Causal Mechanisms and Process Tracing

Department of Government
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Review Case Studies

- Many uses of case studies
- In case comparisons (last week), we focused on scoring cases on variables to test theories *between cases*

Theory testing involves:

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- Across-time comparisons, or
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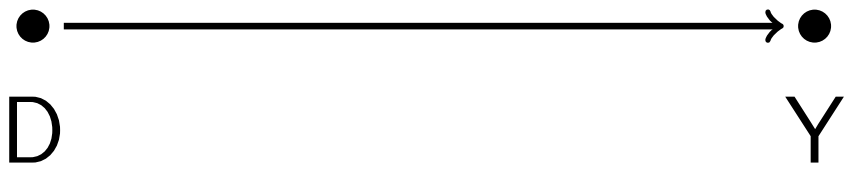
1. Correlation
2. Nonconfounding
3. Direction ("temporal precedence")
4. Mechanism
5. (Appropriate level of analysis)

[1] From Kellstedt and Whitten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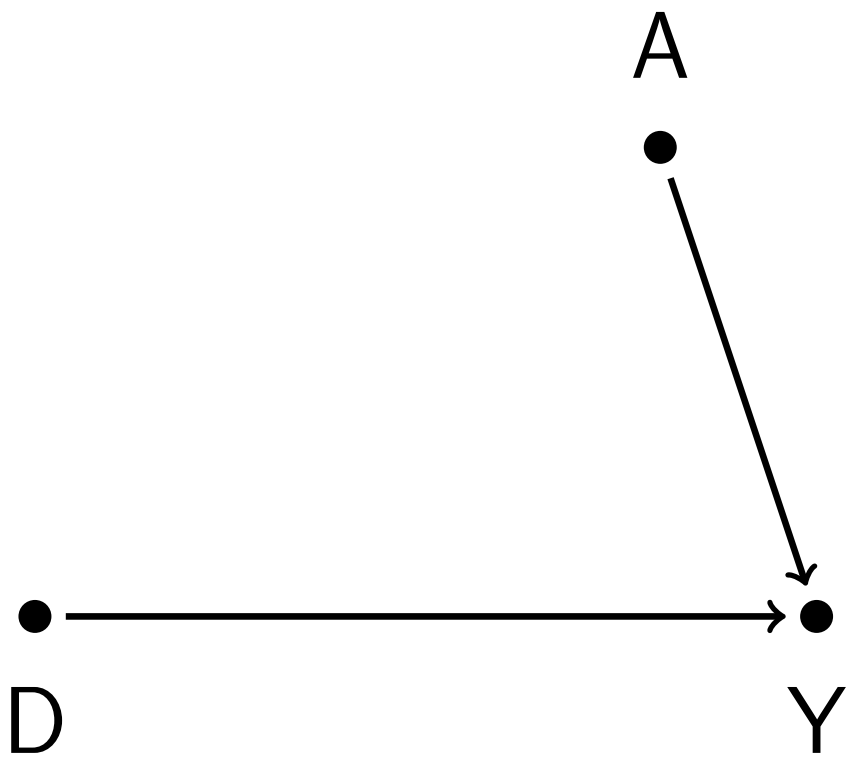
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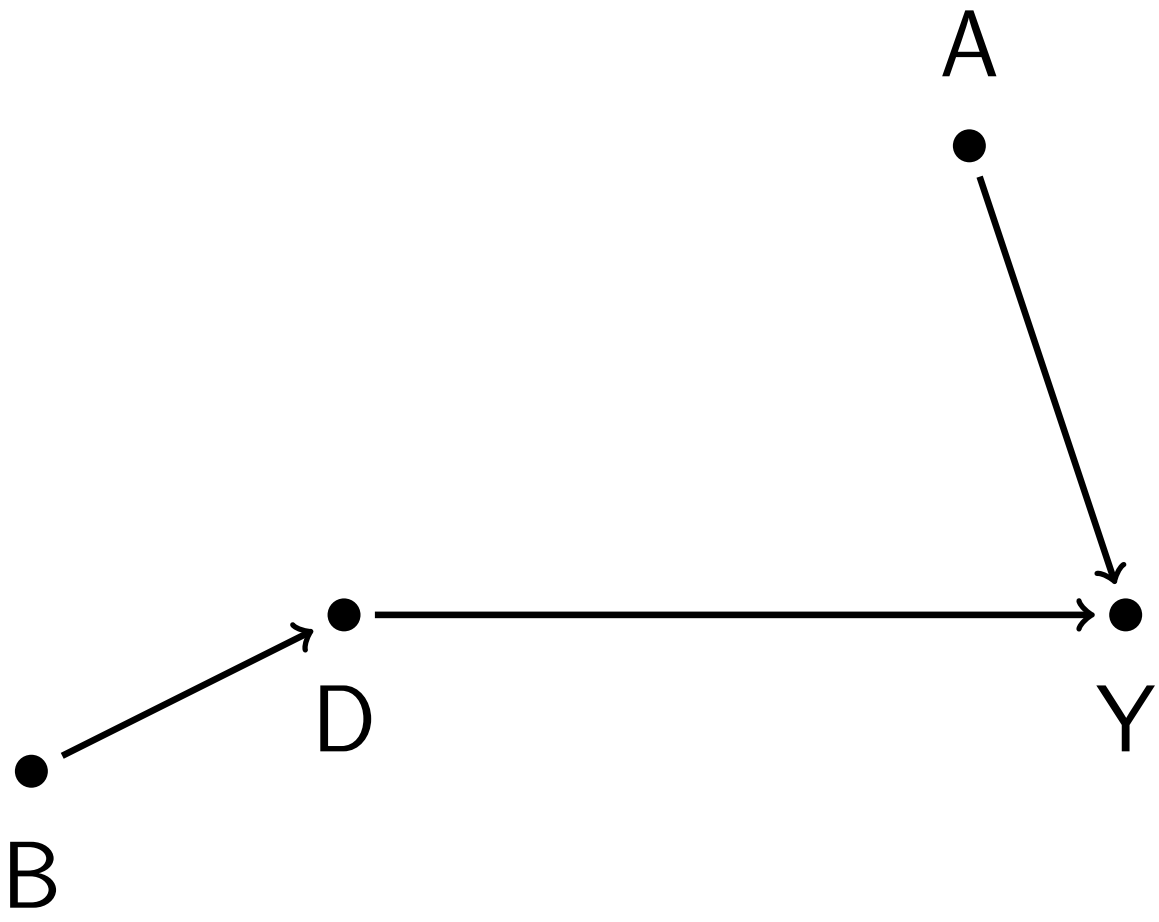
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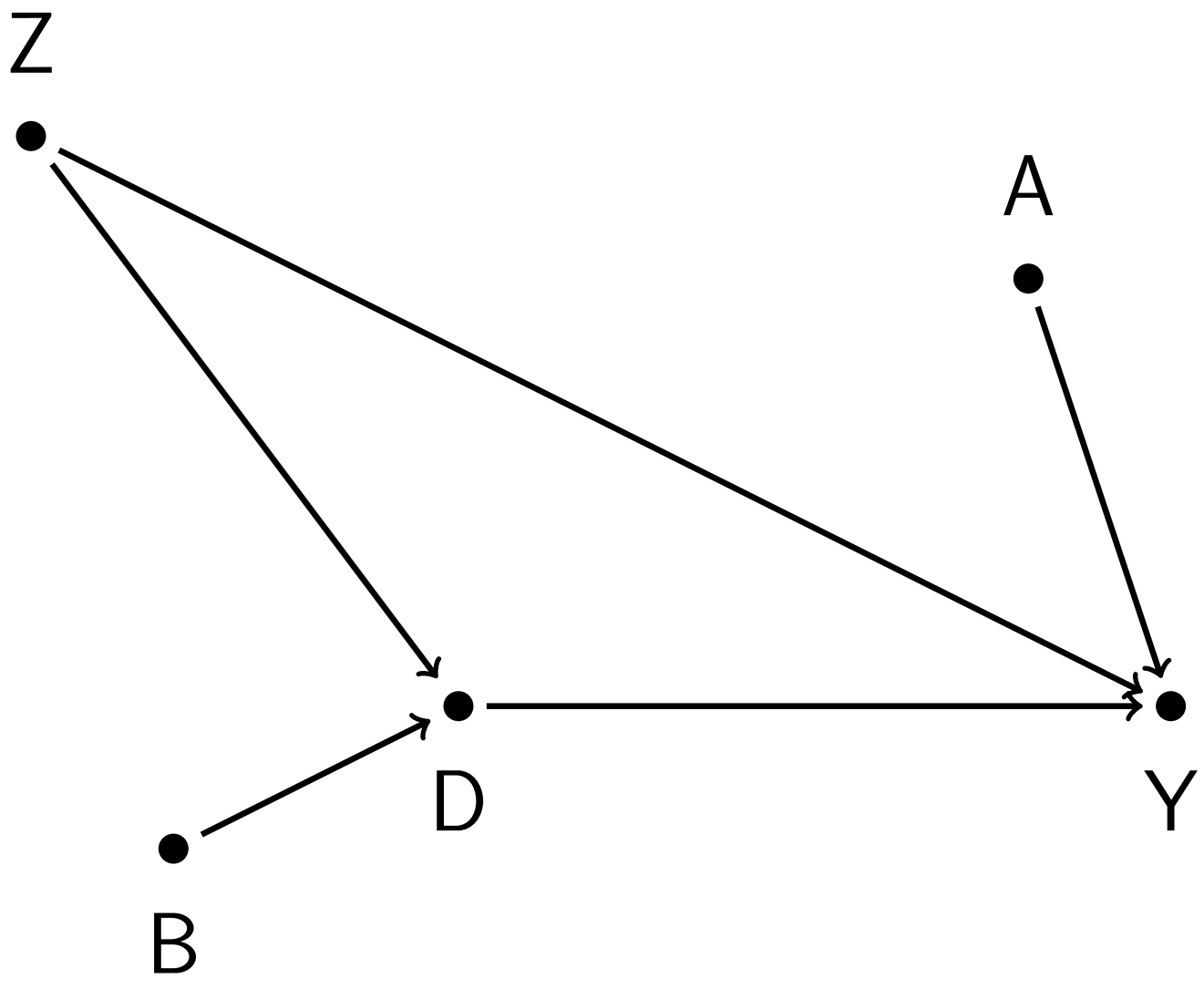
