In this article I present the elements of scientific style, ranging from the specifics of punctuation and abbreviations through to the flow of ideas in the document. I also deal with presentation of data, common grammatical errors, and citation of publications. The guidelines are generally consistent with the style promoted by the American Psychological Association.

KEYWORDS: data presentation, grammar, punctuation, publishing, research

Punctuation
Hyphenation
Italics and Bold
Fonts and Symbols
Abbreviations and Acronyms
Headings, Paragraph Styles, and Lists
Numbers and Statistics
Tables
Figures
Use of Words
Grammar
Flow of Ideas
Style for Cited Publications
References

In this article I provide guidelines for writing in scientific style, starting with the detail of punctuation and working up through to the whole document. The guidelines are based on material presented in the publication manual of the American Psychological Association (1994). I indicate departures from APA style in brackets, thus: [APA:...]. You can access the APA manual and related material via the links provided by Dewey (1998).

This article also defines the general style for articles published at the Sportscience website. Intending contributors should use this article in conjunction with the appropriate template downloaded from the Sportscience site. Some of the material in the templates is duplicated here.
PUNCTUATION

• Insert a comma wherever there would be a slight pause between words or phrases in the spoken sentence.
• Insert a semicolon between two parts of a sentence; the proviso is that both parts must be able to stand alone as separate sentences.
• Use a colon to introduce an explanation or an example of something: here is an example. If there are several simple explanations or examples, separate them with commas; otherwise, use semicolons.
• Avoid excessive use of parentheses ( ). Use them to make an aside (an extra remark) only if commas could be confusing. Never use parentheses within parentheses: find another way of saying it.
• Use brackets [ ] for material inserted into a quotation and ellipsis (three dots) for material omitted: According to Smith (1999), "few such [descriptive] studies were done... before 1950."
• Use dashes--two hyphens with no spaces anywhere--for emphatic asides.
• Use one or two spaces after a period, colon, or semicolon. Note, though, that Web browsers delete more than one space unless you make them non-breaking spaces.
• Use double quotation marks (" ) for speech and verbatim quotations.
• If a quotation is long, type it as an indented block of text without quotation marks, as shown in this example:
  According to Smith (1982)...
  The "newbie effect" disappeared when behaviors were studied in this manner. Examples of methods included indirect observation, self-reports, and retrospective questionnaires. (p. 276)
• Use double quotation marks the first time you introduce a newly coined or slang term; do not use quotation marks thereafter.
• Don't use "smart quotes" (66 and 99), because they create problems when translated into Web documents.
• Use single quotation marks (') for quotes within quotes.
• Use the apostrophe (' ) to denote possession:
  an athlete's responses, two athletes' responses.
  But note that its = of it, whereas it's = it is.
• Put commas, semicolons, colons, and periods outside closing quotation marks: "this", for example, but not "this," or "this." Exception: "If the quotation ends in a complete sentence, the period is part of the quote and should therefore go inside the quotation marks, like this." [APA: all punctuation goes within the quotation marks.]
• Use of and/or instead of or is acceptable when you want to emphasize either or both.
• The forward slash (/) can be used instead of or in sentences that are already replete with ands and/or ors.
• Use Title Case (initial upper-case letters for words of four or more letters) in:
  - the title and subheadings of your article;
  - titles of journals;
  - titles of books or articles in the text, but not in the reference list;
  - proper nouns, including trade names (Wilks's lambda, Aspro, the Web and a Web site, but not in a website);
  - names of tests (the Stroop Color-Word Test);
  - nouns followed by numbers (on Day 2, in Group B) but not in the control group;
  - names of institutional departments (Department of Sport Science, University of Wherever), but not of disciplines (a department of sport science);
  - references to sections of the article (in the Methods section; see Results; in Figure 1; in Table 2; see Appendix 3; in Chapter 4).

HYPHENATION

• Use your spelling checker to decide whether to include a hyphen with a prefix. If the word is not recognized without a hyphen, put one in. Examples: non-athlete, ultra-marathon, pre-treatment. [APA: use a hyphen only with self-]
• Here is the paradigm example of hyphenation of adjectives or nouns: a clear-cut case. (If you wrote a clear cut case, you would imply a cut case that was clear. The emphasis in pronunciation also provides a clue.) More examples: role-playing technique, two-way analysis of variance, high-anxiety group. Hyphenation is not necessary if the first word is an adverb or comparative adjective (according to APA, anyway): widely used text, randomly assigned subjects, higher anxiety group.
• Note also: t-test results, but results of t tests; student-centered teaching, but the teaching was student centered.
• Note also: long- and short-term memory: 2-, 5-, and 10-min trials.

