

Introduction to Statistical Thinking

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Learning vs training

- Purpose
- Learning vs training
- Are you studying for learning or for training?
- Motivation

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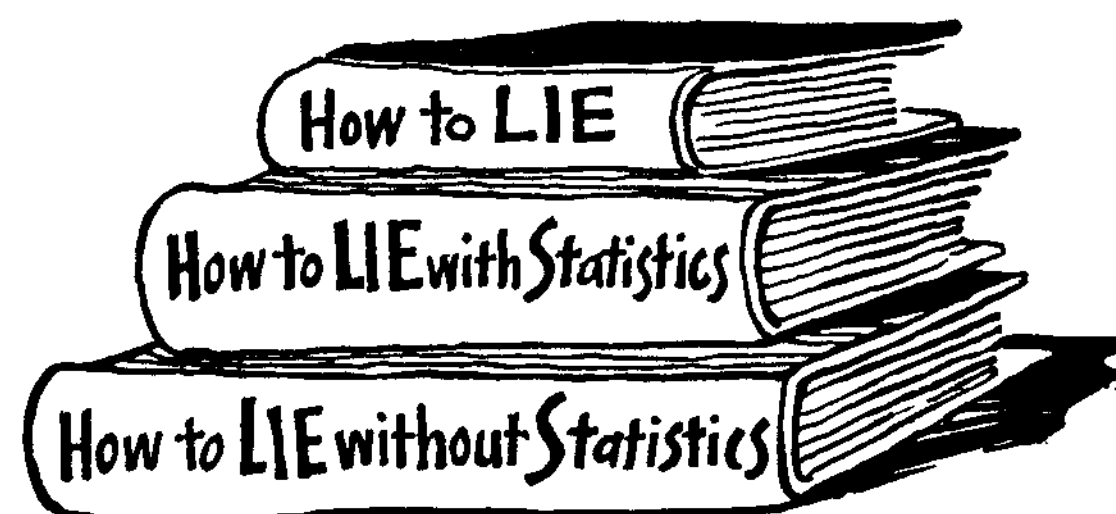
Don't be a slave of the tools, be a master of it

Metaphor

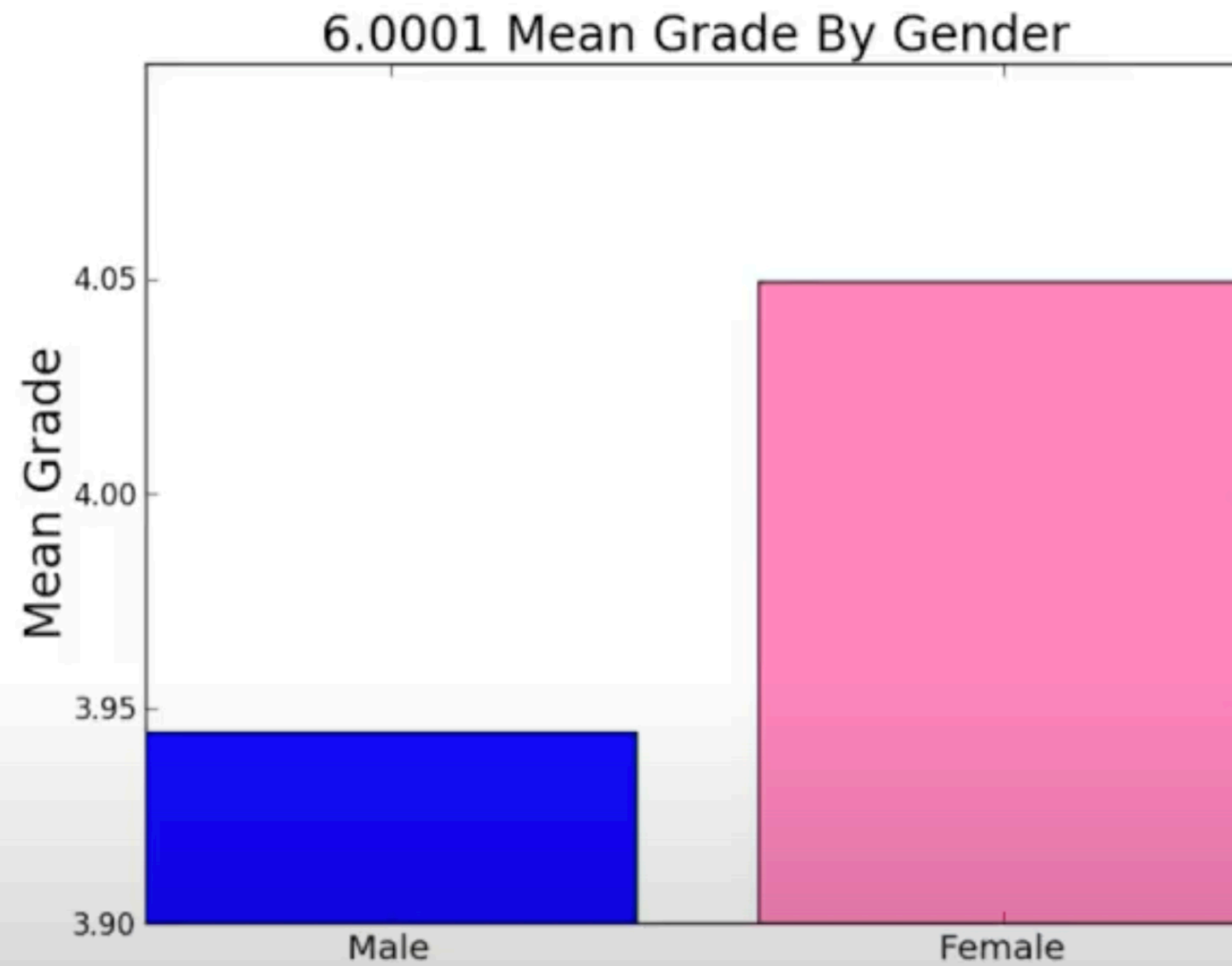
- In search of El dorado
- Mountains to cross
- Can you reach Eldorado?
- What you need?

Statistics

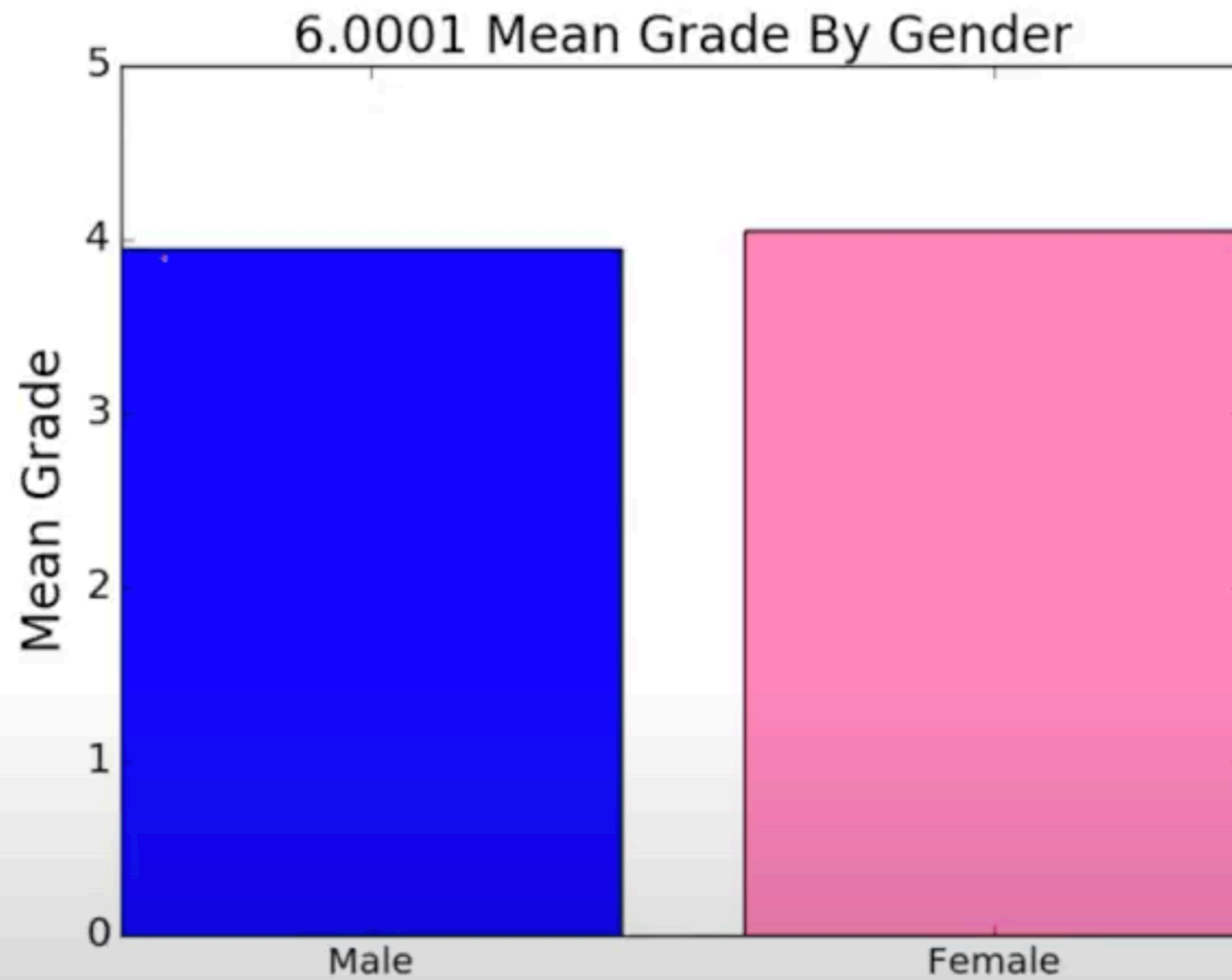
“There are three kinds of lies: lies, damned lies,
and statistics.” (B. Disraeli)



