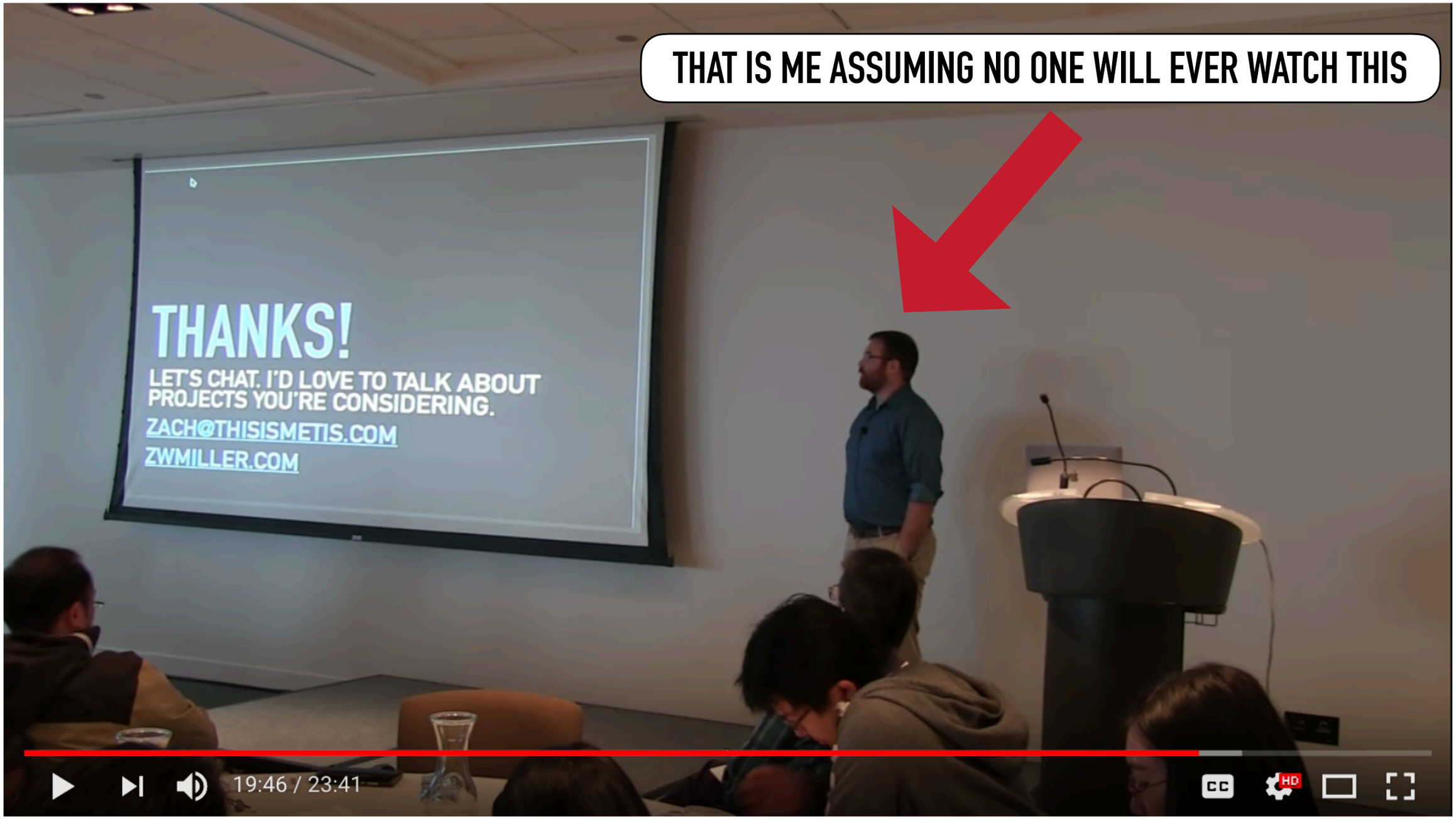
DISPELLING DATA SCIENCE MYTHS FOR BEGINNERS

Z. W. MILLER - 05.19.2018

MY TALK FROM THIS CONFERENCE LAST YEAR GOT A FEW VIEWS ON YOUTUBE. I DID SOMETHING DUMB AT THE END OF IT.



