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A Primer on Plagiarism: Resources for Educators in China

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Introduction

In the past 20 years, China has experienced rapid development in scientific publication (Van Noorden, 2016). In 2016, more than 470,000 scientific articles were published by Chinese researchers, bringing China to the top of the list of countries with the largest number of published articles (National Science Board, 2018). At the same time, commitment to scientific ethics in China has come into question, as China also leads the list of countries with the highest proportion of retractions (Ataie-Ashtiani, 2017). Among reasons for retractions, plagiarism is a particular concern. (Ataie-Ashtiani, 2017; Lei & Zhang, 2017; Mack, 2016; Qiu, 2015; Van Noorden, 2016).

A 2010 survey of Chinese researchers found that more than half of the respondents felt that academic misconduct was a serious problem in China, with the majority focusing upon plagiarism or inappropriate authorship (Liao et al., 2017). When given the same survey five years later, these perceptions were essentially unchanged (Liao et al., 2017). Lei *et al.* found the retraction ratio in China has increased more than three-fold during the past two decades with two large peaks in 2010 and 2015 (Lei & Zhang, 2017). About three quarters of all retractions were due to misconduct, and 41% of misconduct was due to plagiarism (Lei & Zhang, 2017) (Table 1).

Plagiarism in China has ranged anywhere from a few copied sentences to misappropriation of entire documents. Wei Yang, Former President of the National Natural Science Foundation of China in Beijing, reported instances where documents such as grant proposals had been found for sale on the internet (Qiu, 2015). Publications from China have also been criticized for their lack of references. Among Chinese articles retracted in 2016, the number

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of references per article was often below 10, which is often interpreted as an indication of lower quality work (Ataie-Ashtiani, 2017).

Consequently, this has led to a bad reputation for Chinese researchers as a whole, with some journal editors admitting a prejudice when reviewing work from unfamiliar Chinese authors. This reputation is further damaged by the observation that 36.6 % of Chinese author retractions during the last two decades are from repeat offenders with more than five retractions due to “fraud, plagiarism, or faked peer review” (Lei & Zhang, 2017). Senior scientific scholars are calling for multi-faceted interventions that range from setting up the Committee on Publishing Ethics to media exposure, with education in ethics as the center-piece of strategies for change (Qiu, 2015).

As senior researchers and educators at a US/Chinese institution, Professors Gray (guarantor) and Tang have had their scientific works plagiarized by Chinese researchers. As the former senior research administrator for the US National Science Foundation efforts in China, Dr. Sung has witnessed the devastating impact of plagiarism on the reputation of Chinese researchers and their institutions. The aims of this review are to summarize the characteristics of different types of plagiarism, to offer suggestions for incorporating ethical training into Chinese educators’ curricula, as well as to point to various available scientific ethics training resources.

Types of Plagiarism

Plagiarism has been defined in multiple ways. The US Department of Health and Human Services Office of Research Integrity (1994) defines plagiarism as “the theft or misappropriation of intellectual property and the substantial unattributed textual copying of another’s work”. Merriam Webster (2018) online defines plagiarism, “to steal and pass off (the ideas or words of another) as one’s own; to use (another’s production) without crediting the source; to commit literary theft; present as new and original an idea or product derived from an existing source.” This stealing can involve not only words but also processes, results, and images (Office of the President, 2000). There are a range of different types of plagiarism from unintentional to misappropriation large bodies of text. A number of forms of plagiarism are discussed below and summarized in Table 2.

Direct or word plagiarism—The most common and familiar form of plagiarism is copying of another’s words without appropriate acknowledgement, direct or word plagiarism. The severity of direct plagiarism ranges from copying a series of words to copying an entire manuscript. One standard for this form of plagiarism is if an author uses six consecutive words from another’s work without using quotation marks, even if a reference has been cited (Masic, 2014). Reuse of graphics, figures, and photographs without the original publisher’s written permission and cited source also falls under this category.

While direct plagiarism may seem like an easily recognized offense, there are still gray areas. For example, in scientific manuscripts, copying results and discussion sections is considered one of the most egregious forms of plagiarism; however, there are differing opinions regarding whether an author has committed plagiarism if he or she copies text from

the methods section of his or her own previous report (Debnath, 2016; Vitse & Poland, 2012).

Direct plagiarism is especially common when a paper is written in a language other than the author's native language (Higgins, Lin, & Evans, 2016) and is made easier in recent decades by the widespread availability of online text (Pechenik, 2010). Anecdotally, one coauthor of this report has had large sections of his and his graduate students published reports abstracted, compiled, and reported as a new work by a former collaborating Chinese scientist, who denied the offense upon confrontation. Only after confronting the Chinese author's academic dean and two journal chief editors was the plagiarized work retracted.

Idea plagiarism—A foundation for scientific advancement is building upon previous scientific findings and ideas. However, if an author presents others' ideas, designs, models, processes, etc. without citations, then this is considered idea plagiarism. This can be through copying previously, publically reported ideas, as well as from informal exposures to novel ideas. When compared to other forms of plagiarism (such as direct), idea plagiarism is more difficult to prove, especially if a record of presenting the idea has not been previously archived (Debnath, 2016; Vitse & Poland, 2012). Regrettably, the threat of idea plagiarism may inhibit scientists from discussing their work with other scientific groups lest another team beat them to peer-review publication and assume credit for the novel idea.

Self-plagiarism—Self-plagiarism involves an author or authors presenting previously reported work as new; this may include portions of a previous report or republication of an entire article (Vitse & Poland, 2012). A chief motivator for replicate publication is to increase publication counts for career advancement. While using text from a previous report might be forgiven in describing a component of a similar method, an author should cite and often gain publisher permission to redundantly report research results.

As a rule of thumb, the overlap of an author or team of authors' previous publications should be no more than one-third (World Association of Medical Editors, 2018). Additionally, if an author has previously reported preliminary or partial data in a scientific forum (e.g. international conference), he or she should cite that previous presentations in the more complete scientific manuscript submitted to a scientific journal for publication (Anderson & Steneck, 2011). Such previous preliminary reports can lead to conflicts in copyright permissions, which scientific journals may need to explore.

Translation plagiarism—Similar to direct plagiarism, another form of plagiarism is to translate novel data or ideas from one language to another, representing it as unique and one's own creation without crediting the original work. For example, one co-author of this article, together with his colleagues, published a Chinese book based on a nationwide health service survey in the early 1990s. A Chinese student studying at a UK university used the data from the book to write up his PhD dissertation, without citing or mentioning the original work. Another coauthor of this report drafted a detailed scientific proposal to a US granting agency, sharing it with a Chinese collaborator. Later it was learned that the Chinese collaborator engaged his student in translating the document into Chinese for submission to a Chinese funding agency without notifying or crediting the original author. Translational

plagiarism may also occur during the peer-review of grant proposals or scientific manuscripts when a reviewing scientist plagiarizes the original text and ideas from a reviewed work.

Source plagiarism—Source plagiarism occurs when authors do not read original sources of new scientific information and instead glean information from those sources by reading and crediting only secondary sources. The problem with source plagiarism is the possible misinterpretation of the original report by reviewing only the secondary source's interpretation. This can result in the spreading of inaccurate information.

Hence, when citing novel research, one should be careful to review and credit the original published work (Mohan, Shetty, Shetty, & Pandya, 2015). If the original resource is not clearly cited, the authors could be criticized for concealing the original data source and for making it difficult for future researchers to recognize and benefit from the original researchers' work (Mohan et al., 2015). When gaining access to an original source is a barrier or when referencing the ideas proposed by the secondary source, it is imperative that the secondary source be cited properly as a review.

Ghost and guest writing—Ghost writing occurs when someone contributes significantly to manuscript development but is not credited for their work (Citrome, 2017). Conversely, guest or honorary authorship occurs when someone is recognized as an author but has not met criteria for authorship. Often guest authors are recognized for their administrative or other governance authority for the research work or included due to their scientific accomplishments simply to enhance the probability of publication of the manuscript in a desired journal (Citrome, 2017).

A secondary form of guest authorship is the inappropriate designation of multiple authors as first authors or as senior authors with an indication "that these authors contributed equally" when they clearly could not have contributed equally to the work. This seems an especially unethical and even a ridiculous impossibility when the "equally contributing" authors exceed more than two persons. However, many institutions in China drive such unethical multiple recognition by only valuing the first and senior authorship positions in a scientific manuscript. Ghost and guest authorship can often be fueled by "blurring of lines" when it comes to what defines contribution worthy of authorship (Rohwer, Young, Wager, & Garner, 2017).

Who is Plagiarizing and Why?

Students, researchers, and professors in any country have the potential to plagiarize, though some may have more motive or be more susceptible to unintentional plagiarism than others. Students and young researchers may experience greater pressure to be productive publishers in pursuit of a degree or career advancement, leading to less regard to ethical guidelines (Debnath, 2016; Rohwer et al., 2017).

In working in China, we have learned that some Chinese degree programs will not permit a student to graduate until the student publishes a first author peer-reviewed manuscript in a scientific journal of relatively high impact. Students under such pressure are also often more

naïve to some forms of plagiarism, making them more likely to unintentionally commit offense (Armstrong, 1993; Debnath, 2016). One study in which Chinese college students enrolled in English as a second language classes found that while all of these students understood the word “plagiarism,” less than 50% had received formal instruction on plagiarism (Zhang, 2014). This illustrates the importance of proper scientific ethics training early in an academic career.

While students and young researchers may be thought to have the motive to plagiarize, more experienced researchers have faced similar pressures and also been found guilty of plagiarism (Dyer, 2016; National Post, 2012; Retraction Watch, 2018). Over the past decade, more and more Chinese universities and research institutions have used a number of peer-reviewed publications and their impact factor scores as important criteria when considering promotion of faculty and researchers. Also, frequently, financial incentives are offered to the first and senior authors of manuscripts published in high impact journals, especially in leading institutions. These incentives are often not trivial, with some institutions offering bonus payment of up to $165,000 for a single publication (The Economist, 2018). Consequently, there is much competitive pressure to win publication in high impact English journals and sometimes this pressure outweighs caution regarding ethical guidelines.

Ignorance to some of the nuances of plagiarism extends beyond students to more senior Chinese researchers. For instance, one study in which in-depth interviews with Chinese researchers were conducted found that many didn’t see a problem with reporting methods or reusing text without citations (Li, 2013). Ultimately, researchers at any level may be the perpetrator of plagiarism whether through ignorance, the unethical behavior of a trusted team member, or simple malfeasance.

While researchers in the U.S. also face competitive pressures, with their career advancement also depending upon high-impact publications, they are more likely than Chinese researchers to have had specific training on research misconduct such as plagiarism. For example, both the U.S. National Institutes of Health (2018) and the National Science Foundation (2018) require that institutions receiving grants develop instruction in the Responsible Conduct of Research (RCR), covering plagiarism as one of many other topics. The Natural Science Foundation of China, which is the primary funder of basic science research in China, does not have such requirements of its grantees. Formal programs at universities in China tend to be limited to covering issues of data security and do not attend to issues such as responsible conduct of research, including plagiarism.

Another cultural issue is the Chinese notion of ‘imitating the master’--the sense that one learns from and honors a great artist by copying his technique, rather than by innovating. This cultural value, intended as a form of respect, does not justify or excuse the disproportionate level of retractions among Chinese-authored publications. It may, however, diminish the seriousness of plagiarism in the minds of Chinese students in the absence of formal training in scientific ethics.

Why is Plagiarism Harmful?

Simply put, plagiarism is an act of denial of due credit. In general, researchers earn favorable recognition through their published works. Plagiarism, if not corrected, undermines this merit-based system by inappropriately rewarding plagiarizing authors for the honest labor of other authors who developed the original work (Armstrong, 1993; Mohan et al., 2015). Hence, plagiarism may be viewed as a form of stealing, corruption, or other malfeasance directly attacking the scientific community which relies upon ethical scientific behavior.

Plagiarism also wastes the time and energy of scientific journal staff, panels of peer-reviewers, and the scientific community in general who must often rely upon journals to publish new knowledge to push their research fields forward. Plagiarism can also impact the success and value of ethical scientists in that review and publication of their works may have to be unnecessarily postponed while the journal and peer reviewers evaluate the plagiarized manuscript (Anderson & Steneck, 2011).

Perhaps worst of all, plagiarism has potential to skew a body of research by reporting published data multiple times (Anderson & Steneck, 2011). This could alter conclusions made in reviews and meta-analyses, and ultimately could influence evidence-based decisions made by clinicians, scholars, and many other professionals.

Strategies for Reducing Plagiarism

Research ethics training—The first defense against plagiarism is appropriately educating students, researchers, and research faculty regarding the various types of plagiarism and the consequences of such scientific ethics violation. One study published in 2017 suggested that institutional policies on plagiarism in China lack adequate guidelines for ethics education and training (Hu & Sun, 2017). Students, researchers, and research faculty must be very familiar with the requirements to correctly cite previously published or unpublished works and how quotation marks are to be used when exact text is extracted.

It is also important that researchers understand how to distinguish original ideas or conclusions in previous work from their own thoughts (Pechenik, 2010). Pechenik's guide offers many suggestions for avoiding plagiarism in the early notetaking and outline drafting stages of a written work. Keeping a record of where thoughts or text originated from, as well as distancing oneself from the original body of work can help reduce unintentional plagiarism (Pechenik, 2010). Further, it is important to consult primary literature as much as possible and avoid citation of reviews of secondary sources (Price, 2014). Reviewing primary literature not only prevents the temptation of using someone else's summarizing thoughts but also helps preserve the findings of the original works. A list of resources for such scientific research ethic training is made available in the supplemental material (Table 3).

The second defense in preventing plagiarism is to strengthen ethics training by appealing to the moral fabric and integrity of researchers from multiple value systems, any one of which may register as important to an individual. In China, this could mean appealing to researchers to avoid the stain of corruption which undermines the Communist party's

success, or appealing to the teaching of Confucius to avoid dishonoring one's family through public humiliation from an ethics violation, or appealing to one's value of right and wrong based upon the Judeo-Christian commandment of not stealing. Whatever the effective strategy there seems to be need for compelling Chinese research professionals to avoid crossing the moral "redline" of plagiarism even under high pressures from the scientific work environment.

University and institution policies—Plagiarism prevention can also be employed at higher levels through written policies at academic and scientific institutions that would aggressively discourage misconduct. In academia, students, researchers, and faculty should be warned that writing assignments will often be screened with plagiarism detection software, and when detected, violators will be punished following concrete written policies. Examples of violations should be publicly communicated such that individuals and their institutions are concerned.

A recognition of serious consequences for plagiarism can be a powerful deterrent to bad scientific behavior. Many institutions in the USA, Canada, and European countries have written policies regarding punishment for acts of plagiarism, while only a few of universities and institutions in China have clearly developed similar policies. One would think that having such no-plagiarism-will-be tolerated policies and enforcing them would give such Chinese institutions a strong stamp of quality their faculty might acknowledge in manuscript submissions.

As for preventing ghost writing and guest authorship, researchers should be pointed to international guidelines for authorship such as that drafted by the International Committee of Medical Journal Editors (International Committee of Medical Journal Editors, 2018). Minor contributors to a project should only be recognized in the acknowledgements. In addition to adhering to the scientific ethics code themselves, all co-authors on an article need to be vigilant to protect their reputation by ensuring that their colleagues haven't intentionally or unintentionally plagiarized data. Authors may also wish to screen their draft manuscripts prior to journal submission to avoid any potential embarrassments.

Academic journal policies—Recognition of plagiarism can occur at the time of manuscript submission through manuscript software screening, through peer-review, or after publication. Recognition of plagiarism after publication is clearly more painful for the plagiarizing authors and also for the journal; it embarrasses all involved, especially if formal retractions are demanded by the original authors or the original publishing body. Recognition of plagiarism before publication may not have the same negative impact since the journal may choose to simply reject the manuscript, not wishing to confront the authors or to notify the authors' institutional administrators. This "no action" response compounds the problem, however. If the authors are not confronted and are ignorant of their ethical violation, they may simply submit the manuscript to another journal, continuing the ethical problem. If the authors are confronted and in denial, they may again choose to push the problem down the road to another journal.

One co-author on this paper was asked to review the same paper submitted sequentially to two different journals, having pointed out to the first that the authors had failed to properly cite sources of data. A better deterrent would be for the journal to explain in the instructions to authors that suspected plagiarized manuscripts will be rejected, and the authors, their institutional leadership, and if egregious, the funding sources will be formally notified. In the notification the journal may indicate a willingness to reexamine the manuscript should the suspected plagiarism be mitigated. This type of journal response would likely inhibit intentional plagiarism and nudge institutions to make sure their researchers had appropriate ethical training.

Research publications are very important. They can have profound impact upon health policy, clinical interventions, and future funded research. As China's scientific enterprise moves toward center stage in the world, it is imperative that appropriate attention be paid to training its scientists to avoid plagiarism and to adopt global standards for research integrity.

Biography

Gregory C. Gray is a senior researcher and educator in the field of One Health.

Laura K. Borkenhagen coordinates many studies in Southeast Asia and China for the Duke One Health team.

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In Short:

- China now tops the list of countries with the largest annual number of scientific publications. At the same time, China also leads the list of countries with the highest proportion of scienfitic publication retractions.
- The rise in this academic misconduct in China has given Chinese researchers a bad reputation and likely led to lower manuscript acceptance rates in academic journals.
- Plagiarism can be thwarted by strengthening ethics training for students and researchers, as well as implementing penalties for plagiarism offenses in universities, research institutions, and academic journals.

Table 1:

Reasons for retraction of articles published by Chinese researchers between 1997 and 2016.

This table is adapted from Lei *et al.,* 2017.

Total number of publications	**2,796,802**
Number of retracted publications	**834**
Deliberate misconduct	**634**
Plagiarism	258
Fraud (fabrication, falsification)	160
Faked peer review	100
Duplicate publication	52
No permission from institutions/researchers	64
Honest/administrative error	**117**
Other	**70**
Reasons not given/retraction notes not found	**13**

Table 2:

Forms and characteristics of plagiarism.

Type	Brief descriptions
Word plagiarism	Copying other's words or figures without quotation marks and/or citations
Idea plagiarism	Using other's ideas, designs, models, or processes without citations or permission
Self-plagiarism	Duplicating a publication or copying one's own published text or figures without citation or copyright agreement
Translation plagiarism	Translating articles into different languages without acknowledging the original authors
Sources plagiarism	Using incomplete or not detailed information about the source
Ghost and guest writing	Including unjustified or honorary authorship

Table 3:

Sources for Ethical Training on Plagiarism

A Short Guide to Writing about Biology	
Source:	Jan A. Pechenik. New York: Longman; 2010 [Print]
Defining the Role of Authors and Contributors	
Source:	International Committee of Medical Journal Editors
URL:	http://www.icmje.org/recommendations/browse/roles-and-responsibilities/defining-the-role-of-authors-and-contributors.html
How to Avoid Plagiarism: Learn How to Reference Correctly	
Source:	Leeds Beckett University
URL:	https://www.youtube.com/watch?v=N6jwy5ZFgnI
International Bioethics Training	
Source:	National Institutes of Health
URL:	https://www.fic.nih.gov/Programs/Pages/bioethics.aspx?utm_source=funding-news&utm_medium=email&utm_campaign=funding-news
International Standards for Editors and Authors	
Source:	The Committee on Publication Ethics
URL:	https://publicationethics.org/node/11184
Plagiarism: How to Avoid It	
Source:	Bainbridge State College
URL:	https://www.youtube.com/watch?v=2q0NlWcTq1Y
Promoting Integrity in Research and Its Publication	
Source:	The Committee on Publication Ethics
URL:	https://publicationethics.org/
Promoting Research Integrity in a Global Environment	
Source:	Tony Mayer and Nicholas Steneck. World Scientific; 2011 [Print]
Publishing Ethics for Journals	
Source:	Springer
URL:	https://www.springer.com/gp/authors-editors/editors/publishing-ethics-for-journals/4176
Service Avoiding Plagiarism, Self-plagiarism, and Other Questionable Writing Practices: A Guide to Ethical Writing	
Source:	The Office of Research Integrity, U.S. Department of Health and Human
URL:	https://ori.hhs.gov/avoiding-plagiarism-self-plagiarism-and-other-questionable-writing-practices-guide-ethical-writing
Ten Types of Plagiarism	
Source:	Write Check Videos
URL:	https://www.youtube.com/watch?v=EF5eFeJMplA
Twenty-eight Guidelines at a Glance on Avoiding Plagiarism	
Source:	The Office of Research Integrity, U.S. Department of Health and Human
URL:	https://ori.hhs.gov/plagiarism-0
Understanding Plagiarism	
Source:	York St. John University
URL:	https://www.youtube.com/watch?v=ptHIA5bMnio