Introduction to Causal Inference

Causal Inference using Machine Learning
Master in Economics, UNT

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Spring 2024

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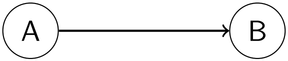
What is a Causal Question?



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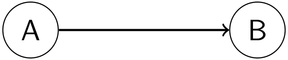

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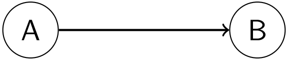

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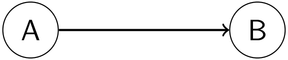

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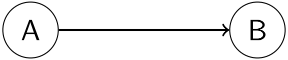

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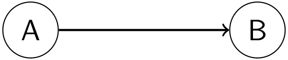

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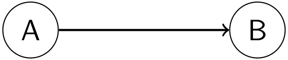

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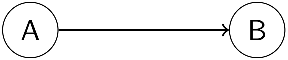

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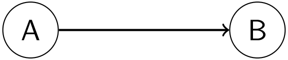

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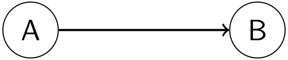

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  - Efficiency (e.g., speed of production or resource utilization)

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   - Example: Eating more food can cause weight gain, but if food intake and exercise both increase proportionally, we may observe no correlation between food and weight in the data, even though causation exists.

Causal Inference Tree

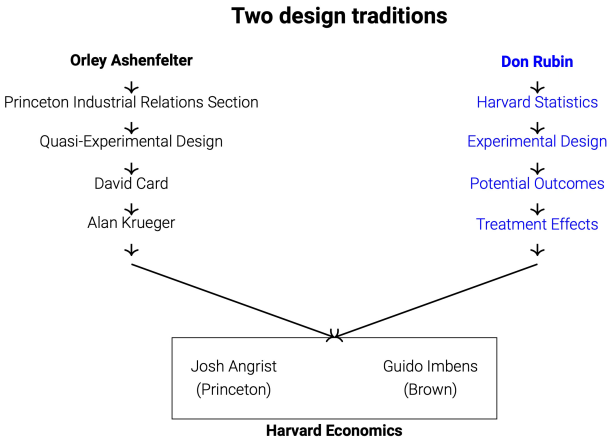

Figure: Source: Scott Cunningham Substack

Experimental Design Tradition

Experimental design relies on randomized controlled trials (RCTs) to establish causality through direct manipulation of the treatment.

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- **Esther Duflo (Nobel Prize 2019)**:
  - Pioneered the use of randomized controlled trials in development economics to study policy interventions.
  - *Contribution*: Applied RCTs to measure the effectiveness of educational and poverty interventions in developing countries.

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