Roadmap: How to Learn Machine Learning in 6 Months

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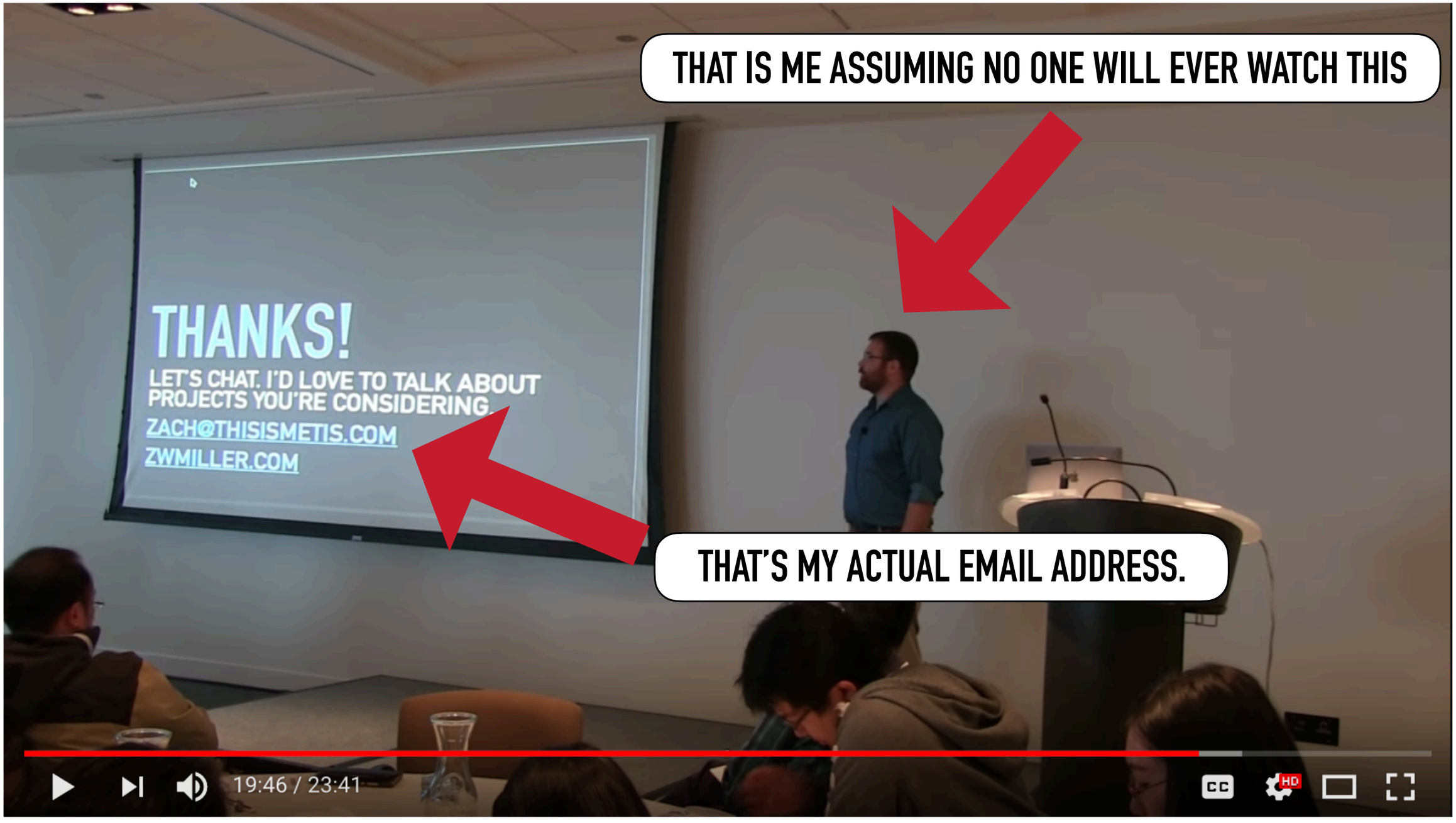

