ABI Summer 2021 Introduction to Statistics

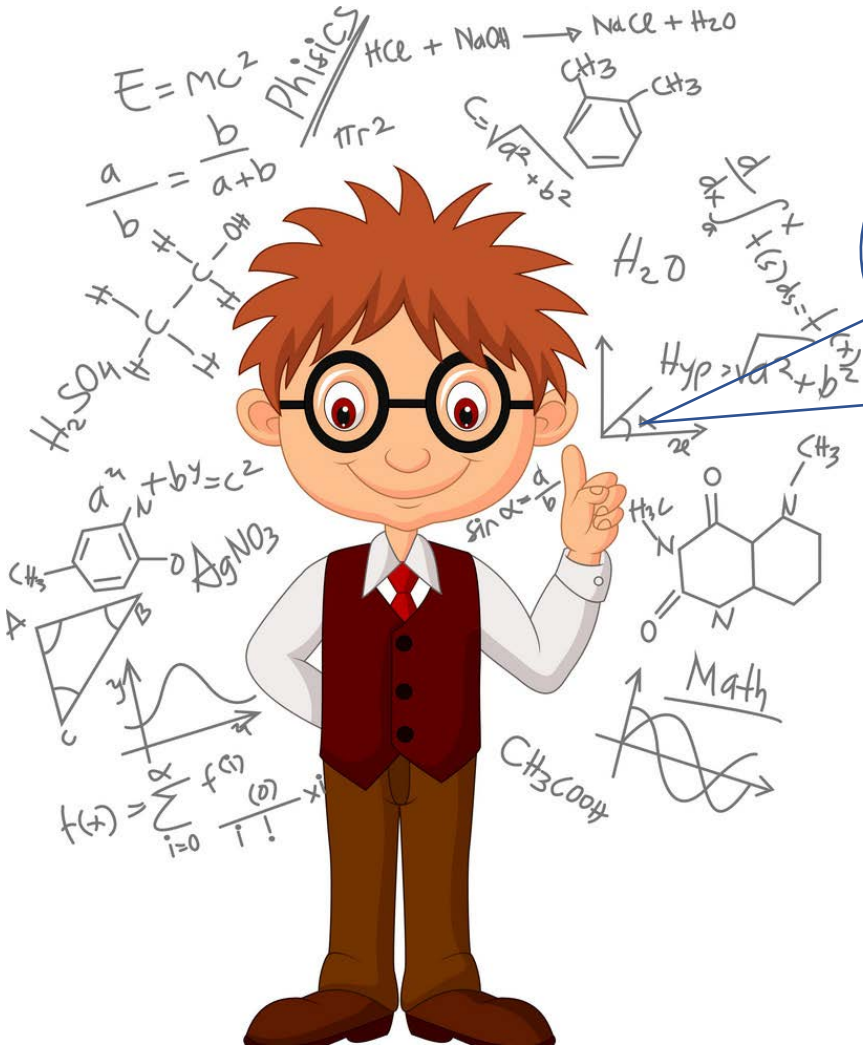
Guest Session 1

Javier Cabrera*, Volha Tryputsen** & Davit Sargsyan**

June 29, 2021

(*)Rutgers, the State University of New Jersey
(**)Janssen Pharmaceutical Research and Development (J&J)

Why and How I Became a Statistician



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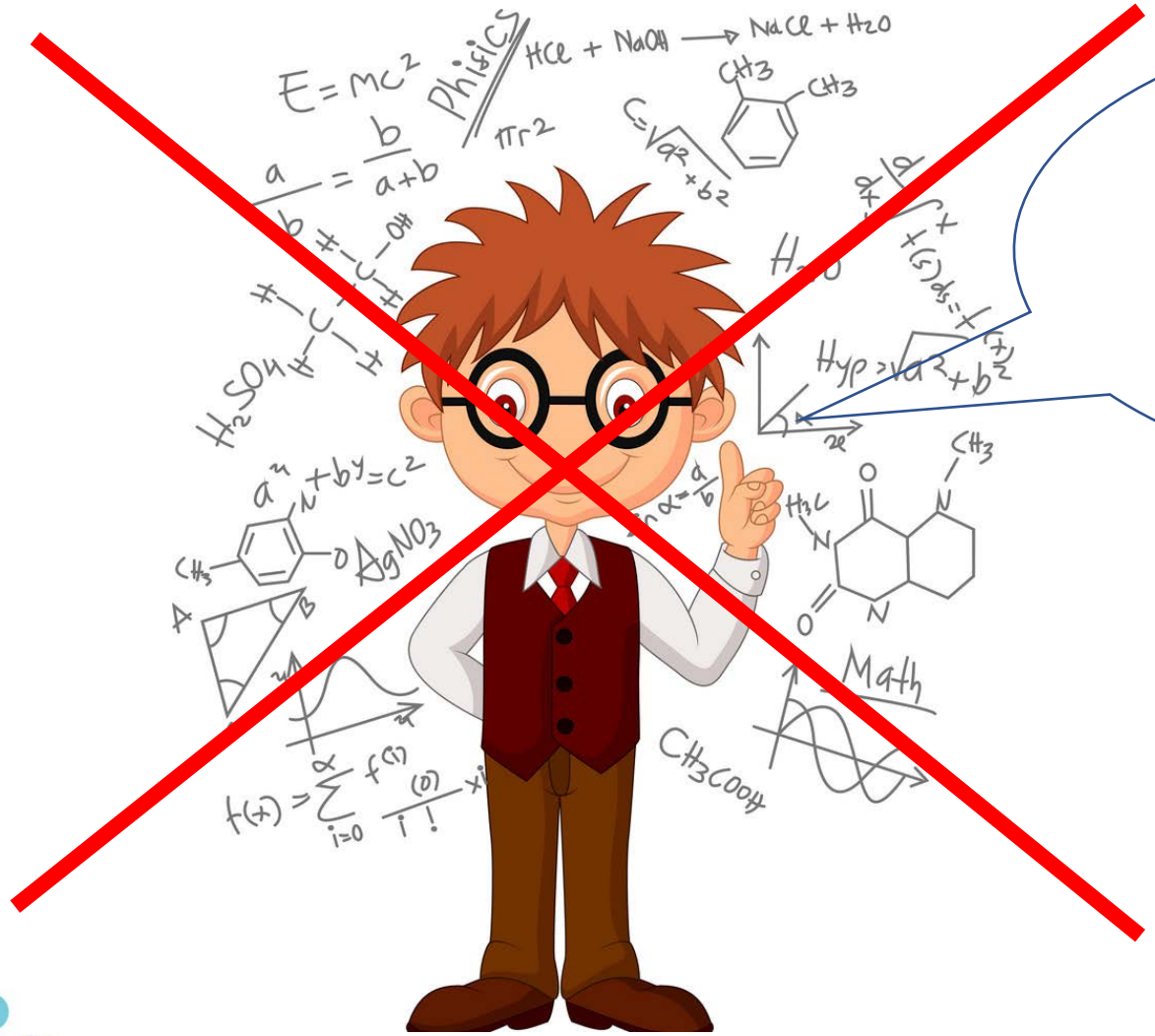

