Psychology 2
PRACTICAL COURSE HANDBOOK
2009/2010

Psychology 2 Course Organiser
Dr Sarah MacPherson

Your Practical Session, Day & Time:

Your Tutor Name:

Tutor contact:
# Psychology 2 Practical Course Timetable

## Semester 1

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<th>Tutorial Topic</th>
<th>Textbook</th>
<th>Coursework</th>
<th>Deadline</th>
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<tr>
<td>1</td>
<td>21/09/2009</td>
<td>Introduction</td>
<td>No Tutorial</td>
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<tr>
<td>2</td>
<td>28/09/2009</td>
<td>Basic Statistical Concepts</td>
<td>Manipulating and Editing Data</td>
<td>Chapters 2 &amp; 3</td>
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<td>3</td>
<td>05/10/2009</td>
<td>Correlations</td>
<td>Exploring Data and Charts</td>
<td>Chapters 4 &amp; 5</td>
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<td>4</td>
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<td>No Tutorial</td>
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<td>5</td>
<td>19/10/2009</td>
<td>One-way Analysis of Variance (ANOVA)</td>
<td>Parametric 2-group Comparisons</td>
<td>Chapter 6 (pp. 175-190)</td>
<td>Draft Introduction &amp; Methods Submission</td>
<td>Practical Time Monday 2pm, Tuesday 2pm, Wednesday 10am or Wednesday 2pm</td>
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<td>6</td>
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<td>7</td>
<td>02/11/2009</td>
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<td>09/11/2009</td>
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<td>Draft Results &amp; Discussion Submission</td>
<td>Practical Time Monday 2pm, Tuesday 2pm, Wednesday 10am or Wednesday 2pm</td>
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<td>9</td>
<td>16/11/2009</td>
<td>One-way ANOVA</td>
<td>Chapter 7 (pp. 207-247)</td>
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## Semester 2

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<th>Tutorial Topic</th>
<th>Textbook</th>
<th>Coursework</th>
<th>Deadline</th>
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<tr>
<td>1</td>
<td>11/01/2010</td>
<td>Non-parametric 2-group Comparisons</td>
<td>No Tutorial</td>
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<td>2</td>
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<td>Non-parametric 2-group Comparisons</td>
<td>Chapter 6 (pp. 191-204)</td>
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<td>3</td>
<td>25/01/2010</td>
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<td>Two-way ANOVA</td>
<td>Chapter 8</td>
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<td>08/02/2010</td>
<td>Experimental Design</td>
<td>Two-way ANOVA continued</td>
<td>Chapter 9</td>
<td>Draft Introduction &amp; Methods Submission</td>
<td>Practical Time Monday 2pm, Tuesday 2pm, Wednesday 10am or Wednesday 2pm</td>
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<td>6</td>
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<td>8</td>
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<td>Chapter 10</td>
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<td>Chapter 11 (pp. 408-425)</td>
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<td>11</td>
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<td>Final Report Submission</td>
<td>Monday 22/03/2010 at 2pm</td>
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Introduction to the Course

1. Course Objectives

The Psychology 2 Practical Course is an independent component from the Psychology 2 Lecture Course. The Practical Course is designed to train you in the practical skills of doing Psychology. Its objectives are to help you:

- Understand how psychological theories and concepts are developed from experimental research
- Understand how psychologists design experimental studies and collect quantitative data
- Understand how statistical models and techniques help psychologists summarise data and evaluate results from experimental studies
- Develop your ability to critically assess psychological journal articles
- Develop your ability to interpret statistical information in general, and specifically how to evaluate inferences and conclusions present in psychological literature
- Develop your ability to write about psychological topics and to accurately report an experimental study.

2. Course Outline

The Psychology 2 Practical Course is developed across both semesters. Practical sessions will be divided into a one hour large-group session (tutorial) followed by two hours in which you will carry out experiments and/or analyse data on the computers in the practical cubicles. The course follows an incremental structure: each tutorial and practical class builds on the previous one. Therefore, it is very important that you do not miss tutorials and practical sessions during the course of the year.

3. This handbook and further reading material

This handbook is only intended as a guide and is only the starting point of your learning process. In order for you to be able to reach any of the course objectives set out above, you will need to read further appropriate material for the practical course in the same way that you need to do appropriate reading beyond lecture notes.
Reading the recommended book chapters or journal papers will provide you with the minimal information that you will need for each of the research tasks that comprise the course. However, you are expected to go beyond these initial recommended readings and independently select adequate literature as the course develops.

4. Practical Course Requirements

4.1 Practical Course Attendance

These are the Psychology 2 Practical Course Attendance Guidelines:

- Attendance at all Practical Sessions is compulsory – i.e. it is a course requirement.
- If you miss a practical session for medical or serious personal reasons or if you expect to be absent from a future session because of medical or serious personal reasons please contact the Teaching Fellow and your Tutor by e-mail as soon as possible (stating your name and matriculation number).
- If you fail to contact the Teaching Fellow about your absence, your Director of Studies will be informed.
- You should also obtain either a medical note or a letter from your Director of Studies (in the case of serious personal reasons) and hand it to the Psychology 2 Course Secretary.

Because you will work in cubicle groups and the class experiments depend on the participation of all Psychology 2 students, your absence will cause disruption to the normal functioning of the course.

If you miss a session you are thus expected to arrange to catch up with missed work with your cubicle group and complete the relevant practical tasks before the next practical session;

4.2 Practical Course Assessment

During the year you will be required to produce and hand in work to be assessed and to take an active part in the research experiment associated with the practical course. It is a course requirement that you should submit all draft write-ups and final reports. Even if they do not contribute to your final mark, the draft write-ups are extremely important to gain feedback from your Tutor. The draft write-ups are intended to highlight the areas you have to work on to achieve a good mark in the final report.

To make the course more interesting, we produce the dataset from your participation/collaboration. However there is a tight schedule and it is in your interest that you collect data or take part in the studies in a timely fashion, especially when the data collection exercises are not slotted within the practical sessions; non-compliance will affect the quality of the
data and therefore affect the results for your reports! All collected data must be kept and returned to your tutor when you submit your report.

4.2.1 Assessed work deadlines and submission methods
Final reports should be handed in via the dedicated box situated in the basement concourse (you will be shown the location of this box during your first practical session) AND ALSO submitted electronically through Turnitin. You should post your report through the slot labelled with the day and time of your practical session (e.g. Wednesday 2-5 PM). Before you do that, please remember to fill in and attach a Report Cover Sheet (these are available next to the box). Draft reports should be submitted as a hard copy only AND NOT electronically.

4.2.3 Report writing – structure and style
You will find the Guidelines for Report Writing in the Appendix 1 of this Practical Handbook. In addition, it is strongly recommended that you consult the following for advice on writing reports and empirical papers:


4.2.4 Report formatting requirements
- All reports must be word-processed;
- Reports should be printed using black ink on A4 paper;
- Pages should be stapled together and clearly numbered;
- Reports should be *double spaced* with 3 cm *margins*, to enable the marker to add comments;
- Do not cut and paste basic default tables and graphs directly from SPSS – graphs can be edited in SPSS then pasted into Word.
- It is acceptable for you to include *neat* hand-drawn graphics however it is preferable that you learn how to include tables and graphs directly into your document.
- Each report must be accompanied by a completed cover sheet (available in the basement concourse, close to the report submission box).
4.3 Practical Session Conduct Guidelines

Punctuality

- When you arrive for your 3 hour practical session, you should go directly to your tutorial room for the first hour and sign the attendance sheet.
- It is essential that you are punctual, otherwise you will have great difficulty in understanding and carrying out the tasks in the practical session.
- At the end of your tutorial, you will go to the computer cubicles in the Basement Concourse for the remainder of your practical session.
- You should go to the cubicles promptly, with the rest of your cubicle group, so that the group will not have to wait for you to start their work.

Participation and involvement

- You are expected to contribute and participate in all tasks during all practical sessions.
- It is imperative that all members of the cubicle group contribute to each task to the same extent.
- It is not acceptable that you deflect this responsibility and force others to do practical session’s work for you.
- This is particularly critical during the development of your group’s Independent Final Project. If you do not attend these sessions or fully participate in most phases of development of this project, penalties may be deducted from the mark given to the resulting report that you submit individually.

Breaks during practical sessions

Your Tutor will organise a break during the practical.

Use of mobile phones during the practical session

Please ensure that your mobile is switched off throughout your practical session.

Ending and leaving your practical session

- When you have completed the session’s tasks and objectives, you must call on your Tutor to assess whether your work has been completed successfully. Only then, may you leave.

4.4 Practical Course Material

You are required to bring the following material to every practical session:

- This Practical Course Handbook;

In addition, we strongly recommend that you consult in the libraries (or purchase) a textbook relating specifically to analyses using SPSS:

• Field, A. (2005). *Discovering Statistics Using SPSS for Windows (2nd Edition)*. London: Sage (this is the recommended book for Psychology 3, so it may well be worth buying it if you intend to proceed on to the Psychology Honours Course)

**Statistics Software**

SPSS (Statistic package for the social sciences) is the software used to perform statistical analysis in this practical course. The most recent version of SPSS is available in every University public lab. There are potential issues with data transfer and compatibility which you should be aware of when transferring files from one system to the other as the versions of SPSS available throughout University are slightly different. Ask student support ([Student.Support@ed.ac.uk](mailto:Student.Support@ed.ac.uk)) or visit the Statistical Computing webpage ([http://www.ucs.ed.ac.uk/usd/stats/](http://www.ucs.ed.ac.uk/usd/stats/)) for more information.

An important tip when you access data from multiple systems/locations: you should FIRST start SPSS, and then open your file through the Open command in the File drop-down menu. Do NOT try to open your file by clicking twice on it when in your data folder.

**Saving and Backing up your data**

It is important that you maintain multiple copies of your key files and back up your documents and data. Even though you will be provided with a shared cubicle folder, throughout this course you will be working on data that which is generated from your own participation in research and is normally prepared for you just before the session. Permissions will be set up by your tutors or the Teaching Fellow at the beginning of the year for your group folder located in the Y2LAB folder. In this way only the members of your group will be able to access your data.

