Fast, Furious and Dubious? MDPI and the Depth of Peer Review Reports

Abdelghani Maddi (abdelghani.maddi@cnrs.fr)
GEMASS – CNRS – Sorbonne University https://orcid.org/0000-0001-9268-8022
Chérifa Boukacem-Zeghmouri
Université Claude-Bernard-Lyon-1 https://orcid.org/0000-0002-0201-6159

Research Article

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Abstract

Peer review is a central component of scholarly communication as it brings trust and quality control for scientific knowledge. One of its goals is to improve the quality of manuscripts and prevent the publication of work resulting from dubious or misconduct practices. In a context marked by a massification of scientific production, the reign of Publish or Perish rule and the acceleration of research, journals are leaving less and less time to reviewers to produce their reports. It is therefore is crucial to study whether these regulations have an impact on the length of reviewer reports. Here, we address the example of MDPI, a Swiss Open Access publisher, depicted as a Grey Publisher and well known for its short deadlines, by analyzing the depth of its reviewer reports and its counterparts. For this, we used *Publons* data with 61,197 distinct publications reviewed by 86,628 reviewers. Our results show that, despite the short deadlines, when they accept to review a manuscript, reviewers assume their responsibility and do their job in the same way regardless of the publisher, and write on average the same number of words. Our results suggest that, even if MDPI's editorial practices may be questionable, as long as peer review is assured by researchers themselves, publications are evaluated similarly.

JEL-codes

D8; L82; D43; L13.

Introduction

Peer review is at the heart of the crucial question of trust and quality control in scholarly communication. And while researchers agree that it is “an imperfect” system, they also agree that it is “the best system ever” to assess the quality of scientific papers and guarantee integrity (Rodríguez-Bravo et al., 2017). Scientific integrity is indeed a fundamental pillar of the scientific community, ensuring that published results are reliable, reproducible, and adhere to high ethical standards. This is why peer review is a key process for maintaining the integrity of the scientific community and advancing knowledge in the field (Nicholas et al., 2015). It also helps to ensure this integrity by ensuring that scientific works are reviewed by independent experts in the same field.

Peer review process, a true free labor of researchers for their community (Copiello, 2018), also embodies the concept of gift and counter-gift developed by Robert K. Merton (Merton, 1973): the peer reviewer takes time for free to put his or her expertise at the service of a paper produced by a peer in his or her community. Researchers take time and do effort in preparing their work for submission, and then in responding to feedback and making revisions. Additionally, serving as a peer reviewer also takes time and effort for researchers, as they must critically evaluate the work of others and provide constructive feedback.

However, the pressure to publish rapid and significant results can sometimes lead to inconsistencies or distortions in data, and peer review can have its flaws and limitations. For instance, bias or conflicts of

interest of the reviewers, or inadequate or substandard review of the manuscript (Lee et al., 2013; Demarest, Freeman and Sugimoto, 2014).

To address these issues, post-publication peer review platforms like Pubpeer.com are part of a dynamic that aims to provide an opportunity for additional, potentially more critical and independent evaluation of published articles. These platforms allow for comments and discussions to be made publicly available, adding transparency and accountability to the scientific community (Ross-Hellauer, 2017; Tennant et al., 2017). It is therefore important to ensure that evaluation processes are impartial and independent, and to raise awareness among scientists of the need to practice ethical and honest science.

In recent years, expressions like "peer review crisis" (Flaherty, 2022) or "reviewer fatigue" (Cochran, 2015) raised to depict a phenomenon determined by several factors. Driven by national research systems with strong incentives to publish, the number of scientific articles has been increasing over the last twenty years. Scientific journals are facing an influx of submissions that are difficult to process (evaluate) in a short time. As a result, the evaluation process deadlines have been extended for most scientific journals. It also occurred an excessive demand made on researchers. According to a report by *Publons* (Publons, 2018), 70% of researchers decline invitations. Similarly, 10% of reviewers do 50% of the peer review work. Furthermore, editorials have expressed alarm at the lack of time available to researchers for this task, which is crucial to the health of scientific communication (DeLisi, 2022).

The Covid-19 pandemic has also exacerbated the peer review crisis with an unprecedented acceleration of the pace, particularly in the health. The use of Artificial Intelligence (AI) is becoming an increasingly discussed scenario, especially with the current ChatGPT debate (Hosseini M and Horbach SPJM, 2023). The aim is to provide review assistance to who will be able to run some tasks automatically, in order to better focus on the scientific expertise of the paper and the qualification of its quality.

