Theory Development and Hypothesis Generation

Department of Government
London School of Economics and Political Science

1 Theory

2 Generating Hypotheses

3 Hypothesis Testing

4 Preview

1 Theory

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Scientific method

1. Research question(s)
2. Clarify the core concepts
3. **Develop theory**
4. Derive specific, testable hypotheses
5. Plan data collection
6. Gather data/evidence
7. Analyze data
8. Draw inferences

What is a theory?

- Definition: A tentative conjecture about the *causes* of some phenomenon of interest[1]

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  - A mechanism ("how") that links the two

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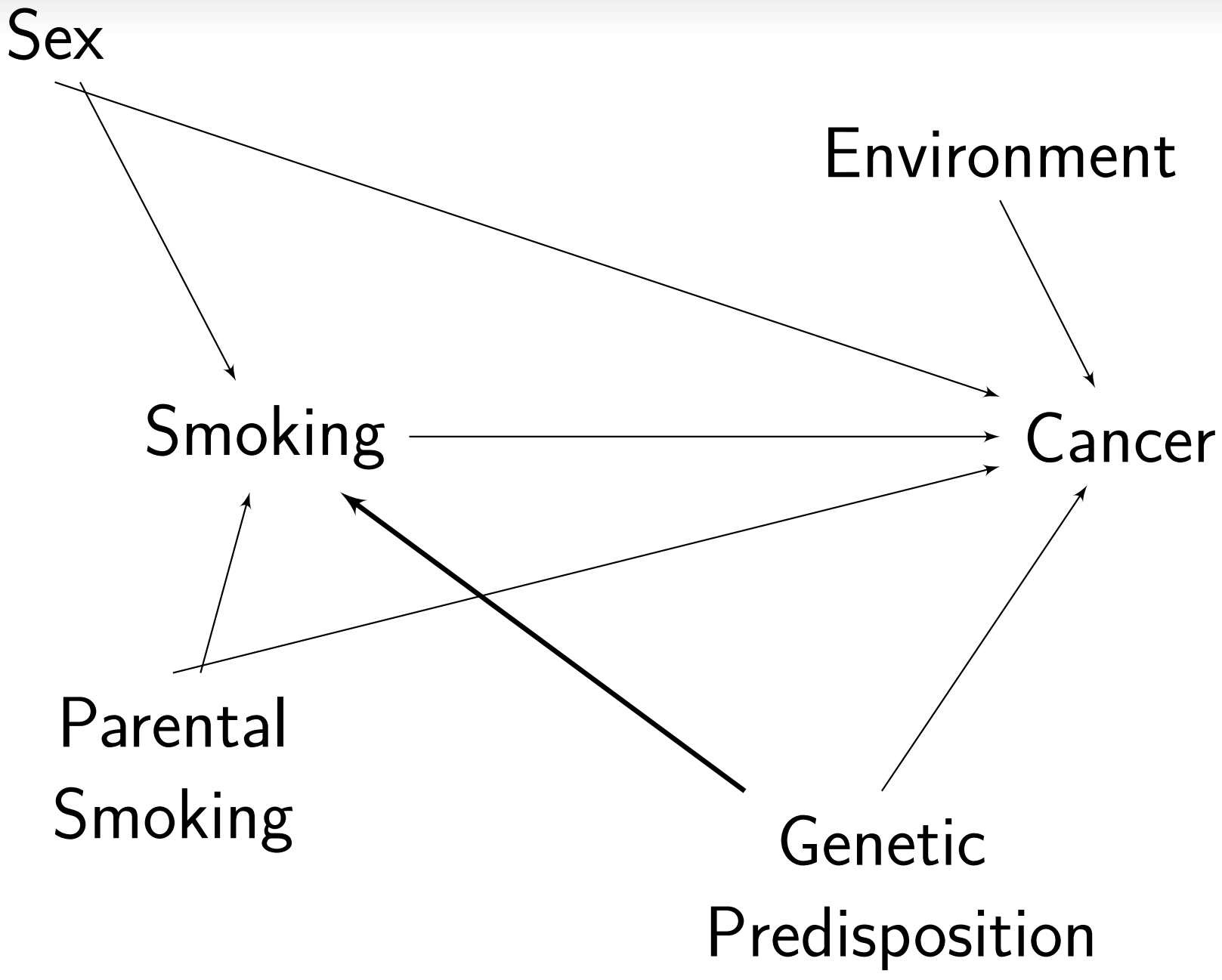
Sex
Environment
Smoking
Cancer
Parental Smoking
Genetic Predisposition

Theory vs. Framework

- Theories are general statements about causal relationships
- *Testing* a theory involves:
  - Stating observable implications of theory (and rival theory/ies)
  - Examining whether evidence is consistent or inconsistent with expectations

