

Chapter 5. Correlation and causation

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Goldberger and Pellagra



The third-variable problem: Goldberger and Pellagra

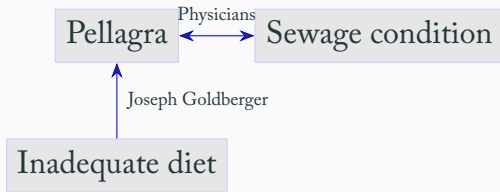
Pellagra

Sewage condition

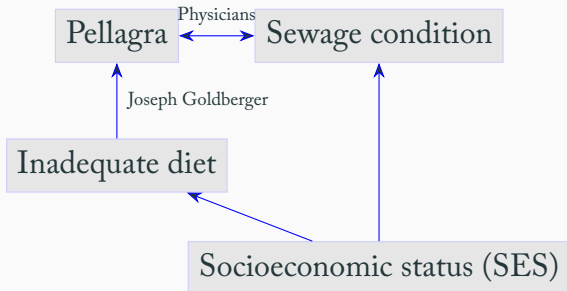
The third-variable problem: Goldberger and Pellagra



The third-variable problem: Goldberger and Pellagra



The third-variable problem: Goldberger and Pellagra



Birth Control by the Toaster

Contraceptive use

Electrical appliances

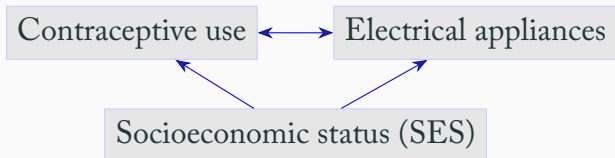
Birth Control by the Toaster

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Electrical appliances

Birth Control by the Toaster



Spurious correlations and the third-variable problem

Spurious correlations and the third-variable problem

- **Spurious correlations** (虚假相关) are correlations that arise not because a causal link exists between the two variables that are measured, but because both variables are related to **a third variable**.

Temperature and crime

Temperature and crime

- **Heat hypothesis:** uncomfortably warm temperatures produce increases in aggressive motives and (sometimes) aggressive behavior.

The directionality problem

The directionality problem

- Eye movement patterns and reading ability.

The directionality problem

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- Self-esteem and Problem behaviors.

The directionality problem

- Eye movement patterns and reading ability.
- Self-esteem and Problem behaviors.
- Altruism and happiness.

Selection Bias

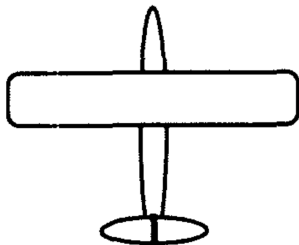
Selection Bias

- **Selection bias** refers to the relationships between certain subject and environmental variables that may arise when people with different biological, behavioral, and psychological characteristics select different types of environments.

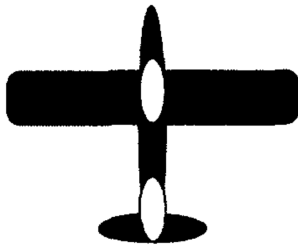
Selection Bias

- **Selection bias** refers to the relationships between certain subject and environmental variables that may arise when people with different biological, behavioral, and psychological characteristics select different types of environments.
- Selection bias creates a spurious correlation between environmental characteristics and behavioral—biological characteristics.

Selection Bias



An outline of a plane



A depiction of a plane with shading indicating where returning planes had been shot.

Selection Bias

Selection Bias

- Arizona has an above-average incidence of deaths due to respiratory illness.

Selection Bias

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- Republicans enjoy sex more than Democrats.

Selection Bias

- Arizona has an above-average incidence of deaths due to respiratory illness.
- Republicans enjoy sex more than Democrats.
- Moderate drinkers have better health outcomes than not only frequent drinkers but also abstainers as well.

Questions?