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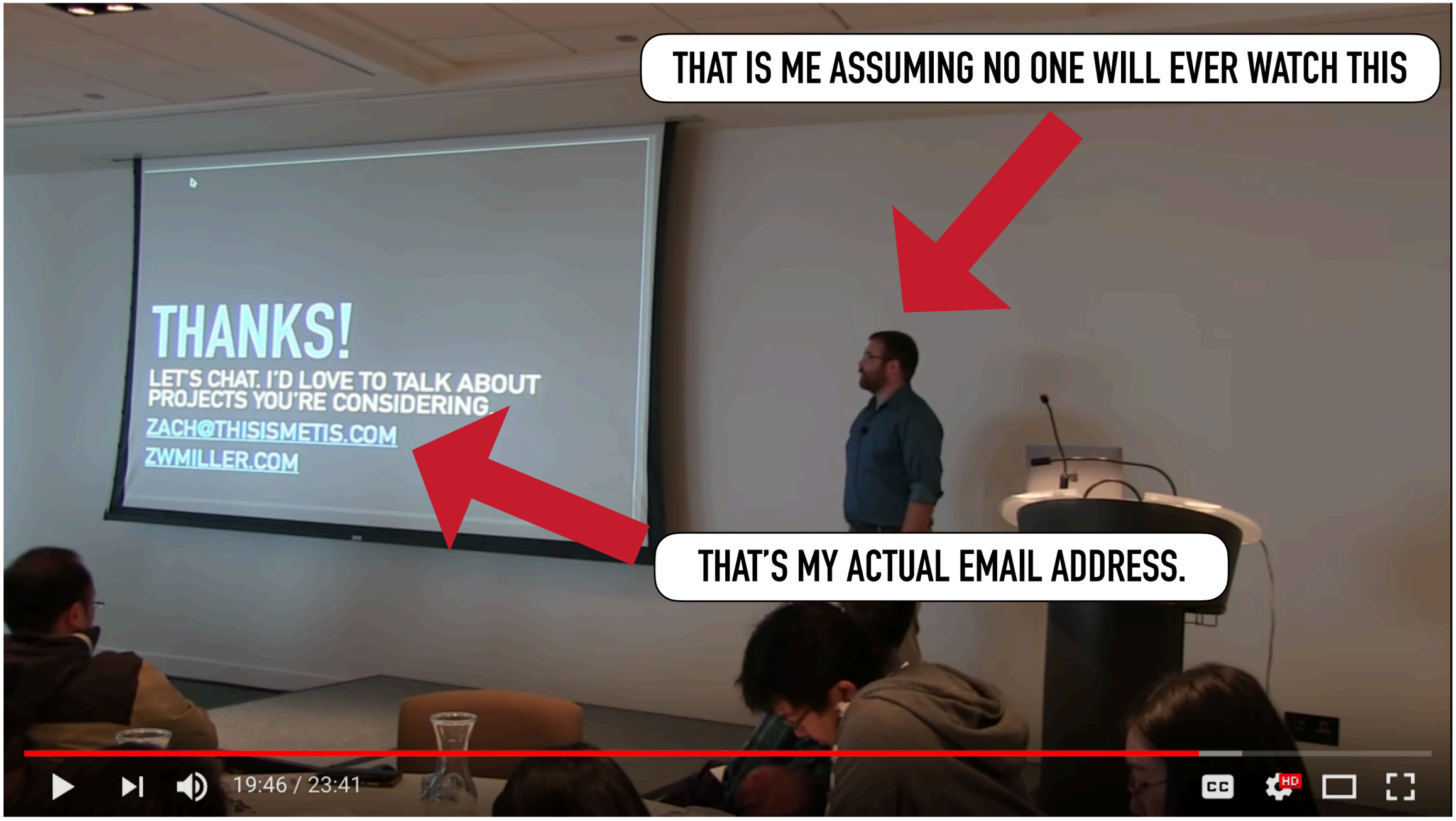

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THAT'S A NON-ZERO NUMBER

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FOR THE PAST YEAR, PEOPLE HAVE BEEN BARING THEIR SOULS TO ME VIA EMAILS ABOUT DATA SCIENCE

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"... ever since I finished my economics degree, I've been grinding at a horrible company. I hate getting up and going to work. Data science seems interesting and more fun than what I'm doing. Should I just keep grinding and hating my life, or do I have what it takes to become a data scientist? Oh, BTW my name is XXX."