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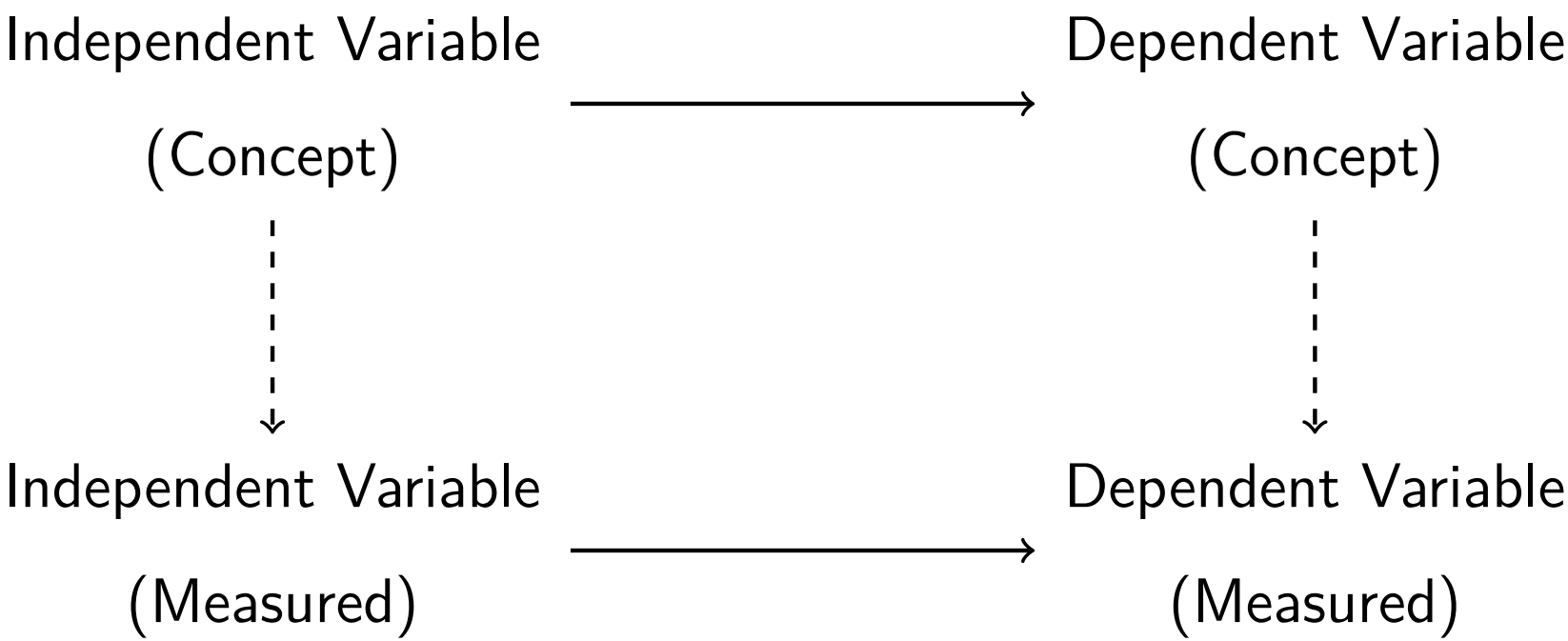
- Applying an interpretive framework involves merely focusing on particular features of an empirical phenomenon

Key Points!

1. Theory is about concepts
2. Analysis is about measured variables
   - Everything from MT
3. So our task as scientists is to:
   - Find observable implications of theory
   - Draw theoretical implications from measures


Independent Variable
(Concept)
Dependent Variable
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Independent Variable
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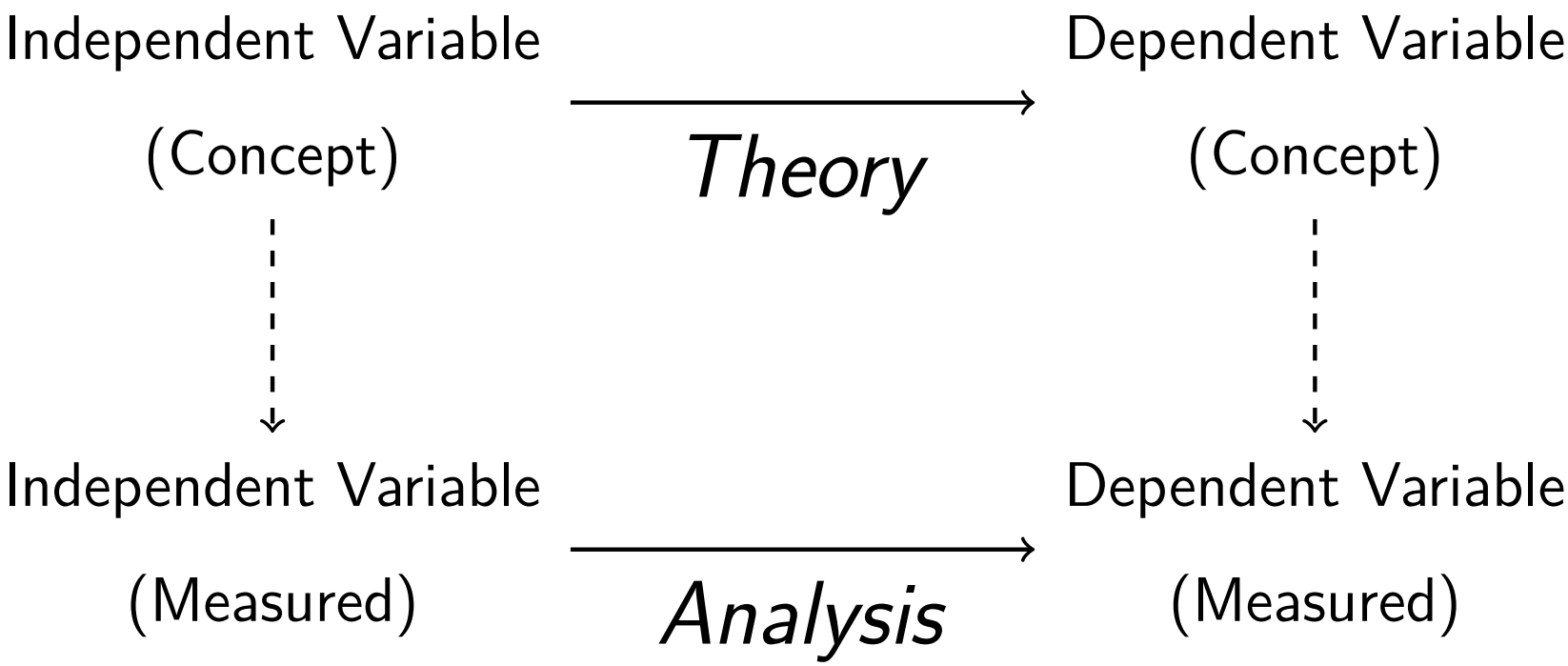
Independent Variable
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Theory
Dependent Variable
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Independent Variable
(Measured)
Analysis
Dependent Variable
(Measured)

Generating Theory I

- One way to theorize is to reason *inductively*
- Induction works by drawing generalities from specific observations
- Sometimes called "bottom-up" theorizing

Generating Theory II

- An alternative way of developing theory is through *deduction*
- Deduction begins from general, assumed principles/axioms to reach more specific observable realities

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- Common example: Rational choice theory

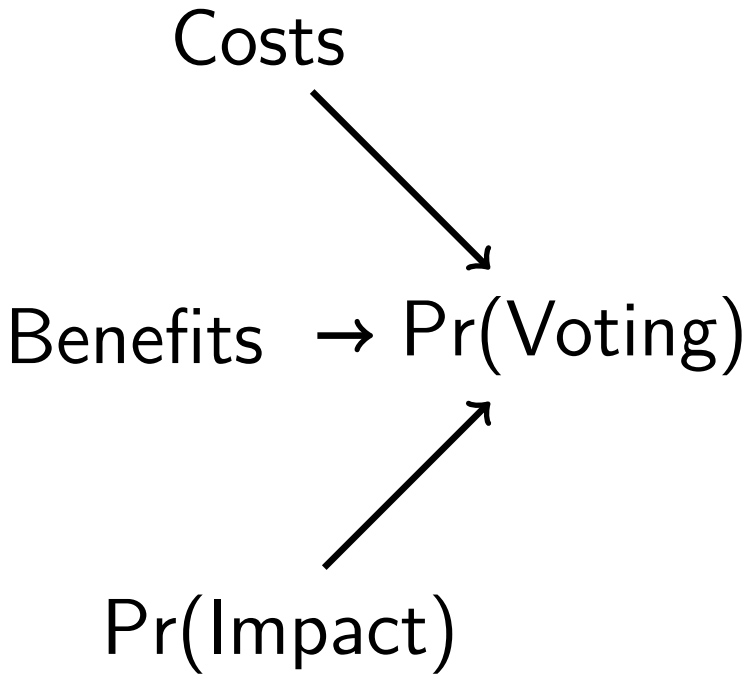
Generating Theory III

- "The Calculus of Voting" is a *rational choice* theory
  - Assumes utility maximization is the driver of all behaviour
  - Understanding phenomena is a matter of figuring out utility structures, especially those created by institutions

The Calculus of Voting

Theory: Voting is explained by 3 factors

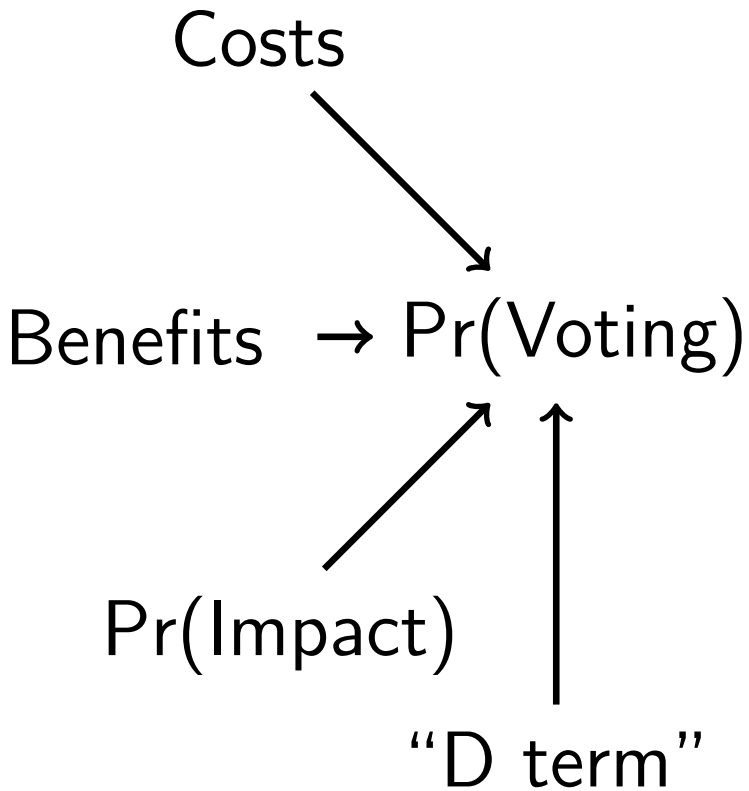
- Costs of voting
- Benefits from preferred alternative winning
- Probability of impacting result



The Calculus of Voting

Theory: Voting is explained by 4 factors

- Costs of voting
- Benefits from preferred alternative winning
- Probability of impacting result
- Benefits from voting *per se*



Aside: Assumptions

If a theory requires assumptions, is that theory credible?

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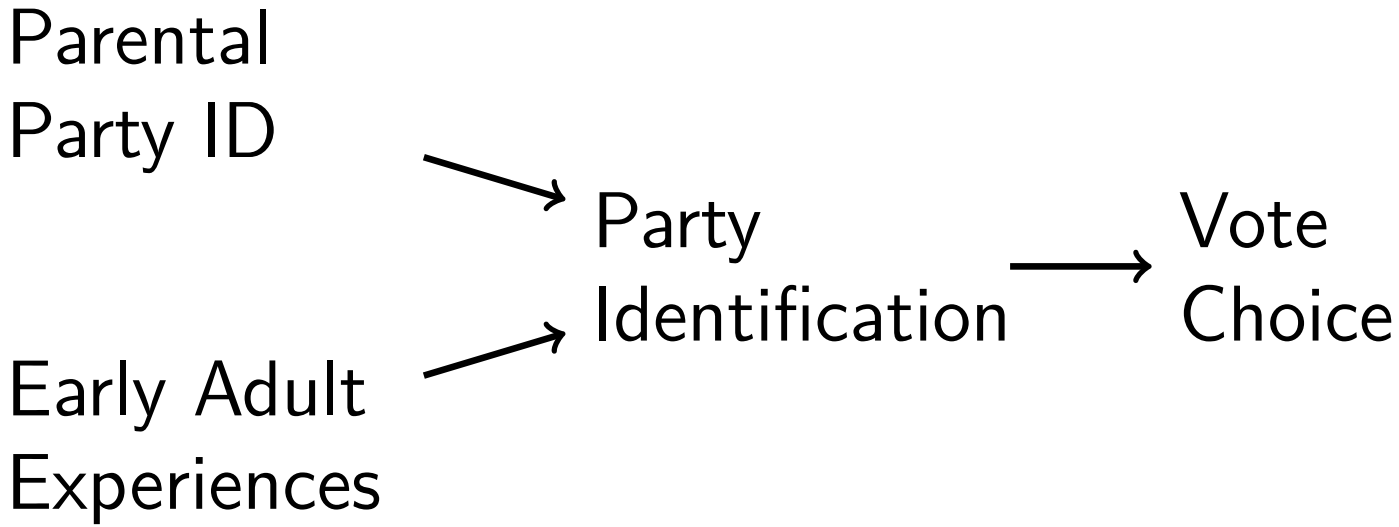
- "The Calculus of Voting" is a *rational choice* theory
  - Assumes utility maximization is the driver of all behaviour
  - Understanding phenomena is a matter of figuring out utility structures, especially those created by institutions
- Not the only broad theoretical paradigm

The Michigan Model

Theory: Vote choice is explained by long-standing partisan identification, which is in turn shaped by early socialization.



Induction vs. Deduction?

- Induction and deduction are both integral to science
- Theory testing and theory building both require observation

Theory Generation in Practice

As you theorize an explanation for some phenomenon, you will draw on:

- General principles
- Extant theory
- Specific evidence

What makes for a good theory?

- Truth
- Relevance
- Coherence
- Falsifiability
- Precision
- Generality
- Parsimony

Generality & Parsimony

Think for 90 seconds about each of these principles:

- Generality: Theories that can explain more are preferred over theories that can explain less
- Parsimony: Simple theories are preferred over complex theories

Are these principles defensible?
Are they any good?

