

# American Statistical Association Style Guide

The American Statistical Association (ASA) publishes the following quarterly journals:

- *The American Statistician* (TAS)
- *Journal of the American Statistical Association* (JASA)
- *Journal of Agricultural, Biological, and Environmental Statistics* (JABES) (jointly published with the [International Biometric Society](#))
- *Journal of Business & Economic Statistics* (JBES)
- *Journal of Computational and Graphical Statistics* (JCGS) (jointly published with the [Institute for Mathematical Statistics](#) and the Interface Foundation of North America)
- *Technometrics* (jointly published with the [American Society for Quality](#))

The Journals Production Office has developed these guidelines to help authors prepare their manuscripts correctly before submitting them to one of the journals.



Manuscripts submitted in LaTeX (any version) should use the "article" style and should not use any special macros. See [Guidelines for LaTeX](#).

## ORGANIZATION

Manuscripts must be organized in the following manner:

- Title Page
- Author Footnote ( *JASA*, *JABES*, *JCGS*, and *TAS* only)
- Abstract and Key Words
- Article Text
- Acknowledgments (*JBES*, *JCGS*, and *Technometrics* only)
- Appendix(es)
- References
- Tables
- Figure Titles and Legends
- Figure Artwork

## ASA STYLE

### Title Page

The title page should include:

- the article title in upper- and lowercase letters (initial uppercase for all important words, including *all* verbs, and for prepositions of four or more letters) (avoid mathematical notation and acronyms; spell out Greek characters),
- the name(s) of author(s) in upper- and lowercase letters,
- the affiliation(s) (including city, state, country if other than U.S., and postal/zip code), and
- email address (if desired).

Generally only the permanent or primary affiliation should be included. Visiting appointments and secondary employment may be noted in the author's footnote for *JABES*, *JASA*, *JCGS*, and *TAS*, or the acknowledgment section for *JBES* and *Technometrics*.

## Author's Footnote

The author's footnote is used in *JABES*, *JASA*, *JCGS*, and *TAS* only. It gives the author's position, employer, and complete address (including email address.) In *JASA* and *TAS* only, any acknowledgment of financial assistance should be stated next, followed by acknowledgment of individuals. Authors should use third person, not first person, as in the following example:

Jerome H. Friedman is Statistician, Stanford Linear Accelerator Center, Stanford, CA 94305 (email: [jerome@stanford.edu](mailto:jerome@stanford.edu)); and Lawrence C. Rafsky is Statistician, ADP Network Services, Ann Arbor, MI 48106 (email: [lawrence@adp.com](mailto:lawrence@adp.com)). This work was partially supported by Department of Energy Grant E82-0001002. The authors thank William S. Cleveland, Joseph Kruskal, John Tukey, Paul Tukey, and the referees for helpful comments.

## Abstract and Key Words

An abstract must be submitted with the manuscript. It precedes the article text. The abstract should summarize results, topics discussed, and main conclusions, but it should not contain any displays or complex mathematical notation and no references. If an abstract exceeds the word limit, it will be edited to meet the length restriction. Abstract lengths should be as follows:

- *JASA* - 400 words
- *JCGS* - 200 words
- *JABES* - 200 words
- *JBES* - 100 words
- *TAS* - 100 words
- *Technometrics* - 100 words

The abstract is followed by three to six key words or phrases that *do not already appear in the title of the article*. These are used by *Current Index to Statistics* to index the article. The following guidelines should be used in preparing key words.

- Identify major techniques used, other areas to which the results apply, and commonly used synonyms for the terms in the title. Because *Current Index* indexes articles by their titles as well as key words, *do not repeat strings of words from the title*.
- Do not combine concepts in one key word if both concepts are important for indexing; that is, "nonindependent and nonidentically distributed variables" would sometimes be separated into "nonindependent variables" and "nonidentically distributed variables."
- Do not use mathematical symbols and formulas. Spell out Greek letters.
- Use the singular rather than the plural whenever possible: for example, use "Gaussian process" instead of "Gaussian processes."
- Do not use abbreviations and acronyms.

For information about the importance of key words and some additional guidance in their selection see [Key Words and Phrases](#) on this site by Gbur and Trumbo (1995).

