

# Causal Diagrams and Moderation

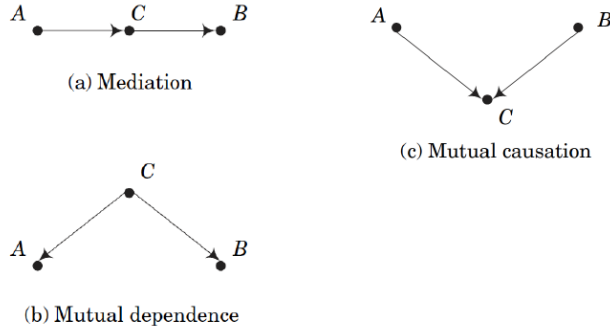
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*Your abstract here, please.*

## I. Causal Diagrams

- Causal diagrams are graphs that can be used to represent causal relationships and therefore describe our qualitative knowledge about a causal mechanism.

### Causal Diagrams



Basic patterns of causal relationships among three variables

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FIGURE 1. CAUSAL DIAGRAMS

With regard to (b) Mutual dependence: C is called a common cause to A and B. A and B are associated, but  $(A \perp B) \mid C$  can hold. A and B have causal relation, when  $E(B \mid A, C) = E(B \mid do(A), C)$ , otherwise.

With regard to (c) Mutual causation: if A and B are correlated, which is conditional on C, then A and B is negative related. A and B have causal relation, when  $E(B \mid A) = E(B \mid do(A))$ . Note that we can't use  $E(B \mid A, C) = E(B \mid do(A), C)$ .

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## II. Moderation

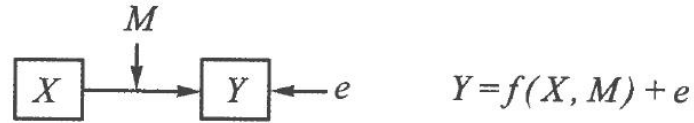


图 1 调节变量示意图

FIGURE 2. MODERATION VARIABLE

Moderation occurs when the relationship between two variables depends on a third variable. The third variable is referred to as the moderator variable or simply the moderator.

We can use the equation to solve:

$$Y = b_0 + b_1x_1 + b_2x_2 + b_3(x_1 * x_2) + \varepsilon$$

## III. References

- 1) Figure1 form Jiaming mao' lectures.
- 2) Figure2 form Wen zhong lin ,et.al ,2005(02):268-274.