How to write an article

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Contents

Preliminary remarks

- **A paper is an argument.** A problem is posed, methods to solve it are presented, evidence is supplied and substantive conclusions are drawn on the basis of the empirical findings. The conclusions are discussed within the context of the literature on the subject and possible strengths and weaknesses are expounded. In other words, there is a clear line in the article that prescribes what is said and when. All parts of the paper should contribute to the argument.
- **Looking is not enough**. Do not only describe the things you see in the numbers, tables, or figures, but make clear how these observations function in the argument. You inspect numbers and patterns because you have a story to tell and they provide the underpinning of that story, so explain what you conclude from the outcomes of your analyses and the figures you have found. Think about the conceptual meaning and function of the figures, where they fit in your argument, and explain this.
- **Level of detail.** Because this document refers to papers written in connection with a course (or a Master's thesis), you are advised to be more specific and detailed about the results and methods than editors would allow in a real journal article.
- **Language.** Write clean straightforward Dutch or English (as specified by your instructor) and try to avoid unnecessary jargon. This is especially necessary for the introduction and the conclusion. Wherever necessary you will have to use technical terms for precision, especially in the method section and in the results, but if you do, always explain what they mean. The paper you are writing should be pitched at the level of fellow students.
- **What to do when your research does yield the expected results.** Suppose you have tested everything and still none of the group differences are significant, none of the correlations amount to anything, and none of the regression analyses give you joy. What to do? It depends a bit on the piece you are writing. If it is an actual research paper, I am afraid all you can do is re-examine your measurement instrument, the substantive theory etc,. and start again. However, if you are writing a paper for a class or your Master's thesis, another approach is available instead of writing a tearjerker story about how sad it all is. The problem with such a nothing-comes-out-of-it approach is that it is difficult to set up an argument. Take a bold step and look at your research from a different perspective. Assume that everybody in the past had it wrong, inlcuding all those studies with significant results. Here is the final study to put all this right: your results show that these supposed relationships etc. simply do not exist. Try to show the deficiencies of the other studies and argue that you did not fall into the traps that they got into. Examine the aspects in which your research is different from other studies and try to find out whether the differences are the possible cause of the varying outcomes. Better die fighting than crying.

This document is largely in line with the instructions of the American Psychological Association. For a more complete description of the APA guidelines, consult the fifth edition of the *Publication manual of the American Psychological Association.*

Reference
American Psychological Association (2001). *Publication manual of the American Psychological Association* (5th ed.). Washington, DC: Author.

- **Note.** The present document was initially developed for a course that emphasised data secreening and multiple regression. Therefore, the student is encouraged to report data screening in much more detail then would sensible in either a Master thesis or a paper to be submitted to a journal. Moreover, (multiple) regression is more prominent here than one would expect in a general document of this kind.

Constituent parts of a paper

1. Title, author(s) and affiliation

- **Devise a comprehensive title** with many key words, so that search engines will be able to find you on the web. Cute titles are fun, but often uninformative. Depending on the medium you are writing for, provide all your initials, or your first and/or given names in full. Provide the name of institution where you have carried out the research and your contact details.
- **For women**: Determine at the beginning of your research career whether you are going to use your maiden name or your partner's. The first option is strongly advised. Once you have made a choice, it is best to stick to it, as others will be able to find all your research output together.
- **Initials and first names.** Most APA journals will only list your initials, so think about these too. For example if you first name is Lotte, but your initials are C.M., decide what you are going to use in your career. For publication purposes you might decide to use your full first name Charlotte, so that your initials are always correctly quoted. If your last name is a very common one (say De Jong) always use all your initials.
- **Use of prepositions in last names.** In the Netherlands it is uncommon to alphabetise on the preposition, but in English-language publications it is. It is advisable to follow the Anglo-Saxon custom. Thus Van IJzendoorn and Van der Veer can be found under the letter V, and De Jong under the D. Note that in this way Van IJzendoorn has avoided the problem of whether he should be under IJ, I, or Y.

2. Abstract

The abstract should be a brief and comprehensive summary of the contents of the article. Ensure that the abstract correctly reflects the purpose and content of the article. Make it carefully, concise, and inspiring, so that after reading people cannot wait to discover more about your research. *Length*: about 120 words; less for a short paper.

The abstract of the *report of an empirical study* should describe:
1. the problem under investigation, in one sentence if possible;
2. the participants or subjects, specifying pertinent characteristics, such as number, type, age, sex, and genus and species;
3. the experimental method, including the apparatus, data-gathering procedures and complete test names;
4. the findings, including statistical significance levels; and
5. the conclusion and the implications of the results.

3. Introduction

A paper starts with an overview of the literature about the relevant subject matter. Try to tailor it carefully to your research and do not summarize the entire literature on the subject. Again, be concise, but detailed enough to be able to place your results in context later. Furthermore, you must make clear why the subject is important enough to be considered for yet another paper. At the end of the introduction, indicate what your own research has been all about and what you consider special about your paper.

Try to sell your article to the reader and do not be too modest. Try to write the text in such a way that others feel they just have to read your paper.

- Problem statement: What is the paper about?
- What is so terrific about it that everybody has to read it?
    - o It is especially nice if you can cite a controversy around the subject, and if your research provides an important contribution to the solution of this controversy.
    - o Another useful point of departure is the methodology of previous research. Discuss weaknesses of previous research, such as insufficient control during the execution of the research, or a failing to eliminate other possible explanations. Announce that you have made important methodological improvements and/or that you have used better measuring instruments, which are more reliable and valid.
- Theory + literature about the subject: mention the most important points and developments in the area, and indicate on whose shoulders you are standing. Cite and reference only works pertinent to the specific issue, no works of only tangential or general significance. If you summarize earlier works, avoid nonessential details; instead, emphasize pertinent findings, relevant methodological issues, and major conclusions. Demonstrate the logical continuity between previous and present work. Do not let the goal of brevity mislead you into writing a statement intelligible only to the specialist.
- State your research questions and/or hypotheses.
- Introduce what you are going to do in your paper and sketch its structure, unless the organization is very standard. At this point, a definition of the variables and a formal statement of your hypotheses give clarity to the paper. Bear in mind the following questions in closing the introduction: What variables did I plan to manipulate? What results did I expect, and why did I expect them? The logic behind "Why did I expect them?" should be made explicit. Develop a clear rationale for each hypothesis.

4. Method section

The method section contains an overview of the persons that participated in your research (now preferably called "participants"), the measurement instruments you used, the procedure used to obtain the data, and the analysis techniques used if not completely

standard. Divide the Method section into labelled subsections. These usually include descriptions of the participants or subjects, the apparatus (or materials), and the procedure.

For articles written as papers for a methodology course, you need to supply a special section explaining all statistical procedures used in the results section to answer the research questions, including an exposition of the analysis techniques and why you used them. You need to explain how the techniques work in fairly general terms, so that it can be understood by a student in the same course. However, do not attempt to write a statistics book, but concentrate on the usage of the techniques in your papers. Do not mention details that are not relevant for the paper itself. Write sentences like: "To investigate outliers in our data, we have used Mahalanobis distances, which indicate .....".

In real-life journal articles, much less explanation of techniques is required because it is assumed that the reader of these research papers is familiar with the standard statistical techniques. If you have used a more uncommon procedure, a certain amount of explanation is expected, accompanied by appropriate and accessible references.

- **sample**: include some (mean) background information such as age, sex, education and how you went about recruiting the subjects for your research project. Give the total number of subjects and the number assigned to each experimental condition (if applicable). If any participants did not complete the 'experiment', state how many and explain why they did not continue. If you decided to eliminate some persons from you investigation, state this here and explain why you have done so.
- **measurement instruments**: mention origin, describe how you used them, mention reliability, validity, and any other particulars, such as whether it was the original version or a translation, how it was translated, etc.;
- **procedure**: in this subsection each step in the execution of the research is summarized. Provide enough information so that your research can be replicated, or provide sufficient references to descriptions of these procedures. Include instructions to participants, and an account of the formation of groups and specific experimental manipulations.
- **analysis methods**: this subsection contains an explanation of the statistical techniques used, with appropriate references to details and relevant computer packages. Using regression analysis in a data analysis course as an example, you would have to present
  - o the methods used for checking whether the assumptions of the regression analysis are fullfilled;
  - o the analysis methods: thus explain what regression analysis is, how regression analysis works, and why you used both hierarchical and backward regression;
  - o the methods used to check the results of the analysis: thus, explain the function of residual analysis, how ans which outliers were checked, and discuss how possible problems with the analysis were addressed.