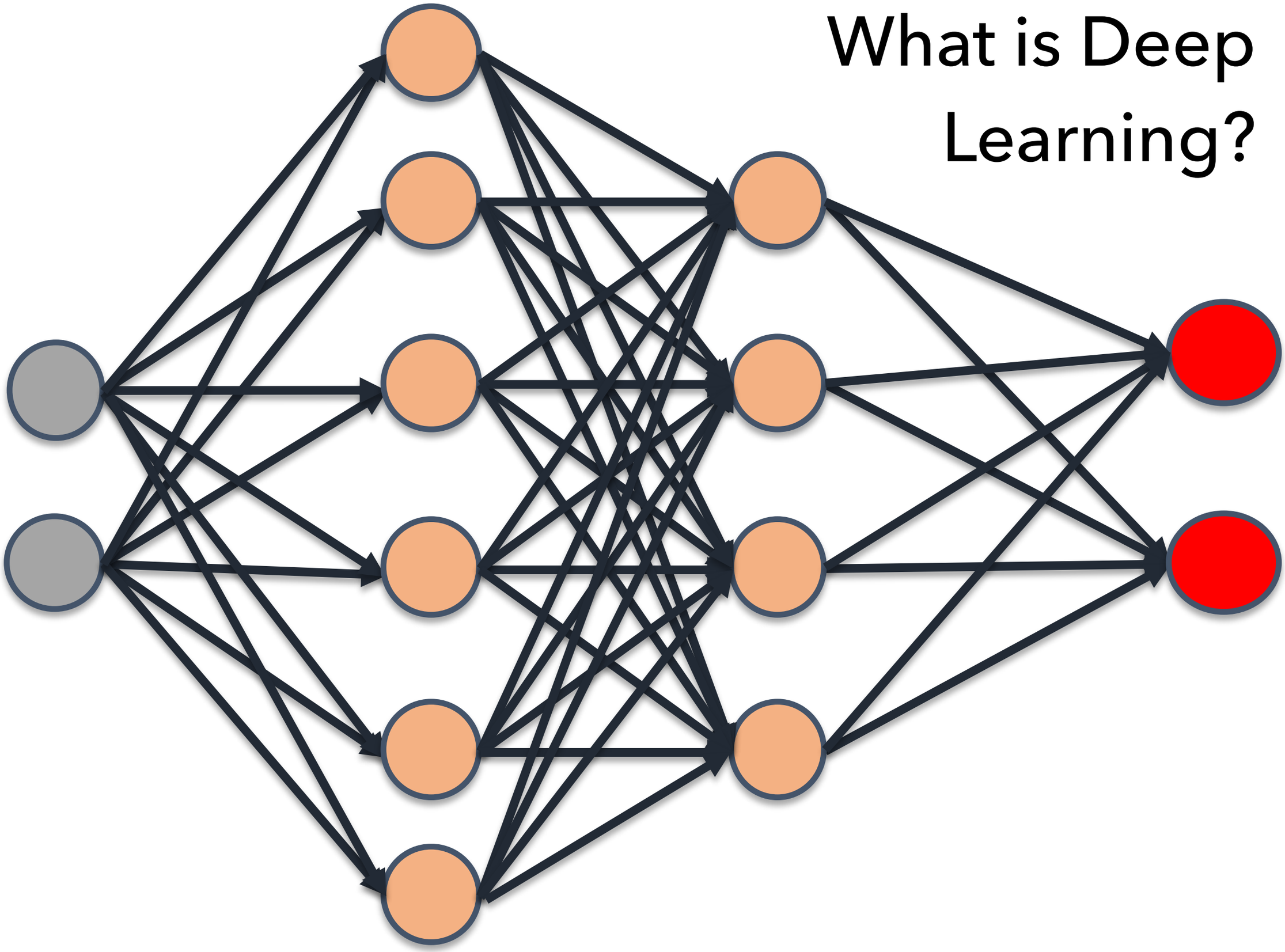
THREE REPEATED THEMES

- Should I learn Deep Learning or Machine Learning?
- Do I really need to know how to program/code?
- How science-y is data science?

1

YOU CAN PROBABLY SKIP DEEP LEARNING TO BEGIN WITH

What is Deep Learning?



WHY DO WE LIKE DEEP LEARNING?

https://github.com/Everhusk/Self-Driving-Car-Engineering/

WHY DO WE LIKE DEEP LEARNING?

Proof. Omitted. □

Lemma 0.1. *Let $\mathcal{C}$ be a set of the construction.*

Let $\mathcal{C}$ be a gerber covering. Let $\mathcal{F}$ be a quasi-coherent sheaves of $\mathcal{O}$-modules. We have to show that

$$\mathcal{O}_{\mathcal{O}_X} = \mathcal{O}_X(\mathcal{L})$$

.

Proof. This is an algebraic space with the composition of sheaves $\mathcal{F}$ on $X_{\acute{e}tale}$ we have

$$\mathcal{O}_X(\mathcal{F}) = \{morph_1 \times_{\mathcal{O}_X} (\mathcal{G}, \mathcal{F})\}$$

where $\mathcal{G}$ defines an isomorphism $\mathcal{F} \to \mathcal{F}$ of $\mathcal{O}$-modules. □

Lemma 0.2. *This is an integer $\mathcal{Z}$ is injective.*

Proof. See Spaces, Lemma ??. □

Lemma 0.3. *Let S be a scheme. Let X be a scheme and X is an affine open covering. Let $\mathcal{U} \subset \mathcal{X}$ be a canonical and locally of finite type. Let X be a scheme. Let X be a scheme which is equal to the formal complex.*

The following to the construction of the lemma follows.

Let X be a scheme. Let X be a scheme covering. Let

$$b : X \to Y' \to Y \to Y \to Y' \times_X Y \to X.$$

be a morphism of algebraic spaces over S and Y.

Proof. Let X be a nonzero scheme of X. Let X be an algebraic space. Let $\mathcal{F}$ be a quasi-coherent sheaf of $\mathcal{O}_X$-modules. The following are equivalent

(1) $\mathcal{F}$ is an algebraic space over S.
(2) If X is an affine open covering.

Consider a common structure on X and X the functor $\mathcal{O}_X(U)$ which is locally of finite type. □

This since $\mathcal{F} \in \mathcal{F}$ and $x \in \mathcal{G}$ the diagram

$$\begin{array}{ccc} \mathcal{S} & \longrightarrow & \\ \downarrow & & \\ \xi & \longrightarrow & \mathcal{O}_{X'} \\ & & \uparrow \\ \text{gor}_s & & \searrow \\ & = \alpha' & \longrightarrow \\ & \updownarrow & \\ & = \alpha' & \longrightarrow \alpha \end{array} \qquad \begin{array}{c} X \\ \downarrow \\ \end{array}$$

$$\text{Spec}(K_\psi) \qquad \text{Mor}_{Sets} \quad \text{d}(\mathcal{O}_{\mathcal{X}_{X/k}}, \mathcal{G})$$

is a limit. Then $\mathcal{G}$ is a finite type and assume S is a flat and $\mathcal{F}$ and $\mathcal{G}$ is a finite type f_*. This is of finite type diagrams, and

- the composition of $\mathcal{G}$ is a regular sequence,
- $\mathcal{O}_{X'}$ is a sheaf of rings.

□

Proof. We have see that $X = \text{Spec}(R)$ and $\mathcal{F}$ is a finite type representable by algebraic space. The property $\mathcal{F}$ is a finite morphism of algebraic stacks. Then the cohomology of X is an open neighbourhood of U. □

Proof. This is clear that $\mathcal{G}$ is a finite presentation, see Lemmas ??.
A *reduced above* we conclude that U is an open covering of $\mathcal{C}$. The functor $\mathcal{F}$ is a "field

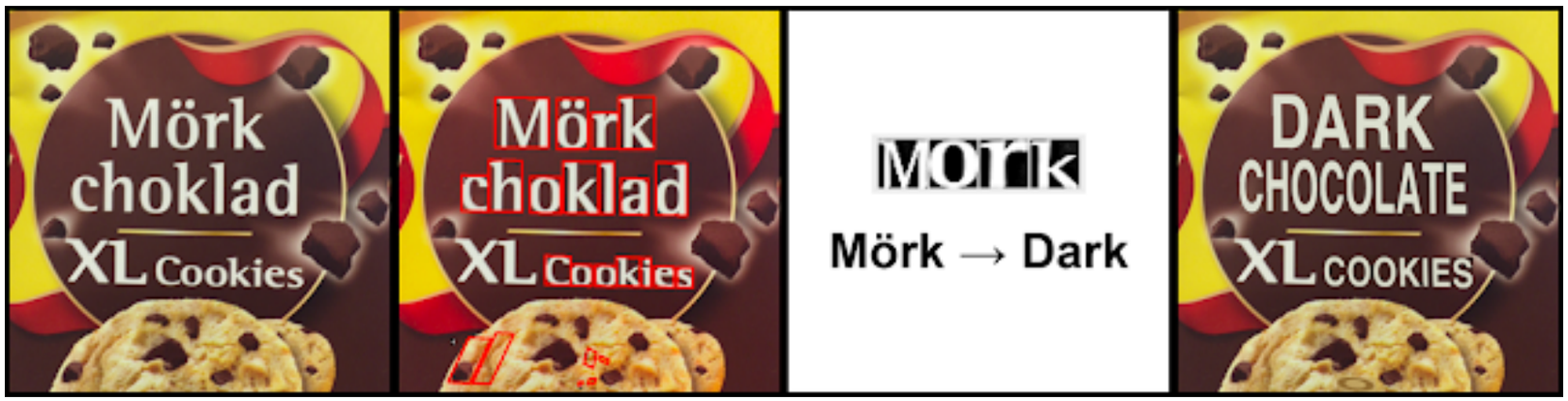
$$\mathcal{O}_{X,x} \longrightarrow \mathcal{F}_{\overline{x}} \quad \text{-1}(\mathcal{O}_{X_{\acute{e}tale}}) \longrightarrow \mathcal{O}_{X_\ell}^{-1}\mathcal{O}_{X_\lambda}(\mathcal{O}_{X_\eta}^{\overline{v}})$$

is an isomorphism of covering of $\mathcal{O}_{X_i}$. If $\mathcal{F}$ is the unique element of $\mathcal{F}$ such that X is an isomorphism.
The property $\mathcal{F}$ is a disjoint union of Proposition ?? and we can filtered set of presentations of a scheme $\mathcal{O}_X$-algebra with $\mathcal{F}$ are opens of finite type over S.
If $\mathcal{F}$ is a scheme theoretic image points. □

If $\mathcal{F}$ is a finite direct sum $\mathcal{O}_{X_\lambda}$ is a closed immersion, see Lemma ??. This is a sequence of $\mathcal{F}$ is a similar morphism.

http://karpathy.github.io/2015/05/21/rnn-effectiveness/

WHY DO WE LIKE DEEP LEARNING?



https://ai.googleblog.com/2015/07/how-google-translate-squeezes-deep.html

SO WHY SHOULD I SKIP IT?

- Neural nets are an extension on traditional machine learning techniques.
- If you don't understand the traditional techniques, I don't want you on my team - even if you're a neural net wizard.
- This sentiment is not just me.

SO WHY SHOULD I SKIP IT?

- Neural nets are extremely complicated models. A “real” model may have hundreds of thousands of parameters.
- Rules of thumb for how to design your architecture are hard to come by.

