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Is correspondence reflected in the author position? A bibliometric study of the relation between corresponding author and byline position

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Abstract Bibliometric indicators are increasingly used to fund and evaluate scientific research. Since the number of authors in a paper and the number of has increased it is difficult to determine the individual contribution of authors. Suggested approaches include the study of author position or the corresponding author. Our findings show that the corresponding author is most likely to appear first and then last in the byline. The results are dependent on number of authors in a paper and national differences exist. This underscores the need to take into account both the number of authors on a paper and their position in the byline to be accurate when measuring author contribution.

Keywords Co-authorship · Corresponding author · Author position · Author impact

Introduction

Bibliometric indicators have gained increasing importance and use in science policy and science management where it has been frequently used in the domain of research evaluation and assessment (Moed 2009). The development of performance indicators to respond to science policy questions and as a tool for distribution of resources has been the most common applications (Adam 2002). When individual researchers are to be assessed, publications in international peer-reviewed journals have been an important indication of visibility and international acknowledgment. Since the number of authors per paper has increased and the share of publications with multiple institutions grew from 40 to 61% between 1988 and 2005 (NSF 2008), it has become more difficult to determine the individual contribution to the work performed. Suggested approaches include the study of author position (Rennie et al. 1997) or the corresponding authorship (Wren et al. 2007).

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Earlier research has with qualitative methods attempted to determine the degree of contribution in relation to author position. The main notion has been that only first and last authorship have any significant meaning (Rennie et al. 1997; Burman 1982; Reisenberg and Lundberg 1990; Drenth 1998; Kennedy 2003). The first author is usually the person that has taken the main responsibility and carried out most of the work in a project (Reisenberg and Lundberg 1990).

In 1991, the International Committee of Medical Editors (ICMJE, also known as the Vancouver group) decided on a number of authorship criteria that should be met in submitted manuscript. Each author should have participated sufficiently in the work to take public responsibility for the content. Authorship credit should be based on (i) conception and design, analysis and interpretation of data (ii) the drafting or reviewing of the article (iii) final approval of the version to be published. There are no clear guidelines made about the order of authorship only that it should be a joint decision by the involved co-authors. These guidelines have been incorporated into the "uniform requirements for the submission of manuscripts to biomedical journals" to which almost 700 journals have subscribed according to ICMJEs website (ICMJE 1997).

The majority of journals require that each article should identify one of the authors as the corresponding author. The intention is that readers should be able to comment and ask questions about the published article. The role of the corresponding author is therefore to respond to these questions but also to be responsible for correspondence with the journal before acceptance and publication. The corresponding author should also be able to declare any competing or conflicting interest and to explain the presence and order of co-authors (ICMJE 1997).

Against this background we further investigated the meaning of author position in internationally co-authored papers. With quantitative methods we studied the relation between corresponding author and byline position and whether the number of authors assigned to a publication makes a difference. We also tested for differences among countries.

Methods

The data used in this study was retrieved from the ISI Web of Knowledge of Thomson Reuters. Only papers published as notes and articles in 2003 were taken into account. Scientific field included Fundamental Biology and Medicine, according to the classification done by Observatoire des Sciences et Techniques (OST) (Zitt and Teixeira 1996). These fields cover the journals subscribing to the ICMJEs guidelines. A selection of the most productive 18 European countries, accounting for 99% of the total EU-25 publication production, were made ($n = 39272$ articles). A difference between international co-authored papers, defined as articles with author addresses from more than one country, and national co-authored papers, defined as articles with author address from only one country, was made (Table 1).

Information such as author name, author position, and author address were collected. In the address field of SCI the corresponding author is labelled reprint author, in this paper referred to as corresponding author. Before 1998, less than 60% of the publications had this tag while from 1998 and onwards on average 98% include the reprint label.

Finally, the first author's institutional origin was manually compared to the last author's using a probability sampling method ($\alpha = 0.05$), by random numbers, to select a representative sample of 1000 articles proportional for the selected countries.

Table 1 Countries co-publications included in the study

Abbreviation	Country
AT	Austria
BE	Belgium
CZ	Czech Republic
DE	Germany
DK	Denmark
ES	Spain
FI	Finland
FR	France
GR	Greece
HU	Hungary
IE	Ireland
IT	Italy
NL	Netherlands
PL	Poland
PT	Portugal
SE	Sweden
SK	Slovakia
UK	United Kingdom

We analysed the data using the software programme Statistica. To examine if there are any differences between countries we used the Wilcoxon Matched Pair Test.