5. Results section

Assuming that multiple regression is the primary technique in the paper, the results section consists of three parts, but if the focus is on other techniques the structure may need to be different. In the latter case you may view sections 5b and 5c as examples of what such sections may look like. Please remember we are still talking about a paper in which the techniques used need to be explained and demonstrated. In a purely substantive paper, the amount of technical detail suggested here would be highly unusual. Not that the analyses should not be carried out fully, but that they can often be presented in a very abbreviated form. You should pay particular attention to the level of detail with which you want to present your analysis. Try to present as much relevant detail as is necessary to understand what is stated about the substantive results – no more and no less.

5a. Descriptive analysis of the variables and checking assumptions

One of the purposes of the descriptive part is to evaluate the basic information in the data. For instance, if your main variable was "problem behaviour", you need to tell your audience how much problem behaviour was present as it is one of the basic outcomes of your study. You also need to do this because you may want to compare the extent of it in the discussion with the amount of problem behaviour in other studies. The other purpose is to check the quality of the data. In particular you need to investigate the following aspects.

a. *Univariate*: check for missing data; inspect distributions, especially to detect outliers using box plots; histograms with a normal curve superimposed for numerical variables; frequency tables for categorical variables, etc; pay attention to skewness and kurtosis, normality (use probability plots and possibly the Kolmogorov-Smirnov test, but the test is very rigorous); pay attention to outliers.
b. *Bivariate:* inspect scatter plots; pay attention to linearity, bivariate outliers and homogeneity of variance - homoscedasticity.
c. *Multivariate*: compute the Mahalanobis distance and evaluate the subjects far distant from the crowd. Decide whether they belong to the population of interest.

Purpose of these analyses:

- to check for correctness of the data (correctness of coding, missing data (see if they have been declared in SPSS), idiotic data; in other words: making the data plausible);
- to acquire a feel for the raw data, so that you recognise unusual outcomes in your results;
- to check whether the assumptions of the main analysis technique have been fulfilled to a reasonable level (do not be too harsh, especially when your samples are large);
- to detect and explain of missing data, or subjects with unusual data.

Make a distinction in your analyses and presentation between the criterion (dependent) variables and the predictors (independent, factors) variables.

Report the conclusions of the descriptive analysis.

o *Report at least (preferably in a table)*: Means, standard deviations, standardised skewness and kurtosis, correlations and/or scatter plots, for *numerical* variables; percentages, distributions, medians, etc, for *categorical* variables.
o Often the numerical information is not sufficient, and you need to illustrate a point you want to make by a special figure. Do not present the same information in more than one figure or table. Choose the one which makes your point more clearly.
o For example: Combine the information on the correlations and the information contained in a scatter plot, but do not provide a complete correlation matrix as well as the matrix of scatter plots. Be selective and search for the presentation that suits the argument best.

5b. Analysis of multivariate results (here multiple regression)[1].

Report a regression analysis with two or more predictors. Present at least a table with the regression coefficients (both standardised and unstandardised, *p*-values, correlation of predictors with the criterion variable, etc. - see below), the model fit (R^2), the significance of the model, and the regression equation. Provide a comprehensible explanation what the numbers means. Be sure not to use too many decimals, two usually suffice.

Try to find a reasonable model to predict your criterion variable on the basis of the variables available to you and relevant to the problem.

5c. Analysis of residuals: check assumptions of regression analysis (in more advanced courses)

Via an analysis of the residuals you have to show that the model is (or is not) a reasonably fitting model.

Check whether there are subjects with large standardised residuals via the histogram of these residuals, and plot the standardised residuals against the standardised predicted values - a residual plot.

Check whether there are points, i.e. subjects, with data far away from the other points via the Mahalanobis distance in order to establish whether they belong to the population from which you sampled. If they do not drop them from the study, if they do, decide how to include them in the analysis. Investigate whether there are influential points with respect to the regression equation by using the Cook distance. Use the appropriate criteria mentioned in the literature, as well as histograms (or boxplots) of the distributions of the Mahalanobis and Cook distances. Note that their

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[1] This documentis in use in two master courses at the Department of Education and Child Studies of the Leiden University. PEO (Conducting and evaluating empirical research) is a first-level course; Data analysis is a second-level course.

distributions are not supposed to look like normal distributions. Instead they are in principle very skewed. Check especially for gaps in the tails of the distributions and identify extreme subjects.

If necessary, redo the analyses without the offending points (subjects) to see whether the regression analyses are strongly influenced by them, for instance via comparing the regression coefficients.

Report your conclusions.

5d. Reporting statistics

- **HyperStat** is an excellent on-line statistics text with many links to other statistical resources – try it out when you have a statistical question. *http://davidmlane.com/hyperstat/index.html*
- **Mean** and **Standard Deviation** are most clearly presented in parentheses: "The sample as a whole was relatively young ($M = 19.22$, $SD = 3.45$)." "The average age of students was 19.22 years ($SD = 3.45$)."
- **Percentages** are also most clearly displayed in parentheses *without decimal places*: "Nearly half (49%) of the sample were married."
- **Chi-square** is reported with the degrees of freedom and sample size in parentheses, followed by chi-square statistic (round to two decimal places) and the significance level. "The proportion of older male teachers was 0.86, whereas the proportion of younger male teachers was 0.52. This difference is significant, $\chi^2(2, N = 167) = 22.01$, $p < .01$.".

Tabel 5d. Example of a contingency table

	Male	Female	Total
Old	73 (86%)	12 (14%)	85
Young	43 (52%)	39 (48%)	82
Total	116	51	167

- *t* **Tests** are reported with the degrees of freedom in parentheses. Following that, report the *t* statistic (rounded to two decimal places) and the significance level. "There was a significant effect for gender, $t(54) = 5.43$, $p < .001$, with men receiving higher scores than women."
  Add values of means and effect sizes (Cohen's *d*). Never report the significance level as $p = .0000$; correct is $p < .0001$.

ANOVAs (both one-way and two-way) are reported in the same way as the *t* test, but there are two degrees-of-freedom figures/values## to report. After the symbol for the test, first report between brackets the between-groups degrees of freedom, then report the within-groups degrees of freedom (separated by a comma), thus: $F(df_{between}, df_{within})$. After that, report the value of the *F* statistic (rounded to two decimal places) and the significance level. The result looks like:
"There was a significant main effect for treatment, $F(1, 145) = 5.43$, $p < .01$, and a significant interaction, $F(2, 145) = 3.13$, $p < .05$."
If available, report effect sizes, such as partial eta-squared (partial η^2), and if relevant the

means and standard deviations. For two-way analysis of variance, please print the complete ANOVA table.

Table x

Analysis of variance table: Dependent Variable: Children become aggressive whenplaying with war toys

Source	SS	df	MS	F	p	Partial Eta Squared
family composition	7.18	2	3.59	4.46	.013	.060
In favour/against war toys	33.93	1	33.93	42.12	.000	.231
family *war toys	5.60	2	2.80	3.47	.034	.047
Error (Within)	112.79	140	.81			
Total (= Corrected total in SPSS)	165.56	145				

- **Correlations** are reported with their degrees of freedom (*N-2*) in parentheses, together with the significance level, in this way:
  "The two variables were strongly correlated, $r(55) = .49, p < .01$."
- **Regression** results are often best presented in a table. APA does not say much about how to report regression results in the text, but if you would like to report the regression in the text of your Results section, you should at least present the standardized slope (beta) along with the *t*-test and the corresponding significance level. (Degrees of freedom for the *t*-test is *N-k-1*, where k equals the number of predictor variables.) It is also customary to report the percentage of variance explained along with the corresponding *F* test.
  "Social support significantly predicted depression scores,   = -.34, $t(225) = 6.53$, p <.01. Social support also explained a significant proportion of variance in depression scores, $R^2 = .12$, $F(1, 225) = 42.64$, $p < .01$."
  In student papers, and many research papers, the table of regression coefficients is also reported. Be sure to add a column with the correlations between the predictors and the criterion variable.

Table y

War toys Study: Regression analysis table: Dependent Variable: Objection against war toys

	Unstandardized Coefficients		Standardized Coefficients	t	p	r
	B	Std. Error	Beta			
(Constant)	.20	.35		.57	.570	-
our child is not interested in war toys	-.30	.05	-2.27	-5.71	.000	#.##
we are against war toys	.25	.05	1.86	4.57	.000	#.##
age chlid	.10	.08	.09	1.28	.204	#.##
sex child	-.04	.08	-.04	-.44	.661	#.##

Note that the predictors are arranges according to their β-values, Always try to find a meaningful arrangement of the rows and columns of a table.

6. Discussion and Conclusions

Provide a clear overview of the results, and link these to the literature review in your Introduction. Indicate the strong and weak points of your research. Write this text in such a way that readers who go here directly from the Abstract still understand what it is all about; so, also give a brief resumé of the purpose of the study. This can be done by starting this section with a brief resume of the goal of your study and your major conclusions from the results. Be enthusiastic about your research (and results). If you yourself cannot be excited about it, how can you expect others to be?

The *result section* is inward looking and only considers what has gone on in the research reported in the paper. The comments given in the result section are meant to explain what the results, the numbers mean, how they can be interpreted..On the contrary, the discussion and conclusion section is ooutward looking. There you relate the patterns found in the result section to the outside world. You inform your public what your results means in connection with research and results of others. To what extent your results confirm earlier studies or deviate from them. You try to give explanations for possible difference, preferably based on numerical evidence already presented earlier.

- Start with two lines or so about what you have done in your study;
- Present substantive conclusions following from the results plus interpretation;
- Address alternative explanations of results;
- Show the relationship with the literature mentioned in the introduction (you may have to search for more literature to link your results to);
- State the relevance of the research and the results;
- Mention possible shortcomings of the research (do not overdo this);
- Optional: suggestions for further research.

7. References

Checking references

Be sure to check that all references in the text are included in the list with references, and that the reference list does not contain entries not mentioned in the main text. Use the official guidelines of the *American Psychological Association* (APA), a summary of which can be found in the Blackboard module of the course. Be ridiculously precise; follow the prescribed punctuation religiously.

Editorial matters

1. **Title.** Restrict your title to important concepts.
2. **Paragraphs**. Check that each paragraph only treats a single subject. Split up long texts by making subheadings. This helps you to structure the text and to check whether all sentences actually belong to the paragraph. You can always remove subheadings later if you want – for English texts this is even necessary. Indent paragraphs about half a centimetre. Sometimes you may want to insert a blank

line, but do not do this with all paragraphs. Be consistent in this. Do not make paragraphs of one or two sentences; merge them into one larger one. Important: a 'paragraph' in an English text is not the same as an 'alinea'in a Dutch text.

3. **Audience.** Always write for a particular audience and do not think too soon that "they will understand". You have to convince people that they have to read your paper, and remember they always have something more important to do. Lure them into reading your world-shocking discoveries.

4. **Organisation of the text**. A scientific article is not a report. You do not have to describe what you did when. A paper is not a chronological story but a reconstruction of a process, and the text is guided by argument. You write this so that the readers can understand the flow of your argument and naturally follow your line of proof. The ##way and## the order in which you acquired your insights is not relevant.

5. **Language.** Scientific articles are generally couched in a relatively formal language. Consequently, avoid the pronoun "I"; use "we" or the passive tense (but there is some debate about this). It is absolutely forbidden to use "you". The reader is not addressed directly . If you must, use the neutral "one", rather than the informal "you".

6. **Number your pages.**

7. **Presentation of results**. In general you have to choose how you are going to present the core of your findings, whether in the form of text, a table, or a figure. Only rarely will you have to use more than one of these. Remember that journal space is at a premium, so you have to restrict yourself. Most papers written by students are intended to be read in a class, so here there is a bit more leeway, but it is good to try and be concise. Additional material can always go into an appendix. Choose that representation which conveys your point best.

8. Use the **spell checker**.

9. Construct a nice **reference list** according to the APA guidelines. All references in text should be in the list and vice versa. For example:

> Person, V. I. (1999). The importance of being an important person. *Journal of Personal Importance, 1*,1-11.

> (i.e., this is a paper in volume 1 of the journal, covering pages 1 through 11. Note that a hanging indentation is used. In the title of the journal all main words are capitalised, and both the name of the journal and the volume number are in italics. Do not indicate the issue number (2), unless you know that each issue is numbered anew.

