

# Alphabetic or Contributor Author Order. What Is the Norm in Danish Economics and Political Science and Why?

Dorte Henriksen 

*The Danish Centre for Studies in Research and Research Policy, Department of Political Science, Aarhus BSS, Aarhus University, Aarhus, Denmark. E-mail: dh@ps.au.dk*

Researchers have different ways of deciding on the author order, and how they do it often depends on the culture of their field. Some fields are well known for using alphabetic author order, while others put a great emphasis on the meaning of the author order and place authors according to contribution. This article is the first to use mixed method to examine the extent of alphabetic author order and to examine why researchers adopt a certain author order norm in the fields of economics and political science. The article finds that alphabetic authorship has been and is the norm in economics, while some tendency towards it exists in political science. The differences in the intellectual and social organization of the fields seem to be a factor in the extent that these researchers will adopt a certain norm. Furthermore, the increasing number of authors per article and the publish-or-perish culture seems to put pressure on the alphabetic norm because it creates greater attention to the reputational advantages of being first-author.

## Introduction

The overall purpose of research is to produce knowledge that contributes to achieve a better understanding of the world, whether it is in the physical or social sciences. Thus, researchers publish to distribute their generated knowledge (Hangel & Schmidt-Pfister, 2017). However, as several science studies show, researchers also publish to increase their reputational capital in the competition for jobs, tenure, promotion, salary, and funding (Brown, Chan, & Chen, 2011; Merton, 1973; Moore, Newman, & Turnbull, 2001).

A common method to increase one's reputational capital is by coauthoring with other researchers; this makes it

possible to optimize the research output and helps diminish the risk of zero-publishing periods (Barnett, Ault, & Kaserman, 1988; Kadel & Walter, 2015). The negative aspects of coauthoring can be the issue of receiving the appropriate recognition for one's contribution, especially when the number of coauthors rises. Thus, it may be necessary for the researchers to mark their contribution to make it visible for colleagues, for example by using the author order to display the individual researchers' contribution and hence secure proper credit.

However, there are multiple ways of deciding on an author order, and researchers often follow the norms of their field. The two most common methods to decide the author order are by estimated contribution or simply alphabetic order. Less frequently applied methods are by flipping a coin (Miller & Ballard, 1992), playing croquet (Hassell & May, 1974), brownie bake-off (Young & Young, 1992), or other imaginative ways. But those publications often include a disclaimer of the author order having any meaning, and the number of authors is often two or three.

The intention with ordering authors according to their contribution is that it shows the extent of each researcher's contribution and/or seniority. For example, the first author(s) in biomedicine is often the one who has done most of the work and written most of the publication. The last author(s) is often the principal investigator and leader of a large project or laboratory; last authorship is thus a sign of seniority. The middle positions are for the remaining researchers who have contributed to the publication (Biagioli, 1998; Hammarfelt, 2017; Zuckerman, 1968). Thus, biomedical author order displays the degree and importance of the individuals' contribution in large research groups.

The use of alphabetic authorship is generally decreasing in research, and the extent depends on the norms of a research field (Waltman, 2012). The increasing number

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of authors could influence the decrease in alphabetic authorship, since it creates a greater need among researchers for the author order to reflect the coauthors' contributions in addition to reduce the probability of incidental alphabetic author order. High-energy physics (HEP), economics, and mathematics (Frandsen & Nicolaisen, 2010; Waltman, 2012) are all known for using alphabetic author order, but the average number of authors in the byline differs considerably in these fields. Mathematics and economics have a similar coauthoring approach, with an average of two to three authors on an article, whereas HEP is infamous for extreme coauthorship groups,<sup>1</sup> with a mean number of authors of ~18 authors (Waltman, 2012).

The differences in coauthorship group size reflect the different perceptions of coauthorship in addition to differences in collaboration behavior. HEP often needs different specialists to conduct experiments and to connect these experiments to the theories. Consequently, there is a tendency for a substantial division of labor, since it is impossible for the individual researcher to have a comprehensive knowledge of all the research (Birnholz, 2006). In HEP, the author byline reflects everyone who has contributed to the research project, and it is ordered alphabetically to equalize everyone's contribution, since they are all important.

Economics use alphabetic name ordering to display equal contributions, and an expectation of coauthors to engage in and to contribute equally to the research process (Brown et al., 2011; Engers, Gans, Grant, & King, 1999). Engers et al. (1999) state that it is an equilibrium for economists to use alphabetic author order, since all authors receive the same recognition and therefore provide equal contributions. However, other studies find a name discrimination in economics that is not visible in fields that use contributor author order (Efthyvoulou, 2008; Einav & Yariv, 2006). This name discrimination makes researchers with surnames in the beginning of the alphabet more likely to receive tenure at top research institutions, receive more citations, and their publications are downloaded more often. Furthermore, previous studies find that researchers with a surname last in the alphabet are less likely to coauthor, and have a greater tendency to exclude or include a prefix in their name depending on whether it favors or disfavors their contribution in the author order (Efthyvoulou, 2008; van Praag & van Praag, 2004).

It seems that political science also displays a trend towards alphabetic authorship (Waltman, 2012). However, political scientists also lack agreement of whether alphabetic coauthorship is, has been, or should be the norm (Chandra, Gandhi, King, Lupia, & Mansfield, 2006; Lake, 2010). This may be because it is still common to be a single author in political science, although in certain areas of the field the coauthoring trend is rising (Henriksen, 2018). The increase in coauthorship has brought a discussion of whether political scientists should adopt either alphabetic or contribution author order. King (2006) suggests that alphabetic authorship should become the

norm in all social science fields since it shows that everyone has contributed equally. In contrast, Lake (2010) recommends that contribution should be the norm since this method encourages researchers to collaborate and increases the visibility of the greatest contributor to a publication.

