Applying Rational Choice Theory to Authors' Behaviors in Unethical Publishing in China

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Abstract

Much have been discussed about unethical scholarly publishing in the learned community from the perspective of publishers, particularly commercial ones, while few have tried to seek an understanding of the actions taken by individual authors in the practice. This paper attempts to adopt an economic principle, the rational choice theory, in the examination of exploitative publishing using China as a case study. It argues that it is human's inclination to make prudent decisions for their highest self-interest while trying to minimize personal losses that drives some researchers to take advantage of an eroding system of scholarly communication. It has also attempted to pinpoint a possible solution.

Unethical Publishing in China

> *In spring 2017, a Springer journal "Tumor Biology" retracted 107 articles, primarily authored by Chinese researchers, because of fraudulent peer reviews of these articles* (Feldwisch-Drentrup 2017).

This incident represents just the tip of the iceberg of academic dishonesty in scholarly publishing in today's China. A number of reports have critically exposed various forms of misconduct, such as widespread plagiarism, with as high as 31 percent of plagiarized submissions to a university-based journal in one case alone (Zhang 2010a, 2010b); the concealed system of ghostwriting in the $100 million market of buying/selling scientific papers (Culliford 2013); the unpromising presence of computer-generated nonsense articles (Van Noorden 2014); and the instant growth of falsified data in clinical trials—over 80 percent of all trials with such a problem detected as of 2016 (Woodhead 2016).

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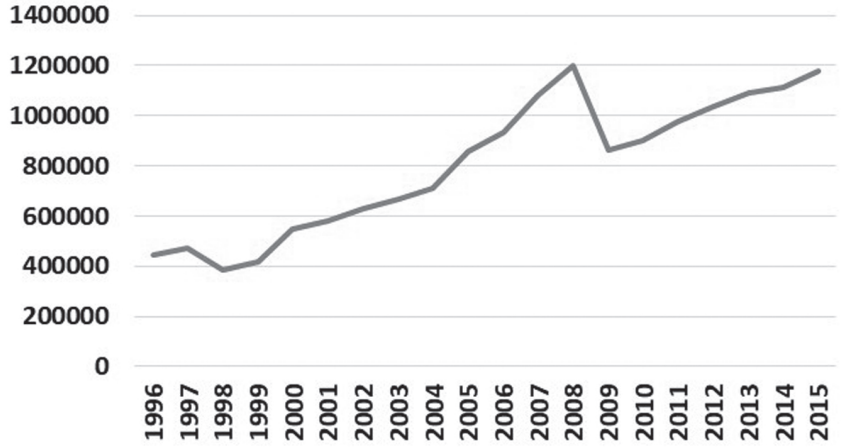

Figure 1. Total number of researchers in China, 1996–2015 (Source: World Bank)

Such unprofessional practices are considered to be the by-products of the rapid expansion of the research labor force in China. In the past two decades, the Chinese government has escalated its spending on science in response to the country's concurrently remarkable economic development. As of 2016, China allocated more than 2 percent of its gross domestic product on R&D, which was greater than the proportion by the European Union (Van Noorden 2016). As a result, there has been a steady increase in the total number of researchers over the years, as illustrated in figure 1. Another indicator of the increase in researchers is the quantity of doctoral students who are required to publish scholarly work before entering the academic labor market. In 1978, China only trained eighteen doctoral students; but thirty years later it outnumbered the United States to become the largest doctorate producer in the world (Majumder 2014).

The dishonorable publishing also results from an instant and massive increase in open access publishing, which in turn benefits from the ubiquitous internet and the easy design and maintenance of web pages. As of 2012, a total of 685 open access journals were active in China's scholarly publishing market (Hu, Huang, and Zhou 2012), and the number was nearly doubled by 2017 (Bi 2017). Scholarly journals have been under the control of the central and local governments through teaching and research organizations, such as research institutions, universities, and cultural entities, whereas individuals and private corporations are not generally allowed to publish scholarly journals. This restriction may help explain why Chinese open access journals have not been largely included in some international blacklists of exploitative journals, e.g., Jeffrey Beall's predatory standalone journal list (Beall 2010).

