PSYC210 Lecture Notes

Rules:
Principles of good design to set-up for data collection. *Research Methods

Tools:
Summarizing and describing data collected. *Research Methods

Theory:
Maths behind the rules and tools. *Statistics

Philosophy/Psychology

Early study of human behavior carried out within the framework of philosophy.

- Philosophy: Nature and origin of knowledge, memory and thought (Aristotle Plato).

Through philosophy the mind is looked as different to the body, the mind is looked at as soul.
Why can the mind study the mind?

The mind through philosophy such as *Structuralism* (Wilhelm Wundt, 1879) discusses that mental events can be broken down into their components.

William James (1980): "Psychology is the science of mental life, both of its phenomena and their conditions".

The Scientific Method

The **scientific method** consists of certain *assumptions*, *goals* and *procedures* for creating and answering questions. (Heiman, 1995)

Simple assumption - order to the universe, what happened in a has caused event b to happen. chain of events, event a leads to event b. Generally things are happening as a cause of nature (causation), correlation means events have occurred but have no relation.
Over-riding goal - to understand and explain behavior.

Four Goals of Science:

- Description: What happened? What exactly did happen in that particular behavior?
  - Psychology: describe a behavior and the conditions under which it occurred. Different levels of description (neuro, social, developmental, environmental, etc.)

- Explanation: Why did that behavior occur?
  - Psychology: finding out the causes of behavior. Describe certain behavior than find the explanation behind it.

- Prediction: What will happen next?
  - Psychology: our ability to predict behavior will only be as good as our ability to explain. "Under these certain conditions we will predict such and such to happen" Prediction allows us to test our explanation. Prediction is only as good as the explanation its based on. mAnd

- Control: How to make it happen?

Factorial Design:

Main Effects - The effects of one IV on the DV, ignoring other IV(s) in the study. Focus on one independent variable and its impact on the dependent variable. There is a main effect for each IV present in the experiment.
Interaction Effects - The effects of one IV on the DV, taking into account the other IV(s) in the study. There is an interaction for every combination of IV's. Look at the relationship between one factor and the DV and see how it changes as the levels of the other factor(s) change.

Chaiken & Pliner Main Effects example:
Factorial matrix showing mean perceived concern about appearance.

Meal Size

Gender	Small (B1)	Large (B2)
Male (A1)	3.12	3.17
Female (A2)	3.56	2.65

Does gender have an effect on perceived concern about appearance?

- We ignore the other IV and average across the different levels of Meal Size.

Male: $\frac{3.12 + 3.17}{2} = 3.15$

Difference = 0.04 (Difference not significant).

Female: $\frac{3.56 + 2.65}{2} = 3.11$

***It is important to interpret interactions *before* main effects.

In line graphs:

- If the lines *diverge* or *intersect*, then there is an *interaction*.
- If the lines are parallel, then there is no interaction so there will be no need for a statistical test. Main effects may or may not be present.

Summary:

In a 2-factor experiment there are 3 sources of variability:

- 2 main effects (1 for each independent variable).
- 1 interaction effect.

In general, interaction and main effects are not dependent on each other in any way. Just because you have a couple of main effects does not mean you will have an interaction. i.e. can have no main effects or interaction, any one, any two or all three.

- Of course, need to do statistical tests to determine whether the observed effects are *statistically significant*. Have to test whether the differences are due to the manipulation of variables and are not random (there can always be participant variability to cause randomness). Observed differences need to be statistically significant.

Descriptive Statistics: Frequency Distributions

- Frequency Distributions - class intervals
- Data curves

- May have to do easy math equations.
- Detail of experiments we've studied.

Z gives you any point from the mean to the continuum. Because normal distribution, one side is half the distribution and 0.05 are in one half of the distribution.

Inferential Statistics: Hypothesis Testing

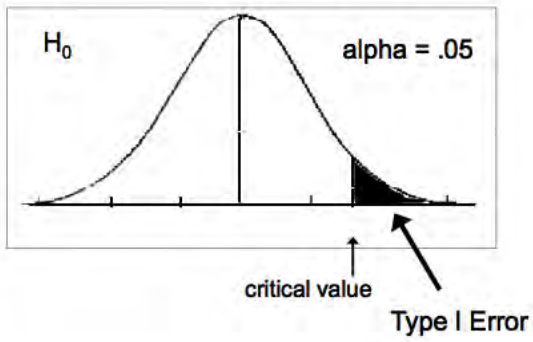
Decision Errors
- Type I Errors
- Type II Errors
- Minimizing Type II Errors

Decision Errors
Hypothesis testing
    - Educated guesses, logic underpinning guesses.
    - Any mean that falls within this area, we are going to reject the null hypothesis.
    - Statistical inferences is all about making guesses, then we determine if these guesses are correct or not.
- Guesses can be wrong. Decision Errors.

State of the World

Decision	H_0 true	H_0 false
Reject H_0		
Retain H_0		

Back to Alpha…
E.g. alpha = 0.05



    - Where? Who with?
    - How often? How much?
- Ideal night out?
- Women's drinking?
- Behavior while drinking?
- Drinking culture in New Zealand?

