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Review

Where did *this* come from? When (not how) to cite sources in scientific publications

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Abstract

In the scientific literature, the link between an idea and its source is its reference information that allows the source to be identified and located. Not so obvious is where the source is cited in the text. Although authors are given extensive details on *how* to format references, they are not always taught *when* to cite them. Further, many are not vigilant in confirming the accuracy of the quoted information against the source or in verifying the associated reference information. In fact, discrepancies between the information cited in the text and the information actually presented in the source are common and often serious. Further, inaccuracies in references that break the link between the citation and its source are even more common. These discrepancies and inaccuracies affect the integrity of science and the validity of the citation metrics (for example, the Journal Impact Factor) that are used, rightly or wrongly, to evaluate the importance of journals and authors. Here, I discuss factors affecting *when* and *where* sources should be cited. I also consider factors that can bias the selection of sources and so interfere with the validity of citation analyses, review some considerations for evaluating a source, call attention to citation and quotation error rates, and review some strategies for reducing these errors. Finally, I summarise the most common recommendations for when, what, where, and why sources should or should not be cited.

Keywords:

Bibliographic errors, citations, citation metrics, documentation, references

Introduction: Why cite references?

> *When asked to indicate where references should be cited in an unreferenced technical text, 50 university students indicated that between 15 and 75 references would be needed. The author of the text had used 41.*
>
> Eugene Garfield (1925–2017), creator of the Impact Factor and other bibliometrics, who conducted the study.[1]

Science could not exist without writing. Science, to be science, must be documented, reproducible, predictive, cumulative, systematic, and public.[2(p1)] These characteristics are made possible only by the written records that comprise the scientific literature. In turn, the scientific literature must be compiled and indexed to be retrievable. These activities are made possible by assigning reference information to a source and making that information available in searchable databases. In fact, accurate and complete citations and reliable bibliographic information are the links that hold science together[3-5] and without which it could not be conducted on a large scale.

Accurate citations allow readers to assess the uniqueness and quality of research reported in an article. Network analyses of citation patterns can trace the development of ideas over time[6] and can identify groups of authors with common interests,[4] facilitating the selection of peer reviewers and allowing professional interactions with online social networks such as ResearchGate.[4] Properly cited sources also help provide the transparency that characterises good science.[3]

In the United States, the practice of citing sources and including the associated reference information in scientific publications began in earnest about 1850.[6] Since then, information scientists have developed an impressive array of methods for continuously storing, updating, expanding, correcting, and searching for information held in a multitude of scientific databases. Although librarians are well aware of the implications of correct and incorrect reference information that allows sources to be cited and verified appropriately, many authors are not.[7] 'Regardless of its importance, the citation may be the least noticed aspect of a scientific manuscript.'[8] Further, most style manuals provide extensive and often mind-numbing details on *how* to format references but little on *where* to cite the related sources.[1,4,6] For example, the *AMA Manual of Style* devotes 51 pages to formatting references (pages 59 through 110) but only 29 lines of text about when to cite them.[9(p60)] Likewise, *Scientific Style and Format* has 98 pages of formatting information (pages 549 through 647) but only 7 lines on when to cite.[10(p549)]

There is general agreement that some types of information should always be cited and that other types need not be. Despite these general agreements, deciding where, when, what, and why to cite often requires applying judgement more than rules; citing 'is both subjective and culturally based' so 'there can be no absolutes . . .'[1] Further, the trade-offs between the relevance, comprehensiveness, and potential number of sources that can be cited make selection difficult.[1] To make matters worse, terms relating to citing and referencing are not used consistently (Table 1).

Worse still is that the extent of errors in citations and references is much greater than generally appreciated,[5,7] and many of these errors are serious.[4,7,11] Inaccurate citations can be quickly and widely replicated in subsequent publications,[3] where they can contaminate evidence, displace alternative evidence, and even lead to unnecessary research.[6,11] Here, I discuss factors affecting *when* and *where* sources should be cited and consider several other topics related to citing and referencing sources.

