

EXPERIMENTAL DESIGN AND ANALYSIS 2017
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IMPORTANT NOTATION:

X_i = refers to any values. The i refers to the number of the value.

- So if 27 is the 10th score this would be notated as= X_{10}

\sum = 'the sum of'

$\sum X_i$ = the sum of all the values in the sample.

- E.g. 21, 27, 34, 34, 39 would be $\sum X_i = \sum (21+27+34+34+39)=$

$\sum X_i^2$ = square each of the values in the sample and then sum them

- E.g. with the numbers above $\sum X_i^2 = \sum (21^2 + 27^2 + 34^2 + 34^2 + 39^2)$

$(\sum X_i)^2$ = sum each of the values and then square the result

N= number of scores

\bar{X} = sample mean

μ = population mean

S^2 = Sample variance

σ^2 = Population variance

S = sample standard deviation

σ = Population standard deviation

CV = coefficient of variation

$\sigma_{\bar{x}}$ = Standard Error of Mean (SEM)

df= degrees of freedom

α =probability of Type 1 error

β = probability of Type 2 error

k= number of samples

\bar{d} = average of the difference scores (in dependent-samples t-test)

d= cohen's d- measure of the effect size

Z-value= value from one-sample test (when we know population SD)

t-value= value from one-sample t-test (when we don't know population SD)

U-value= Mann-whitney U test

F-value= value for one-way between anova

H-value= Kruskal-wallis one-way anova (parametric equivalent between anova)

F-score= value for parametric one-way within anova

MS_{bet} = mean square between

MS_{error} = mean square error

SS_{total} = sum of squares total

SS_{bet} = sum of squares between

SS_{error} = sum of squares error

TOPIC 1: THE SCIENTIFIC METHOD IN PSYCHOLOGY

- The basis of Psychology is to determine reasons behind human behaviour
- This is achieved by using methods by more traditional sciences such as: physics, to understand behaviour.
- 'Science' involves establishing relationships between an event and a set of preceding circumstances
- **The scientific method involves:**
 - I. Objectivity- not letting biases affect your interpretation of a finding
 - II. Confirmation of findings – (e.g., replication- repeating a study should achieve the same outcome)
 - III. Self-correction –(ability to alter conclusions- must be able to adapt and alter conclusion if another study showing a different outcome comes out)
 - IV. Control
- **The experimental method:** when we suspect a relationship between events, we attempt to examine such a relationship by **manipulating the preceding circumstances**, and **observing the change in the final event.**
 - In the scientific method, we examine all possible preceding circumstances involved, while in the experimental method we take one or a few of the circumstances involved and concentrate on them.
- **A 'cause and effect' relationship=** control one circumstance and watch how this affects an outcome.
- A **variable** is a quality which can take on many different values. These data values are quantitative (put numbers to the different states of the variable).
 - Variables can be:
 - I. **Independent:** These are the presumed 'circumstances' manipulated to observe the effect on behaviour. These are 'independent' of behaviour.
 - II. **Dependent:** This is the behaviour of the participant or the outcome/event we observe. These variables are affected by the independent variable.
- The **hypothesis** is a statement of the relationship between the dependent and independent variable.
 - E.g. 'as you get older, you grow taller!'- this is a hypothesis where age is the independent variable and height is the dependent variable. Height is dependent on weight.
- In an **experiment** we are only testing the relationship between the dependent and independent variable. All other circumstances are controlled.
 - Variables could be health of participants, occupation of participants, background of participants.
 - If they affect the results, then they are **extraneous variables**.

- What makes Psychology a 'difficult' science to practice?
 1. The many possible circumstances concurrent to, or preceding a behaviour
 2. The differences inherent in an individual-
 - A form of '**preceding circumstance**' which mean no two people act in the same way.
 - If you only used one person in the experiment, you would not be able to trust the finding.
 - This is WHY data is collected from many participants.