MDPI, in the midst of a controversy

There are some exceptions to the extension of the evaluation process deadlines for some publishers and MDPI (Multidisciplinary Digital Publishing Institute) is among them. MDPI is a Swiss Gold Open Access publisher founded in 1996 that publishes online scientific journals. Over the years, MDPI has become an important publisher in the scholarly publishing market, offering journals in many areas such as chemistry, environment, energy, medicine, life sciences, and social sciences. The company strives to provide an accessible and open publishing platform for researchers worldwide by offering free access to research published on its website (author-pay model). In 2019, MDPI published over 200 online journals. One of the strengths of this publisher is that it offers as a “Push" strategy (Brocato, 2010) very short deadlines compared to those of historical publishers and main competitors (ex. Springer Nature or Elsevier) who own a big part of the publishing market (Larivière, Haustein and Mongeon, 2015). Besides, its business model, at least, meets the requirements of open science publishing, as it has been highlighted by a report from the Open Science Commission[1]. Besides, MDPI the Guest Editor model very popular even in STM

fields and many of its journals are indexed in the Journal of Citation Report, attracting authors to submit papers (Oviedo-García, 2021).

The rapid growth of this publisher raises many questions and its practices have earned it many criticisms within the scientific community(Oviedo-García, 2021). MDPI is criticized for several reasons, including the quality of peer review, editorial practices, and conflicts of interest (Ioannidis, Pezzullo and Boccia, 2023). Some stakeholders in the scientific publishing market criticize the quality of articles published by MDPI, claiming that the peer review process is not rigorous enough to ensure the quality of published articles. Additionally, some accuse MDPI of dubious editorial practices similar to those of predatory journals, such as excessive promotion of certain journals or articles. While for others, MDPI belongs to the category of grey publishers (Siler, 2020) who brings together in their portfolios the worst and the best of editorial practices. The alarming increase in the number of thematic issues has been decried (Crosetto, 2021) and is in turn fueled by recent resignations of journal editors in chief announced on Twitter[2].

It's important to note that these criticisms are just one viewpoint in the scientific community and there are also many positive opinions about MDPI and its publishing model (speed of the peer review process and open access to publications).

Research question

Tightening deadlines can lead to a lack of time for reviewers to conduct a thorough and rigorous evaluation of the evaluated papers. Moreover, increased pressure to complete the review quickly can reduce the motivation and engagement of reviewers, which can lead to a decrease in the quality of the review. Furthermore, a review deadline that is too short can result in omissions or errors in feedback, making it difficult for authors to improve their work in response to reviewer comments. Finally, a quick evaluation can reduce confidence in the peer review process and in the published results. This is why, in this paper, our research question addresses one of the most frequent criticisms against MDPI, namely the length and thus the quality of peer review process:

Can we observe an impact of the short deadlines given by MDPI to its peer reviewers on the length and quality of their reports?

To address our research question, we used a proxy to analyze the depth of reviewers' reports, namely the number of words they contain. We hypothesize that the reports of MDPI editor reviews will be relatively shorter, given that referees did not have much time to produce them. Thus, we used data from the *Publons* platform to compare the average size of reviewer reports for MDPI and that of other publishers. To ensure that we are comparing what is comparable, we constructed a control group of publications sharing the same characteristics as those of MDPI (discipline, type of journal, open access, etc.) from the WoS database.

[1] https://unimibox.unimi.it/index.php/s/86RPXTPqBrcdrap

[2] https://twitter.com/GemmaDerrick/status/1636719477042692096

Data and method

Publons Data

Publons is an online platform that tracks, verifies, and showcases researchers' peer review contributions and activities. The platform was founded in 2013 with the aim of providing researchers with visibility and recognition to their peer review activities and achievements. *Publons* allows researchers to see a full history of their peer review activities, including those performed anonymously, and to receive recognition and credit for their contributions to the scientific community (Teixeira da Silva and Nazarovets, 2022). The platform provides a secure and confidential environment for researchers to manage their activities, making it easier for them to track their contributions and receive recognition. The platform also provides insights and data to publishers, institutions, and funding bodies to help them make informed decisions about research and funding.

