



Writing and Publishing Scientific Papers

A Primer for the
Non-English Speaker

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12. How to Write the Discussion

This section is hard to define, and it is also hard to write. Often, the Discussion section is the most verbose of the manuscript, and can pull down the whole paper. Most rejections happen due to a faulty discussion. Consequently, this section becomes the most important one for the aspiring author.

Authors often follow the “squid technique” (Day, 1998): being unsure what their data mean, they try to hide in a protective cloud (of ink!), confusing the issues that are pertinent to the results.

A discussion should provide the answer to one simple question: what do the data mean? When attempting to answer this question, there are several “dos” and “don’ts”. First, what to avoid in a discussion:

- Do not repeat results. This does not mean that the overall conclusions cannot be mentioned, but reciting the results in different words is unnecessary and superfluous.
- Do not introduce new results. In some cases, the relevance of certain results becomes evident only during the writing of the discussion. Make sure that these are mentioned in the results section and, also, that their relevant methodological details appear in the Material and Methods section.
- Do not pretend to have solved everything. The significance of the findings should be mentioned, and as authors, we genuinely believe our results will shed light on new areas. It is unlikely, though, that all relevant problems have been solved, and it shows no wisdom to make such claims.
- Do not finish with throwaway sentences. Towards the end, the overall significance of your findings could be mentioned. This, however, should not be something very trivial, such as “more studies are needed”. Mentioning

“significant new avenues for future research”, or “indicating significant human influence on XX ecosystem” are also of the “throwaway” kind: they have been made so often that they no longer mean very much. It is best to avoid them.

- Do not try to discuss every possibility, especially if speculative. Your results may have connections to several other areas, facts, and theories. Be modest when trying to discuss these.

However, do:

- Present principles, relationships, and generalisations that follow from your results.
- Refer back to your central problem and, also, write about what was *not* found, corroborated, or supported from your predictions. Point out any gaps or inconsistencies that continue to exist, or that your results indicate.
- Show how your results agree and differ with previous work. Both aspects are important for the further development of the field. Additional support of existing facts, theories, or ideas with a new experimental setup or system is important. Also, do not be silent if your results are different from previous findings. Try to identify and discuss the possible reasons for this. Be cautious and precise when invoking potential factors.
- Explain the significance of your results. You are the best person to understand, and explain, the significance of your findings. Avoid the “so what?” response of potential readers. They may not be willing, or may not be in a position, to go further to analyse your results, and find out about their significance. You know your data well, and you probably have a good perception of their importance. Be honest, and modest — but do not shy away from pointing out the importance of your results.
- Discuss the theoretical and practical implications. A piece of practical work often has theoretical implications, and vice versa: a theoretical work may suggest practical

applications. Point these out; try to think of the possible other uses of your work.

- Present the “new picture”. Again, you are in the best position to appraise whether the new results you present in the results section lead to a new situation. It is your privilege, but also your duty to write this, if pertinent.
- Summarise evidence for each conclusion. Do not leave this to the reader, even if you believe it to be obvious. Do not assume anything, and do not leave this to the imagination or intellect of the reader.

A common error is described by Day (1998) as “a clear stream of discussion ends in a swampy delta”. Finish the paper with a clear statement. There is no need for a cosmic conclusion, but a well-formed, precise statement ends the paper nicely.

Style

The style of discussion is more complex. The tense of this section will switch between present (reference to published knowledge, with a citation) and simple past (when mentioning your own results). Occasionally, other tenses may occur in this section.

A discussion should be kept in proportion with the results. Generally, a discussion longer than twice the length of the Results section often risks “discussing the findings to death”. Write using your own words; do not repeat the wording from earlier sections. There is no need for far-reaching conclusions; you will be able to illuminate one area. Your conclusions can be buttressed by your facts in that one area — but if you extrapolate to a bigger area than your data allow, you may appear foolish to the degree that even your data will be doubted. “Display your small piece of truth — leave the whole truth to ignoramuses, who proclaim its discovery every day”. (Day, 1998).

The simplest statements evoke the most wisdom. Fancy language and technical terms may be used to disguise shallow thinking. Try to write simply.

