## Writing Check Sheet

The actions below are easy to do and can immensely improve the professional character of your report.  Please check off each one and turn this form in with any written material that you turn in to your professors.  More information about these errors can be found in the document following this check sheet.

1.  ☐ I have run the **spelling checker** on my document.

2.  ☐ I have run the **grammar checker** on my document.

3.  ☐ I have used the **equation editor** (*download MS Word file*) to format all equations.

4.  ☐ All of the references in the **List of References** are explicitly cited in my report

5.  ☐ All of the **figures and tables** have references to them in the text.

6.  ☐ All text **references to figures** and tables occur *before* the figure or table.

7.  ☐ The words **"this," "these," and "those"** never occur without referencing a noun. (E.g., "This device is used to …" rather than "This is used to …"

8.  ☐ All **acronyms** are spelled out completely the first time they are used.  For example, "A Magnetic Resonance Imager (MRI) is used for …."

9.  ☐ All **quoted material** relates to points that are subjective or a matter of opinion on the part of the quoted author.

10. ☐ I have not used any of the following **egregious words or phrases**:  a lot, kids, kinds, big, kind of, due to the fact that, (or just "the fact that"), utilize, actually, obviously, rather (as in "It is rather surprising"), very, quite, essentially.  That is, I have used the search feature of Word to look for the words and phrases in Tables 1 and 2.

11. ☐ There are no **sentence fragment**s or **run-on sentences** in my text (the grammar checker should find these errors).

12. ☐ There are no **contractions** in my text (do a global search for the apostrophe and make sure it occurs only in possessives).

13. ☐ The phrase **"et al."** is correctly written, with no period after "et" and a period after "al."

14. ☐ When the **semicolon** is used, it separates complete sentences, not sentence fragments or clauses.

15. ☐ I have eliminated **dangling participles**.  Wherever a present participle is used at the beginning of a sentence, the noun performing the action is the first thing after the comma.

16. ☐ I have used **parallel constructions** in related phrases.

17. ☐ I have checked for **common typing errors**.

**Notes on Writing**

Writing errors can be grouped into 6 categories:

1.  Non-compliance with conventions of technical writing
2.  Wordiness
3.  Poor or incorrect word choice
4.  Grammar
5.  Spelling
6.  Punctuation

The undergraduate or graduate student should have few errors related to 4, 5 and 6 above, but might still use incorrect words, unnecessary words and overly complicated phrases.  Furthermore, the student may not be familiar with the conventions of technical writing, even after having taken a technical writing course.  Consequently, the emphasis of this article is on conventions of technical writing and wordiness, although common errors in the other four categories are included.  To help the student interpret editing marks on their work, a list of editing symbols has been provided at the end of this article.  In addition, some illustrative examples are provided from reports and other bodies of work that I have edited.

**Technical Writing Conventions**

*Referring to Figures and Tables:*

1.  Every figure or table must have a numbered figure/table caption.  An example figure and caption for a Venn diagram is shown in Figure 1.
2.  Figures and tables must be numbered in the sequence in which they appear.  I.e. Figure 4 always appears after Figure 3.
3.  Figures and tables are numbered by different sequences.



**Figure 1:** Venn Diagram

4.  Every figure and table must be referred to in the text.
    Whereas popular magazines often have pictures that are not directly discussed in the text of the article, this practice is not acceptable for technical writing.  Every figure is included in your article for a specific reason, and it is to your advantage to tell the reader directly the purpose of that figure.  At the minimum you should have a sentence that says something like: "Figure 1 is a sketch of the proposed design."  You should then follow this statement with a description of what is shown in figure 1.
5.  Figures can be referenced in the text in one of two ways, either "Figure 1 is a sketch of the proposed device," or "The proposed device has 5 main components (Figure 1)."  The constructions, "(Figure 1) is a sketch of the proposed device," or "The proposed device has 5 main components Figure 1" are not acceptable.
6.  The first reference to a figure or table must appear before the figure or table.
7.  When you borrow a figure from some other source, be sure to provide an acknowledgement of the source *in the figure caption*.
8.  A legend key must always be included.  In some cases, inclusion of the key may require extra effort.  For example, the key may be in the original legend, rather than
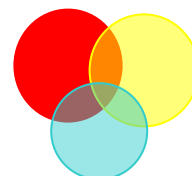
on the figure itself, whereas you need to write your own legend.  Alternately, the plot may be in color or there might be other circumstances that make it difficult to distinguish between the patterns that represent different data.  In this case, *you must ensure that your reader understands the legend*.  You may need to reconstruct the graph yourself in Excel or some other graphing package.  Make sure that you then state that the figure has been "adapted" from the stated source (e.g. "adapted from Minos et al., 2001").

*Citation of References*
1. Every reference listed at the end of your proposal or article needs to be referenced in your text.  References are included in your work to back up specific statements, not to provide further reading for the reader or to let the reader know where you learned about the subject.  If an article is not referenced directly in the text it must not be listed in the "References" section.
2. In citing references, remember that "et al." is the correct abbreviation, not "et al" or et. al" or et. al."
3. Pay attention to the format for citing references, and be consistent.  You should use either: "Johnson et al. (2002) developed the first viable artificial brain."  or "An artificial brain will require 5 billion electrical connections (Johnson et al., 2002).  In the second form, separate the author name from the date with a comma.  You can separate multiple citations with a semicolon, as in (Johnson et al., 2002; Friedrich et al., 2002).  Never list more than one name in the author list.  In other words, do not say, (Johnson, Robertson et al., 2002).  Also, do not say (Stan Johnson et al., 2002).
4. It is also not appropriate to spell out an author's complete name.  You should not say, "Dr. Stan Johnson developed the first artificial brain (Johnson et al., 2002).  It is much better to just say, "Jonhson et al., (2002) developed the first artificial brain."

*Acronyms*
1. The first time you introduce an acronym you must spell it out completely.  The style is: "Amyotropic Lateral Sclerosis (ALS) affects 30,000 Americans."  Do not say: "ALS is Amyotropic Lateral Sclerosis, and it affects 30,000 Americans."
2. Use acronyms sparingly.  You cannot expect your reader to remember large numbers of acronyms, and you do not want to force the reader to flip back continually to remember the definition of each acronym.  A simple guideline is to use acronyms only if you will refer to the item at least three times.

*Quotations*
1. Keep quotations to a minimum.  Quotations should generally be used when presenting something that is an opinion.  When expressing fact, it is better to paraphrase.

   *Compare:*
      According to Johnson et al. (1999), meningitis is the most painful of all neural disorders.

   *to:*

Johnson et al. (1999) have said, "Meningitis is the most painful of all neural disorders."

In this sentence, the quote is effective.

*Compare:*

Meningitis affects 50,000 Americans each year (Johnson et al., 1999).

*to:*

According to Johnson et al. (1999), "Meningitis affects 50,000 Americans each year."

In this sentence the version with the quote sounds as if you are shedding some doubt on what Johnson et al. have said.

*Contractions*
1. You should not use contractions.  You should not say, "The device can't be used in cold weather." Instead you should say, "The device cannot be used in cold weather." Similarly, do not use "haven't," "doesn't," "wouldn't," "don't," "we're," "they've," or any similar term that you might otherwise use in common speech.

## Wordiness

It is typical for students to use phrases and constructions that are more complicated than necessary.  The best way to learn to write clearly is to write a large number of pieces, to practice revising your work, and to have others edit and critique it for you. However, there are some simple rules that can be followed that will make your writing more succinct.

*Avoid Adverbs*
In courses on journalism, the instructor will often tell the students to "take the article they have written and cross out all of the adverbs."  The result is invariably better than the original article.  One adverb that is often overused is "very."  While this word is meant to be a qualitative intensifier, it can cause your work to sound imprecise.

Compare "The curve is very linear" to "The curve is linear."

There is no guideline to distinguish between "very linear" and "linear," so the word very serves no useful purpose in this context.  Ironically, the word "very" weakens the statement rather than strengthening it.

*Beware of Dangling Participles*
The dangling participle is a grammatical problem and is therefore described under the section on grammar.  Avoidance of this error will improve the clarity of your writing.

*Use Parallel Constructions*
Clauses that describe similar items or ideas should have the same grammatical construction to clarify the similarities.  Adherence to this rule allows the reader to focus on the ideas you are presenting rather than the grammatical structure.  For example, instead of "The proposed device is practical, inexpensive, and it provides comfort to the

patient," you should say, "The proposed device is practical, inexpensive, and comfortable to the patient."

*Avoid Other Unnecessary Words and Phrases*
Some phrases that are commonly used by students (and researchers) perform no useful purpose to the point of the article. Others can be readily shortened to a single world. Table 1 lists some of the more egregious examples.

**Table 1:** Phrases to avoid in technical writing.

| Instead of | Use |
| --- | --- |
| due to the fact that | because |
| calibration of the transducer was done | the transducer was calibrated |
| actually | nothing |
| obviously | nothing |
| rather (as in "It is rather surprising") | nothing (as in "It is surprising") |
| very | nothing |
| essentially | nothing |
| It can be seen that | nothing |

The phrase "due to the fact that" may appear in abbreviated forms, such as "the fact that" or "due to." Even these abbreviated forms should be avoided for more succinct and accurate phrasing.

The phrase "calibration of the transducer was done" is less direct than "the transducer was calibrated." Again, other forms often occur that should be avoided, such as "reversal of the procedure was performed," which would be better expressed by "the procedure was reversed."

## Word Choice

Lack of clarity may be caused by failure to choose the correct word. In some case the chosen word may simply be wrong. In other cases it may be close to the desired word but have a completely different meaning. A given word may also be correct in meaning but may be inappropriate for technical writing.

*Common Errors in Word Choice*
Pay attention to the difference between "affect" and "effect." In general, you will use "affect" as a verb and "effect" as a noun. For example, in "temperature affects viscosity," affects is a verb. In "temperature has an effect on viscosity," effect is a noun. Effect can be used as a verb, as in "the hammer effects a knee-jerk reflex." However, it is better in this case just to say, "The hammer causes a knee-jerk reflex."

The word "It's" is a contraction of "it is." It is not the possessive of "it." Correct: "It's 5 pm." Incorrect, "It's watch says 5 pm."

*Inappropriate Words*

1. Some terms should not be used in professional writing. A few are listed in Table 2.

**Table 2:** Words to avoid in technical writing.

| Instead of | Use |
|---|---|
| a lot | many |
| big | large |
| kids | children |
| kinds | types, varieties, models |
| kind of | somewhat (use sparingly) |
| plug in to (i.e. plug in to an equation) | use in |
| utilize | use |
| etc. | (complete the list, if possible) |

*Malapropisms*

Mrs. Malaprop was a character in the play "The Rivals" (R. B. Sheridan, 1775) who was fond of her vocabulary and unwittingly misused words. The malapropism is a common literary device in comedies. Modern examples can be found in Archie Bunker's use of English in the sit-com "All in the Family," but earlier examples can be found in many of Shakespeare's works.

Make sure that you know what a word means when you use it. Otherwise, it could have devastating consequences. Consider this example from a research proposal:

"We will use sophistical analysis software to accomplish these goals."

The author may have intended to use the word "statistical," or may have mistyped "sophisticated." In any case, the definition of the word, "Seemingly correct, but erroneous," was almost certainly not what the author intended.

**Grammar and Grammar Checkers**

As is the case for spelling checkers, grammar checkers should also be used. However, *grammar checkers are often incorrect.* They may flag some sentences that are perfectly acceptable and they may miss others that are completely erroneous. A recent story on CNN examined grammar checkers and noted some of the situations in which they provided incorrect advice. Microsoft's response to the story was that language is highly complicated and that it is unreasonable to expect that a given program could recognize correct and incorrect grammatical structures in all cases. Thus, a grammar checker is never a substitute for a human's working knowledge of language. Nonetheless, grammar checkers can find a variety of errors in your writing that are easy to correct. However,

*You must carefully analyze any sentence that the grammar checker highlights and be cautious in blindly accepting alternatives that the grammar checker suggests.*

Some of the more common errors made by writers are highlighted below.

*Complete Sentences*
1. Sentence fragments are phrases that are written like sentences, with a capital letter at the beginning and a period at the end, but are not complete sentences. Usually they lack the verb required to complete the thought.  Always use complete sentences, except, possibly, for a figure or table caption.   You can say, "Figure 1: Sketch of the final design."  Everywhere else you must use complete sentences.
2. Run-on sentences are the opposite of sentence fragments.  They occur when you have joined two sentences together with a conjunction, but have failed to put the separating comma at the end of the first sentence.  Example: "The data are valid and the statistical analysis demonstrates significance."  (This sentence should read, "The data are valid, and the statistical analysis demonstrates significance).

*Subjunctive Mood*
1. The subjunctive mood is used in cases of doubt.  Students of languages like French and Spanish are highly aware of the subjunctive mood, but in English this mood is less obvious, although it does exist.  Some cases are:
   a. If I were you ….  (Not "If I was you.")
   b. If there were a device that cured cancer … (Not "If there was a device that cured cancer").

*The Dangling Participle*
The –ing ending on a verb can perform two separate functions.  It can turn the verb into a gerund (a noun), or it can turn it into a past participle.  Compare the following:

Eating is good.
I am eating.
I was eating.

In the first sentence, "eating" is a verb that has been converted to a noun, and it has become the subject of the sentence.  In the second and third sentences, "eating" is still a verb form, the participle.  One of the unfortunate aspects of the English language is that it does not distinguish between the gerund and the present (or past) participle. (A few hundred years ago there was a difference in the form of these two forms, but language is constantly changing and it has evolved to eliminate the distinction.  One need only pick up the plays of Shakespeare or a copy of "The Canterbury Tales" to see that dramatic changes in language that can occur in only a few hundred years).  Not surprisingly, having a form that can perform more than one function can cause confusion.

A construction that often occurs is demonstrated by the sentence, "Eating the pretzel, I slipped on a rock."  This sentence could be rephrased as, "While I was eating the

pretzel, I slipped on a rock." This restatement highlights the past participle nature of "eating," and it also makes it clear who was eating the pretzel. In the original sentence, "Eating the pretzel, I slipped on a rock," it is clear who was eating the pretzel because the subject, "I" is the first noun that follows the comma. But what if we said, "Eating the pretzel, the black cat crossed my path?" By strict rules of grammar, this statement means, "While a black cat was eating the pretzel, the black cat crossed my path." It is likely that this meaning was not intended by the writer. Because it is now not clear what noun the participle belongs to, it is called a "dangling participle."

The rule is that when you use a construction that starts with a participle, the first thing after the comma needs to be the subject of the participle. If not, you are breaking the laws of grammar, risking ridicule from various readers and, more importantly, risking being misunderstood.

*Example:*
Correct: "Wielding the knife, I sliced the carrot."
Incorrect: "Wielding the knife, the carrot was sliced." (see Figure 2).

The second form implies that the carrot was wielding the knife, which is not likely, genetic engineering aside.

Some manuals on writing go so far as to suggest that you avoid words that end in –ing altogether. This rule seems a tad restrictive to me. However, one should be careful when using words with –ing. For example, consider the sentences, "Eating the pretzel, I slipped on a rock," (where "eating" is a past participle) and "Eating the pretzel was straightforward," (where "eating" is a gerund). After "Eating the pretzel," it is still not obvious to the reader whether eating is a gerund or a participle. This ambiguity makes your



**Figure 2:** Wielding the knife, the carrot was sliced.

reader think harder than he/she normally would have to. The extra thought is not substantial in this example because the sentence is short, but if the sentence gets more complicated, the reader can become more confused. Try these two sentences:

"Eating the pretzel with my fingers, which were covered in honey, I became frustrated."
"Eating the pretzel with my fingers, which were covered in honey, was the most fun I ever had."

As the –ing word becomes more separated from the part of the sentence that indicates its part of speech, the probability of the sentence being misunderstood increases.

*This*
In writing, the word "this" is best used as a demonstrative adjective, not a pronoun. It always needs to modify something. Do not say, "This causes the patient severe pain
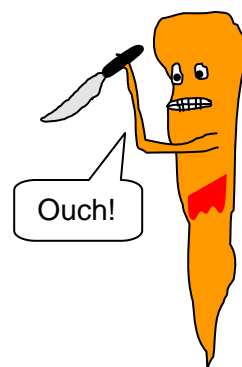
and discomfort." Instead, say, "This complication causes the patient severe pain and discomfort." Similar comments apply to "that," "these," and "those."

## Orthography and Spelling Checkers

*Spell checkers are highly valuable and should be used regularly*, but they cannot find a correctly spelled word that is used in an incorrect context. In addition, some common words may not be present in the spelling checker's dictionary. Pay attention to each word when you use the spell checker and have a dictionary available to look up any words that seem suspicious. Table 3 lists a few of the spelling errors I have seen in reports:

**Table 3:** Examples of interesting misspellings.

| Context | Correct Word |
| --- | --- |
| When ascending, a <u>felling</u> of some safety existed | feeling |
| I could only <u>were</u> the device when I was extremely fatigued. | wear |
| Multimeters and <u>sauntering</u> irons will be used in the laboratory. | soldering |
| … small enough to put into a circuit <u>with ought</u> dramatically increasing its original size. | without |
| In today's fast <u>paste</u> and competitive world… | paced |
| The synthetic fiber could cost <u>any wear</u> from … | anywhere |
| Obstructive sleep apnea affects the quality of life of many who suffer from this <u>depilatory</u> disease. | debilitating (unless obstructive sleep apnea causes hair loss). |
| Our approach to the mapping of the atria makes this device <u>potable</u>. | portable (I do not think that the investigators intended to drink the device). |

## Punctuation

The semicolon is used to separate two sentences that are closely related. If you use a semicolon, look at the expressions on each side. If they are not both complete sentences, then the semicolon is not the correct punctuation.

Students often submit work in which they have paid little attention to the punctuation. An example that is surprisingly common is the addition of a space between the end of the sentence and the period, or the omission of the space between the period and the beginning of the next sentence. *The grammar checker will easily uncover such errors. It is imperative that this tool be used before any written work is turned in.*

## Common Typing Errors

Certain typing errors are commonly found in the work of students. One of these errors is the misplacing of spaces. Below are some examples to look for:

1. No space after a comma. (e.g., "It was warm,sunny and windy).  The spell checker should find most of these errors.
2. No space after a period (e.g. "I think.Therefore I am.").  The spell checker should find most of these errors.
3. No space between the word "Figure" and the figure number (use "Figure 8 shows …", not  "Figure8 shows …").
4. No space between the word "Table" and the table number (use "Table 8 is …", not  "Table8 is …").
5. No space between a number and the associated units (use 15 cm/s, not 15cm/s).
6. No space before an opening parenthesis (e.g. poly styrene sulfonate(PSS) is…).
7. An extra space after an opening parenthesis or before a comma, period, or closing parenthesis (you can do a global search for " .", "  ,", "  )", and " (  ").

The spelling and grammar checker will _not_ find errors 3 – 7 above, but reasonable searches will uncover them.  To find errors like 6 above, for example, do a global search for ^$(.

## Editing Symbols

I use the following symbols for editing text:

Separate: ∫    "in case" becomes "in case."

Delete: ℛ    The device is very expensive" becomes "the device is expensive"

Close up: ⌣    "can not" becomes "cannot"

insert: ∧    "I ate sandwich" becomes "I ate the sandwich"

Interchange: ∿    "dialysis costly is"  becomes "dialysis is costly"

Change to lower case: /    "The Meter was used." becomes "The meter was used."

New paragraph: ¶

Construction is not parallel:

## Abbreviations Used in Editing

The following abbreviations are used to indicate specific problems:

**red:** The sentence or phrase is redundant, meaning that it has already been stated elsewhere and is unnecessary.

**ambig:** The sentence or phrase is ambiguous, meaning that it could be read in two or more ways that are not consistent with each other.

**awk:** The sentence or phrase is awkward.  While it may be grammatically correct, it could be written more clearly and succinctly.

**frag:** A sentence fragment was used.  Although the first letter is capitalized and the last word is followed by a period, the statement is not a complete sentence.

**?:** The sentence or phrase is so confusing that the reader cannot guess what you are trying to say and consequently does not know how to fix it.


**Illustrative Examples**

The examples below illustrate ways to simplify various sentences.  Revisions are in parentheses.

"The addition of more components to the existing design must be designed as to not inhibit sleep."  (The added components must not inhibit sleep).

"The major problem that I intend to address is that standard axillary crutch users need a safer and easier way to ascend and descend stairs."  (Standard axillary crutch users need a safer and easier way to ascend and descend stairs.)

"Stair climbing requires a certain amount of strength and confidence."  (Stair climbing requires strength and confidence.)

"The person can't really feel them."  (The person cannot feel them).

"The electrodes would have to be cordless and be able to be detected by the sensors."  (The electrodes would have to be cordless and detectable by the sensors.)

"Installing the driver would cost a lot of money plus paying for the software and electrodes would be expensive also." (The software, the electrodes, the driver, and installation would be expensive.)

"My group measured an EKG of the heart."  (My group measured an EKG).

"The importance of an effective drug delivery system lies in the population effected, which is basically the whole of society."  (Nearly everyone would benefit from a more effective drug delivery system.)

"Using a laser pointer, there is a risk of eye injury because disabled people might use the pointer to point to a person and by mistake they will point the laser to their eye."  (Laser pointers can cause eye injury if they are pointed into a person's eyes).

"The limiting factor in TDD systems is governed primarily by skin permeability."  (TDD systems are limited by skin permeability.)

"The flexibility of the device will be ensured to fit on children from ages one to five."  (The device must fit on children from ages one to five.)

"Research shows that kidney transplantations are the optimum treatment." (Kidney transplantations are the optimum treatment.)

"An article attributes such discrepancies to be not only genetic, but also due to access to health care for certain minorities (Obrador et al., 2002).  (Obrador et al. (2002) attribute such discrepancies to both genetic disorders and lack of health care access for certain minorities.)

"The device will be able to be replaced by the user." (The device will be replaceable by the user).

"There are two ways to go by troubleshooting a medical device."  (There are two ways to troubleshoot a medical device).

"The problem that will be addressed upon completion of this project …."  (The problem that will be addressed by this project…)

"In a recent study, it has been found that …."  (A recent study found that ….)

"This infection is one that can go unnoticed."  (This infection can go unnoticed).

"The need for an improved surgical swab is apparent."  (An improved surgical swab is needed.)

"However, we know that cotton can leave lint."  (However, cotton can leave lint).

"As you can see, each one of the solutions to the problem is flawed." (Each of the solutions to the problem is flawed).

"We learn from Fluid Mechanics that the greater the surface area touching the fluid, the faster the absorption occurs."  (Absorption is proportion to the surface area in contact with the fluid).

"Another way to evaluate if the design is functioning as desired is …." (Another way to evaluate the design is ….)

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