NOTE that your analysis might be slightly different to others in your tutorial class depending on the practical considerations that you and your group members will apply (i.e. treatment of outliers/missing cases).

**NEVER** do your computer/data work on the original version of any file you open!!! In all cases, you must open the file and then save a copy to your desktop or your group folder.
TITLE:
Manipulating and Editing Data

TOPICS:
Review of basic statistical concepts
Introduction to SPSS environment

OBJECTIVES:

- Understand the relationship between a sample and population in statistical terms
- Define the different levels of measurement (nominal, ordinal, interval, ratio) and understand how they can be identified
- Review independent variables, dependent variables, and list the different designs for psychological studies
- Understand what hypotheses are – null hypothesis and alternative hypothesis
- Understand the format of an SPSS data file
- Manipulate the basic SPSS environment
- Enter some data into SPSS

Work BEFORE the session:

- Read Howitt & Cramer (2008), Chapters 1 and 9
- Revise your lectures notes on research and methodology from Y1 (WebCT is still available!)

PRACTICAL SESSION:

- Kinnear & Gray (2009), Chapters 2 and 3
What is a variable in statistical and research terms? Give 3 examples of variables.

Sampling
(Howitt & Cramer, 2008, Chapter 9)

How are sample and population of scores defined in statistics?

Sample:

Population:

Why does the size of a sample matter in statistical inference?

Imagine you were studying reaction time in a driving simulator. Would the following samples be good (or bad) representations of ‘people as a whole’? Explain your reasons.

a) Edinburgh Psychology undergraduates, randomly sampled

b) Acquaintances of members of the Psychology undergraduate class, randomly sampled

c) Cambridge housewives, randomly sampled

d) People who agree to come to the lab to be tested when cold-called (phoned) at home

e) Adults recruited in Princes Street gardens

Does the word ‘random’ have a specific meaning in statistics? Define what statisticians mean by a random sample.

Imagine you are trying to study the role of vision in ball-catching behaviour by briefly illuminating tennis balls at the start or towards the end of their flight path. You have recruited friends, 12 of whom are fielders from a local amateur cricket team, and 18 of whom have not had substantial practice in catching balls. You want to create two participant- groups of 15 each. Should you:

a) Allocate all 12 cricketers, with 3 non-cricketers, to form one of the groups

b) Allocate half of the cricketers and half the non-cricketers to each group

c) Allocate participants to the two groups using a random number table, and disregarding their experience of catching
Explain your reasons for this choice of strategy for allocation participants to groups.

**Types of measurement**  
(Howitt & Cramer, 2008, pp. 4-7)

Data generally fall into two broad categories and four sub-categories. Explain how you define each kind of data, and give an example:

1. Non-parametric data  
   a) Nominal
   
   b) Ordinal

2. Parametric data  
   a) Interval
   
   b) Ratio

**Research design**

Imagine a study aimed at understanding how high altitude slowed decision making. 12 mountaineers tackle a test involving a series of logical problems at 2,000 feet in the Scottish Highlands, and 12 more tackle the same test above 27,000 feet in the Himalayas. Time to complete the test was compared between the two groups.

- The *independent variable* is the variable that is being manipulated. In this example the independent variable is altitude;
- The *dependent variable* is the variable that is being measured. In this example the dependent variable is time to complete the test.

What other dependent variable could have been measured in this study?

**Hypotheses**  
(Howitt & Cramer, 2008, pp. 96-98)

What do statisticians mean by:  
The *null hypothesis*

The *alternative hypothesis*
Why is the concept of null-hypothesis so fundamental to inferential statistics?

Taking the example above, set out what would be possible experimental hypotheses in this study.

Again, what would be the related possible null hypotheses?

**Hypothesising the direction of influence of one variable over the other – one-tailed and two-tailed studies.**

- In a *one-tailed design*, we predict that one variable will change another in a particular direction. For instance, in a study to measure the effect of psychotherapy for anxious students, the prediction was that compared with the control group who had no therapy, the treated group would show a greater improvement (become less anxious).
- A *two-tailed design* implies no prediction of how one variable will influence another. It does state that there will be an effect. For instance, in a study to compare counselling and cognitive behavioural therapy as a treatment for anxiety, we might have no preconception about which treatment group would show greater improvement.

Give another example of each kind of design.

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**Practical Session**

Kinnear & Gray (2009), Chapters 2 and 3
TITLE:
Exploring Data and Graphs & Charts

TOPICS:
Review of the components of a psychology journal article
Descriptive Statistics
Graphic Representation of Data

OBJECTIVES:

- Review the components of a psychology article (introduction, methods, results, discussion, references, and appendix) and understand what each part is for
- Define the mean, median, variance, and standard deviation of a set of data, and find the standard error of the mean
- Define quartiles, interquartile range, fences, outliers
- Understand and use a basic histogram, bar chart, box-plot
- Understand how simple transforms are used to improve normality (in the distribution of data)
- Understand the concepts of ‘outliers’ and ‘extreme cases’
- Understand what demands your data needs to meet so that it is suitable for parametric statistical tests – i.e. parametric assumptions
- Explore data and create graphs and charts using SPSS

Work BEFORE the session:

- Read Howitt & Cramer (2008), Chapters 2-5 and 11

PRACTICAL SESSION:

- Kinnear & Gray (2009), Chapters 4 and 5
Understanding the components of a Psychology journal article
Journal articles in Psychology have a standard format which simplifies the task of readers, editors, and referees in picking out the essential information quickly. Understanding this standard format is important because it will allow you to:

- read original research articles efficiently,
- write structured and clear research reports for this course and beyond

Some journals depart from this format, for instance placing the Methods section at the very end of the article, or advising that the article is written as a whole, connected text as you would find in a newspaper. The standard format, however, is very widely used, and it is important that you master it in writing up your practical work.

The standard article / report format has the following components, in this order:
- Title
- Abstract
- Introduction
- Methods
- Results
- Discussion
- References
- (Appendix)

For more detailed information on these components consult:
- Appendix 1 of this handbook;

You can find an example of this structure in:

**Measures of central tendency**
(Howitt & Cramer, 2008, Chapter 3)

Define the following concepts:
- Mode
- Median
- Mean
In choosing the appropriate measure of central tendency for your data set, what characteristics of your data set must you take into account?

What is the median of the following set of values?
a) 1 3 4 5 8 9 11 15 15

What is the median of the following set of values?
b) 1 3 6 11 15 19 24 24 29 33

What are the means of datasets a) and b) above?

**Measures of Spread or Variability of scores**
(Howitt & Cramer, 2008, Chapters 3 and 11)

**Variance**
Calculate the mean and variance of the following sample of data
c) 1 2 2 4 5 5 6 8 8 9

Mean:

Variance:

**Standard error of the mean**
Define (and understand the difference between) *standard deviation of scores* and *standard error of the sample mean*

Calculate the standard deviation of dataset c).

What is the standard error of the mean for dataset c)?

**Upper (UQ) and lower quartiles (LQ) of a data set**
Quartiles and the median divide the dataset into quarters, as follows:

1 3 4 LQ 6 8 11 MED 12 15 16 UQ 18 19 21

For this dataset
LQ = 5
MED = 11.5
UQ = 17
The shape of the distribution
(Howitt & Cramer, 2008, Chapter 4)

Using a simple line graph:
   a) represent graphically; and

   b) describe what information is provided by the following curves, which represent the
distribution of scores of an imagined data set

   • A ‘normal’ curve

   • A positively skewed distribution

   • A steep distribution curve (leptokurtic curve)

   • A flat distribution curve (platycurtic)

   • A multimodal curve

Graphical Representation and exploration of the data
(Howitt & Cramer, 2008, Chapters 2 and 4)

Identify the characteristics and use of the following ways of graphically representing your data.
   • Frequency tables

   • Bar Charts

   • Stem-and-leaf displays

   • Box-plots

   • Histograms

   • Error bars

Practical Session
Kinnear & Gray (2009), Chapters 4 and 5
TITLE:
Parametric 2-group Comparisons

TOPICS:
Inferential Statistics: Tests for comparisons between 2 groups (parametric tests)

OBJECTIVES:
- Understand the differences between 1-tailed and 2-tailed statistical tests
- Explain the differences between designs using related vs. unrelated groups
- Explain the use of Student’s t-tests to
  - compare the mean of a single group with a theoretical value (e.g. zero)
  - compare the means of related and independent groups
- Explain how t-tests can be adapted where variance in the two groups is unequal
- Calculate by hand a related or independent t-test on a small dataset
- Explain how the results of t-tests are reported in the literature
- Conduct t-tests using SPSS

Work BEFORE the session:
- Read Howitt & Cramer (2008), Chapter 12, 13, 15, 16 and 17

PRACTICAL SESSION:
- Kinnear & Gray (2009), Chapter 6 (pp. 175-190)
1-tailed and 2-tailed statistical tests
(Howitt & Cramer, 2008, Chapter 17)

Provide an example of:

a) A one-tailed hypothesis:

b) A two-tailed hypothesis:

Thinking now in terms of probability, sketch (with a line graph) and explain in words the way in which the critical value of 5% probability is built up in each type of hypothesis testing:

Related vs. unrelated groups
This tutorial is concerned with statistically comparing one group of scores (one sample) with a second group of scores (another sample) which are defined by the 2 possible levels of one single independent variable (e.g. males vs. females, experimental vs. control subject)

What types of research questions would this design fit?

What sampling issues arise with each of these research questions?

In the following examples identify the dependent variable, independent variable, the levels of the independent variable, and if the design is unrelated (independent groups) or related (within-subjects and matched-pairs designs):

- “Time taken to correctly identify an embedded geometrical figure presented to the participants in their left visual field and in their right visual field”
  o DV?
  o IV?
  o Levels of IV?
  o Related or Unrelated?

- “Depression scores in healthy older adults, and those diagnosed with dementia”
  o DV?
  o IV?
  o Levels of IV?
  o Related or Unrelated?
• “Observed collaborative behaviour score in construction task at 3 years old and 5 years old”
  o DV?
  o IV?
  o Levels of IV?
  o Related or Unrelated?