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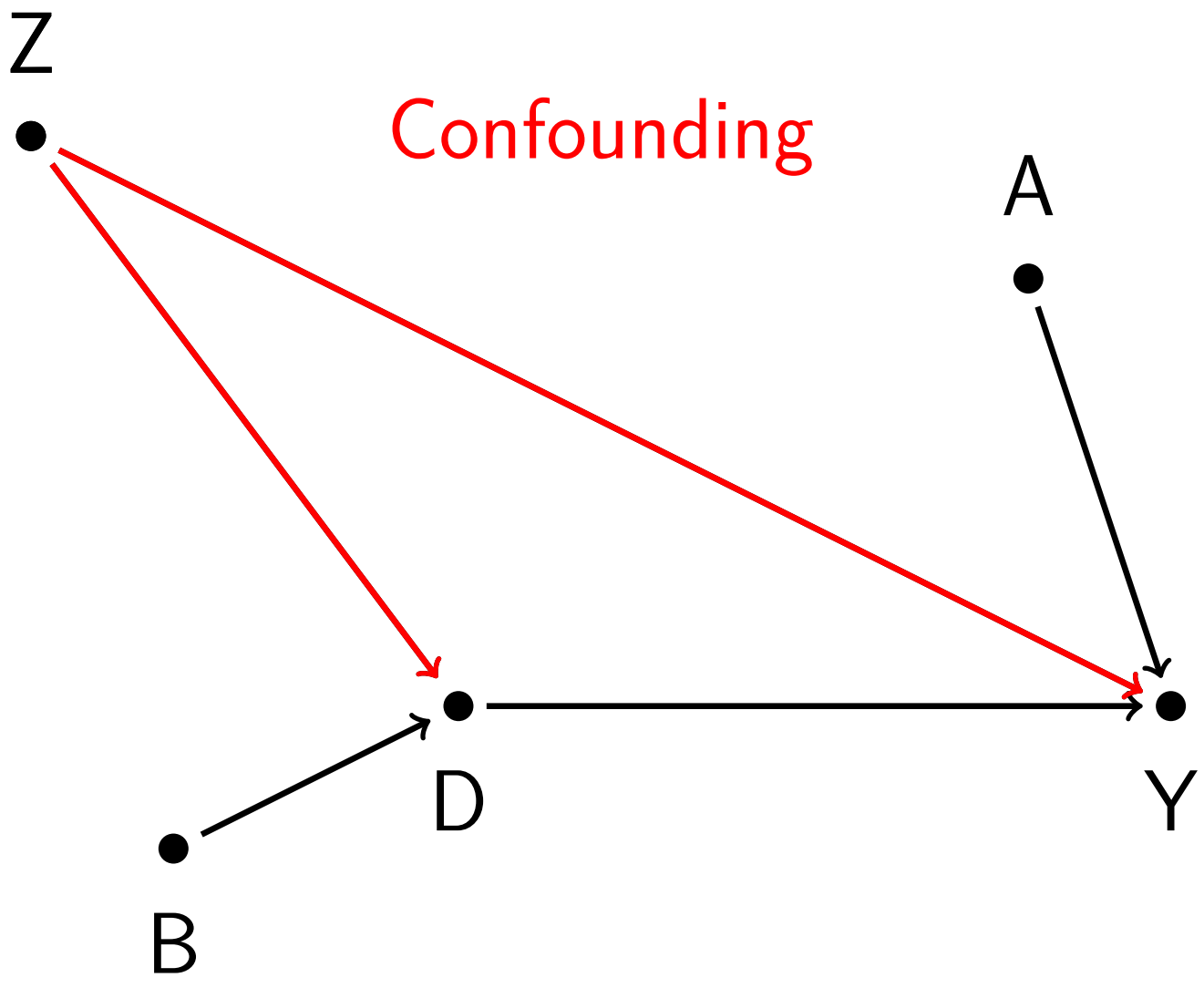
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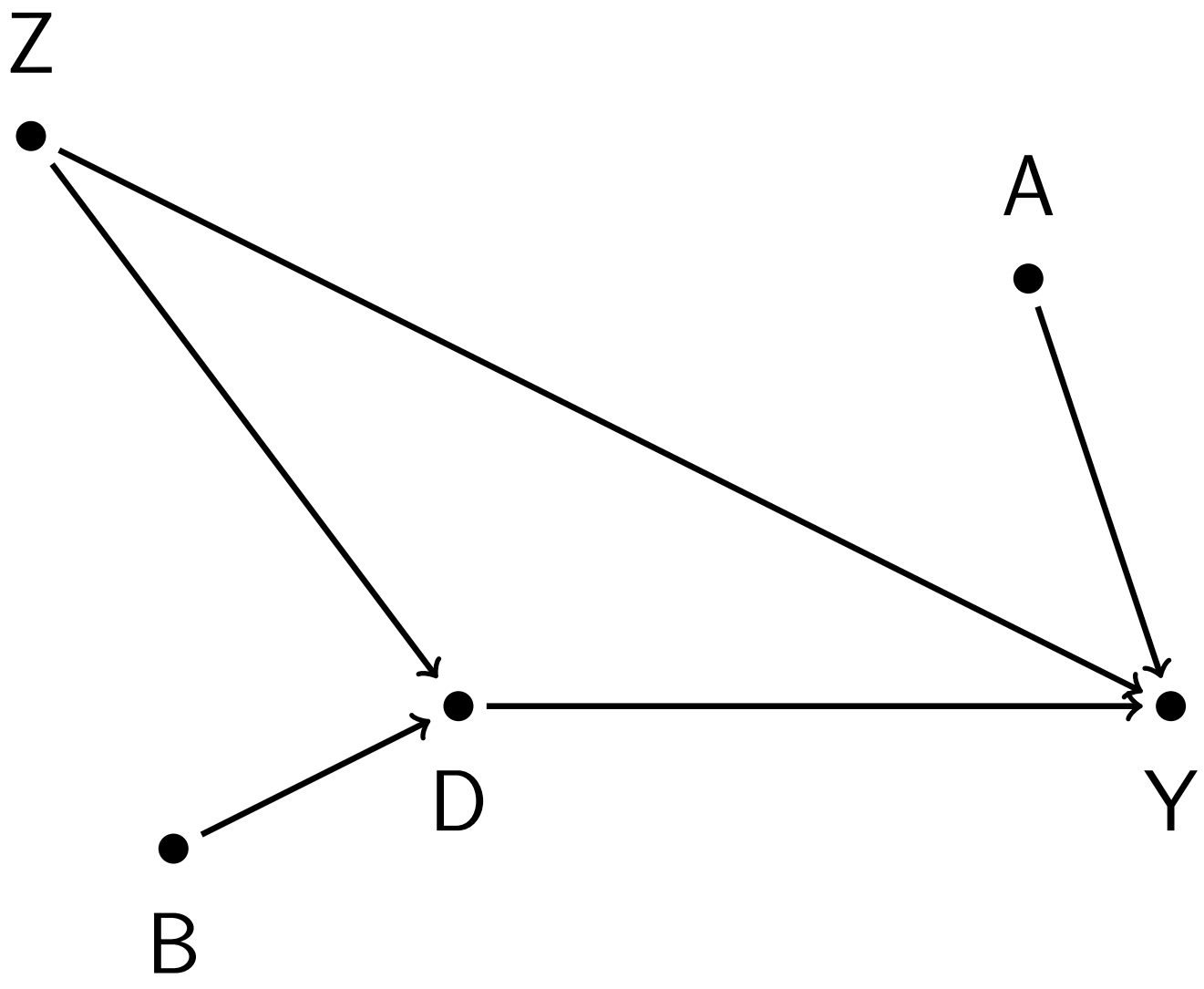
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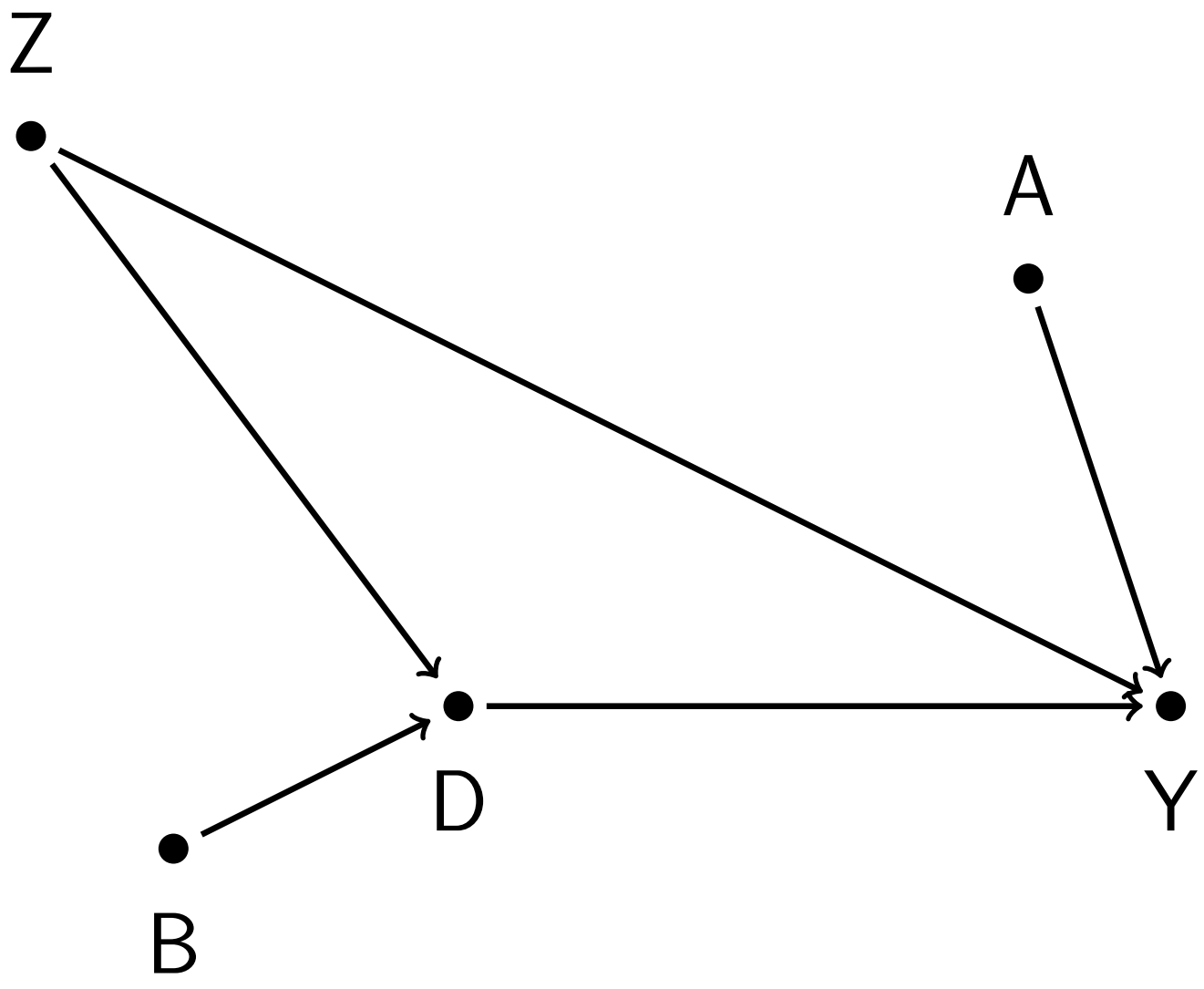
Mediators/Mechanisms