Lying with Pictures



Telling the Truth with Pictures



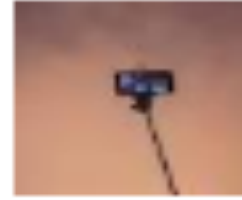
Lying with Pictures





More than 250 have people died while trying to take selfies, study finds
[USA TODAY](#) - 04-Oct-2018
The study by researchers at the All India Institute of Medical Sciences in New Delhi found 259 people died while attempting to take a selfie ...
More than 250 people died trying to snap selfies over 6 years, study ...
[CBS News](#) - 16 hours ago
More than 250 people worldwide have died taking selfies, study finds
[Washington Post](#) - 03-Oct-2018

More than 250 people have died taking selfies, study finds
[Sky News](#) - 03-Oct-2018



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Lawyers Maintain an Edge in Rising Billing Rates, Study Finds

[Law.com](#) - 12 hours ago
But billing rates for nonlawyers in firms are stagnant, according to a new study from Clio, a Canadian company that provides cloud-based ...



Marijuana worse for teen brains than alcohol, study finds

[NBCNews.com](#) - 19 hours ago
Teen brains are more vulnerable to the effects of marijuana than alcohol, a new study finds. Adolescents who begin using marijuana regularly ...
Cannabis More Harmful to Teenage Brains Than Alcohol, Study Finds
[Ganjapreneur](#) - 03-Oct-2018

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Third of councils have no specialist dyslexia teachers, study finds

[Schools Week](#) - 1 hour ago
A third of councils do not have sufficient specialist dyslexia teachers, a new study has found, as £10m recruitment pledge falls short. **Research ...**



Study finds hugging could be as good for you as it feels

[Atlanta Journal Constitution](#) - 17 hours ago
Maybe Freddie Freeman is on to something. The Braves first baseman is a well-known hugger, and a new study concludes those hugs could have health ...
Hug It Out: Study Shows Hugs Really Do Make Us Happier, Especially ...
[Study Finds](#) - 22 hours ago

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Education improves economic rationality, study finds

[Cornell Chronicle](#) - 17 hours ago
Hyuncheol Bryant Kim, assistant professor of policy analysis and management, set out to answer this question and found that education can be ...

Decision based on Data everywhere

Hydrology Netherlands, building dams and dykes. Should be high enough for most floods. Should not be too expensive.

Insurance Given your age, health condition, smoking habits. What is a fair premium?

Clinical Trials A Covid vaccine is tested on 100 patients. 68 got cured and 30 did not get cured, 2 showed severe side effects. How effective is the drug?

Environment What is the chance that there will be extreme rainfall tomorrow? What would be pollution level of Chennai next year?

Randomness

What is the common thread in all these examples?

Randomness

Randomness

What is common to all these examples?

Randomness

- Notion of average: fair premium
- Quantifying chance: most of the floods
- Variability

Probability

Probability studies randomness

Sometimes the physical process is completely known: dice, cards, fair coins

Probability

Examples

Rolling 1 die:

Alice gets \$1 if no. of dots ≤ 3

Bob gets \$2 if no. of dots ≤ 2

Who do you want to be, Alice or Bob?

Probability

Examples

Rolling 2 dice:

Choose a number between 2 and 12

Win \$100 if you choose the sum of the 2 dice.

Which number do you choose?

Probability

Examples

Rolling 2 dice:

Choose a number between 2 and 12

Win \$100 if you choose the sum of the 2 dice.

Which number do you choose?

Well known random process from
physics: $1/6$ chance of each side.