

The background of the slide is a bright blue sky filled with soft, white, fluffy clouds. In the upper left and upper right corners, there are two bright, circular objects that resemble suns or stars, each with a lens flare effect. The overall scene is bright and airy.

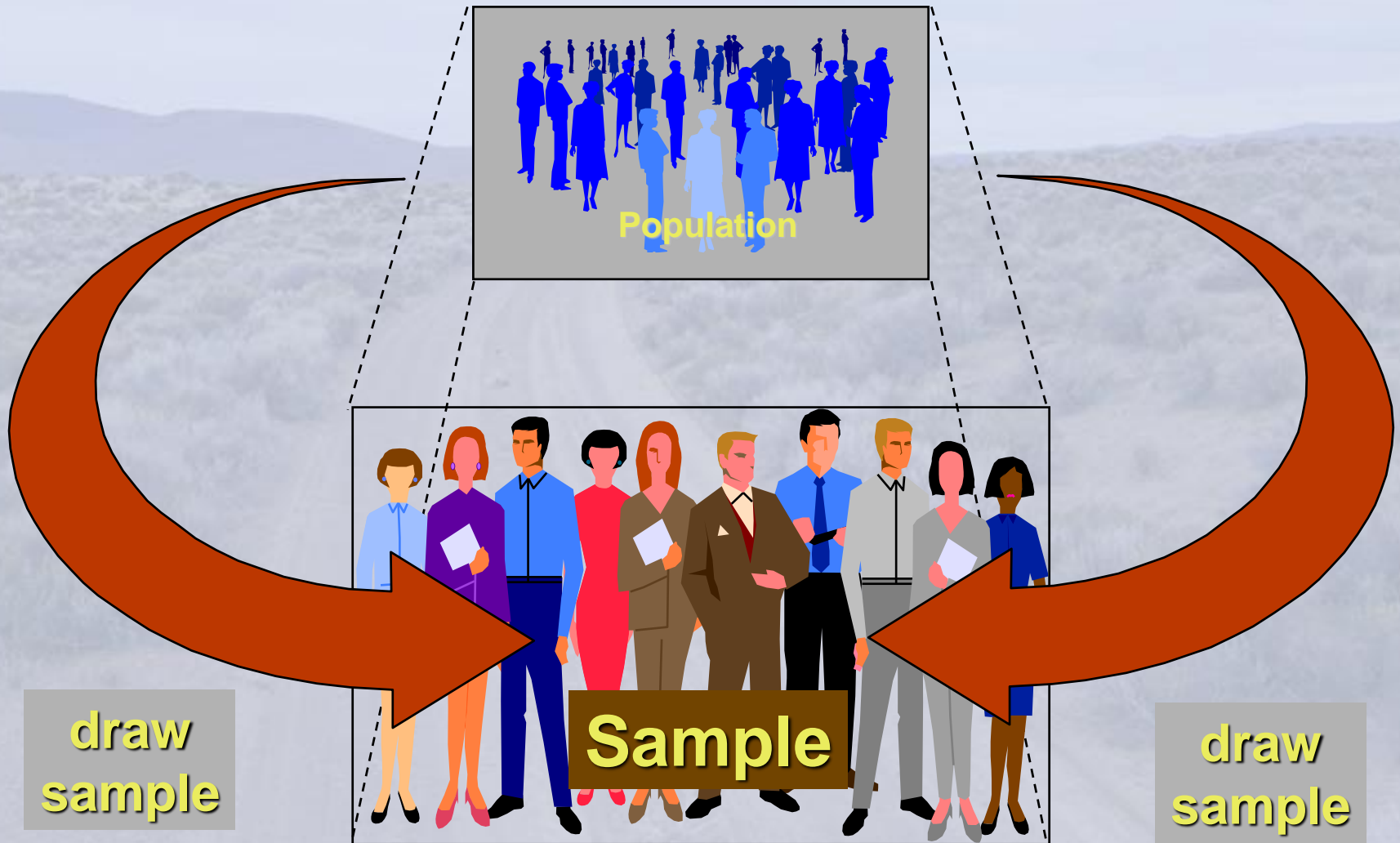
# External Validity

# How Do We Generalize?

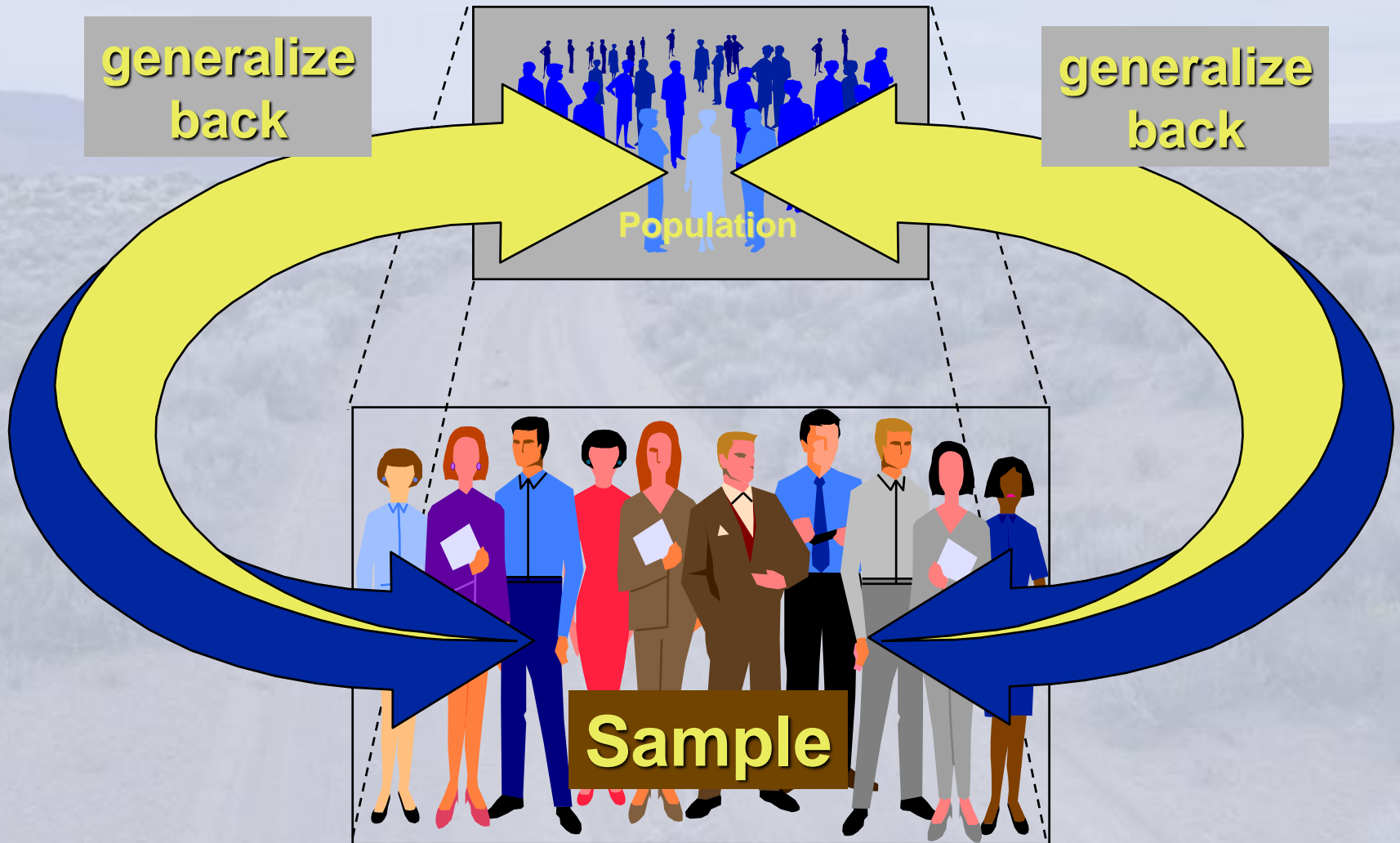
specified persons,  
places , times



# How Do We Generalize?



# How Do We Generalize?



# Threats to External Validity

**Interaction of Selection  
and Treatment**

maybe it is just *these*  
**people**

**Interaction of Setting  
and Treatment**

maybe it is just *these*  
**places** and conditions

**Interaction of History  
and Treatment**

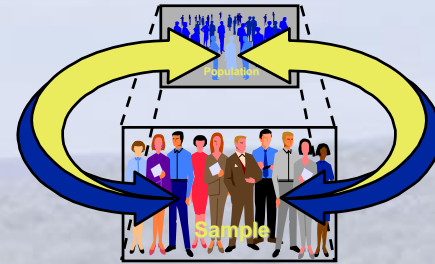
maybe it is just *these*  
**times**

# How Can We Improve External Validity?



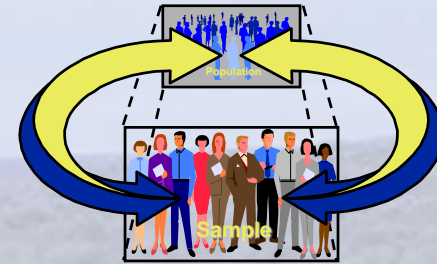
# How Can We Improve External Validity?

random sampling

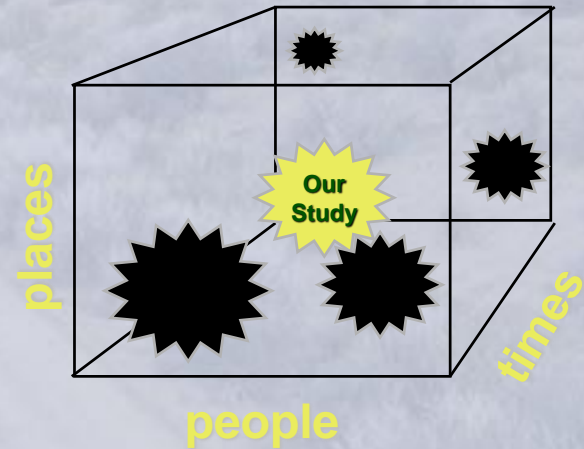


# How Can We Improve External Validity?

random sampling



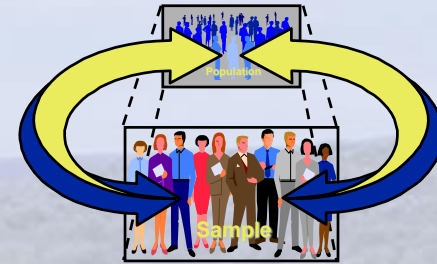
replicate,  
replicate,  
replicate



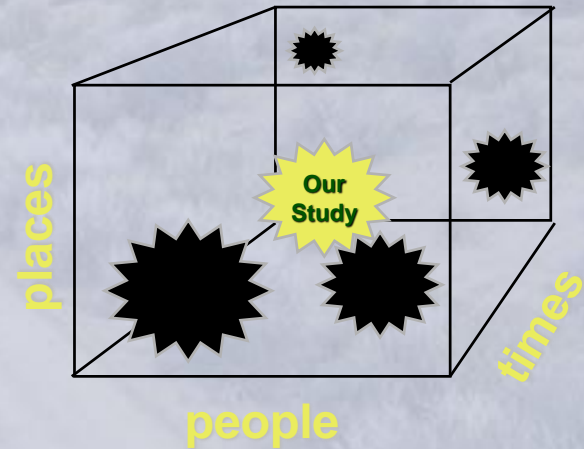


# How Can We Improve External Validity?

random sampling



replicate,  
replicate,  
replicate



use theory





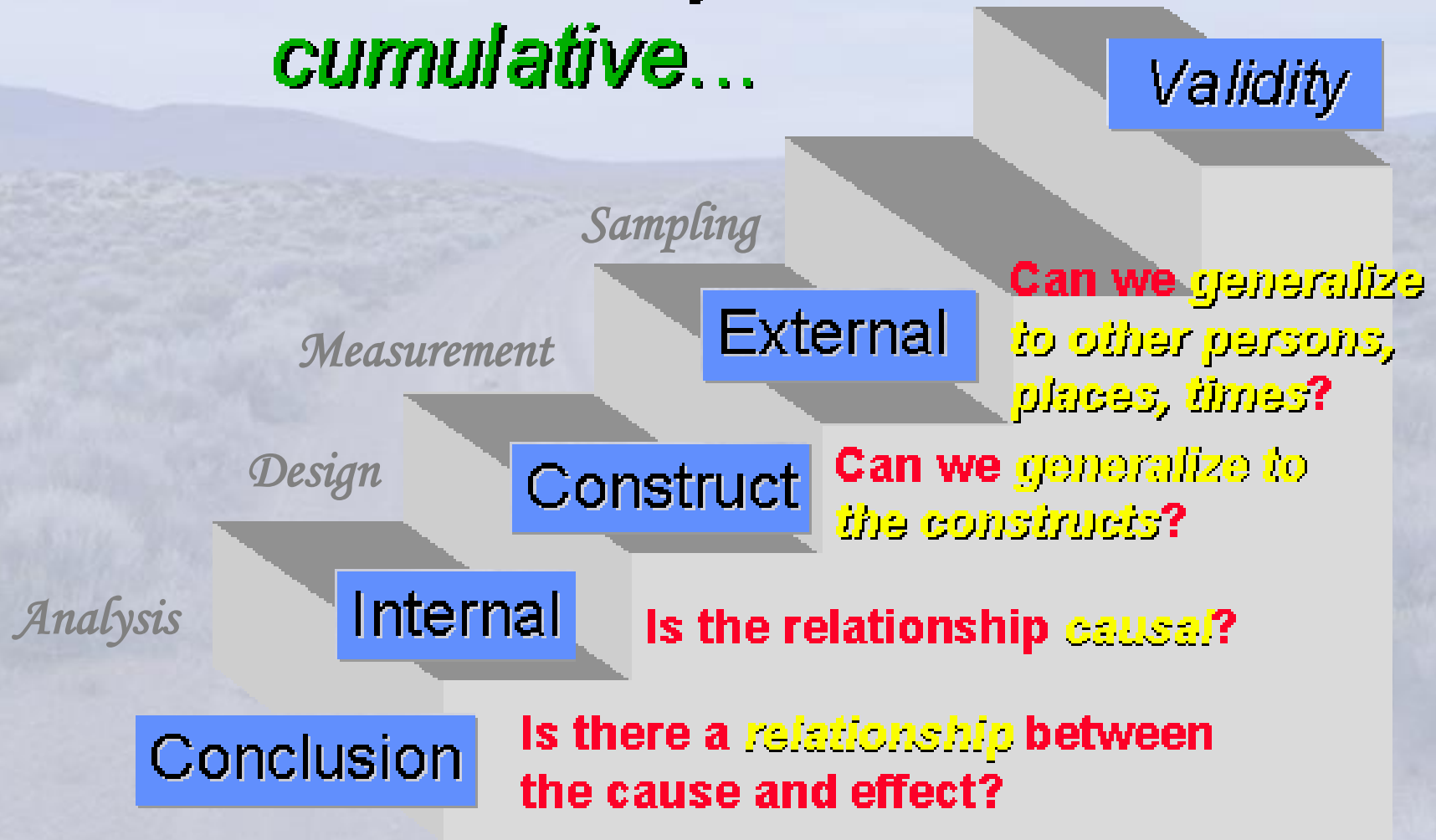
Internal validity

# Validity

- ***Validity: The best available approximation to the truth of a given proposition, inference or conclusion.***

- The first question we have to ask is “validity of what?”

