

Orphan Papers and Ghostwriting: The Case against the ICMJE Criterion of Authorship

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Although popular, I argue that the International Committee of Medical Journal Editors (ICMJE) account of authorship is flawed. It inadvertently allows for practices that it was designed to prevent. In addition, it creates a new category of authorless papers—*orphan papers*. The original World Association of Medical Editors (WAME) criterion is preferable.

Keywords: authorship, ghostwriting, ICMJE, orphan papers, WAME

INTRODUCTION

Authorship is the key mechanism by which the scientific community allocates credit and blame. As such, it is incredibly important to have a clear idea about what makes a contribution worthy of authorship credit in the biosciences. The International Committee of Medical Journal Editors (ICMJE) criterion of authorship is fast becoming the consensus account. Currently, over 600 biomedical journals use it (Wistlar et al., 2011). There are dissenters from this growing consensus (Matheson, 2011), but for the most part, the ICMJE criterion is the leading contender for a universal standard of authorship in the biosciences. In this article, I argue that the ICMJE criterion is flawed; it does not prohibit some of the behavior it is intended to discourage. Practices like ghostwriting are inadvertently made permissible by the strict application of the ICMJE standard, despite the fact that the ICMJE explicitly bans ghostwriting. In addition, it creates a conceptually problematic category of

authorless papers—*orphan papers*. Finally, it exhibits a flawed strategy for promoting the ethical conduct of research by focusing too much on increasingly complex guidelines and too little on enforcement. The original World Association of Medical Editors (WAME) criterion avoids these problems and is a better account of authorship in the biosciences.¹ This critique bolsters the existing concern that the ICMJE criterion is simply a poor fit with scientific practice because it is at odds with the judgment of many scientists.

AUTHORSHIP CRITERIA

Medical journal editors have taken the lead in defining authorship in the biosciences. There are two main authorship criteria outlined by groups of editors in the biomedical sciences. The ICMJE sets out the following standard:

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. Authors should meet conditions 1, 2, and 3. (ICMJE, 2011)

According to the ICMJE criterion, someone is an author only if they meet all three conditions. WAME lists a different authorship criterion. They stipulate that only someone who has made

substantial intellectual contributions to the study on which the article is based (for example, to the research question, design, analysis, interpretation, and written description) should be an author. It is dishonest to omit mention of someone who has participated in writing the manuscript (“ghost authorship”) and unfair to omit investigator [sic] who have had important engagement with other aspects of the work. (WAME, 2007)

These accounts are written to clarify who should count as an author according to journal editors and contain broader discussions of both what it is to be an author and how authors should behave. As such, they are not intended as philosophical accounts of authorship, but I suggest that they are the best place to begin to look for a clear analysis of scientific authorship.

Medical journal editors are not the only people writing about authorship in scientific contexts. For example, the authors of a leading responsible conduct of research text, Shamoo and Resnik, offer an alternate account. They say, “[p]eople should be listed as an author on a paper only if they (a) have made a significant contribution on a paper; (b) are prepared to defend and explain the paper and its results; (c) have read and reviewed the paper” (Shamoo and Resnik, 2009, p. 101). In addition, authorship standards are also thought to differ between research sub fields, with each sub field sharing slightly different

community standards. For the purposes of this paper, I will focus on the ICMJE and WAME accounts of authorship.

There is considerable overlap in these criteria, in that there will be substantial agreement about who should count as an author on a given paper in a great many cases. However, there are also places in which the two accounts diverge. For example, a person who made a direct, intellectual contribution to a project and wrote part of the paper would qualify as an author under the WAME criterion but would not qualify under the ICMJE if she did not approve the final version of the paper. Additionally, an author who has made a significant intellectual contribution on a paper and is prepared to give final approval but has not written or critically revised its content would count as an author by the WAME but would not count as an author under the ICMJE account. If we could apply these criteria to every scientific paper ever written (or even just biomedical papers), we would undoubtedly find a truly unruly collection of results—many papers would meet both of the criteria, some none, and the rest would exhibit some combination of one or the other.