ITALICS AND BOLD
• Use italics for emphasis and bold for strong emphasis. Avoid italic bold, which does not always show up as bold in some browsers. [APA does not use bold.]
• Use italics in expressions such as the term whatever, and for listing descriptors of a scale. For example, items on the 5-point scale ranged from not at all to always.
• Put the title of a paper, book, or journal in italics in the body of the text. In the reference list, titles of papers are in normal case. [APA uses quote marks for titles of papers in the text.]
• Put headings in BOLD UPPER CASE.
• Put subheadings in Bold Title Case. [APA: italic.]
• Put sub-subheadings in Plain Title Case.
• Do not use italics for foreign words and abbreviations common in scientific English, such as ad lib, per se, et al., via, ad hoc, post hoc, a priori, a posteriori.

FONTS AND SYMBOLS
• Keep the fonts shown in the template of the article you are writing: Times New Roman for the body of the text, and Arial (PCs) or Helvetica (older Macs) for the headings and subheadings.
• You may use Insert/Symbol from the menu bar of Microsoft programs. Choose the normal text font to get these symbols: ± ° · µ. Choose the Symbol font to get ± ° Δ α β γ δ λ μ ≤ ≥ ≠ ± √ ∑ and so on.
• Make a non-breaking space in Word documents with option-spacebar on a Mac, and with control-shift-spacebar in Word on a PC. You can also use the Special Characters sub-window of the Insert/Symbol window to get a non-breaking space.
• Macintosh users can also produce the following limited set of symbols by use of shift, option and command keys: ° ± … · and the usual accent marks and international letters of the alphabet. Do not attempt to produce any other symbols using shift, command or option keys, because the symbols do not transfer to Web documents via Word. Use Insert/Symbol for other symbols.

ABBREVIATIONS AND ACRONYMS
• An abbreviation or acronym (short name) is justified only if the full expression is excessively long or if the abbreviation is well known to all researchers in the discipline. Even so, an easily understood short form of the expression that avoids abbreviations or acronyms is preferable.
• If you must use an abbreviation, define it in parentheses the first time you use it: for example, body mass index (BMI), maximum oxygen uptake (VO₂max), the fatigue dimension of the Profile of Mood States (POMS-fatigue).
• Use the following well-known Latin abbreviations only within parentheses: that is (i.e.), for example (e.g.), and so on (etc.). Do not use the abbreviations for namely (viz.) or compare (cf.), which few people understand. [APA allows these two abbreviations.]
• Use vs (versus) and et al. (and others) inside or outside parentheses without defining them.
• Use Note: instead of N.B. (note well).
• Use abbreviations without explanation for the following terms in the Summary, but define them in the Methods: standard deviation (SD), 95% confidence interval (95%CI), 95% confidence limits (95%CL).
• Note the lack of periods in acronyms and the lack of apostrophes in their plurals: ACSM, APA, IQ, IQs.
• Use no periods or spaces in abbreviations of countries: US, UK, NZ. [APA has periods and spaces.]
• Use a period only if the last letter of the abbreviation is not the last letter of the word, as in these examples: Prof., Dr, Mr, Ms, Vol. 1, p. 3, p. 23-25, 2nd ed., et al., vs, etc., and so on. [Minor departures from APA style here.]
• Use the following Systeme Internationale (SI) abbreviations for units of measurement (Young, 1987) [APA uses some of these abbreviations.]
  meter  m
  millisecond  ms
  gram  g
  second  s
  kilogram  kg
  minute  min
  mole  mol
  hour  h
  liter  L (not l)
  day  d
  milliliter  ml
  week  wk
  degree °C
  year  y
• Never add an "s" to the above abbreviations.
• Use the style 1 ml.min⁻¹.kg⁻¹ for scientists and ml/min/kg for non-scientists.

HEADINGS, PARAGRAPH STYLES, AND LISTS

• Use the heading, subheading, font, and paragraph styles appropriate for the publication you intend you submit your article to. [APA has a confusing hierarchy of headings.] For Sportscience the styles are shown in the templates for the article and are included in the Styles pull-down in the menu bar. Here are the main ones:

TITLE OF DOCUMENT: Optional subtitle 14-pt Arial

HEADING IN 11-PT ARIAL

Subheading in 11-pt ARIAL

Sub-subheading in 11-pt ARIAL

First paragraph in 11-pt Times New Roman...