The arguments above for using either alphabetic or contribution order reflect the research and collaboration culture in the different research fields. However, previous studies of authorship order norms in economics and political science are either quantitative (Efthyvoulou, 2008; Waltman, 2012; Weber, 2018) or theoretically based (Ackerman & Branzi, 2017; Engers et al., 1999). Thus, none of the previous studies investigate why social scientists adopt a certain authorship-ordering norm. Instead, they mainly demonstrate which ordering norm is dominant in the field followed by arguments for and against the different norms.

This article goes beyond demonstrating what the different authorship-ordering norms are in economics and political science. Instead, it explores why the researchers chose a certain author order and shed light on the factors and values that influence decisions on authorship. Hence, the article will answer the following research questions:

1. To what extent do social scientists use alphabetic authorship, has this changed over time, and is it country-specific?
2. Why do social scientists adopt either the alphabetic or the contribution authorship norm, and what influences their decision?

The first research question will mainly be answered using bibliometric data, and it will show the dominant author trend in economics and political science, if the extent is country-specific, and if it has changed over the last 35 years. The findings of this question contribute to the examination and discussion of the findings of the second research question. The second question uses interview data to show how research and publish-or-perish cultures influence the use of and traditions for either author order norms.

Thus, this is the first study to apply mixed methods to investigate the trend of alphabetic and contribution author order. The combination of bibliometric and interview data makes it possible to discuss the extent of alphabetic authorship as well as why this is the norm. The examination of whether it is country-specific contributes to the discussion of whether the interviewees' adoption of either norms depend on institution or field.

The article has the following outline: The first section presents the intellectual and social organization of economics and political science. The second section gives a description of the methods and data sampling. The third section shows the empirical results of the bibliometric and interview studies. Finally, the last section discusses and concludes.

### *Intellectual and Social Organization of Economics and Political Science*

The culture and institution of a research field influence the norms about appropriate research conduct (Knorr

<sup>1</sup>The observed maximum number of authors on an article is 5,154 authors

TABLE 1. Distribution of economics articles and authors per country.

Country	Economics					
	DK	SE	DE	UK	US	All
$N_{articles}$	4,605	6,950	22,887	47,943	154,799	212,170
$N_{co - authored\ articles}$	3,254	4,906	16,206	32,342	95,102	128,890
$\%_{co - author\ articles}$	71%	71%	71%	68%	61%	61%
$\mu_{authors}$	2.4	2.5	2.2	2.1	2.0	1.9
$\mu_{authors \geq 2}$	3.0	3.1	2.7	2.7	2.5	2.5

Cetina, 1999). Hence, researchers enmesh in a social system, which sets the rules and norms for research conduct. The execution of research itself can follow a strict, objective algorithm, but the institutional, organizational, and epistemological characteristics influence the researchers' behavior. This article applies Whitley's (2006) theoretical framework of intellectual and social organization of research fields to understand the collaboration and publishing behavior of economists and political scientists. The framework is applied with a special focus on why they use a certain author order and how it reflects their coauthoring behavior. In short, Whitley (2006) employs two main axes to describe intellectual fields: mutual dependency and task uncertainty. Mutual dependency measures the degree to which a researcher is dependent on colleagues, while task uncertainty refers to the extent of agreement of methods, stability of research outcome, and the intellectual priorities and goals of the field.

According to Whitley (2006), economics is a field characterized by low functional dependency, high strategic dependency, high technical task uncertainty, and low strategic task uncertainty. This implies that it is a field with a partitioned bureaucracy, which produces analytical, specific, and ambiguous empirical knowledge. The core of the field focuses on specialized theoretical and analytical knowledge, while the peripheral areas are more ambiguous and empirically oriented. Economics has a high technical task uncertainty because of issues with reproducibility (Chang & Li, 2015; Maniadis & Tufano, 2017), and with applying the core theoretical models to empirical phenomena (Whitley, 2006, p. 126). The low strategic task uncertainty is visible by the great agreement of the core goals as well as the use of esoteric and standardized symbol systems. The high strategic dependency means that strong norms influence how economists communicate their findings and reflect the strong trend towards alphabetic author order. The mean number of authors is 2 (Table 1) reflects the low functional dependence in economics, with a low division of labor compared with the sciences. Thus, the research tasks and problems rarely require much different expertise.

Political science is like economics, a field with low functional dependency, and the mean number of authors is 1.5 authors (Table 2). Political science is also a more heterogeneous field than economics, since it largely forms subgroups around objects of study and distinct methodological approaches. Whitley (2006) describes political science as fragmented adhocracies: diffuse results, discursive knowledge

of common-sense objects. Thus, it is characterized by high technical task uncertainty and high strategic task uncertainty. Furthermore, the variety of audiences and research strategies means it has low strategic dependency. Hence, political scientists largely apply exoteric language and concepts when communicating their research. This implies that they must elaborate on the meaning and understanding of concepts in order to justify a specific interpretation. Research is weakly coordinated on an international level, and instead it occurs at the local level through personal contacts.

Thus, political science is as a field more oriented towards local norms for publishing and collaboration, which the lack of norms for author order reflects. Economics is generally more international oriented and as a field has strong norms and traditions for how to publish and collaborate.

#### Method and Data Sampling

The study consists of two substudies: a bibliometric study to show the author order trend in Denmark and internationally, and an interview study to support the trend demonstrated in the bibliometric study, as well as to understand these trends and norms of author order.

##### Bibliometric Study

The bibliometric study primarily consists of data about economic and political science articles from the Web of Science (WoS). Parts of the bibliometric data are from a previous study by Henriksen (2018), which sample all research articles belonging to economics and political science<sup>2</sup> subject categories with at least one Danish address, and published between 1980 and 2014. It was updated and expanded in October 13, 2017 by adding articles with Swedish (SE), German (DE), British (UK), and American (US) addresses. The additional data make it possible to investigate coauthorship and author order trends in multiple countries. The countries Germany and the USA were selected based on statements from the interviews with 17 Danish economists and political scientists who frequently refer and compare their research and collaboration behavior to German and American researchers. Sweden was selected to see if the trend is similar in another Scandinavian country with a similar culture, while the United Kingdom was included based on it being a native English-

<sup>2</sup>Political Science is fairly broadly defined for the purposes of this study and includes the subject areas Public Administration and International Relations.