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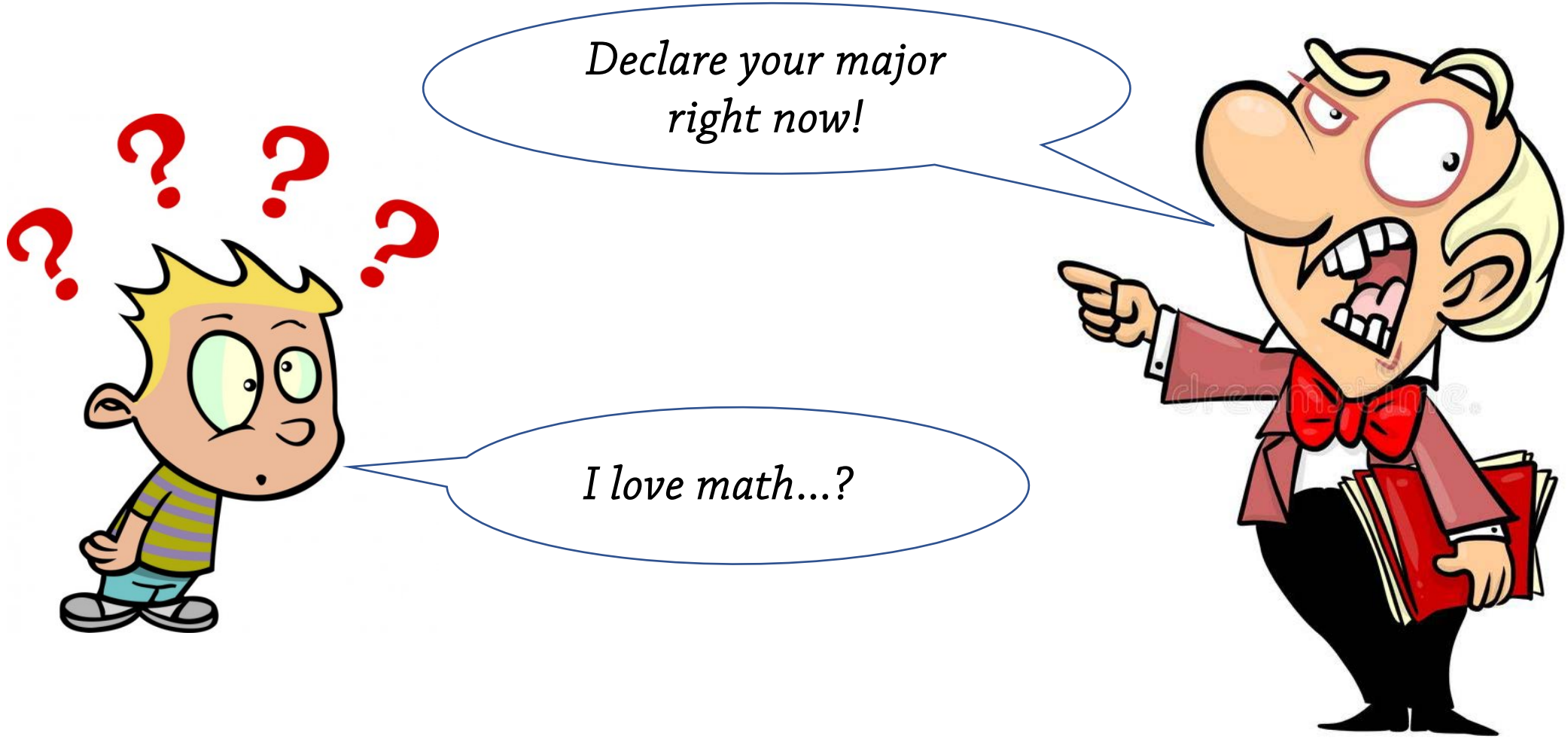

