# DS002.5.1 Statistics (& Probability)

# outline

1. Go over homework
2. Student presentation
3. Statistics
4. Probability

# Homework: great job!

1. assert statement tests
2. adding the file to your code repository
3. using the code on Colab

# Presentation: Statistics in Python

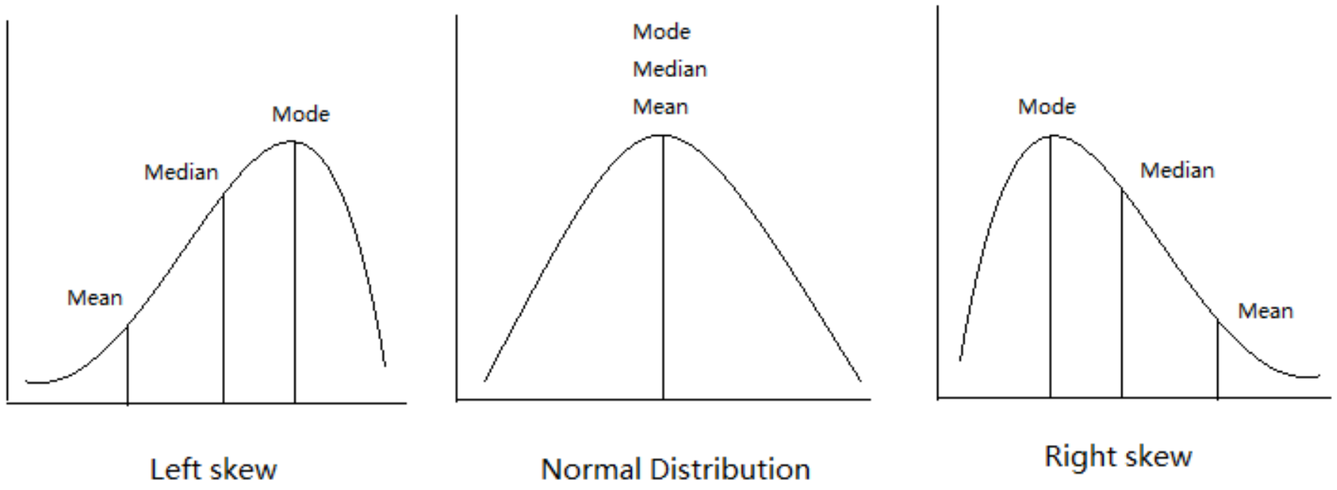
**Perbhaat Khowaja and Sumedha Bhandari**

# Statistics: distribution/dispersion/correlation!

1. Finding the center
2. FInding outliers
3. Getting the shape
4. Quantifying relationships

# Finding the center

1. **mean()** `the average value`
2. **median()** `the middle-most value`
3. **mode()** `most common values`

