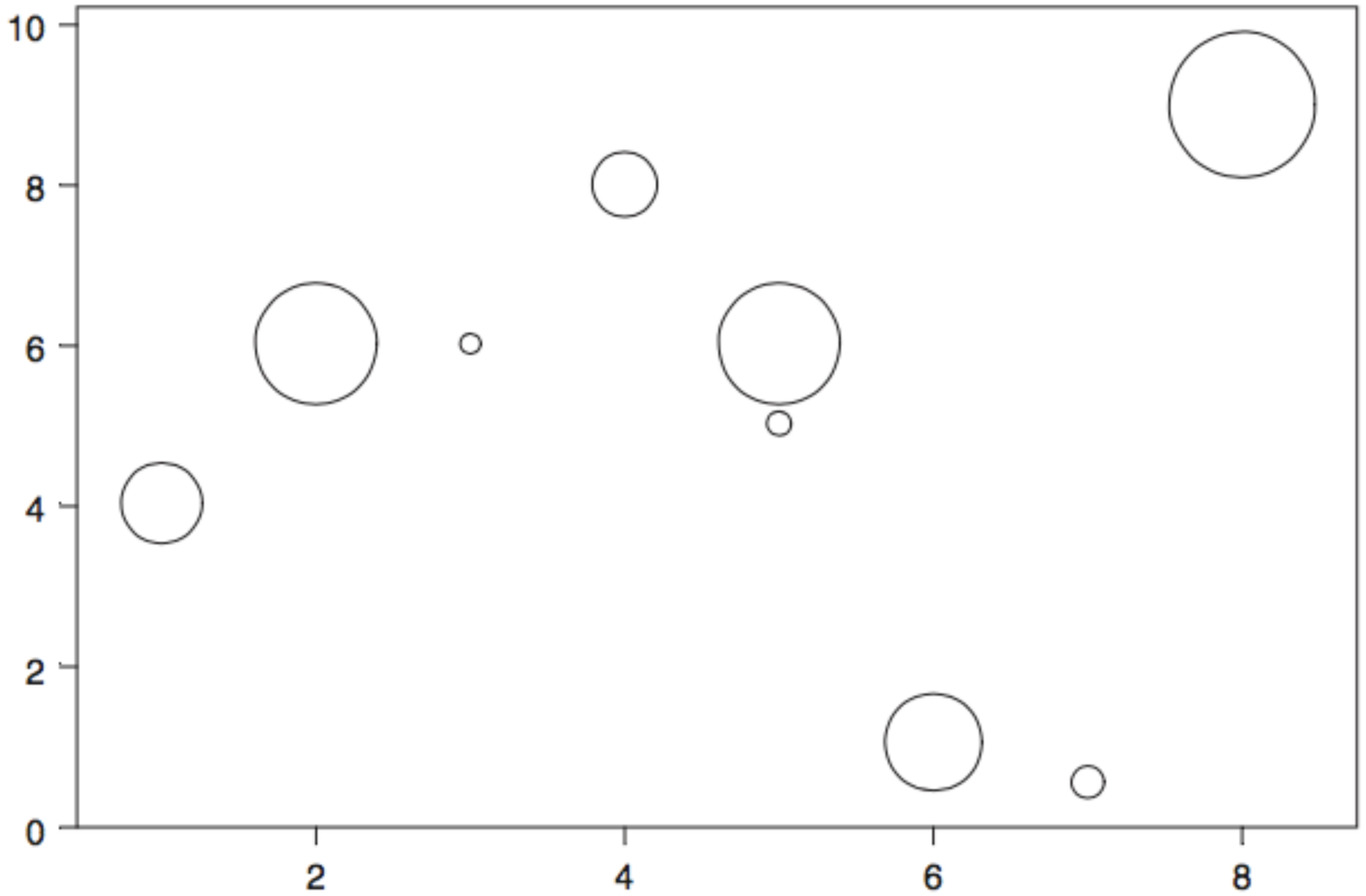



# 4. Slope



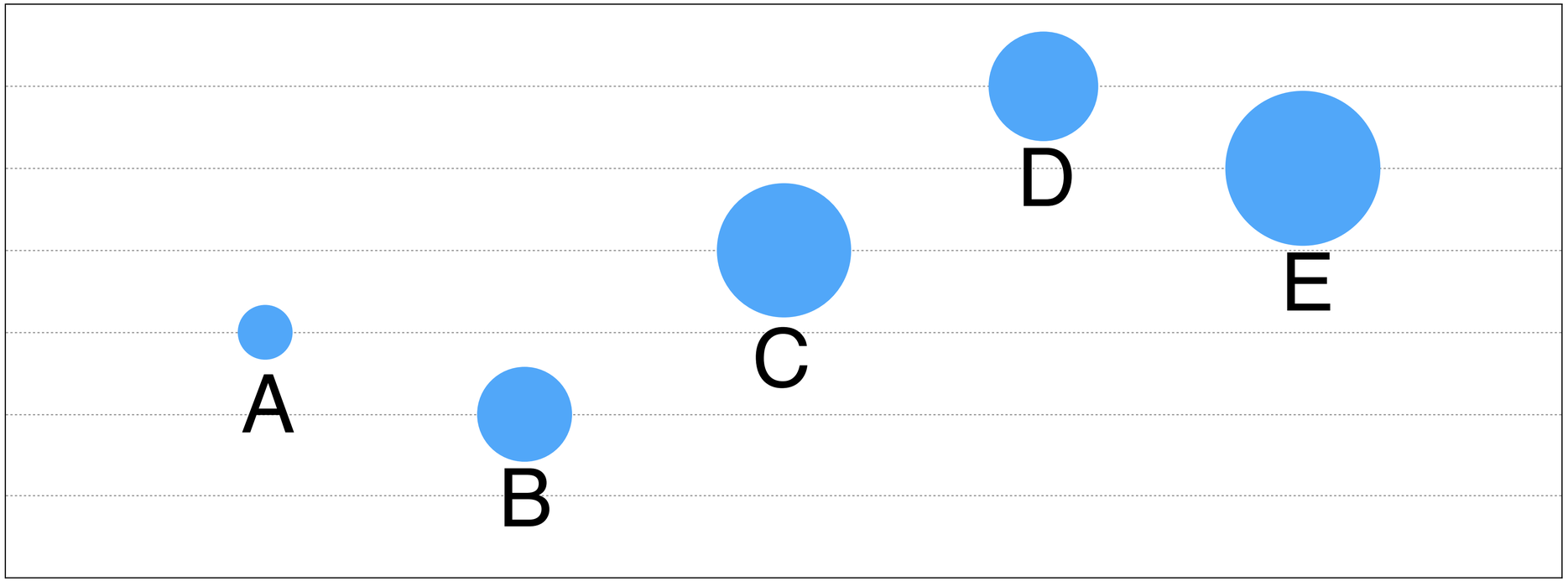
