

Interfacing Processes in Nature with Scientific Operations with Statistical Models

VARIABLES

Intelligence
Aggression
Amount of reward
Success
Highway safety
Memory

ABSTRACT VARIABLES Versus OPERATIONAL DEFINITIONS

Example: Highway Safety

OPERATIONAL DEFINITIONS OF VARIABLES

Example: Abstractly: "Highway Safety improved recently."

That abstract statement can be translated into operational definitions

A) Highway Safety = Total number of crashes in a calendar year recorded in the Utah Crash Summary published by the Utah Department of Public Safety

B) Highway Safety = %Alcohol related deaths

A) & B) are two different...

What might be an operational definition of “improve”?

What might be an operational definition of “recent”?

FINALLY: How might we operationally state the original abstract statement that “highway safety improved recently?”

“The total number of crashes

SCIENTIFIC HYPOTHESES

Scientific Hypothesis: About the relationship between two variables

CAUSAL HYPOTHESES: Changes in one variable (independent variable) cause changes in another variable (dependent variable)

Example:

INDEPENDENT VARIABLE

DEPENDENT VARIABLE

PREDICTIVE HYPOTHESES: Changes in one variable (Predictor Variable) predict changes in the other variable (Criterion Variable or Dependent Variable)

Example

PREDICTOR VARIABLE

CRITERION VARIABLE (Dependent Variable)

CORRELATIONAL HYPOTHESES: Changes in one variable are associated with changes in another variable

No logical difference between...

Example

ONE VARIABLE (Predictor or Dependent)

OTHER VARIABLE (Predictor or Dependent)

Data comes from DV measurement operations

DV's are measurement operations that....

Examples

Blood Pressure

Memory

This operational definition of memory confounds...

DV's are measurement operations

Generate numbers

Statistics process numbers

Statistics don't evaluate...

ABDUCTION

Abduction is the thought process by which...

Example

Computers and ...

Processes in Nature

Measurement Operations

Statistical Models

First Example: Roll 1 Die

Example: Roll one die

Infinite Process in Nature →

FIRST:

Reduce Process to Measurement Operations →

SECOND:

Model DV operations in terms of Probability

SCIENTIFIC
MEASUREMENT
OPERATIONS



RANDOM
VARIABLES



What is a Random Variable?

ABDUCTION OVERVIEW

Roll a die

Process →

Measurement
Operation →

Random
Variable



Second Example: Normal Probability Distribution

Process → DV → RV

Person → Test → Normal Distribution



Warning!

Last example for you to complete on your own:

Define INTELLIGENCE as: “How many uses can you think of for an electric drill in ten seconds?”

CONFOUNDS: *

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