SO WHY SHOULD I SKIP IT?

- Complicated models need a TON of data and computational effort to work well.
- Most businesses don't have the resources to effectively weaponize deep learning.

SO WHY SHOULD I SKIP IT?

- Most regulated industries still don’t allow deep learning because it’s too “black box.”
  - e.g. How can I tell which part of my model is targeting minorities in loan rejections?

SO WHY SHOULD I SKIP IT?

- Most regulated industries still don’t allow deep learning because it’s too “black box.”
  - e.g. How can I tell which part of my model is targeting minorities in loan rejections?
- Sidenote: It’s not a blackbox, it’s just the chain rule from calculus

2

YES, YOU DO NEED TO KNOW HOW TO PROGRAM LIKE YOU AREN'T AN IDIOT

Josh Wills
@josh_wills

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Data Scientist (n.): Person who is better at statistics than any software engineer and better at software engineering than any statistician.

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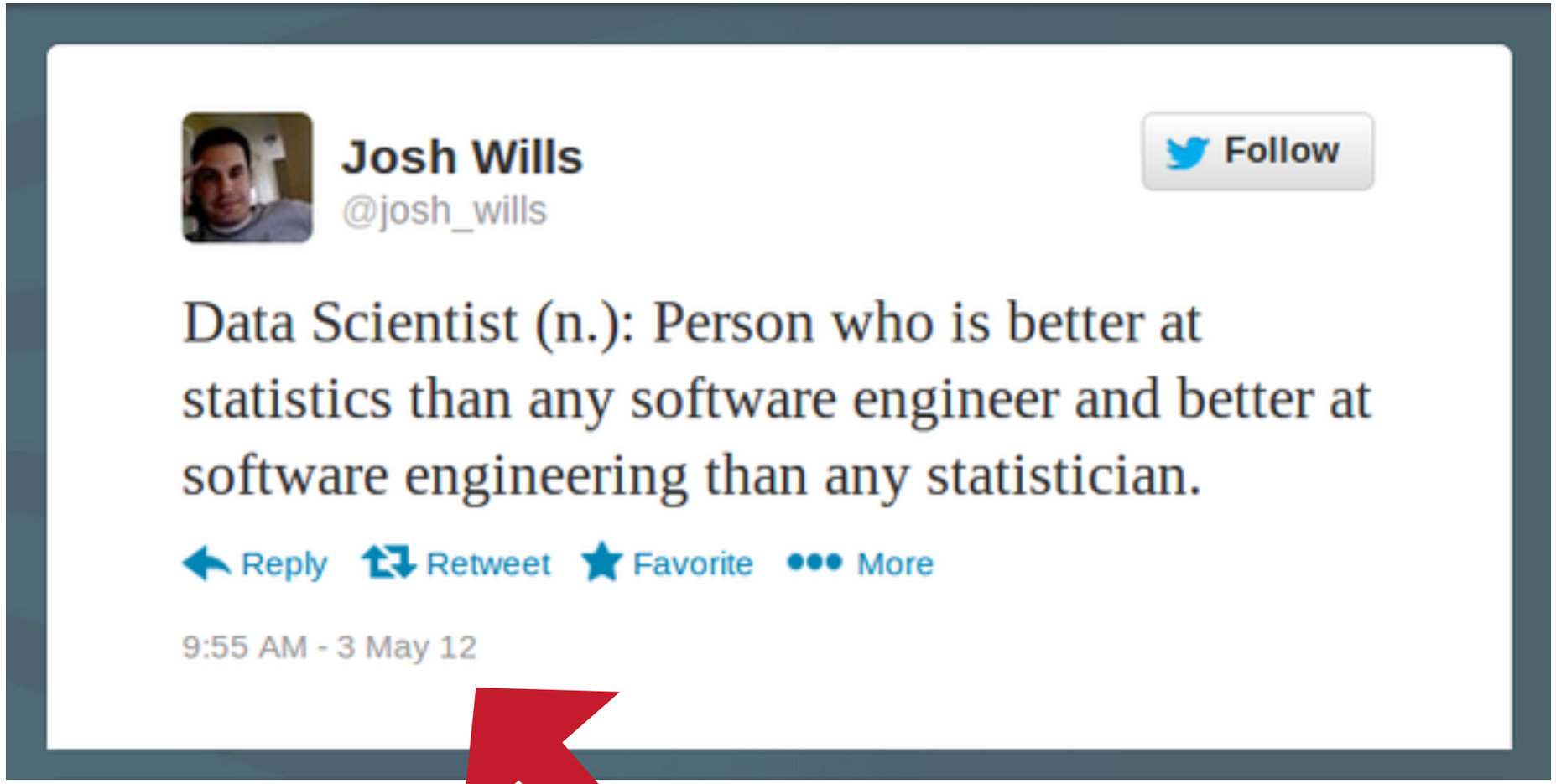
9:55 AM - 3 May 12



2012 IS NOT 2018

THE MODERN DATA SCIENTIST

- Data is in a data warehouse or cluster.
- Prototyping still happens - but it has to be productionizable at the end.
- Data science teams are no longer just that one weird physicist guy that celebrates Pi day. Your code is part of a stack that your team relies on.