TABLE 2. Distribution of political science articles and authors per country.

Country	Political Science					
	DK	SE	DE	UK	US	All
$N_{articles}$	1,843	2,332	11,114	27,786	87,960	124,949
$N_{co} - authored\ articles$	938	1,206	3,881	10,463	31,339	42,927
$\%_{co} - author\ articles$	51%	52%	35%	38%	36%	34%
$\mu_{authors}$	1.9	2.1	1.6	1.7	1.6	1.5
$\mu_{authors \geq 2}$	3.4	3.3	2.8	2.7	2.5	2.5

speaking EU country. Tables 1 and 2 show the sample’s distribution of articles and the mean number of authors per article per country in the sample.

A binary variable “Alphabetic author order” with one for alphabetic author order and zero for contribution author order was added to enable an examination of the extent of alphabetic authorship. The article uses a two-option model for author order, alphabetic, or contribution, so it assumes that authors chose to determine the author order based on either their last names or their contribution to the research. To determine the author order, the article uses similar criteria as Waltman (2012) and van Praag and van Praag (2004):

1. The alphabetical order of authors is determined by their last names. In cases where the authors have the same last name, their alphabetical order is determined by their initials.
2. If the author name has a space, an apostrophe, or a hyphen in it, it is ignored. For example, the last name “van Praag” is treated as “vanpraag.”

The next step was to take into consideration the possibility of incidental alphabetic authorship; the authors are placed alphabetically even though the author order is decided based on contribution. This is more likely to occur in cases with articles with a relatively small number of authors than in cases with a large number of authors. Thus, it is generally more likely to overestimate the extent of alphabetic authorship in the social sciences compared with the physical sciences. The article uses a similar formula for correcting for incidental alphabetic author order as van Praag and van Praag (2004) and Waltman (2012). The model is formulated based on the notion that authors can either choose alphabetic or contributor author order. First, if you have a set of  $N$  articles where each publication has at least two authors, then let  $n_i$  symbolize the publication’s number of authors, so  $p_i$  symbolizes the probability of the authors intentional use of alphabetic author order. Thus, if the author order is alphabetic, let  $a_i = 1$  and if the author order is contributor, let  $a_i = 0$ . Both  $n_i$  and  $a_i$  can be observed from the bibliographic data, while  $p_i$  must be calculated. The model estimates the probability  $\bar{p}$  that authors intentionally use alphabetic authorship, and is formulated in the following way:

$$\bar{p} = \frac{1}{N} \sum_{i=1}^N p_i \quad (1)$$

Estimating  $\bar{p}$  in Equation (1) is done using the estimator  $\hat{p}$  given by:

$$\hat{p} = \frac{1}{N} \sum_{i=1}^N \hat{p}_i \quad (2)$$

where

$$\hat{p}_i = \frac{a_i - (1/n_i!)}{1 - (1/n_i!)} \quad (3)$$

Thus,  $n_i!$  In Equation (3) denotes the factorial of  $n_i$ , so  $n_i!$  is  $n_i! = 1 \times 2 \times \dots \times n_i$ . Note from Equation (3) that the expected value of  $\hat{p}$  depends on the share of publications with alphabetic author order. Consider the case for two authors. For publications that are not in intentional alphabetic order, one would expect that half are (incidental) alphabetic order while the other half is not alphabetic order. Hence, if the actual share with alphabetical ordering is 80% (hence 20% nonalphabetical), then the estimated share of intentional alphabetical ordering is 60%. However, if the actual share with alphabetical ordering is only 50%, then the estimated share of intentional alphabetical ordering is 0%. Figure 1 shows the estimated probability of intentional alphabetic author order for 2, 3, 4, and 5 authors starting, with 50% of the articles using alphabetic author order.

The study uses the model above to calculate the percentage of estimated intentional alphabetic author order, which it compares and discusses in relation to the percentage of “actual” alphabetic author order. The study only presents the development in alphabetic authorship for articles with two to five authors, since only 1.5–2% of economics and political science coauthored articles have more than five authors. The development over the last 35 years in both fields is presented by dividing the results into different time periods.

*Interview study.* The qualitative study consists of data from 17 semistructured interviews with nine economists and eight political scientists from the same university in Denmark. The interviews occurred in the period from August to September 2017, except for one pilot interview with a political scientist conducted in June 2017. The participants were 11 male and 6 female researchers at different stages in their careers, who all have coauthored at least one

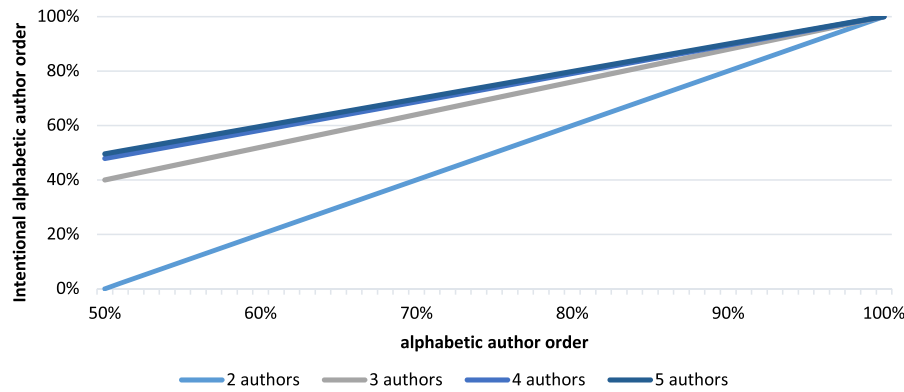


FIG. 1. Probability of intentional alphabetic author order as a function of percentage of alphabetic authored publications and number of authors. [Color figure can be viewed at wileyonlinelibrary.com]

TABLE 3. Distribution of interviewees' adoption of alphabetic or contribution norm.