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Hypotheses

[2] Toshkov p.64

[3] Kellstedt and Whitten (p.4)

Hypotheses

- Definitions:
  - observable implications; testable propositions entailed by the logic of the theory[2]
  - a theory-based statement about a relationship that we expect to observe[3]

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Hypotheses

- Definitions:
  - observable implications; testable propositions entailed by the logic of the theory[2]
  - a theory-based statement about a relationship that we expect to observe[3]
- Features
  - Derived from theory
  - Specific
  - Empirical/observable
  - Causal ("if-then" logic)

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How do we generate hypotheses?

- Think about *observable implications*
- What would evidence consistent with this theory be?
- What would evidence inconsistent with this theory be?

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  - This is *falsifiability*

Ex.: Broad Street Cholera

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  - Around Broad Street (Soho)
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- 1854 outbreak of cholera in London
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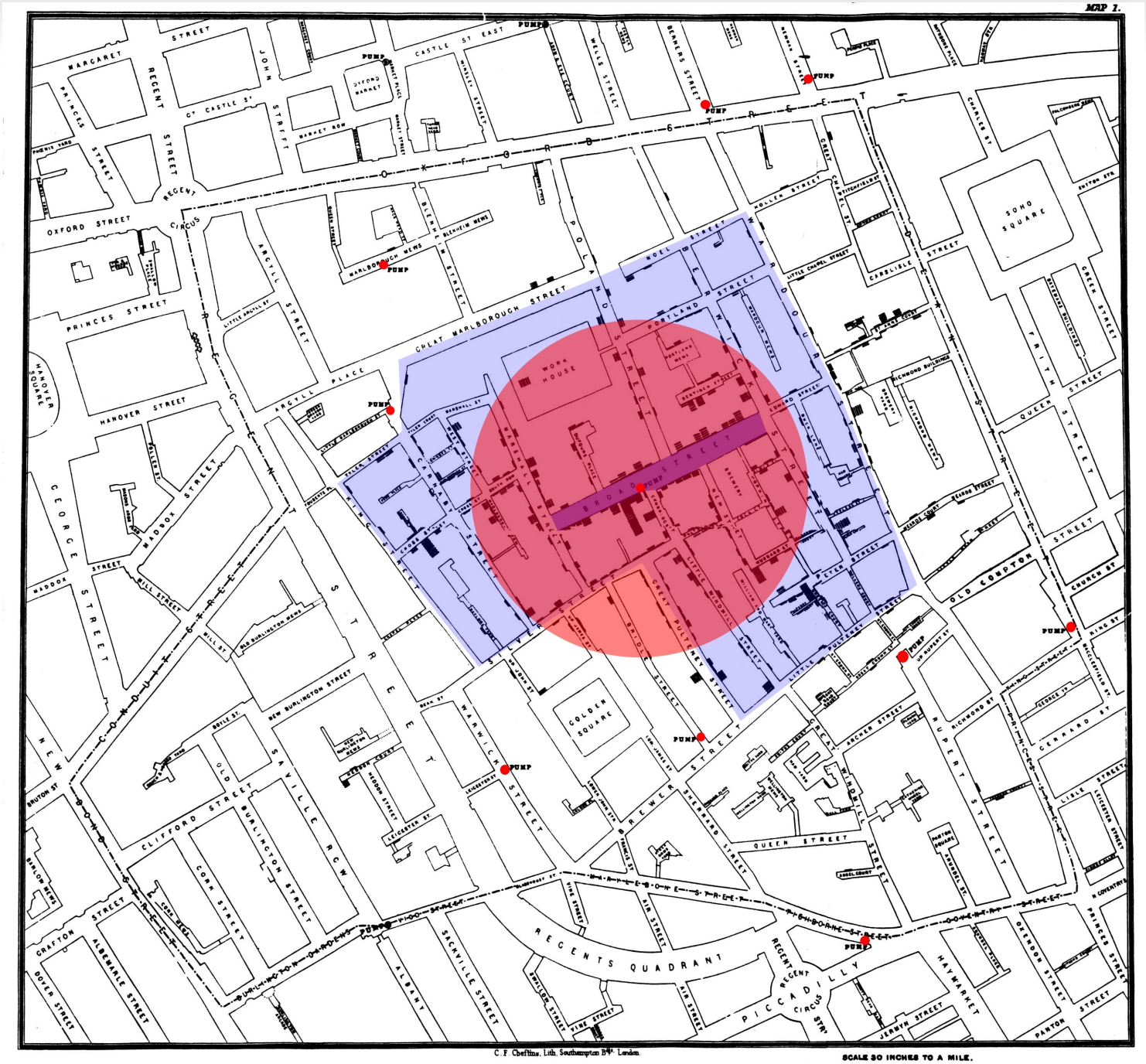
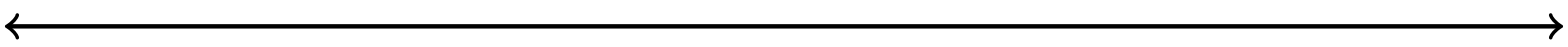
  - 616 eventual deaths
- What causes transmission of cholera?
- Dominant theory at time: "miasma"
- Hypotheses:
  - Clean up garbage $\rightarrow$ $\downarrow$ cholera
  - Open windows $\rightarrow$ $\downarrow$ cholera


MAP 1.
BROAD STREET
WORK HOUSE
GOLDEN SQUARE
SOHO SQUARE
REGENTS QUADRANT
PICCADILLY
OXFORD STREET
REGENT STREET
C. F. Cheffins, Lith. Southampton Bldgs. London.
SCALE 30 INCHES TO A MILE.