## Text of Article

*Headings.* The main body of the article should be divided by appropriate numbered section and subsection headings. Main headings are typed in all uppercase letters and centered; when numbering use arabic numerals followed by a period (e.g., 1. INTRODUCTION, 2. ANALYSIS OF DATA). When subheadings are needed, be sure to use no fewer than two under a main heading. They should be typed in upper- and lowercase letters, flush with the left margin; do not underline. Use arabic numerals in the following style: 1.1 Review of the Literature, 1.2 New Methods, and so forth. Sometimes a third level of headings is required. Whenever possible, ASA prefers to use an indented, underlined, upper- and lowercase paragraph heading ending with a period.

*Acknowledgment.* *JABES*, *JBES*, *JCGS*, and *Technometrics* include an Acknowledgment section at the end of the article. This section should acknowledge financial assistance in the form of grants or university funding, assistance by individual colleagues, and any other pertinent information.

*Appendixes.* A single appendix is headed "APPENDIX: FOLLOWED BY A DESCRIPTIVE TITLE" (it is helpful to the reader to give the appendix a descriptive title). If there are two or more appendixes, they should be labeled "APPENDIX A," "APPENDIX B," and so on. Section headings, displayed equations, tables, and figures that are part of the appendix are numbered A.1, A.2, A.3, and so on (if only one appendix, still use A.1, A.2, A.3, etc). All appendixes must be cited in the main body of the article as "the Appendix" if only one and "Appendix A," "Appendix B," and so forth, if two or more.

*Footnotes.* Footnotes are not used in ASA journals. They should be incorporated into the text as parenthetical material or, when appropriate, added as an appendix at the end of the article.

*Reference Citations.* All references included in the References at the end of an article must be cited in the text of the article. For text citations, ASA uses the author's surname and date of publication, according to the following style.

1. A direct citation of a reference places only the date within parentheses.

Gentleman (1978) explored this in greater detail.

2. An indirect citation of a reference as an example places both the name and the date within parentheses with no punctuation between them:

Other recent suggestions include the use of Chernoff faces (Smith 1980).

3. Citation of a particular page, section, or equation of a work should follow the date and be preceded by a comma. Use sec., chap, app., eq., p., and pp. in such citations.

We rely on an algorithm of Das Gupta (1965, pp. 115-120).  
This distribution is known to be normal (Smith and Smith 1958, chap. 5).

4. References following direct quotations must include the page number(s) of the quote:

"This was found to be fallacious thinking upon closer investigation" (Smith and Smith 1958, p. 209).

5. For works with multiple authors, use the full form of citation at all times for two authors. Use the full form the first time only for three to five authors; thereafter use the first author's surname followed by the phrase "et al." (not underlined). Use the first author's surname followed by the phrase "et al." for citations of references with six or more authors.
6. When two or more works by the same author are cited together, do not repeat the name(s):

Tukey (1965, 1980)

Gilula and Smith (1971a,b)  
(Tukey 1965, 1980)

7. When citing several references within parentheses, place them in date order:

(Smith and Smith 1958; Tukey 1965, 1980; Gilula and Smith 1971a,b; Smith 1980)

## The Reference List

The parts of a reference are author, date of publication, title, and publication information. All parts must be supplied for each reference.

*Author.* Author names are typed in upper- and lowercase letters, surname first followed by a comma and initials with periods and a space between all:

Bowman, M. J., and Myers, R. G.

Editor(s) are identified by "(eds.)" following the name. The reference list is alphabetized by authors' surnames, with work by a single author preceding that author's work in collaboration with others. Works by multiple authors should include all authors' names, never simply the first author's name followed by "et al." When more than one work is listed for the same author or team of authors, replace the name(s) with a long dash preceding the date for second and subsequent works.

*Date of Publication.* The date of publication follows the author name(s), within parentheses and followed by a comma:

Anderson, T. W. (1974),

If two or more works by the same author or team of authors have the same publication date, list them by order of appearance in the text and distinguish them by lowercase "a," "b," and so on, after the date: "(1970a)." Works accepted for publication but not off press are listed as "in press" instead of the anticipated date of publication; this may be changed on page proofs if the work comes off press by that time.

