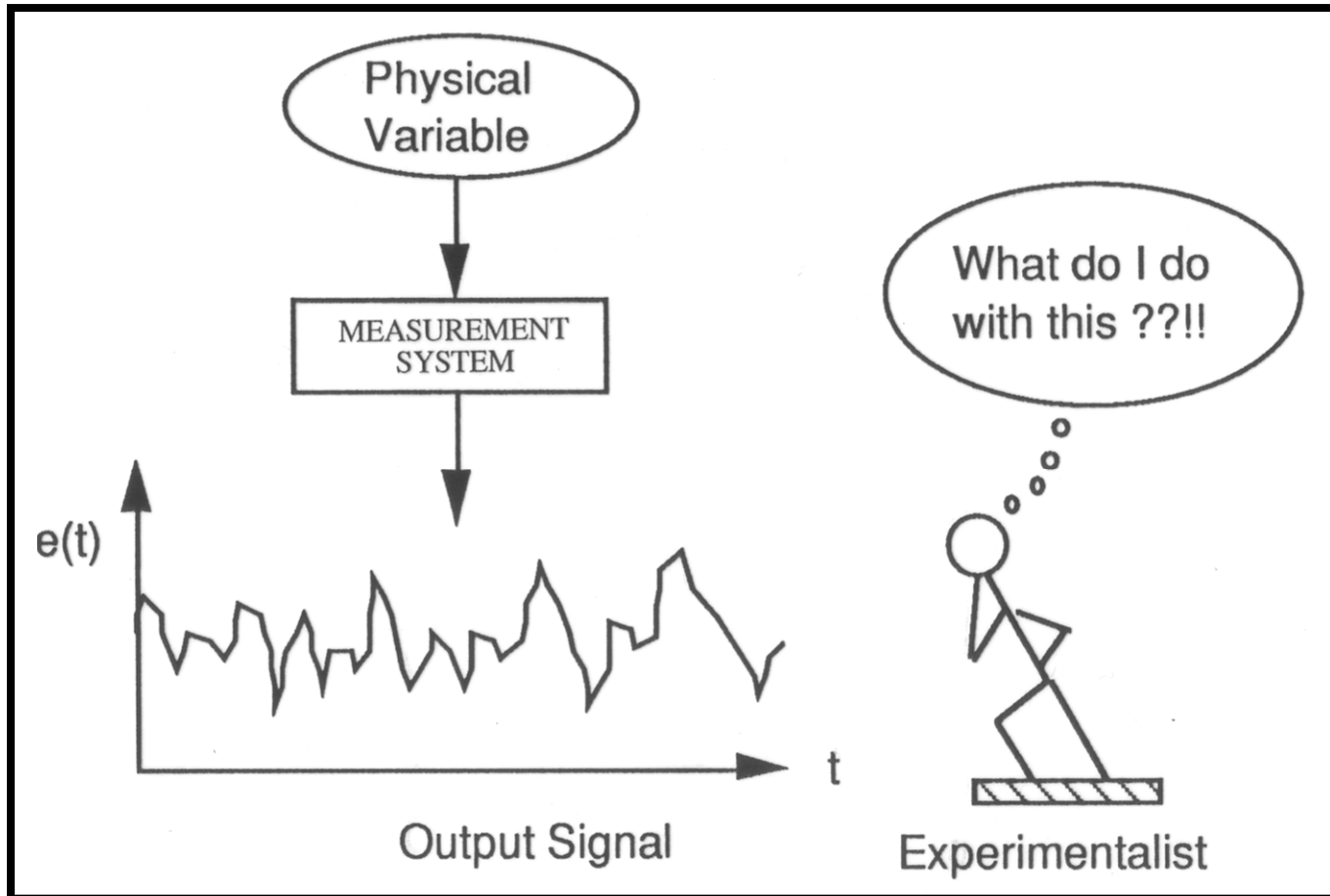
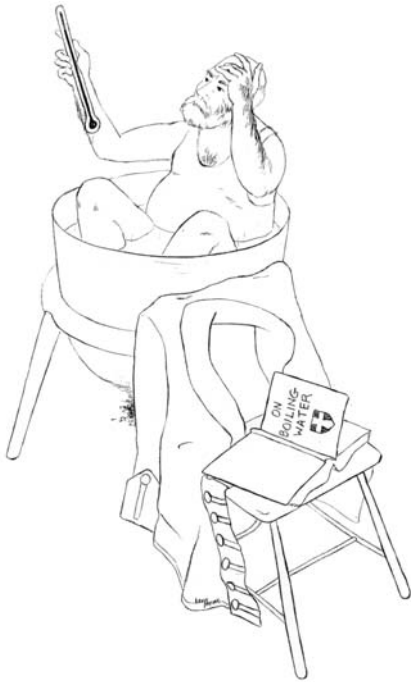


