



Authorship in Scientific and Academic Research

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Introduction

Authorship is common to many fields of endeavor, including fiction writing, journalism, high school studies, blogging (Twitter, Facebook, etc.), music composition, and submitting grant proposals. Even an income tax form can be considered to have an author, be it the tax payer or a tax consultant. Standards of authorship vary between these and other spheres of activity, but they have at least the following in common: by claiming authorship, an individual or group (a) declares that the authored work is his/her/their creation (originality), (b) asserts certain rights to the work (ownership), and (c) warrants that the work and the manner in which it was produced conform to standards implied by the work's genre (honesty).

This article is concerned with works written for a scientific or academic audience. *Science* is understood here to apply broadly to any rigorous, empirical, descriptive, or explanatory project that is meant to be shared widely in the academic and/or scientific community. In this sense, works in physics, biology, sociology, and history, among others, are scientific. Works written for academic, but not scientific, audiences may not meet the standards of rigor demanded by science. They may be based primarily on opinion, personal experience, or anecdote, or be primarily emotive or aesthetic (music, poetry, fiction) or interpretive (literary criticism).

Authored works are not limited to those that are published, but also include those that are intended primarily or solely for oral presentation or performance. For ease of expression, I will normally refer to a single author of a written work, but unless stated otherwise, all points also apply to coauthored works, whether intended for publication or presentation.

Primary Norms of Authorship

As stated above, any individual or group claiming authorship for an academic or scientific audience is simultaneously making an assertion of originality, a claim to ownership, and a promise of honesty. These norms are primary in the sense that most of the rights and responsibilities of academic and scientific authorship are implicit in them; they are concerned with the standards to which publications are held.

Originality

In claiming authorship to a work, a researcher warrants she, herself, composed, thought up, invented, or engendered (hereafter "written") the work's expressions, sentences, passages, etc. (hereafter "phrases") and interpretations, insights, conclusions, etc. (hereafter "ideas"), with three exceptions:

- phrases and ideas that explicitly disclaim originality by clear attribution to other sources;
- phrases and ideas that are so well known that no attribution is needed (e.g., "Four score and seven years ago..."; the theory of evolution); and
- phrases and ideas that are held in common, such as proverbs (e.g., "better safe than sorry"; the theory of evolution).

In the case of coauthored works, the warrant is made that the listed coauthors wrote the work themselves, and that each listed coauthor made a nontrivial contribution to the task. The exceptions listed above sometimes bleed into one another, as illustrated by the theory of evolution. By one reasonable account, Charles Darwin is the author of the theory of evolution, and everyone knows this; by another reasonable account, so many people, both before and after Darwin, have contributed to the theory of evolution that it is held in common.

For the most part, the use of well-known and commonly held phrases and ideas, authored or commonly held, are not problematic, but there may be instances in which such use goes awry. Common knowledge is rarely actually universal. It is possible for a writer to be mistaken in thinking that the origin of a phrase or idea is well known and needs no attribution, or that a phrase or idea is held in common when it actually has an identifiable author. One or two such

nonattributed phrases in an article probably do not merit ethical censure, but a work or career riddled with them suggests that the author is dishonest or unacceptably careless.

Violation of the principle of originality generally falls under the heading of plagiarism, which is defined by the U.S. government as “the appropriation of another person’s ideas, processes, results, or words without giving appropriate credit” (Office of Science and Technology Policy, 2000: 76262). Note that giving proper credit is all that marks the difference between acceptable conduct and misconduct.¹ Delineating the forms of acceptable attribution is beyond the scope of this article, but ample guidance is easily found in manuals of style and the policies of most publishers of academic journals and books. See “Unacceptable Practices” below for more on plagiarism.

The principle of originality protects authors by implicitly granting them ownership to their phrases and ideas. It also constrains authors by requiring them to honor the ownership rights of other authors and to take responsibility for their own phrases and ideas.

Ownership

In the absence of a statement to the contrary, authorship implies a certain degree of control over the work. Quoting or paraphrasing a published, authored work without proper attribution is a violation of the moral rights of the author. In some cases it may also be a violation of copyright or other enforceable standards. Indeed, quoting too much of a text can be a copyright violation even with attribution.²

Ownership also implies a certain degree of responsibility for the work, first and foremost that the listed author(s) accept responsibility, as well as credit, for the work (Rennie, 1994).

¹ “Research misconduct” is a technical, quasi-legal term for three of the most serious violations of the norms of science, namely fabrication, falsification, and plagiarism.

² Under U.S. law, original works are granted copyright at the moment of creation (<http://www.copyright.gov/>) whether or not a copyright notice, such as “© 2011 John Doe,” is included in the work. Copyright protection can be waived or modified by an author who wishes to encourage free distribution or reuse of her or his work; see, for example, <http://creativecommons.org/>.