*Title.* The title of an article in a journal or a chapter of a book is given within double quotation marks and immediately follows the date. It is separated from the publication in which it appears by a comma (placed before the closing quotation mark). The title of a journal or book should be underlined or typed in italics; journal titles must be spelled out completely and no abbreviations used (unless that is the actual title of the journal). Follow these titles with a comma. All titles should be typed in upper- and lowercase letters, using initial uppercase for all important words and prepositions of four or more letters.

*Publication Information.* The details of publication for an article in a journal include the series designation (e.g., Ser. A), volume number (for "in press" articles also), issue number if each issue begins with page 1, and continuous page numbers (e.g., 1148–1152, not 1148-52). The details of publication for a book include the volume number and edition number (or revision) if any, placed within parentheses immediately following the title—(Vol. 1), (rev. ed.), (Vol. 1; 2nd ed.); editor name (s) if any (initials separated by periods and spaces followed by surname)—ed. A. Zellner; place of publication; name of publisher; and continuous page numbers if listing only a single chapter or contribution—pp. 209–244.

*Unpublished or Obscure Works.* ASA discourages references to unpublished or obscure works. If such a reference is necessary, the entry should include the type of document it is (unpublished Ph.D. dissertation, unpublished technical report, Technical Report 721, unpublished manuscript, etc.) and the sponsoring body or repository. Personal communications are not included in the reference list but are cited in text as follows:

(P. Smith, personal communication, March 2, 1984)

Following are some examples of correct format for different types of references commonly found in articles in ASA publications.

Berk, K. N. (1978), "Comparing Subset Regression Procedures," *Technometrics*, 20, 1-6.

Bowman, M. J., and Myers, R. G. (1967), "Schooling Experience and Gains and Losses in Human Capital Through Migration" (with comments), *Journal of the American Statistical Association*, 62, 875-898; Corrigenda (1968), 63, 222.

Dixon, W. J. (ed.) (1983), *BMDP Statistical Software* (Vol. 1, 3rd ed.), Berkeley, CA: University of California Press.

Efron, B., and Morris, C. (1977), Comment on "A Simulation Study of Alternative to Least Squares," by H. Clark and T. Schwisow, *The American Statistician*, 72, 102-109.

Freund, R. J. (1977), "An example of Prediction with Regression: A Comparison of Methods," in *American Statistical Association Proceedings of the Statistical Computing Section*, pp. 218-221.

Hoerl, A. E., Kennard, R. W., and Baldwin, K. R. (1975), "Ridge Regression: Some Simulations," *Communications in Statistics, Part A - Theory and Methods*, 4, 105-123.

Hogg, R. V., Smith, J., Jones, L., and Smith, S. (1973), "A New Sample Adaptive Distribution-Free Test," Technical Report 24, University of Iowa, Dept. of Statistics.

International Mathematical and Statistical Libraries, Inc. (1976), *IMSL Library 1* (5th ed.), Houston, TX: Author.

**NOTE:** When the publisher is the same as the author, simply state "Author" rather than repeating the name.

McQueen, M. Y. (in press), "Kruskal's Proof Refuted," in *The Theorems and Proofs of Kruskal*, eds. J. Doe and B. Doe, Chicago: Rand McNally.

Scheffe, H. (1958a), "Experiments With Mixtures," *Journal of the Royal Statistical Society, Ser. B*, 20, 344-360.

—(1958b), "Optimal Asymptotic Tests of Composite Hypotheses," in *Probability and Statistics* (1978 ed.), ed. U. Grenander, New York: John Wiley, pp. 255-279.

—(1973), "Symptotic Theory of Sequential Fixed-Width Confidence Intervals," unpublished Ph.D. dissertation, Florida State University, Dept. of Statistics.

*Webster's Ninth New Collegiate Dictionary* (1983), Springfield, MA: Merriam-Webster.

## Tables

*General Guidelines.* Most tables are theoretical rather than empirical. They could be much more selective than has been customary, because the informed reader can usually reconstruct the omitted values from the algebraic formulas given, if they are really needed. Tables illustrating an argument given in the text should have a clear story line. Those merely recording numbers for reference can either be put in an appendix or even be omitted. Exceptions to this are rare.