Results

Overall, when the number of authors in an article where more than two, the first author accounted for the majority (52%) ($n = 20356$) of corresponding authors, of all internationally co-authored papers. The last author appeared as corresponding author in 39% ($n = 15470$). Only 9% ($n = 3446$) of internationally co-authored papers have a corresponding author positioned elsewhere in the byline.

Next we tested whether the number of authors in a publication had an impact on the position of the corresponding author. Corresponding author appearing as first author in the byline was more common when the number of authors was less than seven. When the number of authors are more than seven there was no difference between first and last appearing as corresponding author, see 95% confidence interval in Fig. 1.

The frequency of first versus last author having the same address was examined using a sub-sample of 1000 articles. We found that in 54% of the selected articles first and last author had the same address. When the last author is the corresponding author 73% of the articles have the same first versus last author addresses. In the case of first author being the corresponding author the equivalent frequency is 42%.

We also explored whether any differences between countries could be discerned due to different scientific publication cultures. If we compare the byline position of corresponding author between countries we find that there was a significant difference (Wilcoxon Matched Pair Test: $p > 0.001$) between countries. When researchers based in Scandinavia, the Netherlands, and former Eastern countries were corresponding authors it was more common that the corresponding author appears first in the byline (Fig. 2).

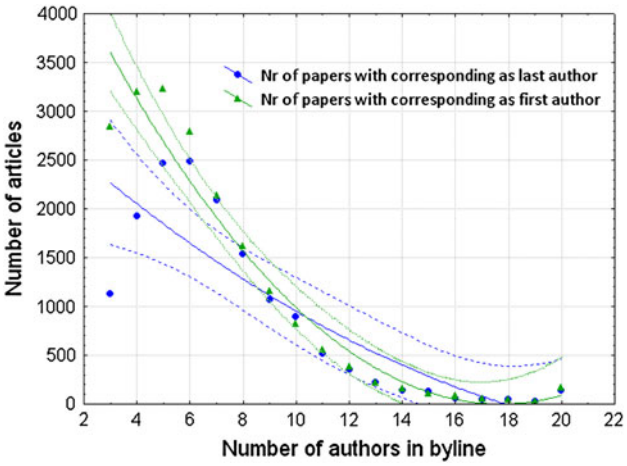

Fig. 1 Distribution of papers by position of corresponding author

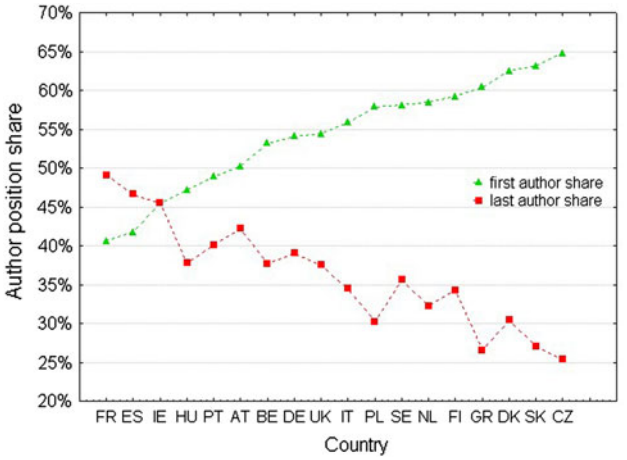

Fig. 2 Byline position in international co-authored articles, differences between countries

A similar pattern as for international co-authorship can be discerned in national co-authored papers. For France and Spain it is more common that corresponding author appears last in the byline for international co-authored papers while for national co-authored papers corresponding author, more commonly, appears first in the byline. On average, in national co-authored papers the corresponding author appears more often as a first in the byline (60%) than in international co-authorship (54%) (Fig. 3).

Discussion

The findings in this study provide evidence that theories stating that (1) corresponding author is the author contributing more to the article (Wren et al. 2007) and (2) first and last

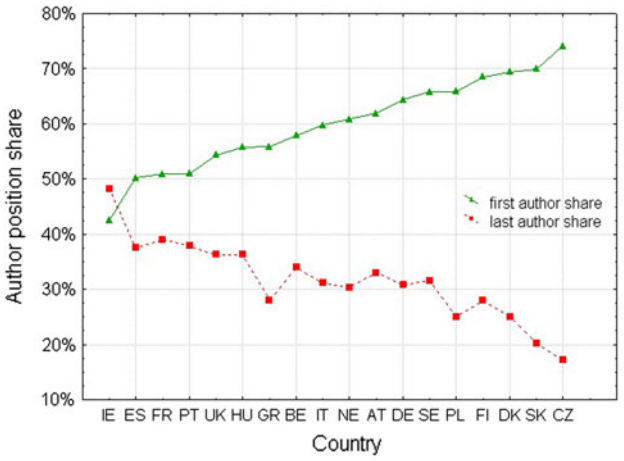

Fig. 3 Byline position in national co-authored articles, differences between countries

authorship have any significant meaning (Rennie et al. 1997; Burman 1982; Reisenberg and Lundberg 1990; Drenth 1998; Kennedy 2003) are complementary. This argument is supported by the result that the majority of corresponding authors appear as either first or last authors. We found that corresponding authors were more likely to appear first in the byline, which is in accordance with ICMJEs guidelines, i.e. the author contributing most to the article should be positioned first.

By tradition, in the cases were the first author is a junior researcher the final author is traditionally the mentor/supervisor (Rennie et al. 1997; Bhopal et al. 1997; Burman 1982; Reisenberg and Lundberg 1990). This has been supported by a study showing that the share of last authors with a professor rank is significantly higher than among first authors even though the number of professors appearing as first authors has increased (Drenth 1998). The last author position can also be reserved for the director of the laboratory or department, who played no direct role in the specific research, so-called gift or honorary authorship (Bhopal et al. 1997; Burman 1982). The origin of the tradition of the senior author occupying the final author position is believed to arise from the obligation of senior scientists' to recognise younger colleagues (Rennie et al. 1997; Shapiro et al. 1994). Whatever its origin, it has become a strong tradition in scientific publication (Buehring et al. 2007). The sequence of authors may also reflect the contribution of work with first author contributing most and last author contributing the least (Gaeta 1999).

This traditional way of structuring a paper could partly be supported since the majority of an article's first and last authors have the same address. In the case of last author being the corresponding author the likelihood of first and last authors having the same address was significantly higher than when the first author appeared as corresponding. A qualitative study investigating the seniority of authors would be needed to examine this issue further.

According to earlier research (Yank and Rennie 1999) the first author was twice as likely as the other contributors to have coordinated the study. The first and last contributors on the byline were also more likely to have written the paper, designed the study, and analyzed the data. In a survey (Wren et al. 2007) carried out with promotion and tenure committee chair people the aim was to assess how they value author contributions (according to initial conception; work performed; and supervision) determined by author position on a hypothetical manuscript where the correspondent author appeared as either

last or middle author. The results indicate that respondents considered that the first author in a three-person byline had made the greatest contribution to the work performed (57%), whereas the last author deserved most credit for both the initial conception (49%) and supervision (54%) of the project. When the last author appear as the corresponding author, there was no significant difference in three-author compared with five-author bylines for the credit apportioned to the last author for initial conception, work performed or supervision. By contrast, the first author's relative contributions decreased significantly for initial conception and for work performed but not for supervision. When the correspondent author in a five-author byline paper was changed from last to middle author, the latter received increased credit for initial conception (34% versus 6%), work performed (20% versus 11%) and supervision (33% versus 7%), and the last author's overall credit decreased from 38 to 16%. This indicated that the corresponding author is perceived as the author contributing more to the article independently of the author position.

The results in this study combined with earlier research suggest that candidates for promotion or tenure would be well advised to highlight publications on which they acted as corresponding author, especially if they were not the first or last author. Our observation that the first and last author account for the majority of correspondence suggest that some of the recent efforts to develop bibliometric formulae to measure author impact (Ball 2005; Gomez-Alonso 2004) would need to take into account both the number of authors on a paper and their position in the byline to be accurate.

Different national scientific cultures seemed to influence the corresponding author position. A call for a shift in national publication culture towards common international standards could make the research better visible and comparable. Secondly an increasing harmonization would support the development of infrastructure such as databases and methods that can be used for observing and analysing scientific publications.

Limitations of the study

This study has focused on articles in the fields of Life Sciences. It is important to remember that the order of authorship could be different in other fields such as for example Physics. The results should therefore not be transferable to other fields.

The study has only investigated a number of countries. The results could therefore vary depending on the countries studied. The authors are addressing this issue and the role of countries in an ongoing study.

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