Authors are also responsible for the work's accuracy, reliability, and honesty (see below). If a chemist asserts that it is safe to mix compounds A and B, when doing so actually tends to generate an explosion or toxic fumes, the chemist deserves censure. If a second chemist quotes the assertion without attribution or qualification, he or she also deserves censure, not only for plagiarism, but also for the damage his quotation causes. However, if the second chemist makes the same assertion with attribution, the blame for the incorrect assertion adheres only to the first chemist because, all else being equal, the second chemist is justified in assuming that the report of the first author was correct.³

In science there is often an expectation that a reader who is unable to replicate published findings should receive cooperation from the author if the reader asks for clarification or additional information. If the author had plagiarized the relevant passage, it is unlikely that he would be able to fulfill this expectation.

Honesty

The responsibility to give credit where credit is due (discussed above) is just one aspect of the honesty required in scientific and academic research. In addition to including correct attribution, research publications are also expected to be candid nonfiction. Although science requires creativity, it does not tolerate creative writing. An honest work rests on a foundation of solid research methods scrupulously followed; draws on rigorous analysis and interpretation of data; describes the methods⁴ and sources accurately and in adequate detail; and reflects faithfully the research activities and findings.

Responsible authorship also demands candor, which requires works to reflect the author's best judgment and knowledge at the time of writing and publication. The author should be

³ The second chemist might merit censure if he/she was reckless in repeating the assertion and should have known better. For example, if the first publication was issued 75 years earlier and the second chemist did not check more recent sources to challenge or confirm the assertion, the second chemist would be blameworthy.

⁴ Description of methods is required only in fields in which there is an expectation that the research can be replicated or the methods stand as an independent warrant of the publication's credibility. Methods sections are not expected in some fields, such as history and anthropology, which count as scientific according to my definition.

convinced of the validity of the research and the accuracy of the research report, and any doubts or shortfalls should be reported as such.

Honesty and candor do not require disclosure of privileged, sensitive, or confidential information, but they might require acknowledgement that such information is being withheld. Candor also does not require reporting the one's every slight misgiving or every implausible conflicting interpretation; authors are allowed to make a strong case and are not required to make it tedious.⁵

At times candor is hampered by policies, some of which do not allow inclusion of a methods section, and most (perhaps all) limit the length of publications. When possible, authors faced with such restrictions should make supplemental information available, via the publisher's or the author's Web site, as appropriate.

Secondary Norms of Authorship

Secondary norms are concerned with responsibilities of authors to publishers and the reading audience. While primary norms are derived from or implicit in the norms of scientific and academic research per se, the secondary norms of authorship discussed here are essential to the smooth and efficient operation of the publishing process. In a sense, primary norms apply to the research record itself, while secondary norms apply to the management of the research record.

⁵ The case of "negative results"—"experimental outcomes that were not noteworthy or consistent enough to pass peer review and be published" (Schooler, 2011, p. 437)—may be considered an exception to this claim. Most scientists do not make the effort to write an article reporting negative results, but their failure to do so skews the research record. Insofar as publishing negative results is a duty, it is made extremely difficult in the current publishing environment, in which there are few venues to publish such studies and doing so garners little credit for the author.

Responsibilities to publishers

It would be very surprising to find a publisher of academic or scientific work that does not have a published set of guidelines for authors (see Appendix). No authorship policies of which I am aware are at substantive variance with the primary norms outlined above, but many authorship policies include additional guidelines. In submitting a manuscript to a publisher, an author enters into an implicit contract to follow the publisher's authorship policies.

Authors should not submit manuscripts to a publisher whose policies they find unacceptable. Both common courtesy and the efficient working of the publication process require authors to meet deadlines agreed upon with publishers and to reply promptly to publishers' requests for information.

Most publishers have an explicit policy not to consider for publication a work that has already been published, as a whole or substantially so; this is generally called *duplicate publication*. On the face, this may seem to benefit the publisher at the author's expense, but it is actually in line with the primary norms of scientific publication: previously published works can hardly be considered original. There are exceptions to this policy, such as the publication of translations and reprinting articles in anthologies. There is no exception to the rule that the original publication should receive proper attribution.

Most scientific publications also forbid *simultaneous submissions*—submitting a manuscript to more than one publisher at the same time. This is burdensome for the author because the review process can be quite lengthy; having six months pass between submission and publication of a journal article is not unheard-of, and I once waited nearly two full years to receive the reviewer's comments. However, from the point of view of publishers, and for authors as a community, it is an essential and justifiable restriction precisely because the review process is so time-consuming and expensive. The duplication of effort entailed by simultaneous submission is wasteful for all concerned. Simultaneous submissions are less problematic in book publishing, at least for publishers whose initial review is of a prospectus or proposal. Even so, the publisher's guidelines should be followed, and the most honest and

straightforward approach would have the author disclose that the proposal is being sent to more than one publisher.

Authors also have a responsibility to honor the norms of the peer review process. Most importantly, they must honor the confidentiality of the process and not use information gained in confidence to their own advantage. An author should also not discuss the manuscript with anyone currently reviewing it or share the reviewer's report with anyone who is not implicated in the manuscript (coauthors, editors, etc.).

Responsibilities to the readership

Duplicate publication and simultaneous submissions are offenses against the particular publisher involved, but also to the community of authors and readers. Offenses related to duplicate publication include so-called "salami science" (Huth, 1986) and the quest for the "least publishable unit" (Broad, 1981). Both of these colorful terms draw attention to the practice of trying to get the largest number of publications from the smallest amount of researcher—slicing the science as one might slice a salami. When researchers believe (usually correctly) that the quantity of their publications is more important for advancement than their quality, it is not surprising to find them engaging in such practices. However, these practices are harmful to the economical use of the publication process by wasting the time of editors and reviewers and squandering space. Noneconomical publishing clutters the research record with insignificant, fragmented, and misleading reports that are more difficult to synthesize for the advancement of science.

Authors who submit work to peer-reviewed publications also have a duty to review the submissions of others. This is simple reciprocity. As William F. Perrin makes the point about fairness while leavening it with some healthy self-interest:

If an average acceptance rate of 50% is assumed, and if each paper needs at least two reviews, then each paper published represents at least four reviews. Following this logic, if you publish three or four papers a year, you should be doing at least 12 to 16 reviews. Anything less means that you are sloughing off the work to others who are perhaps less knowledgeable and capable

than you in your specialty, and you should not be upset when someone reviewing a paper of yours "doesn't have a clue." (Perrin, 2008)

Good Practices in Coauthorship

Collaborative research carries benefits, such as when two or more people bring complementary skills or knowledge to the project, but also introduces complications concerned with sharing and coordinating tasks and distributing credit. Presumably these difficulties increase as a function of the number of team members. In many cases, some important members of the research team are not candidates for authorship at all. Lab technicians, clerks, administrative assistants, and others can be crucial to research, but as individuals who are primarily research employees and whose contributions to the team can reasonably be considered works made for hire,⁶ they may have no interest in or claim to authorship.

Coordinating tasks

The number of tasks⁷ that could be adduced for distribution among members of the research team is vast, but perhaps they can be summarized as follows, presented in something like chronological order:⁸

1. Assembling the research team and establishing expectations.
2. Coming up with the initial idea and refining it.
3. Searching the literature and situation the current project in it.
4. Identifying or developing appropriate methods.
5. Communicating with relevant oversight boards (IRB, IACUC, etc.).*
6. Gathering or producing data.
7. Analyzing data.
8. Writing, reviewing, and revising drafts.
9. Communicating with potential publishers and the actual publisher.*

⁶ In U.S. copyright law, in the case of works made for hire "the employer, and not the employee, is considered the author" (Library of Congress, 2010, p. 1). Detailed discussion of copyright, works made for hire, and the relationship between employment and authorship in research are beyond the scope of this article.

⁷ In this section, I use the words *task* and *responsibility* in a way that I hope emphasizes the distinction between one's actions from the ethical implications of those actions.

⁸ A more thorough task list can be found in Pimple, 2005.

10. Coordinating tasks.*

11. Handling postpublication tasks (sharing data, responding to correspondence, etc.).*

All of these tasks could be subdivided, and all of them could be shared. Tasks marked with an asterisk (*) are generally best handled by a single person (possibly, but not necessarily, the same person for all of the tasks). All team members must communicate openly, honestly, in a timely manner with other team members, but this responsibility falls most heavily on those charged with these tasks. These persons will be most effective if they practice respect, transparency, and diplomacy. The task with the greatest potential for ensuring a good collaboration, ethically and logistically, is assembling the research team and establishing expectations. Unfortunately, expectations are often established implicitly rather than explicitly, and failing to discuss and come to agreement on expectations at an early stage squanders an irretrievable opportunity.

Researchers are understandably more excited about doing research than in organizing a workforce, but without an early discussion of the division of labor and credit, each of the team members is tacitly invited to assume that his own expectations will prevail. A vitally important practice, then, is a frank and thorough conversation about the distribution of tasks and credit. This discussion should take into account the knowledge and skills of the team members, including the limitations of their knowledge, skills, and time; and relevant laws, policies, and ethical norms. Agreement should be reached on circumstances or events that might make it necessary to re-visit the ground rules and ways to resolve disputes, especially those that cannot be resolved within the team. The results of this conversation should be put in writing and distributed to the team members.