It is unclear how well the ICMJE criterion reflects the considered view of biomedical researchers. Bhopal et al. (1997) found that only 24% of British medical researchers were aware of the ICMJE criterion. In addition, 62% disagreed with the three part criterion, saying that meeting any one of the three ICMJE conditions is sufficient to merit authorship credit. Anecdotal evidence suggests that the mistake of reading each ICMJE condition as individually sufficient is quite common in the biomedical sciences. Of course, attitudes might have changed between now and 1997, but I suggest that the ICMJE authorship criterion is still out of synch with biomedical practice.

GHOSTWRITING

The concept of scientific authorship has received greater attention recently because of the exposure of unethical publication practices like honorary authorship and ghostwriting, which occurs when academics publish papers under their name despite the fact that someone else wrote them. When a pharmaceutical or medical device company wants a particular viewpoint to be expressed in the scientific literature, they may hire a medical communications company to draft a paper that carries their message. Then they get someone else (usually a prominent academic or opinion leader) to publish it under their name alone, eliminating all evidence of the company's financial conflict of interest (Fugh-Berman, 2005; Moffatt and Elliott, 2007).

For the purposes of this paper, let us imagine the following typical ghostwriting scenario (Sismondo, 2007; Fugh-Berman, 2010). Company A is introducing a new drug. They hire marketing consultants B to map out a publications plan. This plan identifies all of the strategic marketing needs for the

drug and then outlines a suite of possible scientific publications that meets these needs. The marketing consultants hire a freelance medical writer C to draft a paper as part of the publication plan. The marketing consultants give the freelance writer data (generated by scientists at Company A) to work from and a list of strategic marketing messages to include in the paper. The writer writes several drafts until the marketing consultants are happy with the quality of the paper and its effectiveness in establishing the correct marketing messages. At that point, the marketing consultants approach a key academic opinion leader D to put his or her name on the paper and submit it for publication with no mention of anyone else's contributions. Key academic opinion leader D edits the paper, making small editorial changes, and submits it to a leading journal. The paper passes the peer review process and is published in a well regarded medical journal with only academic opinion leader D listed as author. Clearly, there is much wrong with this scenario, including undisclosed conflicts of interest, but is this an authorship problem? The answer depends, at least in part, on how ghostwriting is defined.

GHOSTWRITING DEFINITIONS

Much of the relatively recent interest in clarifying who counts as a scientific author stems from the concern about unethical scientific practices. The ICMJE account needs to be able to allow that bad authorship practices are wrong. Standards were clarified in direct response to the scientific community's recognition of fraud, misappropriation of credit, and especially ghostwriting. There is a broad consensus that biomedical ghostwriting is wrong. There is less agreement about how to define ghostwriting and how to think about its connection to authorship criteria, as there is no universally agreed upon definition of scientific ghostwriting. The literature defines ghostwriting in slightly different ways, but this difference has a real impact on what counts as ghostwriting.

There appear to be two main schools of thought. Some papers define ghostwriting as "failure to name, as an author, an individual who has made substantial contributions to the research or writing of the article" (Flanagin et al., 1994, p. 222). This "substantial contribution" approach is also found in more recent discussions of ghostwriting. For example, a Public Library of Science (PLOS) Medicine debate states that ghostwriting occurs "when someone makes substantial contributions to a manuscript without attribution or disclosure" (Götzsche et al., 2009, p. 0122). Frequently, these authors use the terms "ghostwriting" and "ghost authorship" interchangeably; both are defined in terms of a substantial contribution to either writing or research.

The other approach is to define ghostwriting as ghost authorship and explicitly state that a ghostwriter is somebody that met the relevant scientific authorship criteria but was not listed as an author (Moffatt and Elliott, 2007).²

This approach requires that the ghostwritten hidden contribution be worthy of credit as an author. I argue that this second approach is better—ghostwriting is best defined as ghost authorship. It occurs when someone deserves authorship but is not listed as an author. It is the flip side of honorary authorship, where someone who does not qualify as an author is listed as such. As a result, understanding authorship is the key to understanding and correctly identifying biomedical ghostwriting. Ghostwriting is simply ghost authorship.