Publons is now part of Clarivate Analytics, a global company that provides insights and technology solutions for various industries, including academic and research publishing (Web of Science – WoS database). *Publons*, as a platform for managing and showcasing peer review contributions, has become a valuable asset for Clarivate Analytics in its mission to support the research community and improve the scientific publishing process. The acquisition by Clarivate Analyics in 2017 has allowed *Publons* to expand its services and reach a wider audience, while still maintaining its commitment to transparency and recognition for peer reviewers.

Publons also made available more than 300,000 items designating the characteristics of referee evaluation reports in journals: average word count, country of referees and journals metrics. As part of this study, *Publons* made its database available by adding article identifiers (WoS UT). This allowed us to easily match *Publons* data with that of the WoS database and add other variables. Our final dataset contains 61,197 distinct publications reviewed by 86,628 reviewers. *Publons* database provides a word count per review.

Web of Science data

The data about citations scores and disciplinary assignation of publications has been extracted from the French "*Observatoire des Sciences et Techniques*" (OST) in-house database. It includes five indexes of WoS available from Clarivate Analytics (SCIE, SSCI, AHCI, CPCI-SSH and CPCI-S. for more information see: https://clarivate.com/webofsciencegroup/solutions/webofscience-platform/) and corresponds to WoS content indexed through the end of November 2020. We have limited the analysis only to the original contributions; i.e., the following documents types: "Article", "Conference proceedings" and "Review".

Method

We extracted publications from the MDPI publisher from the *Publons* data, in order to compare the length of the reviewers' reports concerning them. Since the length of the reviewers' reports can strongly depend on the intrinsic characteristics of publication (for example the discipline), we extracted a set of publications sharing exactly the same characteristics as those of MDPI (see Fig. 1). We also identified publications that are not part of either MDPI or the control group.

Thus, in this study, we compared the length of reviewers' reports for these three datasets (MDPI, control group and *Publons* outside MDPI).

Results

In this section, we first present some descriptive statistics of the *Publons* database: distribution of publications by country, distribution of reviewers by country, evolution of the average number of words in reviewer reports over time, and average number of words by discipline. Second, we compare the average number of words in reviewer reports in the *Publons* database, those of MDPI journals, and those of a control sample sharing the same characteristics as MDPI (e.g., disciplinary distribution).

Descriptive statistics

Figure 2 below shows the geographical distribution of the publications in the *Publons* database.

Figure 2 shows that the distribution of countries in the *Publons* database is strongly similar to that of the WoS database as a whole (see appendix). Thus, the significant weight of high-income countries such as the United States, China, the United Kingdom, and Germany is observed in this database. However, it should be noted that some countries are overrepresented in the *Publons* database, mainly some countries of northern Europe, Australia, and Iran. This result is to be expected, especially for countries like Norway, Sweden, or Finland where open peer review practices are highly present. On the contrary, several African countries are not represented in the *Publons* database. In other words, the metadata of the reviewer reports is not available for the publications from these countries.

Figure 3 shows the distribution of reviewers based on their country of affiliation in *Publons* database. It is important to note here that the data provided by *Publons* does not allow for disambiguation of authors, as their names are not available. Therefore, for example, if an American reviewer evaluated five papers and uploaded their reports to *Publons*, they will be counted 5 times for the USA. This means that Fig. 3 simply represents the number of reviews performed by the country of affiliation of the reviewer and not the number of distinct reviewers by country. This means there are two factors that can impact the number of reviewers by country: 1) the extent to which scientific journals solicit researchers from that country to review papers, and 2) the degree of voluntarism of these researchers to upload the metadata of their reports to *Publons* (or allow the journal to do so on their behalf when they agree to review a paper).

As seen in this figure, the distribution of reviewers by country is significantly different from that of publications. For example, although China is the world's largest producer of scientific publications

(Tollefson, 2018), its weight as a paper reviewer remains very low (2728 reviews, which represents 3.15%), while its weight in the total number of publications exceeds 20%. This result is striking in that it shows that scientific research, even though it is becoming increasingly internationalized, remains strongly controlled by American and to a lesser extent, European researchers. This is to be expected given that a majority of important scientific journals come from these two continents and naturally solicit local researchers. Researchers from emergent countries are contributing by their outputs but not yet by their expertise to the scholarly publication system.

Another striking result (besides the 23.73% from the US and 9.72% from the UK) is the strong presence of researchers from certain countries, which are relatively lower ranked in terms of publication numbers, such as Italy in third position and Australia in fourth. This is also the case for Portugal, Sweden, Switzerland, and the Netherlands. However, these results should be approached with caution as the data also depends on the commitment of researchers to open peer review and, more broadly, open science.

Table 1
Number of reports by year and overall descriptive statistics on their length

# Reports	**N = 86,628**[1]
Length-review-words	Med.: 305 [429–470]
Period	
1999	12 (< 0.1%)
2000–2005	503 (0.6%)
2006–2010	4,072 (4.7%)
2011–2015	19,550 (23%)
2016–2020	62,491 (72%)
[1] Med.: Median [Mean - SD]; n (%)	

Table 1 shows the year-wise distribution of reports and the median, mean, and standard deviation of the number of words in the *Publons* platform. It can be observed that 95% of the available reports in our database pertain to publications between 2011 and 2020. This is due in part to the creation date of this database (2013), so few reviewers publish their reports retrospectively. Furthermore, the table indicates that the average number of words per report is 429 words, with a standard deviation of 470. In other words, the variability of report size is very large within this data set.

Now let's take a look at the evolution of the distribution of the number of words per report over time. Figure 4 shows that, overall, the size of reviewer reports has remained stable throughout the period. The average number hovers around 500 words. Furthermore, the box plot shows the presence of extreme

values, representing reports that are several pages long, with a maximum of 13671words (and minimum of 1 word). In this figure, for better readability, only the number of words between 50 and 2000 words are displayed.

Figure 5 displays the average length of reviewers' reports (in number of words) by discipline. We used the 27-panel disciplinary classification of the European Research Council. This classification assigns the Web of Science subject categories to at least one of the 27 panels. The 27 panels are further divided into 3 broad disciplinary domains, namely: “Physical Sciences and Engineering” (PE), “Life Sciences” (LS) and “Social sciences and humanities” (SH). It was developed by the *Observatoire des sciences et techniques* (https://www.hceres.fr/en/science-and-technology-observatory-ost). This disciplinary classification is available at this link: https://doi.org/10.6084/m9.figshare.21707543.v1.

As it can be seen in Fig. 5, the average length of reports varies greatly among disciplines. Reviewers in the Humanities and Social Sciences write, on average, the longest reports (what was to be expected), followed by Life sciences. For example, the average length is about 700 words in “The Study of the Human Past” and “The Human Mind and Its Complexity”, followed by “Environmental Biology, Ecology and Evolution” and “Neuroscience and Disorders of the Nervous System” with an average length of reports around 600 words. On the other hand, in Physical Sciences and Engineering, reviewers tend to write relatively short reports. In the majority of PE disciplines, the average length does not exceed 320 words.

Table 2
Number of publications per dataset, 2013–2020

Dataset	**2013-16**	**2017-20**	**Total**
MDPI	314	457	**771**
Control group MDPI	309	854	**1 163**
Publons outside MDPI	16 467	36 011	**52 478**
Total	**17 090**	**37 322**	**54 412**

Table 2 shows the distribution of publications in *Publons* according to whether they are published by MDPI or not. Thus, out of the 54,412 publications over the period 2013–2020, 771 are published by MDPI. The control group, consisting of publications that share exactly the same characteristics (disciplines, open access, type of journal based on the impact factor, etc.) as those published by MDPI, consists of 1163 publications. Finally, the other publications present in *Publons* and which are not in the first or second dataset make up the vast majority, i.e. 52,478 publications. We divided the data into two periods: 2013–2016 and 2017–2020. The goal is to analyze whether the length of reviewers' reports evolves over time.

The Fig. 6 shows the average number of words in reviewers' reports, according to the dataset and period. The most striking result, contrary to our hypothesis, is that the average number of words for MDPI reviewers is not lower than that of the control group or even *Publons* (excluding MDPI). The average length is around 500 words for the first period in all three datasets. For the second period, there is a significant decrease in the average number of words for the control group and *Publons* excluding MDPI. The average number of words in MDPI reports remained stable over the period. Given the significant variability in the length of reviewers' reports, we prefer to be cautious about interpreting the observed decrease in 2017–2020. In any case, the results clearly indicate that MDPI reviewers do not write less than those of other publishers, at least in the *Publons* dataset. This result should also be taken with caution, given the representativeness of the *Publons* database (see the section on study limitations).

Conclusion

In this paper, we aimed to verify if the short review times applied by MDPI negatively impact the depth of peer review, measured by the average number of words in reviewer reports. To do so, we used data provided by *Publons*, consisting of a dataset of 61,197 publications and 86,628 reviewer reports. We also examined the structure and disciplinary/geographical composition of this dataset.