Awarding authorship

There can be no doubt that disputes about who should be included as an author occur frequently and are sometimes deeply acrimonious. Individuals who are responsible for

investigating allegations of unethical behavior by scientists⁹ report that many unfounded allegations of research misconduct arise from collaborations gone sour. A representative dispute that resulted in a Federal investigation is described in Fields (1993):

[A] co-investigator of a funded NIH grant application had conflicts with the PI. After the first two years of the grant, the PI decided to leave his¹⁰ co-investigator off the competitive renewal application. When she discovered this, the former co-investigator alleged to the institution that the grant renewal application failed to acknowledge her as the source of the ideas that she had contributed to the first grant application. An inquiry determined that (1) the co-investigator had agreed to contribute her material to the first grant, (2) she had not taken an active part in the preparation of the subsequent renewal application, and (3) she was not eligible under institutional rules to be a principal investigator. The inquiry concluded that it was not necessary to determine whose ideas and words were used in the later proposal and that there was nothing to warrant further investigation. The contribution of the scientist to the original grant proposal did not guarantee her tenure or require specific attribution of her ideas during the competitive renewal. (p. S62)

Although this example concerns a grant application, the same kind of acrimony also arises over research publications.

It appears that too few policies give adequate guidance on substantive criteria for being counted as an author. In my review of 16 authorship policies, 9 did not include such criteria. One of the best and perhaps most influential set of guidelines on authorship is the Uniform Requirements for Manuscripts (URM) of the International Committee of Medical Journal Editors (ICMJE). Nearly 1,000 journals that have requested to be included as a publication that follows the URM are listed on the ICMJE Web site.¹¹ Here are the substantive criteria for authorship:

Authorship credit should be based on 1) substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; 2) drafting the article or revising it critically for important intellectual content; and 3) final approval of the version to be published.

⁹ In the United States, this incumbent in this role is typically referred to as a Research Integrity Officer, or RIO. Every academic institution in the U.S. that receives funding from the National Institutes of Health is required to have a RIO.

¹⁰ Fields and Price "alternated the genders of scientists without accurate reference to the actual participants" (page S61, footnote).

¹¹ <http://www.icmje.org/journals.html>

Authors should meet conditions 1, 2, and 3. (International Committee of Medical Journal Editors, 2010, p. 3)

Distributing credit

Once it has been decided which members of the research team will be listed as authors, the next hurdle is assigning authorship order. Unfortunately, authors are listed in a one-dimensional sequence of names, but contributions to a publication can be multidimensional. Especially when there are four or more authors, I doubt that it is often a simple matter of lining up authors in order of importance, but more likely an almost intuitive balancing the relative importance of a number of factors that each author brings to the collaboration. Even when the relative value of contributions is clear-cut, the order of authors does not always follow in a straightforward way.

There are a few helpful conventions that vary by subfield.

- In some fields it is understood that the person who did the most work or made the most important contribution is listed first and the lab director is listed second or last. Other authors are listed in descending order of the importance of their contribution.
- Articles derived from a student's thesis or dissertation usually¹² list the student first and the advisor second or last; other authors are listed in order of contribution. (See also "Faculty–student collaborations" below.)
- In some fields, especially those with unusually large research teams, authors are listed alphabetically by last name.

To the best of my knowledge, these conventions are not official but are presumed to be understood by the members of particular fields.

In disciplines in which the reputation of the lab is typically closely entwined with the reputation of the lab director, routinely listing the lab director as second or last author, even when she made little or no direct contribution to the article (called gift, guest, or honorary

¹²

authorship; see below), may be legitimate. If it is well understood that a particular position on the authorship list is held for the lab director, there may be no claim of authorship per se on her part at all. For lab directors of a certain stature, being an author in the ordinary sense is less important than being known for leading a team that produces many, or particularly good, articles. This does not preclude the possibility that some lab directors merit less credit than others, but if the convention is known and followed, at least there is no deception involved.

In my opinion, the significance of having one's name in a particular place in a list of authors is not well-established in proportion to its importance. Authorship order is a matter of convention, but the conventions sometimes conflict and are generally inadequately formalized and publicized. It seems as if many researchers believe that their fortunes may rise or fall based on being listed as an author on a single publication.¹³ Even if authorship order were well defined, assigning order would require a good deal of judgment and practical wisdom, not to mention good will.

When the expectations of a research team are discussed, it would probably be fruitful to discuss not only who will be an author, but the criteria and decision process that will be used to make that determination. There is no formula that will ensure fairness, but demonstrated commitment to mutual agreement is helpful for fostering good will.

Faculty–student collaborations

Determining authorship in the case of collaborations between faculty members and undergraduate or graduate students pose a particular challenge. It seems likely that in most cases the student spends more time working on the project, but the faculty member's contribution is likely of much higher quality. This supposition is based on the sometimes dramatic differences in experience, knowledge, and skill between the two. In many cases, a good deal of the effort a faculty member puts into such collaborations derives directly from the

¹³ I do not have data to support this claim, but I do know that researchers have been chastised for listing in a grant proposal as published one or more works that had not yet been published. I know personally of a case in which a researcher came to some grief for listing such an article as "submitted" under the assumption that by the time the proposal was reviewed, s/he would have had the time to submit it and the statement would be true (even though it was false at the time it was written).

student's inexperience and the faculty member's duty to help increase the student's knowledge and skill. It is not uncommon for students to think that they deserve first or sole authorship in such cases, but this is based in part on their natural naiveté and profound awareness of the massive effort they themselves have made, with a corresponding lack of awareness of the cost of the collaboration to the faculty member. If authorship is based solely on the amount and quality of the contribution to the research and manuscript, faculty members probably deserve primary authorship credit most of the time. However, a good argument has been made by Mark A. Fine and Lawrence A. Kurdek that it is often (perhaps usually) proper to give the student primary authorship credit to be "consistent with the generative aspect of faculty–student collaboration—to provide students with experiences that will eventually allow them to conduct independent scholarship and to assist future students" (Fine, 1993, p.1145).¹⁴

Acknowledgement

As mentioned above, sometimes important members of the research team do not merit (and may not want) authorship credit. In many instances, it is appropriate to mention these contributions in an acknowledgement. Authors should seek and receive permission from persons they wish to acknowledge.

I am not aware of any general standards on acknowledgement, but I am also unaware of any circumstance in which acknowledgement matters to anyone but the person acknowledged (and perhaps his mother). I would be surprised to learn of a case where career advancement can be credited to acknowledgement. If I am correct, and the publication in which the research will appear has no policy to the contrary, I see no ethical bar to being generous, while also honest and accurate, in acknowledgements. Of course, acknowledgement inflation will reduce the impact on each individual acknowledged, so it may be counterproductive to overdo it.

¹⁴ My summary does not do justice to Fine and Kurdek's argument; I encourage readers to consult their article.

Unacceptable Practices

All of the practices described in this section are generally condemned while, unfortunately, widely practiced. They are all violations of the norms of originality and honesty and are presented here in descending order of seriousness.

Plagiarism

As mentioned above (Footnote 1), plagiarism is one of the three offenses defined in the U.S. as research misconduct. It sometimes strikes me as strange that anyone commits plagiarism, given the fact that proper conduct is separated from misconduct (which can destroy a researcher's career) by a pair of quotation marks and a citation. The most common plea of a person caught in an act of plagiarism is that he did not know that it was wrong. This excuse can hardly be used by researchers with advanced degrees, unless their teachers have been (almost) criminally negligent.

It has also been claimed by more than one plagiarist that the passage in question was "not the important part" of the work. According to Ihsan Yilmaz, a Turkish physicist: "Even if our introductions are not entirely original, our results are—and these are the most important part of any scientific paper"¹ (Yilmaz, 2007). The question remains: If it is not that important to the work, why not attribute the source? Perhaps because quoting these sections would imply that the author was lazy or incompetent. By plagiarizing instead, the author may hide incompetence, but, when caught, reveals dishonesty.

Yilmaz provides a number of other common excuses for plagiarism. He begins his letter by characterizing as "upsetting and unfair" the accusations that he and his colleagues had committed plagiarism for "using beautiful sentences from other studies." Yilmaz claims that it is "inappropriate to single [them] out" because "for those of us whose mother tongue is not English" doing so is "not unusual." (Read: everyone does it.) He also asserts that "I aimed to cite all the references from which I had sourced information, although I may have missed some of them" (i.e., it was an accident). Besides, "In the current climate of 'publish or perish,' we are under pressure to publish our findings." (I'm a victim of circumstances.) None of these excuses

stand up to the most generous interpretation; they all boil down to an admission of incompetence.

At the risk of being soft on plagiarists, I feel compelled to add that many scientists and observers of the world of research have expressed concern about the pressure to publish. Pressure in itself is not an excuse, but there may be such a thing as a corrupting level of pressure. Yilmaz may be incompetent by an unfair measure of competence, and it may indeed be the case that the system itself is corrupt. Even when the system is to blame to some (or even a great) extent, those who capitulate to an unjust system do wrong.

I also hope not to be accused of being hard on Yilmaz in particular and nonnative speakers of English in general. It seems likely that the system is indeed less just to them than it is to native English speakers, especially if their educational systems do not adequately prepare them to succeed in global science. I use his letter because it is the most comprehensive example that I have seen of the special pleading of a plagiarist (unless it is actually a brilliant satire). In addition to being a violation of the norm of originality, plagiarism is unethical in cases in which the author vouches for work that he, himself, did not actually do, as already described in the example of the chemist in the section above on Ownership, because the validity of scientific claims is crucial to the enterprise.