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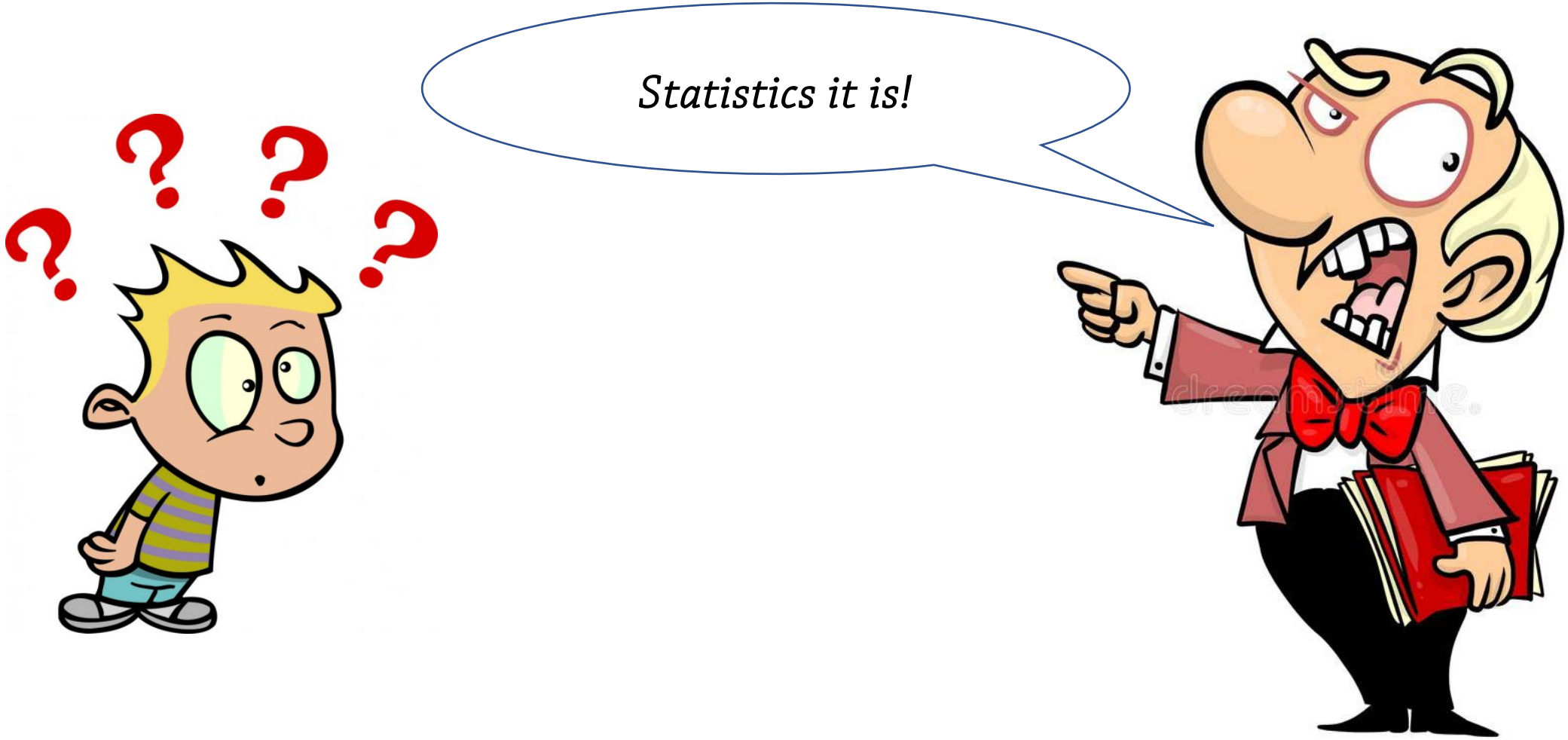