THE MODERN DATA SCIENTIST

- Jupyter Notebooks are not acceptable unless you're on a team of 1 or 2. You have to know how to write modules, link code together, and optimize your code.

THE MODERN DATA SCIENTIST

- Jupyter Notebooks are not acceptable unless you're on a team of 1 or 2. You have to know how to write modules, link code together, and optimize your code.
- Even if you're on a team of 1, you really shouldn't be treating notebooks as the end point.

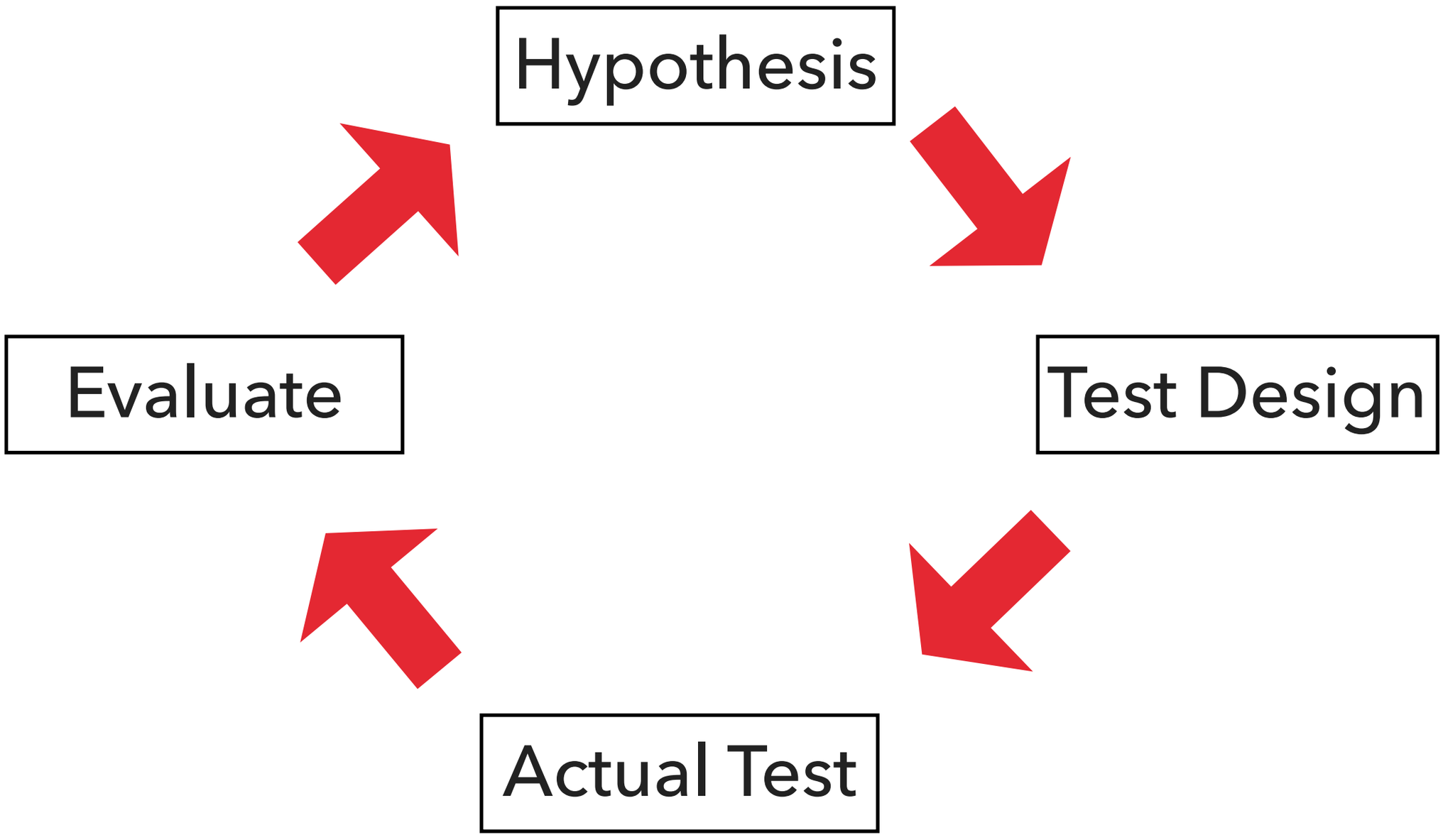
DOCUMENT YOUR CODE.

YOU ARE NOT AN ANIMAL.

