

Giving Credit: Citations and References

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You are nearing the end of the process of writing your scientific paper. You have carefully written a concise introduction, provided a detailed description of your methods, reported your results clearly, and discussed the meaning of your results. You may even have the perfect title and abstract ready to go. But the need to keep your focus and attention to detail remains, because there is still an area where you can stumble and hurt your efforts: the citations and references. Lest you consider references to be a minor component of a paper, consider the fact that the Council of Science Editors devotes 86 pages in their style manual to the proper use of references (1) and the *AMA Manual of Style* (2) includes 41 pages covering references.

During the writing process you compiled a file (a stack of photocopied articles or an electronic database) of previously published papers that directly or indirectly contributed to your study. Therefore, it is important to give credit to (cite) the ideas, methods, and results of others. It is also important to tell readers where they can access documentation of this work (references). A citation (typically a number or the author name and year) inserted in the text identifies material that should be attributed to or associated with previously published work. A corresponding reference documents the original source of the material. Citations and references can be a source of information for readers, but they can also become a source of frustration if not selected and used wisely. So let's go over some basics of the use of citations and references.

Organizing Citations and References during the Writing Process

The ideal time to organize (or perhaps reorganize) the materials you might cite is when you begin writing a paper. Organizing potential references at this stage is useful for several reasons. First, the process allows you to identify where in your paper a previously published

article is most relevant and should be cited. For example, articles that help you define your topic for the reader or help the reader understand the knowledge gaps that need to be filled might be categorized as important for the Introduction. Prior publications that contain details of methods you applied would be cited in the Methods/Experimental section, and articles that support your results—or help you interpret your results—would be considered relevant for the Discussion section. Second, organizing and reviewing potential references allows you to see the larger picture of the types and scope of articles you have assembled. This process can help you recognize whether your references appear to emphasize one aspect of your study at the expense of another. This process also helps you remove early in the writing process any references that ultimately did not contribute to the study. Third, organizing your references as you begin writing helps you get an early count of the number of citations that are accruing in your paper. Many journals limit the number of references, so early recognition that you are likely to approach this limit can save you grief later. Perhaps a review article or a couple of more-recent papers could substitute for a larger number of general papers that describe your research topic. The one nice thing about the Internet era is that readers can more readily access the older publications cited in newer references or review articles. Thus, you do not need to be ultracomprehensive in citing the literature.

The 2 most common citation and reference formats used today are the citation-sequence or consecutive-numbering system (the “Vancouver system”) and the author name–publication year system (the “Harvard system”). During the writing process, it is important to follow the format used by the particular journal you have in mind. This information can usually be found in the Information/Instructions for Authors. Even if the selected journal uses the consecutive-numbering system, many authors find it helpful to use the author name–publication year system in early drafts of a paper (3). The reason is that the numbers assigned to references likely will change if you add or delete a reference or if you modify the sequence of citations in the text. If you insert an author name and year of publication in the text instead of a number, any subsequent changes to citations or references are easy to match. When you prepare the final version of the

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paper, you can assign numbers to both the citations in the text and the corresponding references.

Fortunately, many word-processing programs have built-in functionality for inserting citation placeholders, creating and editing citations and references, and creating bibliographies. There are also several citation/reference-management software programs that can be purchased (e.g., Thomson Reuters' EndNote, ProCite, and Reference Manager; ProQuest's RefWorks) or downloaded for free from the Internet (e.g., Zotero). Most of the available programs will format citations and references in a variety of standardized formats, including the citation-sequence and author name-publication year systems, and will even reformat citations and references from one style to another. If you use a citation-management software program, however, be aware that as the author, you are still responsible for checking the accuracy of your references.

Accuracy and Value

All references included in a paper should be accurate and add to its value. Therefore, the selection of references should follow some fundamental guidelines. Accuracy requires 2 elements. First, make sure that you have read and verified every article or document that you plan to use as a reference. You must verify that the article (a) indeed contains the information you are citing and (b) is the original source of this information. I have looked up references included in papers and frequently found that they were incorrect in some manner. I have also encountered instances in which a cited paper was actually not the source of the details of the original method or study but instead referred to an earlier publication that was the original source of the information. The only circumstance in which this practice might be excusable is when the original source is very old and difficult for the reader to access and the citing publication does a good job of describing this information or the details of the original method. The second element of accuracy is the correct order and spelling of author names, the correct journal name, and the correct year, volume, and page numbers. Besides being insulting to the authors of the paper you are citing, errors make it more difficult for readers, peer reviewers, and editors to find the cited article. Remember that citations and references serve purposes beyond simply giving credit to others. References provide other investigators with the sources of your methods (4). References add support to the interpretations and conclusions drawn from your results (5). References help editors pick our peer reviewers. References help peer reviewers evaluate your work more effectively and efficiently. Thus, a misspelled author name, an incorrect

journal name, or an incorrect volume number can make it difficult for others to access the correct article. In the current age of electronic publishing, the references in many online journals have a direct link to PubMed or the cited journal that makes it easy to access the selected article. An error may cause the reference not to link properly, thus requiring a manual search for the article and leading to wasted time.

References have value only if they contain all of the information and facts to which the author had access. The issue of value is why most journals do not allow authors to cite submitted papers or unpublished results, and why many journals discourage citing abstracts and personal communications. Submitted papers may not be accepted, in which case they are of no value to anyone. Even if a paper is accepted at a later date, the final published version may differ in content from the version being cited. The same problem arises with unpublished results.

