



Whose citations are they?

by John Rodgers

Citations play a critical role in scientific communication, but authors, readers and reviewers seem to discern their functions poorly. I propose a theoretical framework for discussing these functions and address the question of how authors can take responsibility for their own citations.

Confronting the frequent occurrence of plagiarism in graduate student writing in the biological sciences, I began, about a decade ago, to think that teaching graduate students not to plagiarise was not the critical issue. In my experience, almost all cases of plagiarism by students and post-doctoral fellows occurred in the Introduction or Discussion sections and were due to lack of training in the arts and skills of writing. My students had a poorly developed sense of how to cite. They had learned that citation is a means of ‘giving credit’ to avoid plagiarism. Students related to their citations awkwardly, often ‘borrowing’ them from their source text. Citations were dragged into the text in much the same way that words, phrasing and ideas in the source text were loosely paraphrased or patch-written into

their own texts. The students had little sense of what citations might do for them as elements of writing itself. I wanted to teach them how to cite skilfully. It was time for them to take ownership of the citations. It was time to ask of them, and of myself, “Whose citations are they?”

Citations

In analyzing this question with respect to texts, I consider the nature of three types of citation function and several meanings of ownership. Let me first set out some terminology, chosen to avoid the imprecision of the common terms in English. By ‘citation’ I mean a functional relationship between a referring text and a source text (Figure 1). The citation is a thread with two termini: the citans (commonly referred to as a reference, a citation, a cite, an in-text reference and a variety of other terms) in the text and the citandum (often referred to as the referent) in the source. The citation helps weave together (plexis) texts and their sources. Skilful citation produces a seamless and effective text (euplexis), but failure to cite skilfully produces a fabric of patches, crude mends and plagiarisms (dysplexis).

The citation may be formal, such as one using the Vancouver citation styles, or informal, such an allusion. Formal citations have as intermediary text elements the bibliographic references found in footnotes, endnotes or reference lists. Informal citations lack (formal) references; allusive citantia fail to connect with their citanda for readers

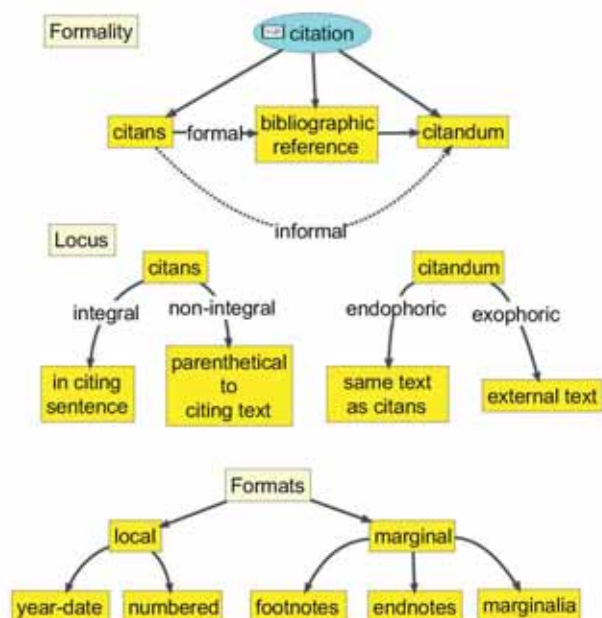


Figure 1 Citation forms. An unconventional nomenclature differentiates the appearance of the citation as a metatextual element in the citing text (the ‘citans’, plural ‘citantia’) and in the cited text (the ‘citandum’, plural ‘citanda’). In conventional usage the terms ‘citation’, ‘reference’ and often ‘footnote’ are interchangeable. ‘Citation’ refers to the non-textual conceptual relationship that is manifested by the textual elements citans, reference and citandum, but also the set of textual elements that manifest the citation. The reference is missing or allusive in informal citations. ‘Locus’ refers to the textual positions of citantia and citanda, ‘format’ to the stylistic conventions used to express them.



Figure 2. Typology of citation functions. Most citation functions can be classified in one of three broad groups; a particular citation might exert more than one function. Authorising functions handle the authority and credibility of and credit due to authors; they authorise the text as trustworthy in the commons. Evidentiary functions handle the relationship of citations to particular arguments. Mapping functions orient the writer and reader within the commons.

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- > outside the ‘intellectual commons’ or ‘disciplinary community’ assumed by the author.

Citations can be characterised in terms of their form (format, formality, locus) (Figure 1) and function (Figure 2). Format refers to the stylistic structures used to render textually the citans and its reference. In print media the citans is meta-textual; it is itself a text participating in the physical structure of the text [1]. Formality refers to whether the citation uses an explicit reference or relies on the reader’s familiarity with the field to identify the citandum. In electronic media, citantia or references may be replaced with hypertext links directly to the citanda, bypassing both the need for and the value of the reference. With respect to locus, the citandum may be endophoric, found elsewhere in the citing text, (e.g. “see below”), or exophoric, found in an external source. The following three sentences illustrate formality and locus, as well as other features discussed below:

- a. *Within a sentence, a citans may be integral or non-integral.*
- b. *Swales classified the citans as integral or non-integral [2].*
- c. *A citans may be classified as integral or non-integral [2].*

In sentence (a) the citation to John Swales is both informal (lacking a reference) and allusive (opaque to most biomedical scientists but perhaps not to many readers of *TWS*). The same citans is integral in (b) in that it forms a syntactic (parsable) part of the sentence itself. In this case, ‘Swales’, an element retained from the citandum, becomes the subject of the citing sentence. In contrast, the citans is non-integral in (c) because it is merely parenthetical to the sentence. This sentence would have the same content with or without the citans.

The typology of citation functions shown in Figure 2 draws from a rich literature that cannot adequately be cited here. The analysis of citations draws on three main sources: the tradition of rhetoric and English composition studies exemplified in the United States by Kenneth Burke [3] and focused recently on citation functions by Shirley Rose [4]. Swales comes from this tradition. From social science come the other two major tributaries. In the literary constructivist movement the names of Foucault [5], Gilbert [6], Wollgar and Latour [7] figure prominently. The Mertonian school [8] led directly to theories of social credit and Garfield’s aggressive deployment of information science to the numerical analysis of citations [9]. The confluence of these tributaries was first described by Swales [2] and reviewed more recently by White [10]. (See also Cozzens [11].)

The functions of citations are authorising, evidentiary and mapping. Through their authorising functions, citations legitimise the text and establish the author as trustworthy in the discourse community. Evidentiary functions mediate the logical role of source texts. They may justify claims of causality, explain terms or experimental operations, or provide evidence in an argument. Logical citation

functions are confirmatory, oppositional, evolutionary [12] or hedging [13]. Finally, mapping functions orient readers and writers within the constantly shifting commons, which must be constructed on the fly by the reader in order to decode the text. Mapping functions may be informational (e.g. ‘as reviewed by...’), axiological, conceptual or community-defining functions. An expert’s choice not to cite may indicate that the author considers the idea to be in the commons; a novice may inappropriately follow the rule-of-thumb, ‘When in doubt, cite!’, thereby proving his naivité. In the sample sentences exhibited above, sentence (a) assumes the reader is familiar with Swales already, or will not be interested. In sentence (b), Swales is an authorising figure only to those in a community familiar with the literature of English composition. Swales is relegated to a minimalist position in sentence (c). The mapping functions are critical to the demarcation of private and ‘common’ knowledge within a discourse community. Moreover, certain well-known citations can be symbols for larger bodies of ideas [14]. Thus, the names of Burke, Merton, Foucault, Garfield and Latour I dropped in the previous paragraph symbolically evoke several rich intellectual traditions.

Note that the citation in (b) is clearly attributive; we don’t know whether Swales provides ‘evidence’ for this claim, but we know that it is Swales’ claim. In contrast, the citation in (c) is profoundly unclear; we are tempted to think that the claim is supported by evidence in the citandum; that the citandum contains the source of the concept of an integral citation is obscured. The authorising functions can be further divided into authoring, tasking and attributive, all of which explain the role of authorities in the text. For example, the authoring function establishes the bona fides of the named authors. Acknowledgments and author descriptions assign specific tasks to different named authors and non-authorial contributors. The attributive citation identifies the source of an idea, work or text. It mediates the exchange of Mertonian credit, discharging the intellectual debt of authors owed to their sources. This is the sole citation function taught to most students, bringing them to grief when they fail to exert it appropriately.

The writing and citation traditions of the humanities allow their writers to wield the full diversity of citation forms and functions. A cultural trend spanning more than a century within the sciences has reduced the repertoire of citation functions available to the scientist [15, 16]. The scientific report uses attributive citations very little. Integral citations, which facilitate attribution, are nearly extinct. The conditions which make relevant the use of paraphrases and summaries are nearly as rare as those calling for quotations. An informal analysis of papers in my own field (immunology) suggests that evidentiary citations outnumber attributive citations at least twenty-fold. Many student writers in the sciences, trained in the colleges to cite attributively, are hard-pressed to make the transition smoothly.

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Ownership of citations

The junior scientist has little skill using evidentiary citations. Moreover, the novice has a tenuous command of the field, does not really know what is in the commons and what is not. Indeed, only an expert can command the domain of ‘common knowledge’. My experience with student writers is that most citations are either ‘borrowed’ from a source or downloaded from a search engine based on a brief read of the abstract. (A correspondent suggests instead that novice writers are wed to a poverty of citanda and are resistant to incorporating new ones.) Thus is born the initial reference list. To this list a senior author may add a few references; under pressure from the publishing house, they may have to trim a few out. A reviewer may request a citation or two on the grounds it is important to the field. Whose citations are these?

In legal theory, there are three kinds of rights, separably attached to ownership: possession, use and disposal. Thus, I might own a book but have no right to copy it; someone might own a famous painting but have no right to alter it. To this list, add a fourth: a ‘right of origination’. A creator has the right to remain associated by name with the created work (work for hire is an important exception).

Consider citations in the light of these four rights of ownership. Who originates citations? Who possesses them? Who uses them? Who can alter or destroy them?

Who originates a citation? If one accepts that a citation is a relation, it doesn’t belong quite to text or source text. With legs standing on two continents, the citation originates in both, belongs to neither. The citation separates itself as a countable entity; in Garfield’s citation maps, the nodes (citantia and citanda) are dwarfed by the swarms of citation links standing on their shoulders. Surely, Foucault is the author of the famous sentence asserting that the author is the principle of thrift limiting the proliferation of meaning, found in the Harari translation [5]; isn’t Foucault partly the author of any citation to him? Isn’t that the meaning of Mertonian credit? We give Foucault credit, we give him his due, because the citation, in the guise of a citandum, is his. But without an authorial choice there is no citation of Foucault, so the credit for the citation, under the veil of a citans, belongs to the author, not to Foucault. In this case, there are two and even three citanda from which to choose. Many citers mistakenly cite Bouchard’s translation [17]. This in an example where the citation should place the citandum with Harari, not with Bouchard. Or, if we consider citations from Garfield’s viewpoint, the citation of Foucault appears to stand alone, its termini being of minor import. In this view, the citation belongs to the commons in which it operates.

According to historians of the footnote, citantia in the tradition of British philosophy and the humanities tended to use integral citantia and commentative footnotes [1, 11], so that in some circles the terms ‘citation’ and ‘footnote’ are nearly synonymous (e.g., [18]). Under the influence especially of German chemists, the sciences have discarded footnotes and integral citantia. This fits the positivist

conceit of hard science, in which arguments are established through the unveiling of evidence, not human authority. In many styles (as in *TWS*) citantia are reduced to a number, often no more than a superscript. This tidy style obscures the identity of source authors, reducing their visibility to writer, reader and reviewer. Coupled with the ease of using reference-managing software, the contemporary writer risks losing both the kinaesthetic and literary experiences of handling source texts and notecards. Original ‘ownership’ of citations by authors is limited to a few keystrokes.

The rights of possession have little relevance here. Source authors are not possessive; they rise up when they are *not* cited. It used to puzzle me that most of my colleagues do not see the recycling of source-text citations as plagiarism, but the present analysis makes sense of this. The non-integral evidentiary citans is so terse that it barely registers as belonging to an author. So little scholarly effort goes into selecting and using a citation that it appears hardly to represent scholarly effort. Moreover, it is possible that within the positivist ethic of scientists, citation of evidence, like evidence itself, appears to be in the public domain. Because of its inherently relational construction, which we have seen already destabilises the right of origination, and its increasingly minimalist presence as a meta-textual element, authors feel less possessive of their citations than of their words. Likewise, the rights of disposal and alteration are rarely invoked. Most authors care little if, for example, when reformatting a text for a different journal, they must convert citations from a name-year to a numbering system, even though this considerably changes the functional landscape of citation.

The rights of use are potentially important but severely limited due to the impoverished repertoire of citation techniques available to the scientist. The deft writer can use linking words to express logical development with evidentiary citations in the Introduction and Discussion sections of a paper; occasionally a nuanced phrase will reveal an attributive usage. The ideal author of written science is nearly voiceless, and only the most careful writing can differentiate between an attributive and evidentiary citans indicated by a number.

This is a conundrum for those of us concerned with the appearance of dyslexia in science writing. It appears to me that the majority of dysplectic transgressors are writers unskilled in citation or scientists not yet expert in their own commons. We can blame the colleges for the simplistic view that euplexis is achieved by paraphrasing and attributing one’s sources. But it is not enough to blame those who might have trained our students. We can also observe that graduate, medical and post-doctoral training programs provide little training in the art of skilful citation. This will not surprise the readers of *TWS*, who are well aware that scientists rarely have the inclination or time to invest themselves in the skills of literary and educational scholarship. The apprentice model for training biomedical researchers is flawed in this aspect; mentors rarely have the skills needed to train the next generation of writers. >

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> Mertonians assume that citations deliberately reflect the relative influence of texts on a scientist's thinking. The anthropological study by Latour and Woolgar [7] of a future Nobel laureate's laboratory seems to me to support that model. I suggest, however, that this is not the general case. Instead, I suggest a different model, a 'null' token model in which formal citations are little more than whispers in a game of Rumour, in which the (unskilled) writer has tenuous knowledge of sources but provides the citation merely as a 'token' needed for publication. This model could be seen as cynical but might play a role in citation analysis parallel to the role played by Kimura's neutral mutation theory [19] in population and evolutionary genetics. This was the null hypothesis that most mutations have little

(positive) effect on fitness. In this neutral model, citations are null tokens; they serve no particular function but are carried along to satisfy the minimalist needs of reviewers. In this model, citations belong to no-one except the commons, where they are blown about by winds and gusts of scientific fashions, or where some might serve as selfish memes. The entry of citations into the commons must be deliberate, but once there, how can we know that they are maintained through deliberation rather than fashion? Are there statistical properties that could distinguish null token networks from Mertonian networks? This is a question for the social scientists.

The task for educators is to teach skilful, reflective citation. I suggest that undergraduate students, and graduate students in their dissertations, be encouraged to use commentative footnotes deliberately to reflect on the functional role of citations in their texts. This practice will not extend into the print journals, but writers well versed in the manifold uses of citations will handle themselves better when breathing the cold thin air of scientific writing.

Informed consent or overwhelming paperwork?

The Food and Drug Administration (FDA) is proposing to add a new item to the list of required elements of informed consent¹. The proposal is that Patient Information Leaflets (PILs) for clinical trials that are conducted under Investigational New Drug (IND) regulations include a statement that the data collected during the trial has been or will be submitted to the National Institutes of Health/National Library of Medicine (NIH/NLM) for inclusion in the clinical trial registry databank (www.ClinicalTrials.gov). The proposed requirements apply both to drug and device trials.

The FDA argues that the informed consent regulations protect subjects who participate in clinical trials. Amongst other benefits, the regulations educate participants so that they can make autonomous decisions, and protect them from unethical practices. These are admirable aims. However, the FDA proposes that in addition to the factual statement about the registry databank, the statement should include a descriptive explanation of its nature and purposes. Investigators and Institutional Review Boards (IRBs) may require even more information to be added.

The FDA is currently inviting comments; the deadline is 1st March 2010. If the proposal is accepted, medical writers will need to use their best summarising skills to include all of the required elements of informed consent, plus the additional elements requested by the IRBs and Independent Ethics Committees (IECs) in as few pages as possible. Despite common agreement that PILs are too long, the number of details that must be included continues to grow.

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¹ Federal Register. Proposed Rules. 29 December 2009, Vol 74, No. 248