Table 1. Terms related to citing and referencing sources of information in scientific articles
Source: A person, place, or thing (for example, a publication or recording) containing or providing information.
Citation: A notation in a text indicating the source of the information in the text. (However, the term is often used to refer to the reference information that identifies the source and where it can be accessed.)
Citation style: The form of notation used to identify a source (for example, superscript numbers or a first author's last name and publication date in parentheses).
Reference: The information needed to access the source or its bibliographic information. (However, the term is often used to mean the citation or the source itself.)
Reference style: Conventions for formatting the reference or bibliographic information in a text as prescribed by style manuals.
Reference list: An inventory of the reference information of sources cited in a text, usually under a heading of that term and placed at the end of the text (sometimes replaced with 'literature cited' by those who use 'reference' to mean the source rather than the information that 'refers' users to the source).
Bibliography: A list of the references relevant to the text, whether or not they are cited in the work.
Documentation: All the citations, references, and sources presented to authenticate or verify or refute a fact or a claim.

When to cite

> ***In principle, every nonobvious factual claim should be supported in some way, either by citing direct evidence or by tracing a link through citations and/or inference to that evidence. Similarly, every hypothesis, conceptual analysis, or statement of a theoretical position that is not advanced for the first time in a given article should trace a link to its source***
>
> Robert West, 2017[12(p192)]

In scientific articles, citations have three general purposes: to acknowledge the contribution of others,[6] to document research,[9(p192)] and to direct readers to additional information.[9(p60)] Most citations are to someone else's work, but one class of citations stands out: those that recognise the authors' 'intellectual debt'[1,6] to the researchers and scholars whose publications influenced the authors' research.[12(192)] However, the extent of these intellectual debts is not always known or widely accepted.[1,5] The scientific history may be unclear, disputed, incorrect, incomplete, or lost entirely.[6] It is also difficult to decide which sources are related closely enough to the current research to be cited and to determine how recent, detailed, or reliable the sources need to be.[5] Thus, which sources to cite is largely a matter of judgement.[1]

Many aspects of (clinical) research should be documented (Table 2). Those listed in the following paragraphs have some overlap, and not all may apply in every case.

1. Attribution: Acknowledge the ideas, discoveries, or writings of others who influenced the research

- Cite the contributions of others to the research, especially when quoting verbatim or paraphrasing or summarising in the text.[18] Such citations also protect against charges of plagiarism.[5]
- Cite tables, graphs, images, and data created, compiled, or published by others.[14]
- Authors should cite their own work on the topic[4] to acknowledge their own contributions to the literature[12(p191)] and to indicate that they have the expertise to conduct the study. However, self-citation only to advance one's reputation is widely considered inappropriate and even unethical.[3,5,12(p194)]

2. Orientation: place the research in context

- Cite or describe any general historical, social, geographic, or scientific circumstances or conditions needed to explain why the research was undertaken and why it

