The relationship between the corresponding author and its byline position: An investigation based on the academic big data

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Abstract. With the increase of international collaboration, author contribution is becoming a key issue in research evaluation. Different counting methods may result in different results. Given the importance of the byline position and the significant role of the corresponding author, this study investigates the relationship between corresponding author and its byline position. By analyzing over 11 million papers from Web of Science published from 2000 to 2008, we find that the relationship between the corresponding author and byline position varies with year, the number of authors, countries and research fields. Our findings can provide insights to scientific research evaluation.

1. Introduction

Given the increase in international collaboration, it grows an awareness about assessment of author contribution on scientific papers [1-6]. There are different methods of measuring an author’s contribution [7-8, 44]. For example, the whole counting which refer to accredit each author with one full credit, and the fraction counting, one full credit is shared by all authors [37-38]. However, the position of an author in the byline of a paper can influence readers’ inferences about their research contribution, and not all authors are credited as equal contribution [9-11, 43]. As a result, previous studies have asserted that both whole counting and fraction counting are susceptible to equalizing bias by dividing credits uniformly among all authors [28-29]. Corresponding author, who is originally intended to communicate with editors about the content of papers and to receive advice from readers [16-17], is usually the owner of the research results from the perspective of intellectual property, and is usually the person responsible for the paper [18]. Dividing credits equally among all authors may underestimate the contribution of the corresponding author. Although the straight counting which accredits one full credit to the most important author, such as the corresponding author and the first author [29, 39, 45], and the harmonic counting has considered the important role of corresponding author [40], these methods ignore the contribution of other authors [41-42]. Therefore, in order to assess the author’ contribution accurately and given the importance of the position of an author in the byline, it is a fundamental key issue to identify the position in the byline of the corresponding author.

The existing studies demonstrated that in the first author is served as the corresponding author most often the field of ecology, and the last author being served as the corresponding author the next most [20]. The results heavily depend on number of authors, and national or regional differences exists [20-21]. The first author from non-English-speaking country has the less potential to serve as the corresponding author, especially when the last author comes from an English-speaking country [22].
However, these studies just focus on a small portion of data, covering only a limited research field (in ecology) or time range, which may not be ultimately generalized to other situations.

Against this background, we perform a comprehensive analysis using a large bibliometric database that contains over 11 million papers from various research fields that are published between 2000 and 2008 on the Web of Science (WOS). Generally, we investigate the relationship between the corresponding author and its byline position from four perspectives: years, the number of authors, countries, and research fields. We find that the percentage of the first author served as the corresponding author is the highest, but this percentage decreases over time. However, the last author makes up a growing percentage of corresponding author since 2000. The number of authors, countries, and research fields also influence the relationship between the corresponding author and its byline position. Therefore, when considering contribution of corresponding author, it is necessary to take factor above into consideration. Our study can provide insights to scientific research evaluation.

2. Materials and methods

2.1. The dataset
We use the data from the Web of Science (WOS), which is a well-established database used for the bibliometric analysis [23]. In total, we analyze over 11 million papers published from 2000 to 2008. Here, papers include articles, notes, reviews, letters and conference proceeding papers. In the WOS, the corresponding author is usually labelled reprint author [20,22,28].

Table 1. Names of selected countries and their codes

| Country                  | Code (ISO) |
|--------------------------|------------|
| The United States        | US         |
| China                    | CN         |
| The United Kingdom       | GB         |
| Germany                  | DE         |
| Japan                    | JP         |
| France                   | FR         |
| Canada                   | CA         |
| India                    | IN         |
| Korea                    | KR         |
| Spain                    | ES         |
| Australia                | AU         |
| Brazil                   | BR         |
| Netherlands              | NL         |
| Turkey                   | TR         |
| Russia                   | RU         |

2.2. Countries considered
The most productive 16 countries, in terms of the number of scientific papers, are selected for the current study. They are US, CN, UK, GB, JP, IT, FR, CA, IN, KR, ES, AU, BR, NL, TR, and RU (see Table 1). Country codes are according to the International Institution for Standardization (ISO standards). The total number of papers published by these 16 countries is 11,540,922 covering over 75% of worldwide papers.
2.3. The national attribution of the paper
It is very important to determine the national attribution of each paper. The whole counting and fraction counting are widely applied in counting paper numbers [24-26]. But both of them can lead to some issues, such as inflation [27-28], which may affect the accuracy of the results of this study. Previous studies suggested that straight counting which accredits an important collaborator with full credit maybe a good option at the country level [29]. The straight counting method mainly consists of the first affiliation/address and corresponding affiliation/address [30-31]. In a previous study, the findings show that for over 95% of papers in the WOS, the first address and corresponding address point to the same country. Therefore, we used the first affiliation of a paper in order to simplify our analyses.

