

Causal Inference in Air Pollution Epidemiology: Has its time come?

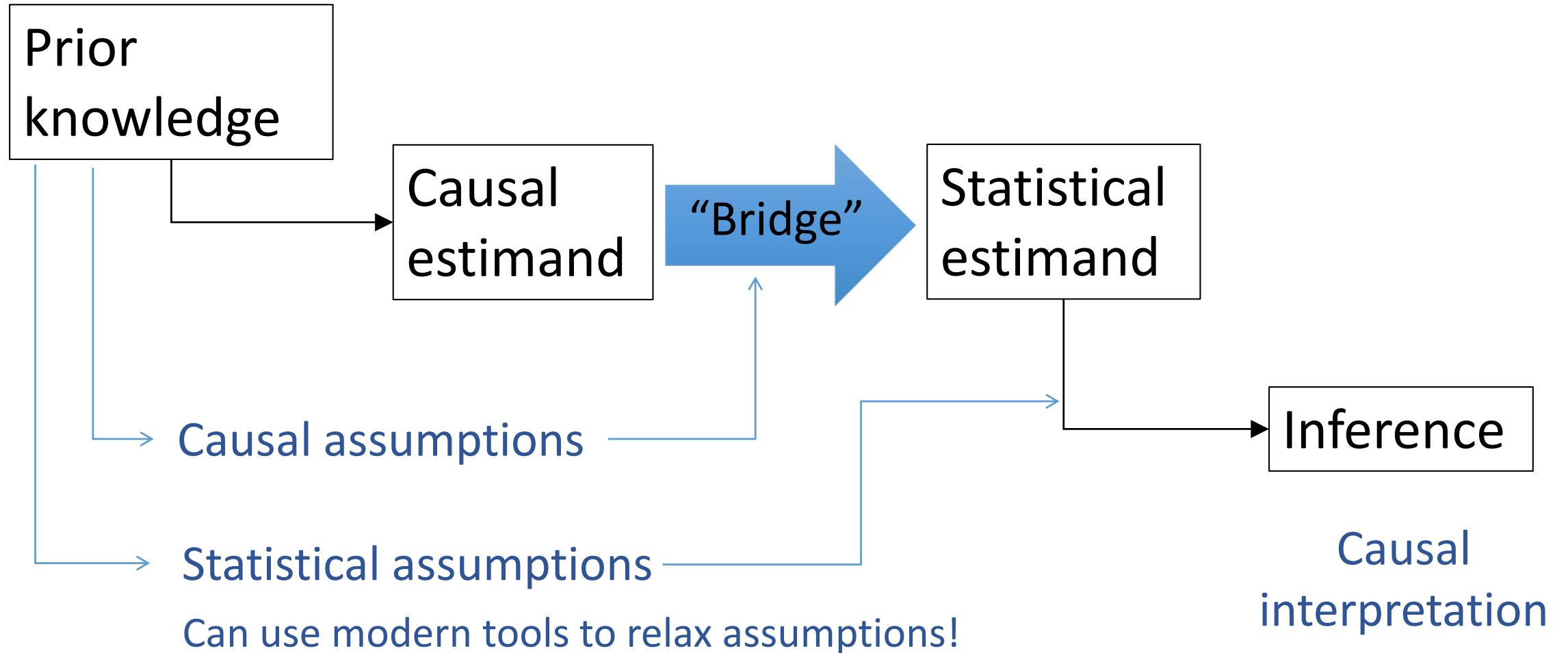


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30,000 foot perspective of causal inference



Key causal assumptions

- Ignorability
 - No unmeasured confounders
- Positivity
 - For every level of the confounding variables, all relevant exposures are represented
- Consistency
 - The potential outcome under the observed exposure history is precisely the observed outcome

Are we ready to use causal inference tools in air pollution epidemiology?

- Maybe yes
 - Causal thinking is useful
 - Helps refine the target quantity of interest
 - Reduces unnecessary statistical assumptions & constraints
 - Helps refine study designs and data requirements
 - Even when causal assumptions aren't met, the resulting statistical estimand may still be more useful than the alternative
 - Estimand derived from non-causal, model-based conditional analyses
- Maybe no
 - Not enough trained experts
 - Causal methods in air pollution epidemiology are in their infancy
 - Air pollution epidemiology is more challenging

Causal inference and environmental policy

- A rationale to delay public health protections?
- How much evidence and what type is needed to act?
 - The Case for Action (Sir Austin Bradford Hill, 1965)