# 5. Area

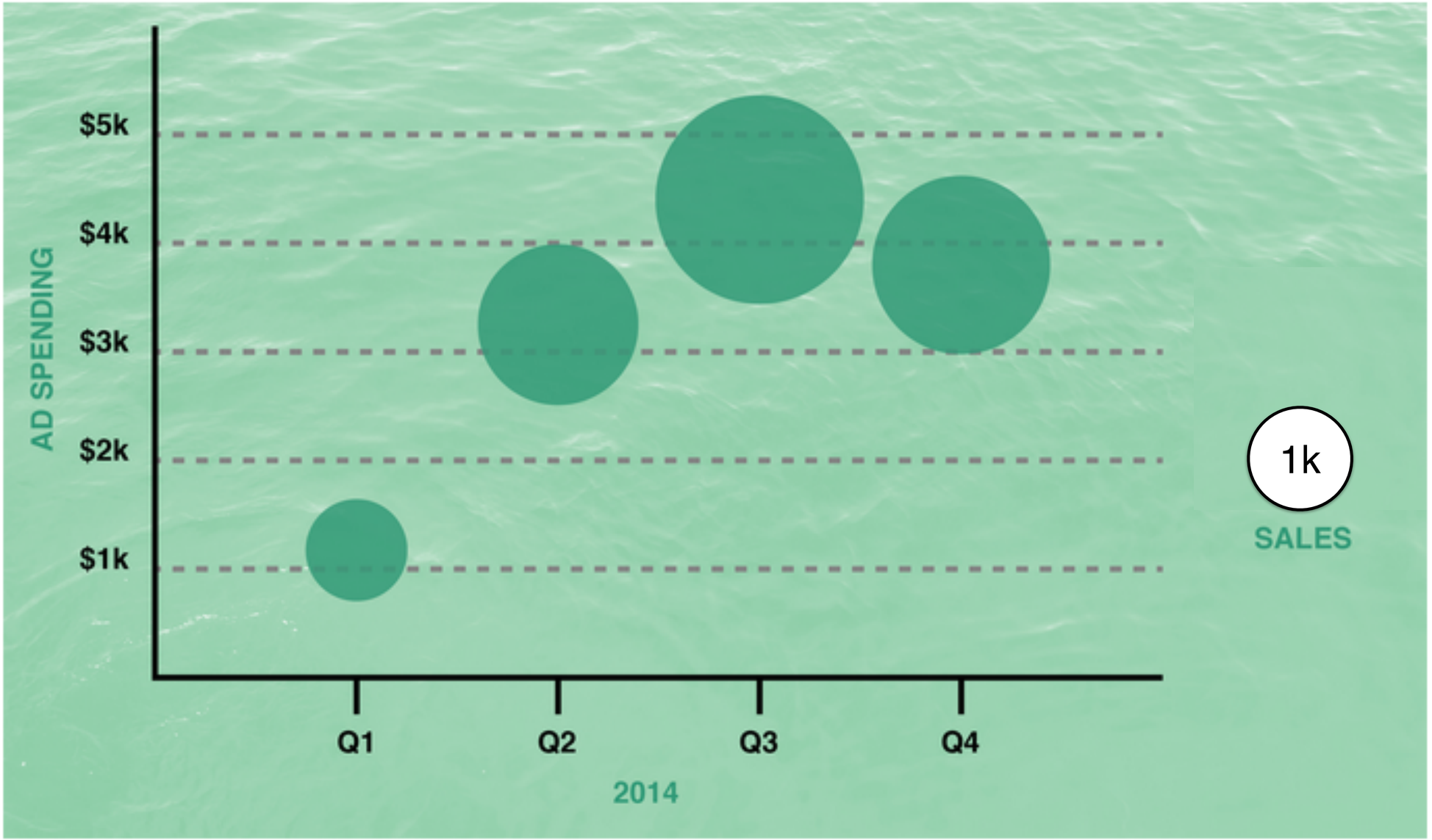



bubble plot

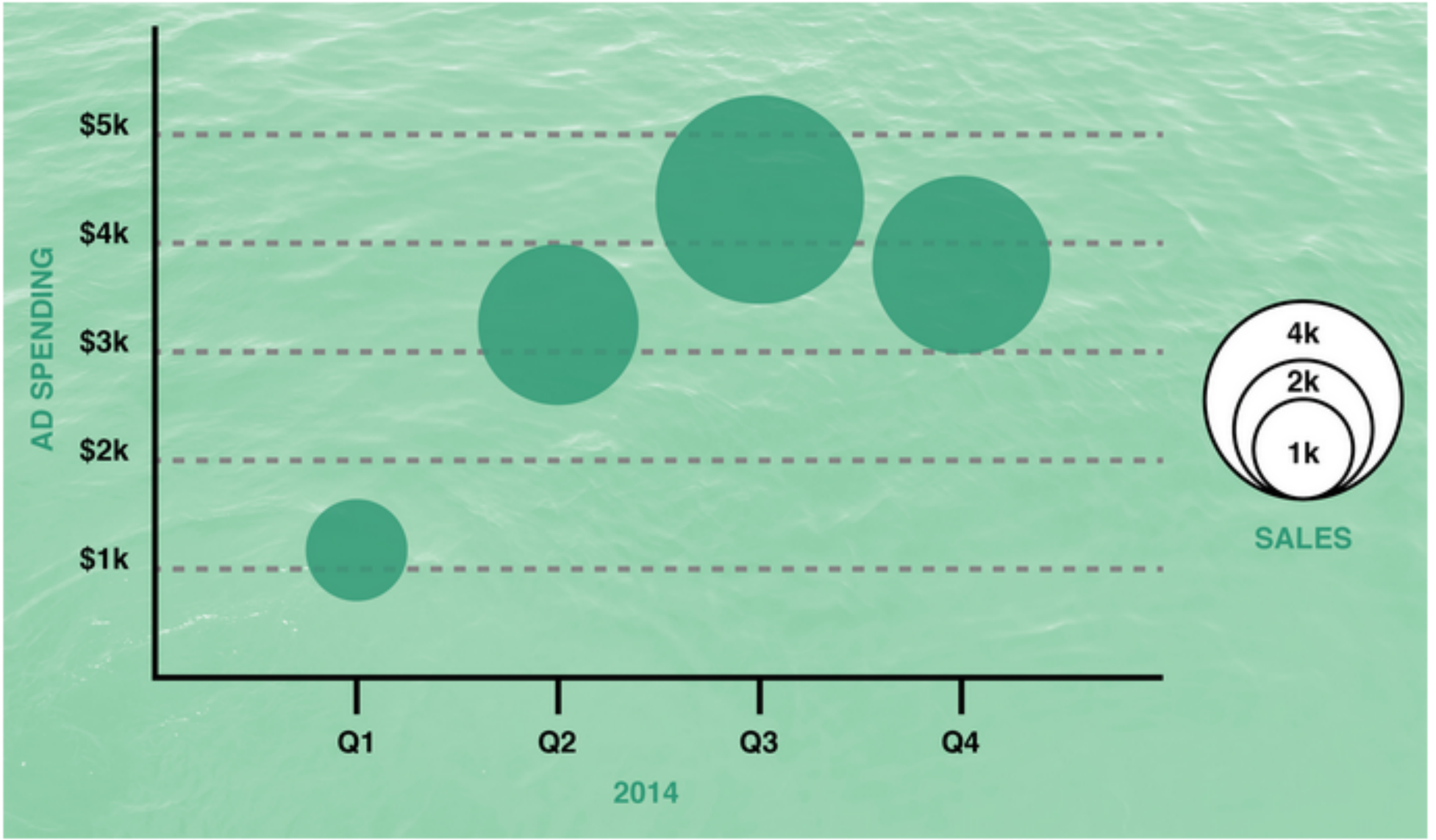
# Circles: Area Judgments

If the area of A is 1, what are the areas of the other circles?

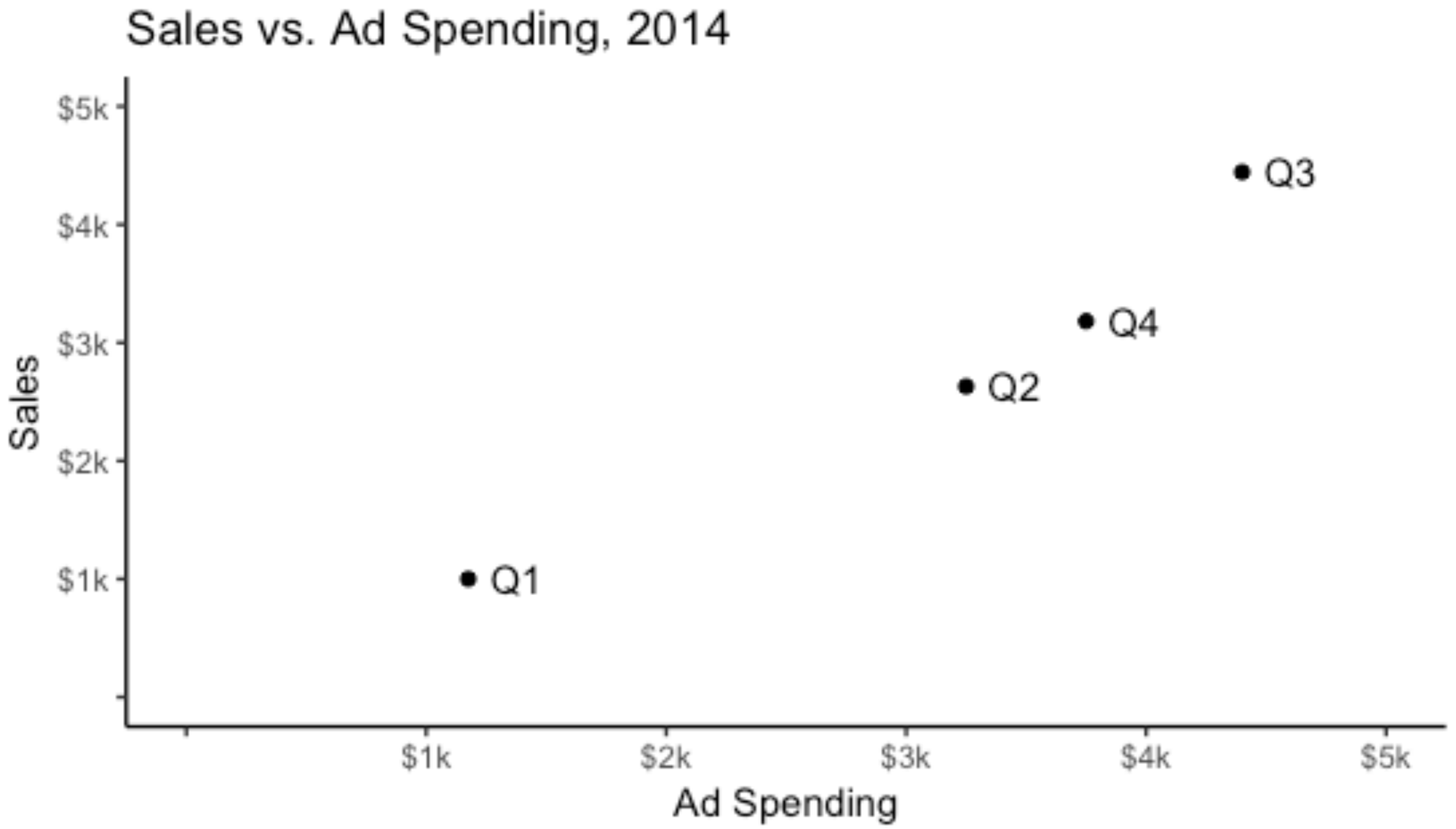




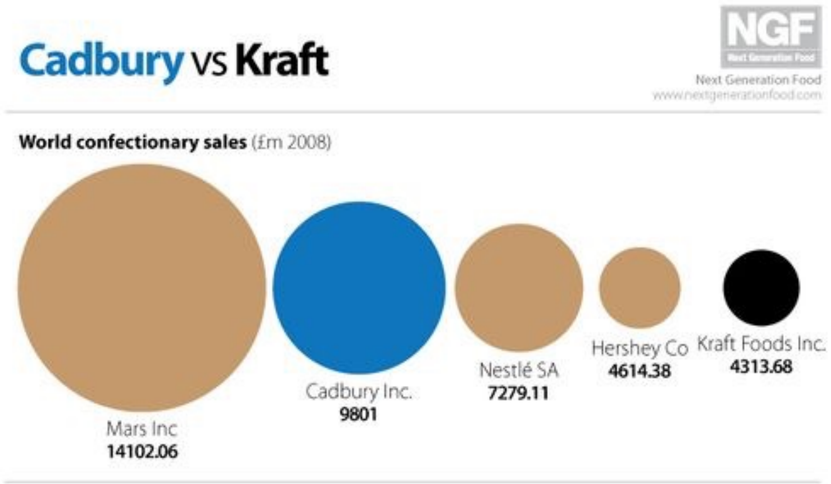

https://visage.co/data-visualization-101-bubble-charts/

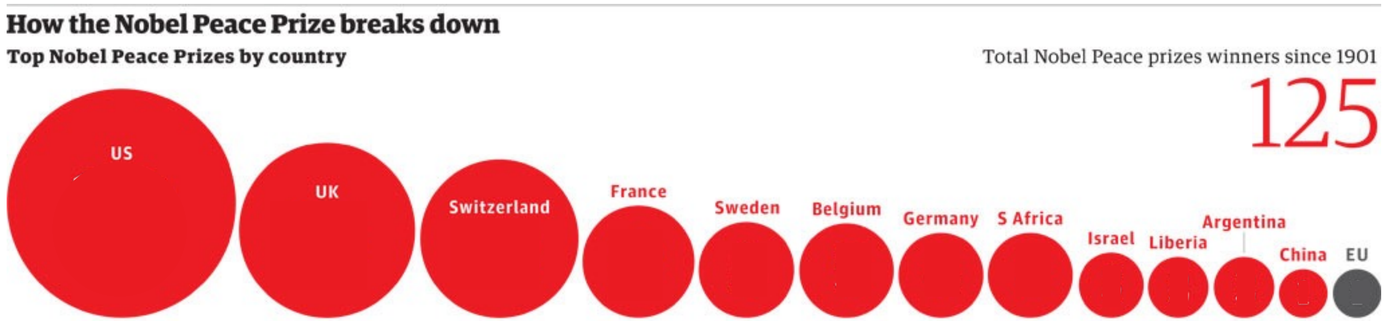



https://visage.co/data-visualization-101-bubble-charts/

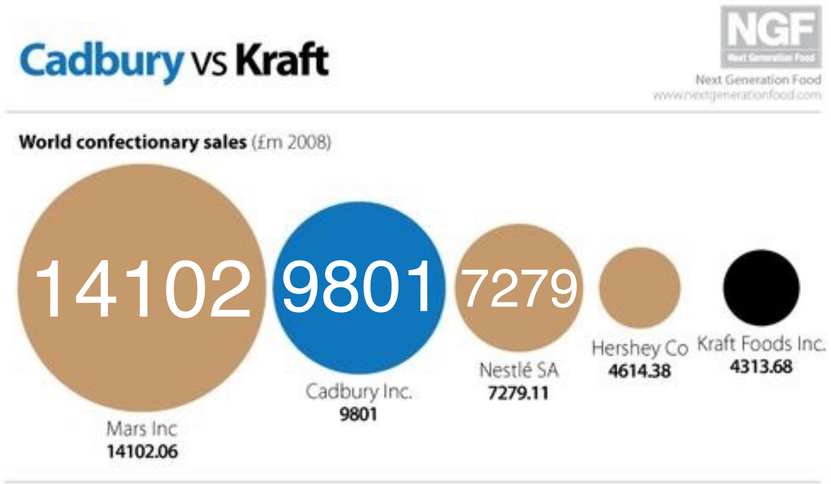

Sales vs. Ad Spending, 2014
$5k
$4k
$3k
$2k
$1k
Sales
Q3
Q4
Q2
Q1
$1k
$2k
$3k
$4k
$5k
Ad Spending

# Area or Diameter?



# Area or Diameter?




Ratio of values:

14102/9801 = 1.44

Ratio of diameters:

2.85cm/2cm = 1.425

Ratio of areas: $\frac{\pi 1.425^2}{\pi 1^2} \approx 2.03$

# Area or Diameter?


Ratio of values:

$$29/14 = 2.07$$

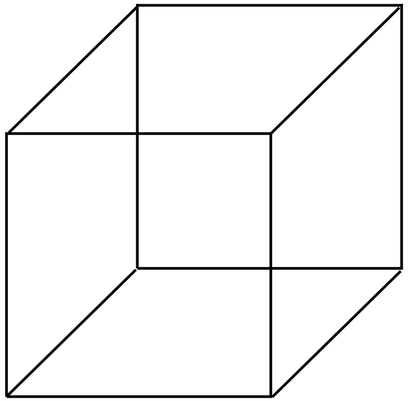
Ratio of areas:

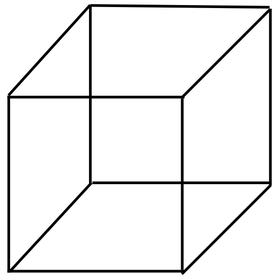
$$\frac{\pi 1.325^2}{\pi 1^2} \approx 1.76$$

Ratio of diameters:

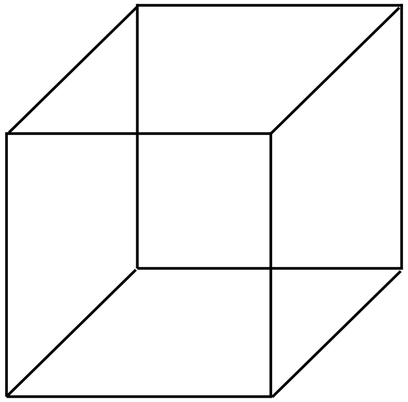
1.325

# 6. Volume

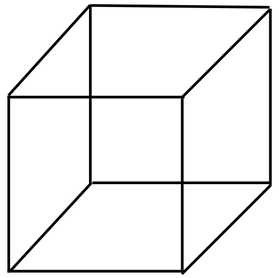




# 6. Volume



side = 2.75
volume = 20.7



side = 1.83
volume = 6.13

left cube is
3.38X
larger
(by volume)

# "Stevens's Power Law"

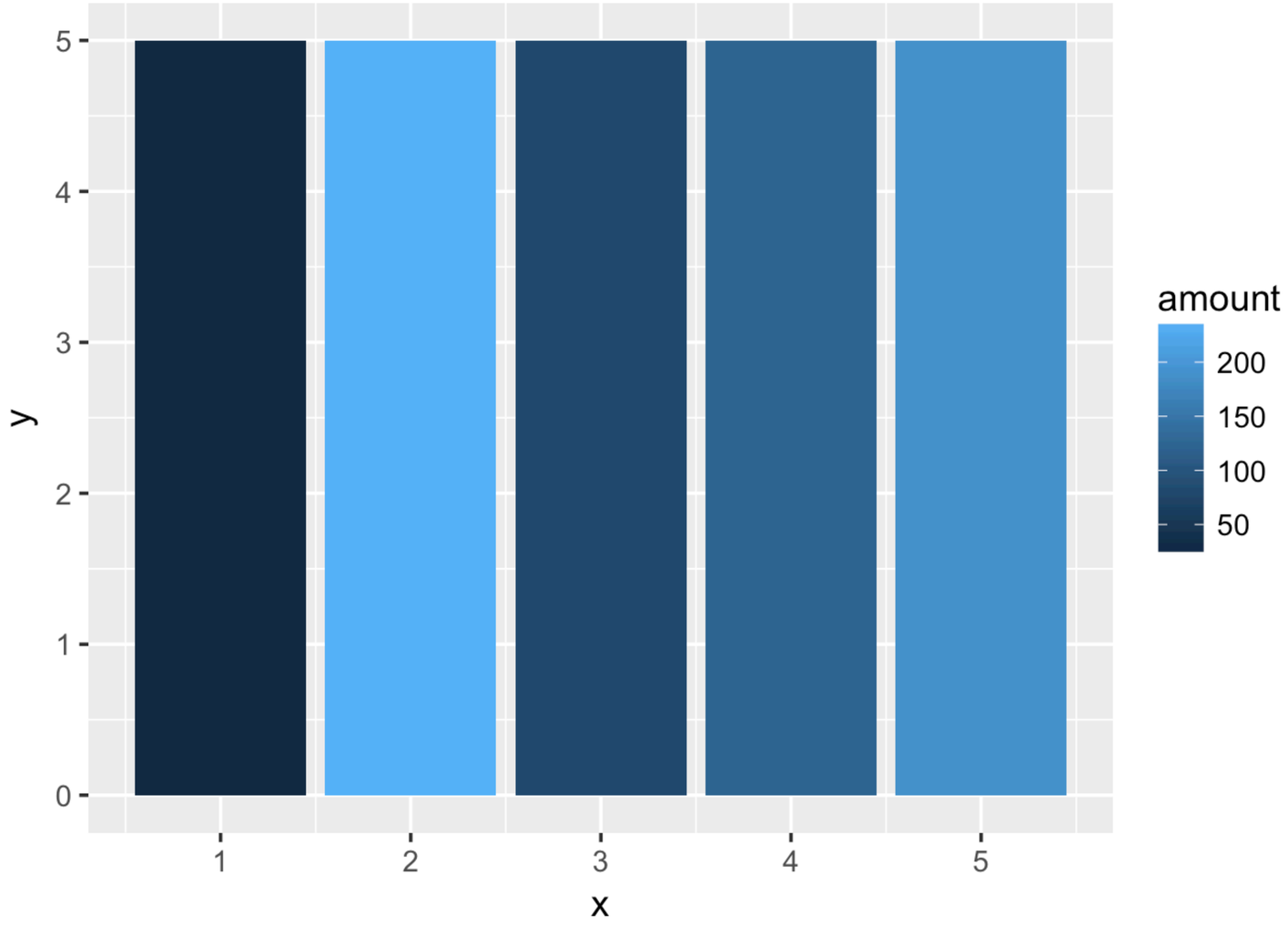
x = actual value  perceived value $^{\beta}$ = Cx

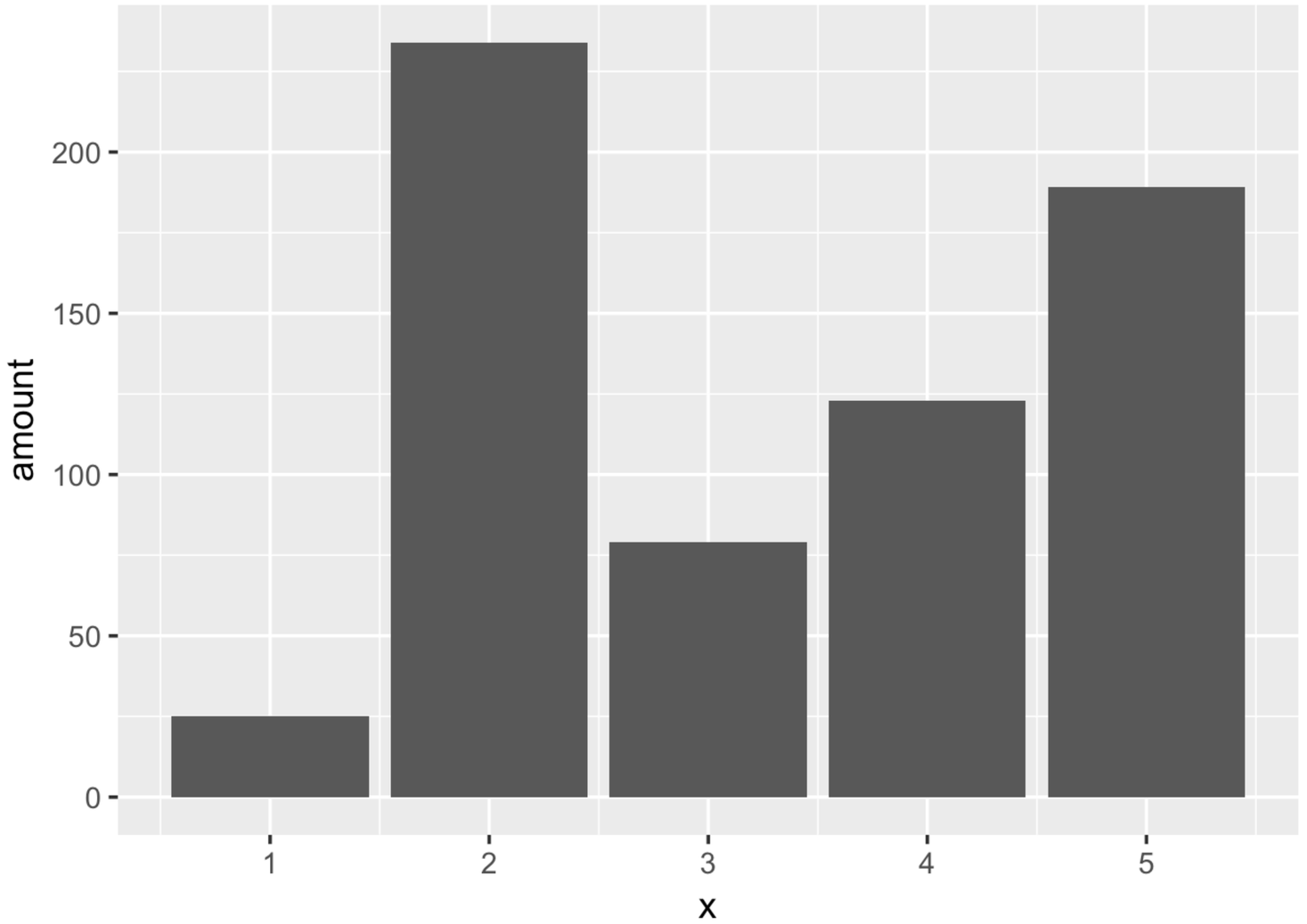
β = .9 το 1.1 for length

β = .6 to .9 for area

β = .5 το .8 for volume

# 7. Color (for quantitative data)




amount
200
150
100
50
0
1
2
3
4
5
x

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