

WRITING LABORATORY REPORTS

Each student is required to prepare **three written reports**, based on three experiments conducted in the laboratory, according to the specific format described below.

The following descriptive outline of the substance, style and organization/format of the manuscript is based upon the standard requirements for publication of a research paper in a journal of the American Psychological Association. Specific and more extensive details are provided in the APA Publication Manual (American Psychological Association, *Publication Manual of the American Psychological Association*, 5th ed., Washington, D.C., 2001).

Although most of the experiments will be conducted as a group, your write up is to be done individually. You can include readings from your workbook, but you will be required to provide a more thorough and complete review of the literature relevant to your study. This will require doing library and/or web-based research on the topic and incorporating the details from a number of published scientific reports into your paper.

Writing a lab report is not that tricky, but there are ways you can help yourself. One way to improve your paper is to model it after the articles you will be reading for your papers. When you collect literature for your papers, study how those authors write about the questions or issues related to your experiment. This is instructive because, in a sense, you are seeing how other authors have solved the problem you are faced with; namely, how to write a paper on the same topic as your paper. You can learn from seeing which topics they do and do not include in their papers and how much space is devoted to each topic. If you use this information as "advice" on how to write and structure your paper, yours will be better. Feel free to ask or discuss any questions or comments you may have during the semester.

Your paper will be better if you tell a "story." Remember, every experiment is done for a purpose and this purpose is the basis for your story. As you work on your paper, it is important to keep that purpose in mind at all times. What you write, how you write it and in what order you write it should reflect the story you are trying to tell. Just as order is vital to the telling of any story, it is also vital in a lab report. Think about these points as you read different papers and decide for yourself which papers you think are interesting and well written. To help you improve your writing skills, I have created a class web site that provides web sources on writing improvement.

Outline of Report

The general rule regarding line spacing is to double space your entire report.

Title page (page 1)

A cover sheet contains the title of the report, as well as the author's name and institutional affiliation (i.e., Queens College/City University of New York). Also, include a "Running head," a title that will appear along with the page number on each page.

The titles of the following sections are set off by a centered heading, in lower case letters:

Abstract (page 2)

The purpose of this section is to provide a brief (100-150 words) summary of your experiment, including the experimental question or purpose, methods, results (what you found), interpretations and conclusions. Write 2-3 sentences for each of these four points. The best way to do this is to write the abstract last. Then you can use modified sentences from each of the four sections in the paper you've already written.

Introduction (page 3)

The purpose of the Introduction is to present a review of the relevant background literature and to lead up to the main goal of your experiment. In the main body of the Introduction, the experimental study is presented in historical, theoretical and empirical context. This is accomplished by (1) a statement of primary phenomenon of interest, (2) a summary review of the relevant theories, concepts and ideas in historical perspective, and (3) the methods, findings and interpretations/conclusions of related research studies. Be sure to include the reasons for considering the problem/questions interesting and/or important.

The best (and easiest for the novice) way to write about studies from the literature in your Introduction is to cover four key points in succession: 1) the question/purpose of the study, 2) the experimental conditions (i.e., methods), 3) the results of the study and, 4) the author's conclusions. A brief description on each of these points (1-2 sentences) will give the reader (and you) all the necessary information to fully understand the study you are describing.

The Introduction section ends with a brief description (usually about one paragraph) of your study (i.e., the problem that was investigated), and the formulation of a specific set of predictions (i.e., expected results and their theoretical and/or empirical rationale). The experimental hypotheses being tested are enumerated and **briefly** explained.

Other points:

You will find it very instructive if you study how issues are dealt with in the papers you cite since they are trying to make the same kinds of points that you are.

If your experiment addresses more than one issue/question, cover each in their order of importance. In such cases, the different questions should be discussed separately throughout the paper, always in the same order.

There should be no quotes in the Introduction. Quotes are used only very rarely in scientific papers (usually for precision and emphasis because the author is about to disagree or refute what is in the passage). There will rarely be a sufficiently compelling reason for you to include them in your reports.

When you use a term for the first time (e.g., full report, partial report, sensory memory, in order, any order), you must define it for the reader. The same is true for abbreviations which should be defined upon the first appearance in the paper. For instance, "In the present study, reaction time (RT) was used to examine . . .". This is a very important point because failure to provide definitions of all relevant terms/concepts means that your reader probably won't understand what you are trying to say.

Methods

The purpose of this section is to describe your procedures in sufficient detail so that a researcher who reads it will be able to replicate your experiment and get the same results. Use this fact as your criterion for including details in this section. For example, the number of

cubicles, color of the walls, whether you walked the participant to the room, etc. are irrelevant and should not appear here (this section is not a history). A second purpose of this section is to permit a reader to evaluate your results independently.

In this section, the essential details of the investigation are described, including the number, selection and characteristics of the participants, the setting and conditions of the study, the instructions given to the participants, the specific stimuli, materials and apparatus used (specific model names and numbers are not required), the precise procedures employed, and the methods for obtaining and scoring of responses.

To organize better this section, use the subsections described below. The heading of each subsection is flush with the left-side margin of the paper.

Participants

The number, source and characteristics (i.e., mean age and SD, gender, education, handedness, vision--normal or corrected-to-normal) of the participants are described. You also must mention that informed consent was obtained prior to beginning the experiment.

Experimental Design

This subsection begins with a thorough description of the experimental conditions (the independent variables). This includes a description of how the independent variable(s) was manipulated with respect to participants, the nature of all conditions along with details of how the conditions were ordered (i.e., what was counterbalanced and how). The dependent variable(s) are described next. All other relevant controls should also be described. In between-groups designs, the manner of assignment to the different groups should be described here, along with the characteristics of every group.

Note: This subsection is necessary when complex (i.e., multi-variable or multi-level) experimental designs are employed. It may be omitted when simple designs are employed (e.g., experimental vs. control condition, one-way designs). In that case, information in this section concerning the independent variable should be provided at the beginning of the Procedure section.

Procedure

This subsection continues with a concise description of the experimental procedures. Organize this around the events in each trial: including the order, timing and details about all the different stimuli that were presented. When you get to the imperative stimulus, give the specific details about its nature (duration, the visual angle of visual stimuli or intensity of auditory stimuli, how presented, what letters/words were used, etc.). Then, describe the nature of the participant's task and how they made their responses. Include some detail on the instructions to the participant regarding task performance.

In the next paragraph, describe the remaining important details of the testing situation and conditions (such as the number of trials of each type, the number of trials per block, were the blocks or conditions presented randomly, the length of the practice and experimental portions of session--were they time-based or performance-based, the % correct criterion for ending practice).

Details on participant debriefing methods/questions should be mentioned last. This can be in a separate section if you want.

Statistical Tests

This section describes the data reduction procedures and specific designs of the various statistical tests done on every dependent measure. The descriptions for every statistical test should be presented in terms of the question that the analysis is designed to answer.

Results

In this section, the findings (results) of the study are presented. They should be presented **in the context of the questions asked in the experiment**, along with a minimum of interpretation. If there are two or more questions, give the results pertaining to each one in turn. The easiest way to organize the results section is to divide it into subsections, with a different subsection for each condition. This makes sense because each of your conditions was done in order to answer a question empirically. Thus, be sure to include the answer to that question in each section. **For each question (or subsection), begin with a brief statement of the issue being addressed by the data, followed by a description of the data, supporting statistical analyses, and a final one-sentence summary/conclusion.**

The first section of the results usually describes the overall accuracy (mean and SD) of the participant's performance on the task. For this, you must compute a mean and standard deviation from the individual-participant means (these will be given to you in class).

The basic data (e.g., RTs, mean number of errors, recall, etc.) are summarized in *clearly-labeled* tables and figures (which appear at the end of the report on separate pages), as well as in the form of a verbal narrative. Avoid redundancy; do not repeat numbers that appear in the figures/tables in the text of the Results. The results of the statistical analyses of the basic data are also summarized here verbally in the text.

Be sure to include the results of the statistical analyses in an appropriate manner. For example, when presenting ANOVA results, say: "There was a significant effect of accuracy, as organized lists were better remembered than disorganized lists [$F(x,y) = x.xx, p < .0x$]." or "Accuracy decreased significantly as the cue delay time increased [$F(x,y) = x.xx, p < .0x$]."

If you debriefed your fellow students (a very good practice), then summarize your findings in the final section of the Results.

Discussion

The purpose of this section is to allow you to interpret your results by telling the reader what you think they mean (relative to the issues you raised in the Introduction) **and** to place them into the context of other related studies. Thus, you need to compare your results directly with those of other studies in the literature (presumably those you mentioned in the Introduction). If your results do not compare well with those of other studies, you will need to advance some reasons why this happened.

Begin (first paragraph) with a brief summary of your findings (in words, not numbers) and their implications. Continue (subsequent paragraphs) by summarizing how your findings relate to those in the relevant literature cited in your introduction. These paragraphs should be organized along the same lines as you organized the introduction and results. This is done because the questions/issues are consistent throughout your paper. These sections can be followed by a discussion of the problems or weaknesses (methodological or theoretical) with your study (in the order of their importance). Next, if applicable, discuss any possible alternative

interpretations of your results and outline possible future directions for this research area (based on your findings). Finally, provide a brief concluding paragraph with the take home message.

Be sure your discussion covers **all** the major issues/questions raised in the Introduction.

Keep notes on your impressions while you conduct the experiment on yourself as well as on your classmates. These observations may be invaluable if you need to come up with possible reasons for a failure to replicate the results in the literature.

References (starts a new page)

All references cited in the report are listed in alphabetical order by authors' names. Items in the reference list are not numbered and only those items referred to in the text are included in the list. Articles in journals are listed as in the following example:

Jones, A.G., Smith, L.F., & Johnson, B.L. (1983). Age differences in conservation of number. *Developmental Psychology, 14*, 69-73.

Books are listed as in the following example:

Jones, A.G. (1983). *Contemporary issues in developmental psychology*. New York: McGraw-Hill.

For a more detailed description of the proper form for reference listings, see the APA manual.

Tables (each on a separate page)

All Tables are numbered, labeled and presented consecutively on separate pages.

Figure Captions (starts a new page)

This page contains the captions for all the figures, presented consecutively. Figure captions do not appear on the figures.

Figures (each on a separate page)

All figures are numbered and presented consecutively. Label all axes clearly and scale them properly. Means must be accompanied by information on the variability of the data (SD or SEM). If there is more than one set of data in one figure, you must use different line types. This will entail including a legend to show what the different line types mean.

Additional General Information and Helpful Hints

1. All reports must be typewritten, using double spacing with 12 point font and only one side of the paper. One inch margins should be used for top, bottom, and sides, and pages should be numbered consecutively, beginning with the Abstract.

All papers must be submitted both as a hard copy (i.e., on paper) **and** as a word processing file (Word or Word Perfect) to the place designated by the instructor.

2. All reports should be written in the past tense. The exception to this general rule may occur in the Introduction or Discussion when referring to general principles, theoretical statements or assertions that are eternally true. For example, "the Additive Factors Method is considered to be

a great improvement over the Subtraction Method.”

3. When writing, always keep in mind that you did this experiment to get a result that would answer a question. Therefore you need to emphasize these answers in your results, discussion and abstract. In most cases, you cannot describe the specific results without using numbers so be sure to give them in all cases. These numbers will provide the basis of your conclusion at the end of discussion (final paragraph) and at the end of the abstract (final sentence or two).
4. The first sentence of every paragraph should be a topic sentence. This tells the reader what the paragraph is about. It is also a good way for you to organize your writing. That is, if any of the sentences in the paragraph do not relate to the topic sentence, they most likely should be moved to a different paragraph. Alternatively, you could change the topic sentence to be more encompassing (although be careful not to lose your focus).
5. The more critical you become of your writing, the better your paper will be. A good way to do this is to read each sentence aloud and ask yourself:
 - a. Does it make sense?
 - b. Is it perfectly clear?
 - c. Does it exactly follow the preceding sentence?
 - d. Have you provided the reader with all the information necessary to understand this sentence?
 - e. Are there too many words? Is the information it contains sufficiently different from the other sentences?
 - f. A paragraph should contain a number (i.e., more than 1) of related sentences. Separate paragraphs by general topics/ideas.
6. Be very careful when using words like “it,” “this,” “that.” You know what you are referring to but, unless you specifically state what the referent is, the reader will not know what you mean.
7. You can improve your writing greatly by going to the library and reading some journal articles, not for content so much as for the structure of the sections and to learn how to describe things. Make a list of expressions (words and phrases) that are commonly used or that seem particularly good to you (given your style). Keep this list with you when you are writing and refer to it often. You can even learn a lot from analyzing how information is presented in newspaper or magazine articles.
8. Edit your paper--it will benefit from repeated rewriting. Putting the paper aside for a day or so can help you to spot problems in the writing. Your mother/father/boyfriend/girlfriend should be able to read this and understand most (if not all) of it. If you can't be self critical enough, ask someone else to read your paper. If they have a problem, assume that **you** have not written clearly enough. Use their feedback for a rewrite.
9. It is best to pick one term for a concept (e.g., icon, noise) and stick to it. You will only confuse the reader by using multiple terms for the same thing.
10. Do not speculate about things that were not addressed in your experiment. For example, if

you have not collected data on a particular variable, you cannot know if it affected your results (e.g., you don't know if letter confabulations affected your results since you did not manipulate this variable). You can only speculate that this might have been a factor that contributed to, for example, reduced levels of accuracy.

11. When making statements such as "Many investigators have found that . . ." be sure to put several references at the end of the sentence (or at least saying: see name, year, for a review).

12. Rarely if ever use the word "caused." Scientists use words like "indicated" and "suggested" or, if they're really confident, they'll say "strongly suggests." This is where it is good to use a variety of terms.

13. You will be expected to paragraph appropriately, spell and punctuate accurately and write complete and coherent sentences. You are also expected to use the course vocabulary and all experimental psychology terms correctly.

14. Avoid the use of first person pronouns (e.g., "I" or "we") and of the passive voice ("Participants were instructed to..."). Instead, convey the information using the third person ("he, she," "the child") in the active form ("The experimenter instructed the participant to . . .").

15. References are cited in the body of the report as in the following examples: (a) "In their study of adopted children, Jones and Smith (1981) found that..." (b) "Several investigators (Jones and Smith, 1981; Lewis, 1978) reported that..." In the text, use APA format for references. Do not use first names anywhere in the paper.

16. Some common mistakes:

"Stimulus" is singular; "stimuli" is plural.

"Datum" is singular; "data" is plural.

"mean" = "average"

say: "the present experiment" in referring to your experiment, not "this experiment"

17. The length of your reports is unspecified. Much depends upon how much research or literature on the selected problem is available, as well as the complexity of the problem and how much data you choose to present.

18. Use any free time in the laboratory period to work on the lab report. Also, the Introduction and Method sections can be written before the statistical analyses are done, so the task of writing the entire report, from title page to reference list, is spread over a longer time period.

19. Do not spend money on a cover--your instructor is not impressed with the packaging.

Paper Deadlines

Paper 1 October 12

Paper 2 November 16

Paper 3 at Final exam

You must submit your each paper in two forms; a hard copy submitted at the start of class and electronically as a word processing file (Word or Word Perfect) to my email address (ray.johnson@qc.cuny.edu). Both submissions are required to avoid a grade penalty. I typically give extensive feedback on your papers that is potentially useful for improving your writing and grade on subsequent papers. However, if you submit your paper late without prior approval, I will not guarantee that I will spend this time on you paper. Failure to observe the final deadline will result in the loss of ½ grade/day.

IF YOU PLAGIARIZE, YOU WILL FAIL