

Writing Lab Reports & APA Format

Structure and Content of a Laboratory Report

This following provides a brief overview of the structure and content of various elements in a laboratory report, based on APA guidelines. The APA publication manual can be referred to for more detail.

The purpose of a lab report is to communicate research in a clear, systematic and standardised way. Primarily, a lab report should communicate the following things:

- **Why did I bother?** Why did I do this experiment and why is it an interesting contribution to science?
- **How did I do it?** How did I carry out this research (this should be detailed enough so that the experiment could be replicated precisely)?
- **What did I find?** What were the results of your study?
- **So What?** What do your findings mean in terms of your hypotheses and what theoretical contribution do they make?



IMPORTANT!

The advice that we give you in this handout is not inflexible, it is a guide! For example, when we say that the title should be fewer than 15 words, the world will not end if your title is 16 words. So, please use your common sense. In case you don't have any, the snail of sense will appear to give you some advice.

Format

There are several sections to a lab report:

- Title
- Abstract
- Introduction
- Method
 - Participants
 - Materials (Optional)
 - Design
 - Procedure
 - Scoring (Optional)
- Results
- Discussion
- References
- Appendix (Optional)

Title

Your title should ideally be fewer than 15 words. A good title alerts the reader to the overarching theme of the work to be reported. A good title also captures the reader's attention. But the latter goal should not interfere with the former one. Don't use superfluous words, such as "An Empirical Investigation into Anxiety Disorders in Children with ...", when you could write "Anxiety Disorders in Children with ...".

- ✗ Too Vague: "The 'Beer-Goggles' effect".

- ✗ Too specific: "Investigation into the effects of drinking 6 pints of Guinness in a nightclub in Brighton at 11.30, while listening to drum and bass played at 100 db through a good sound system, on 12 men's and 15 women's ability to accurately judge the attractiveness of members of the opposite sex".
- ✓ About Right: "The 'Beer-Goggles' effect: the effects of alcohol on attractiveness ratings of the opposite gender".

Abstract

What is the study all about (in no more than about 150 words)? Abstracts provide a reader with the most important details. Ideally, the abstract enables the reader to decide whether he or she should read the article. Again, never promise more than can be given. Not everyone is going to be interested in the work; but that doesn't mean the writer shouldn't point out some of the most intriguing features of the study. The abstract should not be composed of selected sentences from the body of the paper. Instead, the writer should sit down and try to distil the essential elements of the work to be reported. The abstract is extremely important; it shouldn't be short-changed. It should be written last. This paragraph should concisely describe the problem under investigation and the motivation for the study, the participants, the experimental method, findings, and conclusions. You could try to write a sentence on each of these areas. To conserve characters in the abstract, type all numbers except those that begin a sentence as digits. Avoid ending the abstract with throw-away and uninformative statements such as 'These results will be discussed', or 'how these results relate to past theory will be discussed'.

- ✓ Ugly (1993) has shown that the propensity to misclassify members of the opposite sex as attractive is increased in nightclub settings. This study was designed to ascertain whether this effect is due to the dim lighting employed in these venues, or the consumption of alcohol in this setting. Ratings of the attractiveness of a set of stooge participants were taken in both a well-lit and dimly-lit nightclub by both sober and drunk participants. A 2 way ANOVA revealed a significant effect of alcohol consumption, but not of the lighting used. The results suggest that, contrary to Ugly's hypothesis, dim lighting does not contribute to the inflated attractiveness of opposite-gender mates; instead these ratings are influenced solely by alcohol intake.

Introduction

A good introduction addresses two questions: What has been done in this area by other researchers? and, What is the point of the present study?

The introduction is the place to include the review of the research literature that led to your hypothesis. For instance, you might show how prior findings are inconsistent or ambiguous. Explain how your experiment may clarify the problem. State your hypothesis explicitly toward the end of the introduction, after you have explained the research and thinking that led to it. Identify independent and dependent variables here: do this subtly, do not write things like 'The independent variable was amount of alcohol drunk and the dependent variable was the attractiveness of the mate selected', but instead say something like 'this study looks at whether the amount of alcohol drunk and the gender of the consumer has an effect on the attractiveness of the mate selected'. If you have made predictions about the outcome of the study, say so ('alcohol is expected to reduce the attractiveness of the selected mate'). Be sure you say why you expect these results. Do not expect readers to guess what you are thinking.

In the introduction, you are moving from the general to the specific: a general discussion of the problem area, to your specific hypothesis. Successive paragraphs should be explicitly connected and form the thread of a coherent argument. If we take the 'beer-goggles' example, a good 'broad' structure would be:

- Define the beer-goggles effect and why it is important.
- Describe relevant previous research and what it has told us about the beer-goggles effect. This could include theories of the beer-goggles effect.
- Describe the problems with previous research and/or explain any unresolved issues within the literature.
- Describe how you are going to overcome these problems/resolve this issue and why that will be an important advancement to our knowledge (and/or why it will have practical benefit).
- Informally state your hypotheses.

Do not criticise past work on the beer-goggles effect and then suddenly announce your prediction that the 'beer-goggles effect will be more pronounced in dim lighting'. What research has been done on levels of lighting and

attractiveness ratings? Why does this research lead you to this hypothesis? Have Staggering (1996) and Vomiting (2002) had a theoretical dispute over the origins of the beer goggles effect or the factors mediating it? Make sure everything you say is there for a reason that directly leads to the motivation for your study. Other issues can be taken up in the discussion.

Provide a rationale for your study. Most of you will do experiments that are subtle variations on the experiments given to you as inspiration. This means that you are replicating in spirit what the original researchers did, but in a slightly different way. Perhaps this is simply to check the generality of the results with a slightly different procedure and with different materials. If so, state what interesting differences there are between your study and the one you're replicating to show how your results extend their findings. Or you may be extending the research in a more radical way: for example, you may be applying the beer goggles effect to a domain in which (as far as you know) it hasn't been applied before (for example, attractiveness ratings of same-gender mates). Whatever the rationale of your study, state it. Related to this point, state why you chose the conditions that you did, and what you expect to happen. However, this needs to be stated informally (anyone writing 'my experimental hypothesis is that ...' will be fed to a large swimming pool of hungry piranha fish).

This section should not get a primary heading (i.e., "Introduction"), although subheadings may be useful to help organize the material for the reader.

Method

This section should be written so that someone else can repeat the experiment just by reading your method section. A key point throughout is include enough information for replication, but to not include superfluous information that you don't think has any bearing on the results of your study. The method section generally consists of up to four subsections:

1. Participants
2. Materials (Optional)
3. Design
4. Procedure
5. Scoring (Optional)



Subsections

Although the above 5 sections are recommended if you look through journal articles in different areas of psychology, and from different publishers you'll notice differences in these sections.

For example, it might not be sensible to have a 'materials' section for your particular piece of research, but you might choose to have a 'stimuli' section (common in cognitive psychology), or 'apparatus' (for example, if you have used an fMRI scanner, you might want to describe its details).

Similarly, the 'scoring' section is not that common in some areas of psychology, but in developmental psychology you might have a section on 'scoring' or 'coding' where you, for example, explain how you have transformed videos of children into numeric codes/values.

Also, some articles have a design section, whereas others don't. Just be aware that there isn't a 'law', just guidelines. Read a few APA journals (e.g. Journal of Experimental Psychology, Journal of Abnormal Psychology, Journal of Personality and Social Psychology, Emotion, Developmental Psychology) to see the variability in how research is written up.



Throughout the method, results and discussion, label any experimental groups with meaningful names, not with numbers or letters.

Participants/Subjects

Who was studied? How were they selected? From where were they selected? It is often sufficient simply to state the number of participants used in the study (perhaps with a breakdown by gender). However, it may be necessary to provide more information. For example, if the researcher is investigating racism, information regarding the participants' ethnicity, education, and socioeconomic background should be provided. This information might not be pertinent if the researcher were studying memory. It may also be necessary to describe the recruitment procedures for participants (for example if using clinical samples). For some studies, it may be enough to say that subjects were contacted by phone (or through the mail) and were paid for their participation (or that they received course credit, etc.) On the other hand, a good deal more may need to be said. Some research, in which participants must participate in several sessions, may require using postcards or phone calls to remind and motivate them. If this is the case, then the method used should be described. If not all participants contacted to participate actually completed the study, the number of individuals who did not participate and their reasons (if known) should be provided. Unfortunately, there are no strict guidelines about what information should be included. The researcher needs to use his or her best judgement.

There is no need to describe how participants were randomly allocated to groups, just state that they were; similarly there is no need to describe how experimenters were assigned to participants.

- Example: Fifty participants completed all conditions of this study: 25 were male and 25 female. Ages ranged from 18 to 39 years ($M = 24.26$, $SD = 3.52$ years). Participants were all undergraduate students at the University of Sussex who took part in return for free admission to the nightclub. All participants were naive to the purpose of the experiment.'



Use the word 'subject' only when referring to non-human animals (i.e. mice, rats, skunks, killer whales etc.). When referring to humans use the word 'participant'.

Materials/Apparatus/Stimuli

What equipment or instruments were used to collect data? If questionnaires were used, they should be described in this section, giving brief examples. If computers were used, describe the specific models of the computers and the software used to collect the data, if this is relevant to how the data was collected. Sometimes these sections are separated – the section for apparatus describes the physical tools to present or collect data, and the materials section describes the stimuli that participants see or hear. If materials (such as a questionnaire) were used, either cite your source (if published materials were used) or provide a copy in the appendix of your paper if you devised the instrument yourself. For example:

- Considered Ratings of Attractiveness of Personality Scale (CRAPS), Legless (1994): the CRAPS was used to measure each participant's opinions of the attractiveness of the stooges' personalities. This scale is a 45-item self-report questionnaire containing a 5-point Likert response scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Dazed and Confused (2005) found that, compared to other assessment scales, the CRAPS is a better measure for discriminating between nice people and statistics lecturers, and has high internal consistency, $\alpha = .83$.
- Considered Opinion of Attractiveness Rating scale (COAR), Nicearse (1992): the COAR was used to ascertain participant's opinions of the physical attractiveness of the stooges. This scale is a 30-item self-report questionnaire containing a 5-point Likert response scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Minger (2003) found that, compared to other assessment scales, the CRAPS is a better measure for discriminating between ugly and attractive people, and has good internal consistency, $\alpha = .76$.



There is no need for an apparatus section unless you have complex apparatus. In materials, there is no need to list objects that you self evidently used, such as pieces of paper, pens, chairs and tables etc. Instead, in materials you should describe only the stimuli and their relevant properties and the criteria by which you selected or constructed them. For example, if participants had to view a video tape of a traumatic event, from where did the footage come?

Design

This heading is normally included only if you have an experimental design that is complex, such as mixed design with several independent or dependent variables. Otherwise, this information would be part of your procedure. It should explain to the reader clearly what the different conditions are and how they were manipulated. This tells the reader about what form the experiment took. How many people took part in each condition and what did you ask them to do? Did each person perform in all the experimental conditions? Did you have a number of different groups of people, each of whom took part in only one experimental condition (i.e. repeated measures -vs- randomised design)? How did you decide who was in which group, if you used a randomised design? What kind of measurement scale best describes the data you collected? State clearly what your independent and dependent variables were and how they were operationalised.

- Example: A repeated measures design was used. There were two independent variables: the lighting used in the nightclub (bright or dim) and the level of alcohol consumed (none or 6 pints). There were two dependent measures that were analysed separately: the participants' ratings of physical attractiveness (the COAR scale) and the participants' ratings of the attractiveness of personality (the CRAPS scale). Participants took part in all four conditions of the experiment.

Procedure

How were the data gathered? Were participants run individually or in small groups? Were participants tested in a laboratory or in a field setting? How were relevant dependent variables assessed? Did participants respond using a questionnaire, a computer, or were their behaviours assessed using videotapes and trained raters? Give enough information for replication, but don't give information that would not be relevant to how the results were obtained, e.g. don't say 'participants entered the laboratory and were told to sit down on the provided chairs' unless the chair has a steaming dog-turd on it and your study is about reactions to being asked to sit on steaming dog turds.

In the procedure, make sure you describe what the cover tasks were; the reader should not have to refer to the appendix, materials section, etc, to know what the procedure was (conversely, don't put procedural information in the materials or other sections). Note if participants responded to the cover task questions verbally or in writing; if verbally, how did you record the participant's responses? Were participants run individually or in groups?

Results

What did you find? The first paragraph in the Results section should include a brief overview of the analyses to be described. This might include summarizing the hypotheses to be investigated. In subsequent sections, the researchers should state the specific hypothesis being evaluated and describe the analyses that were performed to test the hypothesis. The results should then be reported. Generally, one reports descriptive statistics, then inferential statistics, then states in words what was found. It may be helpful to provide a table or figure to aid in presenting the results from specific analyses.

- This section should be a summary of your findings.
- Begin with a description of the analysis (optional).
- Describe the data (Means, SDs etc.). If you have lots of summary statistics (i.e. means) to report, use a Graph or a Table instead of writing them.
 - Remember to give any graphs or tables full titles - remember to label the axes on graphs.
 - Graphs of means should include error bars.
- Report the findings in sentence form.
- Include the results of any statistical tests and explain what these tests mean in relation to the experiment and your initial predictions.
 - Report statistical tests in APA format (your stats handouts will advise you on this for tests we do this year, and Field (2009) and Field & Hole (2003) also summarise how to report a variety of different tests).
 - There should be no leading zero before correlation coefficients or probability values. So, it is correct to report $r = .32$, or $p < .001$, but incorrect to report $r = 0.32$, or $p < 0.001$.

- Finally, ask yourself “If the graphs and/or tables were removed, could the reader still understand the results from the text I have written?” If the answer is ‘no’ then you haven’t included enough information on how you did your analysis and what it means.
- ✗ Don’t cut and paste tables straight from SPSS – reformat tables using APA guidelines to include only pertinent information, and graphs may need to be edited in the SPSS graph editor.
- ✗ Do not include raw data.
- ✗ Don’t present the same data in both a graph and a table - do one or the other.
- ✗ Do not discuss or interpret your results in this section—save it for the discussion section.
- ✗ Do not try to complicate the results section. You don’t get extra marks for trying to flash for the sake of it. The best experiments are elegantly designed so that they can be analysed with a straightforward statistical procedure.

Results



Although you often get told not to ‘interpret’ or ‘discuss’ your results in the results section, this doesn’t mean that you can’t talk about them at all. Note that I’ve also said that you *should* ‘report your results in sentence form’. So, it’s good to report a result and say something like ‘... indicating that difference in attractiveness ratings due to lighting was present in the sober participants but not the drunk ones’. That’s not discussing your results, that’s stating what they are. However, you should try to avoid saying things like ‘...indicating that difference in attractiveness ratings due to lighting was present in the sober participants but not the drunk ones, which supports Drunk’s (1978) theory of the beer-goggles effect, in which he states that lighting will magnify the effect of beer on attraction’.

Example:

Figure 1 shows the mean attractiveness ratings given by participants in each of the four experimental conditions. The graph shows that when participants were drunk, the attractiveness ratings were higher than when participants were sober, supporting the idea that the beer-goggles effect is alcohol dependent. In addition, although the level of lighting appeared to have an effect in sober participants (attractiveness ratings were higher in bright lighting conditions compared to dim), in drunk participants lighting had little impact (the means are very similar across lighting conditions).

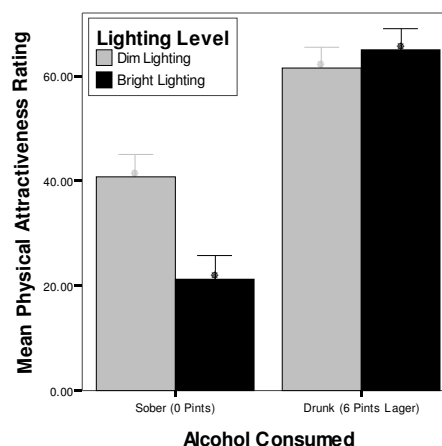


Figure 1: Graph showing the mean physical attractiveness ratings (and 95% confidence interval) given by participants when sober and drunk, and in dim and bright lighting.

A two way 2 (alcohol: 0 pints or 6 pints) \times 2 (lighting: dim vs. bright) repeated measures ANOVA was conducted on the attractiveness ratings. This revealed a significant main effect of alcohol, $F(1, 25) = 287.78$, $p < .001$, indicating that attractiveness ratings were significantly higher when participants were drunk. There was also a significant main effect of lighting, $F(1, 25) = 14.04$, $p < .01$, indicating that attractiveness ratings were significantly higher in dim conditions. The alcohol \times lighting interaction was also significant, $F(1, 25) = 47.29$, $p < .001$, indicating that difference in attractiveness ratings due to lighting was present in the sober participants but not the drunk ones.



APA Format

Reporting your results in APA format IS important because it ensures that we communicate numeric data in a way that everyone understands. Therefore, using *M* to represent the mean, *SD* to represent the standard deviation and so on, matters because everyone can be 100% clear about what you're reporting. So, this is one respect where (in my opinion) attention to detail is good.

Discussion

- ✓ Start your discussion by summarising your main findings. Even though the results were described in some detail in the Results section, they should be briefly reviewed here. You shouldn't include any statistical results in the discussion, only the conclusions from them. This portion of the Discussion section need not be longer than a short paragraph.
- ✓ Then relate these findings back to your original predictions, and in turn what this means in terms of the question you were originally trying to answer. What are the theoretical implications of your findings?
 - Do the results support, contradict, extend or qualify the previous findings? The implications of each of the major findings should be discussed. It is particularly important to link the findings obtained in the study being described with those of other researchers. The reader should be told how the researcher's findings fit into the available literature on the topic, and what the implications of these findings could be. Speculation can also be offered to explain the data if they are not consistent with other research
- ✓ What are the weaknesses of your own study? Are there any factors that could be improved?
 - When bringing up criticisms of your study in the discussion, relate what you say to the conclusions you drew. How could the particular point you bring up undermine the conclusions you draw? If it cannot, then it is not a useful criticism of your study. Just because a variable you did not control e.g. an individual difference between people (or a materials variable) could influence the dependent variable, it does not mean there is a problem with your study. Remember the magic of random assignment of participants to groups. If you bring up a problem explain why it is really a problem.
- ✓ Suggest some areas for future research based on what you've found.
- ✓ Finally, conclude by summarising the main findings and their implications.
- ✗ Do not repeat statistical details in your discussion (those that do will be dragged naked through a field of stinging nettles).

Your lab report should follow the shape of an hour glass. It should start in the introduction in broad terms as you introduce the background to your study, narrow in the middle as you describe your study in detail, and then broaden out towards the end as you discuss the implications of your findings.

References

Follow the APA style guidelines summarised below.

Appendix

If more than one set of items is included in the appendix it should be given alphabetically, labelling each with a letter APPENDIX A, APPENDIX B etc... on separate pages. You won't normally be marked for materials in the appendix, but it is worthwhile including materials that you have created especially for the study that the reader would not be able see somewhere else through a reference. In some cases your results might be worth including, if they would help the

reader in understanding your study, such as the inclusion of transcribed interviews in a qualitative study. Here are some examples of what you put in:

- ✓ Full instructions given to participants.
- ✓ Full list of stimuli presented to participants.
- ✓ Master copies of questionnaires, forms etc. used in the experiment (e.g. a parental consent form).
- ✓ Diagrams or sketches of unusual experimental equipment.
- ✗ Do not include any SPSS output unless you are told to do so.

How to Write Well

A good lab report would be well written, which would involve having well constructed sentences, without grammatical errors and spelling mistakes. Sentences should follow on from each other logically, and paragraphs should be used appropriately. Advising how to do this is beyond the scope of this document, but there are numerous guides on the internet and books in the library that can help you in improving your writing. One classic work is:

- Strunk, W., Jr., & White, E. B. (1979). *The elements of style* (3rd ed.). New York: Macmillan. Which is available online: <http://www.bartleby.com/141/>

You would also benefit from looking at the style of writing found in articles from psychology journals, and using them as a model of how to write.

Good writing is a process that takes time, care and practice. Some basic process tips on writing any kind of academic work are given below:

- **Never turn in a first draft.** The secret to good writing is re-writing. Review and edit your paper — several times, if necessary — to achieve your best work. The quality of your grade will depend on the quality of your work.
- **Never write your paper the night before (or day) it is due.** Write your paper, then walk away from it for a day or two. You will be surprised at the mistakes and improvements you will discover when you re-visit it!
- **Every paper is too long.** A good paper is direct, to the point, and economical. A good exercise is to (a) write your paper, (b) wait a couple of days; then (c) rewrite your paper cutting the length by one-third.
- **Always proofread your papers.** Nothing makes a bad impression on a tutor like a paper that contains obvious typographical, spelling, punctuation, and grammatical errors. In addition, never rely on your spelling checker as your proof-reader. Spell checkers generally cannot correct grammatical or punctuation errors. Spell checkers also miss typographical errors where the word used is incorrect, however, it is spelled properly (e.g., form instead of from).
- **Work from an outline.** It does not matter if you have all the facts if the reader has to work to make sense of your paper. Content is not enough. It has to be well-organized. Any lack of organization will be obvious.
- **Make it interesting:** Remember that someone is going to read your paper, so make it interesting. No one likes a flat, monotonous, colourless recitation on a topic.
- **Make sense:** give your report to a non-psychologist. If they can understand it then you have probably written it clearly.

What the Hell is APA Style?

Your lab report should follow the same format as an article submitted to be published in a Psychology Journal. There is a 'right' way to write papers in psychology, which is governed by a set of rules called APA style. This does not refer to writing style but to an editorial style which is followed by journals of the American Psychological Association (APA) and used by many other journals in psychological and social sciences. *We expect you to follow APA style in all written work*

for this course. This editorial style consists of rules or guidelines that a publisher observes to ensure clear and consistent presentation of written material. Editorial style concerns uniform use of such elements as:

- Punctuation and abbreviations
- Construction of tables
- Selection of headings
- Citation of references
- Presentation of statistics
- Many other elements that are a part of every manuscript

The style is documented in the 440 page long APA Publication Manual (5th ed., 2001). Today the manual is in its fifth edition (the sixth has just been published but my copy hasn't arrived yet so I can't tell you how it differs from the fifth), and the APA format described in it is a widely recognized standard for scientific writing in psychology and education. It's an unwieldy beast, and although copies are available in the Sussex library (Main/Reserve/Short QZ 35 Ame), only a madman would read it from cover to cover. Summaries of the rules for using APA style are available on the internet. A useful 'crib sheet' that summarises important aspects of APA style is:

- <http://www.wooster.edu/psychology/apa-crib.html>

This link below has in a great to resource for writing psychology reports and using APA style:

- <http://owl.english.purdue.edu/workshops/hypertext/apa/index.html>

The APA Manual draws a distinction between *final manuscripts* such as class papers, theses, and dissertations, and *copy manuscripts* to be submitted for review and publication. Final manuscripts differ from copy manuscripts by having double spacing and placing figures and tables at the end. Your laboratory reports should be 1.5 spaced (or double spaced if you want to waste paper) and tables and charts should be placed at appropriate places in the text.

This all Sounds Horribly Complex: I'm Going to Have a Nervous Breakdown!

Don't (have a nervous breakdown, that is). We don't expect you to follow APA style to the letter. We aren't concerned if you don't indent paragraphs in the exact way specified by the APA, for example, as long as the lab report looks presentable. Again, a good way to get an idea of how to format your paper is look at recent journal article in the field that you are writing on and emulate the style they have used. Articles can be easily viewed from the electronic resources for psychology section from the library, available at this link:

- http://www.sussex.ac.uk/library/subjects/psych_indexes_and_abstracts.php

However, there are certain aspects of APA style that we do expect to be adhered to, such as the use of references and presentation of results, which we will give some pointers for. Other notable aspects are:

- **Word-Processing:** Reports should be word-processed, with a size 12 serif font (such as Courier or Times New Roman) with no handwriting.
- **Use of Colour:** Use colour only when it is absolutely necessary – most figures and graphs in APA publications are clear enough without the use of colour.
- **Numerical Values:** Use figures to express numbers 10 and above except at the beginning of a sentence; spell out words for nine and below, except for numbers used in conjunction with a larger number (e.g., 5 to 12), numbers in mathematical functions, and numbers denoting place in a series (e.g., Grade 6).
- **Abbreviations:** Give the full title of abbreviations on their first usage; don't overuse abbreviations and acronyms.
- **Emphasis:** A general rule of thumb is to use italics and other marks of emphasis (i.e., such things as quote marks, dashes to separate words, and capitalized letters) sparingly.

- **Quotations:** Short quotations (fewer than 40 words) should be incorporated in the text and longer quotes in freestanding, indented blocks of lines (double spaced), without quotation marks. Start such a block quotation on a new line, and indent the block about 1/2 in. (1.3 cm, or five spaces) from the left margin (in the same position as a new paragraph).
- **Statistical Notation:** Throughout your results sections you should follow APA conventions, these will be highlighted in handouts on particular topics and examples can be found also in Field (2009). The following are a few common terms: *SD* (standard deviation); *N* (total sample); *n* (portion of a sample); % if preceded by a number or use *P*; *t* (in association with the computed value of a *t*-test); *Mdn* (median); *M* (mean); and *p* > .05 (for probability greater than .05).

How Do I Reference Material?

- Your use of evidence is crucial to a successful lab report. Don't write "evidence suggests..." or "figures show that 58% of people have some kind of anxiety disorder" – always cite from where your evidence comes.
- References cited in text must appear in the reference list; conversely, each entry in the reference list must be cited in text.
- Don't include references in the reference list that you didn't include in the text.
- You should also not cite articles that you read about in a secondary paper or book, without acknowledging that you haven't actually read that article. Guidelines on how to cite secondary sources can be found here: http://cmhs.utoledo.edu/npiazza/course_info/2ndSource.htm. You can cite secondary sources, by saying something like: Smith (1998) suggested that anxiety disorders can be bad for you (as cited in Jones, 2000). You should include the reference to the Jones article at the end, but you don't include the secondary Smith reference.

References in the Text

To refer to an item in the list of references from the text, an author-date method should be used. That is, use the surname of the author (without suffixes) and the year of the publication in the text at appropriate points. Example:

- ✓ Evidence suggests that drunk people tend to overestimate the attractiveness of the opposite sex (Legless, 1994)
- ✓ Studies by Legless (1994, 1987) indicate that drunk people tend to overestimate the attractiveness of members of the opposite sex.
- ✓ Largerlout (1987) found that alcohol did not impair his ability to judge the attractiveness of women, however, his subsequent marriage to Daisy the cow casts doubt upon his findings.

Citing Work of Two or More Authors

When a work has two authors, always cite both names every time the reference occurs. For works with three, four, or five authors, cite all authors the first time the reference occurs. In subsequent citations, include only the last name of the first author followed by et al.

Reference List at the End

The references should be given on a separate page and listed in alphabetical order. If there is more than one author, use the first author's surname. Two papers by the same author go in date order (older one first). If both appeared in the same year, indicate by letter e.g. 1998a and the second 1998b. The following gives some examples, showing a dual authored journal article, a web-page, an edited book, a single authored journal article, and a book in an edited volume. For other examples consult the crib-sheet link given above or the APA publication manual.

Journal articles:

- ✓ Slaughtered, V., & Offmyface, J. (1994). The effect of alcohol on perception of objects. *Journal of Liver Cirrhosis*, 15, 154-167.

Books:

- ✓ Drunkwoman, M. G. (1992). *Beer-Goggles: Fact or fiction*. Langedred, USA: Betty Ford Clinic Press.

Chapters in Books:

- ✓ Shit-faced, H. (1991). A few pints never stopped me from being able to accurately judge attractiveness. In Drunkwoman, M. G. (Ed.) *Some boring case histories from people who think that they are immune to the effects of alcohol* (pp. 234-246). Yawn, USA: Boring Press.

Reporting Results

There is a specific way in which to report the results from inferential statistics, which is given in the APA publication manual. When giving means, always include the units of measurement. Means should be accompanied by their standard deviations or standard errors (also give units for these). Don't report more decimal places than you can precisely measure, as it implies your tool of measurement is more accurate than it actually is. An example of sentence from a results section is:

"The mean score in the conflicting condition (37.5s, *SD* 5.9s) was significantly greater than the mean score in the consistent condition (24.3s, *SD* 6.8s) and this difference was significant ($t(67) = 4.38$, $p < .05$)."

Throughout your statistics handouts you will be given advice on APA format for particular techniques. Field (2009) and Field & Hole (2003) also have examples of how to report results in APA format.

Using tables and figures

'Figures' is the technical term for graphs, charts, drawings and pictures. When correctly used they can be invaluable in aiding the presentation of complex data. Avoid duplication description of data, i.e. don't have table and graph that shows the same thing, and describe the data in detail in your text as well. As well as mentioning the figure or table in the text, you should also describe in words what they tell you, such as the main trends of results that a figure shows.

Figure checklist for APA style:

1. All figures included in a paper should be necessary for understanding the results.
2. Figures should be simple, clean, and free of elaborate detail.
3. Always double-check to see if data have been plotted correctly.
4. All figures should be mentioned in the text (e.g. 'see Figure 1').
5. All figure labels are numbered consecutively (Figure 1, Figure 2, etc.).
6. The length of the vertical (Y) axis should be approximately 2/3 the length of the horizontal (X) axis.
7. The dependent variable is plotted on the Y-axis, and the independent variable is plotted on the X-axis.
8. Clearly label each axis with respect to what was measured, quantity measured, and units in which the variable was measured.
9. Choose the appropriate scale units (length of intervals) so that the figure will not distort actual data points.
10. Make sure that the scale points on each axis have equal intervals.
11. All figures are followed by a caption, which is written below each figure and ended with a period, e.g: 'Figure 6. Reaction time in seconds as a function of the intensity of the stimulus'.

Table checklist for APA style

1. All tables included in a paper should be necessary for understanding the data.
2. Tables should be simple, clean, and free of elaborate detail.
3. Always double-check to make sure the data are correct.
4. All tables should be mentioned in the text.
5. All table labels should be numbered consecutively (Table 1, Table 2, etc.).

6. The data are listed in an orderly fashion with the decimal points falling in a straight vertical line.
7. All tables include a caption which is located directly below the table label. These should be concise but communicate essential features of the table (what it measures and in what units).

How to write a REALLY good lab report

In the course document there is a guide to what each grade means. This is well worth reading and bearing this in mind when writing your lab report and in your self-evaluation of it. If you really want to get top marks, then you should be aiming to write a lab report that, in principle, is worthy of publication. If you want some advice on what makes papers worthy of getting published and what makes others get rejected, the following guide is useful. This link below is from APA and provides a gateway to online tutorials and the like.

→ <http://www.apastyle.org/>

If all as else fails, you might want to read:

→ Field, A.P., & Hole, G. (2003). How to design and report experiments. London: Sage.

General Tips

- ✓ Write in past tense throughout. The only exception is when you make your predictions at the end of the introduction; these can be in the future tense (e.g. 'sobriety will predict accuracy of attractiveness ratings').
- ✓ Generally experiments are written up in the passive voice (i.e. it is not appropriate to say 'I', 'we', or 'my'). However, the APA have relaxed on this issue a bit (which is a good thing because it makes science more readable). However, if your report is littered with 'we did that' and 'we did this' and 'I think that' you will do badly. It is still the norm that the passive voice is used, it's just that we won't complain quite as much as we used to if the occasional 'we predict that...' creeps in.
- ✓ Make sure any factual assertions are substantiated with a reference or your own data (*n.b.*, your own *data* not your own *experience*): don't make sweeping statements and generalisations without good evidence. Saying things like 'I think the beer goggles effect is rubbish because I can drink 10 pints and never end up waking up next to a gibbon' will result in a large electrical current being passed through parts of your anatomy that ensure the beer goggles effect will no longer be something with which you unduly concern yourself.
- ✗ Do not use technical terms (especially statistical ones) inappropriately: the marker will not be fooled!
- ✗ Do not quote other people without referencing them: this is plagiarism and the university gets very upset about it.
- ✗ Do not copy your mate's report: It is very easy to detect, it is nearly always picked up on, and the results are usually unpleasant for all concerned.

Acknowledgements

This handout has a long history. Some of it is from an old handout I did in about 1998, it also cribs some stuff from an old handout of Zoltan Dienes, and much of it comes from a handout Shane Lindsay did in 2004. Shane's handout used material found on the following sources:

- Writing Lab Reports in Psychology, Greg Pierce, Psychology Department, Copyright © 2003 The Trustees of Hamilton College. All rights reserved.
- Preparing your laboratory report by Dr. Jan Kennedy, <http://www.psychwww.com/tipsheet/labrep.htm>
- Owen Williams, University of Minnesota, Crookston
- <http://www.wooster.edu/psychology/apa-crib.html>

Needless to say, you should consult these excellent resources, and I am grateful to the authors for generously making them available. I also apologise to them for taking their work and inserting loads of gratuitous smut, and my own (no doubt) extremely bad advice. They should not be blamed for these additions.