Unifying Data Science

Nick Eubank

1. Provide unified conceptual framework for relating data science tools
2. Learn causal inference
3. Get practice developing data science project start-to-finish

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  - Statistics
  - Economics
  - Political science
  - Engineering

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  - Computer Science
  - Statistics
  - Economics
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$\Rightarrow$ Development of new tools occurred *within* each silo.

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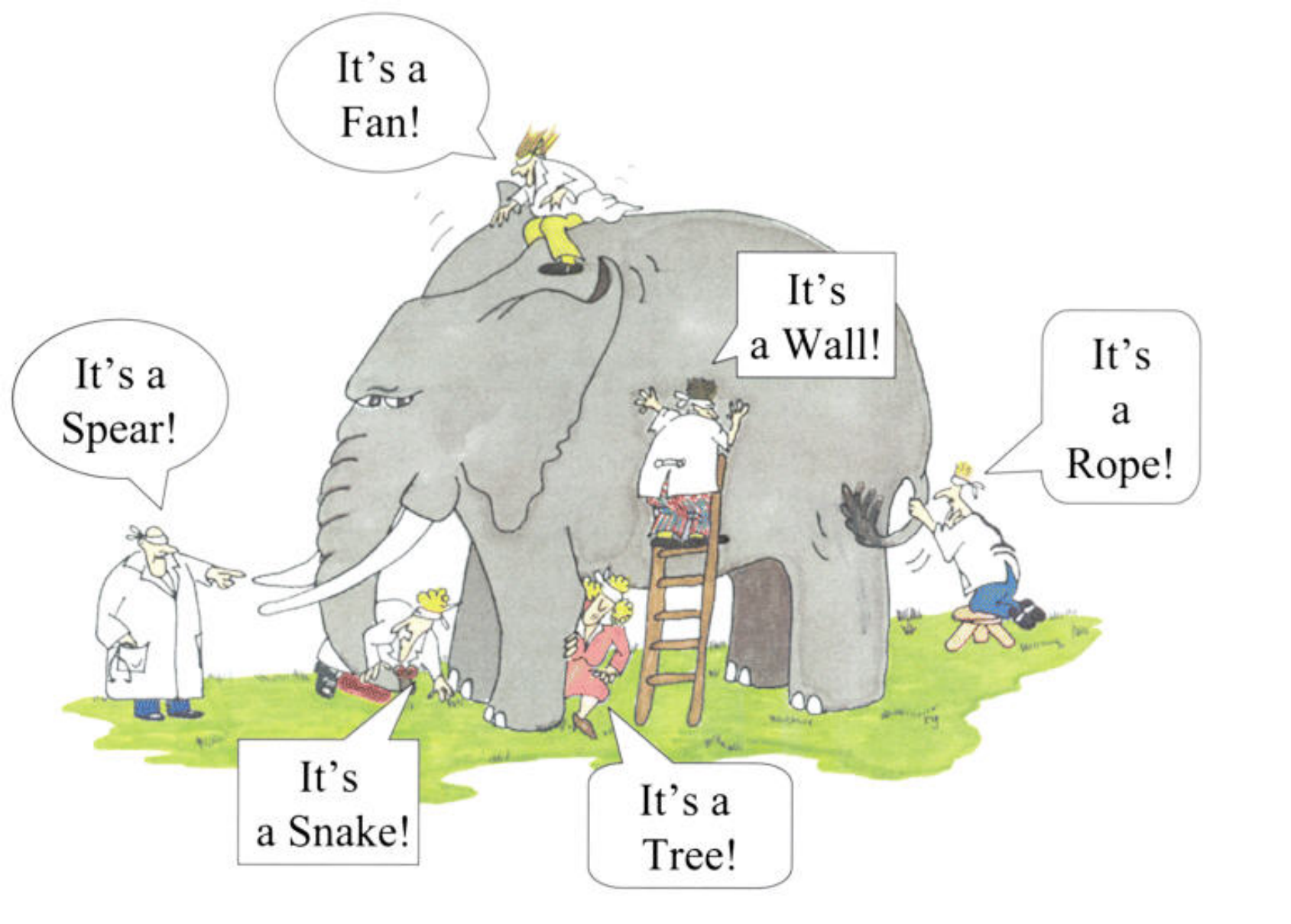
- Each silo has focused on the aspects most relevant to their applications. e.g.:
  - CS likes to classify things and make predictions, don't care how model works
  - Social scientists like to make causal statements, don't care about predictive power



⇒ This is where we are *now*.

What is (empirically) Data Science?

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An effort to unify the development of quantitative methods

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An effort to unify the development of quantitative methods

$\rightarrow$ Recognize the elephant

This Class

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

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1. Introduce a taxonomy of questions
   Descriptive, causal, predictive

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1. Introduce a taxonomy of questions

   Descriptive, causal, predictive
2. For each class of questions, we will discuss the relative strengths and weaknesses of different empirical approaches
   - 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. Provide unified conceptual framework for relating data science tools
2. Discuss descriptive questions
3. Learn causal inference
   Deep dive – $\sim$ half the semester
4. Discuss prediction

This Class

1. Provide unified conceptual framework for relating data science tools
   Practice generating questions
2. Discuss descriptive questions
3. Learn causal inference
   Deep dive – $\sim$ half the semester
4. Discuss prediction

This Class

1. Provide unified conceptual framework for relating data science tools
   Practice generating questions
2. Discuss descriptive questions
   Relatively brief
3. Learn causal inference
   Deep dive – $\sim$ half the semester
4. Discuss prediction

This Class

1. Provide unified conceptual framework for relating data science tools
   Practice generating questions
2. Discuss descriptive questions
   Relatively brief
3. Learn causal inference
   Deep dive – $\sim$ half the semester
4. Discuss prediction
   Relative merits of supervised machine learning v. causal methods

Data Science Project

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

- Teams of 2-3, grouped by interest and experience
- On topic of your own choosing

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$\rightarrow$ MIDS first-years: Capstone with training wheels