> o Person, V. I. (1999). *On becoming important.* Amsterdam: VIP Publishers. [this is a reference to a whole book. Do not capitalise the main words of book titles].
> o Person, V. I. (1999). *I have always been important.* (Internal report). Amsterdam: Institute for Self-Importance. [this is a reference to an unpublished report]

o Person, V. I. (1999). My importance is growing. In V. I. Person (Ed.), *On the art of becoming important* (pp. 55-66). Amsterdam: VIP Publishers. [this is a chapter of a book edited by V. I. Person]

10. **Understandable abbreviations**. Do not use the names of the variables from your SPSS output. These are generally unusable because SPSS labels are usually only clear to the reseacher herself. If you must use abbreviations, use those that are immediately understandable and meaningful, but be sure to indicate the precise meaning of the abbreviation in the Method section.

11. **Mathematical symbols** are always in *italics*: R (multiple correlation), p (the significance or p-value), t (of the t-test) etc. The same is done in formulas.

$$Y = b_0 + .. + b_1 X_1 + b_2 X_2 + b_k X_k$$

Note that *numbers* in subscript are not italicized, but *letters* in sub-scripts are. Subscripts (as in b_0) and superscripts (as in R^2) can be made by clicking Font in the Format menu, and checking the box Subscript or Superscript. If you prefer to do this via the keyboard: press Ctrl and = together to start it, type your sub-script, then press Ctrl and = again to end it. For superscripts use Ctrl and + together. Do not start a sentence with a mathematical symbol or a number, for instance "*T*-tests have shown.."
Complex formulas can be constructed with the formula editor (Insert -> Object -> Microsoft Equation 3.0; for further details see the Word Help function).

Tables

- It is only rarely that tables from the output of a computer program can be used directly. You nearly always need to edit them. You have to remove unnecessary columns, translate or expand headings and names of variables, etc. A lot can be done within SPSS itself, but this requires some practice. After you have done this use "Copy Object". You can also export the table to Word and do all the editing there. In that case use the simple "Copy" option in SPSS. A mixture of both is of course also possible.
- Be sure that in one column every figure has the same number of decimals, and make sure you align all the decimal points (or commas). Of course, there are no decimal points when displaying frequencies. Getting the correct number of decimals is more easily done in SPSS than in Word (double click on the table, block the figures and then right-click on the blocked section. Choose "Cell properties and adjust the number of decimals.)
- Do not provide more decimals than you can vouch for. Ask yourself whether it would make a difference for what you have to tell if you omitted the last decimal"; if not, delete it. Often this means that you will have at most two

decimals in a table, unless the numbers are very large or very small (e.g. *p*-values).
- Labels ("Table 1. *Regression weights and their statistical significance*") should be *above* the table. The legend for a figure ("*Figure 1*. Residual plot") should be *below* the figure. All tables and figures should be referenced in the text.
- Tables can serve for reference (presentation of results from your analyses), for interpretation, or both. Decide what the function of the table is, and structure it in such a way that the table fulfils this optimally. For instance, think about the order of the rows and columns, and how they can tell the story best.
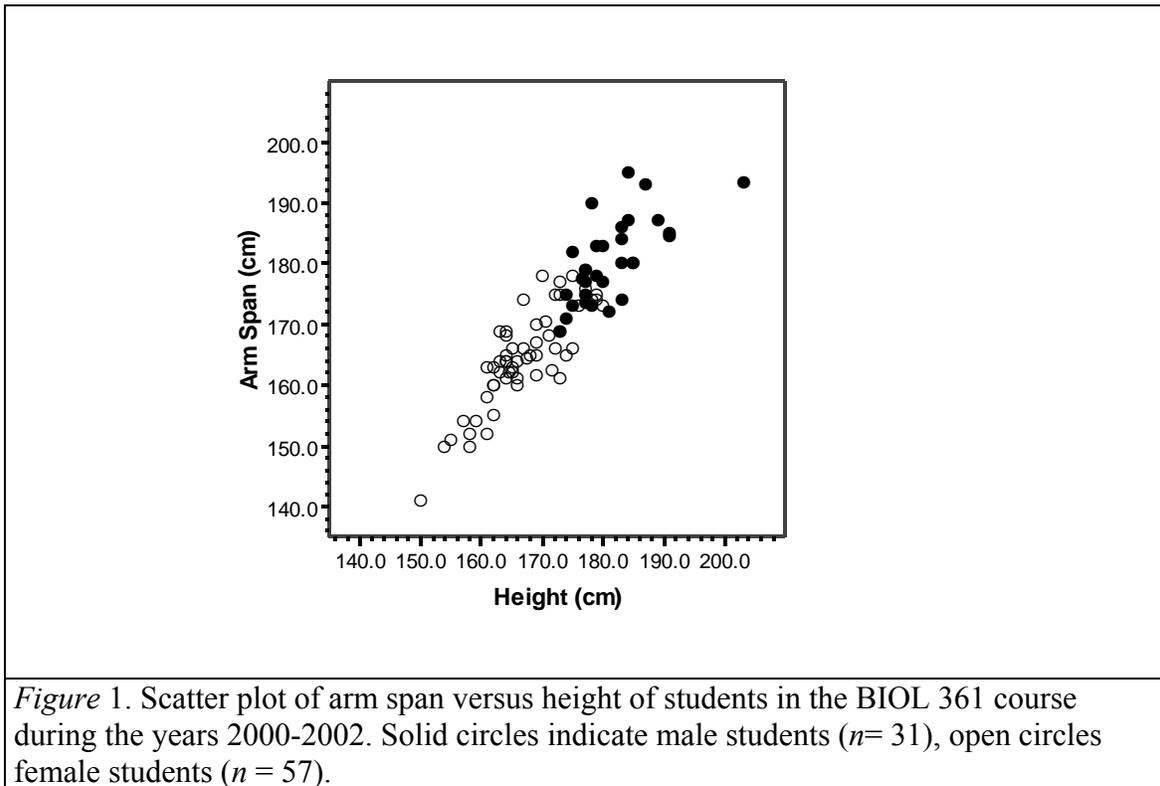
Graphics

