

SISMID 2022 / Causal Module / SWIGs
Breakout Questions - adjustment

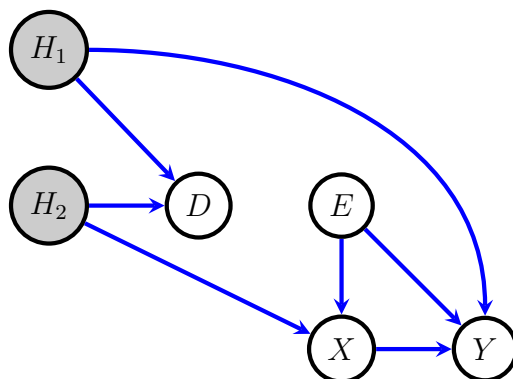


Figure 1: A causal DAG \mathcal{G} ; the shaded variables are unobserved.

Consider the causal DAG \mathcal{G} in Figure 1. Here we wish to estimate the effect of X on Y .

- (a) Construct the SWIG $\mathcal{G}(x)$ *Hint: First ‘split’ the X node into a random part (X) and fixed part (x); then label all vertices that are (strict) descendants of the fixed node as potential outcomes.*

- (b) Is there (marginal) confounding between $Y(x)$ and X ?
Hint: test for d -separation in the SWIG $\mathcal{G}(x)$ conditional on the emptyset $\{\}$.

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- (c) Is there confounding between $Y(x)$ and X given E ?
- (d) Is there confounding between $Y(x)$ and X given $\{D, E\}$?
- (e) Suppose you have access to a dataset consisting of observations on D, E, X, Y for a random sample of units. How would you estimate $\text{ACE}(X \rightarrow Y)$?