Observational Equivalence

- Definition: All hypotheses for two (or more) theories are identical
- What to do?
  - Generate more specific expectations
  - Move outside *scope conditions*
  - Settle for lack of explanation

Median Voter Theory of Legislatures



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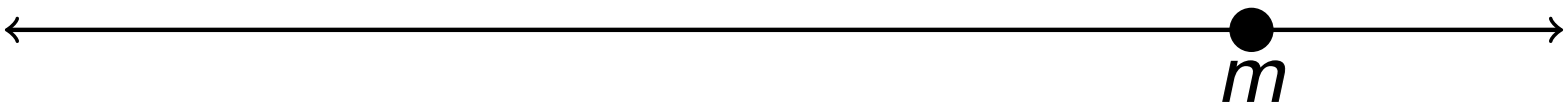

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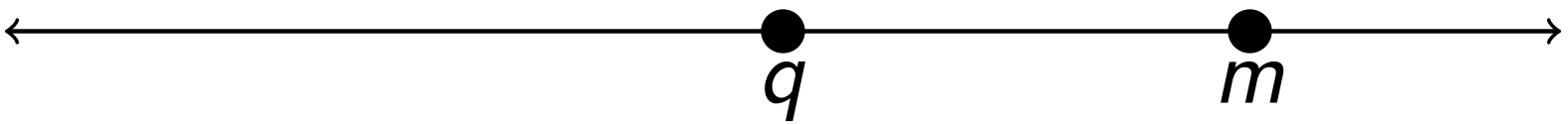

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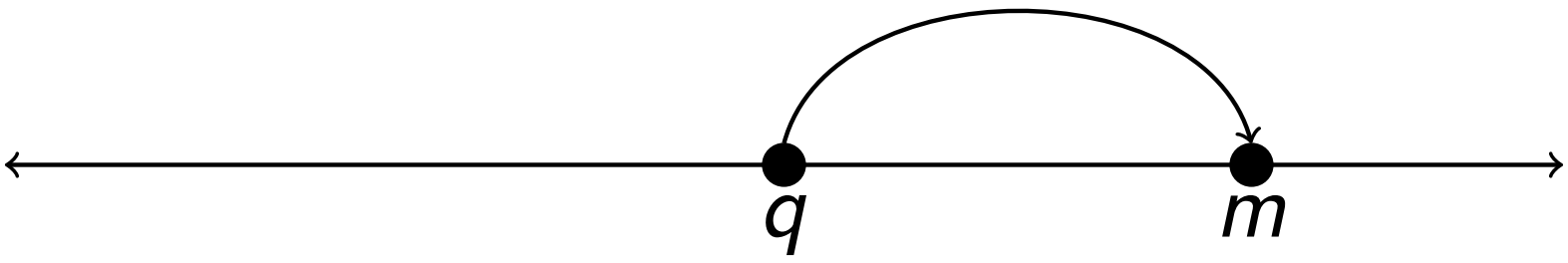

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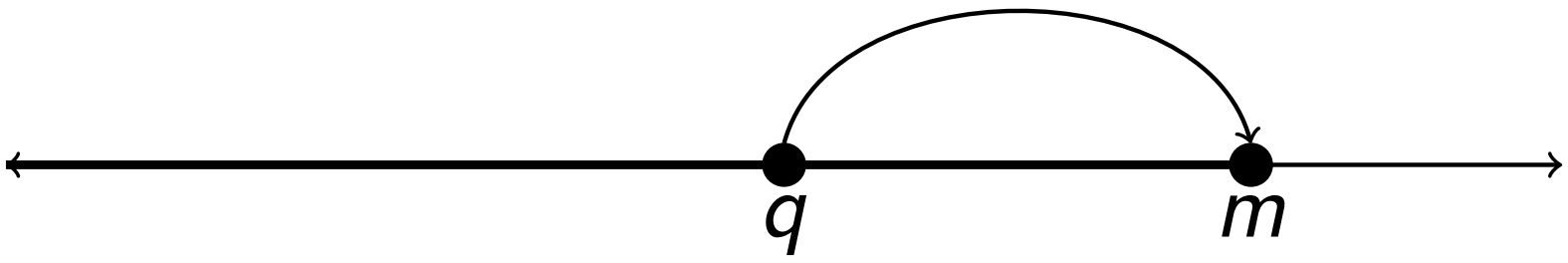
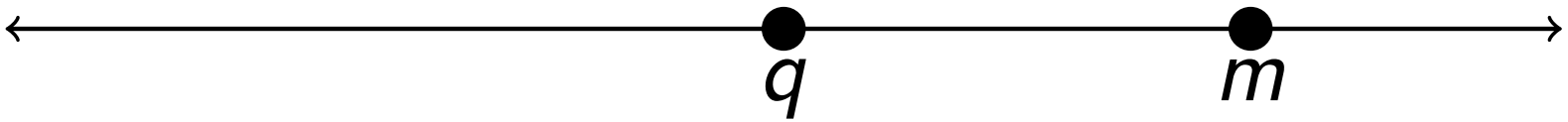