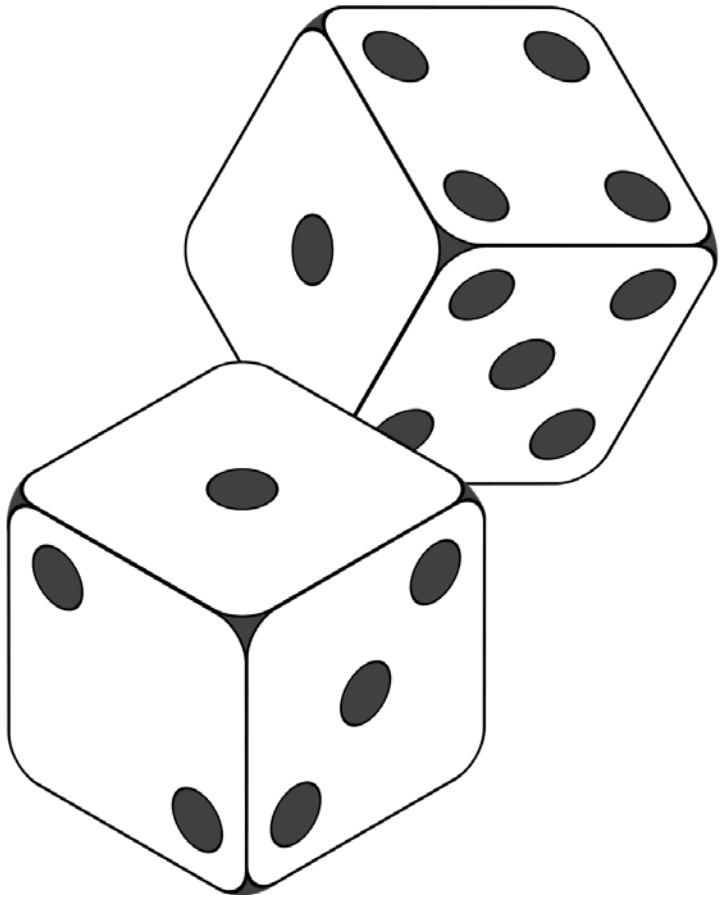
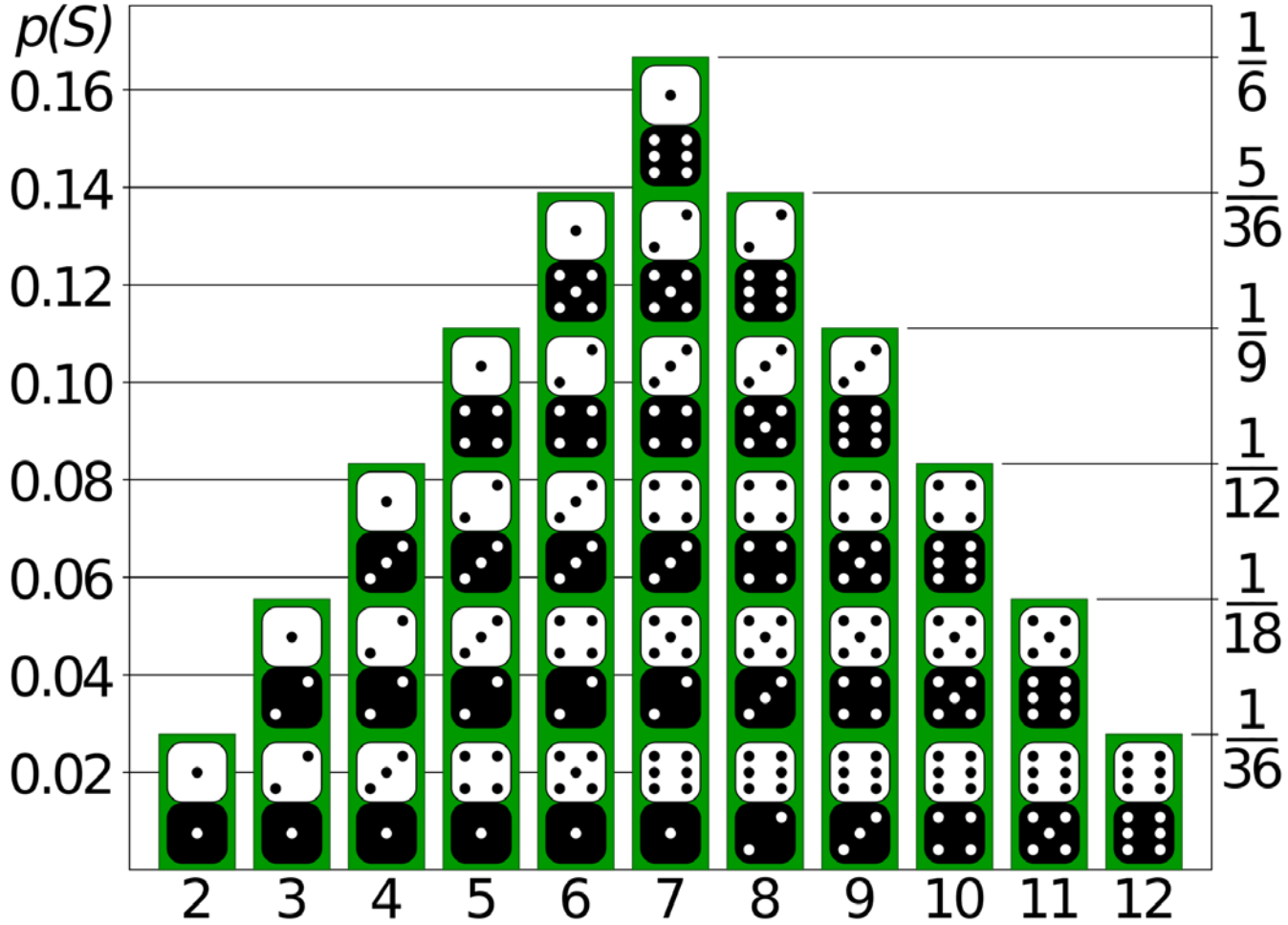
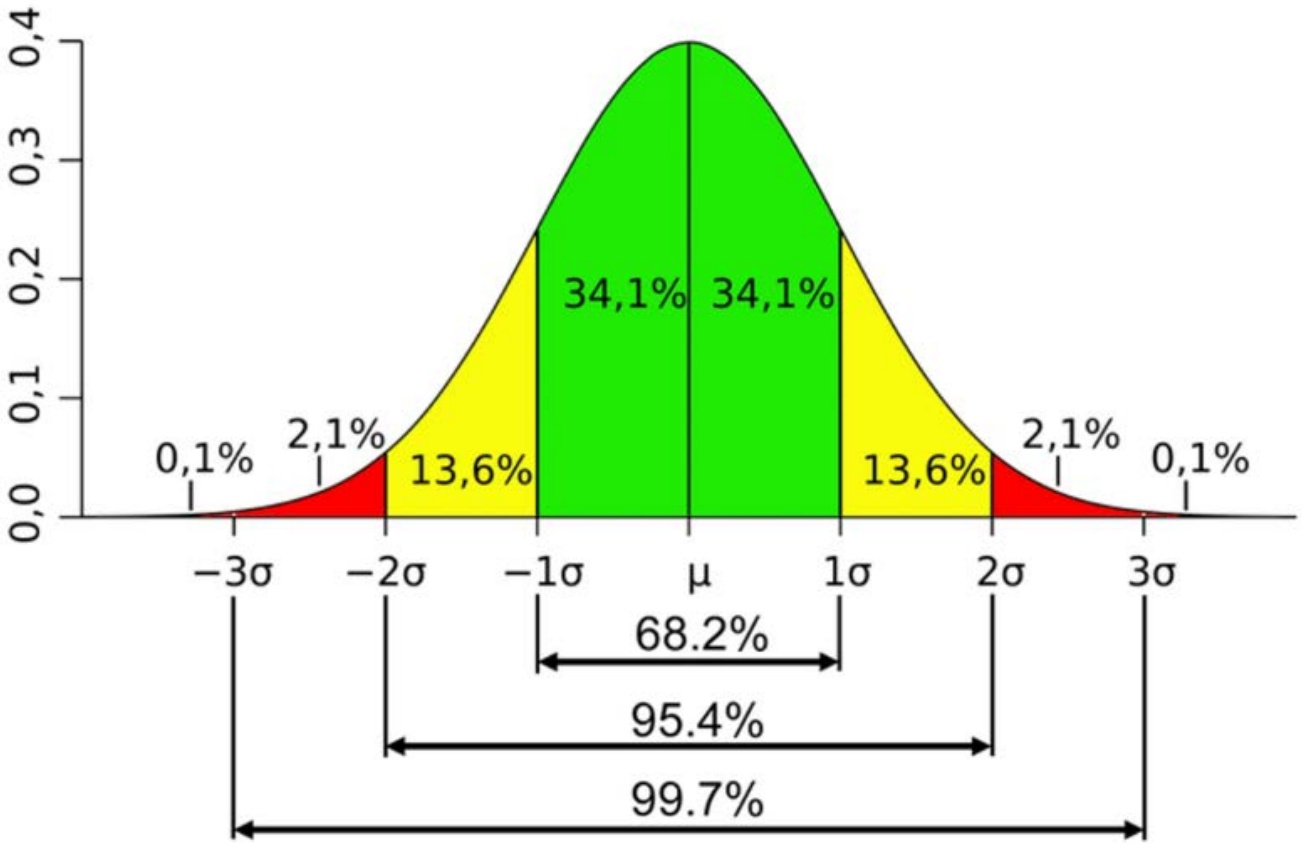


Probability and Distributions





Normal Distribution

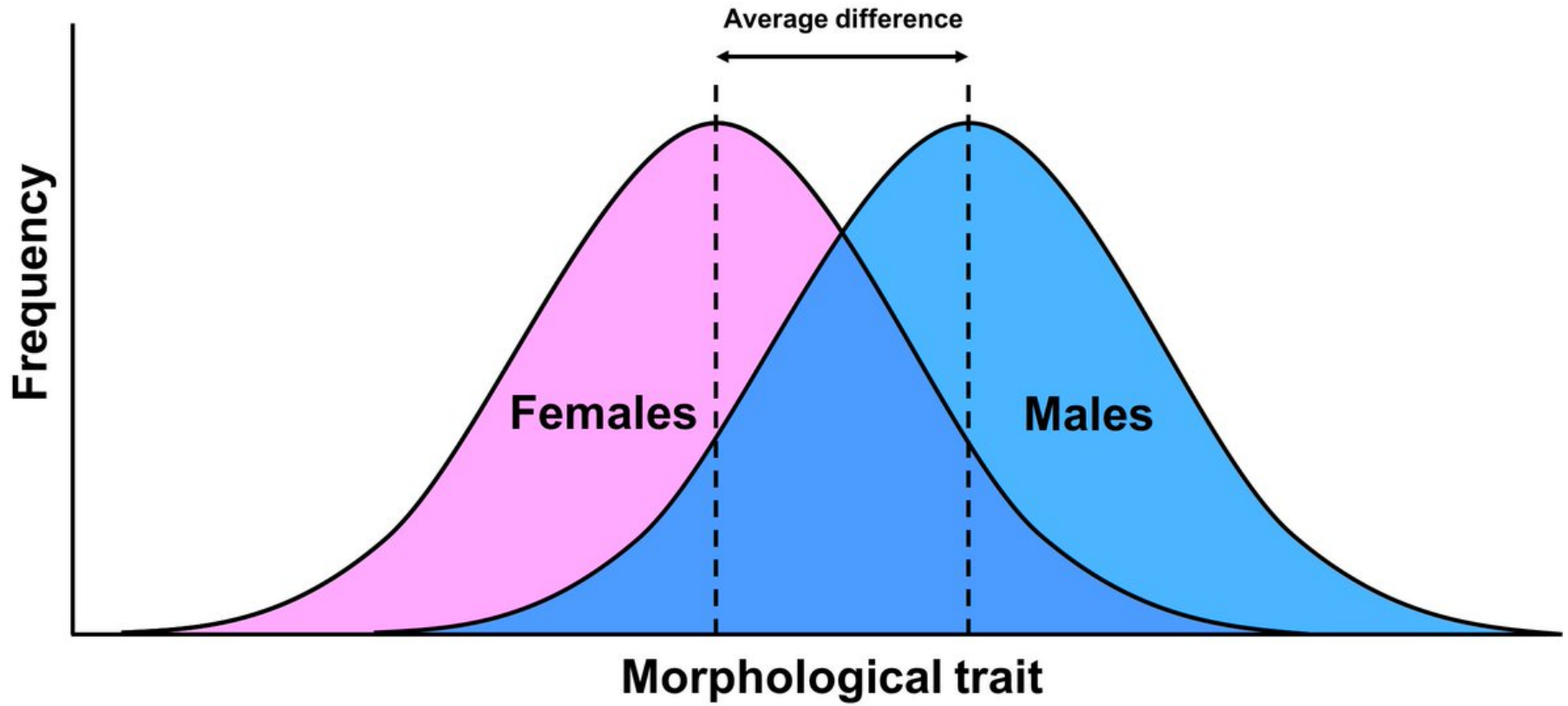


$$\sigma^2 = \frac{\sum(\chi - \mu)^2}{N}$$

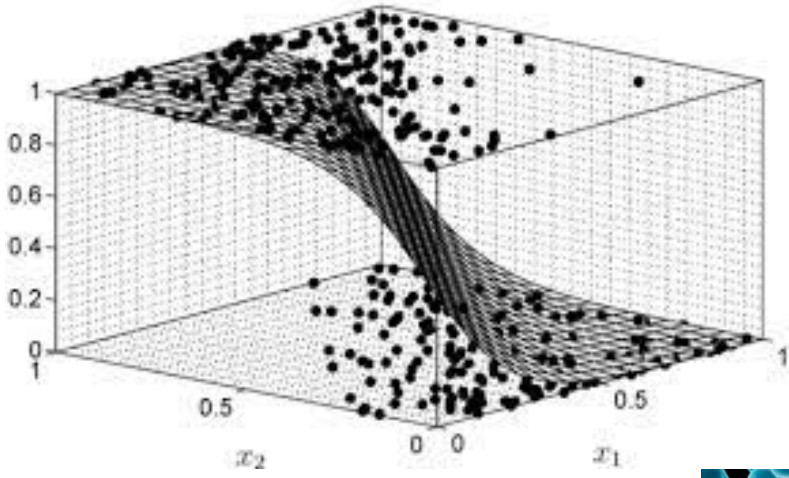
Normal Probability Density Function

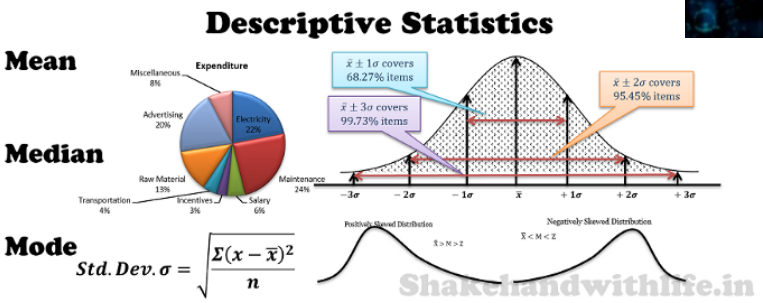
$$F(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-(x-\mu)^2 / 2\sigma^2}$$

