

PLS 210
Political Science
Research Methods

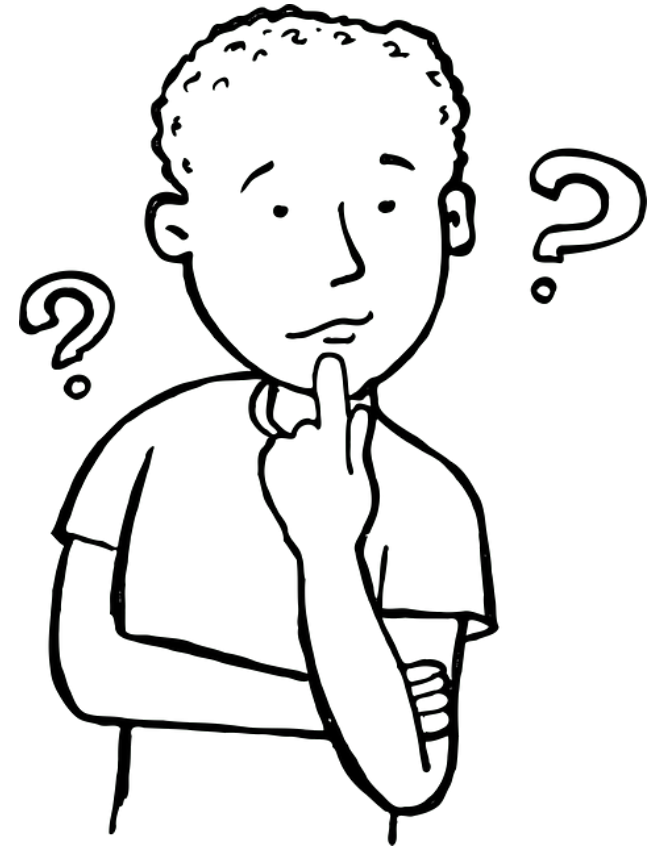
Week 8:
Within-case inference

Recap

- Inference:
 - Descriptive
 - Causal

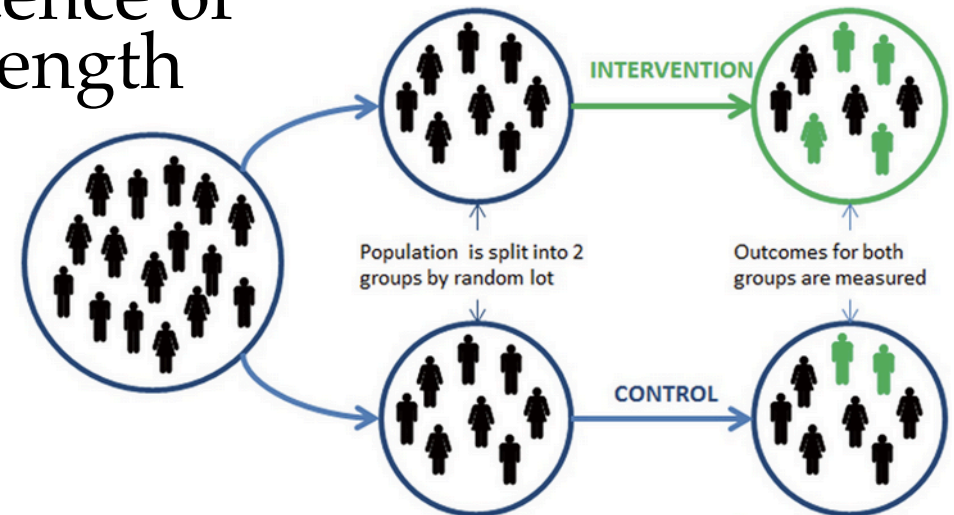
Plan for this week

- Making valid inferences within cases:
 - Randomized controlled trials
 - Process-tracing



Randomized controlled trials (RCTs)

- Administration of treatment
- Random assignment into treatment and control groups
- Advantages:
 - Compelling evidence of the existence of causal relationships and their strength
- Limitations:
 - Ethics and feasibility
 - Limited external validity
 - Inferential black box



Process-tracing

- Limitations:
 - External validity
 - Indirect evidence of causality
- Advantages:
 - Wide applicability
 - Causal mechanisms

Process-tracing

- Collier:

- “[S]ystematic examination of diagnostic evidence selected and analyzed in light of research questions and hypotheses posed by the investigator.”
- “[A]n analytic tool for drawing descriptive and causal inferences from diagnostic pieces of evidence—often understood as part of a temporal sequence of events or phenomena.”

