Lecture 34
Woodward on Manipulation and Causation

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Philosophy 270
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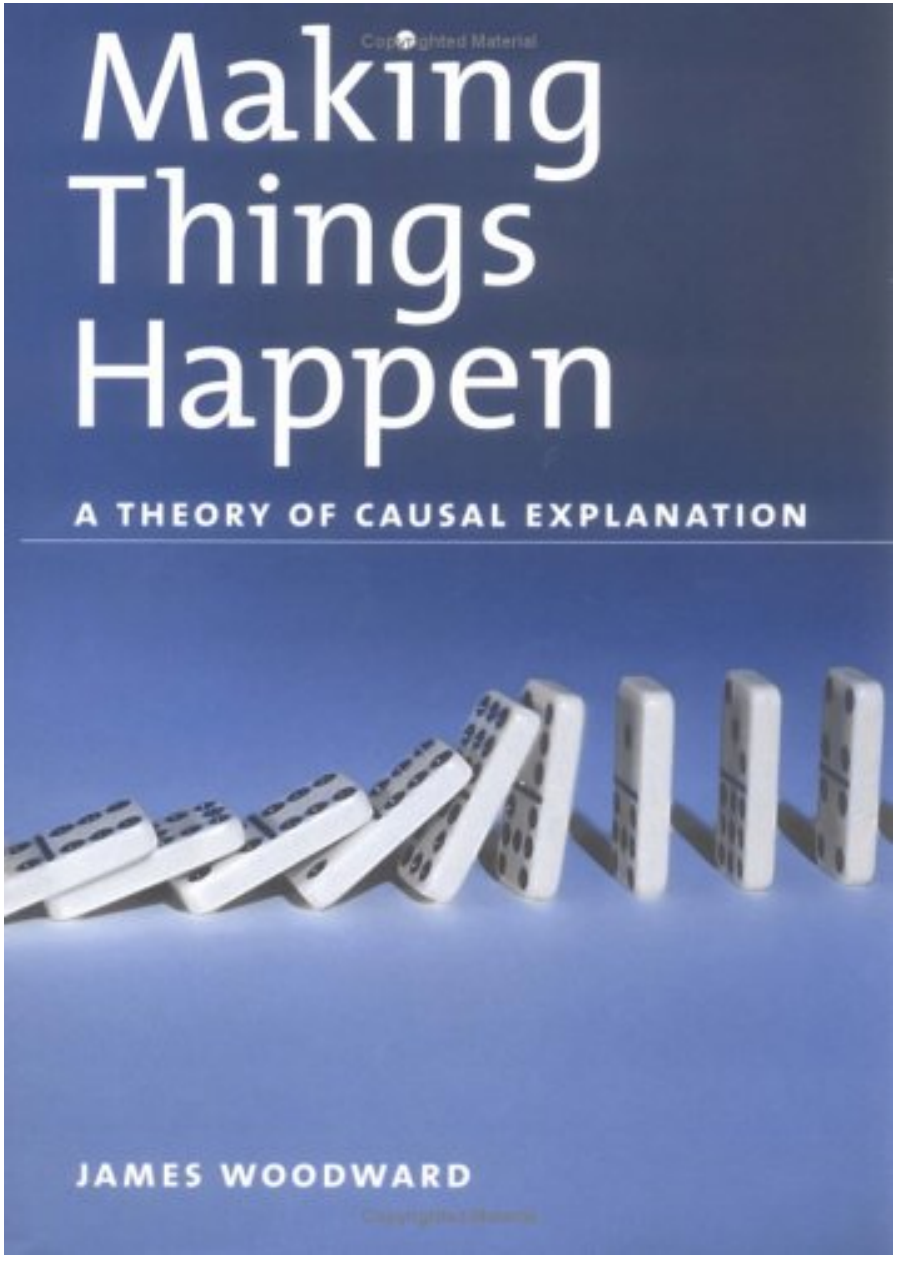
The book



This book defends what I call a manipulationist or interventionist account of explanation and causation. According to this account, causal and explanatory relationships are relationships that are potentially exploitable for purposes of manipulation and control. (v)

Introduction

Manipulationist theory of causation (rough statement)

"X causes Y" means that manipulating or changing X would change Y.

Examples

- The position of a light switch is a cause of the light being on because we can change whether the light is on by manipulating the switch.
- The reading on a barometer is not a cause of rain because we cannot change whether it rains by manipulating the barometer reading.

This theory has been endorsed by many scientists but few philosophers.

Regularity theory of causation (simple version)

"X causes Y" means that all occurrences of X are followed by occurrences of Y.

Example

Let X be that a man takes birth control pills; let Y be that the man does not become pregnant.

- On the regularity theory, X causes Y. (Wrong!)
- On the manipulationist theory, X does not cause Y. (Right!)

Definition

A theory of causation is *reductive* if it defines causal concepts in terms of non-causal concepts.