• Use this convention for an itemized list within a paragraph: (a) first item, (b) second item, and (c) the final item. If one or more items contain a comma, use this convention: (a) separate the items with semicolons, as shown in this example; (b) second item, etc.; and (c) the final item. Include the letters only if you refer subsequently to one or more of the items: for example, Item (b).
• Use bullets to list points that are complete sentences, as shown throughout this document. [APA does not use bullets.] Exception: use numbered points if you want to refer subsequently to one or more of the points by number. For example:
  Use a numbered list for items that could stand alone as paragraphs.
  Do not try to include two or more paragraphs under one number.
  Somewhere in the article you would have to refer to one or more of these numbered points, for example Points 1 and 2, above. Otherwise you would list them with bullets.

NUMBERS AND STATISTICS

• Use tilde (~) to mean approximately equal to.
• Numbers beginning a sentence must be spelled. Rewrite a sentence so you don't start it with numbers greater than ninety-nine.
• Note: one, two, three… nine, 10, 11, 12… Exceptions: a 2-m tape measure; 3 million.
• Put a space between numbers and units: for example, 75 kg. Exception: 75%.
• Note: 0.32, not .32.
• Note: 143, 2,461 or 2461, 21,278, 1,409,000…
• When you quote numbers, make sure you use the minimum number of significant digits or decimal places. For example, 23 ± 7 years is easier to read than 23.4 ± 6.6 years, and the loss of accuracy is not important in most situations.
• Use the appropriate number of digits: two significant digits for standard deviations (one digit if the standard deviation is for a descriptive statistic like height or weight, or if precision is not important); two decimal places for correlations, two significant digits for percentages. Examples: 73 ± 5; r = 0.45; r = 0.08; 16%; 1.3%; 0.013%.
• If it is more convenient to show p values than confidence limits, show the exact p value to one significant digit (for p < 0.1) or two decimal places (for p > 0.10). Do not use p < 0.05 or p > 0.05. Examples: p = 0.03; p = 0.007; p = 0.09; p = 0.74. (The exact p value is important for anyone using your data to calculate confidence limits or using your data in a meta-analysis.)
• Make sure the significant digits of the mean and standard deviation are consistent. Examples: 20 ± 13; 0.020 ± 0.013; 156 ± 7; 1.56 ± 0.07; 15600 ± 700.
• Use the standard deviation as a measure of spread. Do not use the standard error of the mean.
• Avoid test statistics like t, F and \( \chi^2 \), but if the journal insists on them, show only two significant digits.
• Show 95% confidence intervals for effect statistics like a correlation coefficient or the difference between means.
• Interpret the magnitudes of outcomes in a qualitative way, using both your experience of the magnitudes that matter in this area of human endeavor and also any published scales of magnitudes (e.g., Cohen, 1988; Hopkins, 1998). You must interpret the observed effects and the confidence limits. For example, you might have to say that you observed a moderate effect, but that the true value of the effect could be anything between trivial and very strong.

**TABLES**

• Create tables with the Table pull-down in Word. Do not use tabs.
• Examples of tables in Sportscience style are shown in Tables 1 and 2.

<table>
<thead>
<tr>
<th>Table 1: A simple generic table for articles at the Sportscience website.</th>
</tr>
</thead>
<tbody>
<tr>
<td>heading</td>
</tr>
<tr>
<td>item</td>
</tr>
<tr>
<td>item</td>
</tr>
<tr>
<td>item</td>
</tr>
<tr>
<td>item</td>
</tr>
</tbody>
</table>

*Put any footnotes here. Note that the caption and footnotes are in cells of the table.

*Number footnotes as shown.
Table 2: A complex table.

<table>
<thead>
<tr>
<th>heading</th>
<th>heading</th>
<th>heading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subheading1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>item</td>
<td>item</td>
<td>item</td>
</tr>
<tr>
<td>item</td>
<td>item</td>
<td>item</td>
</tr>
<tr>
<td>Subheading2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>item</td>
<td>item</td>
<td>item</td>
</tr>
<tr>
<td>item</td>
<td>item</td>
<td>item</td>
</tr>
</tbody>
</table>

*Put any footnotes here. Note that the caption and footnotes are in cells of the table.