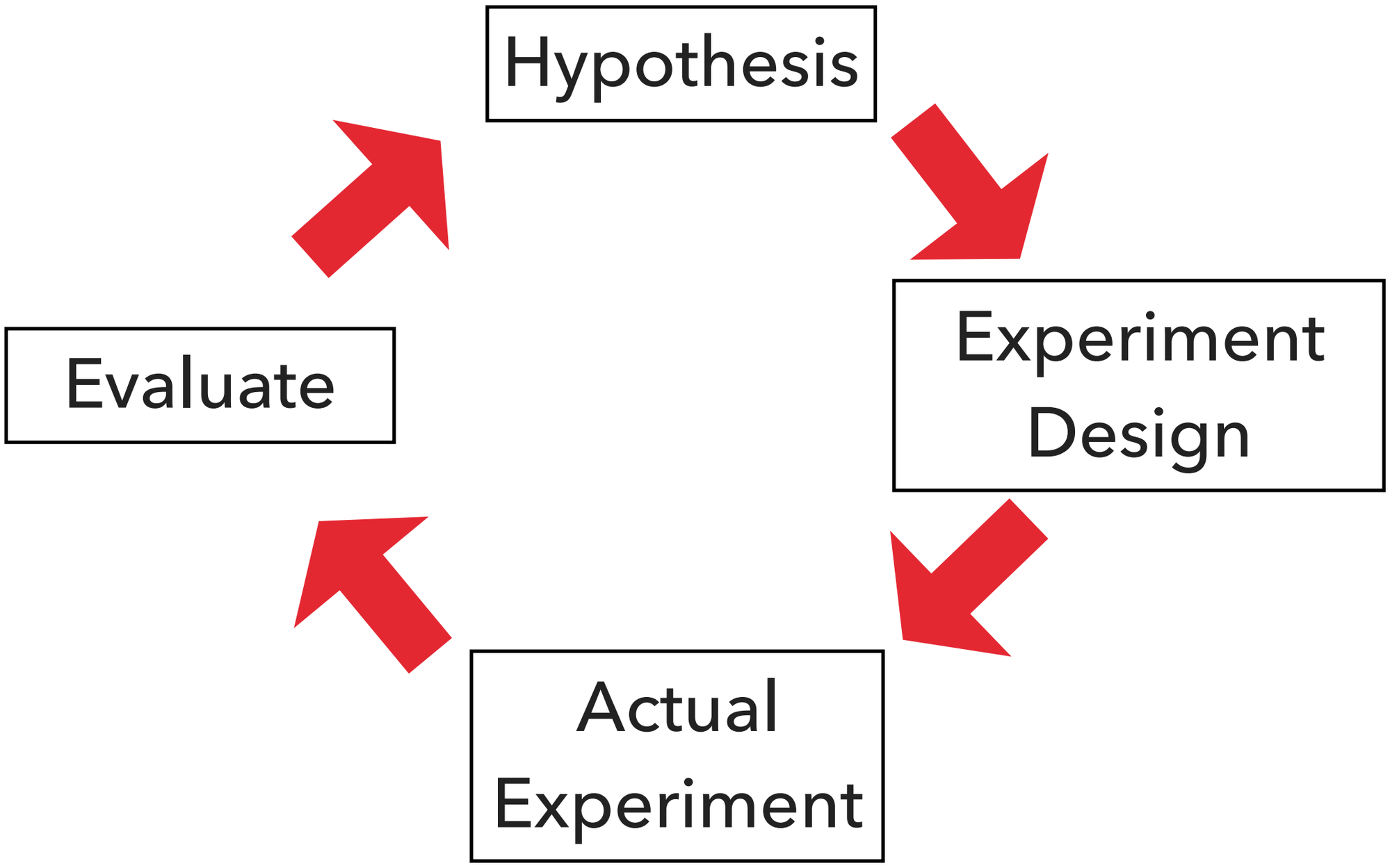
3

DATA SCIENCE SHOULD BE SCIENCE DONE WITH DATA

THE DATA SCIENCE CYCLE



THE SCIENCE CYCLE



DATA SCIENTISTS AREN'T JUST "DATA STORY TELLERS."

WE'RE INVESTIGATIVE JOURNALISTS/INTERPRETERS.

DATA STORY TELLERS?

Story Teller	Interpreter
▸ Leaves out the boring parts ▸ Changes facts for the sake of the story ▸ Don’t need to prove the story, just make it entertaining.	▸ Finds a way to convey the confusing parts in the needed language ▸ Sticks to the data and the facts ▸ Uses statistics to justify any and all choices.

THANKS!

LET'S CHAT. I'D LOVE TO TALK ABOUT PROJECTS YOU'RE CONSIDERING.

ZACH@THISISMETIS.COM

ZWMILLER.COM

Unlisted Sources

http://www.interactive-biology.com/3247/the-neuron-external-structure-and-classification/