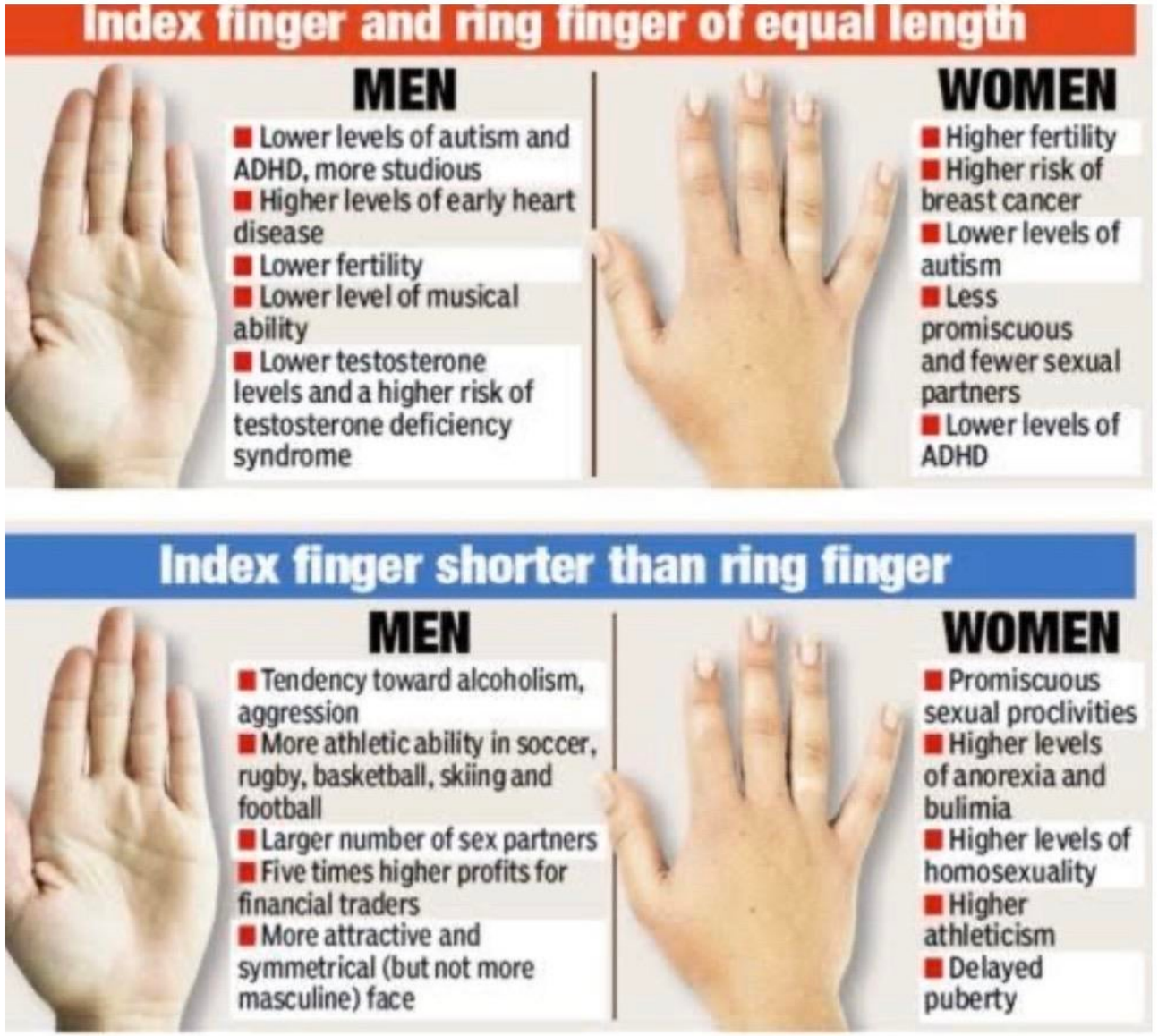



**Nhan Tran,** Mean, Median, and Mode in Statistics

# Correlation?

**A longer index finger compared to your ring finger is considered a *high 2D:4D ratio.***

1. **Individuals with a lower 2D:4D ratio tend to be more aggressive** [1]
2. **Men with lower 2D:4D ratios are nicer to women** [2]
3. **Men with lower 2D:4D digit ratios tend to marry younger** [3]
4. **High 2D:4D digit ratios correlate with poker hand rank** [4]




[1] https://www.sciencedirect.com/science/article/abs/pii/S0301051104001048

[2] https://www.mcgill.ca/psychology/debbie-s-moskowitz

[3] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3338004/

[4] https://www.bmj.com/content/375/bmj-2021-067849

# Measuring significance: P Values

- P-value is a number between 0 and 1
- P values are expressed as decimals...
- P-values are determined by the observed correlation and the sample size.
- Small p-values are strong evidence.
- With a small p-value, we reject the null hypothesis H0.

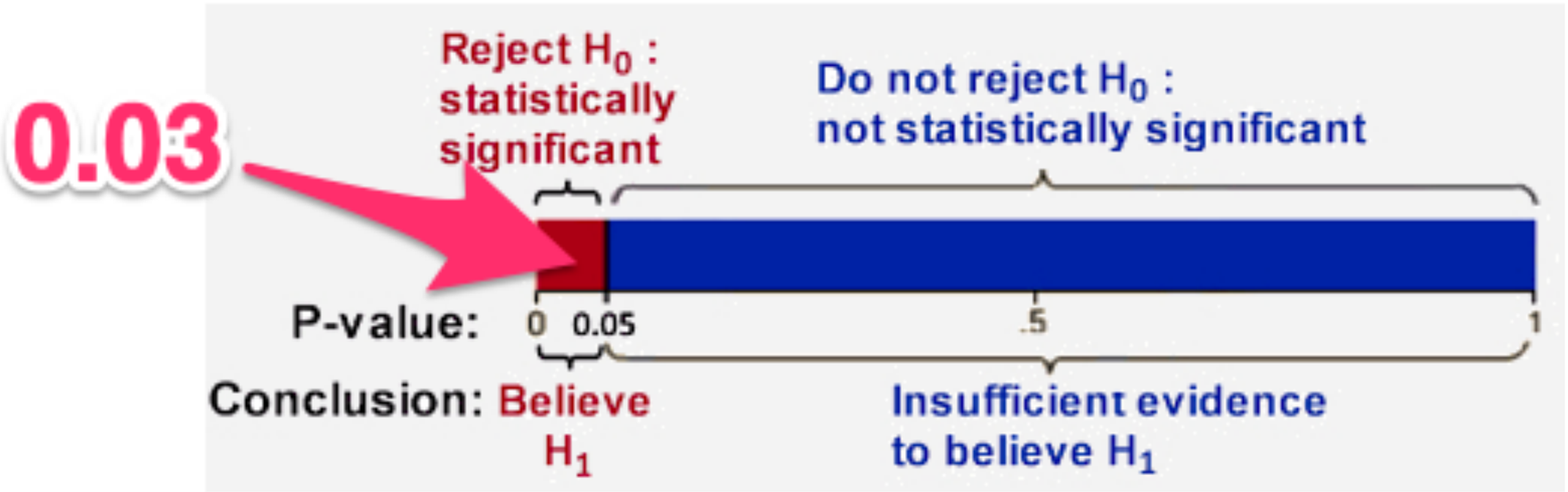
# Giving Science the Finger

**James M Smoliga, professor of physiology, Lucas K Fogaca, Jessica S Siplon, Abigail A Goldburt, Franziska Jakobs. 15 December 2021**

| gender | D2:D4 | Best poker hand |
|---|---|---|
| Women | 0.927 | 0.28 |
| Men | 0.916 | 0.03 |