Table 2. Common recommendations for when, what, where, and why sources should or should not be cited.
Do's
1.Do cite the words and ideas of others, especially verbatim quotations, paraphrased text, and summaries of their work.[1,4,13]
2.Do cite direct quotations exactly, with the same words, spellings, and errors as they appear in the original source.[14] Provide page numbers for direct quotes.[5,14] When citing two or more quotations from the same reference, include the page number(s) for the quote in parentheses after the citation in the text,[9(p64)] for example, '[23(p5)] and [23(pp10-12)].'
3.Do cite sources to support or refute all substantive claims.[5,12]
4.Do prefer primary sources[15] unless the source is unavailable or the secondary source is standard and reliable. Citing a primary source implies you have a complete copy of the source or that it is readily available to readers. However, sometimes, an authoritative review article may be more useful to readers than the original article.[1,15]
5.Do cite current sources. However, especially key or classic articles in a field (often, primary sources) can be cited irrespective of when they were published.[2]
6.Do cite your own work when appropriate.[5]
7.Do place the citation immediately after the information it pertains to, not necessarily always at end of a sentence or paragraph.[3]
8.Do cite only one or two key sources for the same information.[15] However, controversial topics may benefit from citing several substantive sources, implying additional support for the claim.
9.When possible, preferentially cite sources that are publicly and easily accessible.[13]
10.Do prefer sources that have been peer reviewed.[5,12]
11.Do format the references as directed in the journal's instructions for authors.[5]
12.Where possible, do include a unique, permanent identifier for the source, such as a digital object identifier (DOI), an International Standard Serial Number (ISSN), an International Standard Book Number (ISBN), or Uniform Resource Locator; a website link (URL).[15]
13.Do include the most recent date on which you accessed a website.[5]
14.Do include chapter and page numbers for information in books and longer sources to make verifying the accuracy of the cited text easier.[1,9(p83)]
15.When citing books, do include any subtitle, edition, chapter names, authors' names, book editor(s), inclusive page numbers of the chapter(s), the location of original quotes, the name of the publisher (not the printer), and the publication date.[9(p82)]
16.Do cite the name and media (telephone, email) of personal communications in parentheses in the text and be able to verify that the person named has agreed to be identified in the text.
17.Do cite in parentheses unpublished observations, oral presentations, abstracts, or manuscripts submitted but not yet accepted for publication.[15]
18.Do cite key articles in the field to indicate that you are aware of the current research and thinking on the topic.[2,5]
19.Do number references in order, carrying the sequence through figures and tables as if they were blocks of text to be read before returning to the text proper[15]
20.Do verify, at least twice, that the cited text is consistent with the corresponding information in the source and that the reference information is accurate and complete.
Don'ts
21.Don't include or ignore specific sources for reasons other than meeting the principal goals of citations.[5,7]
22.Don't ignore the relevant work of rivals.[5]
23.Don't mislead readers about the origins of facts or ideas.[1,2] Uncited text can give the impression that the idea was yours when it is not.
24.Don't misrepresent the cited source[13] as presenting fact when it is speculative,[9(60)] and don't generalise the meaning beyond what the source intended.[9(60)]
25.Don't 'over-reference'; excessive, indiscriminate, and redundant referencing wastes everybody's time.[15]
26.Don't cite 'common knowledge' or information generally accepted as true in the field.[12]
27.Don't cite unread sources.[9(p60)]
28.Don't cite a source after reading only its abstract; especially, don't cite any data reported in the abstract.[16]
29.Don't assume that a secondary source has accurately summarised a primary source.[15]
30.Don't cite a printed reference if you read the source online and vice versa.
31.Don't cite a retracted article without acknowledging the retraction.[15]
32.Don't knowingly cite an article from a predatory journal or other possibly unreliable source.[15]
33.Don't feel obligated to cite sources suggested by journal editors; resist 'forced citation'.[12]
34.Don't make up your own journal abbreviations.[13]

took the approach that it did.[1] Most of these citations will likely appear in the discussion, which usually contains more details than the introduction does.

- If appropriate, direct readers to more extensive background or adjunct information related to the research.[5]

3. Justification: explain the problem, purpose, and nature of the research

- Define the specific nature, scope, and importance of the problem to be addressed.[12(192)]
- Identify and critique alternative interpretation(s) of the problem as defined.[1]
- Explain important components of the research, such as theories (for example, behavioural vs cognitive theories of mental illness), decisions (for example, setting eligibility criteria), choices (for example, selecting an imaging modality), or assumptions (for example, the study will be long enough for a sufficient number of outcome events to occur).[12(p192)]
- Establish the appropriateness of the research design and methods.[14]
- Identify and critique alternative interpretation(s) of the research design and methods.[12(p194)]
- Differentiate the current research from the research of others.[5]

4. Documentation: verify the nature or quality of the materials, methods, and activities in the research

- Identify any facts or definitions used in the research (for example, historical or current events, policies, organizations, initiatives, conferences).[12(p192)]
- Identify any relevant equipment, materials, software, protocols, databases, registries, measurement techniques, and so on, used in the research.[5] Identify any standards used in the research (for example, statistical methods,[15(p17)] normal and cut-off laboratory values, diagnostic criteria,[5] case definitions, regulatory requirements, treatment guidelines, reporting guidelines).
- Cite the sources most needed to understand or replicate the current research.[13]

5. Argumentation: explain, defend, and refute interpretations, claims, and positions

- Review the literature in detail; verify what is known or believed about the problem, its implication(s), and its possible resolution(s).[5]
- Support and refute claims and arguments about the *conclusions* of the research.[1] (Remember that conclusions should not restate results but rather explain what the results mean.)
- Support and refute claims and arguments about the *implications* of the research in context (for example, the implications for patient care, health care policy, or future research).[5]