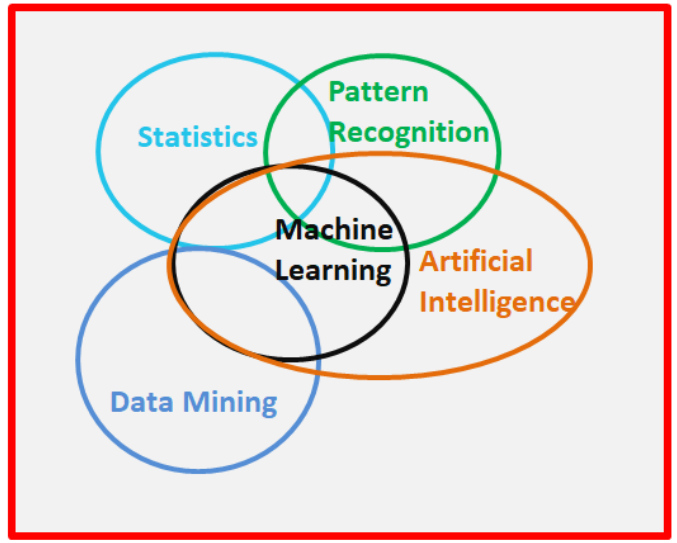
Probability and Distributions



Applications of Statistics







Volha Tryputsen: my statistics journey

1999

B.A. Statistics/ Economics coursework

2007

B.A., M.S. Biostatistics

2010

Discovery Statistics

2014

Doctor of Public Health candidate, Biostatistics

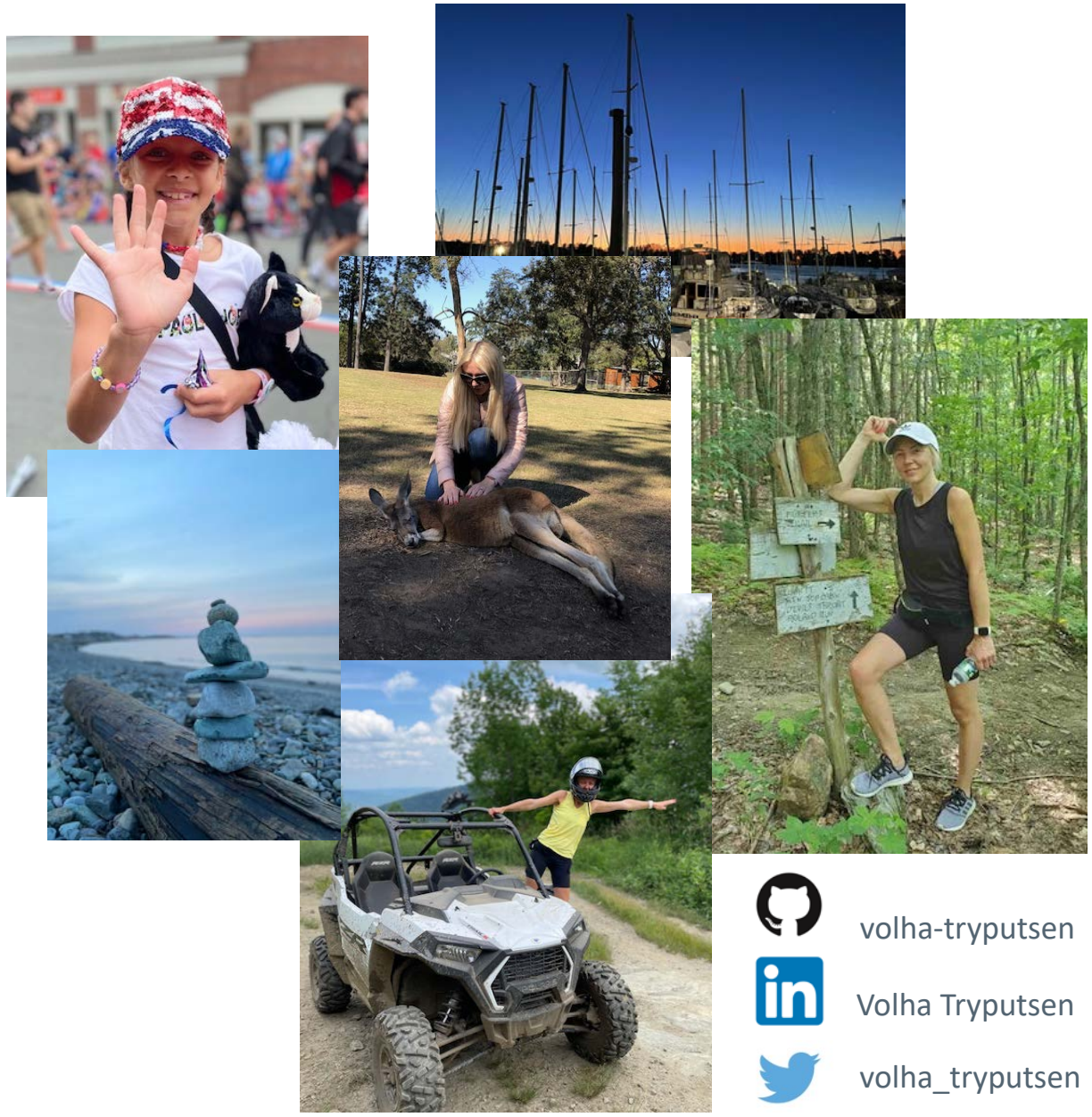
2021

I ♥ STATS

R Innovation Data Science Women

ABI

Volha Tryputsen: when I take my stats hat off…

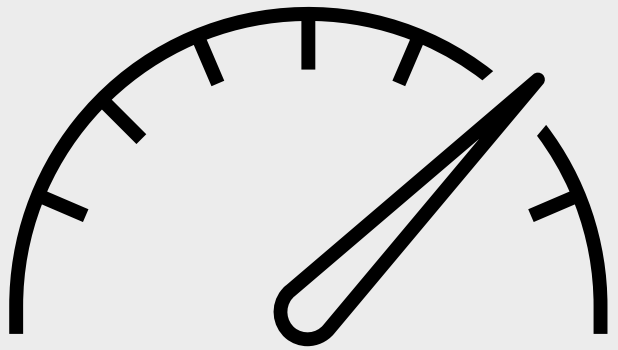


volha-tryputsen

Volha Tryputsen

volha_tryputsen

How Much Statistics Do **You** Know?



