

CITING WITHOUT REFERENCING AND TWO OTHER WAYS TO REDUCE ERRORS IN SCIENTIFIC COMMUNICATION

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A new method for citing articles and books in scientific publications is proposed. The method all but eliminates the need to list references. In addition to identifying and illustrating the basic rules involved, this article *uses* the proposed method. Thus, while citations appear throughout, no references are presented. Instead, readers can locate each cited publication by simply copying the citation verbatim and inserting it into the dialogue box of Google Scholar. Two more recommendations for improving the transmission of scientific are also proposed.

Keywords: improving scientific communication, scientific citing, references errors in science

Most scientific articles are between 9 and 12 pages long, with about a third of their lengths being devoted to listing references. If the reference list could be eliminated, not only would articles be shortened, but the need to tailor references to conform with the formatting style adopted by each journal would be a thing of the past. Other advantages will be identified later.

This article will describe a method of citing that allows readers to quickly shuttle between the citations made and the publications themselves, thereby eliminating the need for reference lists. To help make the process clear, I will actually *use* this method throughout the article. The first proposal along these lines was made in 2022, although the focus of this earlier article had to do with reducing what were termed *citation errors* {Ellis *scientific communication* 2022}. Here the focus will be on how conventional referencing can be all but eliminated, although I will also devote some space to describing how citation errors can be reduced along with one other change in conventional citation practices. In this latter case, I will propose that different encasement symbols be used to distinguish three types of scientific publications. These symbols are as follows:

- (a) parentheses () for citing empirically based publications,
- (b) square brackets [] for citing reviews and meta-analyses, and
- (c) squiggly brackets {} when citing theoretical, opinion, or policy related publications.

So, while the present article primarily has to do with illustrating how scientists can cite without providing references, I will also deal with

reducing citation errors and with the use of three types of citation encasement symbols.

Before going further, it is important for readers to bear in mind the difference between *citations* and *references*. A *citation* consists of the information provided in the body of a publication that tells readers how to locate a reference to a particular publication. Most often, citations are provided in parentheses at the end of a sentence, and they usually indicate the last names of the initial one or two authors and the year of publication, with the phrase “et al.” used to indicate that additional authors were also involved. Citations are obviously an indispensable feature in scientific writing.

A *reference* provides the more detailed information that is usually needed to locate a cited publication. In most contemporary scientific articles, references are listed at the end of the article in alphabetical order according to the first author’s last name. Typically, references provide the complete list of authors, the year of published, the title of the publication, the journal in which the article appeared, the volume, and the page numbers.

I will now show how advances in the availability of science-oriented internet websites have made it possible to by-pass references and go directly from a citation to nearly all scientific publications (or at least to their abstracts). The main purpose of this article is to present and illustrate the rules to follow to make this citation process a reality.

The Reference Free Citation Method

I will refer to the citation method being proposed as the *reference free citation (RFC) method*. It builds on the fact that the quickest way to obtain most scientific publications nowadays is by using internet search engines such as Google Scholar, Microsoft Academic, ISI Science Citation Index, Scopus, Medline, PsycINFO, and PubMed.

To describe the RFC method without being overly repetitious, I will limit my comment to Google Scholar (although other search engines such as Microsoft Academic function similarly). In addition to being the first free-to-use search engine for science publications, Google Scholar (a) contains no blogs or other non-scholarly postings, (b) is extremely comprehensive, covering publications extending back well over a century, and (c) requires no access codes.

Three Basic Rules for Using the RFC Method

The RFC citation method can be described in terms of three basic rules. These rules are as follows:

- (1) As with conventional citing methods, such as the one developed by the American Psychological Association (APA), the RFC method

involves listing the first author and the year of publication. If there are two authors, both will always be cited. When there are three or more authors, the number cited will depend on how many authors' last names are needed to narrow the Google Scholar search down to a single hit. (In the present context, a *hit* refers to identifying a specific publication located by Google Scholar.)

- (2) In the case of a citation that results in multiple hits after the first two authors and the year of publication have been provided, at least one more word must be included in the citation. This word can sometimes be the name of the third author (if there is one) or it can be a word or two from the title of the publication. When one or two words are taken from the title of a publication, italics should be used.
- (3) Unlike conventional citation methods, symbols such as commas, ampersands, and “et al.” are not used in the RFC citation method.

Illustrating the RFC Method

To illustrate the RFC method, I will cite a few publications in which I have been one of the authors. The first example was the article mentioned here earlier {Ellis *scientific communication* 2022}. As will be explained more later, I have put this citation in squiggly brackets because it is a policy-based or argumentative article, not one that describes analyses of empirical evidence. To experience how this article can be accessed without first knowing its full reference, readers can do the following: (a) copy the three words and one date encased by the brackets verbatim, (b) open Google Scholar, (c) insert these three words and the year of publication into Google Scholar's dialogue box, and (d) press enter. Doing so will result in just one hit. To read this article, one can simply click on the PDF symbol to the right.

Readers might wonder why they could not just enter my last name and the year of publication into Google Scholar and accomplish the same objective. In fact, for authors with unusual last names, this approach is sometimes sufficient. However, because my last name happens to be fairly common, many hits appear when just my last name and the year of publication are entered into Google Scholar's dialogue box. Therefore, to narrow the number of hits down to just one, it is necessary to add two words from the article's title – i.e., *scientific communication*.

Here is a second example: It involves a book that provides an extensive (700-page) literature review in the field of criminology, entitled *Handbook of Crime Correlates, Second Edition*. Using the RFC method, this book can be cited as [Ellis Farrington Hoskin 2019]. (Parenthetically, square brackets are used for this book because it is a review publication.) If one copies the three author names plus the year of publication that are bracketed, and inserts them into Google Scholar's dialogue box, just one hit (i.e., the correct one) will appear. Because this book is not open-access, one can only read most of the first hundred or so pages of it on Google Scholar. To do so,

simply click on the book's title.

For a third example, consider a research article that I co-authored while working with colleagues in Malaysia on a study of religiosity and fear of death. Using the RFC method, the citation to this article would be (Ellis Wahab *comparison* 2013). Like the book mentioned above, this article had three authors. However, when I put in the three authors' names along with the year of publication – i.e., Ellis Wahab Ratnasingan 2013 – I was surprised to see that several hits appeared in Google Scholar, although the targeted reference was first on the list. Given that the objective of the RFC method is to use the fewest number of words beyond the first two authors that are required to locate each cited publication, I removed the third author and inserted the word *comparison* (a word appearing in the article's title). This had the intended effect: Only the correct hit emerged from the revised search.

Some Qualifying Comments

No matter how comprehensive Google Scholar is in its coverage of scientific publications, there are bound to be omissions as well as occasional errors. Omissions are especially common for books and articles sponsored by governmental agencies. To cite these or any other publications that cannot be located using Google Scholar, authors can simply fall back on using conventional citation methods with references.

Another qualification involves noting that some journals (and books) use numbering citation styles. When preparing manuscripts for these publications, the RFC method is easy to adapt. Authors can simply provide numbers in the text (rather than citations), and then list these numbers at the end of the report adjacent to their corresponding RFC citation.

When authoring research reports, scientists sometime choose to incorporate authors' names as part of the sentences being written. Here is how the RFC method can be adapted in these cases: Say an author wants to refer to an article written by a colleague and myself pertaining to sex differences in smiling. In this case, one can note that Ellis and Das (*smiling* 2011) found that females were significantly more likely to smile in high school yearbook photographs than was the case for males. Readers wanting to locate this article only need to copy the two authors' last names, the word *smiling*, and the year of publication – i.e., Ellis and Das (*smiling* 2011) – and insert them into Google Scholar's dialogue box. In other words, Google Scholar responds to Ellis and Das (*smiling* 2011) the same way as it responds to Ellis Das *smiling* 2011 for reference identification.

Additional Recommendations

So far, the focus of this article has been on using the RFC method for citing scientific publications in a way that does not require providing a reference list. I now turn to two other changes in citing practices that I recommend as being integral parts of the proposed method. The first of these proposals involves differentiating three types of scientific publications and the other pertains to making citations more specific.

Distinguish Three Types of Publications. Regarding their basic content, scientific articles and books can be subsumed under three categories. These are (a) reports of findings from original empirical research, (b) literature reviews of original research (including meta-analyses), and (c) publications that are of a theoretical, argumentative, or policy-oriented nature. More details in making these distinctions are as follows:

- (a) *Original research reports.* Publications that are primarily written to describe findings from empirical research comprise the majority of publications in most fields of science. These publications also sometimes include re-analyzing findings from previously collected empirical data. My proposal is that citations to these types of publications should be encased in parentheses (as most journals currently do).
- (b) *Literature reviews.* As scientific research continues to accumulate numerous empirical studies on specific topics, the value of literature reviews, including meta-analyses, becomes ever greater. For reasons explained below, it is useful to clearly distinguish these publications from reports of original research. This can be done by encasing all types of literature reviews in square brackets.
- (c) *Theoretical, argumentative, or policy-oriented publications.* Even though the present article cites publications that are empirical in nature, it is obviously largely argumentative and policy related. As such, when it is cited, it should not be confused with publications that describe findings from either original research or reviews of original research. Instead, when publications that are theoretical, policy-oriented, or argumentative, they should be encased in squiggly brackets.

Why bother making distinctions between these three categories of scientific communication? One reason has to do with the importance of separating original research reports from reviews of such research. Imagine instances in which you want to assert that many studies have reached a specific empirical conclusion, and that you have located a meta-analysis to support this conclusion. However, since the meta-analysis was published, you find three more empirical studies that are relevant (whether they provide additional support for the meta-analysis or not). What to do. One

option is to cite these studies together within parentheses, even though they should not be given equal empirical weight. Another option is to just cite the meta-analysis, even though doing so is somewhat misleading.

As the numbers of reviews (including meta-analyses) are published, distinguishing them from publications pertaining to findings from a single empirical study has become increasingly important. In addition, by putting citations to original research in parentheses and reviews of original research in square brackets, it is possible to clearly cite research reports that were published after a pertinent review of the same evidence.

Another reason for distinguishing between these three categories of scientific publications is to avoid making misleading statements about the nature and strength of evidence supporting (or refuting) various ideas. Allow me to provide an example. It comes from a theoretical article pertaining to a range of behavioral sex differences. The article stated that girls in Western cultures are taught to be passive, subjective, emotional, and dependent, while boys are taught to be the opposite {White De Sanctis Crino 1981:552}. This assertion may or may not be true, but the article by White and associates provides no empirical evidence. Instead, their article cites two books, one by Miner {*studies management education* 1965} and the other by Killian {*working* 1971}. Even though no pages were cited to guide one in locating any relevant passages, I took time to read these two books. Doing so revealed that neither book offered anything beyond vague arguments, sometime bolstered by a few anecdotes, and no specific information about “Western cultures” were made. In other words, the assertion by White and associates that girls in Western cultures are trained to behave in more passive, subjective, emotional, and dependent ways than boys in Western cultures is not empirically supported by either of these two books. Had the citations to these two books been encased in squiggly brackets, rather than in parentheses, readers would have been able to tell that neither one reported any original empirical evidence, just opinions.

Of course, some scientific publications, particularly books, contain all three types of information, i.e., findings from empirical research, reviews of prior studies, along with theoretical and policy arguments. In these cases, the encasing symbols used should reflect the main reason for the publication being cited. And, as I will now argue, authors should direct readers to specific pages in the publications cited to make verification more efficient and rapid.

Make Citations More Specific. Substantial value comes from routinely including page numbers (or table and figure numbers) in one’s citations. As a result, I strongly recommend using these numbers much more often than is currently done. For those who dismiss this recommendation as little more than a trivial nuance, take a few minutes to examine twelve specific examples of citation errors that I identified in my earlier article on referencing {Ellis *scientific communication* 2022:2-5}. In all

twelve of these examples, the findings from published studies either found the exact *opposite* of what was reported by those citing them or contained no information at all pertinent to what was attributed to them.

While citation errors can never be totally eliminated, their frequency is alarming and can be substantially reduced. I am confident that well over 90% of citation errors would be eliminated by adopting the practice of routinely providing specific page numbers (or table or figure numbers) when citing. (Parenthetically, one should *not* include the page, table, or figure numbers specifically when searching Google Scholar or other search engines for a cited publication. But, when one is trying to verify what was stated in a publication, this type of detail can be extremely valuable.)

Allow me to present three more examples of citation errors not included in the twelve provided in the earlier article. The first example involves a study conducted by Batson, Early, and Salvarani (1997). This study was cited by Baez and Flichtentrei (*gender* 2017:2/21) as having found no sex differences in tendencies to be empathetic. In fact, Batson, Early, and Salvarani (1997) provided *no evidence at all* regarding sex differences in empathy. If the citing authors would have been following the practice of providing a specific page (or table or figure) number for what they attributed to Batson and associates, they would have almost certainly realized that they were making a citation error (and consequently not made it).

The second example of a citation error that would not have occurred if a page (or table or figure) number would have been included involves a literature review of sex differences in play behavior among primates [Gennuso Brivido 2018:2]. In this otherwise informative review, the authors cite a book chapter by Maestriperi and Hoffman [*dynamics* 2012] as offering evidence that male monkeys engage in more social play than do females. Whether this generalization is true or not, the cited book chapter contains no evidence directly bearing on the issue. The closest Maestriperi and Hoffman [*dynamics* 2012:255] come to generalizing about sex differences in social play involved the following quotation: “Young males spend increasing amounts of time in rough-and-tumble play with their peers, while young females become increasingly interested in exchanging grooming with older female relatives or in playing with infants”. If Gennuso and coauthors would have felt the need to provide a page number in citing the book chapter by Maestriperi and Hoffman, they would have almost certainly realized that this particular citation was not directly relevant to their assertion.

The third example of a citation error comes from a study of the association between the 2D:4D finger length (an often-purported measure of *prenatal* testosterone exposure) and athletic performance. Ceylan, Küçük (*performance* 2022:545) cited Ellis and Nyborg (1992) as having found these two variables inversely correlated. This statement is not true. In

actuality, the Ellis and Nyborg study was focused entirely on circulating testosterone levels among males; 2D:4D, females, and athletic performance were not even mentioned.

Before drawing this section to a close, allow me to make two more points and then provide a final illustration: The first point involves my reason for drawing attention to citation errors. I have no desire to embarrass or demean those responsible. In fact, in my earlier article on reducing citation errors, I point to instances in which I too have made these errors {Ellis *scientific communication* 2022:5}.

The second point involves stating that it is not necessary to provide page numbers (or table or figure numbers) with all citations. My recommendation is this: If a study being cited states the conclusion attributed to it in its abstract, providing specific page (or table or figure) numbers are optional. Otherwise, it is not. Put another way, *the goal of every citation should be to make it possible for readers to quickly verify justification for each citation*. If this justification is not readily discernible in the abstract, readers should be directed to a specific page (or table or figure) number. Of course, if the latter is not done, the citation is either in error or incomplete.

Eventually, journal editors and reviewers should automatically reject manuscripts, or at least return them for revision, if the above simple rule is not followed. I know this recommendation will irritate seasoned authors who are used to citing articles and books without providing page-specific (or table-specific) information, but the need to reduce the number of citation errors demands it.

To provide a final illustration for using page (or table or figure) numbers, say that a researcher happens to be interested in knowing if criminality is associated with sexual promiscuity. Research findings in this regard are summarized by Ellis Farrington and Hoskin [2019]. However, this is 700 pages long and contains no abstract, certainly not one that mentions criminality or sexual promiscuity. Accordingly, the complete citation should be either [Ellis Farrington Hoskin 2019:245] or [Ellis Farrington Hoskin 2019:Table 5.6.4a]. Not only does this type of precision help to prevent citation errors, it speeds up the process of readers being able to quickly obtain more details about this relationship if they choose to do so.

Conclusions

If practices surrounding scientific citations remain as they are, the proportion of science publications with citation errors will almost certainly proliferate. This is due at least in part to the substantial increase in open access journals (Pandita *global level* 2013; Virmani *beware* 2016:Figure 1; Gaurav Singh *literature* 2022:Figure 1). When compared to subscription-supported journals, open-access journals usually have higher acceptance rates and shorter intervals between submission and publication, reflecting

their editors typically relying on fewer outside reviewers (Sugimoto, Lariviere *acceptance* 2013; Bjork *acceptance* 2019:5).

The present article proposes three changes in the citation process for scientific publications, with a focus on retiring the practice of citing-with-references. Instead, science writers should adopt a method of citing-*without*-references. The *Reference Free Citation (RFC) method* herein proposed makes it possible for readers of scientific publications to “shuttle” from a citation of interest to the actual cited publication itself in seconds.

Besides speeding up the process of accessing cited publications, there are at least three other advantages to using the RFC method for citing. These advantages are as follows:

- (1) The RFC method will reduce the length of the average scientific report by roughly one-third.
- (2) This method puts the burden of identifying each publication cited entirely in the hands of the citing author(s). As a result, the risk of references containing misspelled author names, inaccurate years of publication, or other errors is eliminated (except in rare instances of errors made by Google Scholar).
- (3) Above all, as publications undergo peer review, editors and reviewers can quickly verify any questionable citation simply by copying the citation as it appears in the manuscript and inserting the citation into Google Scholar’s dialogue box. When this is done, a single hit should appear; anytime this fails, the citing author has made a mistake. In addition, if page (or table or figure) numbers are reported as herein recommended, editors and reviewers can quickly determine where to go to confirm the accuracy of any questionable citation.

In closing, it is hard to deny that a number of researchers have become lackadaisical in providing accurate documentation for their arguments. All experienced authors know that reviewers have better things to do than tediously trying to verify questionable citations in the manuscripts they are asked to review (especially when the citations in question lack specifics in terms of pages or tables where the evidence is located). As a result, reviewers tend to give far too many unwarranted passes to questionable citations.

The RFC method will substantially shore up the science citation process by taking advantage of the fact that nearly all scientific publications (or at least their abstracts) are now easily accessible on the internet. Thanks to search engines such as Google Scholar, scientific publications can now be located almost instantly. While errors and misjudgments in citations will never entirely disappear, the procedures described in this article will reduce them substantially. Furthermore, the RFC method will virtually eliminate errors in referencing by making it possible for readers to jump from a citation to the publication cited in seconds.

Because this is the first article to be published in which the RFC method

is actually utilized, other researchers are invited to critique the method for overall workability before it is considered finalized. Once refinements are made, I recommend that journal editors who are willing to publish manuscripts using this method make this known in their *Instructions to Authors*.

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