- Fairfield:

- The inference process can be formalized as a sequence of tests where each piece of diagnostic evidence increases or decreases the plausibility of the hypothesis under consideration.”

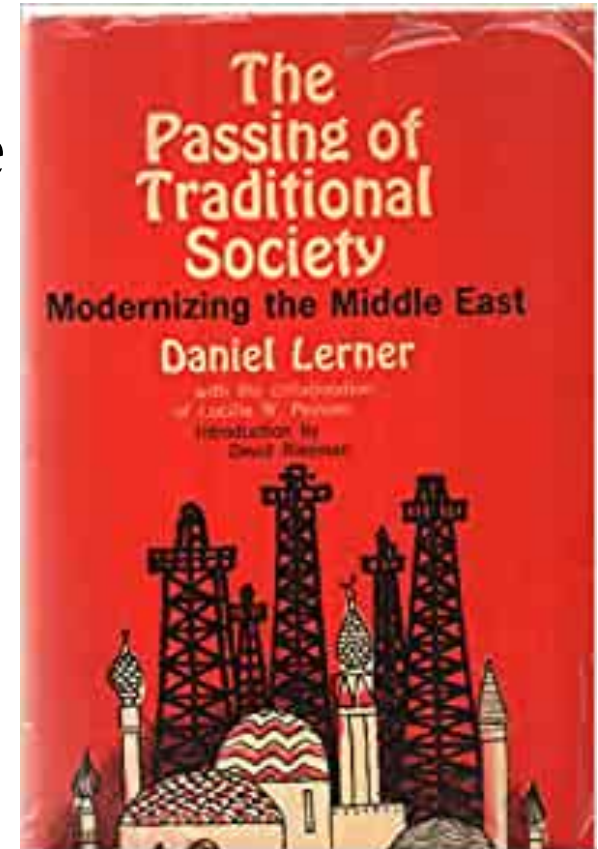
Process-tracing

- Bennett:
 - “This mode of analysis is closely analogous to a detective attempting to solve a crime by looking at clues and suspects and piecing together a convincing explanation, based on fine-grained evidence that bears on potential suspects’ means, motives, and opportunity to have committed the crime in question.”
- Sherlock Holmes:
 - “When you have excluded the impossible, whatever remains, however improbable, must be the truth.”
 - Doyle, Arthur Conan. 1892. *The Adventures of Sherlock Holmes*. London: G. Newnes.



Process-tracing: descriptive inference

- Daniel Lerner:
 - Rapid transformation of the Turkish village of Balgat from 'traditional' to 'modern' in the 1950s
 - Lerner, Daniel. 1958. *The Passing of Traditional Society: Modernizing the Middle East*. Free Press: Glencoe, Illinois.



Process-tracing: causal inference

- Bennett:
 - “Process tracing, which focuses on the diagnostic intervening steps in a hypothesized causal process, can provide inferential leverage on two problems that are difficult to address through statistical analysis alone.”



Process-tracing: causal inference

- Bennett:

- “The first is the challenge of establishing causal direction: if X and Y are correlated, did X cause Y, or did Y cause X? Careful process tracing focused on the sequencing of who knew what, when, and what they did in response, can help address this question. It might, for example, establish whether an arms race caused a war, or whether the anticipation of war caused an arms race.