In empirical tables it is best to use meaningful abbreviations in row and column labels, rather than let long descriptive labels cause irregular spacing or rows or columns. In contrast, in theoretical tables, labels consisting of merely arbitrary algebraic symbols (e.g.,  $\alpha_1, \alpha_2, \beta_1, \beta_j, \pi$ ) should be avoided and something more helpful given to the reader. Empirical tables will show better what the numbers are saying if the rows and columns are ordered by some measure of size, rather than being shown in, say, the alphabetical order of the row and column labels. The numbers in the table should be heavily rounded—more than two effective digits are seldom used even by the author in interpretations, so the reader will hardly need them. Row and column averages are also often helpful to the reader.

*Numbering and Citing.* Tables are numbered consecutively in the order in which they are cited. Therefore, each table must be cited. In page layout tables are placed in sequence as close as possible to their first citation in text.

*Title.* Each table must have a brief descriptive title:

Table 1. Mean Performance Scores of Students With Different College Majors

The title should not duplicate information in the headings of the table.

*Column Headings.* Every column must have a heading that identifies the content, including the stub column. A heading, should be brief and should not be much wider than the longest entry in the column. Standard abbreviations may be used without explanation (e.g., "no." for number, "%" for percent), but abbreviations of technical terms and the like must be explained in a note to the table (if not already introduced in text). Sometimes a straddle heading may be appropriate to avoid repeating the same word in two or more column heads:

Level
10% 5% 1%

Headings are separated from the title by a double horizontal rule covering the entire width of the table, straddle heads are separated from column heads by a single horizontal rule straddling only the pertinent columns, and column heads are separated from the body by a single rule covering the entire width of the table. No vertical rules are used.

*Body.* No horizontal or vertical rules are used in the body of the table. Rows in a table should be single-spaced, with occasional gaps for big tables (e.g., every fifth line). Columns should be fairly close together, to help the eye move from one to the other. Only like items should be included in the same column. If the bottom part of a table requires different column headings, it should be presented as a separate table. Within columns decimal points should be aligned. If values are also given parenthetically, align decimals of values within parentheses separately. Close the body with a single horizontal rule covering the entire width.

*Notes and Footnotes to Tables.* When additional information must be given (e.g., explanations of abbreviations, descriptions of procedures, and anything applicable to the general comprehension of the table), it should be presented as a note immediately beneath the rule closing the body. The word "NOTE" should be typed flush left and followed by a colon and the text of the note. If a particular entry in a column requires explanation, use a footnote designated by a superscript lowercase letter next to the entry. The footnote should follow the Note and should have a paragraph indent.

*Tables From Another Source.* Authors must obtain written permission to reproduce or adapt all or part of a table from a copyrighted source. This is obtained from the copyright holder and must be submitted with the manuscript. The source and reprint permission are given as a final note to the table. The word "Source" begins a new paragraph and is followed by a colon and the source information. Source information should be worded as requested by the copyright holder.

The following are useful references to consult for more information on tables:

Ehrenberg, A.S.C. (1978), *Data Reduction: Analyzing and Interpreting Statistical Data* (rev. ed.), New York: Wiley.

—(1981), "The Problem of Numeracy," *The American Statistician*, 25, 67-71.

## Figure Captions

Each figure must have a figure caption, including the figure number. Figures are numbered consecutively, using arabic numerals, as they are cited in text. Prepare the captions on a separate sheet and place them after the tables. They will be typeset and placed beneath the figures.

Figures must be clearly described. The combined information of the figure caption and the text of the body of the paper should provide a clear and complete description of everything that is on the figure. Detailed captions can often be of great help to the reader. First, describe completely what is graphed in the display; then draw the reader's attention to salient features of the display and briefly state the importance of these features.

Generally, it is a good idea to include the key to symbols in the caption to avoid cluttering the display. Abbreviations not already defined in text must be defined in the caption.

Figures and their titles are editorially reviewed. The following examples illustrate these guidelines.

Figure 1. Regression Quantiles in a Heteroscedastic Case. The scatter is an artificial sample of 100 points from a heteroscedastic model with Gaussian noise. Superimposed on the scatter are the regression quantile estimates for  $\theta$  in  $\{.05, .25, .50, .75, .95\}$ . The vertical dashed line is drawn through  $\chi$ .