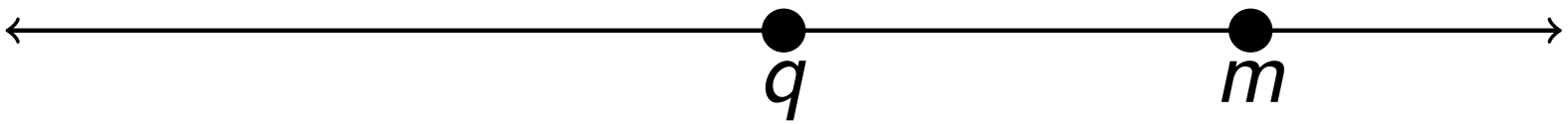
If this is true, why do we sometimes see policies left of m in a legislature?

Three Competing Theories

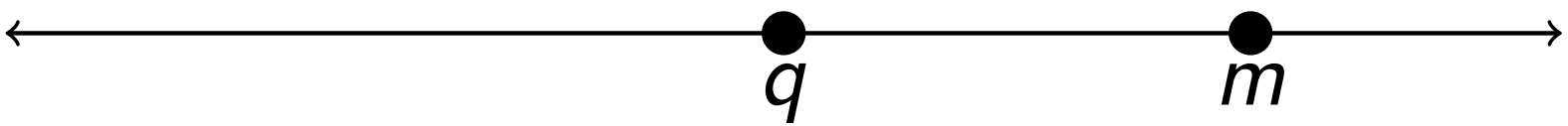
Committee Gatekeeping



Party Cartels



Pivotal Politics



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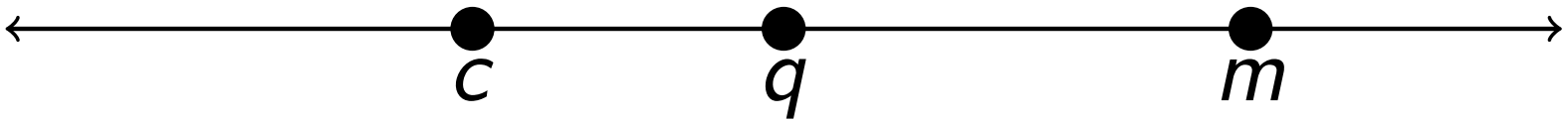

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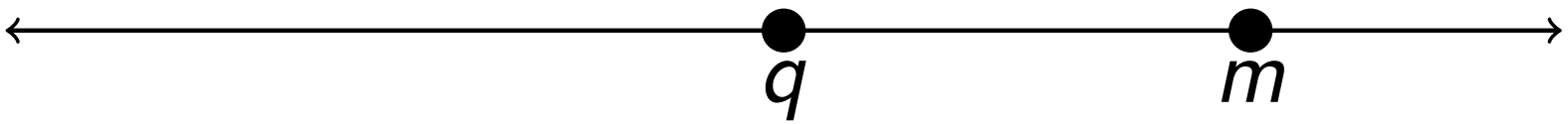

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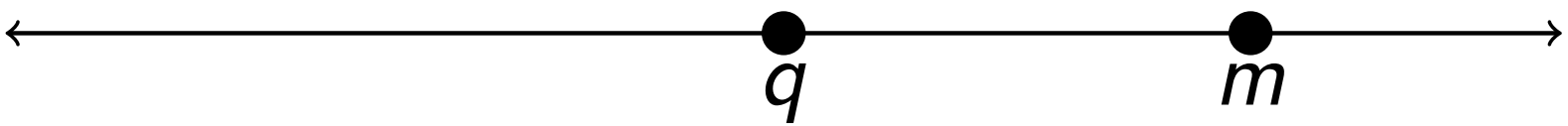

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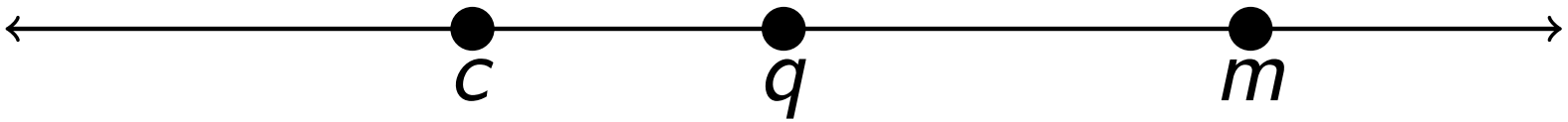