One might think that this is a distinction without a difference, but it highlights a dilemma. On one hand, if ghostwriting occurs in the absence of any explicit discussion of what it is that makes someone a scientific author, why is someone guilty of ghostwriting (or even more strangely, ghost authorship) if they made a significant unacknowledged contribution to a project but that contribution falls short of what is necessary to merit authorship by current authorship guidelines? This worry is moot if scientific authorship is a matter of simply making a substantial contribution to a paper or project, but the leading authorship criteria all require more than a substantial contribution to the work of a project to earn authorship. On the other hand, if ghost authors are those who can be shown to have made hidden contributions sufficient to count as an author, which authorship criterion should we use and what do we do when criteria conflict?

I think that there are two good reasons to think that the ‘substantial contribution’ account of ghostwriting is inferior to the ‘ghost authorship’ account. First, the ‘substantial contribution’ account is literally false when applied to the norms of scientific practice. There are all kinds of significant contributions that do not count as ghostwriting according to the norms of biomedicine. The issue hinges on how we are to understand the meaning of ‘significant contribution’ in these cases. If we simply assume that ‘significant contribution’ means a contribution worthy of authorship, we beg the relevant question by assuming what we are trying to prove. Are there some significant contributions that do not merit inclusion as author? The answer is straightforwardly yes. For example, someone who collects all of the data on a project could easily have made the greatest contribution to a project in terms of the number of hours worked but would not qualify as an author according to any of the main accounts of authorship. In addition, this person would not qualify as a ghostwriter either. It might be discourteous to not mention this contribution in an acknowledgements section, but standardly, no one would identify such a paper as being ghostwritten for not mentioning this kind of contribution.

A defender of the ‘significant contribution’ model might counter by specifying that a ghostwriter is someone who makes a substantial contribution to the production of a manuscript and not just to a project generally. Again, this point is going to hinge on what counts as “significant” in this context. If we simply assume that a significant contribution is one that qualifies someone as an author, we beg the question again. To do so is to make the distinction between

the two definitions of ghostwriting moot; they both would mean the same thing. However, it is entirely possible that someone could make a significant, unacknowledged contribution to the production of a manuscript and still not be considered a ghostwriter. Consider the case where a researcher hand writes a paper in shorthand notes, counting on an administrative assistant to type, organize, and format the resulting paper. The administrative assistant would have made a significant contribution to the production of the manuscript but would not generally count as a ghostwriter. It is simply false that any unacknowledged contribution to a project or manuscript automatically creates a case of scientific ghostwriting.

Second, even if the significant contribution model does not match current practice, there is always the question of whether it should. If given the choice of reforming the practice or reforming the definition of ghostwriting, which is better? I argue that there are good reasons to restrict ghostwriting to cases of ghost authorship. Authorship is important because scientific authors are publicly accountable for their work. Ghostwriting is immoral because it is seen as a way of deliberately avoiding this mechanism. Ghostwritten papers of the standard sort are written for hire by people with extensive conflicts of interest. These conflicts are thought to directly shape the content of the papers they ghostwrite in ways that are undetectable when the writers are not credited as authors. Defining ghostwriters as ghost authors allows us to identify what is wrong with the practice, which offers additional support for avoiding the ‘substantial contribution’ definition of ghostwriting.

APPLYING AUTHORSHIP CRITERIA TO CASES OF GHOSTWRITING

If ghostwriting is fundamentally about authorship, how well do the various accounts of authorship handle cases of ghostwriting? In other words, are cases of ghostwriting really cases in which people merited inclusion as authors according to leading accounts of authorship but were not listed? A closer look reveals that the ICMJE three part criterion is not up to this task. It allows for the most common forms of ghostwriting.