I would make a distinction that I have not seen made elsewhere between technical plagiarism and culpable plagiarism. The danger of this distinction lies in extending the ethically unproblematic category of technical plagiarism too far, which would be regrettable. However, I believe the distinction is widely observed, if not consciously, if only because the lower threshold for plagiarism is not well-defined. I doubt that it is possible to find a research article in the English language that does not have at least one pair of words that cannot be found anywhere else. Even an uncommon phrase can be forgiven if it is not too long appears to be the only instance of plagiarism in a work.

I was once startled to come across an example of clear-cut plagiarism for which, I claim, the author is not culpable. In a book that somewhat straddles the line between popular and academic, one chapter begins with an extended epigram, perhaps a whole paragraph, quoted and correctly attributed to a well-known work on the subject of the chapter. One or two pages later, another paragraph from the same work is quoted, but without attribution. Given that these two paragraphs are probably the most quoted sections of the original work, which itself is the best-known work of its field, the author could not possibly have thought that no one would notice this plagiarism. Furthermore, after already attributing one quotation, what would be the point of plagiarizing the other? I assume that the attribution got lost in the editing process.

I would also include the verbatim reuse of one's own methods section in successive publications as an arguable case of technical plagiarism. I would not qualify it as culpable plagiarism, assuming that the methods section is accurate for all of the publications in which it is published and that at least the first publication or the latest publication in which it appears is cited. I have been told by a few researchers that their lab director insists that the methods section must always be rewritten. This strikes me as a case of being overly scrupulous.

Similar to the methods section is boilerplate language in certain classes of documents. It is common for previously written passages to be reused in grant proposals, such as the facilities section, and it does not seem to me misleading or dishonest in the least.

The good news about plagiarism is that Internet-based plagiarism detection tools are improving and their use is spreading. Déjà vu,¹⁵ a database of "extremely similar" Medline citations, shows a dramatic drop in the rate of plagiarism between 2006 and 2008 (Garner, 2011; Reich, 2010). At the same time, and for the same reason, the detection of plagiarism may be on the rise, as older papers are discovered to be plagiarized.

¹⁵ <http://dejavu.vbi.vt.edu/dejavu/>

Self-plagiarism

Self-plagiarism is an oxymoron that is nonetheless used to describe an author's reuse of his own work. Extensive self-plagiarism in a single work would be better described as duplicate publication.

Ghost writing

Ghost writing has two faces in research. The slightly less culpable is hiring someone to write or extensively edit one's research paper without attribution to the actual author. All else being equal, this form of ghost writing is not significantly different from works made for hire (see Footnote 6).

The more culpable face of ghost writing is the practice of pharmaceutical companies and perhaps other for-profit ventures writing a research article about their own products for publication in a scholarly journal under the guise of having been written by an independent researcher, who, in fact had nothing to do with the research aside from accepting a large payment for the use of his or her name. In politics we call this "bribery" or "corruption." It is no more acceptable in research.

Gift, guest, and honorary authorship

These three terms are generally interchangeable. They are usually applied to the practice of granting authorship to a senior administrator, such as a department chair or a lab director, even when he had little or nothing to do with the project. Under some circumstances, I believe this can be an acceptable practice (see "[Distributing credit](#)," above).

There are known cases in which a researcher adds as an author someone who had no knowledge of or connection to the research, usually as a gift to a friend or as a way to boost the publication's authority by including a well-known researcher. This practice is completely unacceptable.

Emerging Issues in Authorship

Science has played an increasingly important and wide-spread role in our lives at least since World War II. There are more scientists than ever before and every self-respecting nation has, or aspires to have, a highly regarded science program. Science costs and produces more money than ever before. Two relatively recent trends related to authorship and credit in science publication are aimed at making it clearer who gets credit, what they get credit for, and how much that credit is worth.

Contributorship

In 1960, “the average number of authors per paper” was 1.67 (Broad, 1981, p. 1137).¹⁶ In 2008, the average was 4.7 (National Science Board, 2010, pp. 5-34), an increase of 281%. When one or two people are listed as authors on a paper, it is easy to decide which gets more credit. Once four or more are listed, it gets more complicated, especially when each author brings something unique to the collaboration. When things go wrong—for instance, when a paper has to be retracted because of errors or dishonesty—it can be hard to determine who is to blame, and to what degree.