Policies by the government and institutions have played a critical role in regulating scholarly publishing. In addition to China's harsh control over academic journals, many policies have been created to place tremendous pressure on individual researchers for publishing in international journals that are in English and are recognized for their quality as measured by journal impact factor scores. But even when a journal is too young to establish its academic reputation, it is still acceptable to many Chinese authors so long as the journal is published in English and is operated in a foreign country. The efforts of globalization by the Chinese government have been already extended from economy to science, and to the area of scientific research and publishing.

A publish-or-perish law in China's academic community has impelled researchers to seriously seek every possibility of publishing, much like the situation in many Western countries. When research projects are incompetent for publishing in highly rated journals, lower-tiered venues of publication are satisfactory. When publication is the primary, if not only, requirement for career development, alternative publishing becomes a popular option. Yet on the other hand, much like some developing countries where exploitative publishing has been prevalent (Bohannon 2013), false publications soon found their place in the publishing market in China, resulting in a diverse array of unethical practices. An unhealthy academic culture has been developed, gradually eroding scientific integrity in the country.

Although there have been a lot of analyses that attempted to explore economic, technological, and sociopolitical factors associated with recent scholarly publishing crises (Borgman 2007; Kling and Callahan 2003), most focused on the understanding of possible causes from a publisher's perspective (e.g., Laakso et al. 2011; Larivière, Haustein, and Mongeon 2015; Shen and Björk 2015). Relatively few have examined the behaviors of individual researchers and their adaptation to a changed culture. This paper is an attempt to apply the popular economic Rational Choice Theory to grasp an exchange process that aims to identify the best available options and choose the preferred option based on some consistent criteria in the context of scholarly communication, with a focus on the various forms of improper practice in contemporary China.

To be fair, unethical publishing is not only observable in China but also extensively practiced in other parts of the world. The above-mentioned predatory blacklist collects problematic journals published in many countries, including the United States and Europe (see also Shen and Björk 2015, figs. 6, 7). Authors who publish articles in such journals are everywhere, although developing countries, mainly India and Nigeria, are particularly visible (Bohannon 2013; Xia et al. 2015, 1416). This present study focuses on the publishing behaviors of Chinese authors because of data availability and my familiarity with this country.

Rational Choice Theory in a Nutshell

Rational choice theory (RCT) can trace back to Adam Smith, who proposed the idea of "invisible hand" in his book *The Wealth of Nations* in 1776. It soon became the prevailing economic principle to help scholars better recognize the behaviors of a society with regards to individual actions taken according to personal preference. RCT has been considered to help explain and predict future consumer-spending decisions and company strategies (Simon 1955; Von Neumann and Morgenstern 1944). The theory was introduced to many other social science fields in the 1960s, particularly because of the work of sociologists Peter Blau (1964), James Coleman (1990), and George Homans (1958, 1961) and criminologist Gary Becker (1968).

In the standard view, rational choice is defined to denote that individuals are rational in that they can think in a logical way. People incline to measure the likely costs and benefits of any action before they choose what to do and how to do it. Derived also from the expected-utility model in economics, RCT perceives individuals' actions as a real-valued utility function in that people have self-interests to guide them through a process of defining their utilities upon some persistent criteria. Any action of an individual's choice is determined by his/her perception of the utilities; and in turn the choice and action will influence the utilities.

In other words, individuals choose a sequence of actions according to their personal preferences which may be represented by their attitudes toward risk, resentment, sympathy, envy, loyalty, love, and a sense of fairness (Amadae 2017). As an economic model of decision-making, RCT accepts that all people try to actively maximize their advantage in any situation and therefore consistently try to minimize their losses. The actions taken by individuals help construct complex social phenomena in terms of social changes or the actions of social institutions.

A Rational Choice Approach of Analysis

Fraudulent Practices

The Chinese have a long tradition of rote learning that is based on repetition and memorization (X. Li and Cutting 2011). As a technique extensively used in the mastery of knowledge in ancient China tracing back to Confucianism, rote learning has not only been recognized in the preparation for examinations but has also been practiced routinely in the creation of scholarly work. It does not necessarily represent an opposing method of education and research to understanding, comprehension, or active learning, but may rather be viewed as a complementary learning tool (Dahlin and Watkins 2000; Kennedy 2002). As part of the rote learning, appropriately copying and pasting classical phrases and sentences are considered clever, while a citation to classical work is considered unnecessary.

Such a rote-learning tradition has a substantial impact on creative writ-

ing. Because there is no rule as to what extent one should quote classical work, Chinese authors often get confused as to the distinction between origination and plagiarism in writing. Their habit of reciting classical work can make them take for granted the appropriateness of copying phrases, sentences, or paragraphs of others' publications, even if the latter are from nonclassical works. Apt training in scholarly undertaking and writing has been largely absent, even in higher education; and if such training does exist, instructors themselves may not fully understand the difference and importance.

On one hand, the long-standing custom of inappropriate copying/pasting makes researchers unaware of the necessity to provide credit to the original sources. On the other hand, however, some have deliberately abused the tradition for their own benefit even though they are knowledgeable of scholarly misconduct. When an entire chapter has been borrowed from somewhere else without reference to the primary source, for example, it is hard to believe that the author is unconscious of text-stealing. Sometimes, an entire article may have been pilfered without even bothering to make minor changes to the text. Rote-learning tradition can no longer be a reasonable explanation.

Plagiarism is the primary form of scholarly misconduct in contemporary China. A recent survey among six thousand scientists at six of the nation's top institutions revealed that a third of the respondents admitted that they had been involved in plagiarism (Jacobs 2010). A university journal editor reported that as high as 80 percent of submitted papers are presenting some levels of piracy, detected by a software called CrossCheck (Zhang 2010b). A famous online watchdog, New Threads, exposed thousands of plagiarism cases in the nation, some of which are published by university presidents and nationally glorified researchers. According to the watchdog's editor, Shi-min Fang, the majority of these cases exposed "are plagiarism . . . which are endemic in China" (White 2012).

The degree of academic plagiarism can range from stealing ideas to copying paragraphs or even passing off entire manuscripts as mentioned above, which appear not only in publications but also in other types of research outcomes, such as patent products. According to the US National Academy of Sciences (NAS) in coalition with other scientific research organizations of the United States, plagiarism is described as "using the ideas or words of another person without giving appropriate credit" (NAS 1995, 148). As a widespread occurrence in China, plagiarism was officially identified in the 1990s when three cases activated a vigorous national discussion of the problem (X. Li and Xiong 1996). Since then, plagiarism has been a popular topic debated in academia and beyond to expose unprofessional behaviors for the purpose of education, for enhancing scientific integrity, and for advocating strict policies to prevent future scholarly skullduggery (Henry 2017).

Language-stealing is easy to detect with automated antiplagiarism software applications, while data- and idea-stealing is rather difficult to determine. For linguistic plagiarism, there are varied degrees of severity, and there are differences between unaware bootlegging and intentional theft. Furthermore, it is challenging to identify plagiarism that steals publications but modifies the original texts (Y. Li 2013; Sorokina et al. 2006).

Duplicate publishing is a subtype of plagiarism. Instead of copying language of the original text, some academic thieves modify their own articles that have been published elsewhere. Duplicate publishing is rather invisible to the public because it requires sound justifications for the similarity of publication content and subject. A systematic examination of the prevalence of covert duplicate publications in Budd-Chiari syndrome articles revealed a high of 10 percent of paper duplications, out of a total of 1,914 articles by Chinese authors (Qi et al. 2013). More of such duplicate manuscripts have been found to be published in Science Citation Index journals than in Chinese core academic journals. In many cases, authors exploit language differences between English and Chinese to create overlapping content (Tucker et al. 2011).

Similarly, another common form of scholarly misconduct, i.e., data fabrication, is much less detectable, although it is by no means less popular than plagiarism. Data fabrication is widespread in biomedical fields because of the nature of their research and practice. For example, "A Chinese government investigation has revealed that more than 80 percent of the data used in clinical trials of new pharmaceutical drugs have been 'fabricated'" (MacDonald 2016). Another well-known case is of a scientist who published his research in a recognized English-language journal on the discovery of a breakthrough in the genome-editing technology NgAgo. Later, the author withdrew his publications due to extensive criticism of the integrity of his dataset after the failure of other scientists in replicating his lab work ("Time for the Data to Speak" 2017). Had the author not made his discovery high-profile, and had his area not been biomedical science, nobody would have paid any attention to this research or even have noticed or questioned its existence.

Ghostwriting occurs either through individual arrangement or organized business, such as essay-mill companies; the latter method has increasingly developed into a sizeable market in China. The article-buying and article-selling business is estimated to be more than $1 billion USD a year (Xia 2017). On some websites or physical locations, ghostwriting advertisements are easy to notice, where academic articles are being traded as merchandise, typically ¥500–1,000 CNY ($75–150 USD) per one thousand words. Extra fees are usually charged if the service provider is asked to arrange publishing of articles in legitimate journals, sometimes in recognized journals, which is usually guaranteed because of some agreements

between the provider, who is always a middleman, and the publisher, who manages to keep some peer-reviewed articles but reserves space for paid articles in the same issue of a journal. Ghost writers are those contracted by the middleman on a paper basis, who draft (often plagiarize) a paper based upon the request of a buyer for a specified subject, length, and even style of writing. Such published manuscripts are either duplicate or entirely pointless scholarship, given ghost-writers' lack of even the basics of scientific research in divergent fields.

Compared to the above popular forms of academic misconduct, peer-review fraud is less prevalent and is only discovered when the publishing journal finds it. Such a fraud may originate from the relatively new practice of some academic journals that asks authors to recommend peer reviewers in the processing of submissions. A few authors take advantage of the apparently careless management by certain journal editors for not checking the information of the nominees selected by the submitters. What the cheating authors have done is to list known scholars in respected fields, while changing the contact emails to their own or accomplices, with the hope that editors will not find the changes. Many editors, indeed, have not paid attention to the changes, ending up sending review requests to submitters themselves or accomplices rather than to the suggested reviewers. The retraction incident by *Tumor Biology* is one case of such a practice; had it not been detected, it would have been ignored and buried in the mass of past publications.

Publishing fraud has many other forms, such as nonsense writing in the English language by Chinese authors publishing in profit-oriented predatory journals, mostly based in India, Pakistan, and Iran (Bohannon 2013; Xia et al. 2015). The categories in table 1 provide only a snapshot of some dishonest publishing behaviors—it is a snapshot that exposes seriously worrying practices of scholarly misconduct in the country. While science has been very much booming in the past several decades in China, so is the culture of fraudulent publishing. The causes may be cultural, economic, political, or technological, yet author behaviors are also a reasonable explanation.

Rational Choice

Rational choice theory will assume that academic cheaters in China have calculated cost-benefit risks before they decided to abuse the publishing system. Common risks of such publishing abuses to these authors may consist of the likelihood of social censure; destruction of scholarly and personal reputation; and professional discipline, ranging from a fine to career demotion and even to employment termination. In very rare cases, legal actions may result, e.g., when clinical trials are falsified in pharmaceutical research and production. The benefits may be measured by repu-

Table 1. Major forms of publishing misconduct in China

Type of Misconduct	Common Characters	Remarks
Plagiarism	Copying language (including phrases, sentences, paragraphs, and entire manuscripts), ideas, patents, data, etc., without providing necessary citations to original sources	Having a long history and being prevalent in today's practice; easy to detect
Data fabrication	Making up or modifying raw data to support research ideas, and providing intentional misrepresentation of research results	Having a short history and being prevalent in today's practice; somewhat difficult to detect
Ghostwriting	Starting from college students, but extending into academic publishing, as a paid service without providing credit to real authors	Having a relatively long history and being prevalent currently; easy to moderate detection
Nonsense writing	Writing and publishing articles that are scientifically senseless and do not represent real academic research	Having a short history and being prevalent in today's practice; easy to detect
Duplicate publication	Copying own published research to publish in a second place, a type of self-plagiarism, with or without using the original language	Having a short history and being less prevalent; somewhat difficult to detect
False reviewing	Nominating reviewers, when asked by journals, with real names, titles and affiliations, while changing contact of the nominees to their own	Having a short history and being less prevalent; detectable only by publishers
Reciprocal publishing	Publishing acquaintance's articles in the journal of one's control in exchange for publishing own articles in the acquaintance's control	Having a long history and being less prevalent

tation, career promotions and monetary rewards as opposed to the risk outcomes; and these benefits are primarily from other people's intellectual work.

The severity level of policies has a direct impact on the measure of costs against benefits: a harsh policy escalates the degree of risks, while a lenient policy does the opposite. When judging the level of severity, one will not only examine the face value of any policy, i.e., its language, but also observe how seriously the policy has been enforced. Most institutional policies in China have emphasized penalties for the wrongful publishing behaviors of writers, where the types of academic misconduct have been accurately defined, and the consequences have been clearly outlined. However, execution of the policies is extensively arbitrary and indulgent. Unless a case is too notorious to be covered up, institutions tend to keep misconduct instances low key to prevent the institutions from criticism

and embarrassment (Yang 2004). As such, cheaters commonly receive minimal to no punishment.

On the contrary, returns can be quite generous. The above-mentioned scientist, whose article on the breakthrough genome editing technology NgAgo published in an internationally recognized journal, *Nature Biotechnology*, was awarded around $34,000,000 USD for his genomic research institute and appointed to a high-profile political post. Even though he retracted the article under immense pressure of international scientists who were all unable to replicate his experiment, there was no single action taken against his questionable work by the institution or government (Cyranoski 2017). Another example is the Hanxin event: a professor of Shanghai Jiaotong University sanded away the Motorola logo on a microchip and claimed the chip to be developed by himself (Barboza 2006). With this "invention," he was promoted to deanship, granted major national funds, and sponsored to create several companies. Unfortunately, he was not as lucky as the genomic-research scientist and all prizes were rescinded upon exposure of his dishonesty.

Aside from these eye-catching incidents, numerous amoral publishing activities have been undertaken silently, and have provided their bearers with desired returns regardless of whether such activities have been exposed or not. The rewards have been so appealing and the danger has been so minimal that cheating has been widespread and tolerance toward misconduct has been prevalently developed in academia in the country.

Gary Becker (1968), in his seminal study on criminology, offered an economic model of crime. The model outlines a rational-choice structure based on determining the utility of a potential criminal offense by using the following cost-benefit calculation:

$$\mathrm{EU} = pU\,(Y - f) + (1 - p)\;U\,(Y)$$

Here, p stands for the probability that a potential offender will get seized; f represents the severity of the punishment if detained; Y is the money value of the gain, which is the utility benefit that the criminal gets when the crime is effectively taken while the perpetrator is not apprehended. According to the equation, crime will increase in Y and decrease for both p and f, thus the total utility (EU)

While unprofessional publishing may not be at the same severity level as most types of crime, the behaviors are very much comparable, at least analogous to other forms of crime such as theft. Some criminological analyses emphasize the f value in the prediction and prevention of crimes (Wright et al. 2004); and analyses of deceitful publishing also need to pay special attention to the likelihood that cheating is exposed and to the degree that an exposure is penalized. The reason that an author is committing academic fraud, as an analogy to a criminal committing a crime, is because the risk associated with it is negligible (Akers 1990). Toward

this understanding, it is not exaggerating to emphasize the importance of policy implementation in academic conduct. Other criminologists (e.g., Matsueda, Kreager and Huizinga 2006) relate criminal activities more to the anticipated rewards of offending (Y). It is also true that when personal gains are so attractive, a distorted view of the consequences and benefits by some researchers will lead them into the not-very-risky publishing game.

Weighing the costs ($Y - f$) is key in RCT. Because it is the nature of human beings to deliberately amplify their advantage in given situations and steadily work on lessening their losses, the larger value this formula can yield, the greater self-interest people will obtain. In scholarly publishing, RCT assumes an interplay of individual behaviors and social values. On one hand, individuals make prudent decisions based on rational calculations with information from social practice; on the other hand, the actions individuals have taken will shape complex social phenomena, which in turn help regulate humans' decisions. The choice to falsify publishing is based on an observation of a considerable value of ($Y - f$)—that is, the rewards of offending considerably outweigh the severity of punishment—defined as a learning outcome in RCT. Increased cases of such falsification contribute to general behavioral changes and to the construction of an unhealthy academic culture.

Once unprofessional conduct becomes the norm, it provides the basis for rationality in individuals' decision-making—the collective behavior in society reveals the sum of the choices made by individuals (Dawes 1980). Then, destruction of one's reputation is no longer a huge threat when his/her cheating case is uncovered, and therefore the ($Y - f$) outcome is further amplified. If, in the past, plagiarism was undertaken overwhelmingly by single individuals in order to reduce the chance of exposure by "insiders," the latest cases have included group cheaters. For example, all articles retracted by *Tumor Biology*, as cited above, have multiple authors who are usually from different institutions and even different countries. This confirms the existence of a tolerance culture.

Rational Choice and Deterrence

Deterrence doctrine as an application of rational choice has the same use in the analysis of unethical publishing as in criminology. Instead of stressing a utility- and profit-maximization in the economic model of rational choice, deterrence focuses on the definition and implementation of punishment, namely, fear of legal actions in individuals' measure of the cost-benefit difference (Gibbs 1975; Piliavin et al. 1986). In the corrupt publishing practices in China, to be fair, an overwhelming majority of researchers have carried out serious scientific studies following professional codes. This is also a group that constantly points out wrongdoings and advocates changes in publishing policies and academic culture. The thousands of unethical cases revealed on New Threads and other media

were exposed mostly by whistle-blowing people in this group that find themselves in the same tolerance culture that allows appealing returns for cheating behaviors.

As does rational choice theory, the deterrence doctrine applies a utilitarian scheme to publishing misconduct. A slight difference is that for deterrence, "the rational calculus of the pain of legal punishment offsets the motivation for the crime" (Akers 1990, 654), which helps prevent more individuals from taking improper actions in scholarly publishing. In the above mathematical expression, the $(Y - f)$ value can be significantly reduced when the f value is going up, thereby breaking the cost-reward balance.

The introduction of rational choice and deterrence principles is not only a necessary step toward understanding the behaviors of individual authors in academic conduct regarding publishing, but it is also helpful for decoding the cultural description of tolerance. Moreover, it has a real implication in the endeavor of the scholarly community, including all of its constituencies, to reconstruct scientific integrity. For example, the core of deterrence theory assumes that "by increasing the certainty of punishment, potential offenders may be deterred by the risk of apprehension . . . (and) the severity of punishment may influence behavior if potential offenders weigh the consequences of their actions" (Wright 2010, 2). A major takeaway is that the government can elevate publishing policies and enforce them under the rubric of getting tough on fraudulence in order to produce deterrent benefits (see also Fesnik and Zeng 2010). It can efficiently and effectively supersede institutional self-protection, while providing instances for educating great minds because individuals make decisions rationally and by social learning.

Conclusion

> *In summer 2017, the Chinese government announced new "zero tolerance" policies and publicized its investigation into the "Tumor Biology" retracting cases. Involved authors faced disciplinary actions such as being barred from pursuing their research, cancelled promotions, and withdrawn grants* (Normile 2017).

Rational choice theory helps understand the behaviors of authors in fraudulent publishing. The core of this theory is rationality of actions taken by individuals, which is in line with the persistence of a culture of tolerance toward misconduct in China and its impact on authors' decision-making. RCT offers a tool of measurement that can be used to calculate the likely costs and benefits of any action, enabling us to recognize the widespread existence of fraudulent scholarship in a country where cheating can bring about substantial returns with a low possibility of discipline, even though such actions may be exposed.

Rational choice belief and its variation, the deterrence doctrine, share the same view of rationality, but they differ in that the former focuses on a cost-return balance while the latter tends to highlight the position of punishment, namely, the cost element. This emphasis on risk in the prevention of misbehaviors has a practical meaning in the effort to promote scientific integrity and can provide a simplified solution. The Chinese government's reaction to the academic fraud case mentioned above is a necessary and important step toward creating the solution. Corruption has already penetrated every link of the deeper system of China's scholarly publishing; but changes are under way, including changes in the making and implementation of appropriate policies as well as in the perception and compliance of individual scholars with the policies.

Understanding authors' behaviors in unethical publishing has implications in library practice. As information gatekeepers and knowledge facilitators, librarians should have been aware of all types of publishing conduct and been able to distinguish the bad from the good. In reality, however, there has been confusion among academic librarians who may not only be unacquainted with the dynamics of scholarly publishing but also take various views of information safeguarding. A good example is that after Beall compiled a blacklist of predatory journals to alert the academic community to fraudulent publishing, he received more criticism from academic librarians than from predatory publishers (Beall 2017, 278). Librarians need to stand in the forefront of scholarly developments.

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