In contrast to the reasons mentioned previously for citing references, 'common knowledge' need not be cited (such as 'A dog is a four-legged mammal').[1] For example, a specific statement should usually be cited: 'The prevalence of dementia after the age of 85 years is 32%', but a general statement that 'dementia is age-related' probably does not need to be. Discipline-specific information likely to be known by most people in the field or that appears in most textbooks is often considered to be common knowledge. However, 'common knowledge' varies over time, among individuals, and by discipline.[1]

As indicated earlier, citation analyses have uses and implications beyond documenting a single research article; they are the components of many bibliographic measures of academic success.[8,12(p200)] However, in addition to the fact that these metrics have assumed undue importance,[12(p200)] they are also subject to manipulation by both journals and authors. For example, in the attempt to improve their journal's Impact Factor, journal editors or reviewers may 'suggest' that authors cite additional sources that, curiously, were published

in the editor's journal, an unethical practice that also biases the selection of sources. Such suggestions may imply that including these articles is a condition for acceptance ('forced citation').[17] Likewise, authors may include 'gratuitous' or 'vanity' self-citations[4] to improve their Hirsch Index,[18] another citation metric used especially by individual authors. Both practices are, again, widely considered inappropriate and even unethical.

What to cite

> *The primary problem is that researchers fail to build upon prior evidence-based research, and the journal reviewing process does not require them to do so.*
>
> Robert Wright, 2017[7]

Research is conducted primarily to establish matters of *fact* (something is true or not), *value* (something is desirable or not), or *policy* (something is effective or not).[2] The process depends on organising the information from relevant sources into reasoned arguments. Science favours more objective and supportable arguments based on data and logic,[2] not on subjective arguments based on conjecture or belief. Thus, the quality of the source information cited to support an argument is critical.[19] The best sources will match the characteristics of the manuscript on six criteria, as indicated by the mnemonic, AIRCAR.

Audience. Is the audience for the source similar to that intended for the manuscript? The characteristics of the audience can (and should) affect what information the source includes or excludes, the context in which the information is presented, and the ways in which it is expressed. An article written for subspecialists will differ in important ways from a similar article on the same topic written for general practitioners.[2]

Intent. Is the intent of the authors of the source consistent with that of the authors of the manuscript in which it will be cited? The intent can be descriptive, analytical, evaluative, persuasive, controversial, or speculative, for example. The intent of a source obviously affects what information it includes or excludes and how it is presented and interpreted.[20]

Relevant. Will citing the source improve the credibility, objectivity, balance, or usefulness of the text?[5]

Credible. Is the source trustworthy? Is it consistent with what else is known about the topic? Is it adequately and properly cited? Is the coverage of the topic sufficient and are the details adequate?[21]

Authoritative. Are the authors of the source qualified to write on the topic? Are they established, well known, and respected? Has the source been vetted by peer review, sponsored by a professional association, or approved by a government agency?[21]

Recent. Is the information current enough to be useful? Older sources may be out of date, but they may also be classic works in the field.[21]

Where to cite

> *The three most important aspects of real estate:*
> *location, location, location.*
>
> Origin disputed

As in real estate, location is often critical when citing information. Citations should generally be placed as close as possible to the information being cited.[2,3,5] However, they are often routinely placed at the end of a sentence or a paragraph, although ambiguity is possible and even likely in these locations. In the following examples, the text associated with each citation is unclear in sentence A but not in sentence B:

Sentence A: 'The new procedure was more effective than standard therapy in patients with severe disease.[1,2,3,4]' This placement implies that four studies were conducted on this comparison.
Sentence B: 'The new procedure[1] was more effective than standard therapy[2] in patients with severe disease.[3,4]' This placement indicates only two studies were conducted on the comparison in this population.
Sentence A: Adverse reactions to treatment included fatigue, headache, nausea, and vomiting.[2,6,11,17,21]
Sentence B: Adverse reactions to treatment included fatigue,[11] headache,[6,21] nausea,[17] and vomiting.[2,11]

A related issue is whether to name the authors in the text when summarising their work, usually in the discussion. Unless the names are unambiguous and widely known in the field, they are not informative and can be omitted from the text (but not from the reference), allowing shorter and more focused sentences.