- Definition: "the generative mechanism through which the focal independent variable is able to influence the dependent variable of interest" [2]
- Dropping the tautology, "the pathway(s) or process(es) by which an effect is produced"
- Allows us to distinguish:
  - *Direct* effects
  - *Indirect* effects

[2] p. 1173 from Baron, R.M., and Kenny, D.A. 1986. "The Moderator-Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations." *Journal of Personality and Social Psychology* 51(6): 1173–1182.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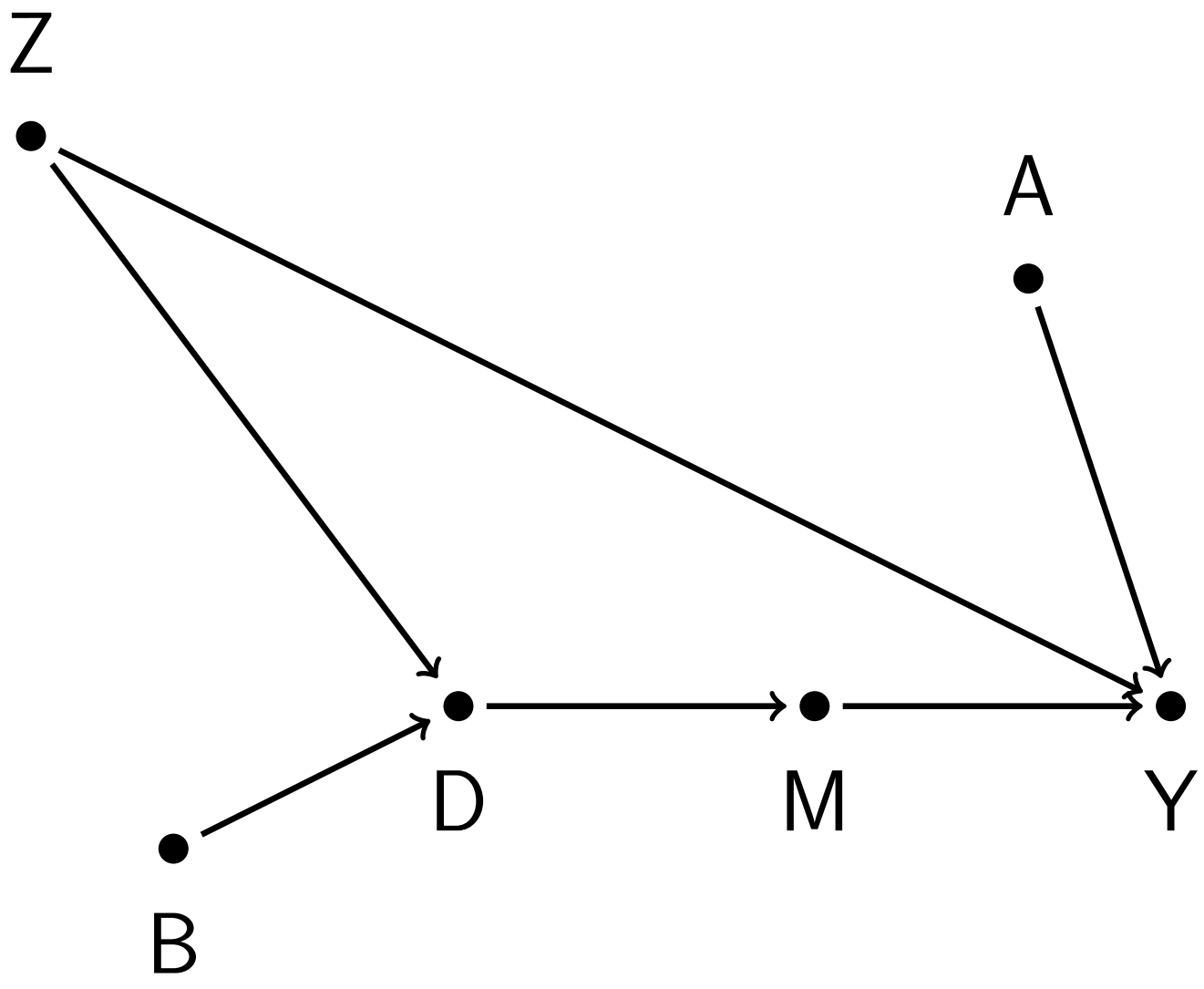
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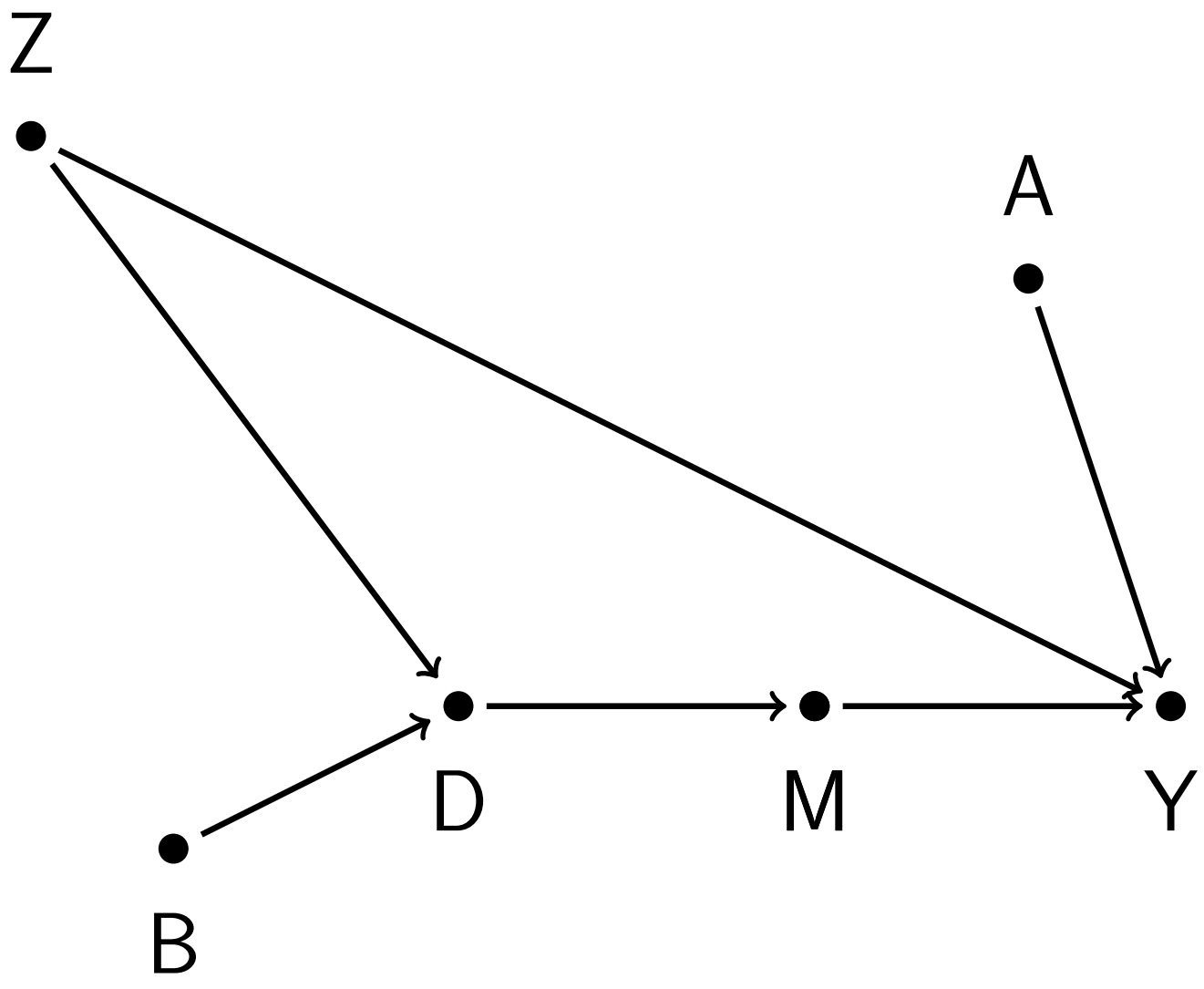
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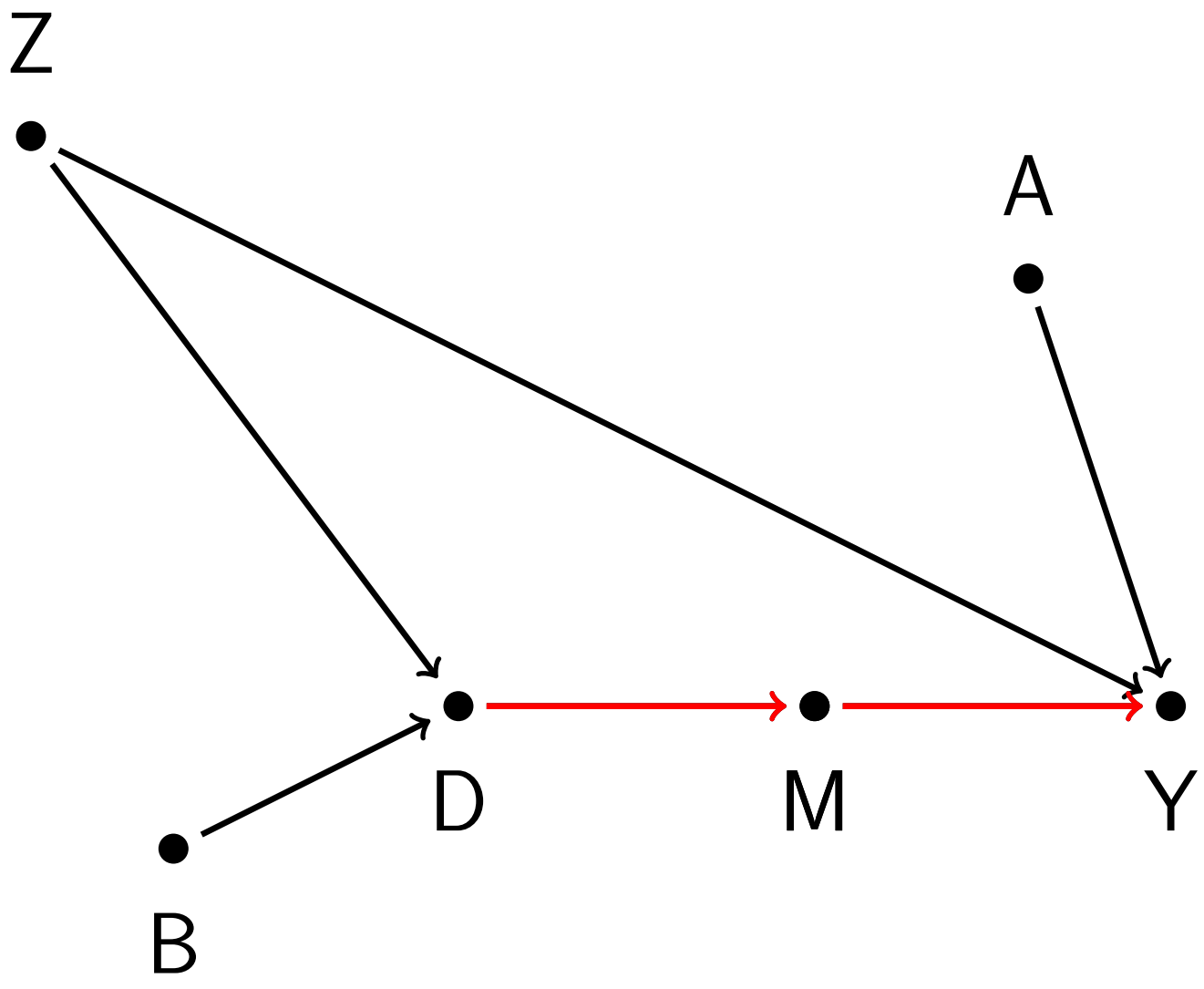
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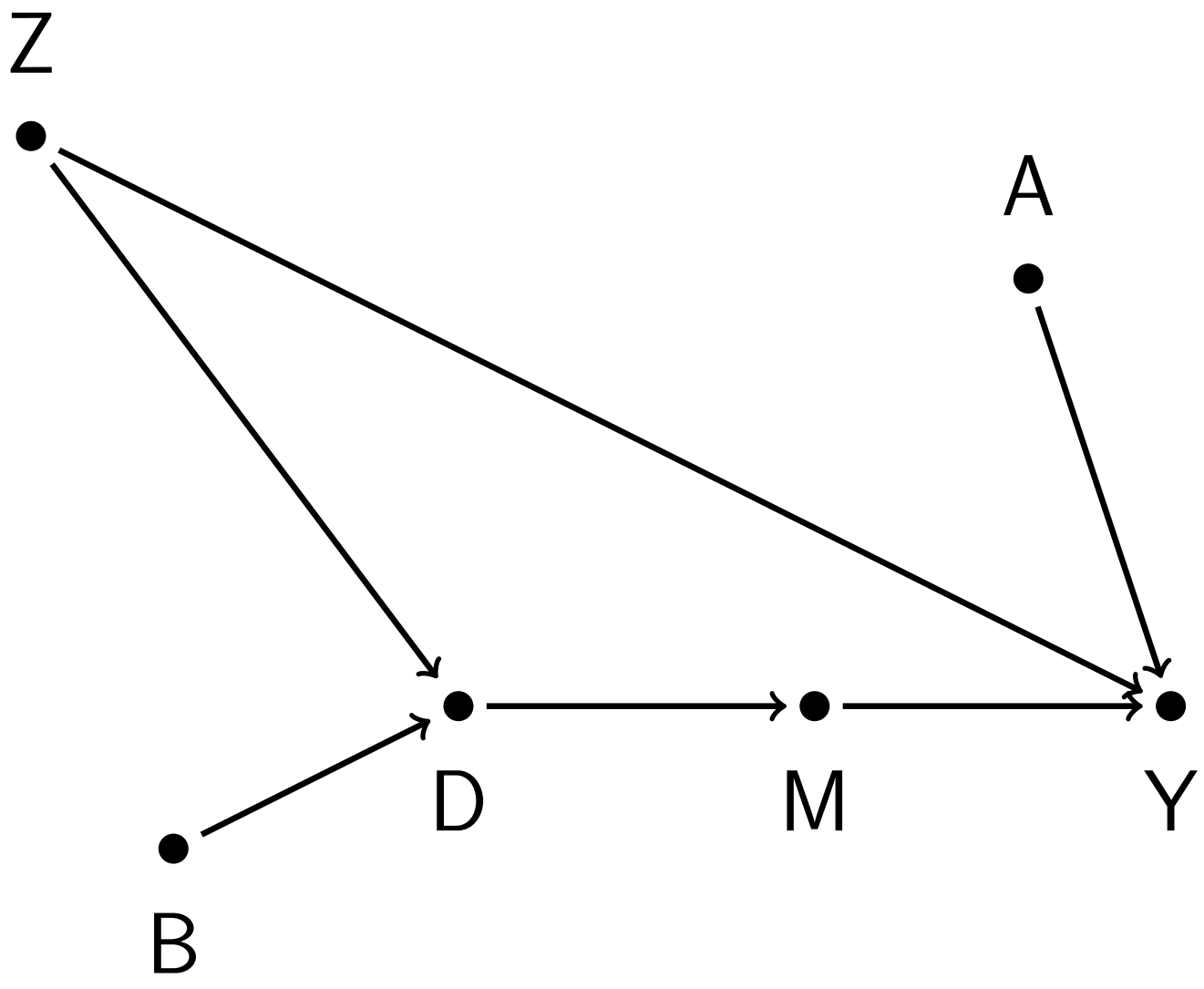
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Two Uses of Studying Mechanisms

