

# Political Science 104

## Lecture 6: Observational Studies

### Natural Experiments

- Observing an “experiment” run by nature.
- In a controlled randomized experiment (a “true” experiment) we have:
  - Treatment and control groups
  - Randomization
  - Control over the treatment
- In a natural experiment we have:
  - Treatment and control groups
  - “As-if” randomization
  - *No* control over the treatment

### “As-if” Random Assignment

- Subjects do not self-select into treatment and control groups.
- Assignment to treatment and control groups is plausibly uncorrelated with alternative explanations.
- Lower on internal validity than if we had truly random assignment.

### Natural Experiment Example #1: (John Snow and Cholera in London)

- Two water companies serve the same neighborhood. Next door houses can have different water sources (“as-if” random assignment).
- One company draws from a clean source (control), the other from a polluted source (treatment).
- Rate of cholera deaths 10 times higher in treatment group (treatment effect).

### Natural Experiment Example #2: (Anti-Communism and reception of West German TV broadcasts in East Germany)

- Local geography determines if East German neighborhoods can receive West German TV signals (“as-if” random assignment).
- Some neighborhoods are blocked (control), some are not (treatment).
- People with access to West German TV turn out to be no more anti-Communist than those without access (treatment effect).

### Natural Experiment Example #3: (Voting in the 2003 California Recall Election)

- Polling places in LA County consolidated from 5,231 to 1,885 (“as-if” random assignment”).
- Polling place the same as 2002 (control), or changed (treatment).
- Changing the polling place reduces the probability of voting by 12% (treatment effect).

## Quasi-Experiments

- Observing similar groups with one or more of these groups receiving a “treatment.”
- In a controlled randomized experiment (a “true” experiment) we have:
  - Treatment and control groups
  - Randomization
  - Control over the treatment
- In a quasi-experiment we have:
  - Treatment and control groups
  - *No* randomization
  - *No* control over the treatment

## Quasi-Experiment Example #1: (Traffic Deaths and Speeding in CT)

- In 1956 Connecticut begins suspending the driver’s licenses of speeders (treatment).
- Treatment group is CT drivers after 1956.
- Control group is CT drivers before 1956, drivers in other states. *Interrupted time series* design.
- Traffic fatalities drop 12% in 1956 as compared to 1955.
- Was this drop due to the treatment?

## Threats to Internal Validity (Traffic Deaths and Speeding in CT)

- **History:** better weather in 1956?
- **Maturation:** long term downward trend in death rate due to improving roads, better medical care?
- **Testing:** Did the pretest (studying 1955 deaths) make people more careful?
- **Instrumentation:** Did we change the way we measure traffic fatalities (i.e., count/don’t count pedestrians)?
- **Instability:** Do fatalities vary widely across years?
- **Regression to the mean:** Was 1955 just an unlucky year?

## Quasi-Experiment Example #2: (The Death Penalty and Crime)

- Some studies have compared murder rates in states with and without the death penalty.
- Can compare murder rates across states, and within states that adopt or drop the death penalty.
- Many studies find no relationship between the death penalty and murder rates.
- Threats to internal validity?

## Threats to Internal Validity (The Death Penalty and Crime)

- **History:** changes in the economy?
- **Maturation:** society changing, growing more or less violent?
- **Testing:** Does publicizing a high murder rate make people more vigilant/careful?
- **Instrumentation:** Are there differences in how states define and record murders?
- **Instability:** Waves of violence or gang wars?
- **Regression to the mean:** Did states adopt the death penalty in response to an unusually bad crime year?

## Other Observational Studies

- Simply observing the world and trying to make causal inferences, without experimental control or special cases with treatment and control groups with one or more of these groups receiving a “treatment.”
- In these observational studies we have:
  - *No* treatment and control groups
  - *No* randomization
  - *No* control over the treatment
- We use statistical controls (control variables) to rule out alternative explanations.

## Control Variables

- C  
? ↙ ↘ ?  
A B
- Could our hypothesized relationship between A and B really be due to C?
- In an experimental setting we can randomize so that C is not systematically related to A and B.
- In observational studies we include C as a *control variable*.

## Statistical controls to rule out alternative explanations

- We hypothesize that higher education leads to higher voter turnout, but income is an alternative explanation. Use income as a *control variable*. Does education still affect turnout once we control for income?

	High education	Low education
High income	70% vote	50% vote
Low income	60% vote	30% vote

## Observational Study Example #1: (Civil Liberties and Perceptions of Threat)

- A survey conducted in late 2001/early 2002 found that people who felt the most threatened by terrorists were the most likely to want restrictions on civil liberties.
- Are there alternative explanations for this finding?
- What control variables would you want to collect to try to rule out these alternative explanations?

## Observational Study Example #2: (Racial Profiling in Traffic Stops)

- Data collected by the Richmond, VA police department over 6 weeks in 2000 showed that minority drivers were more likely to be pulled over than white drivers.
- Are there alternative explanations for this finding?
- What control variables would you want to collect to try to rule out these alternative explanations?