Sentence A: Gonzales and colleagues, in a study of 50 survivors of childhood cancer, found that dexrazoxane was cardioprotective.[21]
Sentence B: In 50 survivors of childhood cancer, dexrazoxane was cardioprotective.[21]

In medicine and the natural sciences, references are generally cited with sequential numbers in the text. (In contrast, references in the social sciences and humanities are often cited in footnotes at the bottom of a page or in endnotes grouped at the end of a text.[5]) Both footnotes and endnotes may contain explanatory information about the source, as well as its reference information. In theory, the presence of such information should increase the likelihood that the cited text is consistent with that in the source.[3]

Citation biases

> ***Eminent scientists get disproportionally great credit for their contributions to science while relatively unknown scientists tend to get disproportionally little credit for comparable contributions.***
>
> Robert K Merton, pioneer in the sociology of scientific research, 1986[22]

Several realities of the research and writing processes inevitably lead to biases. Among these realities is selection bias, which can occur in sources identified in a literature search, when authors differentially cite some relevant sources but not others, and because of the preference to cite higher-ranking scholars and journals.[22] It is usually impossible to find, much less cite, all relevant sources, especially those representing different perspectives, a process confounded by the need to consider methodological quality.[12(p194)] In addition, many references are difficult to acquire, including those in languages not spoken by the requesting authors[4,12(195)] and those behind journal paywalls with prohibitively high access costs. Authors also tend to cite articles that support their research more than those critical of it[7,12(p194)] and may not know of or appreciate the importance of other related articles.

Citing the most easily found sources or those that come to the author's attention outside of a deliberate literature search ('convenience citations'[12(p195)]) can introduce bias. For example, citation indexes and the printouts of database searches may list current sources first, in positions of emphasis.[12(p195)] Even well-designed literature searches are subject to biases by the nature of the databases searched.[3] Similar searches in Google Scholar and PubMed identify different sources and different numbers of sources.[23,24]

However, several biases can be prevented by applying current ethical standards. Gratuitous, vanity, or unnecessary self-citation only to build an author's reputation is one such bias.[15(p17)] At the 2015 *World Conference on Research Integrity*, 1345 participants were asked to rank 60 acts of research misconduct by how frequently they occurred (not on the severity of the misconduct). The 227 participants who responded (17%) ranked gratuitous self-citation to advance one's reputation as

the most common of the 60. Citing sources to influence journal editors, peer reviewers, or colleagues was ranked fifth, and citing to improve journal metrics was ranked sixth.[25]

Despite the recommendation that journals limit the number of references in an article 'so that it is easier for authors to maintain an overview over what they cite,'[3] such limitations can also create bias by forcing authors to choose among relevant references. These circumstances 'suggest that the process of citation is subject to considerable bias, and, although there is a duty on researchers to minimise this, it is unlikely that bias will ever be eliminated.'[12(p198)]

Errors in references and citations

> *Take no reference for granted. Verify the reference that your best friend gives you. Verify the reference that your revered chief gives you. Verify, most of all, the reference that you yourself found and jotted down. To err is human, to verify is necessary.*
> Frank Place, reference librarian, 1916[26]

Citation and referencing errors are unfortunately common in the literature,[5] with studies from several disciplines reporting that typically between 30% and 75% of articles have at least one such error.[3,7,27] One systematic review of 28 studies of citation errors found that about 25% of the quotations contained errors, half of which were major errors. Only six studies had error rates below 10%.[3] Indeed, sources may be 'misquoted, inapplicable, unreliable and occasionally even imaginary'.[27] However, errors may also be made indirectly if the text is poorly written or lacks the context against which the cited information is to be interpreted.

Other errors can come from citing unread articles[7] or only abstracts, which often contain information different from that in the associated article.[5,12] Authors may have missed the source, misinterpreted the source, mistakenly cited the wrong source, or consciously or otherwise selected a non-representative source. In this last case, the findings reported in the source itself may be ambiguous or have been wrongly interpreted, especially if the research was poorly conducted or reported. The source may also not be representative of the research on the topic if the quality or results of similar studies are highly variable.

A typical problem is condensing the information in a source by summarising results or removing details. For example, the cited text might read, 'The response rate was 80%', whereas the source text may report that response rate was divided into categories: '35% had a full response, 21% had a moderate response, and 24% had a poor response.' The combined 80% response rate is accurate but may also be misleading.