Student’s t-test
(Howitt & Cramer, 2008, Chapters 12 and 13)

One-sample t-test
Compares the mean of a single group to a theoretical value (e.g. zero). Briefly describe a study for which this would be the appropriate test statistic.

T-test for related samples:
Compares the means of two related samples scores to see whether the means differ significantly. Describe a study for which this would be the appropriate test statistic.

T-test for unrelated samples:
Compares the means of two unrelated samples of scores (ex. two separate groups) to see whether the means of the two groups differ significantly. Describe a study for which this would be the appropriate test statistic.

What does Levene’s test check for?

Calculate by hand a related/independent t-test using the dataset handed out in the tutorial
(Howitt & Cramer, 2008, Chapters 12 and 13)

Bringing it together – how are results of t-tests reported in the literature
(Howitt & Cramer, 2008, Chapter 16)

T-test results are reported in a specific manner. Notice the elements that are reported and the order in which they appear:
  • The statistical distribution used (in this case t)
  • The degrees of freedom
  • The result of your calculation
  • The probability (or significance level)
  • The type of hypothesis, one or two tailed

Take the following elements: p <.001; df=85; two tailed, t =11.69. Put them in the correct order for expressing a result of a group comparison using a t-test
Read the following extract from a journal article, focusing on the way the authors report the results

In experiment 1, where photographs of adult males and females were simultaneously presented, judges correctly matched newborns to parents at a significantly higher mean rate than the 3.33 expected by chance (mothers: \( t = 6.14, df = 159, p < .001 \); fathers: \( t = 2.51, df = 159, p < .025 \)). Mothers were matched to their newborns at a significantly higher rate than were fathers (mean match-difference = 0.44, SE = 0.19, \( t = 2.31, p < .05, df = 159 \), paired-difference \( t \)-test).

a) What do the authors mean by “significantly higher”?

b) What conclusions can the authors draw from these results and how would you correctly express them?

_________________________________________________________________________

**Practical Session**

Kinnear & Gray (2009), Chapter 6 (pp. 175-190)
TITLE:
Correlations

TOPICS:
Tests of association or correlation

OBJECTIVES:
- Correlation – definition and pitfalls in its interpretation
- The graphical representation of association – scatter plots
- Calculate by hand a Pearson or Spearman correlation on a small dataset
- Introduction to the idea of significance testing – how the Pearson correlation is tested for significance
- Explain how correlations are reported in the literature
- Run correlational analysis using SPSS

Work BEFORE the session:
- Background reading from Howitt & Cramer (2008), Chapters 6, 7, and 10

PRACTICAL SESSION:
- Kinnear & Gray (2009), Chapter 11 (pp. 393-407)
Correlation
Consider the following diagram:

‘Sun rises’ ----------- ‘x is out of bed’
\ /
‘x works from 8.00 to 5.00 every week day’

What relationships may this third variable have with the other two?

What types of research designs would allow you to establish a causal relationship between variables?

The graphical representation of association – scatter plots
(Howitt & Cramer, 2008, Chapter 7)

From an imagined correlational study, take the x axis to represent scores on an intelligence measure, and the y axis to represent scores on a measure of trait anxiety. Use scatter plots (with a possible best fitting straight line) to represent the following relationships and describe what possible conclusions you may draw from them:

**A positive correlation between intelligence test performance and anxiety**

![Graph showing a positive correlation between anxiety and intelligence scores.]

**A negative correlation between intelligence and anxiety**

![Graph showing a negative correlation between anxiety and intelligence scores.]

A perfect negative correlation between intelligence and anxiety

![Graph showing a perfect negative correlation between intelligence and anxiety.]

No correlation between intelligence and anxiety

![Graph showing no correlation between intelligence and anxiety.]

**Correlation Coefficients – definitions**  
(Howitt & Cramer, 2008, Chapter 7)

What information does a *correlation coefficient* provide us with?

What types of correlation coefficients do you know and what types of data do they best fit?

Describe what the following features of an imagined Pearson Correlation Coefficient allow you to learn about the association between intelligence and trait anxiety with a correlation coefficient, $r = -0.42$.

The sign:

The value:

What conclusions can you draw from this value?
Calculate by hand the Pearson correlation coefficient for the data set handed out in the tutorial

**What do statisticians mean by probability testing or significance testing?**

Reminding yourselves that in statistics *inferences are based on the characteristics of the population as defined by the null hypothesis* (Howitt & Cramer, 2008, p. 97), consider the following statements about probability or significance level $p$ (also known as the $\alpha$ level).

$p$ expresses...

- The likelihood (probability) of obtaining the scores in the sample by pure accident.
- The likelihood of the null hypothesis ($H_0$) being true.
- The likelihood of the experimental hypothesis ($H_1$) happening in the sample of scores if this sample comes from a population in which the null hypothesis ($H_0$) is assumed to be true.

Discuss how adequate each statement is.

What are the most commonly used (probability) *critical values*?

Going back to the value that you found for the correlation coefficient ($r$) above, determine if it is statistically significant at the 5% critical value (consult table in Howitt & Cramer, 2008).

**Bringing it all together – how are correlations reported in the literature?**

Take the following extract from a journal article as an example:


**Abstract**

Previous research has shown that variation in sex-specific personality traits in women can be predicted by measures of physical masculinisation (second to fourth digit ratio and circulating testosterone). This study aimed to test the hypothesis that certain sex-specific traits in women (maternal tendencies and career orientation) could be predicted by one index of masculinisation, height. Data was collected via online questionnaires. (...)

**Results**

*Pre-reproductive women (age 20–29)*

Normality of distribution of all the variables was tested for using Kolmogorov–Smirnov test. None of the variables were normally distributed (all $z$s > 2.7, all $p$s < .001). Therefore, the non-parametric statistic, Spearman’s rank correlation was used to analyse the height and personality relationships. **As age was not correlated with height ($r = -.002$, $p = .96$, $n = 678$), it did not need to be controlled for in the following analyses.** As parental income whilst growing up was not correlated with height ($r = .04$, $p = .26$, $n = 671$) it also did not need to be controlled for in the following analyses. Height was significantly negatively correlated with importance of having children ($r = -.24$, $p < .001$, $n = 678$) and self-rated broodiness ($r = -.22$, $p < .001$, $n = 678$). Height was significantly positively correlated
with importance of having a career ($r = .11, p = .005, n = 678$) and career competitiveness ($r = .12, p = .003, n = 668$). Height was significantly negatively correlated with ideal number of children ($r = -.14, p < .001, n = 672$) and positively correlated with ideal own age at time of having first child ($r = .11, p = .004, n = 636$).

Examine how the correlation results are reported:

a) How do you evaluate the values of these correlation coefficients?

b) What do the authors mean by a “significant correlation”?

c) What conclusions might the authors have drawn from these results and how might they have correctly expressed them?

Have a closer look at the section in bold, why do you think the authors included this information in their reporting of results?

_____________________________________________________________________________________

**Practical Session**

Kinnear & Gray (2009), Chapter 11 (pp.393-407)
SetTitle:
One-way ANOVA

Topics:
One-way ANOVA comparisons

Objectives:
- Explain why, to compare 3 or more groups, a single one-way ANOVA is preferred to t-tests
- Understand and explain the different elements of an ANOVA table
- Calculate by hand a one-way ANOVA on a small dataset
- Explain how the results of ANOVA are reported in the literature
- Run a one-way ANOVA in SPSS

Work Before the Session:
- Background reading from Howitt & Cramer (2008), Chapters 19-21

Practical Session:
- Kinnear & Gray (2009), Chapter 7 (pp. 207-247)
Looking for differences.
If Anne’s school primary had 6 teachers at the same level, how many 2-group comparisons would be necessary to check for differences between the arithmetic marks of their classes?

What is meant by Type I and Type II errors? (Howitt & Cramer, 2008, p. 100)

One-way ANOVA
Describe the two types of one-way ANOVA:

• An uncorrelated or unrelated 1-way ANOVA:

• A correlated or repeated measures 1-way ANOVA:

Some technical terms relating to ANOVA designs
(Howitt & Cramer, 2008, Chapter 20)

On the basis of your background reading, explain the following technical terms:

• Factor

• Level

• Degrees of freedom

• Sum of Squares (SOS)

• Mean Square (MS)

What properties of the data should be checked before a parametric ANOVA is employed?
ANOVA: Basic steps

\[
\text{Variance estimate} = \frac{\sum X^2 - \left( \frac{\sum X}{N} \right)^2}{(N-1)}
\]

Where:
- $\sum X^2$ = the sum of the squares of each score
- $\left( \sum X \right)^2$ = the square of the sum of all scores
- $N$ = the number of scores
- $N-1$ = the degrees of freedom

Therefore, you can calculate the variance of all scores across all groups using this formula, and tabulate the following overall values:

- Total Sum of Squares (SOS), corrected to reflect deviations around the grand mean
- the corresponding degrees of freedom (df)
- and Mean Square (MS = SOS/df), the variance estimated mentioned above

In the example below, calculate the degrees of freedom for the group factor (with 3 levels):

Also, calculate the degrees of freedom for the error component:

<table>
<thead>
<tr>
<th>Simon’s class</th>
<th>Helen’s class</th>
<th>Anne’s class</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>15</td>
<td>24</td>
</tr>
<tr>
<td>11</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td>15</td>
<td>16</td>
<td>19</td>
</tr>
<tr>
<td>8</td>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td>16</td>
<td>18</td>
<td>28</td>
</tr>
<tr>
<td>12</td>
<td>17</td>
<td>23</td>
</tr>
<tr>
<td>10</td>
<td>15</td>
<td>22</td>
</tr>
</tbody>
</table>

- The null hypothesis suggests that differences between the groups are due to sampling error, rather than real differences related to the influence of the independent variable.

- If the null hypothesis is correct, the variance estimate derived from the true score should be no different from the variance estimate derived from the error scores. After all, under the null hypothesis the variation in the true scores is due to sampling error, anyway.

- If the alternative hypothesis is correct, then there should be rather more variation in the true scores than is typical in the error scores.
Therefore, the greater the difference between these two variances, the more likely that the ______ hypothesis is correct.