# The Validity Questions are *cumulative*...

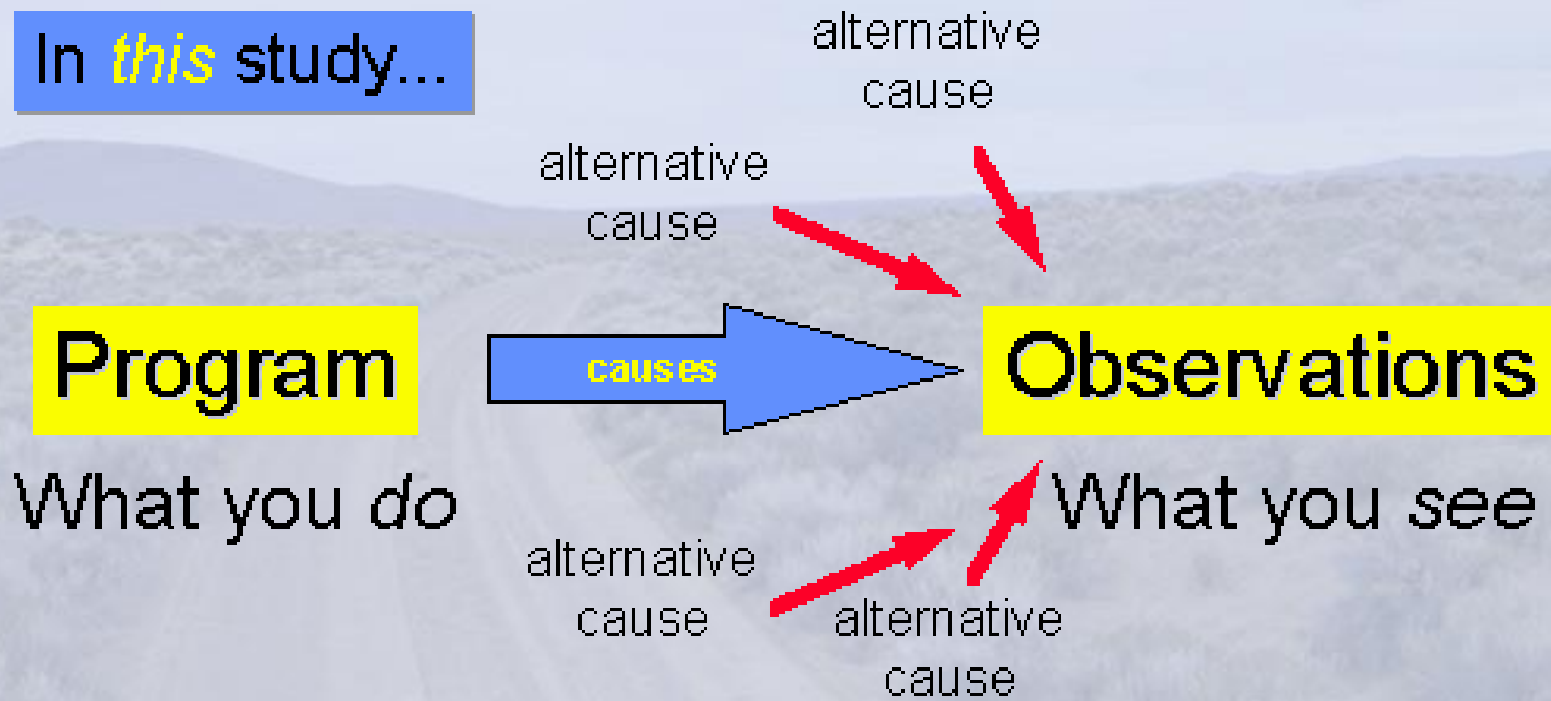


# Internal validity

- Internal validity is the **approximate truth** about inferences regarding cause effect or causal relationships.
- Internal validity is only relevant in studies that try to **establish a causal relationship**. It is not relevant in most observational or descriptive studies.
- For studies that assess the effects of **educational program** or interventions, internal validity is perhaps the primary consideration.

# Internal validity

In *this* study...



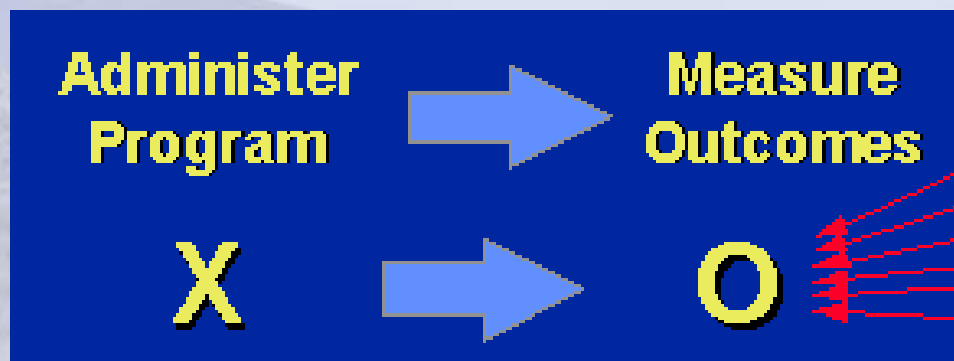
The key question in internal validity is whether observed changes can be attributed to your program or intervention (i.e. cause) and not to other possible causes (alternative explanations)

# Threats to Internal validity

- We divide the threats to validity into three categories:
  - **Single group threats**
  - Multiple group threats
  - Social interaction threats

# Single group threats

## Two Single Group Designs:



## Single Group Threats

history  
maturation  
testing  
instrumentation  
mortality  
regression





# Single group threats

- When you observe a change or gain of outcome from pretest to posttest after implementation of a program, you want to conclude that the outcome is due to your program. How could you be wrong?
  - History threat
  - Maturation threat
  - Testing threat
  - Instrumentation threat
  - Mortality threat
  - Regression threat

# History threat

- It's not your program that caused the outcome, it's something else, some historical event that occurred.

# Maturation threat

- Some outcomes change with time (natural history) even if they had never confronted with your program. All you are doing is measuring normal maturation or growth over time.

# Difference between maturation and history threats

- If we're talking about a specific event or chain of events that could cause the outcome, we call it a history threat.
- If we're talking about all of the events that typically transpire in your life over a period of time (without being specific as to which ones are the active causal agents) we call it a maturation threat.

# Mortality threat

- In mortality threat people in your study are dropping out of the study. This may change the composition of pretest and posttest groups, making comparison of them invalid.