Figure 2. Data and Components. The natural logarithms of calendar-adjusted Bell System telephone installations are plotted in the top panel, and the three components are plotted in the other panels. The scales of the panels are not the same. The bars to the right portray the relative scaling by representing the same amount of change in the data and components. For this example, the decomposition was run with the length of the trend smoother equal to 15 and the length of the seasonal smoother equal to 11. The seasonal component accounts for a substantial amount of variation in the series. The irregular component reveals two outliers, one in 1968 and one 1971, both of which are the result of strikes.

## Figure Artwork

Figures must be visually clear and capable of withstanding reduction. They are printed the width of one column, one and one-half columns, or two columns. It is best to prepare artwork so that when reduced to one of these sizes, the letters and symbols will be no smaller than 8 points, the type size used for tables and figure captions. All lines, lettering, and plotting symbols must be sharp and dark enough to bear reduction without loss of clarity. A reducing photocopier is often useful in judging how well an original can stand reduction. If you do not want a figure reduced, prepare the artwork to the appropriate size, with lettering and symbols no larger than 8 points.

When feasible, put important conclusions into graphical form. Not everyone reads an entire article from beginning to end. When readers skim an article, they are drawn to graphs. Try to make the graphs and their captions tell the story of your article.

Make the quantitative information that is graphed stand out. Be sure that different items on a graph can be easily visually distinguished. Avoid cluttering graphical displays. For example, too much writing on the plotting region can interfere with the viewer's perception of geometric patterns; put as

much of the writing as possible in the figure legend. Do not overdo the number of tick marks and tick mark labels.

Proofread figures.

*Preparing Camera-Ready Artwork.* The preferred form is Postscript (.ps) electronic files; a glossy black-and-white print of professionally prepared artwork (or actual artwork); that is, typeset words, symbols, and numbers with bars and rules done in black tape or India ink. Hand-lettered and -drawn artwork is acceptable only when neatly executed in India ink. Typed or pencil-drawn and -lettered artwork is never acceptable because these media do not reproduce well. Crisp, clean photocopies are acceptable. The main criterion is that everything be **sharp** and **black**. To aid legibility of words, use upper- and lowercase letters—not all uppercase letters—for axis labels and any other labeling necessary. Decimal fractions should not show a zero before the decimal point, for example, .05 instead of 0.05 or -.05 instead of -0.05.

The following are useful references to consult for more information on graphical displays:

*The Chicago Manual of Style* (14th ed.) (1993), Chicago: University of Chicago Press.

Bertin, J. (W.J. Berg, trans.) (1983), *Semiology of Graphs*, Madison, WI: University of Wisconsin Press.

Chambers, J. M., Cleveland, W. S., Kleiner, B., and Tukey, P. A. (1983), *Graphical Methods for Data Analysis*, Belmont, CA: Wadsworth.

Cleveland, W. S. (1985), *The Elements of Graphing Data*, Monterey, CA: Wadsworth Advanced Books and Software.

Fisher, H. T. (1982), *Mapping Information*, Cambridge, MA: Abt Books.

Schmid, C. F. (1983), *Statistical Graphics*, New York: Wiley.

Tufte, E. R. (1983), *The Visual Display of Quantitative Information*, Cheshire, CT: Graphic Press.

*Figure Artwork From Another Source.* Authors must obtain written permission to reproduce or adapt all or part of a figure from a copyrighted source. This is obtained from the copyright holder and must be submitted with the manuscript. The source and reprint permission are given at the end of the figure caption. Source information should be worded as requested by the copyright holder.

## Mathematical Material

Numbered mathematical expressions should be typed and centered on a separate line and identified by consecutive arabic numerals in parentheses placed flush with the right margin. Short expressions requiring only one line should remain in the text unless there is need to refer to them elsewhere by number. Lengthy equations should be handled by the use of definitions or broken to conform to the column format.

*Rule of Thumb:* A mathematical expression that exceeds 50 characters and spaces will not fit in one column width and will need to be broken.

Keep in mind that space is placed around all operation symbols and before and after function words such as log, sin, and ln [unless they precede or follow a parentheses, e.g.,  $\log(x+y)$ ].

ASA style aims for compactness (which lessens the expense of typesetting and printing) with the least possible loss of readability. Authors can help by remembering to limit the amount of material



extending above and below the normal depth of letters on the line:

1. If a fraction appears in the text, separate the numerator and denominator with a solidus (/) rather than a division bar [e.g.,  $(w+x)/(y+z)$ ].
2. Represent exponentials by "exp(x+y)" instead of "e" with a superscript.
3. Do not use double accents unless absolutely necessary.