1. Determine *how* a causal effect comes about
2. Establish seemingly disconnected cause and outcome through a chain of smaller causal effects

1. The *how* of the *why*

- A causal effect is an explanation of *why* something occurs
- Mechanisms explain *how* that effect occurs

Example: Smoking

We know that smoking kills.

How does this effect occur?

Source: © Wellcome Trust

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- We may be able to establish a number of small linkages
- The product (multiplication) of these effects is the *total effect*

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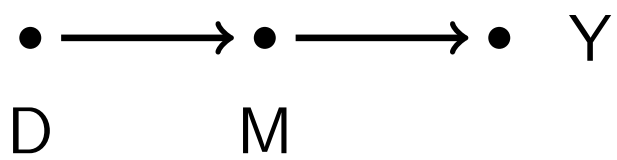
- The product (multiplication) of these effects is the *total effect*
- Two ways to conceptualize this:
  - Deterministic causality
  - Probabilistic causality

Pearl's Front Door Criterion

- Same rules for understanding mechanisms as causes generally
- Mechanisms must be:
  - exhaustive
  - isolated



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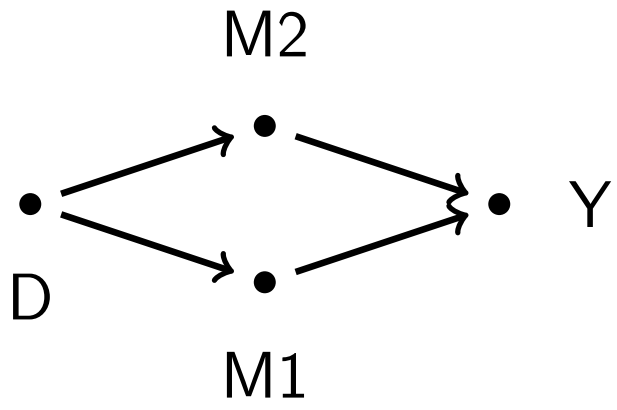

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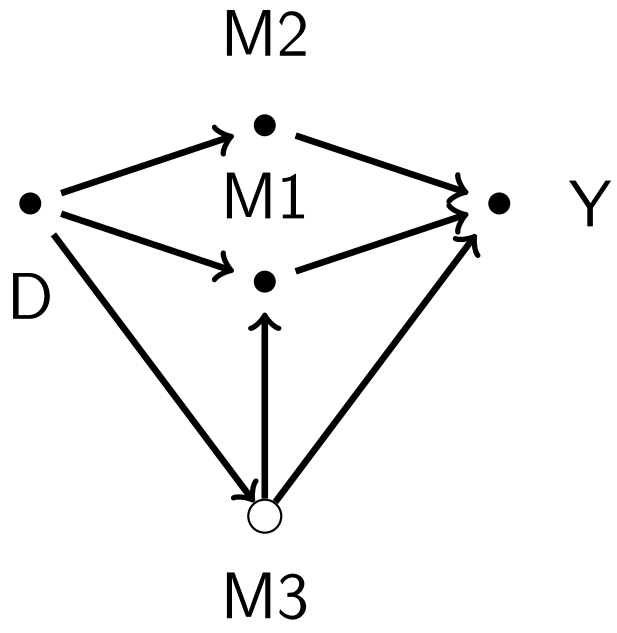