The Experiment



What is an Experiment ?



An experiment is an act in which one *physically and actively intervenes* with the process under investigation and *records* the results.

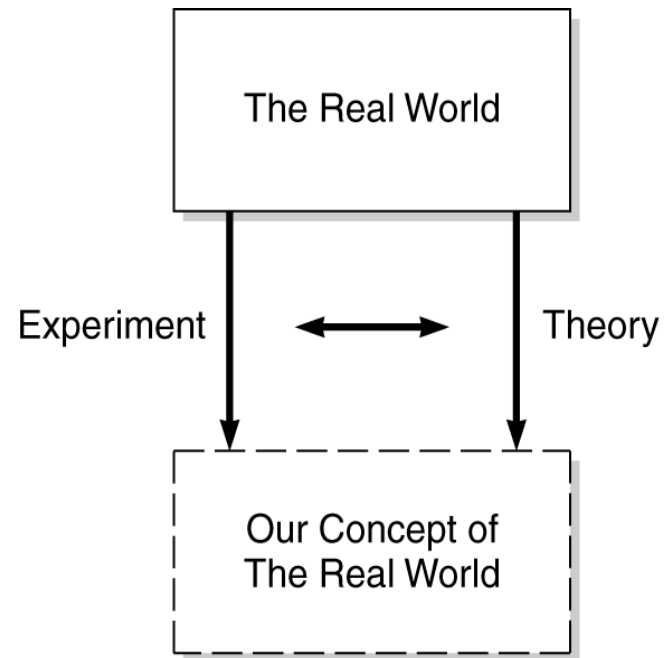
An Experiment ?

- Observing the number of students entering the NW doors of DeBartolo Hall at 9:25 AM on Tuesday
- Recording the number of students entering the NW doors of DeBartolo Hall at 9:25 AM on Tuesday
- Recording the number of students entering the NW doors of DeBartolo Hall at 9:25 AM on Tuesday, when you open, then close one of the doors every minute

The Role Of Experiments

Experiments serve to advance the understanding of our world. This understanding is advanced by both experiment and theory and the constant interplay between them. Experiments help us to:

- Arrive at laws and theories based upon their results (the *inductivistic* role).
- Test the validity of a theory (the *fallabilistic* role).
- Illustrate something in nature (the *conventionalistic* role).



Random selection
(experiment)



Population
parameters

Statistical
inference



Sample
statistics

μ (true mean)

(sample mean) \bar{x}

σ^2 (true variance)

(sample variance) s_x^2

Classification of Experiments

Experiments can be classified according to their purpose as:

- variational
- validational
- pedagogical
- explorational

In-Class Example

- Classify each of the following experiments:
 1. Determining the stress versus strain relation of a new bio-material
 2. The cloning of the first sheep 'Dolly'
 3. Measuring the acceleration of a swinging pendulum and comparing the results with theory
 4. Using theory and acceleration measurements to determine the mass of a weight attached to the bottom of the pendulum

Experimental Variables

A *variable* is a physical quantity of a process that can affect the outcome of the experiment. Variables are classified as:

- Independent:
- Dependent:
- Parameter:
- Measureand: