This is a checklist and guide to common format and punctuation errors for engineering and other scientific articles based on an experimental research design. It is from a self-study guide written to help graduate students and researchers at Hanyang University in Seoul, Korea, write for publication in English in engineering and applied sciences. Parts may be helpful to other non-native speaking scientists writing in English as well as other novice researchers. Any part may be freely distributed in electronic or print form for non-commercial, educational purposes either for self-study or classroom use as long as information indicating attribution is included as follows:

The full-text of the entire guide to engineering and applied sciences writing can be found here: http://ctl.hanyang.ac.kr:8001/writing/engineeringresearchwritingebook.pdf (2.8 MB)

For more information on appropriate use see http://creativecommons.org/licenses/by-nc-sa/2.0/kr/deed.en_US

For a definition of non-commercial use see http://ocw.mit.edu/OcwWeb/web/terms/terms/index.htm#noncomm

This edition is currently being revised. We welcome suggestions or corrections: adamturner7@gmail.com

Section I Checklist

Follow these checklists to review your paper when writing full journal articles that have an experimental structure.

In some fields that have structured abstracts such as medicine, not all points below on abstract writing may apply.
# Abstract writing checklist

1. I have found and followed the “guidelines for authors” from the journal website.

2. The abstract is the correct number of words.

3. I have written my abstract as a complete text. The reader can understand the key results of my research without reading the whole paper.

4. The main keywords or index words are contained in the title and abstract.

5. I have used as many index words as possible (usually 5) to make it as easy as possible to search my article online. I have consulted the official keywords in my field if appropriate. I have included both general (for non-specialists) and specific (for specialists) key words for interdisciplinary journal papers.

6. I have fully spelled any abbreviations that should be spelled in my field. I have reintroduced those abbreviations in the introduction since the abstract should be written as a separate document.

7. I do not include references from other individual papers directly in the abstract. I only describe my own research, well-known theories or methods, or problems of the field in general.

8. I have included a sentence describing the research methodology used in the paper.

9. I did not copy and paste any of the sentences from the paper directly into the abstract—especially the first two sentences of the introduction.

10. There are no weak verbs such as “discuss,” or “examine,” or unclear terms such as “various methods.” I have described precisely how I did my research and what I found.

11. (Recommended but not required.) The sentences of my abstract follow the same general structure as the rest of my paper: introduction, methods, results, and discussion.

12. I have specifically stated the exact results, implications, and/or importance of the findings. I have quantified (used numbers or %) if possible.

13. In the first few sentences of the abstract, I have shown how my paper addresses a research problem, a limitation of previous methods, or an issue or “gap” in the research in my field (not required but a characteristic of well-written abstracts in any field).
## Introduction section checklist

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>I classify the key methods or theories and clearly define the key terms and concepts in my paper using formal definitions where appropriate.</td>
</tr>
<tr>
<td>2.</td>
<td>I not only list previous research, but I also analyze, synthesize and evaluate the literature in my field related to my research problem.</td>
</tr>
<tr>
<td>3.</td>
<td>I clearly explain the research problem or the lack of research in the area I am working on.</td>
</tr>
<tr>
<td>4.</td>
<td>I mention the weaknesses or limitations of previous research or methods related to my research problem.</td>
</tr>
<tr>
<td>5.</td>
<td>I have made the importance of my paper clear by showing how it is different from previous research and why my research is needed in the field.</td>
</tr>
<tr>
<td>6.</td>
<td>I reintroduce all abbreviations such as scanning electron microscopy (SEM), in the introduction, even if I have introduced them in the abstract.</td>
</tr>
<tr>
<td>7.</td>
<td>I have chosen the journal I want to send my paper to after I have completed the first draft. I understand that if I send my paper to a general or multidisciplinary journal rather than a specialist journal, I may need to give more background information and definition of key concepts in the introduction.</td>
</tr>
<tr>
<td>8.</td>
<td>I have read the author guidelines from the journal and have looked at a sample of the journal I am sending my paper to in order to make sure that the correct reference system is being used.</td>
</tr>
<tr>
<td>9.</td>
<td>I use a variety of verbs to introduce previous research such as “suggested,” “proposed,” “developed,” etc.</td>
</tr>
<tr>
<td>10.</td>
<td>I have not copied and pasted the exact same sentence in the first line of my abstract and the first line of my introduction, as it is considered poor style.</td>
</tr>
<tr>
<td>11.</td>
<td>I have not copied and pasted any sentence from another article, even if I have given a reference. Instead I have rewritten the sentence in my own words as well as giving the reference.</td>
</tr>
<tr>
<td>12.</td>
<td>I introduce references in a variety of ways appropriate to my field using author names as the subject when discussing the work of an individual author as well as references at the end of the sentence.</td>
</tr>
<tr>
<td>13.</td>
<td>I have remembered to identify the corresponding author, to include any acknowledgements for those who have helped me, and to provide the exact grant number for any funding that I have received to do the research.</td>
</tr>
</tbody>
</table>
### Methods section checklist

1. I have explained my criteria for choosing any special materials/equipment or unusual methods that differ from commonly accepted procedures.

2. I use transition signals to show the sequence of steps in my methods section.

3. I have used active sentence structures to emphasize the choices I have made for my methods if necessary.

4. I have provided enough information so that another researcher could replicate (do) the same experiment with the same results (this is not as easy to do these days, but it is still a worthwhile goal in science).

5. I have explained the assumptions made in my model or method if they might be questioned.

6. I not only describe my procedure, but I explain the reasons for choosing my methods where necessary by using sentences beginning with "To + Verb" or "In order to + Verb."

7. I have checked my paper again for any problems with passive sentence structure.

8. I have checked any complex statistical methods again that I have used with this guide from *Nature.*
   http://www.nature.com/nature/authors/gta/Statistical_checklist.doc

### Results section checklist

1. I do not merely describe all of the results in a list, but interpret the important results for the reader. I use words like “significant,” “unexpectedly,” “surprisingly,” or “interestingly” to bring the reader’s attention to the most important results.

2. If appropriate, I have pointed out any problems or inconsistencies with the data (not the same as limitations of the paper).

3. If my paper does not have a separate discussion section, but a combined results and discussion section, I have also included references that compare my findings with the results in previous research papers.

4. I have used the past tense to talk about the completed individual results of my paper, but I have used the present tense to talk about descriptions of figures or tables and generalizations based on these results.

5. My tables have headings at the top, but my figures have captions at the bottom.
Discussion/conclusion section checklist

1. I discuss only the most significant findings and do not simply repeat the results section with more commentary. ☐

2. I have noted any problems with the methods or data. I note the implications of these problems and how they might affect the validity of my conclusions. ☐

3. My discussion section includes references from other papers to either support or compare my research. ☐

4. I have analyzed the structure of papers in my field to understand the relationship between the results, discussion, and conclusion sections. ☐

5. I have identified and clearly explained the implications of my findings for the field if important. ☐

6. I have mentioned whether my results support or differ from previous research in the field. If they differ, I have attempted to explain why. ☐

7. I have mentioned some possible areas for further research, the importance of the findings, the limitations of the findings, or the implications and possible applications of my research (not always required but good practice). ☐

Proofreading

1. I printed out my article and viewed the figures, tables, and graphs in print (sometimes font size and color looks clear on screen but is not clear in black and white print). A font size of 8 is often seen as the minimum for readability. ☐

2. I have done the final proofreading on paper not on the screen. Final proofreading for grammar, format, and spelling is more effective on paper. ☐

3. I have found and followed the “guidelines for authors” from the journal website and check the correct format of the references for my target journal. The references are in a consistent format. ☐

4. My acknowledgements section has the grant number for my research. ☐

Section 2 Common Format and Punctuation Errors
Common format errors

* This material was designed for graduate students writing for publication in English at Hanyang University (http://www.hanyang.ac.kr/) in Seoul, Korea. However, it is useful for academic writers from any language background.
Index to common format errors

1. Contractions 단축형 are not used in research writing.
2. Do not use batang, gulim, or malgun gothic fonts.
3. The format of abbreviations 생략형
4. The format of figures and tables
5. International format for measurements in the sciences
6. Incorrect use of < > in titles and subheadings

See also formats for Email (http://www.hanyangowl.org/media/formalemail/formalemailformat.pdf) and international formats for writing the date [PDF files]. (http://www.hanyangowl.org/media/formalemail/internationaldateformats.pdf)

Note for instructors: the writing term “mechanics” is not well-known in East Asia.
Contractions (shortened forms of words) are not used in research writing. Always spell words fully.