A second challenge is that of potential spuriousness: If X and Y are correlated, is this because X caused Y, or is it because some third variable caused both X and Y? Here, process tracing can help establish whether there is a causal chain of steps connecting X to Y, and whether there is such evidence for other variables that may have caused both X and Y.”

Process-tracing: “Silver Blaze”

Table 2

Overview of “Silver Blaze”

Causal Puzzle

To explain the murder of John Straker and, secondarily, the disappearance and whereabouts of the racehorse Silver Blaze.

Main Characters

Silver Blaze, the racehorse that is the favorite for the Essex Cup, has disappeared.

John Straker, the horse’s trainer, has been killed by a terrible blow that shattered his head.

Fitzroy Simpson, a prime suspect, has been lurking around the stable seeking inside information about the race.

Ned Hunter, a stable boy, has been drugged with opium concealed in curried mutton. He therefore fails to guard Silver Blaze on the night of the horse’s disappearance.

Colonel Ross is the owner of King’s Pyland Stables and of Silver Blaze.

Hypotheses

Independent Variables

- H1. Romantic entanglement started chain of events
- H2. Chain of events started in Straker household

Intervening Variables

- H3. Straker abducted horse
- H4. Straker planned to harm horse
- H5. Straker practiced the injury

Dependent Variables

- H6. Simpson killed Straker
- H7. Straker killed himself
- H8. Horse killed Straker

Process-tracing: tests

Table 1

Process Tracing Tests for Causal Inference

		SUFFICIENT FOR AFFIRMING CAUSAL INFERENCE	
		No	Yes
NECESSARY FOR AFFIRMING CAUSAL INFERENCE	No	1. Straw-in-the-Wind	3. Smoking-Gun
		a. Passing: Affirms relevance of hypothesis, but does not confirm it.	a. Passing: Confirms hypothesis.
		b. Failing: Hypothesis is not eliminated, but is slightly weakened.	b. Failing: Hypothesis is not eliminated, but is somewhat weakened.
		c. Implications for rival hypotheses: Passing <i>slightly</i> weakens them. Failing <i>slightly</i> strengthens them.	c. Implications for rival hypotheses: Passing <i>substantially</i> weakens them. Failing <i>somewhat</i> strengthens them.
	Yes	2. Hoop	4. Doubly Decisive
		a. Passing: Affirms relevance of hypothesis, but does not confirm it.	a. Passing: Confirms hypothesis and eliminates others.
b. Failing: Eliminates hypothesis.		b. Failing: Eliminates hypothesis.	
	c. Implications for rival hypotheses: Passing <i>somewhat</i> weakens them. Failing <i>somewhat</i> strengthens them.	c. Implications for rival hypotheses: Passing <i>eliminates</i> them. Failing <i>substantially</i> strengthens.	

Source: Adapted from Bennett (2010, 210), who builds on categories formulated by Van Evera (1997, 31–32).

Process-tracing: tests

Table 3

Straw-in-the-Wind Tests

H1. Straker's romantic entanglement set chain of events into motion.

Clues. A bill from an expensive women's clothing store is found in Straker's pocket, and his wife is ignorant of the clothing in question.

Inference. The bill was owed by Straker for an expensive gift to another woman, and Straker may have been in financial difficulty. This could give him a motive for throwing the race.

Summary. This promising lead, a *straw-in-the-wind*, lends weight to H1, but is not by itself a decisive piece of evidence.

H3. Straker abducted the horse.

Clue. The dog did nothing (i.e., did not bark) in the night during which the horse disappeared.

Inference. The person who approached the stable, possibly Straker, was well-known to the dog. This raises questions about why Straker might have gone to the stable. It suggests that perhaps he came to abduct the horse, but does not strongly demonstrate this.

Summary. This *straw-in-the-wind* favors H3, but does not confirm it.

Table 4

Hoop Tests

H6. Simpson killed Straker.

Clue. Simpson had a potential murder weapon.

Inference. This weapon is consistent with the hypothesis, but does not by itself demonstrate Simpson's guilt.