Citations and references are subject to two main types of error. A *citation error* (here, 'citation' means the reference information that identifies the source) affects how easily or whether sources can be identified or accessed.[7] *A minor citation error* makes the source difficult, but not impossible, to find, whereas *a major citation error* makes finding or identifying it exceeding difficult or impossible.[5,28] Citation errors are usually formatting errors in the reference information, such as misspellings of authors' names or the title of the source, incorrect page numbers or publication dates, and otherwise incorrect, vague, or missing information.[5] Citation errors are common in medicine, with 50%–70% of articles estimated to have at least one such error (Table 3).[5,28-33]

The other type of error is a '*quotation error*', in which the meaning of the cited text is inconsistent with the information in the source.[16] In a *minor quotation error*, the cited text differs from the source, but not markedly so, such as might occur from oversimplification or overgeneralisation on the part of the citing

Table 3. Prevalence of citation errors in a convenience sample of six studies

Study	Sample	Citation accuracy	Comments
Eichorn and Yankauar (1987)[28]	150 randomly selected references from the May 1986 issues of 3 public health journals	**Error rate: 31% (46/150)** Minor errors: 27% (41/150) Major errors: 3% (5/150)	• Minor citation errors were misspelling of authors' names and omissions in document titles.
Montenegro et al. (2020)[29]	240 articles, 60 from each of 4 leading neurosurgery journals published in 2019	**Error rate: 70% (168/240)** Minor errors: 62% (149/240) Major errors: 8% (19/240)	• The number of errors was significantly and inversely correlated with the number of references.
Browne et al. (2004)[30]	259 references from 19 manuscripts submitted to 1 of 5 radiology journals	**Error rate: 56% (145/259)** Minor errors: 53% (137/259) Major errors: 15% (39/259)	• 5% (13/259) of manuscripts contained more than 3 errors. • 79% (205/259) were caused by not following the journals' instructions for authors.
Pope (1992)[31]	10 references from the first issue of 10 library journals published in 1991	**Error rate: 30% (30/100)** Minor errors: 19% (19/100) Major errors: 11% (11/100)	• The 19 minor errors could have been prevented by following the journals' instructions for authors.
Hansen and McIntire (1994)[32]	50 randomly selected references in the June 1993 issues of each of 2 radiology journals	**Error rate: 37% (35/95)** Minor errors: 34% (32/95) Major errors: 3% (3/95)	• Errors were not related to the number of references in the article.
Al-Benna et al. (2009)[33]	117 randomly selected references from research articles in 2 burn journals published in 2006	**Error rate: 14% (16/117)** Minor errors: 10% (12/117) Major errors: 3% (4/117)	• No association with journal, study type, number of authors, article length, or number of references.

Percentages have been rounded. A minor citation error makes finding the source difficult, but not impossible. A major citation error makes finding it exceeding difficult or impossible.

author.[3] ***A major quotation error*** is one that does not support, is unrelated to, or even contradicts the cited text.[3,16] Unfortunately, quotation errors are also common in the scientific literature (Table 4).[3,84–88]

Reducing errors in citations and references

> ***Not only from a scientific viewpoint, but for its esthetic value, an entirely correct bibliography of any subject is a great source of satisfaction, and a worth-while achievement. In fact, an accurate and polished bibliography can truly be called 'a thing of beauty and a joy forever . . .'***
> Judson B Gilbert, urologist, surgeon, and historian of science, 1889–1950[89]

Obviously, reference errors are more common and can usually be prevented by careful attention to detail. Reference information can be verified directly against that of the source or indirectly by that in the output of a source search. Quotation errors, being related to content, are much more difficult to detect, given the need to read and interpret the source carefully and to compare its meaning to that of the cited text.

Workshops led by librarians, training in searching the literature, and peer collaboration improved citing practices among pre-med students.[4] Other proposals for improving citation accuracy have included the (overly optimistic) recommendations that authors contact the authors of each source to verify that the cited information is correct[3,7] and to include copies of each source document with the submitted manuscript.[3] A more realistic (but probably just as ineffective and unenforceable) recommendation is that journal editors require authors to attest that they have read the cited sources they have.[3,11]

Table 4. Prevalence of quotation errors in a convenience sample of six studies.