However, contractions are considered acceptable for personal and most business and newspaper writing as well as TOEFL, GRE, or IELTS essay tests. Teaching materials also often use contractions. Note the following:

X: don’t
→ do not

X: can’t
→ cannot (note that this is one word)
The fonts “바탕, 굴림 or 맑은 고딕” are common defaults for English on Korean computers but should not be used for English documents.

- Times (new roman) is the standard for academic body text and Arial is usually used for headings for Windows users.
- Helvetica is a popular choice for Apple users.
- Calibri is Microsoft’s own default choice for Word 2007 but is not recommended.

There are different standards for web and print documents, and for academic and creative design. For the history of fonts see http://www.urbanfonts.com/blog/font-histories/
3.1 How to format abbreviations

Manual region matching replaces computerized extraction of the region of interest (ROI).

... the region of interest (ROI).

- One space before a parenthesis. Note that there is no space in Korean.
- Spell first then abbreviation (생략형) in parentheses.
- Always capitalize.
- Period at the end.

3.2 Abbreviations:
Don’t introduce abbreviations for words that are only used once

If a word is only used once in a paper, acknowledgement, or abstract section then there is no need to introduce the abbreviation. The abstract is not considered part of a paper since we can read it separately and it doesn’t contain references. Any abbreviations introduced in the abstract need to be introduced again in the body of the paper.

As another example, there is no need for the abbreviations below since the words are obviously only used once in this paper.

Acknowledgement
This work was supported by the Korea Science and Engineering Foundation (KOSEF) grant funded by the Korean ministry of Education Science and Technology (MEST) (No. R19-2008-099-0361)
3.6. Water solubility index

The water solubility index (WSI) increased when both temperature and chlorine concentration increased.

Correct:

No abbreviations in subheadings

Incorrect:

3.6. Water solubility index (WSI)

The water solubility index (WSI) increased when both temperature and chlorine concentration increased.

Abbreviations in body text only

Abstract

Integral imaging, which used to be called ...

KEYWORDS: three-dimensional display, integral imaging, and integral photography

1. Introduction

Various techniques for fabricating autostereoscopic three-dimensional (3D) displays have been actively investigated for decades. Integral imaging (InIm), which was originally called integral photography, is one of the most attractive technologies in the field of 3D displays.
4.1 How to format tables and figures

EXAMPLE

The format can be
Fig. 1.
Figure 1.
FIG. 1.

No period after the word: “figure” if spelled:
X: Figure. 1.
O: Figure 1.

Table captions are on the top.
Figure captions are on the bottom.
However, these days journals may have titles on the top of all figures and tables (but very rarely).

Period usually here.

Some journals include a period here; Others do not. Check the style of each journal.

Fig. 1. Comparison of X and Y.
4.2 How to format tables and figures in text

EXAMPLE

- As shown in Figure 1, the increase in ...
- This increase can be clearly seen (Fig. 1c)

(Fig. 1c)

Put a period when referring to a table or a figure only if it is abbreviated.

Always capitalize the first letter of numbered figures or tables.
4.3 How to format tables and figures in text

EXAMPLE

“Figure” is not an abbreviation.

X: As shown in figure. 1., the increase…
X: This effect can be seen in the results in table. 2. show the ….

O: The last method in Table 2 was employed only for three frames.
O: The change was significant, as shown in Fig. 2. The increase is demonstrated by the effect of …

Capitalize the first letter.
One space after the abbreviation: Fig.
The article “THE” indicates WHICH ONE? Since a numbered figure or table can only be one case “THE” is never used.

The Figure 3 shows the increase in the level of achievement of students after receiving the treatment.

“The” is also used to distinguish groups in the same category. In this example, there are two lines indicating two different groups, we need the word “THE” to help indicate which results “dashed” or “solid” and which group “patient” or “control” we are talking about.

EXAMPLE:
The dashed line indicates the development of the control group, while the solid line shows the improvement in the patients.
SI is the international standard system of measurement in science. In addition to the SI units, there is also a set of non-SI units accepted for use with SI. Visit http://physics.nist.gov/cuu/Units/checklist.html for more information

### 5.1 SI Unit rules

<table>
<thead>
<tr>
<th>SI Unit Symbols</th>
<th>Non SI Unit Symbols</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full word</td>
<td>Symbol</td>
</tr>
<tr>
<td>seconds</td>
<td>33 s</td>
</tr>
<tr>
<td>kilograms</td>
<td>80 kg</td>
</tr>
<tr>
<td>meter</td>
<td>10 m</td>
</tr>
<tr>
<td>kelvin</td>
<td>173 K</td>
</tr>
</tbody>
</table>
5.2 SI Unit rules

Basic rules

1. There is always a space between the numerical value and the unit symbol, except for superscript units for plane angles.
   X: 10 min
   O: 10 min
   O: an angle of 2°

2. No plural form
   X: 10 secs
   O: 10 sec

3. No period after the unit symbol unless it is at the end of a sentence.
   X: The experiment took 10 min. to complete.
   O: The process takes 10 min.

The spectrum analyzer used to capture the Power Spectral Density (PSD) data swept the 79 MHz ISM band for 33 ms twice a second. During the 33 ms sweep, the oven completed 2 full periods of operation to produce the resulting spectrum of Figs. 1 and 2.

**EXAMPLE**

A space between the numerical value and the unit symbol

No period after the unit symbol. Square brackets [...], “33 [ms]” are not used for measurements.

Cooked 10% waxy maize starch slurry was also digested by pullulanase (20 ASPU/g) for 6 h, reheated (121 °C for 30 min), and stored at 4 °C for 3, 6, 12, and 24 h and 2, 4, 6, and 8 days or -20, 4, and 20 °C for 2 days.

A space between the numerical value and unit symbol even for degrees Celsius.

Unit symbols are not followed by a period unless at the end of a sentence.

No plural form

Source: M. Miao et al.: Effect of pullulanase debranching and recrystallization on structure and digestibility of waxy maize starch, Carbohydrate Polymers, p. 2 ©2008
6. Headings and subtitles:
Do not use angle brackets “< >” for titles, captions, or subheadings

Don’t use “angle brackets” in subheadings or table or figure captions when writing in English. It is acceptable in Korean, however.

Correct:

1. Introduction

Banana is a climacteric fruit and, in Mexico, is consumed when the fruit is ripe. For this reason, high quantities of fruit are lost during their commercialization due to poor postharvest handling.

Incorrect:

< 1. Introduction >

Banana is a climacteric fruit and, in Mexico, is consumed when the fruit is ripe. For this reason, high quantities of fruit are lost during their commercialization due to poor postharvest handling.

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See http://www.hanyangowl.org/ for more materials on writing for publication in English. Email suggestions to adamturner7@gmail.com
Common Punctuation errors

• This material was designed for graduate students writing for publication in English at Hanyang University (http://www.hanyang.ac.kr/) in Seoul, Korea. However, it is useful for academic writers from any language background.
Index to common punctuation errors

1. The clause in English
2. Using commas
3. How to use a colon and a semi-colon in a list
4. Punctuation of equations
5. British and American English quotation marks
6. IEEE and APA style reference format basics
7. How to use an En dash (–) and an Em dash (—)
To fix sentence structure punctuation errors, you must first understand the importance of the “clause” 절 in English sentences.
A clause consists of a subject and a verb. A clause that makes sense as a complete sentence is a “main” or “independent” clause.

The company will expand in Asia

Subject  Verb
A clause consists of a subject and a verb. A clause that depends on or needs the main clause to make sense is a “dependent” or “subordinate” clause.

The clause “because young consumers have shown an interest in its new mobile product line” does not make sense by itself. It needs more information to make sense, so it must be a dependent or subordinate clause.
1.3 There are four types of sentences in English that give information. They are made of up different combinations of clauses.

- **Simple**
  - Main Clause

- **Compound**
  - Main Clause +
  - Main Clause

- **Complex**
  - Main Clause +
  - Subordinate Clause

- **Compound-complex**
  - Main Clause +
  - Main Clause +
  - Subordinate Clause
Many common sentence structure problems can be fixed by understanding clauses. If you are not sure what a clause is, please review the first section of this handout.
The word “and” can join words, phrases, or clauses. There is no comma before the word “and” if the subject of both verbs is the same.

X: The company will expand in Asia, and increase its mobile product line.

→ The company will expand in Asia and increase its mobile product line.

The word “company” is the subject of both verbs.

No comma before “and”
The words “So,” and “but,” should not be used in academic writing at the beginning of a sentence (unless it is quoted speech in qualitative research). Their job is to combine two main clauses in a compound sentence. Using “and” at the beginning of a sentence in academic writing should generally also be avoided.

X: Educational technology is always changing. So, teachers need support and training to use it effectively.

→Educational technology is always changing, so teachers need support and training to use it effectively.
The word “because” always joins two clauses: a main clause and a subordinate clause.

X: We had to look for less expensive software. **Because** our budget request was not approved.

X: We had to look for less expensive software, **because** our budget request was not approved.

→ We had to look for less expensive software because our budget request was not approved.

If the word “because” introduces the second clause in the sentence, no comma is necessary.
2.2.1 Sentences starting with “because”

The word “because” always joins two clauses (subject and verb). Like other subordinate clauses, it can come at the beginning of a sentence. However, a comma is necessary before the second clause.

X: Because our budget request was not approved we had to look for less expensive software.

→ Because our budget request was not approved, we had to look for less expensive software.
2.3 Commas with “however”

If words like “however” or “therefore” join two clauses, then a semi-colon and comma are required.

X: There are many textbooks on English writing in Korea, however, few textbooks explain sentence punctuation in English.

→ There are many textbooks on English writing in Korea; however, few textbooks explain sentence punctuation in English.

A semi-colon and a comma are needed. This type of connecting word is called a “conjunctive adverb.”

There are two subjects and two verbs (two main clauses) in this compound sentence, so commas are not enough to connect them.
2.3.1 Commas with “however”

If words like “however” or “therefore” only interrupt a single clause then commas should be put around them.

→ Understanding clause structure is essential to proper punctuation. However, Korean students are usually taught about sentences structure in a way that does not stress combining clauses.

→ Understanding clause structure is essential to proper punctuation. Korean students, however, are usually taught about sentence structure without this emphasis.

There is only one subject and verb in this simple sentence.
There are three main approaches: frequency, spatial, and temporal.

**EXAMPLE**

No space before a colon, but one space after it.

Put a comma between the listed terms. The second comma is optional.
3.1 How to use a semi-colon in a complex list

Use a semi-colon (;) to help make complex lists that contain commas in each item clear. You can also use semi-colons for list items that are complete sentences. Using only commas in the list below would make it almost unreadable.

EXAMPLE

There were four professors assigned to the task force: Peter Jones, professor of Mathematics; Ronald Smith, professor of English; Kim Lee, professor of Education; and Wendy West, professor of Political Science.

Semi-colons separate the items in the list.

A colon introduces any type of list including a complex one.
4.0 How to punctuate equations

Equations follow normal sentence grammar. The equals sign = is a verb. Sentences that end with an equation should have a period like any other type of sentence.

For $k = L - 1$, $A$ is a square matrix. Assuming that the inverse of $A$ exists, which requires are linearly independent [35], the vector is given by

$$w^H = e_1^T A^{-1}. \quad (37)$$

In case the steering vectors are not linearly independent, $A$ is not invertible, and its pseudo inverse can be used in its place.

There is no colon after “by.” There are also no colons after “is” or “as.”

Capital letter and indent after the period because it is a new paragraph

Period after the equation
4.1 How to punctuate equations

In this second example, a colon introduces the equation because there is a full sentence before it. Also, the sentence has not ended, so “where” is not capitalized. The equation is part of the sentence.

EXAMPLE

The desired weight vector is the solution of following simultaneous equations:

$$w^H s_0 = 1$$

$$w^H s_i = 0, \quad i = 1, \ldots, k.$$  (32)  (33)

Using matrix notation, this becomes

$$w^H A = c_1^T$$  (34)

where $A$ is a matrix with its columns being the steering

The sentence has no period yet, so “where” is not capitalized or indented

Colon for introducing the equation
The format of British and American quotation marks is different.
American English

Three metrics are proposed: “loss distance,” “loss frequency,” and loss period.”

In American English, the punctuation is inside the quotations marks.

In American English, double quotations marks are used for single words as well as full sentences.
British English. Organizations like IEEE ask for British English format. British English is also common in international organizations. However, double quotations are used by some British organizations. Check the author guidelines and sample papers carefully.

Three metrics are proposed: ‘loss distance’, ‘loss frequency’, and ‘loss period’.

In British English, commas and periods are outside the quotation marks.

In British English, single quotations marks or ‘inverted commas’ are used for single words as well as full sentences.

Note that there is no difference between quoting single words or entire sentences when choosing British or American style. Use single or double quotations consistently throughout the paper. The only exception is the rare case where there is a quoted word or words inside a quotation. In this case, American English uses single quotations inside the normal quotations and British English is the opposite.
IEEE: Institute of Electrical and Electronics Engineers and other fields of engineering and sciences use the following format for references.

**EXAMPLE**

This effect has been previously observed by [Kim et al. [11]].

Some journals have “et al.” in italics follow the style of the journal.

Put a period after “al.” but not “et”

One space between the word and the square bracket.

Put a period after square brackets [...] at the end of the reference, not before it.
The word “et” simply means AND in Latin so it is not an abbreviation and does not require a period. The word “al.” is an abbreviation of “alia” meaning “and others,” so it requires a period.

Because this term is now common, et al. does not require *italics*, although you will see the italics in many published papers. Follow the style of the journal.
Sanaoui and Lapkin (1992) also found that “considerable growth occurred in French-speaking skills and possibly listening and reading comprehension as well, which implies that an explicit focus on one area can have an effect on the other skills” (p. 544).

There are three types of dashes in English:

- hyphen (−)
- en dash (–)
- em dash (—)
The “en dash” is used to express a simple range of numbers such as 3–5 days. In math the ~ sign means “approximately equal to” as this example makes clear. In pure math and physics the sign ≈ is often preferred.

The thickness of the layer is ~ (120–135) µm, but the results of measuring the micro hardness over the cross-section gives ~ (140–168) µm.

Use an En dash (–) not a tilde (~) to express a simple range between two numbers such as days, hours, etc.
7.2 How to format the “Em” dash

Use an “em dash” to make a comment within a sentence. It is very similar to the use of (parentheses). Note that there is no space between words connected with an em dash (—).

EXAMPLE

…the AMCD and NAMCD algorithms exhibit a form of statistical smoothing, by not reacting to changes that do not permanently affect the video shot—a desirable behavior.
1. You can just type in **Hyphen (-)** on your keyboard.

2. In WORD 2003, 2007: Insert (삽입) → Symbol (기호) → General character (일반문자부호) → **En dash (En 대시)**

3. In WORD 2003, 2007: Insert (삽입) → Symbol (기호) → General character (일반문자부호) → **Em dash (Em 대시)**

4. In WORD 2003, 2007: Insert (삽입) → Symbol (기호) → Mathematical operators (수학연산자) → **Approximately equal ≈**

Note that these characters may not always view correctly in other programs or on webpages. See [http://en.wikipedia.org/wiki/Dash](http://en.wikipedia.org/wiki/Dash) for more information.
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