

# **Formatting Documents, Tables and Figures**

## **Graduate Student Writing Workshop**

February 13 2014  
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# Beams's Crash Course in Tables, Figures, and Appendices

feh.eng.ohio-state.edu/labs/figures,%20tables,%20appendices.doc

(accessed January 16 2014)

## Figures vs. Tables

**If it's not a table, then it's a figure.** There's commonly an urge to mislabel various figures as sketches, drawings, charts, etc. This labeling may be acceptable elsewhere, but in a lab report it is not.

### When Inserting a Figure into Your Text

**Figures should be:**

- *Centered* on the page
- Labeled with the *figure number* and *appropriate descriptive title* under the figure
- *Numbered* in the **order that they appear** in the text (1, 2, 3, etc., not 3, 6, 1, 2...)
- *Referenced* in the **order that they appear** in the text (the first time text mentioning 1 appears should be before text mentioning 2, 3, etc.)

Text will typically appear above and below the figure. Text does not flow around a figure.

Text should reference the figure in one or more locations, typically before the figure appears in the report. If a figure requires a full page, consider instead placing it in an appendix (See the section on appendices).

Figure and table numbering occurs separately. You may have Figure 1, 2, 3, 4, etc. and Table 1, 2, 3 etc. appear within your text concurrently.

### When Inserting a Table into Your Text

**Tables should be:**

- *Centered* on the page
- Labeled with the *table number* and *appropriate descriptive title* above the table
- *Numbered* in the **order that they appear** in the text (1, 2, 3, etc., not 3, 6, 1, 2...)
- *Referenced* in the **order that they appear** in the text (the first time text mentioning 1 appears should be before text mentioning 2, 3, etc.)

Text will typically appear above and below the table. Text does not flow around a table.

Text should reference the table in one or more locations, typically before the table appears in the report. If a table requires a full page, consider instead placing it in an appendix (See the section on appendices).

Tables should also have appropriate column and/or row labels that sufficiently describe the data being displayed. Lack of a good title and labels requires the reader to make potentially incorrect assumptions about your data. Remember units on labels. Figure and table numbering occurs separately. You may have Figure 1, 2, 3, 4, etc. and Table 1, 2, 3 etc. appear within your text concurrently.

## Appendices

### Appendices should be:

- Used when figures or tables require a full page each
- Used when you wish to include attachments you can't otherwise include in the text of your report, or the number of figures and tables would break up the text too much
- *Referenced in order* in your text, same as figures and tables in the body of your report
- Sectioned appropriately (Appendix A might be experimental results, Appendix B might be calculations, etc.)
- Labeled in order by letter. Each **SECTION** requires a new label (**not** each **PAGE**). Pages within an appendix are **numbered** (for example A1, A2, A3, B1, B2, etc.)
- Preceded by a cover page for each appendix. Some may argue that this is a waste of paper, but it breaks up the report nicely and is common in industry.

### Referencing the Contents of Appendices

There are multiple ways to reference Appendices. All figures or tables in an appendix should be referenced individually.

Referencing figures in an appendix: "The setup of part one of the experiment is sketched in Appendix A, Figure 1. Tabulated results can be found in Appendix A, Table 1. A plot of the results is found as Appendix A, Figure 2. Calculations leading to the summary are available in Appendix B, Figures 1 and 2."

Referencing figures in an appendix (second method): "The setup of part one of the experiment are sketched in Figure A-1. Tabulated results can be found in Table A-1. A plot of the results is found as Figure A-2. Calculations leading to the summary are available in Figures B-1 and B-2."

### Contents of Appendices

Figures and tables should be labeled and titled using the same method as if they were being inserted in the body of the report. The numbering of figures and tables in each appendix begins at 1. There are NO EXCEPTIONS to this. DO NOT carry over your numbering from a previous appendix or the body of your report to a new appendix.

## APA Tables and Figures

<https://owl.english.purdue.edu/owl/resource/560/19/>  
(accessed February 2 2014)

### Summary

APA (American Psychological Association) style is most commonly used to cite sources within the social sciences. This resource, revised according to the 6<sup>th</sup> edition, second printing of the APA manual, offers examples for the general format of APA research papers, in-text citations, endnotes/footnotes, and the reference page. For more information, please consult the *Publication Manual of the American Psychological Association*, (6<sup>th</sup> ed., 2<sup>nd</sup> printing).

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**Last Edited:** 2013-05-07 08:11:42

The purpose of tables and figures in documents is to enhance your readers' understanding of the information in the document. Most word processing software available today will allow you to create your own tables and figures, and even the most basic of word processors permit the embedding of images, thus enabling you to include tables and figures in almost any document.

### General Guidelines

**Necessity.** Visual material such as tables and figures can be used quickly and efficiently to present a large amount of information to an audience, but visuals must be used to assist communication, not to use up space, or disguise marginally significant results behind a screen of complicated statistics. Ask yourself this question first: Is the table or figure necessary? For example, it is better to present simple descriptive statistics in the text, not in a table.

**Relation of Tables or Figures and Text.** Because tables and figures supplement the text, refer in the text to all tables and figures used and explain what the reader should look for when using the table or figure. Focus only on the important point the reader should draw from them, and leave the details for the reader to examine on her own.

**Documentation.** If you are using figures, tables and/or data from other sources, be sure to gather all the information you will need to properly document your sources.

**Integrity and Independence.** Each table and figure must be intelligible without reference to the text, so be sure to include an explanation of every abbreviation (except the standard statistical symbols and abbreviations).

**Organization, Consistency, and Coherence.** Number all tables sequentially as you refer to them in the text (Table 1, Table 2, etc.), likewise for figures (Figure 1, Figure 2, etc.). Abbreviations, terminology, probability level values must be consistent across tables and figures in the same article. Likewise, formats, titles, and headings must be consistent. Do not repeat the same data in different tables.

## Tables

### Table Checklist

- Is the table necessary?
- Is the entire table single- or double-spaced (including the title, headings, and notes)?
- Are all comparable tables presented consistently?
- Is the title brief but explanatory?
- Does every column have a column heading?
- Are all abbreviations; special use of italics, parentheses, and dashes; and special symbols explained?
- Are all probability level values correctly identified, and are asterisks attached to the appropriate table entries? Is a probability level assigned the same number of asterisks in all the tables in the same document?
- Are the notes organized according to the convention of general, specific, probability?
- Are all vertical rules eliminated?
- If the table or its data are from another source, is the source properly cited?
- Is the table referred to in the text?

Data in a table that would require only two or fewer columns and rows should be presented in the text. More complex data is better presented in tabular format. In order for quantitative data to be presented clearly and efficiently, it must be arranged logically, e.g. data to be compared must be presented next to one another (before/after, young/old, male/female, etc.), and statistical information (means, standard deviations, N values) must be presented in separate parts of the table. If possible, use canonical forms (such as ANOVA, regression, or correlation) to communicate your data effectively.

Table 1			
<i>Dogs Scoring Above Average on Intelligence by Breed and Gender</i>			
Breed	Male	Female	%
Dachshund	123	234	17.6
Terrier	456	567	31.1
Siberian Husky <sup>a</sup>	789	891	51.3
Totals (N = 3060)	1368	1692	

*Note.* Average score = 150. No animals were harmed during testing.

<sup>a</sup>Three huskies (one male, two female) escaped before testing was completed and are therefore not included in the table

### Table Structure

The following image illustrates the basic structure of tables.

Table 2			
<i>Title</i>			
Header			
Subhead	Column Head	Column Head	Column Head
Row 1	123	234	17.6
Row 2	456	567	31.1
Row 3	789	891	51.3
Row 4	1368	1692	

**Numbers.** Number all tables with arabic numerals sequentially. Do not use suffix letters (e.g. Table 3a, 3b, 3c); instead, combine the related tables. If the manuscript includes an appendix with tables, identify them with capital letters and arabic numerals (e.g. Table A1, Table B2).

**Titles.** Like the title of the paper itself, each table must have a clear and concise title. When appropriate, you may use the title to explain an abbreviation parenthetically. Example: *Comparison of Median Income of Adopted Children (AC) v. Foster Children (FC)*

**Headings.** Keep headings clear and brief. The heading should not be much wider than the widest entry in the column. Use of standard abbreviations can aid in achieving that goal. All columns must have headings, even the stub column (see example structure), which customarily lists the major independent variables.

**Body.** In reporting the data, consistency is key: Numerals should be expressed to a consistent number of decimal places that is determined by the precision of measurement. Never change the unit of measurement or the number of decimal places in the same column.

### Specific Types of Tables

**Analysis of Variance (ANOVA) Tables.** The conventional format for an ANOVA table is to list the source in the stub column, then the degrees of freedom (df) and the *F* ratios. Give the between-subject variables and error first, then within-subject and any error. Mean square errors must be enclosed in parentheses. Provide a general note to the table to explain what those values mean (see example). Use asterisks to identify statistically significant *F* ratios, and provide a probability footnote.

Table 3				
<i>Sample ANOVA Table</i>				
Stubhead	<i>df</i>	<i>F</i>	$\eta$	<i>p</i>
	Column spanner			
Row 1	1	0.67	.55	.41
Row 2	2	0.02	.01	.39
Row 3	3	0.15	.33	.34
Row 4	4	1.00	.76	.54
<i>Note:</i> This is where authors provide extra information important to the data, such as findings that approach statistical significance depending on the <i>p</i> value: Significant at the $p < 0.05$ level.				

**Regression.** Conventional reporting of regression analysis follows two formats. If the study is purely applied, list only the raw or unstandardized coefficients ( $\beta$ ). If the study is purely theoretical, list only the standardized coefficients (beta). If the study was neither purely applied nor theoretical, then list both standardized and unstandardized

coefficients. Specify the type of analysis, either hierarchical or simultaneous, and provide the increments of change if you used hierarchical regression.

Stubhead	<i>B</i>	<i>SE B</i>	$\beta$
Row 1			
Row 2	-4.56	1.87	-.34
Row 3	0.43	0.23	.86
Row 4			
Row 5	-1.22	1.43	-.66
Row 6	0.89	0.65	.38
Row 7	0.77	0.83	-.01

Notes:  $R^2 = .34$  ( $ps < .05$ ).

Table 4 Regression Table

### Notes in Tables

There are three types of notes for tables: general, specific, and probability notes. All of them must be placed below the table in that order.

**General** notes explain, qualify or provide information about the table as a whole. Put explanations of abbreviations, symbols, etc. here.

Example: *Note.* The racial categories used by the US Census (African-American, Asian American, Latinos/-as, Native-American, and Pacific Islander) have been collapsed into the category “non-White.” E = excludes respondents who self-identified as “White” and at least one other “non-White” race.

**Specific** notes explain, qualify or provide information about a particular column, row, or individual entry. To indicate specific notes, use superscript lowercase letters (e.g. <sup>a</sup>, <sup>b</sup>, <sup>c</sup>), and order the superscripts from left to right, top to bottom. Each table’s first footnote must be the superscript <sup>a</sup>.

Example: <sup>a</sup>  $n = 823$ . <sup>b</sup> One participant in this group was diagnosed with schizophrenia during the survey.

**Probability** notes provide the reader with the results of the tests for statistical significance. Asterisks indicate the values for which the null hypothesis is rejected, with the probability ( $p$  value) specified in the probability note. Such notes are required only when relevant to the data in the table. Consistently use the same number of asterisks for a given alpha level throughout your paper.

Example: \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$

Sample Table Notes

If you need to distinguish between two-tailed and one-tailed tests in the same table, use asterisks for two-tailed p values and an alternate symbol (such as daggers) for one-tailed p values.

Example: \* $p < .05$ , two-tailed. \*\* $p < .01$ , two-tailed. † $p < .05$ , one-tailed. †† $p < .01$ , one-tailed.

## Figures

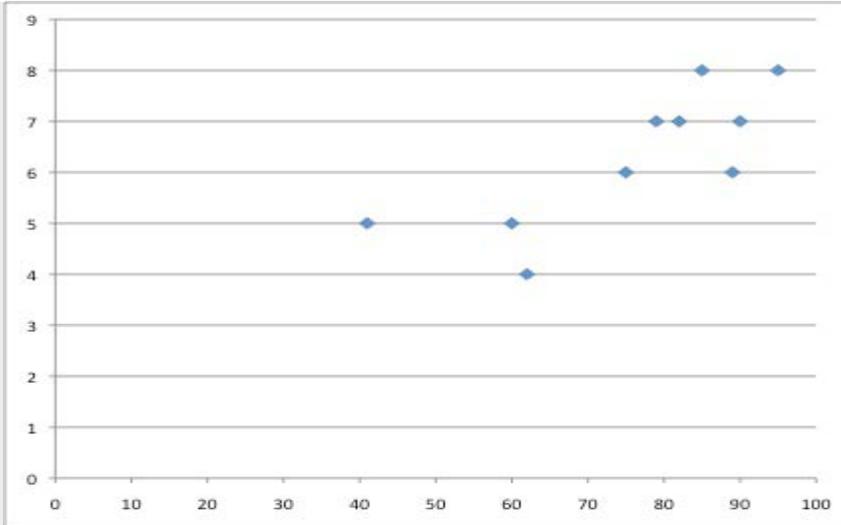
### Figure Checklist

- Is the figure necessary?
- Is the figure simple, clean, and free of extraneous detail?
- Are the data plotted accurately?
- Is the grid scale correctly proportioned?
- Is the lettering large and dark enough to read? Is the lettering compatible in size with the rest of the figure?
- Are parallel figures or equally important figures prepared according to the same scale?
- Are terms spelled correctly?
- Are all abbreviations and symbols explained in a figure legend or figure caption? Are the symbols, abbreviations, and terminology in the figure consistent with those in the figure caption? In other figures? In the text?
- Are the figures numbered consecutively with Arabic numerals?
- Are all figures mentioned in the text?
- As tables supplement the text, so should each figure.

## Types of Figures

**Graphs** are good at quickly conveying relationships like comparison and distribution. The most common forms of graphs are scatter plots, line graphs, bar graphs, pictorial graphs, and pie graphs. For more details and specifics on what kind of information, relations, and meaning can be expressed with the different types of graphs, consult your textbook on quantitative analysis. Spreadsheet programs, such as Microsoft Excel, can generate the graphs for you.

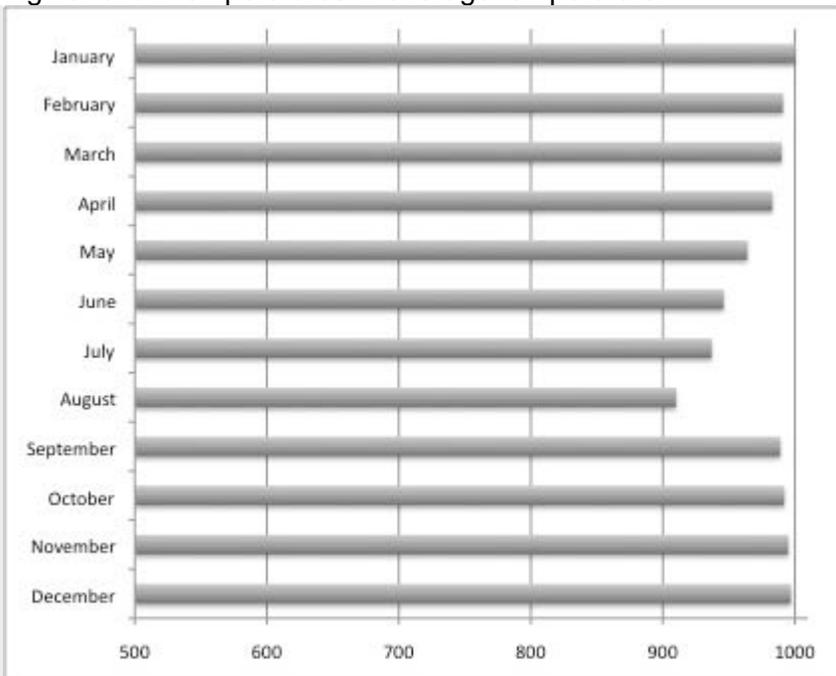
**Scatter plots** are composed of individual dots that represent the value of a specific event on the scale established by the two variables plotted on the x- and y-axes. When the dots cluster together, a correlation is implied. On the other hand, when the dots are scattered randomly, no correlation is seen.



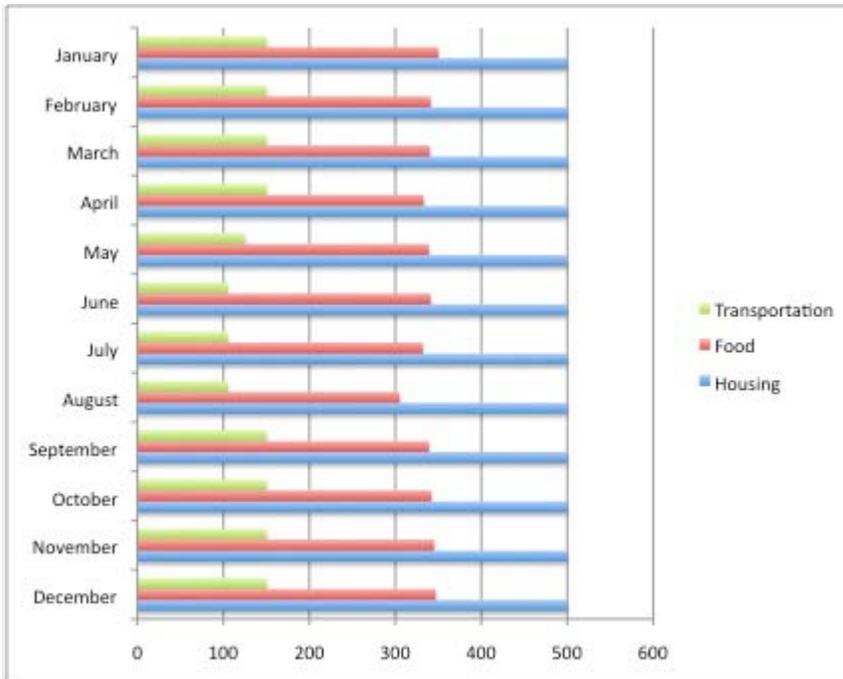
Scatter Plot Graph

**Line graphs** depict the relationship between quantitative variables. Customarily, the independent variable is plotted along the x-axis (horizontally) and the dependent variable is plotted along the y-axis (vertically). See example Figure 1...

**Bar graphs** come in three main types: 1) solid vertical or horizontal bars, 2) multiple bar graphs, and 3) sliding bars. In solid bar graphs, the independent variable is categorical, and each bar represents one kind of datum, e. g. a bar graph of monthly expenditures. A multiple bar graph can show more complex information than a simple bar graph, e. g. monthly expenditures divided into categories (housing, food, transportation, etc.). In sliding bar graphs, the bars are divided by a horizontal line which serves as the baseline, enabling the representation of data above and below a specific reference point, e. g. high and low temperatures v. average temperature.



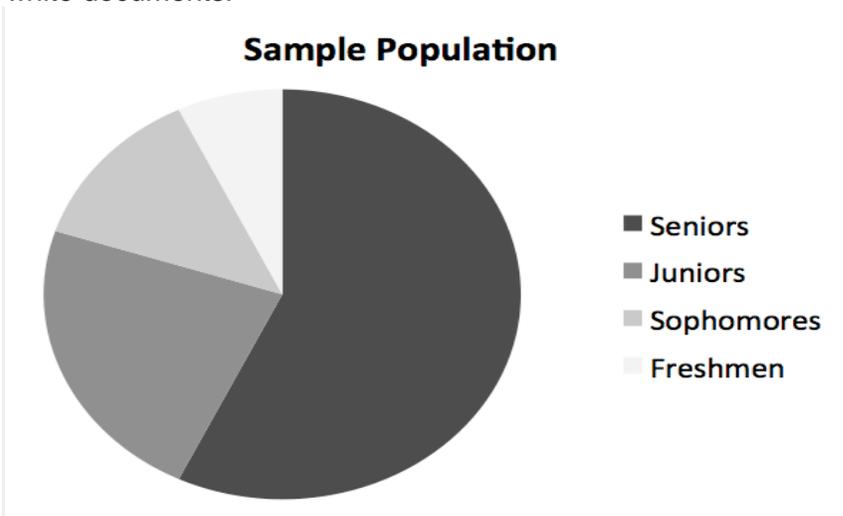
Bar Graph



Bar Graph by Type

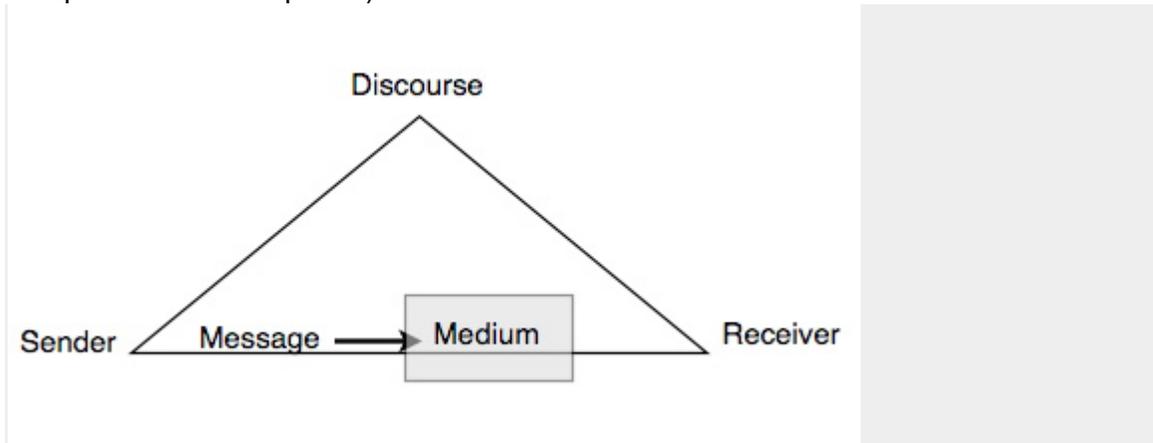
**Pictorial graphs** can be used to show quantitative differences between groups. Pictorial graphs can be very deceptive: if the height of an image is doubled, its area is quadrupled. Therefore, great care should be taken that images representing the same values must be the same size.

**Circle (pie) graphs** are used to represent percentages and proportions. For the sake of readability, no more than five variables should be compared in a single pie graph. The segments should be ordered very strictly: beginning at twelve o'clock, order them from the largest to the smallest, and shade the segments from dark to light (i.e., the largest segment should be the darkest). Lines and dots can be used for shading in black and white documents.



Circle (or Pie) Graph

**Charts** are used to represent the components of larger objects or groups (e. g. a tribal hierarchy), the steps in a process (as in a flow-chart), or the schematics of an object (the components of a cell phone).



**Drawings and photographs** can be used to communicate very specific information about a subject. Thanks to software, both are now highly manipulable. For the sake of readability and simplicity, line drawings should be used, and photographs should have the highest possible contrast between the background and focal point. Cropping, cutting out extraneous detail, can be very beneficial for a photograph. Use software like GraphicConverter or Photoshop to convert color photographs to black and white before printing on a laser printer. Otherwise most printers will produce an image with poor contrast.



Photograph

### **Preparing Figures**

In preparing figures, communication and readability must be the ultimate criteria. Avoid the temptation to use the special effects available in most advanced software packages. While three-dimensional effects, shading, and layered text may look interesting to the author, overuse, inconsistent use, and misuse may distort the data, and distract or even annoy readers. Design properly done is inconspicuous, almost invisible, because it

supports communication. Design improperly, or amateurishly, done draws the reader's attention from the data, and makes him or her question the author's credibility.

The APA has determined specifications for the size of figures and the fonts used in them. Figures of one column must be between 2 and 3.25 inches wide (5 to 8.45 cm). Two-column figures must be between 4.25 and 6.875 inches wide (10.6 to 17.5 cm). The height of figures should not exceed the top and bottom margins. The text in a figure should be in a san serif font (such as Helvetica, Arial, or Futura). The font size must be between eight and fourteen point. Use circles and squares to distinguish curves on a line graph (at the same font size as the other labels). (See examples above.)

### **Captions and Legends**

For figures, make sure to include the figure number and a title with a legend and caption. These elements appear **below** the visual display. For the figure number, type *Figure X*. Then type the title of the figure in sentence case. Follow the title with a legend that explains the symbols in the figure and a caption that explains the figure:

*Figure 1.* How to create figures in APA style. This figure illustrates effective elements in APA style figures.

Captions serve as a brief, but complete, explanation and as a title. For example, "*Figure 4. Population*" is insufficient, whereas "*Figure 4. Population of Grand Rapids, MI by race (1980)*" is better. If the figure has a title in the image, crop it.

Graphs should always include a legend that explains the symbols, abbreviations, and terminology used in the figure. These terms must be consistent with those used in the text and in other figures. The lettering in the legend should be of the same type and size as that used in the figure.

## The Anatomy of a Table

Table 4 below shows the typical layout of a table in three sections demarcated by lines. Tables are most easily constructed using your word processor's table function or a spread sheet such as Excel. Gridlines or boxes, commonly invoked by word processors, are helpful for setting cell and column alignments, but should be eliminated from the printed version. Tables formatted with cell boundaries showing are unlikely to be permitted in a journal.

Example 1: Courtesy of Shelley Ball.

Table 4. Population variation in hatch success (mean percent) of unfertilized eggs for females from populations sampled in 1997. N = number of females tested.

Population	mean (%)	Standard deviation	Range	N
Beaver Creek <sup>T</sup>	7.31	13.95	0-53.16	15
Honey Creek <sup>T</sup>	4.33	7.83	0-25.47	11
Rock Bridge Gans Creek <sup>T</sup>	5.66	13.93	0-77.86	38
Cedar Creek <sup>P</sup>	6.56	9.64	0-46.52	64
Grindstone Creek <sup>P</sup>	8.56	14.77	0-57.32	19
Jacks Fork River <sup>P</sup>	5.28	8.28	0-30.96	28
Meramec River <sup>P</sup>	5.49	10.25	0-45.76	45
Little Dixie Lake <sup>L</sup>	7.96	14.54	0-67.66	71
Little Prairie Lake <sup>L</sup>	6.86	7.84	0-32.40	36
Rocky Forks Lake <sup>L</sup>	3.31	4.12	0-16.14	43
Winegar Lake <sup>L</sup>	10.73	17.58	0-41.64	5
Whetstone Lake <sup>L</sup>	7.36	12.93	0-63.38	57

<sup>T</sup> = temporary stream, <sup>P</sup> = permanent streams, <sup>L</sup> = lakes. **---footnotes**

**---Table legend**

**---Column titles**

**---Table body  
(data)**

**---Lines demarcating  
the different parts  
of the table**

Example 2: Courtesy of Shelley Ball.

Table 2. Log-likelihood tests of deviation from 1:1 sex ratios for nymphs collected from each population in 1997 and 1998. Values are ratios of female:male; sample sizes are in parentheses. Bonferroni corrected probabilities are shown with an asterisks.

Population	Year	
	1997	1998
Beaver Creek <sup>1</sup>	9.00:1(20)***	2.67:1 (22)*
Honey Creek <sup>T</sup>	9.00:1(56)***	2.27:1 (98)***
Rock Bridge <sup>T</sup>	3.33:1(26)**	2.09:1 (68)**
Cedar Creek <sup>P</sup>	2.05:1(119)***	1.87:1 (198)***
Grindstone Creek <sup>P</sup>	-	2.26:1 (140)***
Jacks Fork River <sup>1</sup>	2.89:1(35)**	5.17:1 (37)***
Meramec River <sup>P</sup>	2.80:1(38)**	2.41:1 (58)**
Little Dixie Lake <sup>L</sup>	2.45:1(494)***	2.46:1 (384)***
Little Prairie Lake <sup>L</sup>	2.38:1 (71)***	2.08:1 (157)***
Rocky Forks Lake <sup>L</sup>	2.55:1 (213)***	2.93:1 (299)***
Winegar Lake <sup>L</sup>	3.41:1 (207)***	2.34:1 (204)***
Whetstone Lake <sup>1</sup>	2.69:1 (381)***	2.01:1 (268)***

\* significant at  $p < 0.05$ ; \*\* significant at  $p < 0.005$ ; \*\*\* significant at  $p < 0.001$ .  
<sup>1</sup> = temporary stream, <sup>T</sup> = permanent streams, <sup>L</sup> = lakes.

Example 3: Courtesy of Greg Anderson

Table 2. Planting date, mean planting density, and total number of seed clams planted in plots at Filucy Bay and Wescott Bay in 1979.

Location	Plot code	Planting date	Mean planting density in no. clams/m <sup>2</sup> ± 1 st. dev. (N)	Total no. clams planted
Filucy Bay	F10 x 30	5-16-79	994 ± 39(5)	298200
	F3 x 10	5-24-79	994 ± 39(5)	29820
Wescott Bay	W10 x 25	5-16-79	994 ± 39(5)	248500
	W3 x 10	6-2-79	895 ± 35(5) <sup>a</sup>	26850

<sup>a</sup> Calculated after clams were planted based on estimated 11% mortality of seed clams between 5-24 and 6-2-79.

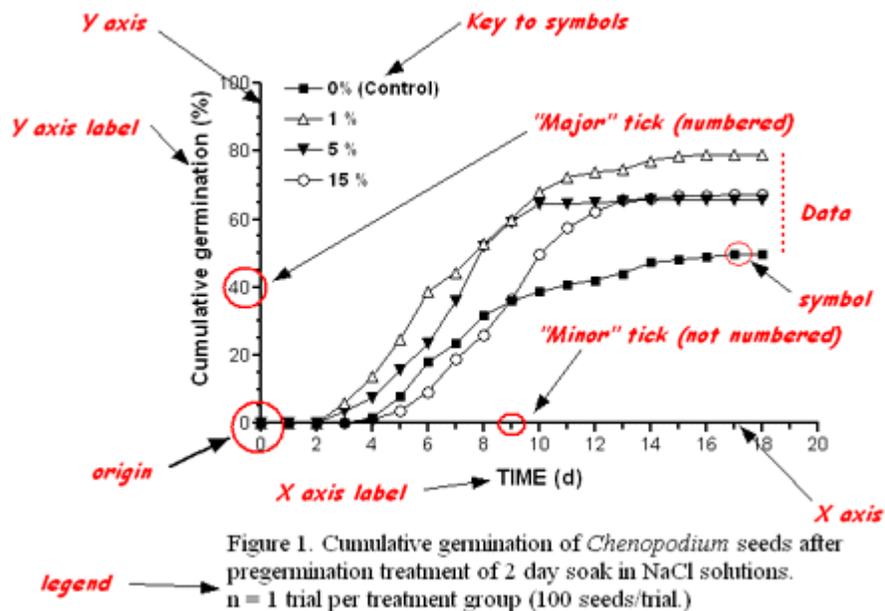
In these examples notice several things:

- the presence of a period *after* "Table #";
- the legend (sometimes called the caption) goes *above* the Table;
- *units* are specified in column headings wherever appropriate;
- lines of demarcation are used to set legend, headers, data, and footnotes apart from one another.
- *footnotes* are used to clarify points in the table, or to convey repetitive information about entries;
- footnotes may also be used to denote statistical differences among groups.

## The Anatomy of a Figure

The sections below show when and how to use the four most common Figure types (bar graph, frequency histogram, XY scatterplot, XY line graph.) The final section gives examples of other, less common, types of Figures.

**Parts of a Graph:** Below are example figures (typical line and bar graphs) with the various component parts labeled in red. Refer back to these examples if you encounter an unfamiliar term as you read the following sections.



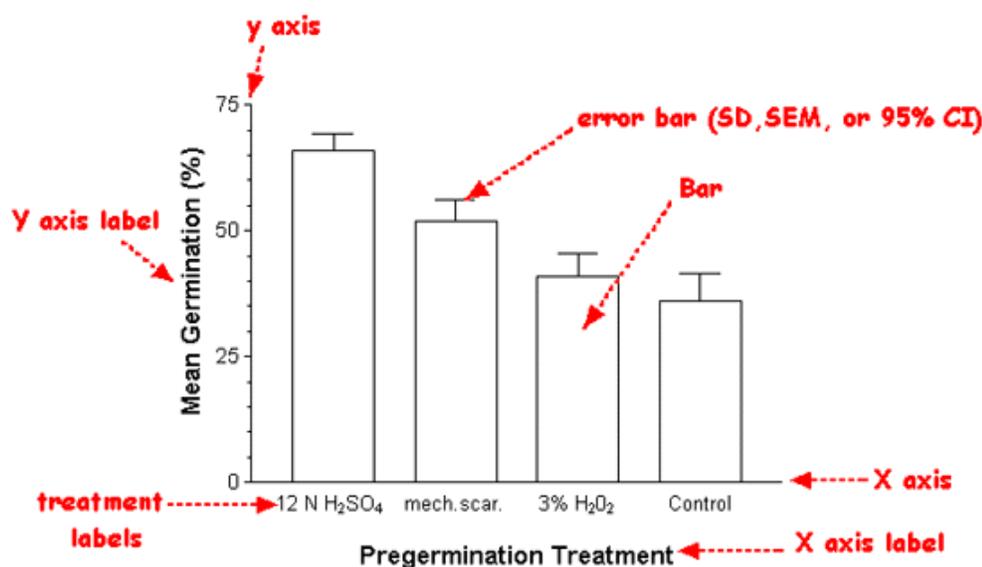


Figure 1. Mean germination (%) of gourd seeds following various pregermination treatments. N=10 groups of 100 seeds per treatment and control. Treatments: 12 hour soak in 12 N H<sub>2</sub>SO<sub>4</sub>, 90 second scarification of seed coat with 80 grit sandpaper, 6 hour soak in 3% H<sub>2</sub>O<sub>2</sub>.

figure legend

### Some general considerations about Figures:

- **Big or little?** For course-related papers, a good rule of thumb is to size your figures to fill about one-half of a page. Readers should not have to reach for a magnifying glass to make out the details. Compound figures may require a full page.
- **Color or no color?** Most often black and white is preferred. The rationale is that if you need to photocopy or fax your paper, any information conveyed by colors will be lost to the reader. However, for a poster presentation or a talk with projected images, color can be helpful in distinguishing different data sets. Every aspect of your Figure should convey information; *never use color simply because it is pretty.*
- **Title or no title?** *Never use a title for Figures included in a paper;* the legend conveys all the necessary information and the title just takes up extra space. However, *for posters or projected images,* where people may have a harder time reading the small print of a legend, a larger font title is very helpful.
- **Offset axes or not?** Elect to offset the axes only when data points will be obscured by being printed over the Y axis.
- **Error bars or not?** Always include error bars (SD or SEM) when plotting means. In some courses you may be asked to plot other measures associated with the mean, such as confidence intervals.

## Additional Resources

**Office Table Tutorials:**

<http://office.microsoft.com/en-us/word-help/overview-RZ001200716.aspx?section=1>

<http://office.microsoft.com/en-us/word-help/tables-ii-use-tables-to-simplify-complex-page-layouts-RZ001230013.aspx>

**Using Excel to Create Charts:**

<http://office.microsoft.com/en-us/excel-help/how-to-create-a-basic-chart-in-excel-2010-RZ102559017.aspx?CTT=1>

**UC Thesis Guidelines and Sample Thesis:**

<http://grad.ucalgary.ca/current/thesis/guidelines>

**UC Thesis Formatting Support (Templates, Course, Tips & Tricks):**

<http://libguides.ucalgary.ca/content.php?pid=222493&sid=1846840>