FIGURES

- Note these rules for choice of figure format:
  - line diagrams or scattergrams if independent and dependent variables are numeric;
  - bar graphs if only the dependent variable is numeric;
  - bar graphs or pie charts for proportions.
- Do not use scanned images of graphs or diagrams, because the lines and symbols become too "pixelly." Draw the figures directly in a computer, using preferably PowerPoint, Excel, or the drawing window of Microsoft Word.
- Make sure the fonts and any symbols are big enough.
- Do not make figures any wider than ~14 cm, because they need to be viewable in a Web-browser window without the reader having to scroll sideways.
- When using Word, paste each figure directly into the text using Paste Special…, unselect Float Over Text, and paste them in as bitmaps or drawings. Also, make sure the figure is displayed at 100% size and that it looks OK when the document is displayed at 100%.
- Put the figure into the cell of a table, as shown. Place the title and any footnotes for the figure in cells above and below the figure. The style for this text is 11-pt Arial.
- Place each figure or table immediately after the paragraph that first refers to it.
- See the examples (Figures 1-4).
Figure 1: Informative title for a time series.

Data are means. Bars are standard deviations (shown only for Groups B and C).

\textsuperscript{a}Use letters to label footnotes, if necessary.

Figure 2: Informative title for a scattergram.

Least-squares lines are shown for each variable.
• Connect the points in a line diagram with line segments. Show curves only if you are modeling a curve to the data.
• Change the color and shape of symbols for different groups of points: ○ △ □ ■ (This strategy helps color-blind readers.)
• Show scattergrams only for a good reason (e.g. to call attention to outliers, a nonzero intercept, heteroscedasticity, or a nonlinear trend); otherwise state the correlation coefficient and/or standard error of the estimate without a figure.
• Hierarchical diagrams summarizing the relationships between concepts or variables can be confusing. Make them as simple as possible.

**USE OF WORDS**
• Use a US-English spelling checker.
• Make sure you use words according to the precise meaning understood by the average person.
• Ideally, you would check whether every word could be deleted or replaced by a better one.
• Aim for economy: *because* instead of *based on the fact that*; for or *to* instead of *for the purpose of*. Similarly: *there were several subjects who completed*...; *it is suggested that a relationship may exist*...; *both alike*; *one and the same*; *a total of n subjects*; *four different groups*; *absolutely essential*; *found previously*; *small in size*; *in close proximity*; *very close to zero*; *much better*; *period of time*; *summarize briefly*; *the reason is because*; *also included*; *in order to*; except for.

• Similarly: *there were several subjects who completed*...; *it is suggested that a relationship may exist*...; *both alike*; *one and the same*; *a total of n subjects*; *four different groups*; *absolutely essential*; *found previously*; *small in size*; *in close proximity*; *very close to zero*; *much better*; *period of time*; *summarize briefly*; *the reason is because*; *also included*; *in order to*; *except for*.

• Aim for precision: *patient* or *gymnast* instead of *subject*; *concentration* or *frequency* instead of *level*.

• Don’t generalize unnecessarily. For example, don’t say *some* if you know of only one instance.

• This on its own is known as an *ambiguous antecedent*. Use instead *this test* or *this problem* or whatever.

• Avoid hype (hyperbole). Words like *very* and *extremely* are usually unnecessary.

• *Affect* or *effect*? *Temperature affected the outcome*. *There was an effect on outcome*. Try this to help you remember which is which: *Affluence affects attitudes*. *The effects of effluent are everywhere*. Note also: *the new regime effected* (i.e. produced) *substantial changes*. *Affect* can also mean *emotion*.

• Note these singular and plural forms: criterion, criteria; datum, data; medium, media; phenomenon, phenomena.

• Don’t use *however* or its synonyms twice in one paragraph, because changing the direction of an argument twice in one paragraph may annoy readers.

• Don’t use *however* more than once every 10 paragraphs. Try a thesaurus for synonyms.

• Keep jargon (technical terms) to a minimum. Explain any that you have to use.

• Avoid the so-called *non-human agent*. For example, use *the authors concluded that*... rather than *the study concluded that*....

• Avoid colloquialisms, such as *steer clear of*.

• *While* sounds more modern than *whilst*.

• Avoid *as such*. Poor: *The SCAT is a reliable test of state anxiety*. *As such*, *it is suitable for experimental studies*. Better: *The SCAT is a reliable test of state anxiety*; *it is therefore suitable for experimental studies*.

• Avoid *her, his* and any other sexist language, even if the subjects are clearly of one gender.

• The following APA rules, in my view, are old fashioned and need not be adhered to strictly:
  - Use *while* and *since* to refer to time. Do not use them when the meaning is *whereas, although*, or *because*.
  - Don’t start sentences with *because, since, or as*.

**GRAMMAR**

• Make sure you write well-formed sentences, and keep their structure simple.

