

Unifying Data Science

Nick Eubank

By the end of this class, you will be able to:

1. Understand how data science tools relate to one another using a unified conceptual framework,
2. Answer causal questions
Does X cause Y?
3. Execute a data science project from conception to delivery

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⇒ Development of new tools occurred *within* each silo.

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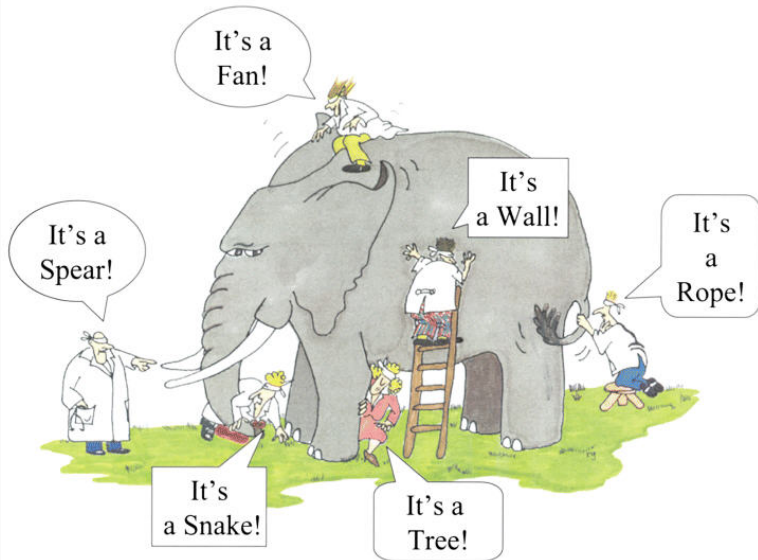
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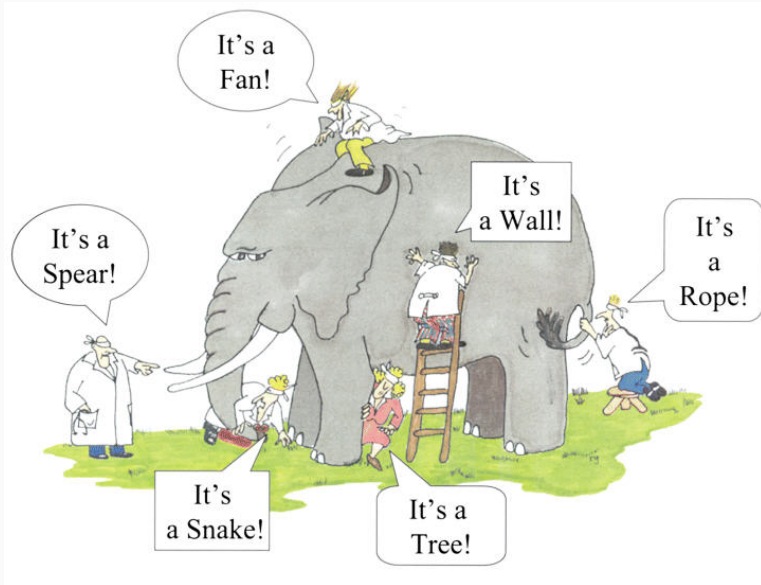
- Lots of duplication of development.
- Every silo has its own vocabulary.
- Each silo has focused on the aspects most relevant to their applications. e.g.:
 - CS likes to classify things and make predictions, don't care how model works
 - Social scientists like to make causal statements, don't care about predictive power

Blind Men and the Elephant

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⇒ This is where data science is *now*.

What do I think Data Science should be?

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What do I think Data Science should be?

An effort to unify the development of quantitative methods

→ Recognize the elephant

This Class

Discipline of learning how best to answer questions using quantitative data.

This Class

1. Introduce a taxonomy of questions

Descriptive, causal, predictive

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- What tools are best suited to each type of question

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By the end of the course, you should know when to reach for...

- Unsupervised machine learning
- Supervised machine learning
- Range of causal inference techniques
e.g. experiments, matching, regression,
differences-in-differences
- Other approaches to descriptive analysis

This Class

The tool you use should be dictated by the question you seek to answer

This Class

1. Introduce taxonomy of questions
2. Discuss descriptive questions
3. Learn causal inference
4. Discuss prediction

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Practice generating questions
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Relative merits of supervised machine learning v. causal methods

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Over semester, you will also develop a data science project from start-to-finish

- Teams of 3-4, grouped by interest and experience
- On topic of your own choosing

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→ MIDS first-years: Capstone with training wheels

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Zeren Li (TA)

- PhD Candidate in Political Science
- Studies Chinese politics
- Strong background in causal inference and machine learning

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 - If you're deciding whether to take this class, I'd suggest buying *Mostly Harmless Econometrics* and skimming a few chapters to get a sense of material we'll focus on for much of semester.

Course site: <http://www.unifyingdatascience.org>