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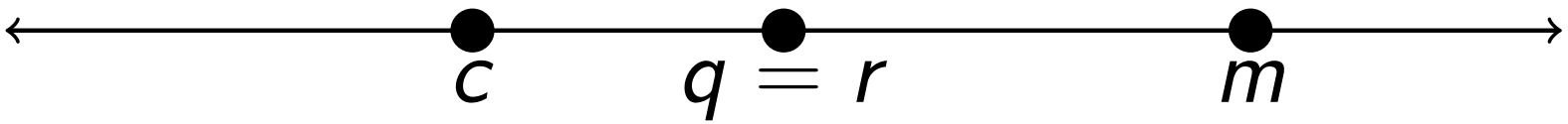

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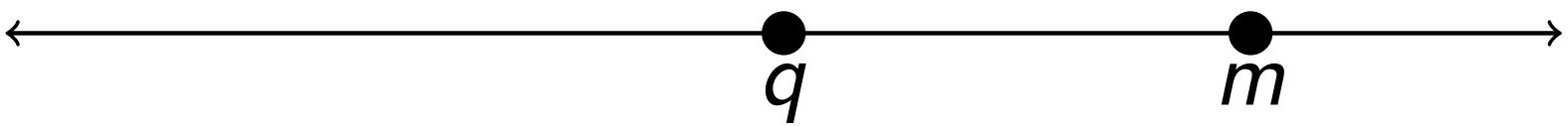

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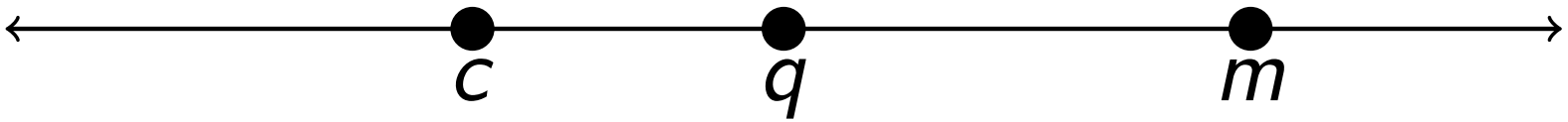

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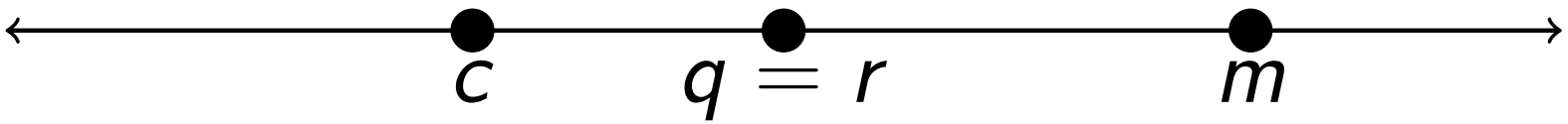

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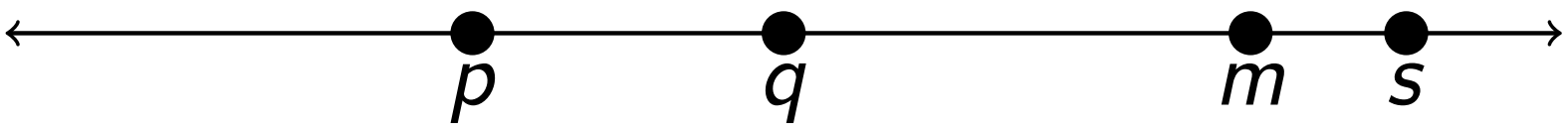

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Hypothesis Testing

- Multiple schools of thought
- History is conflictual and murky
- Two strands of literature
  - Philosophy of science
  - Statistics

Principle of Hypothesis Testing

1. Identify and collect data

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3. Need variation on both X and Y
4. Test difference between outcomes when (possibly) causal variable differs

Forms of Hypothesis Testing

Null hypothesis

Begin with *null hypothesis*

Your hypothesis expects an alternative state of the world

c/o Ronald Fisher

Alternative hypotheses

Begin with 2(+) alternative hypotheses

Accept hypothesis consistent with observation

c/o Jerzy Neyman and Egon Pearson

Fearon's Counterfactuals

- Sometimes we cannot test our hypothesis with actual observations
- What does Fearon suggest we do?

A Good Test

- Correct level of analysis
- Within scope conditions of theory
- Well-defined concepts
- Measures of high construct validity, accuracy, and precision
- Possible to observe any correlation between potential cause and outcome
- Consistent with or an improvement upon past methods
- Test using different data than data used to generate theory

Some Testing Challenges

1. Deterministic and probabilistic causality
2. Effect heterogeneity
3. Multiple causation
4. Equifinality
5. Confirmation or disconfirmation bias

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Theory testing involves:

- Between-case comparisons, or
- Across-time comparisons, or
- Between-case & across-time comparisons
- Within-case comparisons at a lower level of analysis

Methods of theory testing include:

- Case comparisons
- Process-tracing
- Observational statistical comparisons
  - Tabulation/visualization
  - Bivariate statistical inference (e.g., t-tests)
  - Multivariate analysis (e.g., regression)
- Experimentation

Preview of Next Week

How do we make between-case comparisons to test theories?