• Use the first person (I or we tested six runners…) rather than the passive voice (Six runners were tested…). Similarly, say Smith reported instead of *reported by Smith*.

• With comparatives (*more than*, *less than*), the *than* may need to be *than that of* or *than with* or *than by* etc. to clarify the meaning. Similarly, *similar to* may need to be *similar to that of*. Examples: *The measure was more valid than that of Smith et al. (1994)*. *We experienced fewer problems with the revised instrument than with the published version*. *The method was similar to that of an earlier study*.

• Don't use a long string of qualifiers in front of a noun: *a modified test of cognitive function* is better than *a modified cognitive-function test*.

• Avoid grammatically questionable formal cliches, such as: *Based on these results, it is concluded that*... and *The results showed that*....

• Use the past tense to report results (yours or others'). Use the present tense to discuss them. *We have found that*...; *Smith (1989) reported a similar result*. *A simple explanation of these findings is that*...

• Avoid so-called misplaced modifiers: *When sedentary, protein supplementation resulted in...*. *Athletes were consulted when designing the questionnaire...*. *If necessary, subjects were tested...*. *Based on these results, we conclude...*. The next two examples are marginal: *Using stable tracers, it is possible to measure...*. *Given the importance of body mass, there has been little study of its effects...*. Note that *a noun was verbed to verb something* (e.g. *an experiment was performed to test*...


White AB (1999). This is the title of the book chapter. In Brown EF, Jones AB, Smith CD (editors): This is the book title (pages 33-44). City, State: Science Press


White AB, Jones CD (1999). The title of a Web document. site.url/directory/subdirectory/filename.html: Host or Publisher

REFERENCES


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*this hypothesis* is also technically incorrect but is used so widely that it has to be accepted. *A noun was verbed (by) verbing...* is also acceptable. The active voice would avoid these awkward expressions.

- Put only, partly and mainly next to the word they modify: *The test consists only of new items.*
- Note: partly vs wholly; partially vs completely. In the same vein, continual = repeated, whereas continuous = without a break. Not many writers get these right!
- The following rules are broken so frequently that I doubt whether they can be considered rules any more.
  - *Which or that?* Simple rule: Which always follows a comma (and a pause), but that never does. This study, which cost $10,000, was a success. The study that cost $10,000 was a success.
  - *Owing to or due to?* Simple rule: Owing to always has a comma, due to never does. The data were lost, owing to computer malfunction. The loss of data was due to computer malfunction.
  - An adverb is placed usually after the verb. Placing it before the verb produces a split infinitive. For example, *to boldly go...* is acceptable if you are emphasizing go, but if the emphasis is on boldly, *to go boldly* is better.

**FLOW OF IDEAS**

- Focus your thoughts by writing the summary first, even for articles that don't require one.
- Three ways to help get your ideas in a sensible sequence are to make an outline in the form of headings, to put the draft aside for days or weeks, and to get others to comment on the drafts.
- The first sentence of a paragraph usually sets the topic for that paragraph. Don’t have any unlinked ideas (non-sequiturs) in the same paragraph.
- A paragraph must consist of more than one sentence.
- Try to make the ideas within each section flow together.
- Don’t put things in the wrong section or subsection. Skim the finished document to make sure.
- When appropriate, keep the order of ideas the same in different sections of the article.
- Check that you don't contradict or repeat yourself in different sections of the article.
- Aim for simplicity: many readers are less intelligent and less knowledgeable than writers.

**STYLE FOR CITED PUBLICATIONS**

- Use Endnote or a similar reference-managing software to deal with more than a few cited publications (references).
- Cite references consistently in the style required by the publisher. If the style does not exist in your referencing software you will have to find something close, then either edit the style or edit the final list of references. Check that the style format in the software is correct: sometimes the format in which you have entered the references makes a difference.
- Make sure you give part numbers for journals or magazines that start with page 1 in each issue (e.g. Physician and Sportsmedicine).
- Make sure every publication referred to in the article is in the reference list, and vice versa.
- There is no agreed style for citing material published only on the Web. See American Psychological Association (undated) for a short Web page on the problems. See also the Web document by Land (1998).
- The style for articles at the Sportscience site is unique, but similar to that of Psychopharmacology, Biological Psychiatry, or Journal of Cellular Biochemistry. In the body of the article refer to publications in this manner: Jones (1999), Jones and Brown (1999), and for three or more authors, Jones et al. (1999). When the citation is in parentheses, the style of citation is as follows: (Jones, 1999; Jones and Brown, 1999; Jones et al., 1999).
- Here are examples of the style of the reference list for Sportscience articles: