

## Some writing tips for scientific papers – by Andrew Hendry

Note that these comments apply to scientific papers and may not always be relevant to other forms of writing, such as this particular document.

### Paper structure and general guidelines:

1. Try to state the main objective of the paper in the first paragraph. Many authors place the specific objectives of their work in the last paragraph of the introduction, which is fine in some cases. However, I think the reader shouldn't have waded through several paragraphs before he/she knows the general goal of the paper. Putting the main goal of the paper very early on helps the reader to understand why you are presenting particular types of information in the introduction.
2. It is often useful to start each paragraph with a topic sentence that encapsulates the main point of the paragraph. This is then followed by sentences that modify and expand upon the point made in the topic sentence. This approach tells the reader what is coming in the paragraph and aids interpretation. This won't work in all situations but it is a useful tool when possible. This comment and the previous one are a recognition of the way that most people read scientific papers (except when assigned them as a reading): they skim the text reading the first sentence of a paragraph first to see if it looks like it will be relevant. They also start reading at the start of an introduction and if it doesn't hold their attention, they just skim to the next section, or worse yet, the next paper in the massive pile they are trying to read.
3. Make sure the paper follows a clear logical flow and does not jump around between ideas. For example, if you lay out three predictions in the introduction, then organize your discussion around those three predictions.
4. Use subheadings liberally but not excessively (each subheading should usually have more than one paragraph under it). Some people write a discussion that is 10 pages long and covers several distinct subjects without providing any subheadings as guideposts. This makes it very hard for the casual reader to find the part of the discussion that is of interest to them.
5. Make sure your paragraphs are neither too long (e.g., more than a single double-spaced page) nor too short (perhaps less than three sentences). The latter guideline can sometimes be ignored.
6. When stating results, be as direct and clear as possible. That is, tell the reader the actual difference. For example, say "Guppies at low predation sites were more colourful than those at high predation sites ( $P < 0.001$ ; Table 1)." rather than "Guppy colouration differed between low and high predation sites ( $P < 0.001$ ; Table 1)." In the latter case, the reader actually has to go to the Table to find out the direction of the difference. This point may seem obvious but is a very frequent problem.
7. Always state the actual P value until it gets to  $P < 0.001$ . Never use  $P < 0.05$  or  $P > 0.05$ .  $P = 0.051$  means something very different from  $P = 0.51$ , even though both are  $P > 0.05$ .
8. Use frequent citations to relevant work but only cite papers in the appropriate context. That is, make sure the paper actually said what you are citing it as having said. It

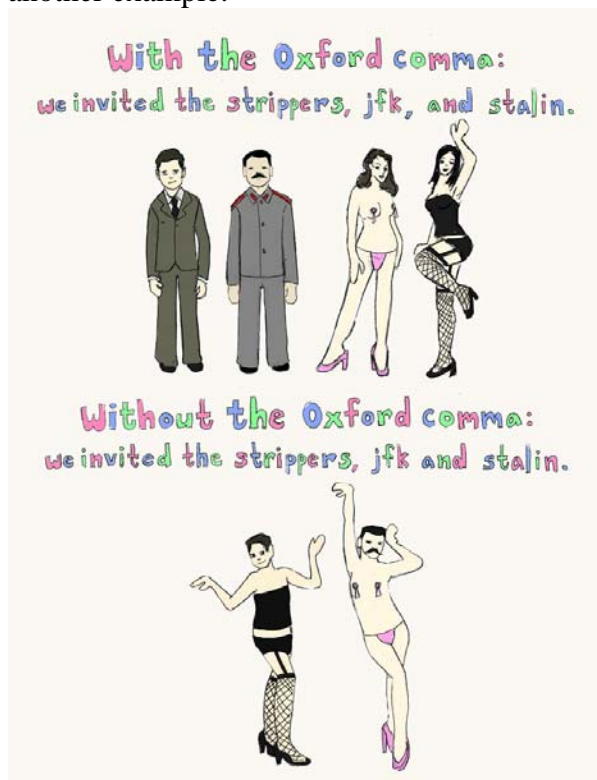
really annoys the reader when people cite a study for something that it actually did not address, except very peripherally. This is VERY common.

9. I rarely include more than five citations to a single point. The number of possible citations to any particular point is usually very large, and you could never cite all of the relevant studies anyway. Instead, cite a selection of ones you feel work best: (e.g., Hendry 1999; Hendry 2000; Hendry 2001) or a single review identified as such (review: Hendry 2002).
10. Beware of excessive citations. Some people will have 60+ citations for a 20 page paper, which is too much (unless it is a review paper). Excessive citations are often conspicuous as long lists of papers after a statement that is peripheral to the main point of the paper. You can often detect this excess as a long (max. 5, by the above criteria) list of papers after a particular point that contains several papers that are not cited elsewhere.
11. When citing a book, it is often useful to include the page number (or range of pages) that provide the support for the specific point you making (e.g., Hendry 2003, p. 666).
12. Make sure all citations in the text match those in the references and vice versa. Make sure the format of the citations is correct and conforms EXACTLY to the specifications of the journal to which you will submit your paper.

### **Grammar:**

1. Avoid long, complicated compound sentences. These are often very difficult to follow.
2. Use “which” and “that” properly. “That” should be used for restrictive clauses (“This is the fish THAT Jack caught.) whereas “which” should be used for nonrestrictive clauses (“This fish, WHICH Jack caught, is a salmon.”) Most people use “which” in many cases where “that” is more appropriate.
3. Avoid all use of “there is”, “there was”, “there are”, and “there were”, particularly at the start of sentences. Use of these terms can make the subject of the sentence unclear.
4. Avoid unnecessary amplification of text. For example, say “sneaky mating is successful” rather than “sneaky mating has been found to be successful”.
5. Avoid the use of “while”, except when the intended meaning is “during the time that.” In other contexts, “whereas” or “although” are usually better.
6. Write out all numbers less than 10 (i.e., one, two), unless the number is followed by a unit, such as m, mg, min, h, etc.
7. “Data” are plural.
8. “Between” is used in reference to two things. “Among” is used in reference to more than two things.
9. Never use “etc.”
10. Never use “unique” unless you truly mean “one of a kind.” People often say: “Our system represents a unique opportunity to test the theory that...” Hogwash. Instead, say: “Our system represents an excellent opportunity to test the theory that...” Similarly, never use “ideal” or “perfect” in this same context.
11. My Mom (a grammar expert of sorts) tells me that only God “creates” things (and she isn’t even religious).

12. Strive for parallelism between related sentences that appear close to each other. As a simple example, use “Low predation sites are characterized by few fish predators. High predation sites are characterized by many fish predators.”, instead of “Low predation sites are characterized by few fish predators. Many fish predators are found at high predation sites.”
13. Beware of misplaced modifiers. For example, “We measured body depth using calipers.” Body depth does not use calipers, as this sentence implies. Instead, use “We used calipers to measure body depth.” Sometimes it is difficult to avoid misplaced modifiers without otherwise destroying the sentence. In such cases, it is forgivable.
14. Use the active voice (“We measured body depth.”), rather than the passive voice (“Body depth was measured.”), whenever reasonable and when not explicitly disallowed by a journal. Be careful to not use it too much though. Six sentences in a row, all starting with “we”, are very awkward.
15. Although many would disagree with me, I believe in the power of punctuation. As one small example, I believe the second last phrase in a list of phrases should have a comma before the “and.” For example, “Speciation can occur by genetic drift, mutation, and natural selection.” rather than “Speciation can occur by genetic drift, mutation and natural selection.” Using the latter often introduces confusion when the phrases themselves are longer and contain “and” within them. The cartoon gives another example:



16. Figures always appear one per page at the end of the MS but figure captions are usually stuck on a single page just before the figure pages.
17. Always use a single space between sentences. All journals do this anyway, and it makes editing difficult if one person (me) uses single spaces and other people (you) use double spaces.
18. Try not to use “may” unless you are implying permission. Instead consider “might” or “can”.
19. Tables always appear one per page near the end of the MS, with the caption for each table appearing above the table itself. Vertical lines are NEVER used in tables and horizontal lines are used sparingly – usually above and below the table and below the column headings in the table. Tables and table captions are usually double spaced. I produce an example below.

Table 1. Descriptive heading here.

	N	Black	Orange	Blue
Yarra High				
Yarra Low				
Damier High				
Damier Low				
<u>Full model</u>				
River F				
Predation F				
Interaction F				

**Other tips:**

1. Tables should be built directly in word, not pasted from Excel. This allows for much better formatting and easier manipulation.
2. When pasting figures into a word document, use “edit” > “paste special” > “enhanced metafile”. This preserves quality but does not also paste the entire underlying excel or ppt file.
3. Figures are better built in powerpoint than in Excel or (most) stats programs – R is probably an exception. Powerpoint allows for much easier editing of the figure. One problem, however, is that the error bars on bar graphs cannot be constructed there. In this case, you can paste a figure from excel (as an enhanced metafile) without any of the headings, axis labels, etc., and then add the labels in excel. Other folks swear by drawing programs, such as Adobe pagemaker, or something like that.
4. If you want to place a hard return before a new heading or table in your word document, use “CTRL > RETURN”. This way the start of the table or heading will always be at the start of that page.
5. If you have a table that is very wide, you can use landscape formatting for that table or figure alone. Place your cursor just before the table heading and click “Insert > Break > Section Break Types > Next Page”. Do the same at the end of the table. Then place your cursor on the table somewhere and “File > Page Setup > Landscape” and make sure to select “This section”.
6. If the journal you are using wants line numbers, you can do this by going to “File > Page Setup > Layout > Line Numbers”. I often find it easiest to use “continuous” numbering (one of the options).