Preparing the Four Main Parts of a Scientific Paper: Concise Advice

This resource consists of the posts in the four-part series "IMRAD Info", which appeared in the AuthorAID blog in December 2016. This series, by Barbara Gastel, provides basic advice on writing the main parts of a scientific paper. We thank AuthorAID member Wilfred Kokas Aupal for suggesting that the series be made available as a single document.

IMRAD Info #1: Introducing the Introduction

Greetings again. I hope you're doing well.

A recent AuthorAID blog post described the hourglass-like structure of journal articles having the IMRAD format (introduction, methods, results, and discussion). In a comment, a reader requested more information on the four IMRAD sections.

Therefore this month I'm providing posts on the four sections. The current post discusses the introduction. Posts on the other three sections will follow.

Before drafting an introduction, look at the introductions to some articles in the journal where you'll submit your article. Introductions in different journals sometimes differ, for example in length. See what is typical for your journal. .

Also consider functions of the introduction. One function is to provide background so readers can understand your work and appreciate its importance. Another function is to indicate the purpose of the research, for example by stating research questions or hypotheses. Be sure to fulfill these purposes.

As usual, authors should consider their audience. In a paper for a general journal, the introduction may need to provide basic background. A paper for a specialized journal might not need to do so.

As noted in the earlier post, the introduction typically starts broad and then narrows down. For example, it may

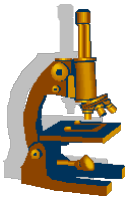
- present general information on the subject,
- then summarize previously published findings on an aspect of it,

- then identify a gap in knowledge about that aspect, and
- then state the questions or hypotheses that the current research therefore addressed.

Because it starts broad and ends narrow, the introduction is said to resemble a funnel. If written appropriately, it will funnel readers effectively into the rest of your article.

Until the next post—

Barbara



IMRAD Info #2: A Method for the Methods Section

Greetings again. I hope you're doing well.

Last week's post discussed writing the introduction section of a journal article. This week's post focuses on the next section: the methods.

Start preparing to write the methods section while still doing the research. As you work, keep careful records of what you do. In particular, note any changes from what you planned. Otherwise, you might forget the changes.

Consider the purposes of the methods section. In general, this section should provide the information needed to (1) replicate the research and (2) determine whether the methods suited the research question.

Check whether your journal's instructions to authors include guidance on the methods section. Also look at the methods sections of some articles in the journal. Doing so can show what format and level of detail are suitable.

Of course, the methods section should be logically organized. Often much of the methods section is chronological. Some methods sections have parts—for example, on the study population, the survey protocol, and the statistical procedures. .

The methods section must contain enough detail. For example, authors may need to specify manufacturers of chemicals, strains and sources of organisms, and brands and models of equipment.

If you used a previously published method, you can briefly describe it and cite the source rather than describing the method fully. Of course, you must note any modifications you made.

Figures or tables sometimes can help communicate the methods. Among possibilities are flowcharts, maps, drawings of apparatus, and tables of experimental conditions.

In sum, preparing the methods methodically can help yield an effective paper.

Until the next post—

Barbara

IMRAD Info #3: Results Sections That Get Results

Greetings again. I hope you're doing well.

The previous two posts discussed writing the introduction section and the methods section. This week's post focuses on the results section.

The results section is the heart of a scientific paper. Without results there's no paper. However, a results section need not always be long. If research is highly focused, the results section may be short but strong.

The purpose of the results section is, of course, to report your findings. The findings should follow from the methods you described. And they should help answer the question(s) you posed.

When writing results sections, some new researchers feel compelled to include every piece of data they obtained. However, summarizing data or providing representative findings is often preferable. Looking at papers in your target journal can help in knowing how much detail to include.

The results section should be well organized. Sometimes chronological order works best. Other times, another order—such as from most important to least important—works better. Sometimes a combination is most effective.

Often a results section includes tables or figures. It should mention each one. But it shouldn't repeat its content in detail. Rather, it should state the main message of the table or figure and perhaps note some important items in it.

Unless a paper has a combined results-and-discussion section, the results section should just state the findings, not comment on them. For example, it should not speculate on reasons for the results.

Such commentary belongs in the discussion section. I look forward to discussing that section in the next post.

Until then—

Barbara

IMRAD Info #4: Discussing the Discussion

Greetings again. I hope you're doing well.

Earlier posts in this series discussed writing the introduction, methods, and results sections of a journal article. The current post discusses the discussion. This section can be especially hard to write because it can vary considerably in content and structure.

One way to approach writing the discussion is to consider its **beginning, middle,** and **end.**

Commonly, the **beginning** should focus on the current research. It should quickly summarize what was done and found. And often it's the place to answer the question(s) that the research addressed. Other items to consider discussing here include discrepancies in the findings and strengths and limitations of the work.

The **middle** should put the current research in the context of previous research. For example, it may show how your findings are or aren't consistent with published findings and may speculate on the reasons. This part may have relatively many citations.

Finally, the **end** should put the research in broader context, for example by noting theoretical or practical implications or both. If the article won't have a conclusions section, the discussion may conclude with a paragraph briefly summarizing the research and stating the take-home message.

Discussions vary somewhat among fields and journals. Therefore, it's important to look at examples in one's target journal.

Whereas the introduction moves from general to specific, the discussion tends to move from specific (the current research) to general (broader significance). In other words: The introduction resembles a funnel, but the discussion resembles an inverted funnel. It leads readers back into the wider world in which the research occurred.

Until the next post—

Barbara