A shift to contributorship is one approach to solving these difficulties. Not many publishers require contributorship. Two that do are Nature and Science, which recently adopted similar policies (Alberts, 2010):

Authors are required to include a statement of responsibility in the manuscript that specifies the contribution of every author. (*Nature Journals*, 2009)

All authors of accepted manuscripts are required to affirm and explain their contribution to the manuscript. (*Science*, n.d.)

For now, contributorship is a supplement to, and not a replacement for, authorship. It has the potential to provide some information that is currently unavailable, and it will almost certainly be used to determine who should get the blame—and who should not—when something goes wrong. I can imagine ways in which contributorship could play out to enhance or detract from research integrity.

¹⁶ Broad’s figure comes from the “Philadelphia-based Institute for Scientific Information.”
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Impact factors

Not surprisingly, there is a growing trend in scientific publishing to rank empirically and objectively the relative importance of journals, articles, and authors, usually based on how often they are cited. This of course had led to efforts to game the system and accrue additional citations that have nothing to do with the quality of the publication. To me, the use of impact indices seems like a regrettable attempt to sidestep human judgment. Their use is in its early stages and so far reviews are decidedly mixed. Time will tell whether they do more harm than good, but I sincerely doubt that they will go away.

Conclusion

Authorship is a lynchpin of academic and scientific research. Ethical authorship is judged by the conventions, expectations, and nature of the scientific enterprise and community. Because of the way research publications are used, originality is a fundamental norm of authorship. Ownership of ideas and their expression is posited on originality, but originality also confers responsibilities of honesty and candor. These three primary norms of authorship are buttressed with more narrow secondary norms related to responsibilities to publishers and to the readership. Coauthorship introduces many complications to the ethical analysis of publication, but is too valuable to be abandoned or carelessly restricted. There are many possible forms of violations of these norms, but perhaps the most common and worrisome unacceptable practices are variations on taking unearned credit, most prominently plagiarism.

Appendix: Review of Authorship Policies

In July and August of 2011, I reviewed 16 authorship policies of more than 19 research journals (some policies covered more than one journal). Included were the "Top Ten Most-Cited

Journals (All Fields), 1999-2009"¹⁷ (ScienceWatch.com, 2009), plus the flagship journals of several major academic societies (see **Table 1**).

Table 1: Authorship Policy Sources

Code	Rank*	Journal and/or organization
AA	-	<i>American Anthropologist</i>
AAS	8	American Astronomical Society (<i>Astrophysical Journal</i> and others)
AER	-	<i>American Economic Review</i>
AHR	-	<i>American Historical Review</i>
APA	-	American Psychological Association
APL	10	<i>Applied Physics Letters</i>
ASR	-	<i>American Sociological Review</i> (requires adherence to the American Sociological Association Code of Ethics)
IEEE	-	Institute of Electrical and Electronics Engineers (covers multiple IEEE journals)
JACS	6	<i>Journal of the American Chemical Society</i>
JBC	1	<i>Journal of Biological Chemistry</i>
Nature	3	<i>Nature</i>
NEJM	9	<i>New England Journal of Medicine</i>
PMLA	-	<i>Proceedings of the Modern Language Association</i>
PNAS	2	<i>Proceedings of the National Academy of Science</i>
PRL	5, 7	<i>Physical Review Letters</i> (also covers <i>Physical Review B</i> , ranked 7th)
Science	4	<i>Science</i>

* Rank column from ScienceWatch.com, 2000.

¹⁷ Two of the journals, *Physical Review B* and *Physical Review Letters*, share a publisher and authorship policy.
CORE Issues in Professional and Research Ethics

I identified 98 principles, rules, expectations, requirements, etc. (hereafter "items") relevant to ethical issues in authorship, excluding items regarding formatting manuscripts, submission procedures, editorial practices, and so forth. I assigned each item to one of 13 major topics that I identified during (not before) the analysis. I divided the topics into 2 to 28 subtopics, each of which included at least 2 items. The number of items per policy ranged from 2 to 36 (average 16.3, mode 8). See **Table 2**.

Table 2: Policy Categorization

Topic	Items	# policies containing items in topic	Rank*
Acknowledgement	3	4	7
Administrative review	4	5	6
Collegiality	4	9	4
Conflicts	4	9	4
Copyright	3	7	5
Data Policies	8	11	2
General standards	9	11	2
Honesty	8	11	2
Multiple authors	28	11	2
Other	5	5	6
Review process	3	4	7
Sources	9	10	3
Submission restrictions	10	14	1

* Ranked from the highest number of policies containing items in the topic (Submission restrictions, 14 policies, rank 1) to the lowest number (Collegiality, 3 policies, rank 8).