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pollev.com/istats820

Prof. Javier Cabrera

2019-2020 (great year) PhD grads

Ben Li
(China)
Pfizer

Tray Beavers
J&J Research
(North Carolina)

Ellie Small
Drew University
(Holland)

Debopriya Ghosh
J&J Research
(India)

Current research interest

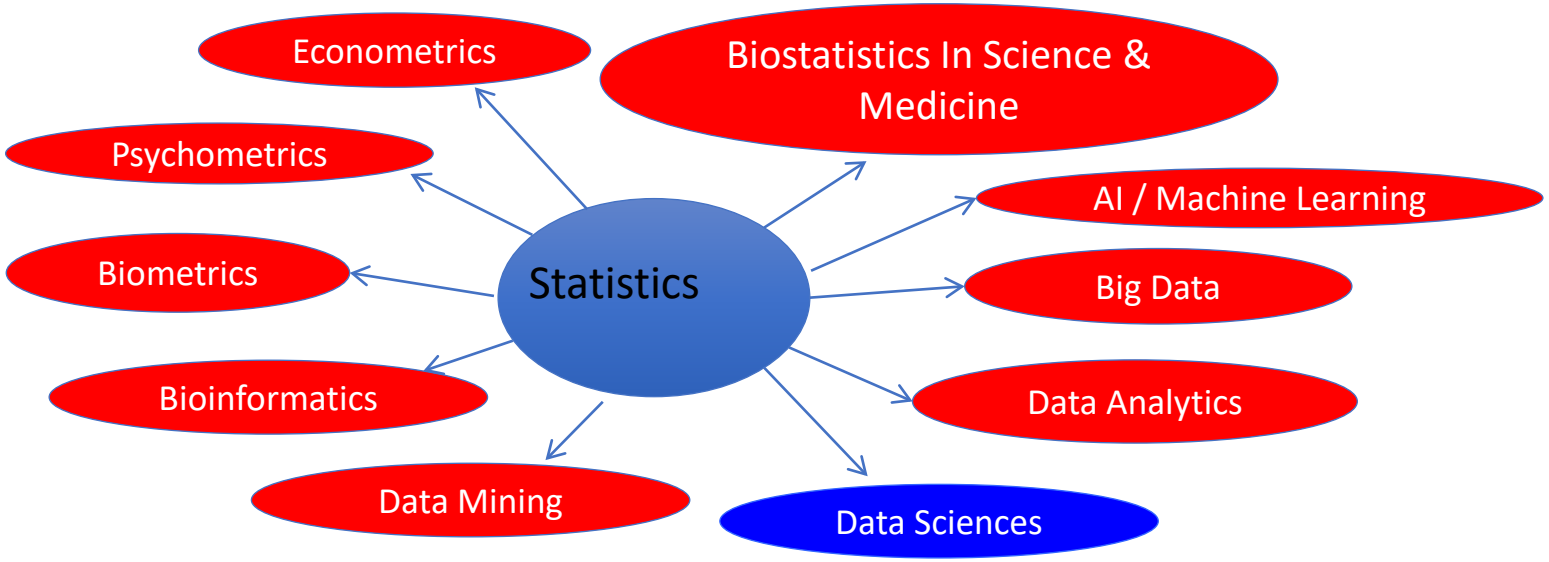
- Statistical Genomics (big p & small n)
  - ➢ Quantile Normalization
  - ➢ Enriched Random Forest
  - ➢ Enriched Lasso
- Cellular level Experiments (big p & very big n)
  - ➢ Data Nuggets
- Statistics for cardiovascular medicine

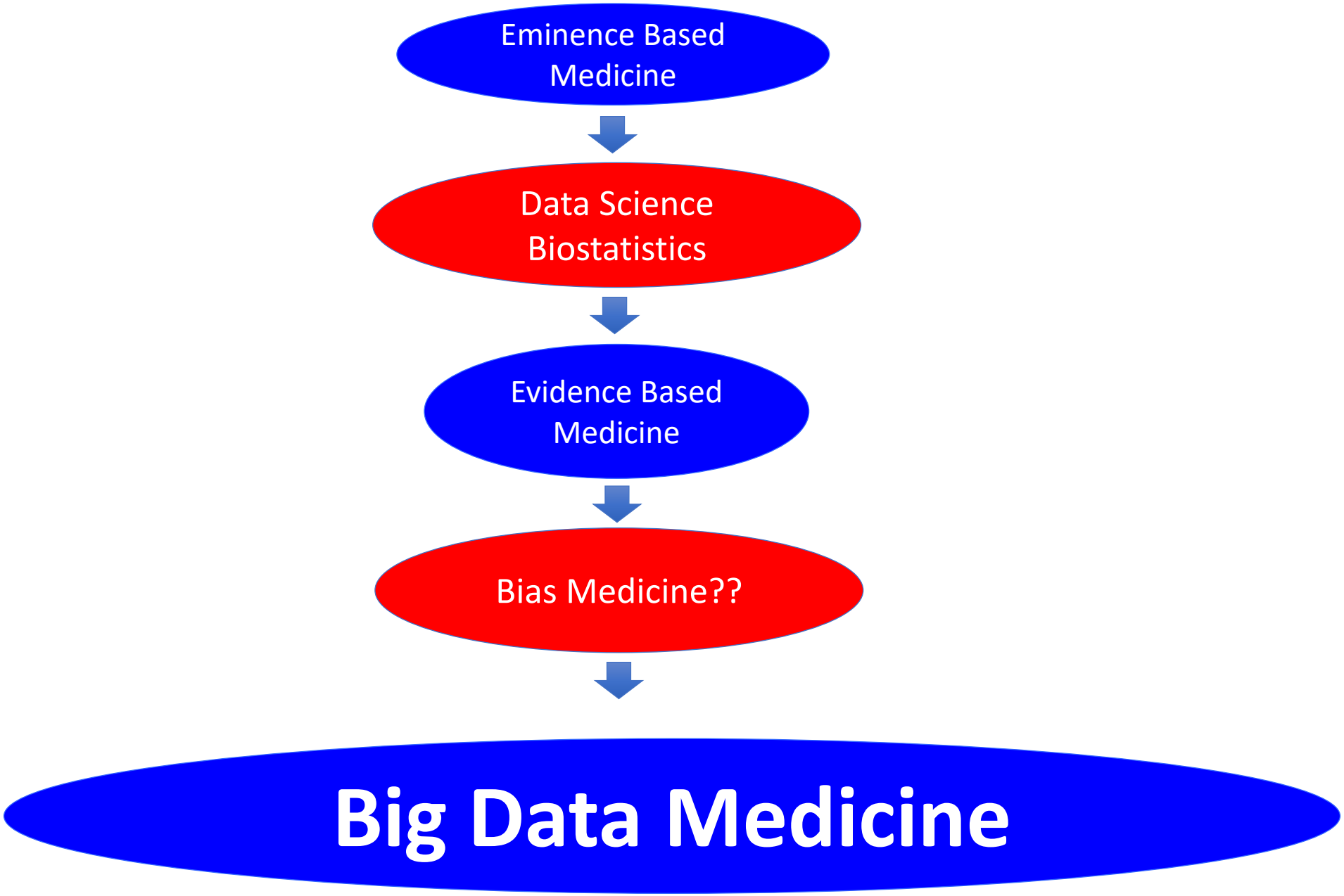
"The best thing about being a statistician is that you get to play in everyone's backyard."