Study	Sample size	Quotation accuracy	Comments
Jergas and Baethge (2015)[3]	Meta-analysis of 28 studies of quotation errors estimating their prevalence	**Estimated mean (95% CI) error rates: 25.4% (19.5 to 32.4)** Minor errors: 11.5% (8.3 to 15.7) Major errors: 11.9% (8.4 to 16.6)	• No indication of publication bias • Large variability in error rates • Large heterogeneity among included studies
Bagga et al. (2021)[34]	260 citations to the ProFHER trial published in 138 articles between 2015 and 2019	**Error rate: 13% (35/260)** Minor errors: 10% (25/260) Major errors: 4% (10/260)	• 19 minor errors oversimplified or generalised the conclusions and 6 numerical or grammatical errors
Gazendam et al.(2019)[35]	250 randomly selected references from 5 high-impact orthopaedic and sports medicine journals published in 2019	**Error rate: 14% (34/250)** Minor errors: 11% (28/250) Major errors: 3% (7/250)	• Error rate not associated with the number of citations, study type, or graded level of evidence in the articles
Cay et al. (2021)[36]	83 articles on the DRAFFT study published between 2014 and 2020	**Error rate: 28% (23/83)** Minor errors: 13% (11/83) Major errors: 14% (12/83)	• Major errors were those not substantiated by, were unrelated to, or contradicted the findings of DRAFFT study
Baethge (2020)[37]	51 articles in 5 German psychiatric journals cited 235 times in 109 quoting articles within 2 years of publication	**Error rate: 40% (95/235)** Minor errors 19% minor (44/235) Major errors: 22% major (51/235)	• No relationship to self-quotations or Impact Factor of the quoting journal • 86% citations unambiguous
Reddy et al. (2008)[38]	258 references from 75 articles randomly chosen from 1 issue of each of 4 general surgical journals	**Error rate: 8% (20/258)** Minor errors: 2% (4/258) Major errors: 6% (16/258)	• Error rates differed by journal • Number of quotation errors moderately correlated with number of references

Percentages have been rounded. A minor quotation error occurs when the cited text differs from the source, but not markedly so. A major quotation error is one that does not support, is unrelated to, or even contradicts the cited text.

Formatting references is tedious work requiring prolonged concentration, attention to detail,[40] and usually knowledge of highly specialised formatting rules. Fortunately, verifying references and formatting information in the text are made easier by style manuals, online references, and reference management software programs.

PubMed is the search function for MEDLINE, a database containing reference information for 34 million sources in the life and biomedical sciences.[41] A most useful feature is that properly formatted reference information (in National Library of Medicine (NLM) style) accompanies a large proportion of the sources. The reference information can be downloaded to a reference management program or pasted directly into a word-processing program.[42]

Citing Medicine is the NIH style manual.[43] Available online, it contains instructions and examples for citing the full range of sources, including articles, newspapers, websites, interviews, eBooks, compact disks, podcasts, and so on. Even if the intended publication uses a different format, the information in *Citing Medicine* is usually sufficient to complete the publication's formatting style.

Finally, dozens of reference management programs, both commercial and open source, can be enormously useful (for example, EndNote, Mendeley, Zotero, and JabRef). Online references can often be downloaded directly into these programs, but the information can also be entered manually. Most programs, on command, can also reformat references to meet most reference styles.

Authors are ultimately responsible for the accuracy of their citations and references,[15(p17)] but peer reviewers and journal editors are in a position to detect errors, especially missing citations,[1] and can at least spot-check the accuracy of a citation or a reference.[3] Some editorial management systems used by publishers also provide editors and peer reviewers with online search capabilities, making such tasks easier.[4]

Good as the above resources are, manually comparing the reference information in the reference list to that in the source documents is still a good idea. It is not perfect, given human error and problems with the information in the source document, but informed judgement combined with automated techniques will likely produce the best results.

Conclusions

In the experiment described in the opening epigraph, students indicated how many sources they would cite in a document containing no citations. The range – between 15 and 75 – was wide, indicating poor agreement among the students.[1] However, as the experiment was repeated over the years, the average number of citations among the groups tested was 45, a number close to the actual number of 41.[44] The consistency of the average number may indicate that readers do have a sense of what information should be supported by citations.[6]

Although many experienced researchers are aware of the high degree of uncertainty in the information cited in scientific articles,[3] the fact remains that quotation and citation errors are far more common than they should be. Verifying the accuracy and completeness of the cited text and reference information is just good science. And it should prevent readers from asking, 'Where did *THIS* come from?'

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