- The regularity theory is reductive.
- Woodward's manipulationist theory isn't reductive. Reasons:
  - *For an action or event I to constitute a manipulation of a variable X, there must be a causal relationship between I and X.* (28)
  - *I must be an event or process with a very special kind of causal structure, and to characterize this structure we must make extensive use of causal notions . . . (I call a manipulation with the right sort of structure an intervention.)* (28)
- A theory of causation can be informative without being reductive, by showing how causal concepts are interconnected. (27)

Types and tokens (39–40)

Two senses of "event"

1. Particular unrepeatable occurrences, e.g., a specific episode of aspirin ingestion by a particular person. *(Event tokens)*
2. Types of occurrences that can be repeated on many occasions, e.g., ingestion of aspirin. *(Event types)*.

Two kinds of causal claim

1. *Token-causal claims:* relate event tokens.
2. *Type-causal claims:* relate event types.

Examples

1. A specific episode of aspirin ingestion by Smith caused a specific episode of headache recovery.
2. Ingestion of aspirin causes relief from headache.

Variables (39)

- A variable is something that can take more than one value.
- Woodward talks of causation as a relation between variables, where the variables have event types as their values.

Example

Variable	Possible values
A	aspirin ingested, not ingested
H	relief from headache occurs, does not occur

If X and Y are variables, Woodward uses the following terms interchangeably:

- X causes Y
- X is a cause of Y
- X is causally relevant to Y

Causation between variables

Woodward's basic idea (40)

The claim that X causes Y means that for at least some individuals, there is a possible manipulation of some value of X that they possess, which, given other appropriate conditions . . . will change the value of Y or the probability distribution of Y for those individuals.

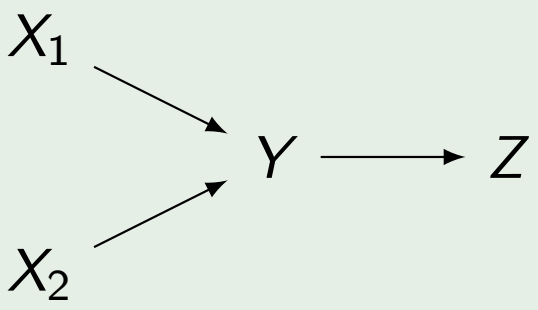
Example

A causes H in this sense if either of these holds:

- A person who has not taken aspirin, and has a headache, would not have a headache if they took aspirin.
- A person who has not taken aspirin, and does not have a headache, would have a headache if they took aspirin.

Causal structures can be represented by a directed graph.

Example



- Vertices represent variables.
- A directed edge (line) from X to Y represents that X causes Y directly (i.e., not via one of the other variables.)

Equations (42–43)

If $X_1, \ldots, X_m$ are all the direct causes of Y then we can write:

$$Y = F(X_1, \ldots, X_m)$$

This is understood as encoding counterfactual information about how Y would change under manipulations of its direct causes.

Example

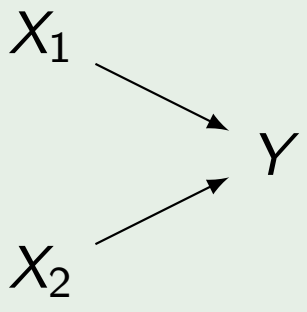
If $Y = 3X_1 + 4X_2$, and we set $X_1 = 2$ and $X_2 = 5$ by manipulations, then Y will take the value 26.

Graphs versus equations (43–44)

Equations give more information than graphs.

Example

The graph



implies that $Y = F(X_1, X_2)$ but does not state the function F.

Interaction between causes (44–45)

Direct causes may act independently.

Example

If $Z = aX + bY$, changing Y by ΔY will change Z by $b\Delta Y$, regardless of the value of X.

Or they may interact with one another.

Example

S = 1 if a short circuit occurs, 0 otherwise.

O = 1 if oxygen is present, 0 otherwise.

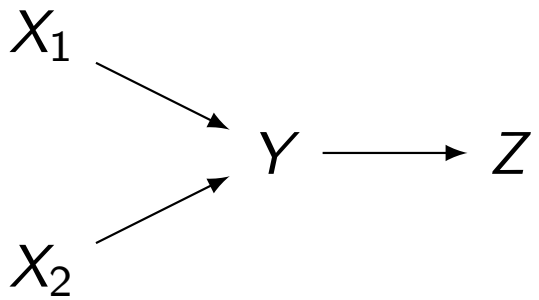
F = 1 if a fire occurs, 0 otherwise.

Assume $F = SO$. Then manipulating S alters F when $O = 1$ but has no effect when $O = 0$.

This difference is not reflected in the graphs, which have the same structure.

Questions

1. What does it mean for a theory of causation to be reductive? Give an example of a reductive theory of causation.
2. Is Woodward's manipulability theory of causation reductive? Explain.
3. Give an example of your own of (a) a token-causal claim, and (b) a type-causal claim.
4. Let S be the variable with values {smokes, does not smoke} and let D be the variable with values {develops lung cancer, does not develop lung cancer}. If S causes D, in Woodward's sense, does it follow that smoking raises the probability of developing lung cancer? Explain.
5. Draw the graph of the causal structure when $Y = X_1X_2 + X_3$.
6. Write equations that give the following causal structure:



Reference


James Woodward.
Making Things Happen.
Oxford University Press, 2003.
Online at Questia.
Numbers in parentheses are page numbers of this book.