John W Tukey
(1915-2000)

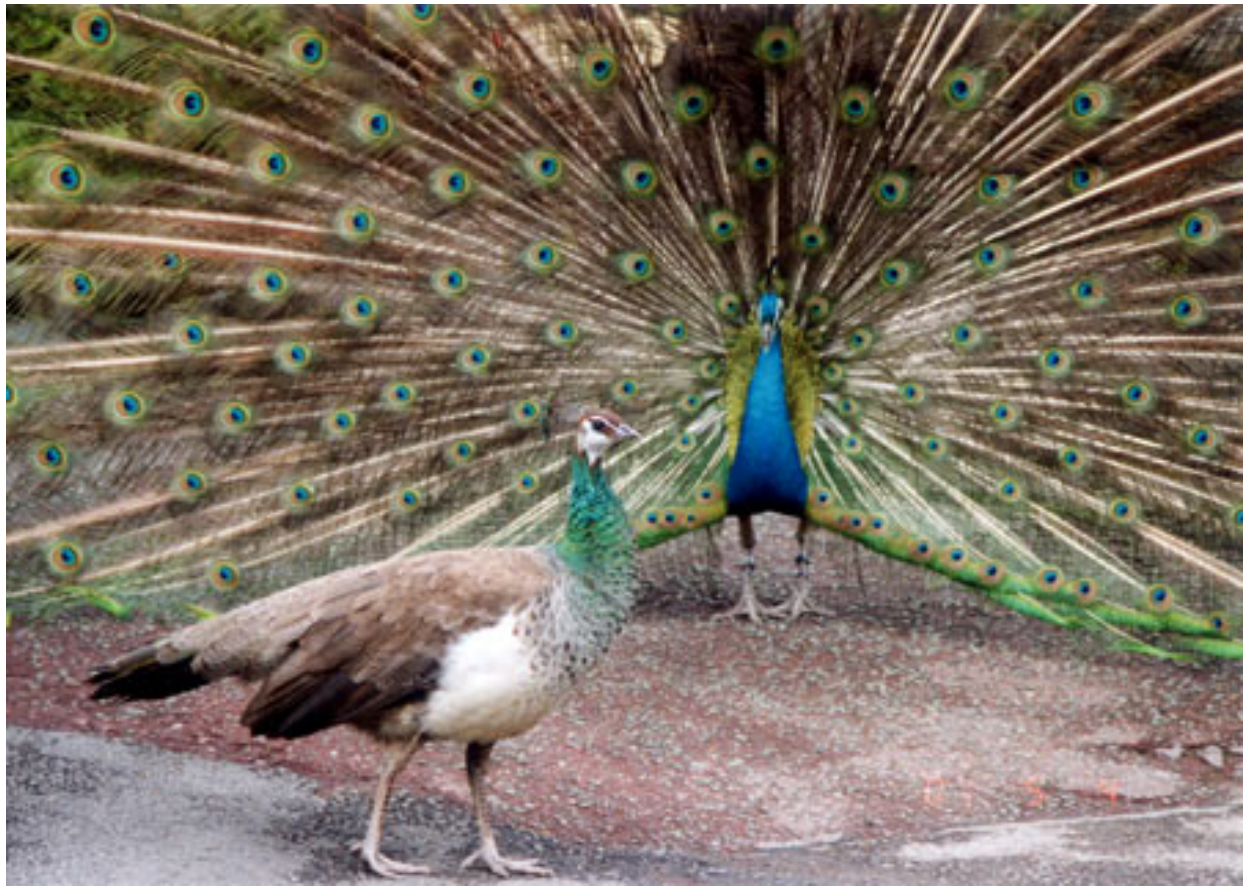
"To understand God's thoughts we must study statistics, for these are the measure of His purpose."

Florence Nightingale
(1820-1910)




Eminence Based Medicine
Data Science Biostatistics
Evidence Based Medicine
Bias Medicine??
Big Data Medicine

Peacock Female Choice



gaudiness. Stein Are Sæther, an evolutionary biologist at the University of Oslo in Norway, says the new study shows that "we really do not understand exactly what females ... are doing when they evaluate males."

Enlarge Image

What females don't want. Peahens in Japan don't always choose the male with the most elaborate train.

CREDIT: MARIKO TAKAHASHI

Peacock Feathers: That's So Last Year

By Virginia Morell
*Science*NOW Daily News
31 March 2008

It's been a truism since Darwin's day: Female peahens prefer a male peacock with a gorgeous train--the fancy feathered fan he unfurls to wow the gals. But a new 7-year study questions this long-held notion, reporting that females in a feral population of Indian peafowl (*Pavo cristatus*) showed no such preference. The controversial paper contradicts previous, lauded studies that did reveal a link and that are part of the canon of evolutionary biology.

It's not what you think – it is what you know

Woman vs. Men
Are they the same?

TARGET BLOOD PRESSURE IN WOMEN

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Question: What should be the target blood pressure for WOMEN with hypertension?

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TARGET BLOOD PRESSURE IN WOMEN

Question: What should be the target blood pressure for WOMEN with hypertension?

Answer: 120 SAME AS MEN!

Know Your Tools

- What are the research questions you are trying to answer?
- What data do you need to answer them?
- Can you design an experiment that will provide you with the data? Think about the experimental design long and hard!
- What are the right tools, i.e., appropriate statistical techniques that can help you answer the questions?
- Do you understand the statistical methods well enough to be confident with your inference? Things to consider:
  - Distributions
  - Missing data
  - Outliers

Now, Let's Learn Some Statistics!

(over the next 3 sessions)