Keep in mind that typewritten and typeset mathematical symbols are often quite different in appearance. Thus careful differentiation should be made between the following:

lowercase letter "el" (l) and numeral one (1)  
 letter "oh" (O, o) and numeral zero (0)  
 upper- and lower-case Greek chi ( $X, \chi$ ) and letter "ex" ( $X, x$ )  
 lowercase "ex" ( $x$ ) and multiplication sign \*  
 lowercase Greek epsilon ( $\epsilon$ ) and "element of" symbol  $\in$   
 upper- and lowercase Greek pi ( $\Pi, \pi$ ) and product symbol  $\subseteq$

It is helpful to identify these symbols on the manuscript.

It is not necessary to underline mathematical material for italics because such material will be typeset in italics unless otherwise indicated and underlining may be mistaken for boldface. Indicate boldface by placing a wavy line below the symbol. Mathematical notation not to be typeset in italics or boldface should be explained in the margin.

Handwritten Greek letters and unusual symbols should be identified for the typesetter. On a separate sheet at the front of the manuscript, list all handwritten symbols used in the manuscript with their identification.

## EDITORIAL STYLE

In addition to content, manuscripts are judged on their clarity. Consequently, well-written and well-structured papers that will be of interest to a wide segment of the readership are preferred.

Although the production office does not undertake major revision or rewriting of manuscripts, it is ASA policy to copy edit all manuscripts and book reviews accepted for publication in accordance with the accepted rules of correct grammar, usage, spelling, and punctuation. In addition, ASA style includes deleting redundant words and phrases and Americanizing all spelling, usage, and punctuation.

Avoid common problems of style:

1. Use quotation marks only when a standard term is used in a nonstandard way and to indicate the beginning and ending of a direct quotation.
2. Hyphens are used when two or more adjectives or an adjective and a noun together modify another noun; for example, *goodness-of-fit test* is the equivalent of *test for goodness of fit*. Most words with prefixes such as sub and non are not hyphenated, for example, *subtable*, *nonnormal*.
3. Italics are used to introduce important terms, when appropriate; they are to be used sparingly to indicate emphasis.
4. Abbreviations and acronyms should be minimized; those that are used are spelled out on their first appearances in the manuscript with the shortened form given in parentheses, for example, *best linear unbiased estimate (BLUE)*.
5. Numbers under 10 are spelled out when they are not part of an equation or an expression containing symbols.
6. The sign % is always used when giving a specific percentage, for example, 23%, not 23 percent. Otherwise use the word *percent*.

For guidelines on style, usage, and the preparation of technical manuscripts for publication, the following sources, used by most publishers and available in libraries, may be consulted.

*The Chicago Manual of Style* (14th ed.) (1993), Chicago: University of Chicago Press.

*Mathematics Into Type* (rev. ed.) (1986), Providence, RI: American Mathematical Society.

Strunk, William, Jr., and White, E. B. (1979), *The Elements of Style* (3rd ed.), New York: Macmillan.

Skillin, Marjorie E., Robert M. Gay, and others, *Words Into Type* (3rd ed.) (1974), Englewood Cliffs, NJ: Prentice Hall.

*Merriam Webster's Collegiate Dictionary* (10th ed.) (1994), Springfield, MA: Merriam-Webster.

For answers to specific problems not addressed in these guidelines, please contact the ASA Journals Department, 1429 Duke Street, Alexandria, VA 22314-3415, (703) 684-1221, FAX (703) 684-3410, or see the staff members at the beginning of this guide for the appropriate person and his or her email address.

## ASA POLICY GUIDELINES

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*Book Reviewers Rejoinders.* The Book Review sections of the journals do not publish rejoinders to book reviewers.

*Materials Retention.* ASA journal editors retain files on accepted manuscripts for at least six months after the date of publication or the date of the most recent correspondence, whichever is more recent. Files on rejected manuscripts are retained at least one year after date of final rejection or the date of the most recent correspondence, whichever is later. Original artwork is returned to an author only on request after completion of printing of the issue in which the article appears.



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