

# Introduction to Causal Inference

## Chapter I : Introduction

- What is causal?
- Motivation of Causal inference

# Causation or Association?

- Association: Two variables statistically dependent

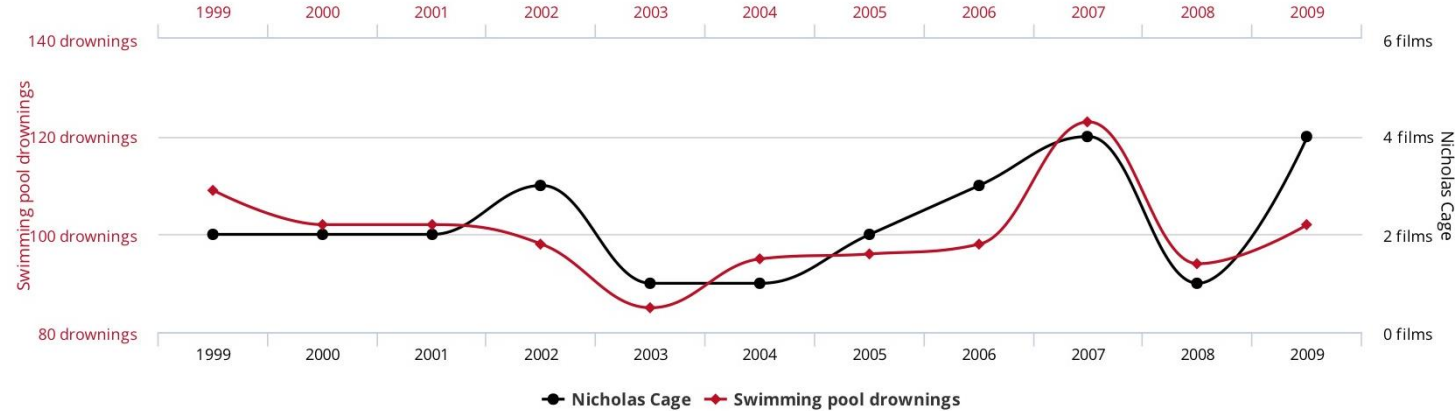
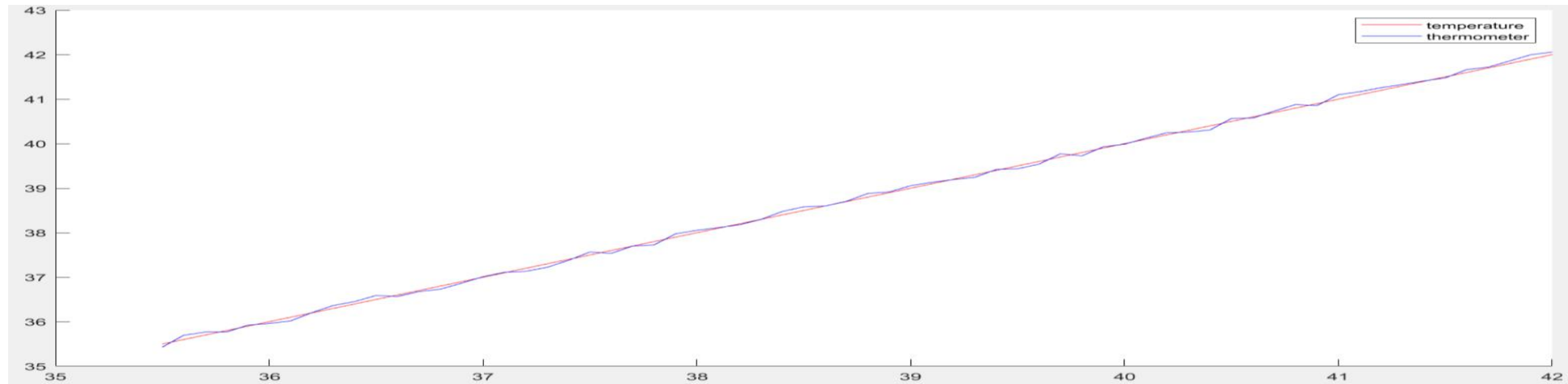
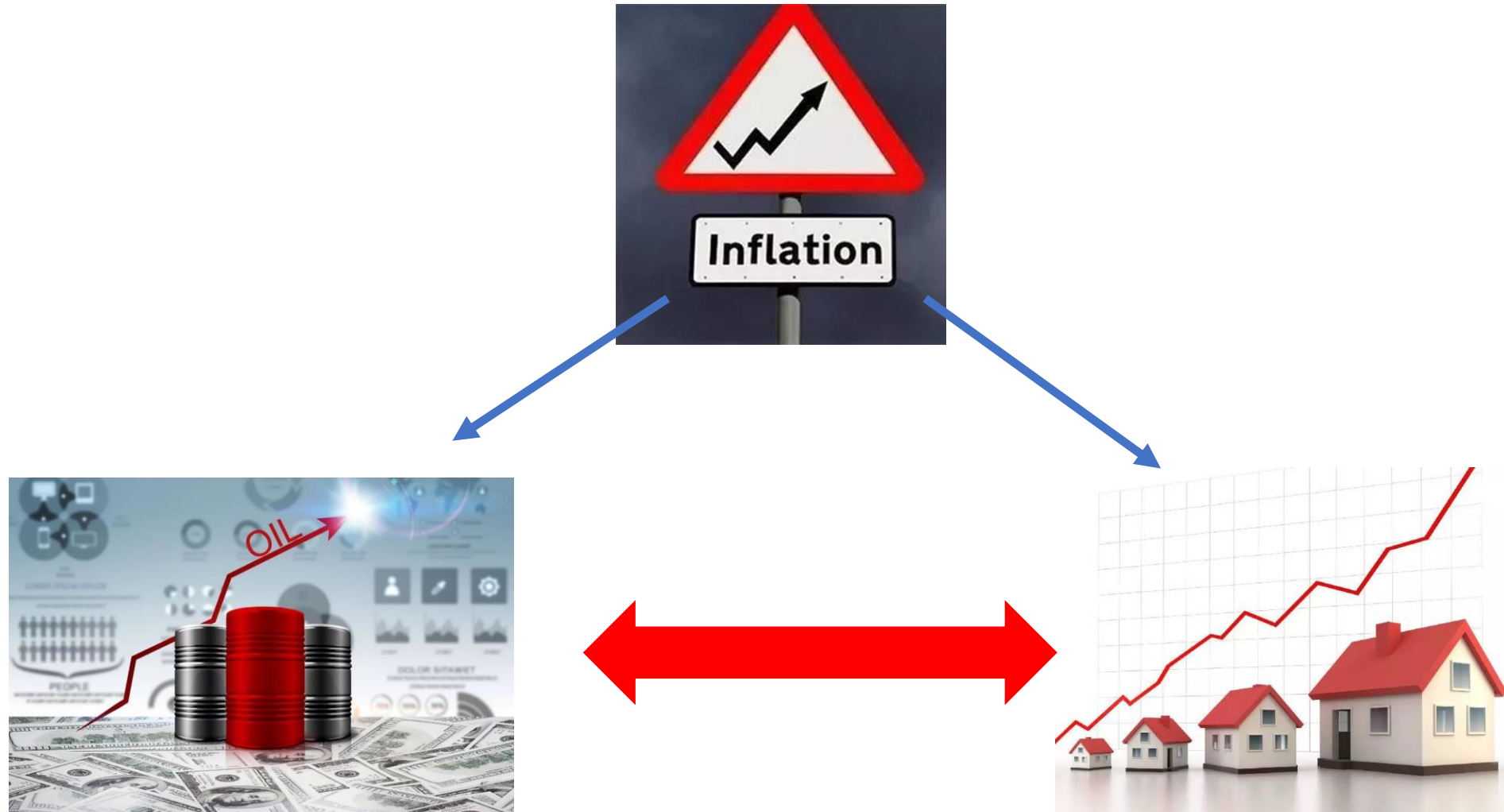