Equality between these two components of variance is tested by calculating the ratio of **between-groups variance** to **error variance** (termed F). The greater the ratio, the lower the chance that differences among groups can be explained purely in terms of sampling error.

The **F-ratio test** (variance ratio test) involves the following calculation:

\[
F = \frac{\text{Variance estimate}_{\text{true scores}}}{\text{Variance estimate}_{\text{error scores}}}
\]

The value obtained for the F-ratio determines if there is a significant difference between the component due to between-group differences and the component arising from error.

Compare the calculated F-value to a table of critical F-values for the appropriate number of degrees of freedom (between-groups df vary across the top of these tables, error df vary down the side of the table) and significance level (P=0.05, 0.01, etc.).

A value of F higher than the tabulated critical value indicates that the observed between-groups difference is unlikely to have occurred by chance. The choice of significance level, as you have already learned, lets you choose how strictly you want to ensure that you do not reject the null hypothesis when the observed result is due to chance; with the 1% significance level, the tabulated value of F will only be exceeded by chance in 1% of cases when there is no real difference among groups. If the value of F is lower than the appropriate tabulated value, there is no statistically significant difference among the groups.

**Displaying your ANOVA results correctly**

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F-ratio</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>368.667</td>
<td>2</td>
<td>184.333</td>
<td>((184.333)/(10.349) = 17.811)</td>
<td>0.000</td>
</tr>
<tr>
<td>Error (within Groups)</td>
<td>186.286</td>
<td>18</td>
<td>10.349</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>554.952</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notice that...

- The upper two Sums of Squares add up to the total Sum of Squares, and that the upper two df values add up to the total df in the bottom row;

- Each Mean Square is calculated as SOS/DF, e.g. \(184.333 = 368.667/2\).

- We never use the Total SOS to calculate the Mean Square in the bottom row of the table.
Using information extracted from the table (notice that you need both the between-groups and the error or within-groups df), you might write:

*There was a significant effect of the teacher on children’s scores in the reading test (F (2,18) = 17.811, p < 0.001).*

It is crucial to understand where the values from the table are used in the text and what the values in the table tell you.

Fill in the missing values in the table below [look up the p value in Howitt & Cramer (2008)], and answering the following questions:

- How many participants were involved in this study, overall?
- How many groups were employed?
- How many participants were there in each group?

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F-ratio</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>68.222</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error (within Groups)</td>
<td></td>
<td>16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>87.556</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Follow the various steps listed in Howitt & Cramer (2008) to work out the SOS values that you will need. Then:

- Draw up an ANOVA table and fill in all of the cells
- Use the information in this table to find an F value
- Look up this F value in H&C and see if, given the df, if this value is significant
Is the F value significant? Report the F value in APA format here:

Practical Session
Kinnear & Gray (2009), Chapter 7 (pp. 207-247)
TITLE:
Non-parametric 2-group comparisons

TOPICS:
Non-parametric tests

OBJECTIVES:
- Understand the context in which non-parametric tests are used in place of parametric alternatives
- Know about the following generally-useful non-parametric tests
- Carry out by hand a simple non-parametric test on a small dataset
- Carry out non-parametric tests using SPSS

Work BEFORE the session:
- Read Howitt & Cramer (2008), Chapter 18

PRACTICAL SESSION:
- Kinnear & Gray (2009), Chapter 6 (pp. 191-204)
The importance of non-parametric statistics
Howitt & Cramer, (Chapter 18, and Appendix B1 and B2)

What type of data is analysed using non-parametric statistics?

The null hypothesis suggests:

The alternative hypothesis suggests:

What are the disadvantages of using non-parametric analyses?

What are the similarities between parametric and non-parametric tests?

- If for parametric data you would use an independent-groups t-test, then if you have non-parametric data you would use:

- If you would use a related t-test, then with non-parametric data:

- If you would use an independent groups one-way ANOVA, then with non-parametric data you would use:

- If you would use a related one-way ANOVA, then with non-parametric data you would use:

- If you would use a Pearson Correlation, then with non-parametric data you would normally use:

Calculate by hand a Mann-Whitney U test using the dataset below:
(Howitt & Cramer, 2008, p. 174)

<table>
<thead>
<tr>
<th>X1</th>
<th>X2</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>17</td>
<td>3</td>
</tr>
<tr>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>13</td>
<td>9</td>
</tr>
<tr>
<td>12</td>
<td>7</td>
</tr>
<tr>
<td>16</td>
<td></td>
</tr>
</tbody>
</table>
Calculate by hand a Wilcoxon Matched Pairs test using the dataset below:
(Howitt & Cramer, 2008, p. 172)

<table>
<thead>
<tr>
<th>Before</th>
<th>During</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
</tr>
</tbody>
</table>

Practical Session
Kinnear & Gray (2009), Chapter 6 (pp. 191-204)
TITLE:
Two-way ANOVA

TOPICS:
Two-way ANOVA - Independent groups

OBJECTIVES:
- Explain how a two-way ANOVA differs from a one-way ANOVA
- Understand what is meant by main effects and interactions
- Understand how to determine what kind of ‘design’ an experiment has
- What are the IVs and how many levels does each have
- What is the DV (or the DVs)
- Design differences (Between subjects, Mixed, Within subjects)
- Perform a 2-way independent ANOVA on a suitable dataset with SPSS

Work BEFORE the session:
- Read Howitt & Cramer (2008), Chapter 22

PRACTICAL SESSION:
- Kinnear & Gray (2009), Chapter 8
How does a 2-way ANOVA differ from 1-way ANOVA?

1) The effect of the levels of each IV on the DV are independent

2) The effect of the levels of each IV on the DV ‘cross’ one another

What is a main effect?

What is an interaction?

What is a ‘between subjects’ IV?

What is a ‘within subjects’ IV?

Consider the effects of years of playing pool and anxiety on performance. Our IV ‘years of playing’ splits competitors into: professionals and amateurs. Our IV ‘anxiety’ also has two levels: some players are comfortable before the match, others feel the pressure. This would make the study a 2 x 2 design.

Is the years of playing variable a between or within subjects IV?

Is the anxiety variable a between or within subjects IV?
Draw a line graph of the scores of each group where the x-axis represents levels of the anxiety IV, the y-axis represents performance) when:

1) No interaction is occurring. What does this mean?

2) The amount of anxiety interacts with level of experience. What does this mean?

Why not just run two separate ANOVAs?’

Going back to the playing pool example:

1) How many IV’s there are?

2) How many levels are in each IV?

Give examples of a 2 x 3 between subjects design.

Give examples of a 2 x 2 within subjects design.

Give examples of a 2 x 3 mixed design.

Practical Session

Kinnear & Gray (2009), Chapter 8
TITLE:
Two-way ANOVA continued

TOPICS:
Two-way ANOVA – Within Subjects

OBJECTIVES:
- Explain how a two-way ANOVA differs from a one-way ANOVA
- Understand what is meant by main effects and interactions
- Understand how to determine what kind of ‘design’ an experiment has
- What are the IVs and how many levels does each have
- What is the DV (or the DVs)
- Design differences (Between subjects, Mixed, Within subjects)
- Perform a 2-way within subjects ANOVA on a suitable dataset with SPSS

Work BEFORE the session:
- Read Howitt & Cramer (2008), Chapter 22

PRACTICAL SESSION:
- Kinnear & Gray (2009), Chapter 9
Practical Session

Kinnear & Gray (2009), Chapter 9
TITLE:
Two-way ANOVA continued

TOPICS:
Two-way ANOVA – Mixed design

OBJECTIVES:
- Explain how a two-way ANOVA differs from a one-way ANOVA
- Understand what is meant by main effects and interactions
- Understand how to determine what kind of ‘design’ an experiment has
- What are the IVs and how many levels does each have
- What is the DV (or the DVs)
- Design differences (Between subjects, Mixed, Within subjects)
- Perform a 2-way mixed ANOVA on a suitable dataset with SPSS

Work BEFORE the session:

PRACTICAL SESSION:
- Kinnear & Gray (2009), Chapter 10
Practical Session

Kinnear & Gray (2009), Chapter 10
TITLE:
Frequency Data

TOPICS:
Nominal data

OBJECTIVES:
- Understand measures of association to analyse nominal data
- Carry out by hand a Chi-square analysis
- Analyse frequency data using SPSS

Work BEFORE the session:
- Read Howitt & Cramer (2008), Chapter 14

PRACTICAL SESSION:
- Kinnear & Gray (2009), Chapter 11 (pp. 408-425)
Chi-square analysis
The formula for Chi-square ($\chi^2$) is as follows:

$$\text{Chi-square} = \chi^2 = \sum \frac{(O - E)^2}{E}$$

where  
\begin{align*}
O &= \text{observed frequency in a particular cell} \\
E &= \text{expected frequency in the same cell, calculated from marginal totals} \\
\text{Sum} &= \text{the sum is over all the cells of the contingency table}
\end{align*}

What is the observed frequency?

The expected frequency can be calculated as follows:

$$\text{Expected frequency} = \text{frequency for that type of respondent} \times \frac{\text{frequency for the group}}{\text{total number of responses}}$$

<table>
<thead>
<tr>
<th>Preference</th>
<th>Boys</th>
<th>Girls</th>
<th>Row frequencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Violent TV preferred</td>
<td>40</td>
<td>15</td>
<td>55</td>
</tr>
<tr>
<td>Non-violent preferred TV</td>
<td>30</td>
<td>70</td>
<td>100</td>
</tr>
<tr>
<td>Column frequencies</td>
<td>70</td>
<td>85</td>
<td>Overall frequency = 155</td>
</tr>
</tbody>
</table>
Inserting the expected frequencies:

<table>
<thead>
<tr>
<th>Preference</th>
<th>Boys</th>
<th>Girls</th>
<th>Row frequencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Violent TV preferred</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>observed = 40</td>
<td>observed = 15</td>
<td>55</td>
<td></td>
</tr>
<tr>
<td>expected =</td>
<td>expected =</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-violent TV preferred</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>observed = 30</td>
<td>observed = 70</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>expected =</td>
<td>expected =</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Column frequencies</td>
<td>70</td>
<td>85</td>
<td>Overall frequency = 155</td>
</tr>
</tbody>
</table>

You can now calculate the Chi-square for the data set.

The degrees of freedom are:

Using the Chi-Square value you obtained and the degrees of freedom, consult a table (H&C, Appendix F) of minimum acceptable values needed for significance for the Chi-Square test at a given level.

The results are reported in a similar way to other test you have seen, e.g.

There was a significant gender difference in favourite type of TV programme \( (\chi^2 = 13.56, \text{ df } = 1, p < 0.05) \).

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**Practical Session**

Kinnear & Gray (2009), Chapter 11 (pp. 408-425)
Appendix 1
Guidelines for Report Writing

An experimental report should convey its message briefly and clearly. Ideally, it should be directed at a non-specialist reader, e.g. a reader who might have a general level of understanding of the topic of cognitive Psychology, but does not specialise in hemispheric differences in information processing.

These are just very brief guidelines of what is expected of you when writing a practical report for this course’s assessment. Ideally, you will master this skill and finish the year writing in a way that is close to a publishable article.

However, do remember that the more experimental articles you read yourself, the better you will get at writing experimental reports.

1. Writing Style
Sternberg (1988) in Chapters 3 and 4 provides a useful set of rules that you should consider in writing a Psychology paper. Please refer to these Chapters for guidance.

The aim of the experimental report is to convey findings to the world in a clear way. Good writing is precise, unambiguous and economical. However, it should also be readable: a) not telegraphic; b) motivating, (i.e. it should invite and interest the reader enough for him/her to proceed); c) easy to follow and understand (i.e. it is your task as a writer to make yourself understood, and not rely on the reader to make an enormous effort in understanding what you mean).

The use of the first person as an author used to be discouraged (e.g. 'I' and 'we'), as it was argued that this tends to draw attention to the author(s), rather than to what he/she has to say. However, there are occasions when it is far easier to say 'We did...' or 'I tested' than to employ baroque forms of expression. You should take example from the literature, for instance, pay attention to turns of phrase that you like and feel you can adapt to your own style.
Brevity should also be worked on. Although achieving a brief exposition of a complex concept is difficult and may involve many re-writings of the same passage, do remember that lengthy expositions containing repetitions and irrelevant information are unlikely to be read and assessed positively.

Finally, take special care with spelling and grammar. Persistent bad spelling and grammar are not admissible at this stage of your academic career. Also, the presence of spell checkers in any word processing software and the availability in the Main Library (at least) of reference books (dictionaries, thesaurus, and grammar) removes any excuse.

2. Report format and length
The following format for experimental reports is a logical and clear method of exposition which has gained widespread acceptance. However, some publications (e.g. Nature) do not necessarily use this format. In any case, most Psychology journals that you will consult during your degree do use the following sequence, with one or two differences. These notes are provided for quick reference, however, Sternberg (1988) in Chapters 3 and 4 gives a useful set of rules that you should consider in writing a Psychology paper.

You should normally work within the following limits:

- Title: 15-20 words
- Abstract: 200-400 words approx. (0.5 sides)
- Introduction: 2.5-5 sides of A4
- Method: 1-2 side of A4
- Results: text, 1.5 sides of A4 (i.e. excluding tables & figures)
- Discussion: 2-4 sides of A4

These are rough guidelines for length. As you know, this will also depend on the content of your report and writing style. However, do remember that length by itself without purpose, relevant content or meaning is pointless.

3. Report Sections
Your report should be divided into a series of clearly labelled sections, each one reflecting various stages of the experimental study. Use numbers, bold type or a different font to clearly label each section. You are also advised to use sub-labels within each section to signpost:
• a sequence of arguments/ideas in your Introduction or Discussion;
• a sequence of categories in the description of the study’s method;
• a sequence of steps of statistical analysis.

These will increase the readability of your report and also help you structure and restructure your report.

3.1 Title
The title should be short and descriptive (try to keep it to a maximum of 15 words). Here are some guidelines:
• It should include a title and sub-title;
• The title should convey the overall content of the report: this should include keywords that are immediately recognisable and or that identify an area of research (e.g. ‘Priming effect of...’, ‘Change blindness...’);
• The sub title should describe the independent and the dependent variable, and do so implicitly (e.g. not 'The independent variable was overtraining...’, but, 'The effect of overtraining on discrimination recall');
• Ask yourself: ‘under what topic would I naturally look in a subject index of a journal if I were searching the literature on the subjects addressed in my report?’ Your answer will give you some idea of what keywords should go into your title.
• Look at published titles for guiding ideas (however, do not simply copy other author’s titles).

3.2 Abstract
The Abstract is presented at the beginning of the report and should contain clear statements on:
• The overall research area;
• The research question, including an articulate summary of the experimental hypothesis;
• The study’s method, including specifically the study’s variables and experimental design;
• The results, including the statistical model used and a synopsis of main findings results and significance levels;
• The discussion, including the conclusions you drew from the results, specifically if the hypothesis(e)s was supported or not.

The abstract should be concise, providing a general summary of the entire report in a maximum of 400 words. It represents a sort of halfway house between the title and the report as a whole. Its
function is to provide enough information to help the reader decide whether or not the article/report it is worth reading the whole article/report in detail. Its use in databases is invaluable and a well written abstract also fulfils the function of attracting and motivating the reader.

A good abstract will elaborate on the title, and condense the full contents of the report, and it should appear on the same page as the title. However, writing an abstract is difficult and it is again a skill that you will master with practice, trial and error and time. It is often the last part of a report/article that one writes and it is almost without exception the result of much re-writing.

3.3 Introduction

Overview of Introduction Contents:
- What is the general area of research
- What is the research question?
- What is the theoretical justification?
- What is the evidence from previous research?
- How does the experiment test it?
- Translate the research question into experimental hypothesis(es), stating explicitly what it is and how it was derived.

The function of the introduction is to clearly describe and contextualise the specific topic of your study. It should state the problem addressed by the research, incorporate it into its theoretical context (by briefly appraising relevant literature), and present the reasons for investigating it. It should end with a clear statement of the experimental hypotheses. As it was stated above, the use of sub-labels (such as the ones used in this text) are very useful for signposting the progression to contents in the Introduction. Some advice follows.

3.3.1 Start in a direct and clear manner

The first sentence, or at least the first paragraph, of the introduction is very important. It should focus the reader's attention on the precise subject being treated, and give some idea of how it will be studied. For example, take the following first paragraph of an article on a memory experiment:
'The study of recall for unconnected lists of words has been used to motivate theories about the organisation of human memory. However, some researchers question the validity of such studies and suggest that a more naturalistic approach, using the idea of meaning schema, might provide more useful insights (e.g. Kelly, 2000)'.

These two sentences immediately focus the reader's attention on the relevant subject area (i.e. human memory), and suggest how the forthcoming experiment will examine this topic (using connected text). Having introduced the reader to the relevant subject matter, the next requirement is to provide a general statement of the question being addressed. Returning to the example, the next sentence might be:

'The present study was carried out to investigate how participants' understanding of text, and the perspective they adopt whilst reading it, affects what they recall.'

3.3.2 Review relevant background literature:
The next task of an Introduction is show why this question is of interest by familiarising the reader with the relevant background literature. This will represent the main body of the introduction. It is therefore important to confine yourself to those studies which directly bear on the experiment you are reporting. Avoid digressions, even if you think that these are interesting additions.

Follow a logical progression (as an inverted pyramid). Start out with a brief introduction to research in the general subject area (e.g. memory/memory research), and then focus more and more specifically on the particular aspect of that general area that the present study is concerned with (e.g. the importance of a perspective on recall, the use of recall schema). Avoid providing excessive detail on the procedural aspects of the reviewed experiments (unless this is directly relevant to your research), however, provide enough information for the reader to appreciate this contextual literature.

Your summary of the pertinent literature should lead seamlessly and naturally to the reason for the present experiment, i.e. the research question. The research question may arise for a number of different reasons – there may be a gap in the literature, the existing results may be contradictory, or the literature review may reveal the existence of evidence which is not adequately explained by any existing theory. The research question, or problem, must be solvable, and its hypothesised solution must be testable if it is to form the basis of an experiment.
3.3.3 Formally state the experimental hypothesis:
The next stage of the introduction is to state the proposed solution to the problem in a manner which suggests how it might be tested – this is done by stating the experimental hypothesis (or hypotheses, if there is more than one).

For our purposes, a hypothesis may be defined as a testable statement of a potential relationship between two or more variables. The variables referred to are the independent and the dependent variables. The hypothesis should mention those three all important experimental elements:

- the independent variable (IV),
- the dependent variable (DV),
- suggest how they might be related.

The hypothesis should be clearly stated, i.e. expressed in the simplest language possible and containing only essential information. It is best, but not crucial, that you present the hypothesis in the form of the predicted relationship between these variables. Depending on the precision of the predictions they make, hypotheses may be one-tailed and two-tailed, that is, directional or not directional. Howitt & Cramer (2008) provide examples of hypothesis along the book.

3.3.4 General Points:
The scope and precision of your Introduction will be intrinsically related to the breadth and depth of your own reading. The advice here is clear, read relevant literature. This includes reading journal articles in full, as abstracts only will not suffice. Therefore, you must do the suggested background reading and go beyond it, as evidence of still broader reading will be rewarded.

When using references, take great care so that you do not plagiarise another author’s work. Plagiarism is claiming the words, and efforts, of others as your own. So do not copy sections of the sources word for word. Instead, draw out the most important points and summarise them in your own words. This will help to convince your marker that you actually understand the area. If you must quote from a paper, ensure that you attribute the quotation to its author (giving name, date, and page number), and present it within quotation marks.

In a similar way, when referring to results of previous research always indicate the source of those findings – do not say, 'it has been shown that x is the case', without indicating where this has been shown, as it stands, this is a meaningless statement. There are two acceptable ways to refer to the source of such statements:
‘Previous research has shown that recall for a passage is enhanced if…’ (Holloway and Kelly, 1998:337).

‘Holloway and Kelly (1998:337) have shown that recall for a passage is enhanced if…’

In the same way that sloppy spelling and grammar is not admissible, sloppy referencing will not be tolerated and will be penalised.

3.4 Method

This section is usually subdivided (Sternberg, 1988:50-51) in the following way:

- Design;
- Participants;
- Apparatus/Materials;
- Procedure

3.4.1 Design:

Here you should state the type of research and statistical design used (i.e. independent groups, repeated measures, etc.), and indicate the dependent and independent variables. Details of how participants were assigned to treatments, and any randomisation techniques should also be given here. All of the information should normally fit into one concise sentence. Again, this is mastering this skill will take time and multiple attempts, but, this is something that is very useful.

- Good example: "Choice reaction times were measured for randomly presented pairs of shapes in each of four orientations, using a within subjects design."
- Bad example: "The dependent variable was choice reaction-time and the independent variable was the orientation of the shape. A repeated-measures design was used, with the same participant in each condition. The order in which the treatments were given was randomised."

3.4.2 Participants:

Type of participant (students, neonates, etc.), the number of participants tested, and their age range and sex. Other characteristics which may affect the results of your study should also be mentioned (e.g. handedness, socio-economic status, etc), but only if they are relevant to the study.

3.4.3 Apparatus:

Specialised apparatus and materials used should be included here (with sufficient detail to allow the reader to make or purchase the equivalent items), e.g. Tachistoscope, particular word lists or rating
scales, commercial ability and personality tests. However, this should be done with restraint and with logic and reason – e.g. the type computer or monitor that you used would not usually (unless particularly relevant to an experimental manipulation) be included here.

3.4.4 Procedure:
Here you should give a detailed, step-by-step account of what happened to the participants from start to end of the experiment. You must include sufficient detail to allow the exact procedure to be repeated, including details of how stimuli were presented, numbers of trials given in each experimental condition, how performance was measured, etc. Instructions to participants should be reported verbatim, although these should be placed in an appendix if they are excessively long. Also include what participants were told after the experiment ended in relation to the study, their participation or results – i.e. to what extent and in relation to what were your participants debriefed.

3.5 Results
The Results section is the place where you present what you have found in such a way that readers are able to see the whole picture of your experimental findings (Sternberg, 1988, pp. 51-52). Again, it takes much practice, guidance from your textbook, course handbook and, most importantly, from your Demonstrator, for you to attain this skill. Once you have done so, and are able to write up your experimental findings correctly, completely and clearly, you should find this section easy to write.

This part of the report must be purely descriptive; it should not include any discussion or speculation. In this section you have two tasks:

- First, you must present and summarise your data in a way that a) prepares the readers for the subsequent analysis, and b) points at preliminary implications of these results for the experimental hypothesis – this should be achieved in the Descriptive Statistics subsection;

- Second, you must report on a) the statistical analysis of your data (what statistic or model did you use?), b) the results that were produced, and c) crucially, on the meaning of these results, i.e. what inferences do they allow you to make about the validity of the experimental hypothesis – this should be achieved in the Inferential Statistics subsection.
3.5.1 *Descriptive Statistics:*

Always begin the results section with a description of your results, using descriptive statistics for your sample(s) (mean, standard deviations, etc.). Normally, a summary of results should be presented as *labelled* tables and graphs (see below, and read Chapter 7 in Sternberg, 1988), and you should refer to these in the text. These are *not* alternative ways of presenting your results, you *must* present them verbally *and* graphically.

In the verbal description make references to the graphical representations of the data and statistics to a) point out the most important features of your data set, b) to describe patterns in the data, and c) to make preliminary observations in relation to the hypothesis that you are testing. This should be done seamlessly and descriptively (as a possible example: “A *preliminary assessment of the data* (in Table 1) reveals that extroversion scores measured before social exposure were consistently higher than...”) and not as an isolated statement (“The results are given in Table 1”).

Relating these descriptive results to your hypotheses presented in the Introduction is *essential*, as the purpose of any experiment is to gather evidence to evaluate the proposed experimental hypothesis(es). It is therefore very important to keep in mind the hypothesis(es) when deciding on the manner in which to present your results. Presenting results well is again a complex skill, but a very useful one to acquire, as the clear presentation of results is central to understanding them.

A summary of descriptive results will also be done graphically. Whether or not tables and graphs are both used to illustrate data will depend on the type of data, and the ingenuity and motivation of the writer. Tables and graphs are used for summarising the data, rather than presenting raw data (a term which implies that the data have not been statistically treated). Raw data belong, if at all, in an Appendix, but this is rarely necessary. Also, do not paste in un-edited output or graphs from a computer statistical package (e.g. SPSS) – this typically includes a great deal of unnecessary and inappropriate information which the reader should not be expected to wade through. As a summary:

- **Tables**: should present the numbers which illustrate the main findings of the study systematically, precisely, and economically. When reporting means, always include the corresponding SD’s in the same table (as SD gives a measure of the variation among the scores within each group). You should also include the row and column means (i.e. marginal means).
• **Graphs:** Often graphs clarify patterns of results and relationships between variables in a more immediate and accessible way than is possible in a table. When deciding on how to illustrate your data graphically, think very carefully about what sort of relationship you are trying to clarify. Different types of results call for different types of graphs (Sternberg 1988, Chapter 7). Refer to your statistics texts for guidance on which types of graphs are appropriate for which types of data. Good use of graphs will greatly enhance your results section.

Take the time and effort to create your own tables with the relevant information and to edit labels and titles on graphs appropriately, so that they can be understood easily and without reference to the text. This means that

• Tables and graphs will have: a clear title and a sequence number, using the prefixes ‘Table’ and ‘Figure’ (e.g. ‘Table 1’; ‘Table 2’; etc., Figure 1; ‘Figure 2’; etc.).
• Table sections (columns and rows) and graph axes will have:
  o Clear labels.
  o Fully labelled conditions – make sure that the condition labels (IV levels) are intelligible (e.g. ‘condition 1’ means nothing) and used consistently throughout the report. In importing graphs from SPSS or any other statistical package into your report, make sure you have edited these first – *unedited SPSS graphs are not acceptable.*

**3.5.2 Inferential Statistics:**

In this section you will report on the process of and on the results and conclusions afforded by your inferential statistical analysis in relation to your hypothesis(e)s, and, as you will know by now, your statistical analysis will be guided by the predictions made in your experimental hypothesis(e)s.

The presentation of inferential statistics needs to follow a logical sequence (if various test statistics are used these follow a logical order), and needs to obey the reporting *rules* that each test statistic requires (e.g. a t-test has a different presentation layout to an F-ratio calculation for an ANOVA model). In this sense, there is no room for innovation here, as all the elements that are crucial to the understanding of the test statistic result (e.g. degrees of freedom, probability or significance level, etc) *have to* be present and *in their correct order.* Your textbook and handbook include specific guidelines for each test statistic, and you should follow them *precisely.*
It is fundamental that in your verbal report you always relate the statistical result to your hypothesis(es), therefore, providing it with meaning. For example, it is not sufficient to say "the result was significant at the P=0.05 level" – this is meaningless. You need to provide the reader with the meaning of the result – "Left-handed participants were significantly faster at this task (t (12) = 2.24, p<0.05), this lends support to the experimental prediction that was made". The report of the statistic result (above, the t-test result) is there to lend support to the finding (that left handed participants were faster at...), which in turn lends support to the experimental hypothesis. The statistical result is not sufficient by itself.

Any further calculations which you wish to include in the report should be placed in an Appendix. Equally, do not paste in un-edited output from statistical packages, as this will almost certainly contain inappropriate material. If you wish to present a summary table of statistics’ results (for example, of an ANOVA model), follow the same guidelines that were provided above for the graphical representation of descriptive statistics regarding labels, sequence numbers, etc. However, make sure that the table fulfils the function of providing information that is above and beyond that which is included in the verbal account of the results – use them, if at all, with restraint.

3.5.3 Common stumbling blocks in results sections:

- Incorrect grammatical forms and expressions

<table>
<thead>
<tr>
<th>Singular</th>
<th>Plural</th>
</tr>
</thead>
<tbody>
<tr>
<td>Datum</td>
<td>data</td>
</tr>
<tr>
<td>Hypothesis</td>
<td>hypotheses</td>
</tr>
<tr>
<td>Phenomenon</td>
<td>phenomena</td>
</tr>
<tr>
<td>Appendix</td>
<td>appendices</td>
</tr>
<tr>
<td>Correct</td>
<td>Incorrect</td>
</tr>
<tr>
<td>The effect of the experimental manipulation on reaction time was...</td>
<td>The affect of the experimental manipulation on reaction times was...</td>
</tr>
<tr>
<td>Reaction time was affected by the experimental manipulation...</td>
<td>Reaction time was effected by the experimental manipulation...</td>
</tr>
<tr>
<td>“the result x is statistically significant”</td>
<td>“The data are significant”</td>
</tr>
<tr>
<td>“The results provide support for the experimental hypothesis, that is...”</td>
<td>“The data prove that the experimental hypothesis...”</td>
</tr>
<tr>
<td>this</td>
<td>is different from</td>
</tr>
<tr>
<td>------</td>
<td>------------------</td>
</tr>
<tr>
<td>No results (lack of results, i.e. not physically present)</td>
<td>Negative results (results that do not support your experimental hypothesis)</td>
</tr>
</tbody>
</table>

- Lack of clear description of results;
- Inadequate labelling of Tables/Graphs.
- Unnecessary/poorly-presented statistical information.
- Failure to cross-refer to Tables/Graphs in text.

### 3.6 Discussion

**Overview of Discussion Contents:**

- Was(were) the experimental hypothesis(es) supported?
- What are the similarities and differences between your findings and those of previous research and widely accepted points of view?
- Are there limitations in the ability of the experiment to answer research question?
- What further research could be done to follow up this study?
- What are the implications for theory or practice?

This is the last major section of your report, and here you have your chance to a) provide your interpretation of your results in relation to relevant psychological theories, b) compare your results with those in previous experiments, c) discuss any shortcomings of the experiment, and d) suggest possible important developments for future work.