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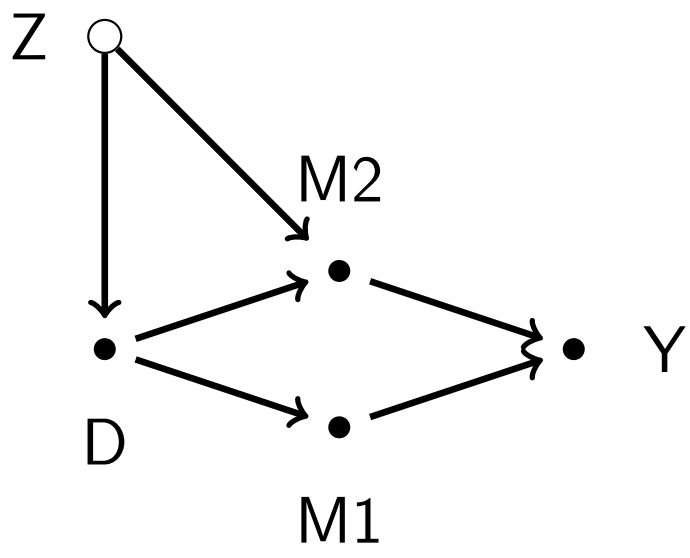

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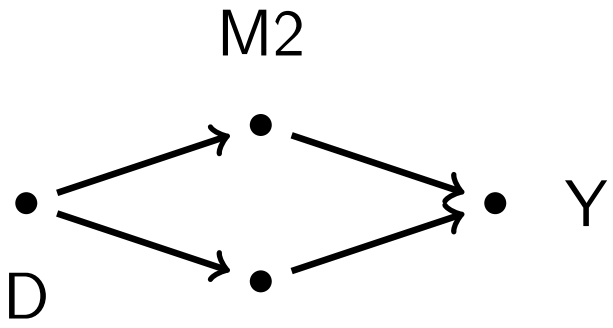

Do We Care About Mechanisms?

Write for two minutes

- Is understanding a mechanism necessary for causal inference?
- When should we be satisfied that we have "bottomed out" a causal process?

Process Tracing

- Definition: "analysis of processes of change that seeks to uncover causal mechanisms and causal sequences"[3]
- Single-case method
- Focused on gathering CPOs
- Sequence of counterfactuals

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[3] p.300 from Brady, H.E., and Collier, D. 2004. *Rethinking Social Inquiry*. Rowman & Littlefield.

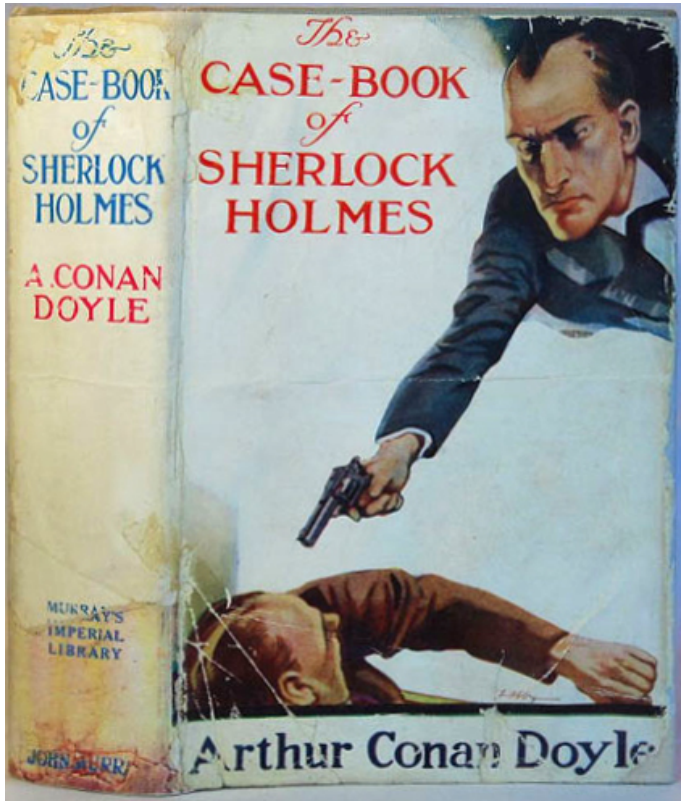
Causal Process Observations

- Definition: "An insight or piece of data that provides information about the context, process, or mechanism, and that contributes distinctive leverage in causal inference"[4]
- Might be used to:
  - Inductively generate hypotheses
  - Deductively test a chain of causal relationships

[4] Brady and Collier 2004, p.277

Inductive Process Tracing

- Broad search for sequential steps necessary for an event to occur
- No *a priori* expectations to test
- Analogous to detective work



Source: Public Domain

Deductive Process Tracing

- Sequence of within-case hypothesis tests
- Theory or extant evidence guide chosen comparisons
  - May iterate if there is no or very weak evidence for one's hypothesis(es)

Four Process Tracing Tests[5]

Broadly consistent with Neyman-Pearson hypothesis testing.

1. Straw-in-the-wind test
2. Hoop test
3. Smoking gun test
4. Doubly decisive test

[5] Note: I am not a fan of this typology.

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- Can we gather within-case DSOs at a lower level of analysis to better understand causality?
  - Local-level geographical variation
  - Across-time variation