# Science as Pursuit of Knowledge

## Convergent vs Divergent Science

### Meaning of the word “Analysis” vs “Investigation”

## Hypothesis Generation

### Importance of Disprovability

### Importance of Prediction

### Prediction vs Predilection

## What is a valuable scientific question?

# Science as Tool to Discover Truth

## Philosophy of Science

### Value of Observation and Senses

### Manifest Truth

### Truth Beyond the Senses: Plato’s Allegory of the Cave

## Authority as source of knowledge

### Effects of Authority on Science

### Where authority is present (all-parts of Scientific Method)

## Convergent vs Divergent Science

## The Scientific Method

## Fallacies with Science as method of learning truth

## Implications of Reducing the Dimensions of a Problem

# What is An Experiment?

## Importance of Establishing Causality

### Correlation vs Causality

## Independent vs Dependent Variables

# Types of Experiments

## Addition Experiments (0A)

## Deficit Experiments (A0)

## Result-Reversed (ABA)

## Latin Square (ABCBACCAB…)

# Validity

## Internal Validity

## External Validity

# Reliability

## Test-Retest Reliability

## Inter-Score Reliability

# Measurements

## Measurement Scales

## Measurement Ranges

## Measurement Error

### Precision (Noise)

### Accuracy (Bias, Artifact)

## Interpreitng Variables: Finding Meaning in Measures

### Meaning of the word Analysis

## Sources of Variance

### Homogenous vs Heterogeneious popultations

# Getting Good Results

## Controls

### Placebo Effect

## Bias

### Experimenter Bias

#### Blinding in Experiments

### Selection Bias

### Reporter Bias

### Proper Rejection Criteria for Data

## Repeatinig Experiments

## Result Representability (Danger of Averaging)

# Interpreting Your Results

## Confounds

## Bayesian Thinking: Explicit Inclusion of Priors

# Experiment Design

### Selecting an appropriate precision level

### Sample Size

### What Power level will our audience care about?

### Power analysis, pre-experimental

## Prediction vs Predilection

### Retrodiction

## Standard Types of Experiments and their pros and cons

### Deficit Experiment

### Protocol Experiments

## Samples vs Populations

### Descriptive and Inferential Statistics

#### Why do statistics?

### Selecting a proper sample size

#### Pre-Hoc Power Analyses

# Interpreting Results

## Bias

### Double-Bind Experiments

## Placebo Effect

## Data Transformation: Normalizaytion and Rescaling

## Explicit Inclusion of Priors: Bayesian Thinking

## False Positives

## Confounds

## Dangers of Historical Data

### Confounds

### Clumping

### Circular Reasoning

## Why do statistics?

## The normal curve: Why is it so common?