

# Lying with Statistics



Mean

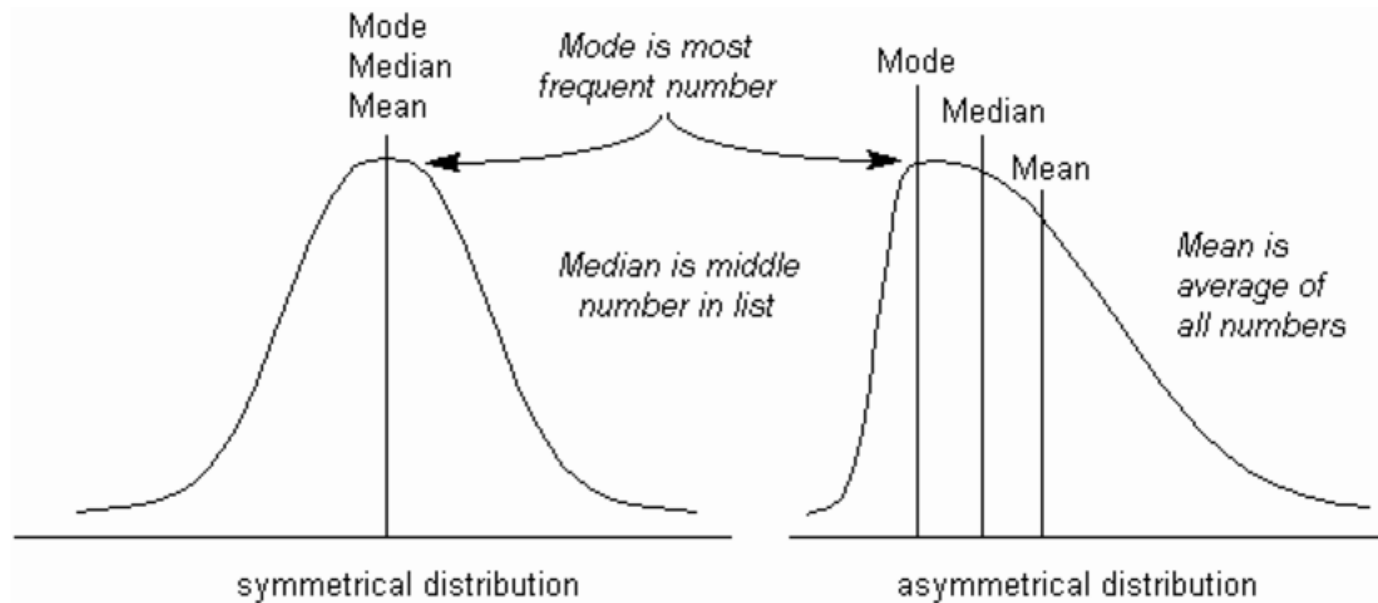
Median

*Statistics*

Mode

Range

# Distribution Matters!



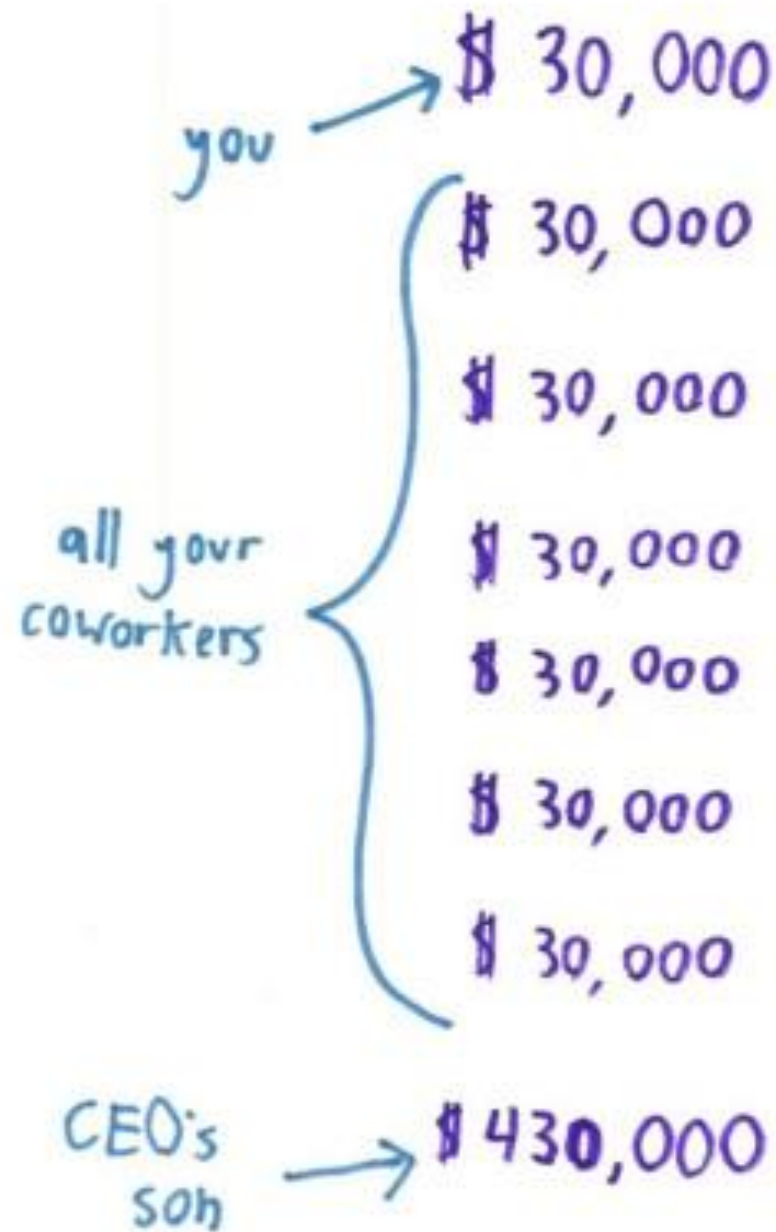
# Mean

What would my  
starting salary be?



I'll put it this way:  
our average starting  
salary is \$80,000!





Average: \$80,000.



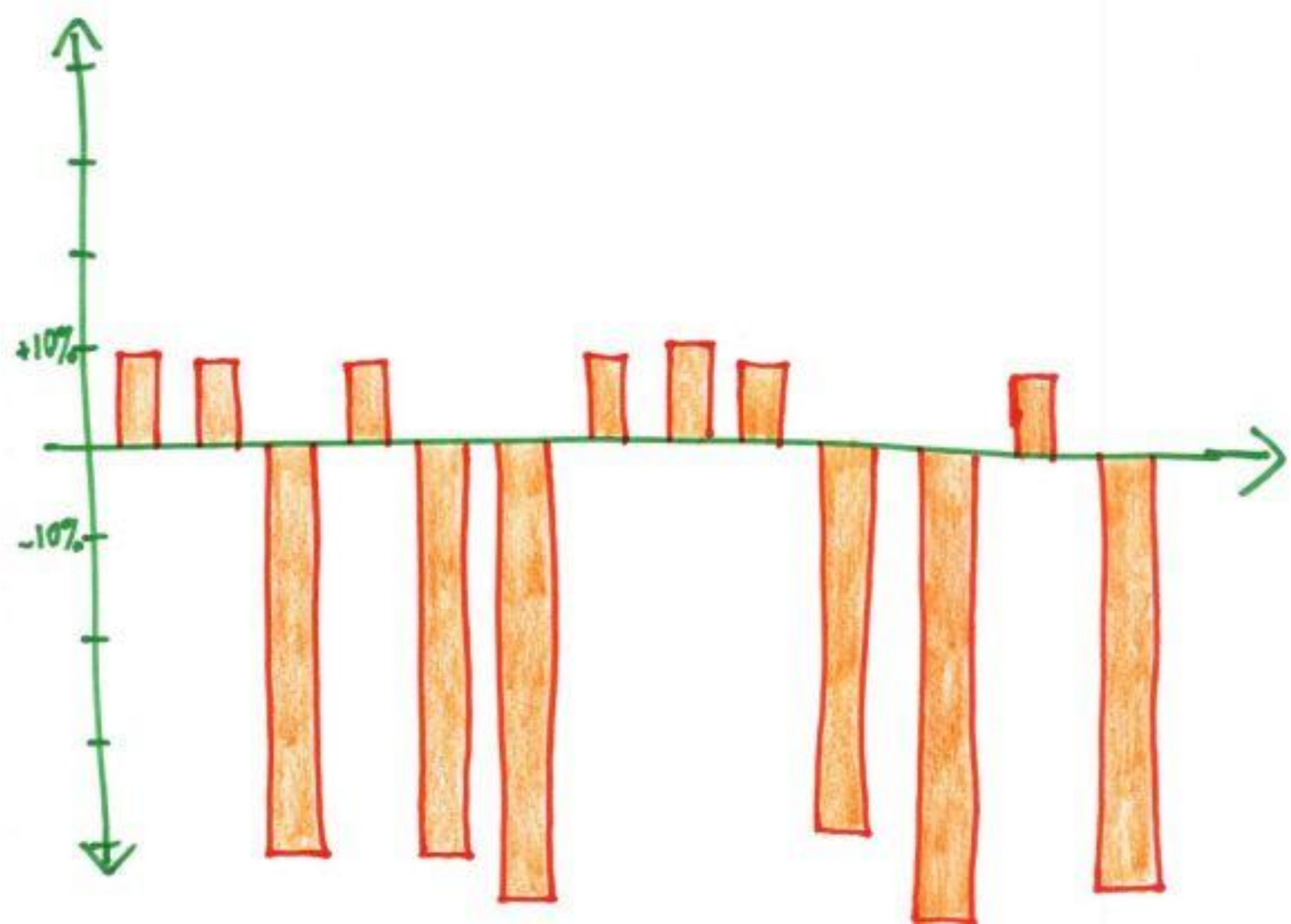
# Median

So, why should I  
invest with you?



Well, not to brag, but  
my fund has a median  
gain of 8% per year!







# Mode

How are you doing  
on your tests?



My modal category  
is 70-80%!





Score Category	Number of Tests
90s	0
80s	0
70s	2
60s	1
50s	1
40s	1
30s	1
20s	1

please don't ask  
about the mean...

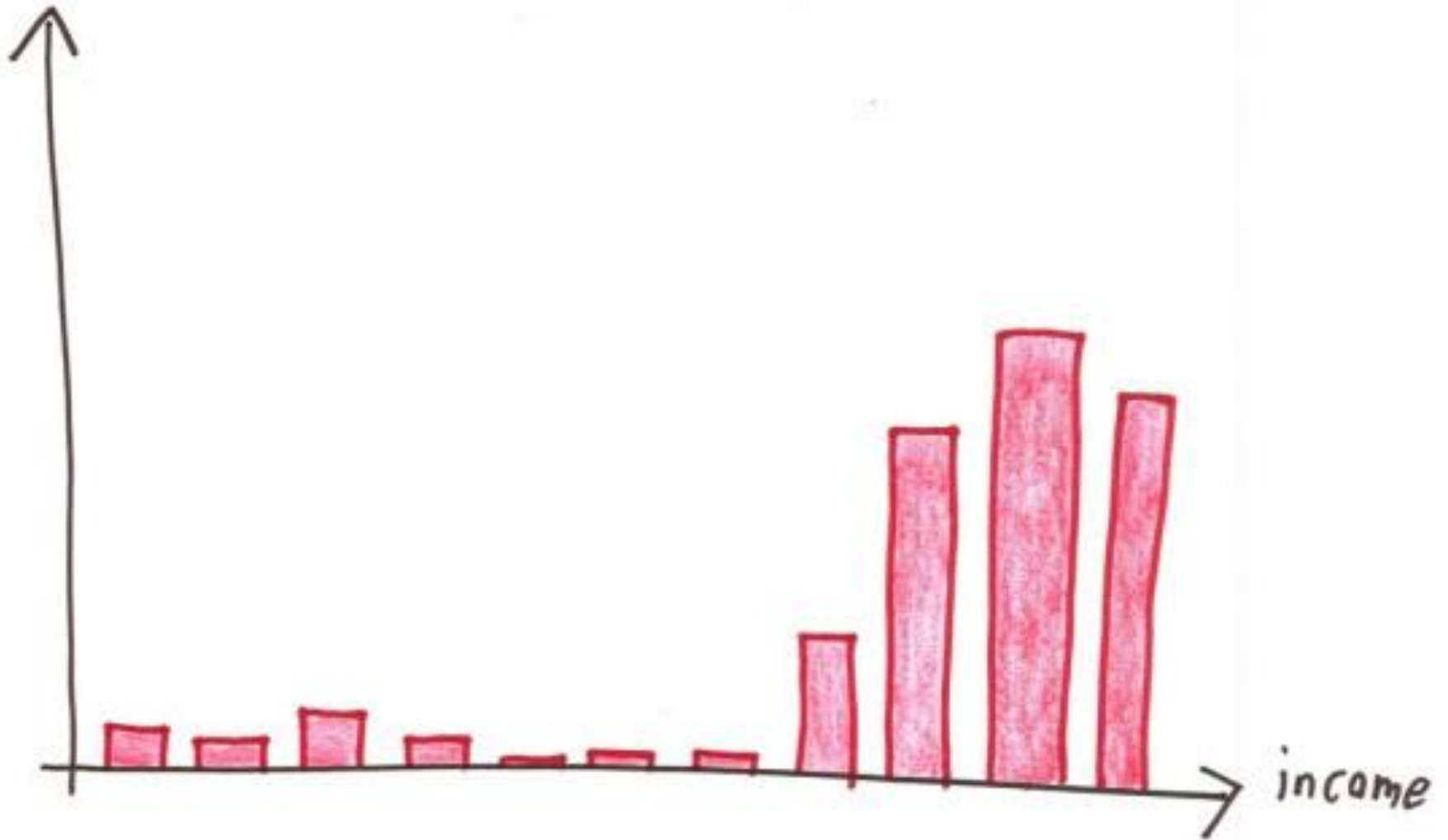


# Range

Our students come from a  
wide range of  
socioeconomic  
backgrounds...



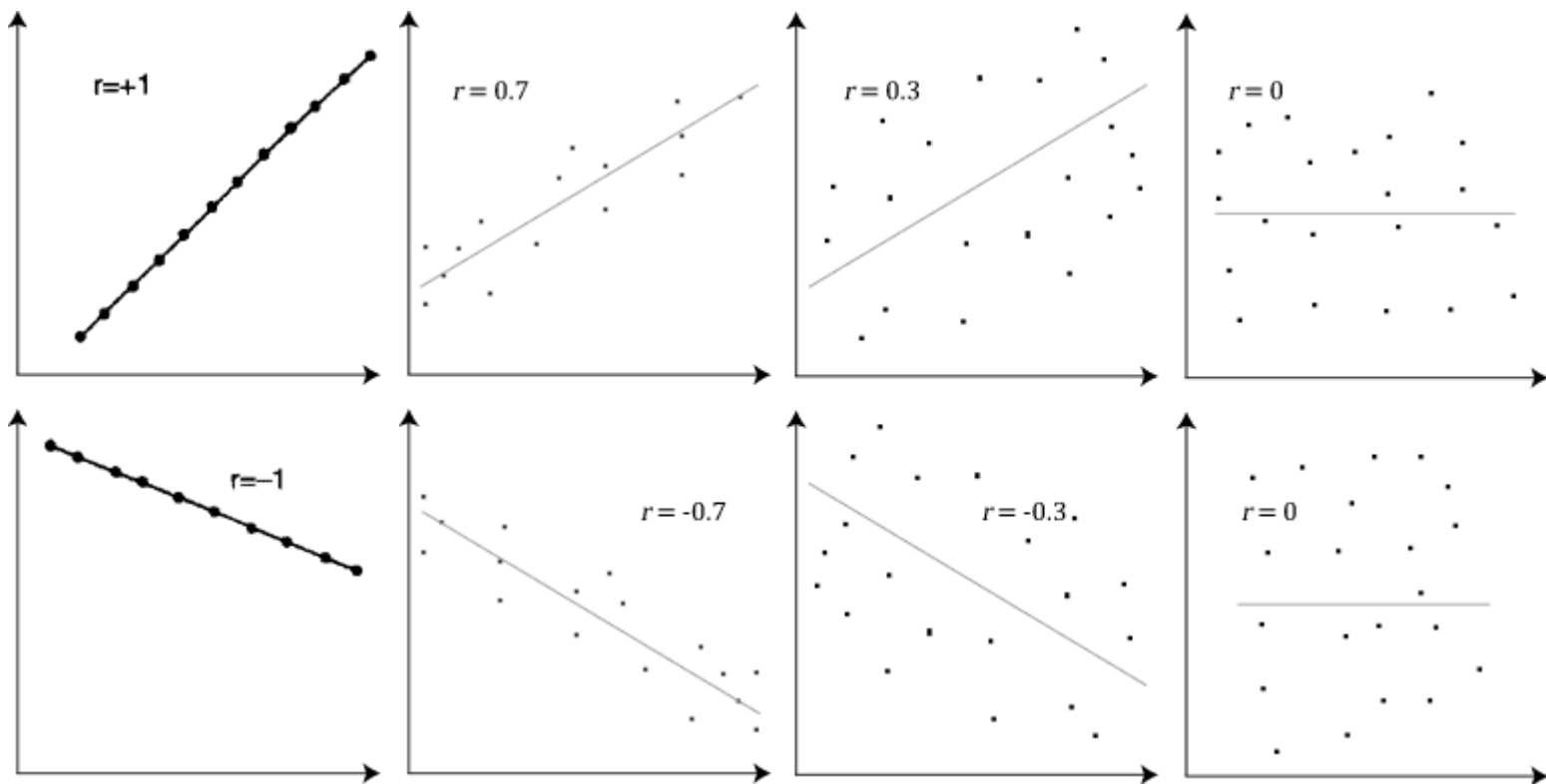
number  
of students



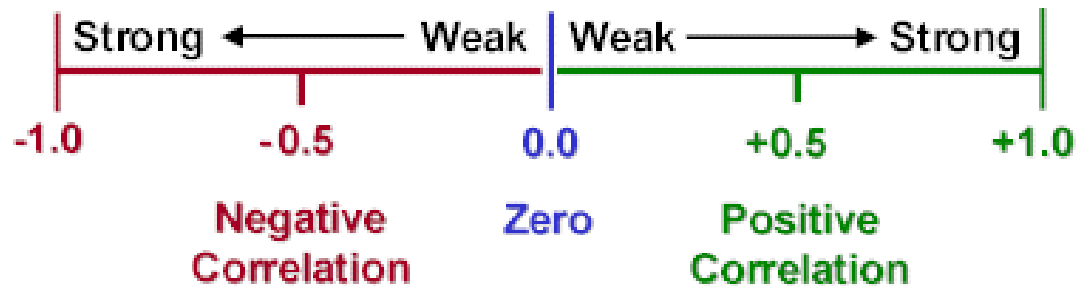
# Correlation Coefficient

Try our energy drink —  
it's highly correlated with  
performance!





**Correlation Coefficient**  
Shows Strength & Direction of Correlation



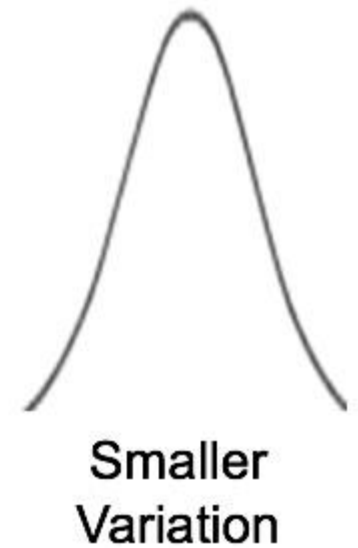
athletic  
performance

professional athletes we  
paid to guzzle the stuff  
...



amount of  
drink consumed

# Variance





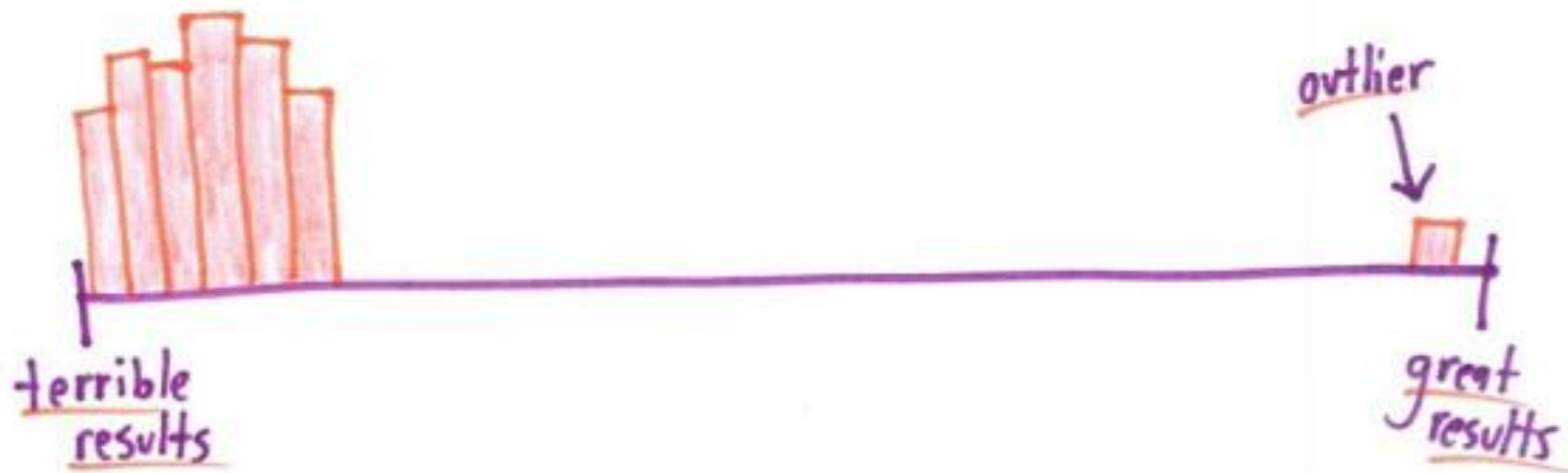
# Variance

These results are  
a disaster!



Sure, they look bad,  
but there's a lot of variance!  
Don't rush  
to judgment.





# BY ACTUAL TEST (one test)

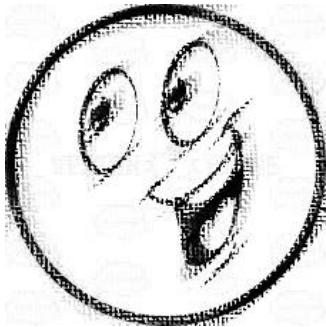


Science proves that tossed pennies come up heads 80 per cent of the time.

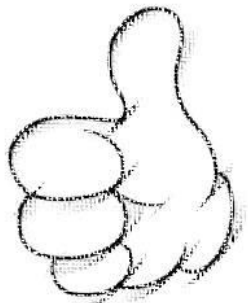


# Changing the Base

Last year: 50% pay cut



This year: 50% raise



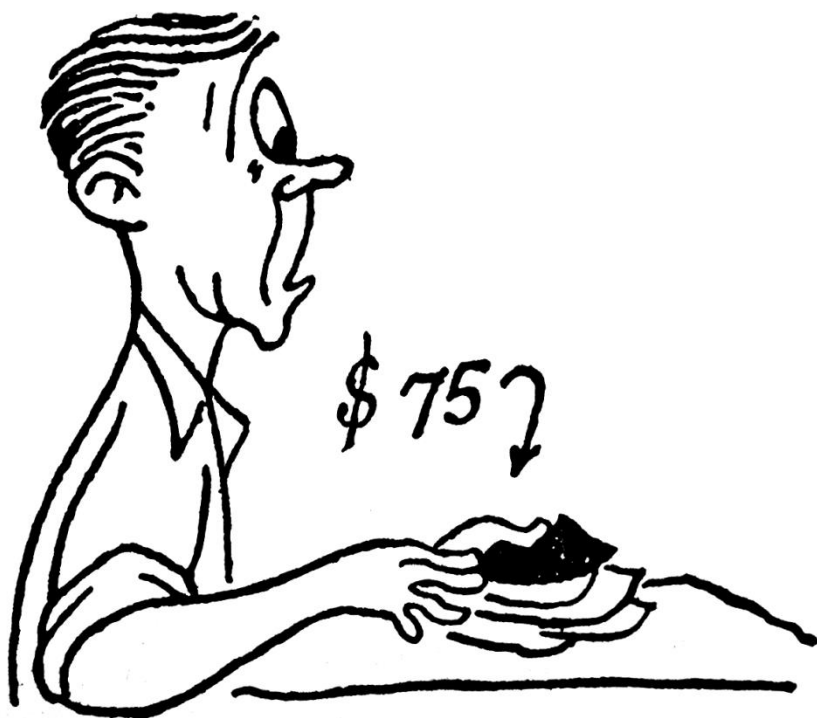
We're even, Steven!

**50%  
PAY CUT**

$$\begin{array}{r} \$100 \\ 50\% \\ \hline \$50 \end{array} \quad \begin{array}{r} \$100 \\ -50 \\ \hline \$50 \end{array}$$

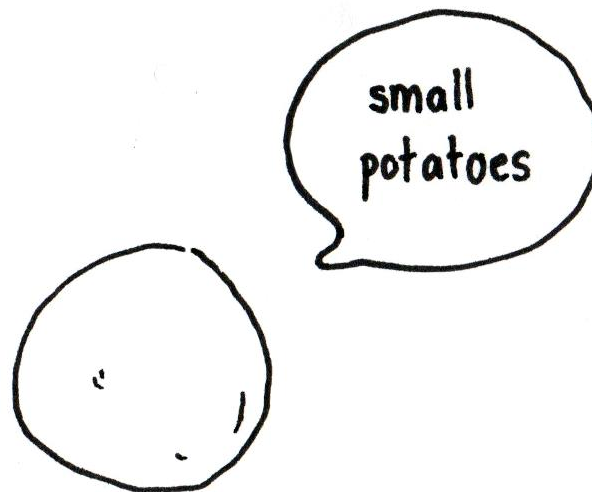


**50%  
PAY CUT  
RESTORED**



2017 profits: 3%

2018 profits: 6%



**Our profits increased 3 percentage points.**

**vs Our profits increased 200 percent!**





# Semiattached Statistic

Survey: “Do you have any complaints about your union?”



# RESULTS

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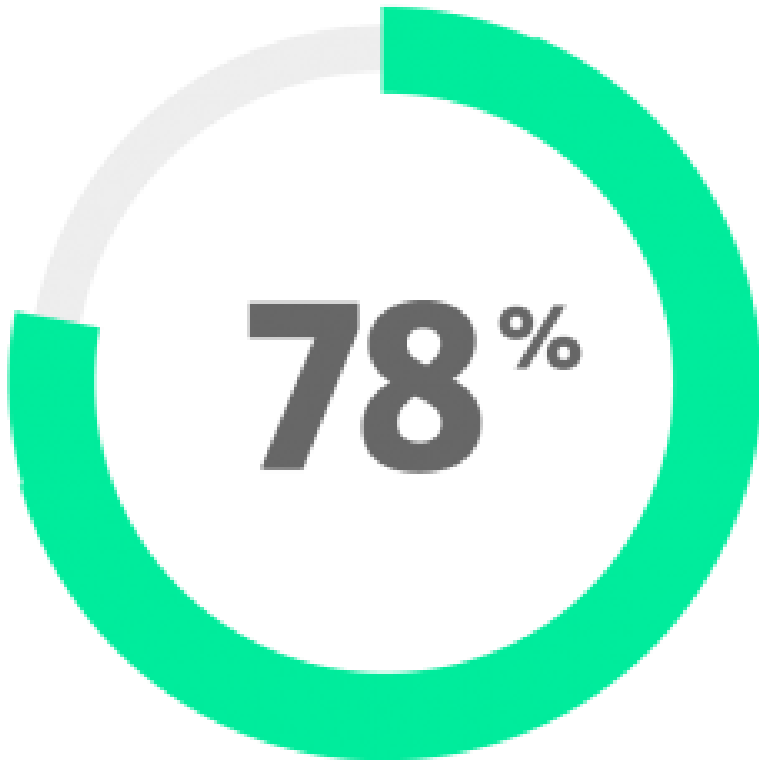
200 workers total

156 workers have one or more  
complaints about their union

# REPORTING

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78% of workers are opposed to the union



The vast majority of workers do not like the union!

Does this square with the question?

“Do you have **any** complaints about your union?”

# 2D Stats in the 3<sup>rd</sup> Dimension!

USA

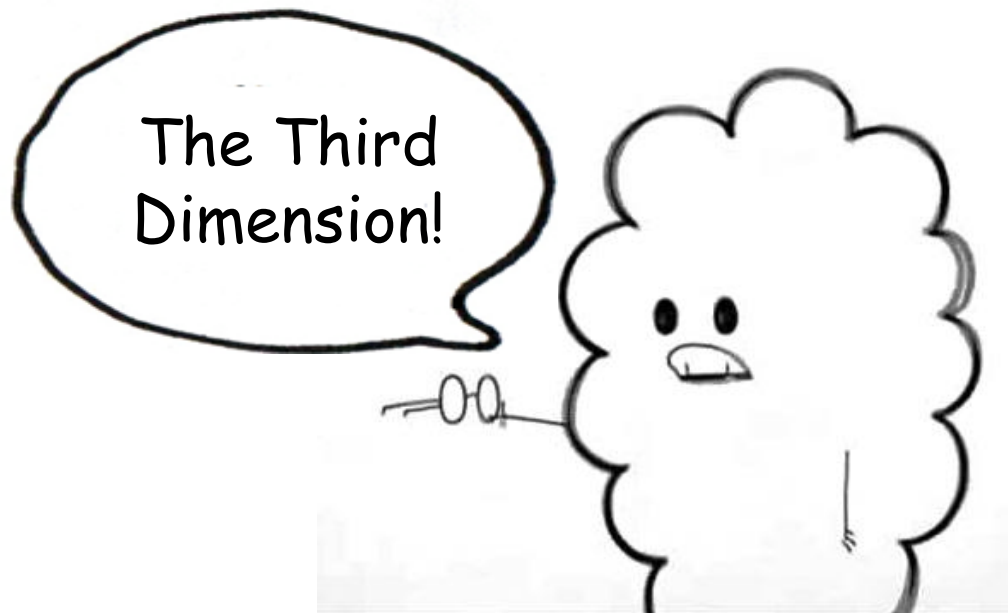
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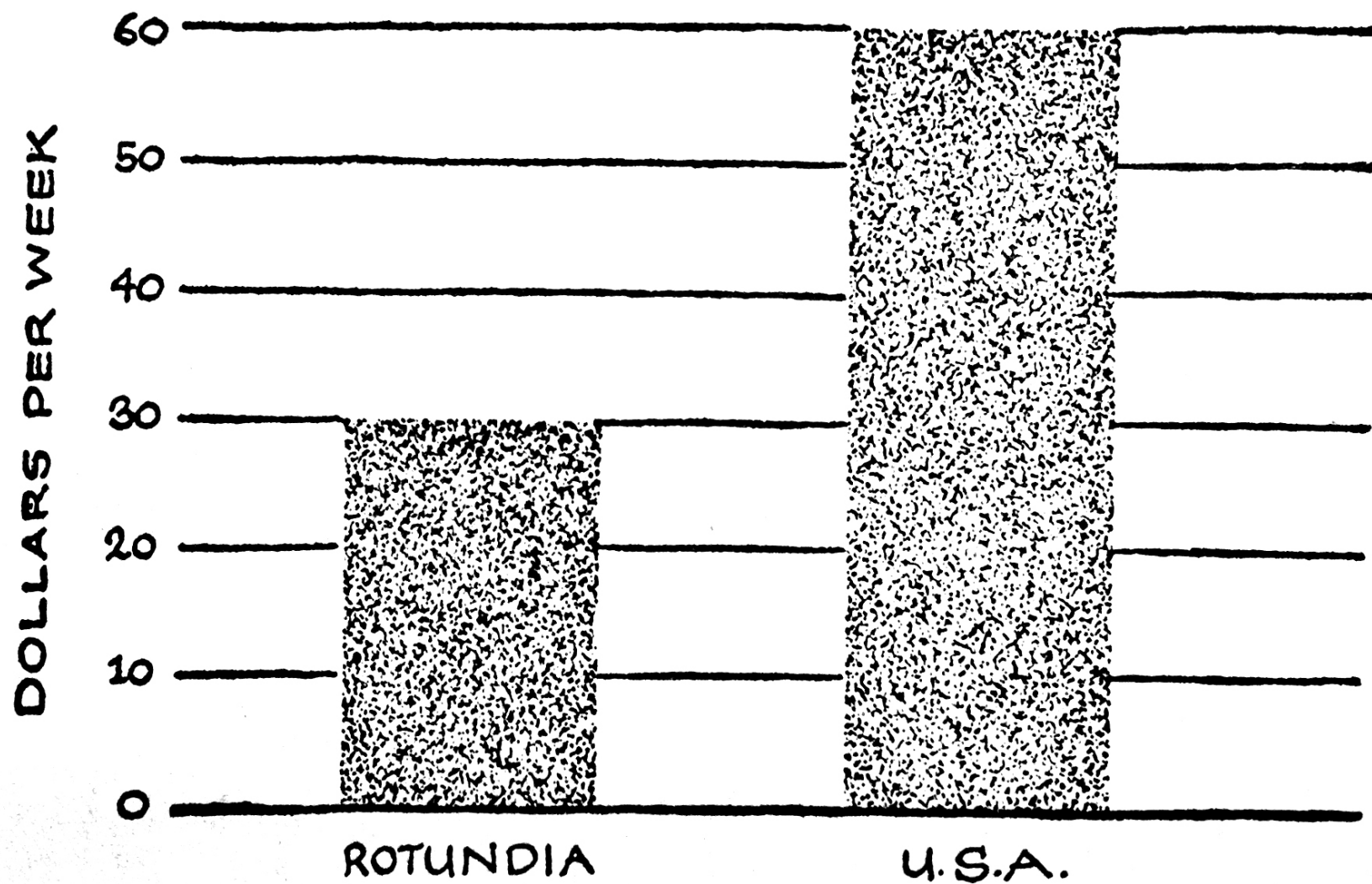
\$60/week

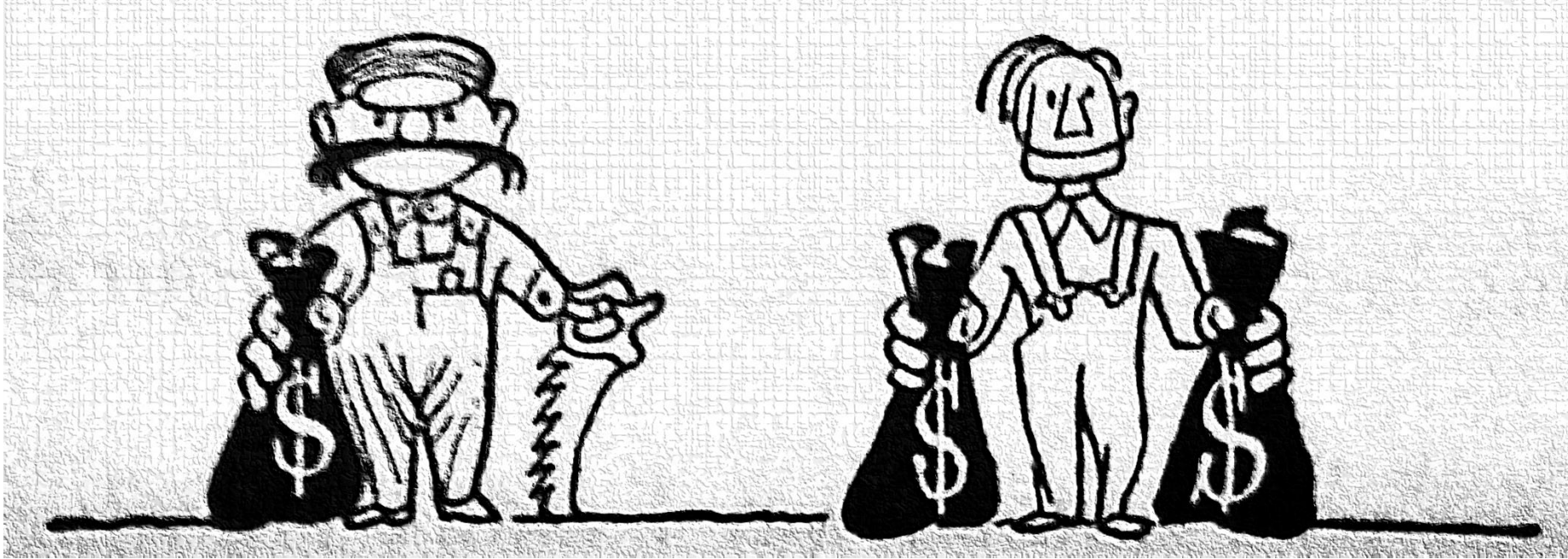
ROTUNDIA

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\$30/week







ROTUNDIA

USA





ROTUNDIA



USA