	Political Science		Economics	
Postdoc: age 30–39	PD_001	Contribution	PD_003	Alphabetic (M)
	PD_002	Contribution (M)	PD_004	Contribution
	PD_007	Contribution (M)	PD_005	Alphabetic
Associate professor: age 30–59	AP_001	Alphabetic (M)	PD_006	Alphabetic
	AP_003	Contribution	AP_002	Alphabetic (M)
	AP_004	Alphabetic (M)	AP_005	Alphabetic (M)
Professor: 40–69	PR_003	Alphabetic (M)	PR_001	Alphabetic (M)
			PR_002	Alphabetic (M)
Senior professor: 70–79	PE_002	Alphabetic (M)	PE_001	Alphabetic (M)

Note. The researcher used either alphabetic or contributor author order, unless there is a parentheses with M, then they mostly adopt the mention norm, but in a few cases use the other norm.

publication. They have between 3–47 years of experience in research. This selection provides insight into changes in the research culture over time and sheds light on researchers' motivation to collaborate and coauthor in different career stages. The interviews focus on different aspects of research collaboration, coauthorship and reward systems, and had a duration between 1–3.5 hours. This article mainly focuses on themes related to alphabetic or contribution author order. Table 3 shows the extent the interviewee adopts either authorship norms.

The article uses quotes from the interviews to substantiate the analysis. The interviews were conducted in Danish, so all of the quotes used in the analysis have been translated. However, the translation is kept as close to the original sentence as possible. In some cases, the quotes are altered to substantiate meaning, shorten sentences, or secure anonymity. However, the symbols in Table 4 show where the alterations are. Furthermore, to secure the interviewees' anonymity, the quotes' reference only displays their professional rank and discipline (see Table 3).

During the analysis, the article will refer to the interviewees according to their field, economics or political science. In case the article refers to both fields, it will refer to them as either social scientists or researchers. The article refers to the group of PhD students and postdocs<sup>3</sup> as junior

researchers and the group of associate professors, professors, and senior professors<sup>4</sup> as senior researchers.

## Results

### *The Extent of Alphabetic Author Order in Economics and Political Science*

Figures 2D and 3A–D show the percentage of (scatter) and estimated intentional (bar) alphabetic author order in economics and political science over 35 years divided into countries and time periods. They show how the estimation of intentional alphabetic authorship corresponds to the percentage of alphabetic authorship. Thus, as the number of authors increases, the difference between measured alphabetic and estimated alphabetic authorship diminishes, and it becomes more likely that the chosen author order is by choice. Furthermore, the figures also show that the trend of alphabetic author order decreases as the number of authors increases.

<sup>3</sup>This article uses postdoc when referring to both postdocs and assistant professors.

<sup>4</sup>Senior professors refer to professors who are at the retirement age, but still active and with fewer formal commitments.

TABLE 4. Quote symbols.

Symbol	Meaning	Intention
(word)	Insert word	To clarify or complete sentence
(...)	Removed words/sentences	To provide a clearer message or secure anonymity
[person]	Replace name	Secure interviewees' anonymity

Figure 2D shows how there has been and is a strong norm for alphabetic authorship in economics. Thus, the changes seem minimal, and the norms seem consistent across countries and time. The results confirm that in economics there is a general norm of alphabetic authorship. These results also correspond with Whitley's description of economics as having high strategic dependence, since the difference between countries' use of alphabetic authorship is small. However, the figures also display how the trend towards alphabetic authorship declines as the number of authors increases.

Figure 3D demonstrates that there is more diversity among political scientists in whether they use alphabetic author order. This corresponds to Whitley's description of political science as having a fragmented research structure in political science and low strategic dependence. However, there still seems to be some trend towards alphabetic authorship, since it is apparent that the estimated alphabetic authorship is higher than by chance. The interviews substantiate this finding, since multiple political scientists stated that they use both alphabetic and contribution author order. The preference of author order depends on the type of collaboration and division of tasks, since they traditionally have used alphabetic author order when the authors' contributions are equal.

No, it is also sometimes alphabetic. ... In this (paper), my colleague had the main responsibility, and that is why he is first author on it. However, the rest of the order is alphabetical, so it is kind of a combi. And then I have some, which I have made with my [supervisor], and some with [research group], and there we use an alphabetic order (PD\_02, political scientist).

Likewise, the interviews with economists support the findings in Figure 2D, where they reveal how there is a strong tradition for and norm for alphabetic authorship. As one professor emphasized "it is the convention in economics" (PR\_01, economist); thus, economists generally agree about this norm. However, many of them have also used a contribution order in cases where the contribution of the authors was unequal, as the quote below illustrates.

Well we have talked about it [and his last name comes before mine], so in that way it [makes sense] (...), so that will be the author order. Unless it is not (...), well if it diverges too much from the 50/50. Now, in the article I'm planning on submitting tomorrow, it is perhaps like 80/20 in my favour, so in that case I will be first (author). Nevertheless, as long as it is around 50/50 it will be him because of the first letter (PD\_03, economists).

Thus, most of the social scientists use alphabetic order if the contributions are judged to be equal, which becomes less likely as the number of authors rises. This can explain the lesser degree to which alphabetic order is applied when the number of authors increases, besides the decrease in incidental author order (see Figures 2D and 3A–D). The bibliometric study confirms the notion that economics is a more rule-governed field, and the norm of alphabetic author order is stronger. Thus, as stated in the Introduction, economics is known for using alphabetic order while political science has not adopted a certain norm. The lack of a norm may also influence that the difference in contribution must be greater in economics than in political science before they use contribution author order.