Figure 1.3: The yearly number of movies Nicolas Cage appears in correlates with the yearly number of pool drownings [1].

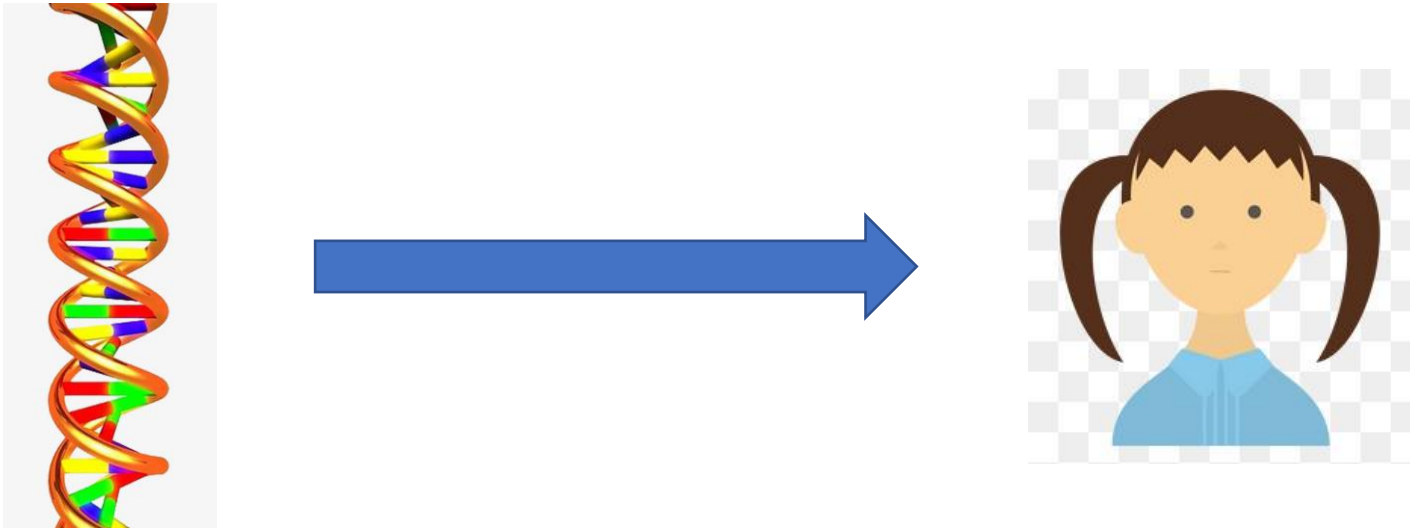
- Causality: The change of dependent variable will lead to the change of independent variable



- Association: Two variables statistically dependent, intervention will have no effect



- Causality: The change of independent variable will lead to the change of dependent variable,
- Intervention on independent variable will cause dependent variable to change; but intervention on dependent variable will not make any sense.



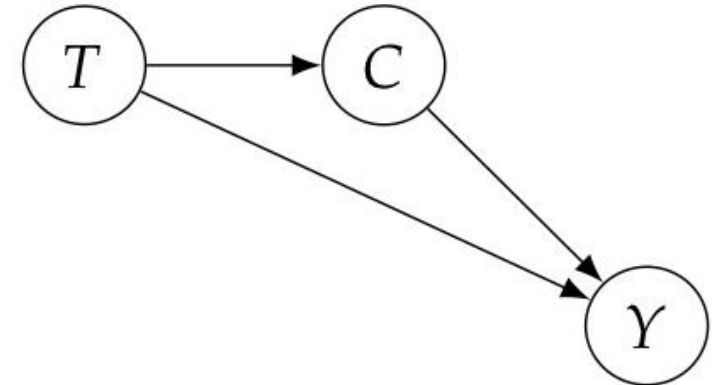
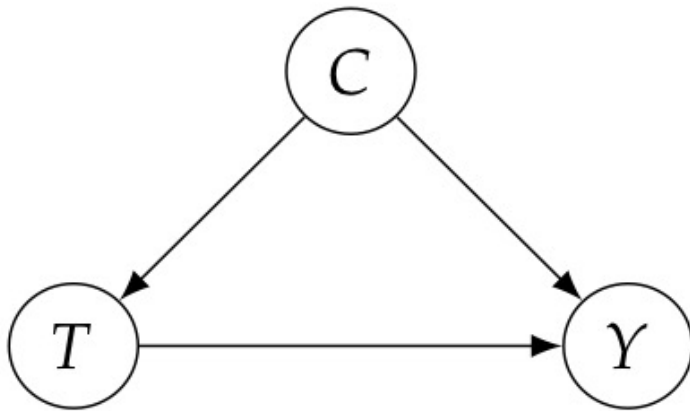
# Why Causal Inference matter?

- Simpson's Paradox

	Mild	Severe	Total
penicillin	15% (210/1400)	30% (30/100)	16% (240/1500)
tetracycline	10% (5/50)	20% (100/500)	19% (105/550)

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T: treatment  
C: condition  
r: result



Causal structure determines our decision