Guidelines for the production of graphs
adapted from
([http://www.science.uwaterloo.ca/departments/biology/undergraduate/courses/biol361/introtobiol361.doc)](http://www.science.uwaterloo.ca/departments/biology/undergraduate/courses/biol361/introtobiol361.doc)
- **The process**.
  - Making good graphs is an iterative, experimental process and requires a desire to make the end product look nice.
  - It is highly unlikely that the graph produced by SPSS will be exactly what you want.
  - However, only edit graphs when your paper is almost done. Otherwise, you will be editing your graphs several times because you have changed your mind as to what to present and how.
  - In a scatter plot, put the criterion (dependent) variable along the vertical axis (Y-axis) and the predictor (independent) variable along the horizontal axis (X-axis). The axes must labelled and the units must be indicated.
- **Clarity.** Strive for clarity.
  - Make the data stand out.
  - Avoid presenting unnecessary information/data.
  - Make sure the message of the graph hits the audience in the face.
  - This means using visually prominent graphical elements to show the data.
  - Make sure that all data are plotted inside the box around the figure.
  - Superposed data sets must be visually distinguishable. If you use special symbols to show groups of points that belong together, they should be large enough to be seen clearly.
  - If your text is going to be reduced in size, make sure that your graphs are still legible.

- **Labelling**. (These may require editing in PowerPoint).
  - Labels describing points should not obscure other points or other labels.
  - Sometimes you may have to delete labels of unimportant points to allow important points to stick out
  - Explanations of points within the graph should be outside the graph itself, preferably in the figure caption. Avoid putting too much explanation in the text. If you feel that this is necessary, you have not made a good graph.

- ▪ Make figure captions comprehensive and informative; place them immediately below each figure, and make sure that in the text you explicitly refer to the graph.
- ▪ Mention the sample size either in the caption or on the graph
- • **Colour**. Be sure to check in the printed version of your paper whether the points you intended to make by using colour will also be visible in black and white.(The Faculty does not have colour printers). *SPSS* often uses a red fill as a default (to make the data stand out on your computer screen). Be sure these colour fills do not obscure other aspects of the graph (like the median line in a boxplot).

Below is an example of a nice graph produced using SPSS, plus a figure caption placed below the figure. Strive for this kind of graphics quality.

Figure 1. Scatter plot of arm span versus height of students in the BIOL 361 course during the years 2000-2002. Solid circles indicate male students (*n*= 31), open circles female students (*n* = 57).

Note: Graphs produced in SPSS sometimes do funny things when copied into Word and printed on paper – therefore always check the final result. You may get the best results by using 'Copy' in SPSS, and then in Word 'Edit' →'Paste Special' → 'Bitmap'. But try a few options to see what works best on your computer. Do not try to edit graphs in Word. PowerPoint is much better for this.