The figures display how the extent of alphabetic authorship drops at four and five authors. The decreases in alphabetic author order is probably because of the slighter possibility of everyone contributing equally when the number of authors rises. This corresponds to the statements by some of the interviewees who described how the collaborations differ when the number of authors rises, since the extent of the individual authors contributions are more skewed.

I have some where it is alphabetical and I also have some, where it is alphabetical where we have not necessarily considered why it is like that. Whether it is also because (...) it fits both the alphabetic order and contribution order. But I also think it is about ... well it ... the longer author orders, where I have been involved there it is definitely not alphabetic ... order that operates it. Somebody is lead author on it, and then there are also those who are placed ... after that (PD\_07, political scientist).

Thus, as the number of authors rises it becomes the norm to have a lead author, who often executes most of the work, while other coauthors have a smaller role. This way of collaborating fits the division of labor approach, which is common in life and physical sciences where contribution order is the norm (Sundling, 2017; Waltman, 2012). However, this just clarifies why researchers use contribution author order, but not why they apply alphabetic author order.

#### *Why Use Alphabetic Author Order*

During the interviews, the researchers were asked what author order they had chosen on their articles, and why. As stated previously, the political scientists do not agree or adopt one norm of author order. However, the majority of economists stated that alphabetical is the norm, since "It is always alphabetic at economics" (PD\_05, economist). Few of the interviewed economists had reflected over this norm, but there was consensus that it is the *right way* to decide author order. One of the associate professors offered the following explanation for the norm:

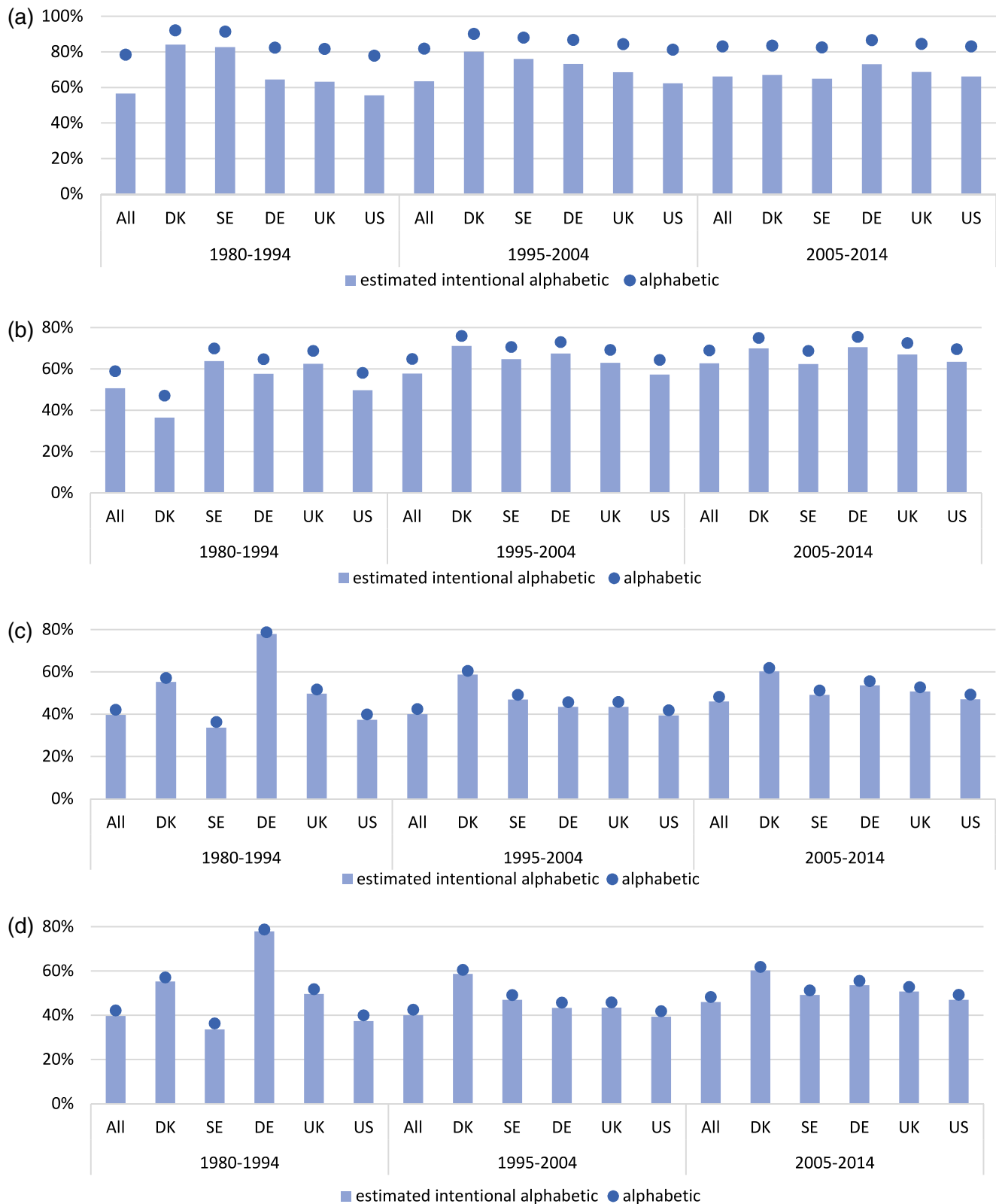


FIG. 2. (A) Estimated intentional (bar) and measured (scatter) alphabetic authorship for two-authored economics articles distributed by country and time period. (B) Estimated intentional (bar) and measured (scatter) alphabetic authorship for three-authored economics articles distributed by country and time period. (C) Estimated intentional (bar) and measured (scatter) alphabetic authorship for four-authored economics articles distributed by country and time period. (D) Estimated intentional (bar) and measured (scatter) alphabetic authorship for five-authored economics articles distributed by country and time period. [Color figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

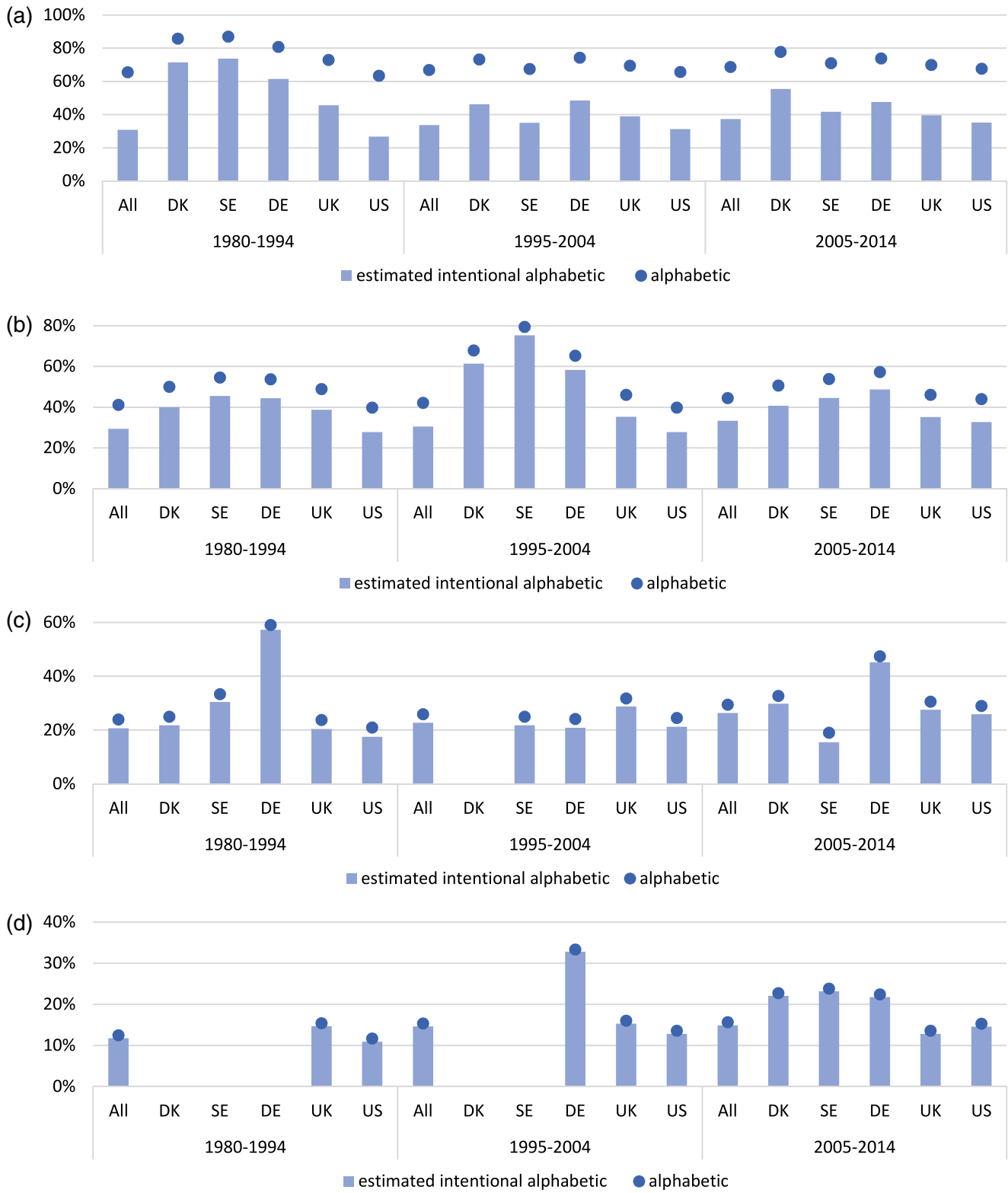


FIG. 3. (A) Estimated intentional (bar) and measured (scatter) alphabetic authorship for two-authored political science articles distributed by country and time period. (B) Estimated intentional (bar) and measured (scatter) alphabetic authorship for three-authored political science articles distributed by country and time period. (C) Estimated intentional (bar) and measured (scatter) alphabetic authorship for four-authored political science articles distributed by country and time period. (D) Estimated intentional (bar) and measured (scatter) alphabetic authorship for five-authored political science articles distributed by country and time period. [Color figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]



I cannot say – if I am totally honest – why this is the chosen way. I could imagine that one of the reasons is that it is because there is no tradition for that many coauthors in economics. Well if you go back, then many of the articles that are written 20–30 years ago often just had one author and maximum two. So then it was perhaps not that important. Maybe, if you have 20 authors then it is perhaps nicer to know who has actually done some of it or if you were just [there] (AP\_05, economics).

Thus, the previous trend of being one or two authors in economics has preserved the alphabetic author order norm. The quote above also highlights the emphasis on actually contributing to the research in economics. Hence, alphabetic authorship may also be a way of preventing the addition of authors who have not contributed, since the byline does not give any insights into the individual coauthor's contribution. The social scientists often compared their field with physical and life sciences, which they perceived to be promiscuous in their coauthor culture.

(...) This also means that in economics compared with the physical sciences so ... it is the same with political science. Economics and political science are not that different in this regard. Well, it is not easy to, if you have your name on the paper, then you have really worked on it (PR\_01, economist).

The researchers emphasized how the high coauthorship standards in their field meant that the number of authors stayed at an appropriate level, and there was no freeriding. This was also the idealistic reason why using alphabetic order makes sense, since it would otherwise be random when everyone contributed equally. The culture of alphabetic author order is so strong in economics that during an interview one of the postdocs reflected over whether the economics journals would change the author order if they did not abide by the alphabetic author order rule at submission.

Well it is ... but I do not actually know. If I, for example, tried to send it in to a (journal), and I did not write us in alphabetic order, whether they still would place us after last name. I think so, maybe. ... Most journals would, maybe, I don't know. I don't know, I have never tried (PD\_06, economist).

Thus, the alphabetic norm in economics is internationally accepted, and it is the overall practice in the field. This confirms that economics has a high strategic dependence; hence, economists orient themselves towards the overall practices of the field. However, when the interviewer questioned the senior economists more thoroughly about the alphabetic norm, they would acknowledge that in rare cases they would deviate from the rule. For example, if they had a longstanding collaboration with one researcher, they would differ in author order depending on who had contributed the most or whose turn it was to be first.

With him, [my colleague] it is like we switch. But, with [my other colleague], we always put it alphabetically, and that is what I usually do because I think it should be alphabetic. It is nonsense to do it differently, and if it is alphabetic then it is good enough. However, with [my colleague], (...) then sometimes we write it so that I am first, and other times he is first. Nevertheless, I generally think, that one should put it in alphabetic order (PE\_01, economist).

This quote illustrates that there are exceptions to the established norm of the alphabetic author order, even among those who advocate it. One of the political science professors had a very pragmatic view on the preference of alphabetic authorship, "If you have a surname early in the alphabet, then you, kind of, think that alphabetic order is okay" (PE\_02, political scientist). Thus, there is an awareness of the lesser visibility of being later in the author order. Still, most senior political scientists use alphabetic order because they view it as the simplest rule, it is the local tradition, and it prevents the need to discuss the extent of each other's contributions.

It is alphabetical authorship (...). We also work on another paper using the same data set, and that is also alphabetical ... and we, and now he is employed on a project, where we also have ... one or more included, and there we also run everything in alphabetical order, and that is really. ... Yes, I think that is, that is the simplest principle (...). I do know that some use the author order to control incentives or who should do the hard work on a paper, or perhaps also if it is a larger project, then it can be important. There are perhaps disciplines where the author order matters more. (...) However, I don't think that means ... that it represents anything in the field of social sciences. Even though some have started to emphasize it more in political science (...). But until now I have run things using alphabetic order unless there has been some special reason to deviate from it (PR\_03, political scientists).

Thus, the quote exemplifies how many of the political scientists use either norm depending on what makes sense in the situation. This shows the low strategic dependence among political scientists, since they orient themselves towards local norms instead of international norms. During the interviews, it also became apparent that there is a clear generation gap in the preferences of either norm in political science. The local tradition for alphabetic order has recently changed, and some of the associate professors described this shift from alphabetic author order being the norm to occasionally using contribution order, even in cases where the contribution is equal.

Until recently, we have had a tradition for (alphabetic order) (...) and then the work was more or less evenly distributed. However, because we can observe an increasing degree internationally, also in political science, that people are beginning to put the one who contributes the most first in line. And the one with the funding, or who has commented on it, or who is the driving force in the background is put last (...). So ... We have started doing [contribution order] more (AP\_01, political scientist).

This quote also emphasizes the greater tendency among political scientists to orient themselves towards an international community instead of the local and national community. Furthermore, it shows a step towards a contribution author order as in the life and physical sciences where the author placement to a higher degree reflects the researchers' tasks on the publication. This quote and the quote in the previous section by a political science postdoc (PD\_07) as well as Figure 3D illustrate how there are changes in alphabetic order norms in Denmark. They show how the trend of alphabetic author order decreases as the number of authors increases, as well as an increasing focus on visibility and credit. Thus, the importance of these becomes greater, since more authors equal more sharing credit, and in some cases a lack of visibility because other studies may refer to it as *first-author et al.*

Furthermore, the reason for the junior political scientists to be more inclined to use contribution order could be the greater competition for tenure positions, which increases the need for junior researchers to stand out in the crowd. The most visible way in academia to show the importance of one's contribution to a publication is first-author credit.

This is of course also important in economics, but the high strategic dependency could be contributing to the stronger tendency of alphabetic authorship in this field. Likewise, when the interviewees were further questioned about why they prefer alphabetic author order, the senior political scientists and the economists emphasized how it is a method to secure that everyone contributes equally to the research and to prevent dispute over the author order. One professor stated that using alphabetic author order reflects a preference to work as *a collegial community* (PR\_03, political scientist), where it is not just one person doing the hard work. Therefore, the alphabetic order should prevent researchers who have not contributed substantially to be added. It should also prevent hierarchy to affect the author order.

But, it seems in some way as a fair allocation in the sense that it is not just those who have tremendous [power]. ... What you can be worried about, it is that young graduate students who feel they have less bargaining power, or are not as good at representing themselves, that they do not end up being first authors, even though they really should be. Whereas, others who contribute less, then end up being first author. So in that way is it fair that you always know it is going to be alphabetic (PD\_06, economist).

Thus, the advocates for alphabetic order stress the fairness of alphabetic order. Often followed by statements like "Then you do not have to get into a difficult decision of who has done the most" (PE\_02, political scientist), or "the alphabetic principle is nice, since it takes out the conflicts in it" (PR\_03, political scientist). However, this does not mean that the researchers are not aware that the position in the byline can mean differences in visibility. Some of the interviewees also described situations where they

were happy that the alphabetic author order gave their coauthor a less visible position. Thus, they were unsure whether they would have followed the alphabetic norm since the contributions had been unequal. By way of example, the case below shows a group of researchers who had invited a student to join them on a publication.

However, (...) we are still so calculating. ... That we were happy that [our coauthor has a surname last in the alphabet], (...) although she really did do her part. But ... still, let us say that [her surname was first in the alphabet], then what? Had we still been able to uphold [alphabetic order]? Or should we have waited to see if [she decided it would be awkward if she was first]. Nevertheless, we did not have that discussion since she happens to be placed last. There are many of these things. ... However, it fitted here, because it would have been strange if she was first (PE\_02, political scientist).

This case illustrates how the alphabetic author order can be problematic if it means that a coauthor with a lesser contribution gets the prominent position. Hence, the alphabetic order can also be the cause of conflict instead of preventing it. The problems with visibility appear several times during the interviews. Some researchers accepted that their surname meant that they were always the last author. However, they are often well-established senior researchers who do not need to prove themselves to stay or to advance in academia. Still, one political scientist described how a long-term collaborator had changed the surname because of grievances over always being moved down the byline. Thus, the new surname would make the collaborator first-author in their future collaborations according to the alphabetic norm. Similar, Einav and Yariv (2006) have found a tendency to change or manipulate surnames in economics to improve one's place in the byline. Therefore, even though the researchers adopt alphabetic author order because it is equalizing and prevents dispute, it seems that it still creates grievances and discriminates.

#### Limitation

These results are limited by the characteristics of the interview sample, since the qualitative study only includes researchers from the same Danish university. Thus, as Knorr Cetina (1999) emphasizes, the epistemic culture that researchers are embedded in is influencing their values and behavior. This of course influences their motives and practices in research. Thus, both the local culture of the researchers' department as well as the country and university have an impact on their research behavior. All of these researchers are influenced by changes in their work life conditions caused by changes in national and university research policies. For example, the increasing internationalization in Danish research during the last 20 years has been instigated by both national and European strategies (Kalpazidou Schmidt, 2012). These strategies have also focused on increasing the general number of researchers by

educating more citizens as well as by attracting foreign researchers to Denmark. The latter means that the work language at Danish universities to a large degree is in English, and the majority of information is in both Danish and English. This means that the research environments orient themselves towards the research norms internationally as well as experiences of having international colleagues with a different research cultural upbringing. Furthermore, studies show that Danish researchers to a great extent engage in international research collaborations (Henriksen, 2018; Kalpazidou Schmidt, 2012).

The bibliometric analysis of author order does not take into consideration the issues with authors having two last names, where the first last name is treated as a second first name during the indexation process (Mongeon, Smith, Joyal, & Larivière, 2017). It is therefore possible that the share of alphabetic author ordered publications is underestimated.

Furthermore, the bibliometric study shows the tendency of alphabetic authorship in Denmark is similar to the trend that is observed in other European countries, and at least for the economic data, it confirms a trend observed in other studies (for example, Laband & Tollison, 2006; Sutter & Kocher, 2004). The inclusion of Asian, Southern European, and Latin American countries would perhaps provide a different picture, since authorship norms are influenced by cultural norms. Therefore, it could be interesting to expand this research by examining whether economists and political scientists in other countries have similar thoughts and experiences regarding the adaptation of either author order norm, as well as researchers in other social science fields.

### Discussion and Conclusion

Previous research of author order often focused on the extent of alphabetic author order (Frandsen & Nicolaisen, 2010; Waltman, 2012), or why it makes sense according to game theory (Ackerman & Branzei, 2017; Engers et al., 1999). This article is the first to apply mixed methods to examine the extent of alphabetic authorship in economics and political science and to explore why researchers use alphabetic author order.

The article finds that alphabetic authorship is the norm in economics, and also across national borders (see Figure 2D). Furthermore, it seems that it will remain the norm for articles with two to four authors, because of the high strategic dependency in the field. Thus, economics has some strong values attached to the communication and presentation of research, including the author order and acknowledgments. Furthermore, the statements by the interviewed Danish economists show how they orient themselves towards an international community and follow the rules of the field. Hence, they put great emphasis on alphabetic authorship being the *right way* and how *we do it*. However, the interviews also reveal how there were exceptions to the rules if the contribution was unequal or if

it was a long-term collaborator. Hence, there was an awareness among the economists about the issue of visibility.

The results for political science are less clear regarding the preferences for alphabetic authorship. Figure 3D display a tendency towards alphabetic authorship in 2–3 authored articles. However, the extent of it differs across countries. This corresponds with the field having a low strategic dependency; thus, research is weakly coordinated on an international level, and instead it is the local level and values that set the frames for how research should be communicated and presented. Thus, when asked about decisions regarding author order, the interviewed political scientists refer to local traditions, which apparently are changing. However, this is not yet visible according to Figure 3D, which displays a trend towards alphabetic authorship. Furthermore, the Danish political scientists explain how, to a large degree, they orient themselves towards the international field where they observe a greater tendency to apply contribution order. Combined with the larger degree of working in an international setting with international colleagues, this seems to bring in new norms. Hence, there is an awareness among the untenured political scientists that if they want to stay in academia, they need to optimize their research communication practice accordingly.

The decrease in alphabetic authorship practices occur for both fields around four to five authors, and it may be influenced by the possibility of equal contribution becoming less likely when more researchers collaborate (Laudel, 2002; Paul-Hus, Mongeon, Sainte-Marie, & Larivière, 2017). Furthermore, the visibility of the individual author decreases at the same time, so researchers may need to ensure that their contribution is noticeable; especially if their contribution is bigger than that of their coauthors. Here, one should not underestimate the influence of the publish-or-perish mantra on research culture. The pressure of publishing was apparent during the interviews as well as the awareness of visibility. These results are similar to the findings by Hangel and Schmidt-Pfister (2017) and Muller (2012), who find that publishing and visibility are ever-present factors that researchers consider when they engage in collaborative projects. Furthermore, the interviews showed that even though the adopted norm can be strong, the researchers sometimes chose to apply the other norm, depending on the situation. Thus, one should be careful with using the author order to interpret the individual researchers research contribution in these fields.

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