It may be useful to look upon this section as the inverse of the introduction. There you started with a fairly general review of the relevant literature, and focused progressively on the present experiment, ending with a statement of the experimental hypotheses. In the discussion, you should take the opposite course: you will start by discussing the experimental hypothesis, stating how it fared in relation to the results of your experiment; then widen the area of discussion to include earlier research (e.g. does it add anything to the previous literature; does it agree with/contradict the earlier work, etc.); and state its significance implications for the area’s theoretical models or research practices.
The Discussion and Introduction should be consistent with and complement each other. However, these should not repeat each other – remember, these two sections have different aims and functions in the report. In the same way, the discussion should not just be a continuation of the Introduction. A lot has happened in the meantime (remember, you have carried out an experiment, you have learnt from your results, etc.). The Discussion has to add to Introduction, not just continue it as though nothing has been learnt.

As mentioned above, you should start the discussion by re-stating the main results of the experiment in an articulate manner and always in relation to the hypothesis(es) that you have been working on – are your hypotheses supported? If so, how? If not, how?

After this, contextualise your results in relation to the previous literature (how does it compare or add). Simultaneously provide an explanatory frame for your results, using the same theoretical models you cited in your introduction. If the experiment has resulted in negative or unexpected findings, do the same as above, and try to suggest alternative theoretical models that may frame or account for the result. Negative and unexpected results are not problematic or second rate results. They are experimental results just like those that support the hypothesis that you tested – remember that the operative word here is ‘tested’ not ‘sought to confirm’. Also, such results may actually be interesting. It is your function as a researcher and as an author to find how they may be interesting (this may take some further reading, beyond that which you had done so far).

Also, if you can see any methodological shortcomings in the study, describe these and (if you can) suggest ways in which they can be overcome. However, these should be relevant – ask yourself, could such shortcomings realistically have had any influence in the results? The obvious fact that (usually) your participants are all Psychology undergraduates, may well affect certain cognitive and personality related studies, but not performance related ones. Try to balance imaginative suggestions with realism. However, please do not always mention ...

- the sample size,
- use of undergraduate participants,
- or ambient noise

... as the default culprits of, for instance, negative results – these need to make sense.

Next, try to think of implications of your results for future research, and how you might extend the present experimental model to consider additional hypotheses. Similarly, you should also consider
the extent to which the results may be generalised: to what populations may you safely generalise?
To what extent are the generalisations limited by uncontrolled variables?

Finally, restate your main findings and conclusions in a fluent and clear final paragraph, so that the reader has some sort of ‘take home’ message from the study.
There is no easy guide to the length of a discussion: an experiment which has clear cut results, and little previous work, may warrant a short discussion; one with less clear results and an extensive literature may require a longer one. In all cases, remember that the key word is relevance and not length.

3.7 References
The content of this section should not be new to you in any way. The use, purpose and format of referencing has been covered extensively in Psychology 1. Therefore, you are expected by now to be able to construct a correct reference list.

Consult the APA format guidelines
- http://www.apastyle.org/elecref.html
- http://www.wooster.edu/psychology/apa-crib.html
- http://www.lib.usm.edu/legacy/tutorials/apatutorial/tutorialindex.html

Look at examples of reference lists in the Psychological literature (i.e. learn by example). As it was mentioned above, bad referencing will not be tolerated.
As a very quick overview, here are some rules:

- Order:
The list’s order is alphabetical, using the first author’s last name – e.g. Kelly, P. comes before Kendall, L, and after Johnson, R.P.

- Format:
  o The first author’s last name should be easily spotted. Therefore, as demonstrated in the examples below, if the complete reference of a book, chapter or journal article takes up more than 1 line, slightly indent all lines after the first line (this is easily done in Word, for instance, with the help of the top ruler).
  o Notice that italics are used in the examples below to note the first step in a series of steps that would take you to find the exact reference (think about the path that you would take if you were going to the Main Library to find this reference):
For a journal article, what would be the first step in finding it? Finding the “journal”, therefore this is noted in italics;

For a book chapter, what would be the first step in finding it? Finding the “book”, therefore this is noted in italics;

For a book, what would be the first step in finding it? Finding the “book”, therefore this is noted in italics.

Here are some examples:

1. **Journal Article:**

2. **Chapter in a Book:**

3. **Book:**

4. **Webpage:**
   A note about referencing webpages: there is a growing trend of students referring to webpages which have not been peer reviewed or screened for the validity of their content, and may largely consist of personal opinion. Be aware that referencing such sites is not encouraged. If in any doubt about any source, consult your demonstrator before using it.

5. **Reference work:**

### 3.8 Appendices

The final section of your report is the Appendices section, containing all material which adds or complements the information in the report, but which would otherwise damage the flow of the main report. However, these should be used with restraint and clearly referred to in the main text – e.g. “Individuals were asked to, first, carefully read and sign a consent form for their participation in this study (in Appendix 2). They were then requested to read the trial’s instructions (in Appendix
2), before initiating the task”. Appendices should follow a logical order. Therefore, in the example above, Appendix 1 would include the study’s consent form, which was mentioned before the trials instructions, which is then included in Appendix 2.

4. Some final words and thoughts

Please make sure that your report is your own independent work, even when you have collaborated on data collection, data analysis or other tasks with other members of your cubicle group. This is a fundamental requirement – see section on plagiarism in Appendix of Psychology 2 course handout. As you will be aware, Edinburgh University as a whole does not tolerate plagiarism of any sort. Regrettably, there have been several cases of plagiarism/cheating in recent years, which have been very unpleasant for all concerned, and have resulted in significant penalties being imposed on the students involved.

Finally, remember that your Demonstrator can help you develop a good report writing style. Pay close attention to their comments, both written and verbal, and you should soon acquire the necessary skills for good report writing. This is something that you are expected to develop during this year, not come into this year knowing beforehand – it is, and should be, a learning process. What has been presented here is a well-defined format, so that you can learn how to write reports using a firm set of guidelines. As you become more experienced in report writing, you will develop a more flexible approach, tailored to the needs of the specific experiment you are reporting, and to your own style.

It is also absolutely essential that you look at published papers to get a full idea of what is involved in a complete published journal article. The course will make use of journal articles throughout, use these not only as references for content, but also for format and style – the more you read, the better you get at writing.

Take the following as further suggestions, just to get you started:

- Take the British Journal of Psychology, Journal of Experimental Psychology: General, or Perception, Personality and Individual Differences (these journals are available in the Main Library catalogue, including electronic access);
- Look through the last two years of the journal series for examples of recent practice;
- Note how many published papers contain all of the details specified above;
• Take examples in style and some generic turns of phrase (e.g. “recent research suggests...”, or “the consensus so far is that...”, or “insofar as these result suggest that there is an effect of social pressure on task precision, these seem to be in accordance with Potter’s (2004) model of ...”).
Appendix 2
Searching and locating journal articles

Using a literature database
Most of your literature searches will be conducted using a literature database such as PsycInfo. A journal database consists of a huge collection of records with the essential data of many thousand academic articles, e.g. author, publication year, title, journal name, and abstract. Usually, the database does not include the text of the article itself. Searching a literature database involves narrowing down the list of articles to the ones that are relevant to you, whilst at the same time not accidentally sifting out those that you want.

Accessing Databases
Different Institutions buy access to different journals, therefore when you find a reference in a database, this does not necessarily mean that the University has subscribed to that resource.

Log into MyEd and you will be recognised as a University of Edinburgh Student. Click on the Library tab, and then click on the Library Resources button. You can then select a database from the Databases A-Z list.

Useful Databases
PsycInfo (www.bids.ac.uk): Large database with Psychology articles. Together with the Web of Knowledge your main source for literature searches. Requires a MyEd authentication.
Web of Knowledge & Web of Science (at wok.mimas.ac.uk): WOS is a large scientific database (WOK includes WOS), not specialised in Psychology. Requires an ATHENS password if accessed off-campus. Links directly from the lists of articles produced by searches to findit@edinburgh (see below)
The Library Catalogue (www.catalogue.lib.ed.ac.uk). You can use it to search for books directly and use the journal search function to check whether a journal that you found in an online database is available at the university. Also contains links to electronic journals if available.
ScienceDirect (http://www.sciencedirect.com/): Database of journals published by Elsevier. As a nice extra, many of the journals are directly available in an electronic format, which can save a lot of time. Requires a MyEd authentication.
findit@edinburgh A very recent update, which is in testing mode at the time of writing, but should be made the standard search tool soon, is a unique catalogue offered to Edinburgh University users, which allows to run a multiple search into selected database this is accessible via this link: www.searcher.lib.ed.ac.uk

Google Scholar (http://scholar.google.com) Google Scholar provides a simple way to broadly search for scholarly literature. From one place, you can search across many disciplines and sources: peer-reviewed papers, theses, books, abstracts and articles, from academic publishers, professional societies, preprint repositories, universities and other scholarly organizations. Google Scholar helps you identify the most relevant research across the world of scholarly research.

Google, Altavista, MSN, Lycos and many more are search engines. Some authors publish their articles online, either directly on their own websites or as downloadable pdfs. If you know that a certain author is relevant for your work, it often pays to see if you can find her personal university website and check the publication list and downloadable materials. This is also useful to try when the University does not hold a subscription for a specific paper you sourced from a database.

- WARNING: There is a lot of incorrect information on the Internet. Do not cite websites unless they belong to a reputable organisation, such as a governmental website when quoting a statistic. Internet resources are generally considered unreliable.

Searching a database

- Enter a single word or a string of words that will be treated as a single whole phrase and click Search.
- The result will be shown as a list of titles ordered by date. Have a quick look at the number of hits. If there are more than 100 you probably need to refine your search further. If there are less than 10 check the spelling of search terms and try to find other keywords. In this case, 2134 hits for “fMRI” means that we have to further refine the search.
- You can shortcut this process by using “and” or “or” in your search expression (“fMRI and autism”). The “or” option is very useful if you have two different names for similar concepts that you would like to cover with a single search, e.g. “affect or emotion”.

Open the “Complete Record” for an article that seems relevant. Check the abstract to see whether it really is relevant. If it is, skim title and abstract for useful keywords that you had not thought of and, most importantly, check the field labelled “Major Descriptors” as these are the subject keywords used by the database. Take a note of the potential keywords and use them for further searches.
Author’s names can be very useful keywords, as many researchers specialise in a certain area. When you know some of the “big names” in an area (e.g. from lecture notes), searching for a name plus a broad keyword can give very good results.
Appendix 3

Quick Overview of the Experiments
Background: In everyday social interactions, individuals must be able to respond to the mental states of others e.g. their knowledge, intentions, beliefs and desires. This ability to attribute mental states to others in order to predict and explain behaviour is referred to as theory of mind. There is considerable debate in the literature whether theory of mind is affected by healthy adult ageing. Some studies show that there are age-related differences in theory of mind and these changes are related to changes in other cognitive abilities e.g. executive function (Charlton et al., 2009). Yet, other studies have shown no affect of healthy adult ageing on theory of mind tasks but age effects on executive tasks (MacPherson et al., 2002). This project will examine the relationship between theory of mind and different aspects of cognitive function in healthy younger and older individuals.

Methods overview: For this project, younger and older participants will be asked to fill in the Social Situations Questionnaire (SSQ; Lawson et al., 2004) which assesses theory of mind abilities and the Physical Predication Questionnaire (PPQ; Lawson et al., 2004) and the two groups’ performance compared. Participants will also be asked to perform some brief tests of executive abilities e.g. task switching, response initiation and associations between performance on the different tasks examined.

General prediction: If theory of mind abilities as assessed using the SSQ rely on executive abilities, age effects should be found on both types of tasks and performance on the tasks should be related.

References:
**Background:** Broadly speaking, if people want to be “authentic”, they should behave in a way that is true to their core traits and values. Among social-personality psychologists, authenticity is typically conceptualised as a *trait*. In other words, authenticity is thought to be a stable individual difference, such that some people consistently behave more authentically than do other people. The purpose of the present project is to examine if and how a person’s current mindset — i.e., their *state* — influences responses on a measure of trait authenticity. This project is inspired by research and theorising on the distinction between “trait” and “state” anxiety (e.g., Endler & Kocovski, 2001). In brief, while this line of research shows that there is indeed within-person stability in anxiety, it does not mean that the situation has no influence on anxiety: regardless of one’s trait level of anxiety, certain situations make nearly everyone anxious (e.g., public speaking). The same may be true of authenticity: while some people may be more authentic than others on average, people will nevertheless experience variation in their levels of authenticity across different situations. Recent research suggests that this idea has merit (Heppner, Kernis, Nezlek, Foster, Lakey, & Goldman, 2008).

**Methods overview:** For this project, participants will be put into one of three different mindsets by asking them to recollect different types of past experiences: a “least me” experience, a “most me” experience, and a neutral/control memory. Following this, participants will respond to one of two different measures of trait Authenticity (either the measure by Goldman & Kernis, 2002 OR by Wood et al., 2008 – survey 2A OR 2B), along with answering a handful of questions about mood and self-esteem in between (survey 1).

**General prediction:** If authenticity is also a state (not merely a trait), then “priming” a past (in)authentic experience should affect how people respond to the trait-authenticity measures. A secondary, exploratory prediction is that the mindsets will affect the different subcomponents of each of the authenticity scales to different degrees (i.e., not all subcomponents will be equally susceptible to the priming effects).

**References:**


When was I the “least me”?

We are interested in exploring the situations and roles that lead people to feel the most ungenuine and the least like their true or real self. In other words, we would like to know what makes people feel “the least me”. Please use the lines below to describe an event that happened in your adult life: an event during which you felt least like your true or real self. Where were you? What happened during the event? What were you doing? Who were you with (if anyone)? How did the event make you feel? Please give as many details as you can. Afterwards, we will ask you a few questions.
When was I the “most me”?

We are interested in exploring the situations and roles that lead people to feel the most genuine and the most like their true or real self. In other words, we would like to know what makes people feel “the most me”. Please use the lines below to describe an event that happened in your adult life: an event during which you felt most like your true or real self. Where were you? What happened during the event? What were you doing? Who were you with (if anyone)? How did the event make you feel? Please give as many details as you can. Afterwards, we will ask you a few questions.
Where did I first live?

We are interested in exploring how people remember certain aspects of their lives. Please recall the first house you can remember living in. What did it look like (inside and out)? What was the neighbourhood like? Describe this house in as much detail as possible in the lines below. Afterwards, we will ask you a few questions.
Survey 1

Below are a number of words or statements. For each, circle a number on the corresponding scale to indicate to what extent you feel that way right now.

<table>
<thead>
<tr>
<th>Feeling</th>
<th>Scale 1</th>
<th>Scale 2</th>
<th>Scale 3</th>
<th>Scale 4</th>
<th>Scale 5</th>
<th>Scale 6</th>
<th>Scale 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upset</td>
<td>1</td>
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<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Proud</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Nervous</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Enthusiastic</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>I am satisfied with myself</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>I think I’m no good at all</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>I’m a person of worth, at least on an equal plan with others</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>I do not have much to be proud of</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
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</tbody>
</table>

Before turning to Survey 2, we’d like to make sure that you’ve recalled all you can about the topic you wrote about a few minutes ago. Think on it for a bit, and if there is anything you’d like to add, please use the lines below. Otherwise (or when you’re done), you may proceed.
Survey 2A

The following measure has a variety of statements that ask about peoples' perceptions of themselves. There are no right or wrong responses so please answer honestly. Use the following scale when responding to each statement by writing the number from the scale that most accurately characterizes your response.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>Neither Agree Nor Disagree</td>
<td>Strongly Agree</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. I am often confused about my feelings.
2. I frequently pretend to enjoy something when in actuality I really don't.
3. For better or for worse I am aware of who I truly am.
4. I understand why I believe the things I do about myself.
5. I want people with whom I am close to understand my strengths.
6. I actively try to understand which of my self-aspects fit together to form my core or true self.
7. I am very uncomfortable objectively considering my limitations and shortcomings.
8. I've often used my silence or head-nodding to convey agreement with someone else's statement or position even though I really disagree.
9. I have a very good understanding of why I do the things I do.
10. I am willing to change myself for others if the reward is desirable enough.
11. I find it easy to pretend to be something other than my true self.
12. I want people with whom I am close to understand my weaknesses.
13. I find it very difficult to critically assess myself.
14. I am not in touch with my deepest thoughts and feelings.
15. I make it a point to express to close others how much I truly care for them.
16. I tend to have difficulty accepting my personal faults, so I try to cast them in a more positive way.
17. I tend to idealize close others rather than objectively see them as they truly are.
18. If asked, people I am close to can accurately describe what kind of person I am.
<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th></th>
<th>Neither Agree nor Disagree</th>
<th></th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>I prefer to ignore my darkest thoughts and feelings.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>I am aware of when I am not being my true self.</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>I am able to distinguish those self-aspects that are important to my core or true self from those that are unimportant.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>22</td>
<td>People close to me would be shocked or surprised if they discovered what I keep inside me.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>23</td>
<td>It is important for me to understand my close others’ needs and desires.</td>
<td></td>
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</tr>
<tr>
<td>24</td>
<td>I want close others to understand the real me rather than just my public persona or &quot;image&quot;</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>25</td>
<td>I try to act in a manner that is consistent with my personally held values, even if others criticize or reject me for doing so.</td>
<td></td>
<td></td>
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<tr>
<td>26</td>
<td>If a close other and I are in disagreement I would rather ignore the issue than constructively work it out.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>I've often done things that I don't want to do merely not to disappoint people.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>28</td>
<td>I find that my behaviour typically expresses my values.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>29</td>
<td>I actively attempt to understand myself as best as possible.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>I'd rather feel good about myself than objectively assess my personal limitations and shortcomings.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>31</td>
<td>I find that my behaviour typically expresses my personal needs and desires.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>I rarely if ever, put on a “false face” for others to see.</td>
<td></td>
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<tr>
<td>33</td>
<td>I spend a lot of energy pursuing goals that are very important to other people even though they are unimportant to me.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>34</td>
<td>I frequently am not in touch with what’s important to me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>35</td>
<td>I try to block out any unpleasant feelings I might have about myself.</td>
<td></td>
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</tbody>
</table>
____36. I often question whether I really know what I want to accomplish in my lifetime.

____37. I often find that I am overly critical about myself.

____38. I am in touch with my motives and desires.

____39. I often deny the validity of any compliments that I receive.

____40. In general, I place a good deal of importance on people I am close to understanding who I truly am.

____41. I find it difficult to embrace and feel good about the things I have accomplished.

____42. If someone points out or focuses on one of my shortcomings I quickly try to block it out of my mind and forget it.

____43. The people I am close to can count on me being who I am regardless of what setting we are in.

____44. My openness and honesty in close relationships are extremely important to me.

____45. I am willing to endure negative consequences by expressing my true beliefs about things.

---

### About You

*Age (in years): ________*

*Gender (circle one): Female  Male*

Educational Attainment (tick the highest level achieved):

_____ Primary/Grade School

_____ Secondary/ High School

_____ Some College/University

_____ College/University Degree

_____ Postgraduate Degree

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*Thank you for participating*
Survey 2B
The following measure has a variety of statements that ask about peoples’ perceptions of themselves. There are no right or wrong responses so please answer honestly. Use the following scale when responding to each statement by writing the number from the scale that most accurately characterizes your response.

<table>
<thead>
<tr>
<th>1</th>
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<tbody>
<tr>
<td>Strongly Disagree</td>
<td>Neither Agree Nor Disagree</td>
<td>Strongly Agree</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. I think it is better to be yourself than to be popular.
2. I don’t know how I really feel inside.
3. I am strongly influenced by the opinions of others.
4. I usually do what other people tell me to do.
5. I always feel I need to do what others expect me to do.
6. Other people influence me greatly.
7. I feel as if I don’t know myself very well.
8. I always stand by what I believe in.
9. I am true to myself in most situations.
10. I feel out of touch with the “real me”.
11. I live in accordance with my values and beliefs.
12. I feel alienated from myself.

About You

Age (in years): ___________ Gender (circle one): Female Male

Educational Attainment (tick the highest level achieved):

_____ Primary/Grade School
_____ Secondary/ High School
_____ Some College/University
_____ College/University Degree
_____ Postgraduate Degree

Thank you for participating!