2.4. Research fields of the paper
WOS covers 252 subject areas, according to different research directions. A subject area can correspond to one or multiple papers, and each paper can also belong to more than one subject areas. Such a substantial amount of subject areas will affect this study from drawing a conclusion in different research fields. Hence, we use discipline classification to combine the WOS subject areas into 14 research fields [32], including physical sciences, chemistry, biology, medicine, agriculture, environmental and earth sciences, mathematics, computer and information technology, engineering, social sciences, business and management, law, humanities, and multidisciplinary sciences. What is needed to be emphasized is that we use the whole counting to categorize each paper by research fields. That is, when a paper is classified into multiple research fields, we count it in every labelled research field. This is because it is really hard to identify the priority of research fields when a paper is labelled as multiple research fields.

3. Results & Discussion
The position in the byline of the corresponding author over years is investigated. Four different positions in the byline of the corresponding author are mainly considered: the first author, the second author, the last author, and other authors. Figure 1 shows that authors listed the first and the last are generally served as the corresponding author, with the first author accounting for the majority (over 50%) in every year from 2000 to 2008. However, the percentage has decreased over time, from 73.86% in 2000 to 66.50% in 2005. Meanwhile, the percentage of the last author served as the corresponding author increased by about 5% over time, from 14.90% in 2000 to 19.35% in 2008.

We further analyze whether the number of authors in a co-authored paper would affect the position of the corresponding author. Our findings in Figure 2 show that the first and the last author would be the best possibility to serve as the corresponding author. We thus consider these two positions in a paper. As the number of authors in a co-authored paper increases, the percentage of the first author served as the corresponding author decreases and the percentage of the last author served as the corresponding author increases. We further find that there is a notable difference between the percentage of the first author served as the corresponding author and the percentage of the last author served as the corresponding author when the number of authors is less than ten. This difference becomes insignificant when the number of authors exceeds ten, and both closes to 40%.
Next, we explore whether different scientific cultures can distinguish the differences between countries. Unsurprisingly, there indeed exists great differences between the major countries in the world (Figure 3). On average, the first author is more likely to serve as the corresponding author in the most countries, with Russia having the percentage of the first author served as the corresponding author as high as 90%. However, an exception is Korea where the percentage of the last author served as the corresponding author is higher about 5% than that of the first author served as the corresponding author (Figure 3).
The byline position of the corresponding author in different research fields is also analyzed. As can be seen from Figure 4, we observe that different research fields have influences on the relationship between the corresponding author and byline position. For instance, the first author is more frequently served as the corresponding author in laws, humanities, social science, business and management, and mathematics, with percentage is more than 80% or even higher. In interdisciplinary fields where collective intelligence is more important, the percentage is lower. Research fields such as medicine, biology, chemistry, and physics are usually believed to be labour intensive, requiring more individual involvement. Thus, the percentage of the last author served as the corresponding author in these research fields more than 30%.

4. Conclusions

In brief, we analyze more than 11 million papers (i.e., articles, notes, reviews, letters and conference proceedings papers) published from 2000 to 2008 in the WoS. Previous studies find that authors listed
the first and the last on a paper are widely served as the corresponding author. Our analysis results also show that this pattern holds up in a wider range of dataset. Furthermore, we find that although the percentage of the first author served as the corresponding author is relatively high, this percentage decreases over time. By contrary, the percentage of the last author served as the corresponding author is getting higher since 2000. From it, we can conclude that the first and the last author have some significant meaning are complementary [35]. That is to say, the first author is the person who contributes the most of tasks on the project, and the last author is the lead of the project. Additionally, as the number of authors in co-authored papers increases, the percentage difference between the first author served as the corresponding author and the last author served as the corresponding author becomes insignificant when the number exceeds ten. This is in line with traditions, i.e. the last author is traditionally the senior author [36].

We also find that there are country differences of the percentage of position in the byline of corresponding author. On average, the first author is more likely to serve as the corresponding author in most countries, except Korea. It seems intuitive that different countries have their own different scientific cultures. We also use discipline classification to combine the WOS subject areas into 14 research fields, and find that different research fields have different relationships between the corresponding author and the byline position. The first author is more frequently served as the corresponding author in laws, humanities, social science, business and management, and mathematics, and this percentage is lower in interdisciplinary fields that requires collective intelligence. In labour intensive research fields, such as medicine, biology, chemistry, and physics, the percentage of last author served as the corresponding author increases to about 30%. In conclusion, whatever the counting methods, it is better to take countries and research fields into consideration when allocating authorship to a paper.

The relationship between the corresponding author and its byline position from four perspectives (i.e., years, the number of authors, countries, and research fields) has been explored by an objective statistical analysis. Our findings can provide insights into scientific research evaluation. However, how to objectively establish the relevant evaluation criteria through the corresponding author needs further studies.

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