Analysis:

Discourse analysis will be applied:

- How meanings are reproduced in talk.
- Particularly attuned to inducing how:
  Talk about drinking ideas about gender.
- Transcribed, read twice and listened to again and then started the detailed analysis.
- Focus on talk about gender (particularly inconsistencies).

Discussion:

Last night, did you:

- Have an alcoholic drink?
- Have a pink cocktail?
- Have a glass of wine?
- Have a special beer for ladies?
- Have more than two pints (women) or three pints (men)?

Is this typical for people of your gender?

Results:

Discourse 1: How much?!
Discourse 2: Why do they drink?
Discourse 3: What do they drink?
Discourse 3: Gender equality explains women drinking.
Discourse 4: Seeing women drinkers as 'inappropriate'.
Discourse 5: Seeing women drinkers as 'vulnerable'.

Critique:

Limitations:

- Having eight groups not a limitation - typical and appropriate.
- Friendship groups bring complex relationships.
- Were participants holding anything back? Or bragging?

Conclusions:

- Important findings even if people were exaggerating how much they drink.
- Qualitative research = no counting of who says what.
- Provides insights into ways alcohol is used to actively perform gender and construct women drinkers as 'vulnerable'.

Function of Discourses

- Discourses are shared versions of 'how things are'
- Change is possible because discourses are shared ideas.
- Discourses can be resisted:
    - Protests
    - Activism
    - Volunteering
    - Comedy

Focus Groups: Pros and Cons

Cons:

- Pre-existing friends can lead to assumptions and tensions

- O (occipital)

How do we map EEG activity to functional behavior?

1. We can measure 'power' or energy within a frequency range, e.g., alpha range (8-13 Hz - attention to action). This uses the frequency domain.
2. We can also measure event-related potentials (ERPs) to a specific stimulus (averaged across many different trials). We have lost the frequency domain using this. This does a whole bunch of trials under a certain condition, because there is lots of frequency variance in behavior, then average all trials and find a known signal.

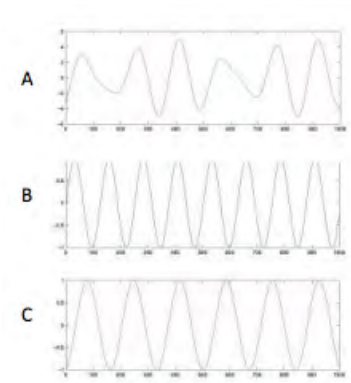
An experiment on action imagination:

- Ongoing experiment based on Pfurtscheller et. al. (2006) article.
- We aim to identify EEG patterns associated with different types of action imagination.
- Participants imagines moving left, right, tongue and both feet.
- *(When studying decide on a mental tag to represent this study).*

- In cognitive neuroscience, we often compare the differences in brain activity recorded under different conditions.
- To isolate EEG activity specific to action imagination, we compare power before and after action imagination.
- Changes in power show up as red and blue. One color indicates a power increase from baseline (often called event-related synchronization: ERS), and the other, a power decrease (event-related desynchronization: ERD).

Here is how the process works…

- EEG power is estimated using a mathematical procedure that decomposes an EEG trace into its components.
  - Trace A is made up of Trace B and C. Using formula, we can decompose (separate) the different components. These tell us something about attention, so we make an experiment to analyze this attention.
  - In our experiments, we are less interested in the original EEG trace (e.g., A). The focus is on its components in the alpha (8-12Hz) and beta (13-30Hz) ranges.



Discerning patterns and relationships in EEG activity helps us to understand brain function.

- The aim is to get an impression of what types of data you might obtain, and how those data appear in single subject figures.

Attention: processing of more important (relevant) things at the expense of less important things.

Some people are actually born without a corpus callosum.

Split hemispheres - separate visual information and separate spatial processes (at least for simple movements).

In testing and analysis, it is important to consider the possibility of Speed-accuracy trade-offs (example of JW above). The first step of data analysis is to look at what we've got, run descriptive statistics and make sure those who are fast are actually accurate also.

Speed-accuracy trade-off: as performance gets faster, accuracy decreases (and vice versa - as performance is slower, accuracy increases).

When doing these experiments it is important to emphasize speed of responding on tasks such as reaction time. If you emphasize accuracy there will be a lot of variability in results.

Developing new experiments.

Colostomy: Surgical disconnection of corpus callosum.
Commissurotomy: surgical disconnection of corpus callosum + anterior and posterior commissures.

History of split-brain:
Akelaitis, and von Wagenen (1942)

- Reported no observable cognitive effects
- Observations did not use experimentally-controlled procedures.

- Auditory input is bilateral (80 - contralateral, 20 - ipsilateral)
- Well-learned actions are typically viewed in terms of *automaticity*: performance of a skill that has been practiced repeatedly with little or no direct attention.
- Neural codes for well-learned actions can be retrieved automatically, even after split-brain. This process must have *subcortical* involvement, given that the two hemispheres are separated.

Attention: processing of more important (relevant) things at the expense of less important things.

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Using theory to guide development of experiments:

Theory: a plausible, or scientifically accepted, principle to explain a phenomenon.

Fitts' Law: movement time is dependent on both the distance to the target, and the size of the target.

- $MT = a + b \log_2 ID$