If we return to the hypothetical case outlined above, who counts as an author? Recall that the ICMJE criterion has three necessary conditions. Conceivably several agents meet the first condition; depending on the details, Company A, marketing consultants B, and freelance medical writer C all can be plausibly thought to have contributed to the “conception and design, acquisition of data or analysis and interpretation of data.” Freelance medical writer C and marketing consultants B perhaps meet the second condition—“drafting the article or revising it critically for important intellectual content.” Only key academic opinion leader D meets the third condition of final approval though. Since each condition is necessary and no agent meets all three, no one merits

inclusion as an author of our hypothetical paper. If no one is an author, the paper is not ghost written, i.e., the charge of ghostwriting is false because there is no contribution that both earned authorship and is not listed.

The WAME account fares better. To apply this account we need to determine who made a substantial intellectual contribution to the project. Again this is going to depend on the details a bit, but it is likely that Company A (or at least the individuals at Company A who designed and ran the experiments that generated the paper's data) and freelance medical writer C would count as authors. Marketing consultants B and key academic opinion leader C would not have earned credit as authors because they failed to make substantial intellectual contributions to the project. The WAME account correctly allows for the identification of the paper as ghostwritten. People who earned authorship credit as authors were not listed as authors on the final project, which means that this paper is correctly identified as ghostwritten.

The practice of ghostwriting is highly unethical because it undermines the transparency necessary for the proper functioning of the system of scientific communication, misleads the medical community and hides conflicts of interest (Moffatt and Elliott, 2007; Moffatt 2011). If we take the ICMJE criterion seriously, ghostwriting as it is commonly practiced in the biomedical sciences should not count towards authorship and would not be problematic (at least in terms of authorship).

In cases of industry-sponsored, biomedical ghostwriting, the unacknowledged "authors" typically do not meet the ICMJE criterion. They do not have final approval, which is listed in the ICMJE criterion as a necessary condition to qualify as an author on a scientific paper. Ghostwriters are paid to produce a paper, but they have no say about what happens to it once it leaves their hands. Typically, their draft is given to an academic to review, who may make changes or not. However, the ghost author loses all control over the paper at that point—ceding final approval to someone who has little or nothing to do with the paper up until that point. This practice creates an unusual situation where the people who produce the article (the ghost authors and whoever produced the data) are unable to defend and explain the results, and where the official sham authors (the academic authors who lend their name to this research) are unable to do so as well.

This concern is not merely academic. Matheson (2011) argues that corporations deliberately use the ICMJE three part criterion in this way to obscure the actual origins of corporate sponsored papers. Matheson, who has extensive experience as a writer in the field of medical communications both as an employee and as a consultant, argues that the final approval requirement of the ICMJE criterion is deliberately used as a way to minimize the appearance of corporate involvement. According to Matheson, the formula is quite simple; as long as no corporate scientist or ghostwriter has final approval, they cannot be listed as an author. As a result, corporations can relegate their employees

to the contributor section by deliberately only offering final approval to the “official” academic authors. The idea is that the contributorship listing is less prominent than the authorship listing, effectively burying the industry contribution in the “fine print,” as Matheson phrases it (Matheson, 2011). Matheson suggests that the solution is to replace the three part ICMJE authorship criterion with one that is more flexible and allows for a greater number of roles and responsibilities to qualify someone as an author (Matheson, 2011). I think that it would make more sense to simply replace the ICMJE criterion with the original WAME standard—to be an author is to make a direct intellectual contribution.

ORPHAN PAPERS

In addition to unintentionally allowing ghostwriting, the adoption of the ICMJE criterion also creates a new category of problematic papers. The resulting papers can be thought of as orphan papers—papers with no authors—because nobody involved in the production of the paper meets the ICMJE authorship criterion. In a sense, this conception highlights what is wrong with industry sponsored, ghostwritten papers. They are cleverly crafted facsimiles of real papers, created to deceive the scientific/medical community for commercial gain. No one is really responsible for the content of these papers in the way that scientific authors are typically responsible for their work. The problem with this conception is that it provides a defense for bad actors to justify their actions. When accused of this type of misbehavior, corporations and medical communications professionals (the people doing the ghostwriting) simply say that they are following standard authorship guidelines—the ICMJE guidelines—and that their contributions do not merit authorship because they do not have final control.

Orphan papers are not merely a problem for ghostwritten papers—a good deal of the scientific literature consists of orphan papers. Consider a typical research collaboration between an advisor and student. The advisor hands a student a research problem and an experimental design. The student performs the experiment and writes up the results. The advisor reads the draft and decides that it is good enough to publish. The advisor submits the paper, but does not allow the student to exercise final approval. The paper gets published with both researchers listed as authors. However, neither the advisor nor the student meets the ICMJE criterion in this case. The widespread adoption of the ICMJE criterion creates orphan papers all across the biosciences.

The fact that the WAME criterion avoids the creation of orphan papers is a good reason to view the WAME criterion as the preferred account of scientific authorship. Under the WAME criterion, writing a manuscript counts as a “substantial intellectual contribution” and whoever performed this role

always needs to be granted the status of author. Is drafting a manuscript always making an intellectual contribution? Yes, the standard components of writing—presenting research, making arguments, and discussing the significance of results—are all substantial intellectual endeavors that need to be acknowledged with authorship. The WAME criterion is the only criterion that allows industry sponsored ghostwriting to be condemned as an authorship problem and, as a result, should be the preferred authorship criterion. What is it then that really makes someone a scientific author? On this account, a scientific author is someone who has made a substantial, direct intellectual contribution to a project.

CONTRIBUTORSHIP MODEL

There is a sense in which looking at just authorship criteria alone misses some of the relevant broader context. Authorship is not the only way in which researchers account for who has earned credit and responsibility on a research project. In particular, one might think that the recent push to require descriptions of the main contributions of each project participant should shape our understanding of what makes an author. Orphan papers are less of a concern in a situation in which everybody's contributions are clearly outlined. There are several different contributorship proposals. Resnik (1997) retains the category of author, but also lists other roles and contributions like statistician, data collection, and grant writing. He argues that this will lead to a clearer and fairer accounting of scientific credit and accountability. The key change from traditional practice is that non-authors have to list their contributions while also retaining the category of author. The WAME approach seems like a better fit with this model, allowing for less redundancy between the ICMJE criterion and Resnik's detailed contributor listing. There seems little need to have a three part account of authorship if all the main contributions get listed anyway. Rennie et al. (1997), on the other hand, proposes a reworking of the current system in which authorship is eliminated in favor of a detailed listing of contributions. I think that this kind of system has potential, but it is unclear if the various institutions in and surrounding science would adopt this change. Clearly, both the WAME and ICMJE criteria of authorship are irrelevant if we move to a system that does away with authorship all together.

In my view, contributorship models have the advantage of increasing transparency. Since transparency is always good in this context, there will always be some preference for a contributorship model. It is less clear that contributorship models have any impact on reducing unethical practices and, if they do not, it is unclear if imposing them is worth the increased bureaucratic cost. Is the positive benefit of a small increase in transparency worth the extra time to set out, print, and police contributorship statements, if they

have little impact of ethical behavior? The worry is that it is only slightly more onerous to lie about one's contributions than it is to lie about one's authorship status. If the real problem is dishonesty, a move to a contribution system does little to address the core issue. This same general problem underlies the debate over authorship. What kind of general strategy will be most effective in promoting ethical research behavior? The answer to this question depends on understanding what is driving unethical behavior in the research context.

STRATEGIC CHOICES

The problem with the ICMJE account of authorship is that it conflates two distinct concepts—what makes someone an author and what the ethical obligations of authors are. Much of this confusion is eliminated if we make a simple distinction between what it is that makes someone an author on a scientific paper and what the ethical obligations of the resulting authors are. On this analysis, the ICMJE criterion is guilty of a category error in conflating two distinct but closely related things—authorship and the ethical obligations incumbent on authors. The ICMJE criterion builds ethical behavior into the very concept of scientific authorship in the biosciences. If the ICMJE criterion is taken seriously, unethical authors do not count as authors even if they have made a substantial intellectual contribution to the paper in question. The problem with this strategy is that it assumes that the promotion of the responsible conduct of research is simply a matter of setting out clear guidelines. Specifically, it assumes that all scientists will behave ethically if they know the ICMJE guidelines. The real problem is not lack of knowledge of research ethics rules (although more knowledge is always better), but rather the lack of punishment for rule breakers. Obviously, all authors should act ethically; but in the context of modern scientific practice with the varied financial interests at stake, ethics guidelines need to be designed to handle cases of deliberate avoidance and manipulation. On this front, the ICMJE strategy does not fail gracefully; there is no real punishment for wrongfully claiming authorship credit and no way to punish cases of ghostwriting either.

The key question is which strategy will improve the responsible conduct of research? The answer to this question depends on what we think causes research misconduct. Consider two strategies to promote research ethics. One approach treats misconduct as mainly a problem of misinformation and honest mistakes. Another treats misconduct as a systemic problem caused by heightened career pressures and lack of oversight. Do we need more restrictive guidelines (which might inadvertently sanction the behavior of deliberate misbehavers)? Or are we better served by a set of looser guidelines?

There are situations in which the ICMJE approach might be better. In a community where any deviation from ethical standards would be immediately apparent and punished, it is easy to imagine a strict approach to defining authorship as superior. It is not unreasonable to think that science could be better off if everyone would follow the ICMJE authorship guidelines in this kind of situation. It would insure the maximal amount of communication and accountability in research groups.³ The problem is that modern science is often done in contexts where ethical lapses are difficult to detect and often unpunished even when known. In these contexts, it is better to have a looser set of standards that cannot be used to justify the ethical violations it is meant to address.

Another problem with the ICMJE approach is that it only goes halfway; there are other equally important ethical aspects of authorship that should count accordingly. If we are going to say that you do not count as an author if you have not acted ethically, then we should make sure that we cover all the ways to act unethically. The biggest omission is the disclosure of conflicts of interest, but there is a whole host of other relevant ethical obligations. If we are going to exclude potential authors who make a significant intellectual contribution on the grounds that they did not write/revise the manuscript or approve the final version, why not exclude potential authors that have not disclosed their conflicts of interest or those who are guilty of duplicative publication or those who refuse to cite relevant work due to personal animosity? If we want to insure that only ethical authors meet the criterion for scientific authorship, then we need to include a much longer list of necessary conditions to the current three part ICMJE criterion. I think the WAME approach is better; we should define authorship in terms of “substantial intellectual contribution” and clearly delineate behavior that does not qualify someone as an author. In addition, there should be a clear statement of the ethical expectations of authors which sets out how authors are expected to behave.

CONCLUSION

The motivation behind the ICMJE approach seems to be that we can force good behavior by defining authorship as ethical authorship. The problem is that this approach seems to assume that coming up with the correct guidelines is sufficient in the face of willful disobedience. The ICMJE criterion does not sufficiently match scientific practice, ironically leading to a situation in which ghostwriting is not an authorship problem. Instead, it creates a whole group of authorless papers—*orphan papers*. This is not the ideal way to promote research ethics. We do not need better and more restrictive guidelines generally; instead, we need for there to be a rigorously enforced penalty for breaking guidelines. The WAME guidelines and a system that actively punishes misbehavior are preferable.

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NOTES

1. As a reviewer kindly pointed out, there are two different WAME discussions of authorship—the original criterion that I discuss here (WAME, 2007) and later guidance (WAME, 2012) which is quite similar to the ICMJE criterion (even recommending familiarity with the ICMJE standard). I think that the newer WAME position is a step backwards, as it blurs different approaches to defining authorship. In this paper, I refer to the original WAME criterion; the newer WAME discussion of authorship has similar problems to the ICMJE account.
2. There is not a perfect split in the literature as some studies combine the two definitions. For example, Mowatt et al. (2002) defines a ghost author “as a person who, in the opinion of the corresponding author, had made a contribution that merited authorship or who had assisted in drafting the review but was not listed as an author or mentioned in the acknowledgment section of the review.”
3. A reviewer raised this helpful point.

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