# Strong correlation!

## High D2:D4 ratios correlate with luck in Poker



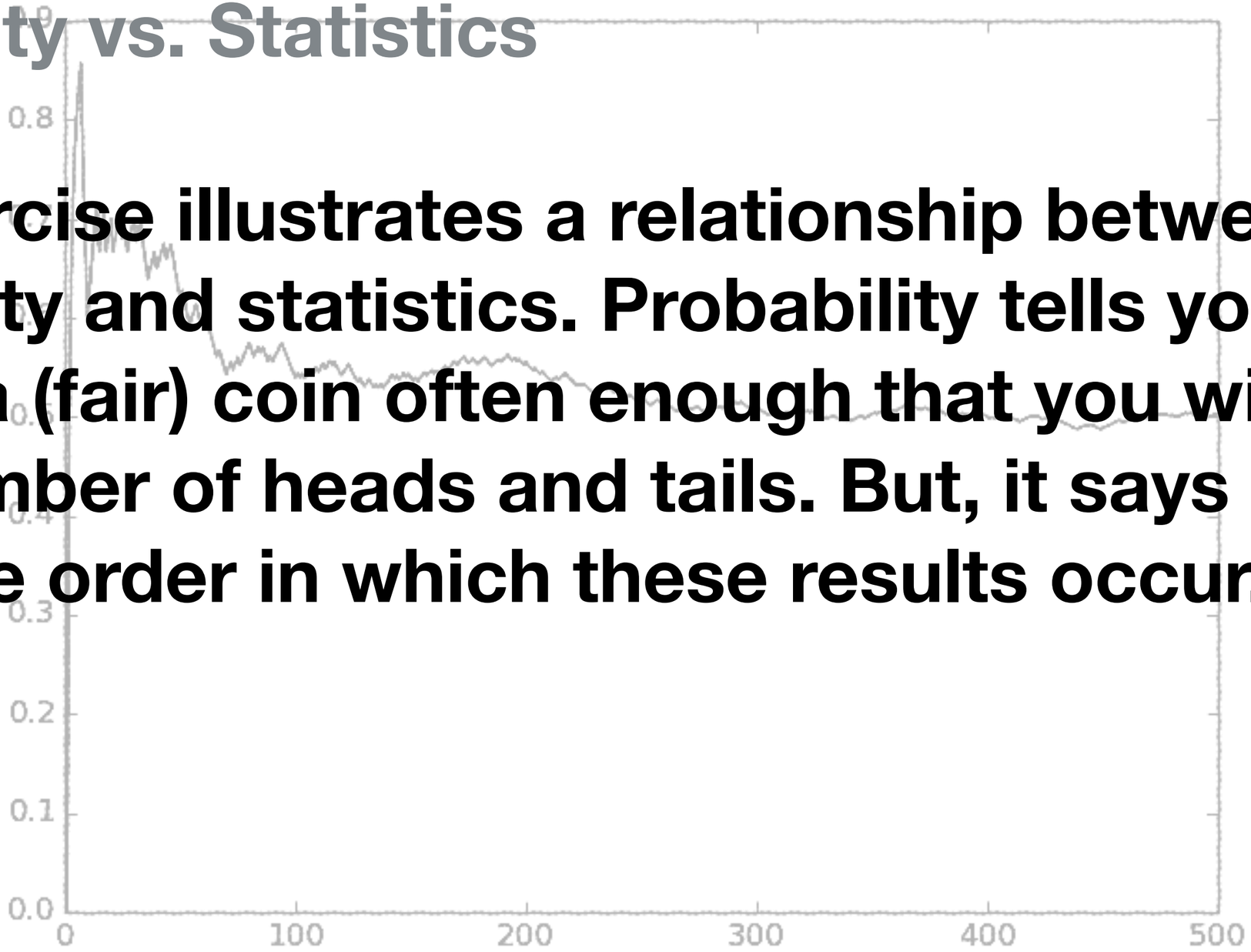
# Questions

1. Are long index fingers lucky in all things?
2. Do high D2:D4 ratios cause luck?
3. Can you think of an experiment to disprove these theories?

# Wednesday: Flipping coins

**Prof. leaves the room you split up into two teams. One team flips a coin 100 times, the other simulates flipping the coin. Both teams record their results on the white board without identifying which is which. Prof. returns and identifies the real flips. How does he do it?**

# Probability vs. Statistics




**This exercise illustrates a relationship between probability and statistics. Probability tells you that if you flip a (fair) coin often enough that you will get an even number of heads and tails. But, it says nothing about the order in which these results occur.**

# More to come!