



SPECIAL ARTICLE

Plagiarism and predatory journals: A threat to scientific integrity[☆]



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Abstract This article presents an analysis of the concept of plagiarism in order to show the wide spectrum of manifestations that can be considered as such when committing a transgression of intellectual property, carried out with the intention of deceiving the authors' true contribution and the originality and novelty of the information. It describes the different circumstances in which intentional plagiarism has occurred, and the damage that this misconduct causes in the credibility of the scientific system, in which authorship credit is the foundation of the academic career, of the prestige of the author in the scientific community, and the basis for financing research. Some circumstances are favouring this fraud: the pressure exerted on researchers by the criteria used for promotion and reward that prioritise the quantity of works on their quality, the existence of a market for the purchase and sale of scientific articles, and the proliferation of predatory journals that operate with no or minimal ethical standards. Finally, the paper highlights the convenience of the adoption of criteria that prioritise the intrinsic quality of the work versus its quantity, including the active involvement of the institutions in the development of active policies for the prevention, detection, and punishment of the cases of potential fraud, and to emphasise that, in the end, the prevention of fraud relies on the individual adoption of ethical and responsible behaviour.

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PALABRAS CLAVE

Plagio;
Autoplagio;
Revistas depredadoras;

El plagio y las revistas depredadoras como amenaza a la integridad científica

Resumen Este artículo propone un análisis del concepto del plagio con la finalidad de mostrar el amplio espectro de manifestaciones que pueden ser consideradas como tal al incurrir en una transgresión de la propiedad intelectual, realizada con el ánimo de engañar sobre la verdadera contribución de los autores y sobre la originalidad y novedad de la información.

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Integridad científica;
Escritores fantasma;
Autores fantasma;
Autores honorarios

Describe las distintas circunstancias en las que se incurre en un plagio intencional y el daño que esta mala conducta ocasiona en la credibilidad de un sistema científico, en el que el crédito de autoría es el fundamento de la carrera académica, del prestigio del autor en la comunidad científica y la base para la financiación de la investigación.

Se consideran como factores favorecedores de este fraude la presión que ejercen sobre los investigadores los criterios utilizados para la promoción y recompensa que priorizan la cantidad de trabajos sobre su calidad, la existencia de un mercado de compra-venta de artículos científicos y la proliferación de las revistas depredadoras que funcionan con nulos o mínimos estándares éticos.

Finalmente se incide en la necesidad de adoptar medidas que contribuyan a la prevención y detección temprana del fraude, resaltando la necesidad de la adopción de criterios que prioricen la calidad intrínseca de los trabajos frente a su cantidad, de una implicación activa de las instituciones en el desarrollo de políticas activas para su prevención, detección y castigo y en la toma de conciencia de que la prevención del fraude reside en la adopción individual de un comportamiento ético y responsable.

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Introduction

The subject of plagiarism has been addressed extensively in the scientific literature.¹⁻⁵ However, in light of the increasing number of publications retracted for this reason,⁶ the alarm raised by cases that have recently appeared in the Spanish press⁷ and the cases that have affected *Anales de Pediatría*⁸ and other paediatric journals, it does not seem irrelevant to once again broach this aspect of scientific misconduct, which is encouraged by various circumstances. One of them is the pressure exerted on researchers by the criteria used for professional promotion and awards, with a priority in the quantity over the intrinsic quality of published works that fosters a career that focuses, rather than on the responsible conduct of research, on the collection of publishable data with the end of developing a competitive curriculum vitae.⁴

To this we must add the presence of a market for the trade of scientific articles,⁹⁻¹¹ the proliferation of predatory journals that, in a twisted interpretation of *open access*, operate under dubious or inexistent ethical standards,^{12,13} the scarce training in ethics of researchers¹⁴ and the perception, among others, "that there is a high likelihood of escaping detection" when engaging in this type of misconduct.¹⁵

The aim of this article was to reflect on the different expressions that plagiarism can manifest as, on the damage caused by this practice and on the need to emphasise that the future credibility of science and the scientific establishment will rest, whatever the external pressures may be, on the pillars provided by the ethics of individuals.

Definition and manifestations of plagiarism

Plagiarism constitutes a severe transgression of the principles of scientific ethics by which an article "represents

an implicit contract between the author of that work and his/her readers. Accordingly, the reader assumes that the author is the sole originator of the written work and that any material, text, data or ideas borrowed from others is clearly identified as such by established scholarly conventions, such as footnotes, block-indented text, and quotation marks"² that reveal the origin of the material through direct citation, paraphrasing or summarising.

The definitions of the World Association of Medical Editors (WAME),¹⁶ the Office of Research Integrity (ORI), the agency that handles disputes regarding possible wrongdoings that threaten scientific integrity in the United States,¹⁷ and the Committee of Publication Ethics (COPE)¹⁸ highlight the intent to deceive, the misappropriation of intellectual property and its use without attribution as the key elements of plagiarism (Table 1). We will apply these criteria to point out the acts that can be considered plagiarism and the damage that they cause.

Aim or intent to deceive

Misleading the reader is an inherent part of plagiarism. However, this deception is not always intentional, and often results from a lack of knowledge of the rules for correct citation, when translating a text or copying an idea trying to emulate the original, or when there are cultural factors at play that affect the perception of what constitutes plagiarism.⁵ Nonetheless, "ignorance is not and cannot be an excuse. Thus it is incumbent on every investigator to be cognizant of all the ethical requirements for conducting scientific studies. Moreover, a scientist needs to develop a strong sense of ethical responsibility to apply at every stage of scientific inquiry".¹⁹

Plagiarism with intent constitutes fraud, and there are two sides to it: the deceit regarding the actual contribution

Table 1 Definitions of plagiarism given by the WAME, the ORI and the COPE.

Organisation	Definition
World Association of Medical Editors (WAME) ¹⁶	“Plagiarism is the use of others’ published and unpublished ideas or words (or other intellectual property) without attribution or permission, and presenting them as new and original rather than derived from an existing source. The intent and effect of plagiarism is to mislead the reader as to the contributions of the plagiariser. This applies whether the ideas or words are taken from abstracts, research grant applications, Institutional Review Board applications, or unpublished or published manuscripts in any publication format (print or electronic).”
Office of Research Integrity (ORI) ¹⁷	Plagiarism includes “both the theft or misappropriation of intellectual property and the substantial unattributed textual copying of another’s work. It does not include authorship or credit disputes. The theft or misappropriation of intellectual property includes the unauthorised use of ideas or unique methods obtained by a privileged communication, such as a grant or manuscript review. Substantial unattributed textual copying of another’s work means the unattributed verbatim or nearly verbatim copying of sentences and paragraphs which materially mislead the ordinary reader regarding the contributions of the author.”
Committee on Publication Ethics (COPE) ¹⁸	“Plagiarism ranges from the unreferenced use of others’ published and unpublished ideas, including research grant applications to submission under “new” authorship of a complete paper, sometimes in a different language. It may occur at any stage of planning, research, writing, or publication: it applies to print and electronic versions.”

of the authors, and the deceit regarding the originality and novelty of the information.

Plagiarism and intellectual property

Plagiarism and the violation of moral rights

According to Spanish law,²⁰ two types of rights are involved in the intellectual property of a work: moral rights and property rights (*copyright*). Authors have moral rights that apply from merely conceiving a work, and these rights are unwaivable, inalienable and life-long. Chief among them is the right to be recognised as the author of the work and the right to the integrity of the work and it not being altered.

Plagiarism consists in “the taking of words, images, processes, structure and design elements, ideas, etc. of others and presenting them as one’s own”.² It affects published material as well as unpublished material obtained through privileged communication channels (peer review process, evaluation of dissertations or grant proposals, etc.) and harms the author by failing to acknowledge their contribution to the generation of knowledge.

The plagiarism spectrum is broad (Table 2).²¹ The extreme is the word-for-word reproduction of a work (clone) published by other authors, usually in another language, as occurred in the case that affected this journal.⁸ Its detection depends on the editorial review processes, and antiplagiarism software is one of the tools available for this purpose.

Plagiarism and the violation of copyright

In the traditional publishing system, journals usually require authors whose articles have been accepted to transfer the property rights concerning the processes of reproduction, distribution and public dissemination of the work (copyright) so that the journal can carry out these tasks legally.²² Thus, these rights are violated by doing a copy-paste of a text, figure or image under copyright.

The copyright can be violated without incurring in plagiarism when quoting a large amount of text from a single source or including tables or images from a copyrighted article with proper citation, but without having obtained permission for their reproduction.² Conversely, it is possible to plagiarise without infringing copyright when the plagiarised material is not subject to copyright, as is the case of publications in open-access journals, which allow the reutilisation of the material but require proper acknowledgement of authorship.

Plagiarism and consent

Plagiarism without consent

The definitions of plagiarism of the WAME¹⁶ and the ORI¹⁷ include the lack of permission from the plagiarised author, and the ORI emphasised this point by referring to this act as *theft*.

Lack of consent is also a factor in the case of *ghost authorship*, whereby the signing authors of a piece exclude from the byline an author that has made significant contributions to the article²³ and who meets the authorship criteria

Table 2 Spectrum of the most frequent types of plagiarism.

Types of plagiarism ordered from most to least severe	
CLONE	An act of submitting another's work, word for word, as one's own.
CTRL-C	A written piece that contains significant portions of text from a single source without alterations.
FIND-REPLACE	The act of changing key words and phrases but retaining the essential content of the source in a paper.
REMIX	An act of paraphrasing from other sources and making the content fit together seamlessly.
RECYCLE	The act of borrowing generously from one's previous work without citation; to self plagiarise.
HYBRID	The act of combining perfectly cited sources with copied passages—without citation—in one paper.
MASHUP	A paper that represents a mixed of copied material from several different sources without proper citation
404 ERROR	A written piece that includes citations to non-existent or inaccurate information about sources.
AGGREGATOR	The "aggregator" includes proper citation, but the paper contains almost no original work.
RE-TWEET	This paper includes proper citation, but relies too closely on the text's original wording and/or structure.

The plagiarism spectrum presented in this table was developed by the antiplagiarism software company *Turnitin* from the analysis of data submitted by 879 university and secondary education teachers on the prevalence and nature of this problem. We obtained permission from the source for its translation and inclusion in this article.²¹

Table 3 Criteria for authorship recommended by the ICJME.²⁴

Criteria for authorship recommended by the ICJME

Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work.

Drafting the work or revising it critically for important intellectual content.

Final approval of the version to be published.

Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

established by the IJCME²⁴ (Table 3). This would deprive that author from receiving the credit that is the foundation of "career advancement, research funding, and credibility to peers".²⁵ Although this represents a misappropriation of intellectual property, the ORI excludes this behaviour from the definition of plagiarism, as it considers it an authorship dispute, difficult to substantiate, which must be resolved through other agencies.¹⁷

Plagiarism with consent

There are instances where plagiarism is performed with the consent of the author of the work, which may be another (ghost authorship), or oneself (self-plagiarism).

Plagiarism with consent of another's work

Plagiarism with consent is habitual in academia, for instance, when students allow each other to use their work, but it is particularly severe when ghostwriters are used to produce a work with a predefined style without giving any credit to the actual author of the work,²³ with two specific circumstances posing particularly serious threats to scientific integrity: the existence of a market for buying and selling publications, and ghostwriter-honorary author tandem in the context of pharmaceutical research.

Internet has facilitated the proliferation of businesses known as *essay mills* whose services include the production of dissertations or other academic works written by qualified professionals that cannot be detected by antiplagiarism

software,²⁶ from which, for instance, a 30 000-words dissertation for a PhD in medicine could be obtained in a fortnight for an approximate price of £40 000.⁹

There are also businesses that write articles which, once accepted by a prestigious journal, are offered to researchers that have only to pay to add their names to the list of authors and thus expand their curriculum.¹⁰ One message sent by a Chinese company offered a slot as first author in an article to be published in a journal included in the *Science Citation Index* for \$14 880, and two such slots for \$26 300. The offer advertised other services, such as the duplication of an article or the drafting of an article with faked data.¹¹

The false attribution of authorship of a work breaches the academic honour system by giving credit to a student that does not deserve it²⁶ and allows researchers to get positions of responsibility or funding in fields that they are not acquainted with but about which they theoretically write. In either case, such acts of fraud put individuals who are honest in their work at a disadvantage.

The ghostwriter-honorary author tandem is at work in the pharmaceutical industry "when pharmaceutical companies and their agents control or shape multiple steps in the research, analysis, writing, and publication of articles. Such articles are "ghostly" because signs of their actual production are largely invisible—academic authors whose names appear at the tops of ghost-managed articles give corporate research a veneer of independence and "credibility".²⁷ Some examples of this are Zoloft® (sertraline), Neurontin® (gabapentin) or Vioxx® (rofecoxib), whose marketing was based on articles based on this ghostwriting

system that minimised or even omitted the adverse effects that could put the health of patients at risk.^{27–30}

Articles resulting from the ghostwriter-honorary authorship tandem can harm health and threaten to erode public trust in the research system. This practice contravenes the authorship criteria of the ICJME²⁴ and constitutes an act of plagiarism, as the honorary author is claiming the authorship of a work that he or she has not actually done.²⁹ This creates a disconnect between an author's credit and the author's responsibility regarding the presented data and results,¹⁹ allowing the pharmaceutical company to appropriate the credibility of the honorary author for the benefit of the product.³

Guest authorship does not only occur in this context. It is frequent for the byline of articles to include the names of researchers that have not participated in a project for reasons related to hierarchy, convenience or exchanges of favours,³¹ a specific situation that is also known as *gift or guest authorship*. In these cases, while the potential damage is lower the reasons why the practice is considered plagiarism are the same, and its use with the intent of obtaining an undeserved professional advantage is obvious.

Plagiarism with consent of one's own work: self-plagiarism

Self-plagiarism, "stealing from oneself", is a controversial issue that may be difficult to understand. Bruton proposes that "plagiarism and self-plagiarism are both wrong and wrong for largely the same reasons. Both require presenting copied material as if it was original, and in both cases, the primary offence is one of deceptively misrepresenting something as other than what it is."³

The most common forms of self-plagiarism are duplicate publication and redundant or overlapping publication. Duplicate publication refers to "publication of a paper that overlaps substantially with one already published, without clear, visible reference to the previous publication".²⁴ Duplicate papers may be identical or differ only slightly in content or even the order of the authors, making it harder to detect the duplication. There are instances of authorised duplicate publication, which is acceptable as long as the editors of both journals agree to the arrangement and the new version of the work includes a clear reference to the previously published version. When this is not the case, it is an act of plagiarism,³² and authors should expect to have their manuscript rejected by the reviewers²⁴ in adherence with the guidelines established by the COPE.³³

Overlapping publication is a form of duplicate publication in which the authors present a work that is conceptually identical to a prior publication but to which they have added data (data aggregation) or removed data points from the original set, thus changing the results. In either situation, there would be no reference or only an ambiguous reference to the prior publication, so that the reader would not be able to determine whether the data were new or had been previously published.²

In addition to artificially inflating the list of publications of a researcher, duplicate publication adds an unnecessary burden to the work of reviewers and editors and obstructs the publication of other articles. They may also result

in qualitative biases (feeling of *dejà vu*) and quantitative biases (meta-analysis) in the assessment of the existing evidence on a given subject.^{2,15,19,34}

Textual recycling (the reutilisation of fragments of content published by an author without citing the source) is controversial, as it is perceived differently depending on the field, the part of the article or the type of article involved (original or review article) and the amount of text that is copied verbatim.³ Regardless, the fact remains that any reutilisation of one's own work should be accompanied by appropriate citations to inform readers of the source of the information and take into account the copyright of the recycled content.

Predatory journals

At the beginning of this century, the open access movement in science revolutionised communications in science, advocating for free access to published articles without economic or copyright restrictions, and proposing, to bring this to reality, publishing in open access journals or archiving articles in repositories.³⁵ In open access journals, contrary to the traditional publishing business model, authors retain their property rights and grant them to readers through Creative Commons licenses, which allow free access and reutilisation of their contents.²²

These journals lack the funding that traditional journals obtain from their commercial distribution, and their survival depends on new business models such as the payment of article processing charges (APCs), moving from the traditional model of multiple pay-per-view fees charged to the reader to the charge of a single publication fee (\$3000 in Plos Medicine).²² On the other hand, this model has opened a path for corruption that has been exploited by unscrupulous companies that launch journals with the sole purpose of profiting from these fees and do not provide any of the services expected from a scientific journal, such as peer review.

In 2008 Jeffrey Bell issued a warning on this situation after noticing the profusion of emails he received from journals with names similar to those journals of international prestige soliciting papers and promising their quick publication, remarking on the amateurish feel of their websites and emails, the use of gmail for submission of papers, and the failure to mention the need to pay APCs that were demanded at a later point. In 2010, Bell made a list of suspicious journals, which he labelled *predatory journals*, that he eventually took down in 2017 after receiving personal threats and threats of legal action from publishers and journals that operated on good faith despite not meeting certain standards, sometimes due to their recent establishment.¹³

Several articles have described the characteristics of predatory journals,^{12,36} warning of the dangers they posed and establishing criteria for suspicion (Table 4) that ought to be considered by researchers seeking a journal to publish their work, readers in determining the credibility of the articles, and evaluators in judging the relevance of an individual's credentials.

Predatory journals threaten the integrity of the scientific system by undermining the aims of open access,

Table 4 Criteria identified or suggested in the literature that can potentially be used to identify predatory journals. Source: Ritching et al.³⁶ Article distributed under a Creative Commons license (CC BY).

Criteria	Description
Peer review	Only superficial or no peer review process is provided by the journal to ensure scientific quality of the submitted paper.
Emails	Aggressive or flattering email invitations sent to a large number of individuals to attract paper submissions from scientists.
Advertising	Rapid publication/rapid peer review processes are promised, and low submission fees are advertised.
Title and logo	The journal's title can be misleading, mimic, or even cloning titles from well-known prestigious journals, or can sound too ambitious. Also, the journal's logo can resemble that of a reputable journal.
Editors	Fake (non-existing) editors or the names of well-known authors without their approval may be added to the editorial boards.
Metrics	False impact factors or 'fake metrics' are provided to attract paper submissions.
Contact information	No valid contact information (email, telephone number, address) is provided, and there is no possibility to get in touch with the publisher. Non-professional email addresses from public providers (e.g. Yahoo, Gmail) are commonly used.
Scope	The journal's scope is too broad, covering almost all fields of science.
Publishing ethics and standards	Research and publishing ethics are not followed; reviewing, editing and or indexing services are not provided.
Indexing	Predatory publishers claim to have their articles indexed, while they are, in fact, not indexed in any important databases such as MEDLINE, PubMed and Web of Science.
Copy-editing and spelling	Published articles are poorly copy-edited and contain numerous typographical or grammatical errors. In addition, such errors can be found on the journal's website, which also commonly include dead links.
Submission system	Predatory journals ask authors to send their manuscripts by email, instead of through a professional manuscript submission system.

creating confusion around those journals that operate ethically under the APC model. They harm the reputation of reviewers and editors whose names they include without permission, of authors, mainly inexperienced ones, that publish their work in them out of ignorance, and of journals that start their trajectory with this model but are not yet established enough to be indexed in prestigious databases. But above all, they cause harm by compromising the quality of published content, as they do not carry out adequate peer review processes, thus constituting a reservoir of scientific misconduct¹² populated by unscrupulous "researchers" whose only purpose is to fraudulently enhance their credentials.

A glaring example of this situation is provided by the 8 articles published in several Spanish paediatrics journals that were cloned by recurrent plagiarists.⁸ This issue also warned of the existence of reoffenders that can act with impunity because these journals do not screen what is published by any means.

When this situation occurs, publishing houses must take the opportune actions to resolve it, which, according to the guidelines of the COPE³⁷ include contacting the authors of the plagiarised material requesting an explanation or an admission of guilt, informing the editors of the journals where the plagiarised article was published requiring a retraction, contact the administration of the institutions to which the authors are affiliated, and inform the victims of plagiarism and the readers of the actions taken to address the situation.

Summary

The credibility of science, its institutions and the individuals involved in its development is founded on integrity, understood as "active adherence to the ethical principles and professional standards essential for the responsible practice of research".³⁸ Plagiarism destroys this credibility and erodes the credits and rewards system that is based on the publications made by scientists.

The pressure exerted on researchers by using the number of publications as nearly the sole criteria for evaluating their performance is frequently presented as encouraging scientific misconduct⁴ and threatening to turn publication into a mechanical process that cannot convey knowledge properly and where anything goes so long as the machinery continues to churn out content. The San Francisco Declaration on Research Assessment (DORA)³⁹ and the Leiden manifesto⁴⁰ are two initiatives that propose the use of criteria based on quality rather than quantity of publications, whose adoption would contribute significantly to the prevention and detection of plagiarism and other types of fraud.

It is also key that academic and research institutions become more aware of their responsibility in fighting fraud and establish proactive policies for its prevention and punishment, developing statements on the principles of ethical and responsible research that need to be adhered to and implementing effective channels for the investigation, resolution and punishment of potential fraud cases.^{5,26} Another important aspect would be the development of effective

training programmes on the ethics of science and on responsible writing for university students and researchers.^{4,14}

However, none of these measures will be effective if we do not accept that the integrity of our scientific system, external pressures notwithstanding, depends on the ethical behaviour of each of us as individuals. Only if we are aware of this can we try to fight the fraudulent actions that threaten to destroy the current scientific establishment.

Conflict of interest

The author declares that there are no conflicts of interest.

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