

## EDITORIAL

# Falsification, Fabrication, and Plagiarism: The Unholy Trinity of Scientific Writing

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One of the greatest, and sadly all too common, challenges facing a contemporary medical journal editor is the adjudication of ethical integrity issues. I had originally presumed that this would be just an occasional role, but it transpires that these problems are quite widespread, ranging from unconscious and unwitting naiveté to the conscious and willful betrayal of scientific trust.

As a journal, we have no significant powers of investigation, and determining, often years after publication, what is truth and what is fiction can be impossibly hard. The *International Journal of Radiation Oncology · Biology · Physics* (the Red Journal) editorial board wishes to lay down an unambiguous, bright line that distinguishes the acceptable from the unacceptable so that no author can, in retrospect, say they were not warned. In medical research, we hold great responsibility and trust, and thus aspire to a conduct of unassailable honesty and integrity in its execution. If not, we breach not only our own ethos but ultimately and importantly medicine's most fundamental tenet, improving the lives and well-being of our patients. Scientific progress is founded on scientific honesty.

Between 2001 and 2010, the number of manuscripts accepted by listed medical journals increased by 44%. The number of retracted papers over the same period, however, went up 19-fold! It has been estimated that the majority of the retractions resulted from conscious misdemeanors rather than honest errors (1, 2). To what can we attribute this extraordinary increase in apparent malfeasance? Although scientific dishonesty has been present forever, our powers to detect it electronically have increased dramatically in recent years. This factor alone accounts for a significant proportion of the apparent rising rate, but not for everything.

There has always been pressure on investigators, but in a time of economic hardship these are amplified. The National Cancer Institute pay line, and that of granting agencies globally, is in sharp decline. The competition for the sparse funding that remains is intense and merit-based. Merit, however, is frequently quantified by numbers of publications, making this a vulnerable target for manipulation.

In addition, many new investigators, including those from emerging nations, may under-appreciate the standard rules of

scientific writing. For example, rules on attribution of another person's work without attribution may differ in other parts of the world (3).

Let us examine the major forms of misconduct that the Red Journal, and all medical journals, face. The Committee on Publication Ethics has defined them as fabrication, falsification, and plagiarism (4).

## Fabrication

Making up data or results and reporting them: you might think that this is so egregious no one would take a chance, but you would be wrong. At the Red Journal, we have, on several occasions, received word from coauthors or other members of the research team of potential data fabrication: studies simply not performed, studies artificially inflated in number, retrospective reviews masquerading as randomized trials. These cases are very challenging to investigate because it is not always clear whether it is the whistleblower or the author who is the credible party.

## Falsification

This is the practice of manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record. This practice is also very difficult to detect, and none of us knows its prevalence. It may also be very subtle, resulting from artful manipulation by investigators themselves or, at a lower level, from data managers or laboratory assistants trying to please their bosses by providing data they believe they desire.

## Plagiarism

Plagiarism means the appropriation of another's ideas, results, or words without giving proper credit. It is a complex and nuanced

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issue with broad grey zones open to interpretation. In its most basic and extreme form, one individual copies wholesale, and without reference, the writings of another. If no experimentation took place at all, then that is also fabrication. More commonly, however, one individual has performed an unoriginal study and recycled the published words of another to describe it. Often whole tracts of writing, say the introduction and the discussion, are copied. This is clearly intellectual theft and cannot be sanctioned.

However, what if it is just a sentence here and a paragraph there? Surely there are only a limited number of ways to express certain thoughts? This is true, and here the editor's judgment of context and attribution becomes important. Was the text referenced, for example, did the authors use quotes?

Our ability to detect plagiarism has recently been improved by utilizing the software university professors use to screen the essays of their students. This software detects sentence and word matches between a manuscript submitted to the Red Journal and one that has already been published. Experience has taught us that most manuscripts have sentences that match, in a very small way, the writings of others. The matching distribution, however, takes a bimodal form, with most manuscripts at one end and a small but very obvious minority at the other.

A complex variant is "auto-plagiarism," again with several forms. In the first, an author writes and publishes an article on a set of experiments. The author then repackages them in a more or less obvious way and submits them to a second journal, perhaps without referencing the first publication. Also common is to publish the same article in various different-language journals. These used to be common practices in the days before the powerful Web browsing tools of modern libraries. It was justified on the grounds that the author was "reaching different audiences," say surgeons on the one hand and radiation oncologists on the other or, perhaps, the English- and German-speaking scientific worlds. In the era of the Internet, electronic journals, and Google Translate, these barriers to accessibility simply do not exist, and the practice is unacceptable.

If we were to go back in time and start retracting duplicate papers, we would have little time for anything else. We have, therefore, decided on a "statute of limitations" considering such behaviors conducted before 2004, when PubMed and the Web of Science brought cosmos to chaos, if not forgotten then, at least, forgiven. Duplicate publication after that date is grounds for a retraction.

More challenging can be the author who writes multiple papers from a single database or repeatedly uses an established set of methods. Here the text of the methods may have to be recycled. We recognize this is occasionally unavoidable, although it is our preference that authors simply reference the earlier paper. The latter tactic frees up more word space to the author for a better elaboration of results or discussion, giving the paper a better chance of acceptance.

"Updates" of previously reported patient sets are another "forme fruste" of auto-plagiarism. There is little doubt that an update can be of great value if it contains an expanded number of patients, stronger statistics, patients, stronger statistics, significantly longer follow-up, a fuller collection of outcome data, a fuller collection of outcome data, a novel or fortified conclusion, and if it references the original publication. Very often, however, these are just time-shifted versions of duplicate publication, with the underlying intent being to boost the number of publications rather than to add to the science. Our editorial team and our

reviewers are alert to this practice, and we will reject repetitive updates written without new information.

A further behavior that touches upon auto-plagiarism is what is known as "salami publishing." Here an individual or an institution takes a single database and slices the data thinly to produce multiple, subtly different, but somewhat repetitive manuscripts, rather than publishing one substantial work of great heft. When we come across this practice, which is "unsporting" at the very least, we ask authors to go back and consolidate their work. Ethics aside, on a practical level there simply is not the page space to tolerate such replication.

Review articles may be a challenge to authors and editors alike. Authors with unique expertise may be asked to write them frequently. Text recycling comes easily and is the natural default of busy experts in a hurry, but it is still unacceptable. We believe that a review author, should make every effort to incorporate new data and literature and to try and reach a new synthesis. If this cannot be done the review opportunity should be declined on the grounds that it already exists in the literature and can be easily searched.

## The Red Journal Process for Assessing Potential Misbehavior

When a reader or a reviewer brings a potential violation to our attention, we follow a series of steps laid down by the Committee on Publishing Ethics (4). First, we acknowledge and thank the informant and let him or her know that we will look into the matter. That is usually the last the informant will hear from us until the case reaches a conclusion.

The next step is to form a team of senior editors to make an initial determination on the credibility of the claim. We will then write to the author stating that a concern has been raised and asking for his or her comments. Sometimes this response is sufficiently thorough and convincing that we take the matter no further. If not, we may call for more information such as institutional review board applications and updates, interim reports to funding agencies, or even the original data files, which most author's institutions mandate that they keep for a period of several years.\*

These materials will be reviewed by the senior editors and by one or more independent statisticians. The latter are particularly helpful at detecting the "fingerprints" of fraud (5). A dialogue with the author will then ensue that becomes increasingly detailed and may ultimately involve the institution.

We are not, however, the Federal Bureau of Investigation, and there is only so close to the truth that we can reach. If we ultimately believe that the published paper is either too flawed or too suspicious to stand this scrutiny, we have three options. The first is to publish a corrigendum if the flaws seem to be the result of honest error, limited in extent, and the overall conclusions are unchanged. The second is to retract the article from the literature and link the retraction to the article through Medline such that no electronic search can reach an unretracted form of the article. The third option falls just short of a full

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\* A word of warning: we may call for original data files from authors not accused of any misbehavior if their results fall far off the norm. In this case we are merely verifying unique or extraordinary results ahead of a decision on publication—a different case altogether.

retraction, and that is to publish an editorial statement of concern. When problems of this magnitude arise, it is our duty to alert the author's university or institution and their office of academic integrity or equivalent. Although we cannot investigate ourselves, the university may choose to look further. It transpires that those who misbehave are often serial offenders. The somewhat addictive editorial blog "Retraction Watch" documents this clearly ([www.retractionwatch.wordpress.com](http://www.retractionwatch.wordpress.com)). Repeat offenders may often cause sharp spikes in retractions for individual journals.

All editors wrestle with these challenges, and all agree that prevention is the best cure. It is far better to prick the conscience of the miscreant before the manuscript is ever submitted than to seek retraction after publication. From now on, we will more clearly define these issues on our Web site at the time of submission, so no one can claim that they were unaware. Our patients need our science to be clean and, although we can never eradicate these bad actors, we can raise awareness of them within

our community, call them out when such behaviors occur, and try our best to live up to the elementary school dictum, "Cheats never prosper."

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