Note that my review of these policies was careful, but not rigorous. No one else has reviewed my analysis, and I have no doubt had moments of inconsistency. The categorization could have been done many different ways; I am confident that mine is reasonable, but it is neither perfect nor the best possible. Perhaps most importantly, it is impossible to tell from published policies what standards journals do not enforce. For example, of the 16 policies I reviewed, only 4 specified that manuscripts must not be based on falsified or fabricated data. I feel certain that this is also the de facto, if not, as it were, the de jure, policy of the journals covered by the other 12 policies. Thus, to avoid mistakenly misrepresenting a particular policy, my analysis does not correlate my items with publishers. I also encourage the reader to treat the numbers as more qualitative than quantitative: a 5 is not always exactly 1 greater than a 4.

Comments on policy topics follow more-or-less in order of significance.

Submission restrictions are included in almost all of the policies reviewed (14 of 16). Of these, 13 forbid or restrict duplicate publication (submitting manuscripts that had already been published) and 13 forbid or restrict simultaneous submission (submitting manuscripts to more than one journal at a time). The one policy that does not restrict duplicate publication does restrict simultaneous submission and vice versa.

Four topics are tied at second place, each covered by 11 policies:

- *Data policies*: 11 policies say something about data availability; 9 of the policies include several items or an independent policy on data availability.
- *General standards* captures items that don't obviously belong somewhere else. Only two items are represented in more than 3 policies: 6 policies include a statement to the effect that authors are expected to meet high ethical standards and 6 policies specify that authors must retract or correct flawed publications. Three policies have both.
- *Honesty* is also something of a hodgepodge, with only half of the 8 items represented in more than 3 policies. Of these, 8 policies forbid plagiarism, 6 specify that the manuscript must be based on the author's original work, 4 forbid falsification and/or fabrication of data, and 4 forbid the representation of previously published data as original.

- *Multiple authors* includes all of the restrictions and requirements for co-authored works. This has the highest number of items, largely because I listed as many specific requirements and restrictions on co-authorship as I was able. In contrast, for data policies, I did not consistently include every item in a policy's section on data, some of which are quite long. One reason for this disparity is that items concerning data tend to be set off in a separate section, whereas items concerned with authorship are often scattered about. At any rate, of the 29 items identified, 13 are represented in only one policy each (e.g., works based largely on a student's thesis or dissertation usually list the student as principal author), and only 6 are represented in more than 3 policies, as follows:
 - 8 policies make it clear that all authors should agree to submit the manuscript and approve of the submitted manuscript.
 - 7 policies specify that all authors should see the manuscript before it is submitted, and 4 policies require all authors to agree to revisions, resubmissions, and retractions.
 - 6 policies specify that, in order to be included as an author, one must have made a significant or substantial contribution to the work; 4 policies specify that one must have contributed to writing, reviewing, and/or revising the manuscript
 - 6 policies specify one or more responsibilities for the submitting/corresponding/principal author.

Some items can clearly be combined under substantive criteria for inclusion as an author, such as the nature and extent of the individual's contribution to the research and the manuscript. Most of them have no such explicit criteria (see **Table 3**). Interestingly, of the policies reviewed, only 1 includes guidance on the order of authors, saying merely that it should reflect the contributions of the authors. None of the policies says anything about the relative importance of position—whether the person who made the greatest contribution should be listed first or last, whether the lab director is always listed last no matter her/his contribution, or what value is to be placed on other positions.

The 3 items in the topic *Acknowledgement* include criteria for acknowledgement but not authorship. All of the 4 policies with items in this topic also have 6 or more criteria for authorship.

Sources includes 9 items concerning the citation of previous works, including the author’s responsibility to secure permission to use copyrighted materials (6 policies), guidance on citing unpublished sources (5 policies), the requirement for accuracy of citations (4 policies), and the responsibility to ensure that sources cited are comprehensive, relevant, and/or up-to-date (4 policies).

Conflicts includes 4 items, only 1 of which is included in more than one policy: the requirement to disclose conflicts of interest and/or funding sources (9 policies).

Copyright includes 3 items: 7 policies include guidelines for authors to distribute or reuse the publication in some way, such as posting it on an institutional Web site; 2 policies require the author(s) to transfer copyright to the journal, and 2 others require the author(s) to grant an exclusive license to publish the work. All of these latter four policies have guidelines for authors to distribute or reuse the publication.

Under the topic of *administrative review*, I included the requirement that research using human subjects or non-human animals must have been appropriately reviewed and approved; 5 policies require both of these, and none of the policies reviewed includes one without the other.

Of the items under the remaining 3 topics, all are included in 3 or fewer policies. *Review process* concerns interaction between authors and reviewers; *collegiality* prohibits personal attacks or discriminatory language; and *other* includes 5 items that don’t seem to fit elsewhere.

Table 3: Policies with Substantive Criteria for Inclusion as an Author

# of policies	# of substantive criteria
9	0
2	1
2	2
2	3
1	4

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