Summary. Simpson had a potential weapon, so H6 passes this *hoop* test.

H6. Simpson killed Straker.

Clues. Simpson's timid, non-menacing appearance, plus the fact that Straker's "head had been shattered by a savage blow from some heavy weapon."

Inference. With a stronger assumption based on his appearance, Simpson could not have inflicted the blow that shattered Straker's head.

Alternative Inference. With a weaker assumption, Simpson's appearance raises doubts that he would have committed the murder, but does not preclude it.

Summary. With a stronger assumption this is a *hoop* test which H6 fails; with a weaker assumption it is a *straw-in-the-wind* test which casts doubt on H6.

Process-tracing: tests

Table 5
Smoking-Gun Tests

H2. The chain of events started in Straker's household.

Clues. The household maid brought the stable boy curried mutton, and he was found later to have been drugged.

Inference. The curry was served to conceal the opium, which in turn was used to drug the stable boy. When it is clear that the curry could only have been introduced in the mutton by someone in Straker's household, members of his household become inextricably linked to a key causal step.

Summary. The clues yield a *smoking-gun* test that confirms H2.

H4. Straker planned to harm the horse.

Clue. Unusual, surgical knife found with Straker.

Inference: The knife is interpreted as *exceptionally* unusual—establishing intent to harm.

Alternative Inference: The knife is interpreted as *somewhat* unusual, suggesting, but hardly confirming, intent to harm. It might possibly be a coincidence.

Summary. If the knife is exceptionally unusual, it is a *smoking gun* that confirms H4. With a weaker interpretation that the knife was somewhat unusual, it is a *straw-in-the-wind* that makes H4 more plausible, without confirming it.

Process-tracing: tests

Table 6

Building a Doubly Decisive Test by Evaluating Alternative Hypotheses

H6. Simpson killed Straker.

Clues. The household maid brought the stable boy curried mutton, and he was found later to have been drugged.

Inference. The curry served to conceal the opium, which in turn was used to drug the stable boy. Because the curry could only have been introduced in the mutton by someone in Straker's household, Simpson is excluded from consideration.

Summary for H6. This *hoop* test rejects H6, eliminating Simpson as a suspect.

H7. Straker killed himself.

Clue. Straker's head was "shattered by a savage blow from some heavy weapon."

Inference. Straker could not have shattered his own head with such a blow.

Summary for H7. This *hoop* test rejects H7, eliminating Straker as a suspect.

H8. The horse killed Straker.

Clues. (a) Bill in Straker's pocket and wife's ignorance of dress; (b) Straker's unusual surgical knife; (c) matches and candle, and the horse disappeared at night; (d) the unusual form of death—Straker's head was "shattered by a savage blow from some heavy weapon."

Inferences. (a) Straker's romantic entanglement and resulting financial difficulty provided a motive to throw the race (*straw-in-the-wind*, table 3); (b) Straker planned to harm the horse (*smoking gun* or *straw-in-the-wind*, table 5); (c) when Straker attempted to harm the horse at night, the candle and prick of the knife frightened the horse and led to a fatal kick (*straw-in-the-wind*); (d) the unusual form of death (savage blow) points to an extreme or unusual cause, i.e., the horse's kick (*straw-in-the-wind*).

Summary for H8. The combined weight of four *straws-in-the-wind*, one of which may be a *smoking gun*, strongly favor the hypothesis that the horse killed Straker.

Summary of Doubly Decisive Test. Two of the three suspects are eliminated by *hoop* tests, leaving only the horse. A series of additional inferences strongly implicate the horse. The combined weight of evidence confirms H8, that the horse killed Straker.

Process-tracing: Fairfield

- 2005 tax reform in Chile:
 - Centrality of economic inequality in a presidential election campaign
 - Type of vertical equity appeal
- Hoop and smoking gun tests



Inference and reasoning

- Deduction
- Induction
- Abduction

Takeaways

- Uses, advantages, and limitations of RCTs and process-tracing
→
- Cross-case inference