Although citations to abstracts might credit researchers who first reported an idea, abstracts have value issues similar to those described above. Readers can usually find abstracts that are published in a regular issue of a journal tracked by PubMed; however, abstracts published in a separate volume of meeting proceedings may be accessible to only a very limited audience. Additionally, because of their short length, abstracts contain limited or no information about many aspects of a study. Unless the readers saw the poster or presentation slides during the actual scientific meeting, they will have no idea whether the abstract matches the final content of the presented material. Therefore, although citing an abstract may be the only available option, be aware of the problems it can cause.

Unless it is vital to the message you are trying to convey, avoid citing personal communications. This type of citation has the same limitations as the citation problems discussed above. Other than what the author states, readers have no access to the actual communication that took place between the author and the person being cited or to the context in which the communication took place. There are generally no supporting data or results. If you decide to refer to a personal communication, it is imperative that the source being cited provide the journal with written permission and confirmation of the accuracy of the cited statements.

Use of Citations and References in a Paper

Maximal clarity should be the goal when deciding where to use citations and references in a paper. In the citation-sequence system, which the International Committee of Medical Journal Editors (6) prescribes and which *Clinical Chemistry* follows, references are listed and numbered in the order in which they are

cited in the text. References cited only in figure legends and tables should be numbered according to the point in the paper where the figure or table is first mentioned. This format initially may seem inconsistent because authors are typically told to place figures and tables at the end of a submitted paper, but it becomes clearer if you consider that (a) journals insert figures and tables in the final print version near where they are first mentioned in the text and (b) readers look at a figure or table when so directed to see what the author is describing and therefore should see citations that directly relate to the figure or table.

Citations should be inserted right after a fact is introduced in a sentence. Thus, a citation might occur in the middle of a sentence (Examples 1 and 2). Wherever you place it, make sure to insert the appropriate citation after the corresponding fact (Example 3). Unless a sentence ends with a fact (in which case the citation follows), do not pool all the citations at the end of a sentence.²

Example 1: *Because of the high reported incidence of infections following hip replacement, we added a 2-week course of ampicillin and sulfadrexin (1).*

Modified Example 1: *Because of the high reported incidence of infections following hip replacement (1), we added a 2-week course of ampicillin and sulfadrexin.*

In Example 1, the authors appear to be citing the fact that they added a 2-week course of antibiotics, which could have been a protocol they used in another published study. In actuality, they were citing the fact that the known high rate of infections (a fact needing a reference) prompted them to use antibiotics. Thus, the modified version inserts the citation at the end of the fact, not at the end of the sentence.

Example 2: *Fetal hemoglobin is replaced by adult hemoglobin (1) during the first 6 months of life.*

Modified Example 2: *Fetal hemoglobin is replaced by adult hemoglobin during the first 6 months of life (1).*

In Example 2, the complete fact is not just that fetal hemoglobin is replaced by adult hemoglobin but also that this process occurs during the first 6 months of life. The example refers to a complete, rather than a partial, fact. Therefore, the citation is now inserted at the end of the fact in the modified example, not in the middle.

Example 3: *Although carcinoembryonic antigen is a good prognostic marker for colon cancer, it can also be found in cancer of the pancreas, breast, ovary, or lung (1–8).*

Modified Example 3: *Although carcinoembryonic antigen is a good prognostic marker for colon cancer (1–*

3), it can also be found in cancer of the pancreas (4), breast (5,6), ovary (7), or lung (8).

In Example 3, multiple facts occur in the same sentence, and it is important to make it clear to the reader which references correspond to which fact (type of cancer). The modified example accomplishes this goal.

If more than one reference is used to support a fact, list the references in chronological order. In modified Example 3, there are 3 cited references to support the fact that carcinoembryonic antigen is a good prognostic marker for colon cancer. In this case, the oldest reference would be listed as reference 1, and reference 3 would be the most recently published reference. If 2 references are from the same year, list the references alphabetically by the last name of the first author.

If you are submitting your paper to a journal that uses the author name–publication year (Harvard) system, a similar chronological hierarchy holds true. If more than one reference supports a fact, the oldest reference is cited first in the text (e.g.: Smith, 2003; Hopewell, 2005; Corrigan, 2006). If there are 2 references with the same first author, cite the oldest reference first in the text (e.g.: Hopewell, 2003; Hopewell, 2005). If more than one reference has the same publication year and the same first author, differentiate the references by alphabetical letters after the year of publication (e.g.: Hopewell, 2003a; Hopewell, 2003b).

Check Before You Submit

Before you submit your paper, make sure that every citation has a corresponding reference and that every reference is cited in the appropriate spot in the paper. Also make sure that no reference has been included twice in your list of references. Check that every reference is in the proper format for the selected journal and that you have not exceeded the allowed number of references. Make sure that you did not include any references in the Abstract. Take a hard look at any reference citations within the Results section. It is likely that such sentences or ideas more appropriately belong in the Discussion section.

Final Thoughts

Citations play an important role throughout a scientific paper because they occur in nearly every section of the paper, including figures and tables. Similarly, the references at the end of a scientific paper play an important role because they direct readers to resources that can help them understand the study, reproduce the results, and critically evaluate what contribution the study makes. Citations and references that are clear, are accurate, and add value may not get you bonus points, but citations and references that are unclear,

² The reference numbers used in the examples do not correspond to any actual references at the end of the article.

inaccurate, or unhelpful will hurt a paper's chances of acceptance. Never underestimate the power of a reference.

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