Several insights can be drawn from this analysis, most notably that the length of MDPI reviewer reports is not lower than that of reviewers in other journals, contrary to our initial hypothesis. Even we acknowledge that MDPI reviewers may also review publications for other publishers, our findings show that they write, on average, the same number of words in their reports and that shorter review times do not seem to affect the quality (or at least the depth) of their evaluation. This shed light on how researchers, through their voluntary evaluation work, perform the same quality peer review, whatever the reputation of the publisher. By doing that, they do help to legitimise grey publishers.

Besides, *Publons* data analysis allowed us to highlight several related results that deserve to be mentioned here. One of the most interesting is the fact that, even though emerging countries have made significant progress in terms of the number of publications, such as China becoming the world's top producer or India ranking in the top 3 (according to the Scimago ranking of 2022, see : https://www.scimagojr.com/countryrank.php?order=itp&ord=desc&year=2022), peer review remains heavily concentrated in Europe and the United States. The majority of reviewers for international journals (indexed in WoS) are either American or European. This issue of diversity among reviewers solicited by these types of journals is not yet well analyzed, to our knowledge, in the existing literature and deserves special attention (for a more inclusive and diversified science).

Another interesting finding, is the extent to which our study confirms from the data the strong contrast in terms of the length of reviewers' reports according to discipline. Reviewers' reports are relatively short in technical disciplines, such as mathematics or computer science, while they are significantly longer in the humanities and social sciences (followed by life sciences).

In terms of following up this research, one of the interesting questions would be which geographical areas, and more specifically which countries, contribute most to MDPI in terms of peer review reports. This question would bring a better understanding of the status of MDPI regarding the global scientific community.

Discussion

The current scientific publishing market operates according to the rules of an oligopolistic market (Larivière, Haustein and Mongeon, 2015), in which a limited number of publishers have control over the majority of scholarly journals. Elsevier, Springer Nature, Wiley, Taylor & Francis, and Sage currently hold over 70% of the market share (Besancenot and Vranceanu, 2017). The barriers to entry in this market are so high that in order to succeed, a new entrant must adopt "Push" strategies (Brocato, 2010) by reaching out to researchers. Surviving in this market is tuff, and publishers need to raise incentives for researchers to encourage them to publish in their journals, without being too intrusive.

On the economic side, MDPI seems to have found the right formula, given its spectacular progression since its launch and the indexing of many of his journals. Putting open access (author-payer) at the center of its economic model, with an editorial support meeting all the eligibility criteria to be indexed in international databases such as WoS and Scopus and finally convincing some highly renowned researchers to manage special issues in several disciplines. This in turn gives it a certain progressive reputation, since indexing in international databases is in itself a guarantee of quality and legitimacy and constitutes a strong incentive for researchers to submit their research there. To top it off, MDPI offers very short deadlines, allowing for rapid publication while meeting institutional requirements to be indexed in international databases. At the same time, competitors like Taylor & Francis, well considered and seen as legitimate, are offering accelerated publication services aligning publication speed with APC rate[3].

We can see here a good formula for breaking into this oligopolistic market. Are WoS and Scopus the "Achilles' heel" of the scientific publishing market?

Some stakeholders in the scientific publishing market, including some open access advocates and institutions, are outraged by these practices and accuse publishers like MDPI of being a grey publisher, on the border of predatory publishers (Crosetto, 2021). The reality is more complex and lead to shed light on nuances to find the right balance. Certainly, the scientific community of the 21st century increasingly wants a world in which research results are accessible to all without obstacles or limitations. In the meantime, the current system of scientific publishing, that has built over the years, is not based on the principles of open access. Wanting scientific publishing to be open access and without an economic model raises questions about its sustainability and funding.

Limitations

By using *Publons* data, we are aware that it is not representative of all reviewer reports from MDPI or the scientific community as a whole. This said, we must add that these data is the only data available to

date. Therefore, it is possible that the reviewers who post their reviews on *Publons* are those who contribute the most and this should be generalised and not only apply to MDPI reviewers. Given this possible selection bias, it would be interesting to conduct further studies of this type to confirm (or not) our results.

[3] https://taylorandfrancis.com/partnership/commercial/accelerated-publication/

Declarations

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Compliance with Ethical Standards

The authors have no relevant financial or non-financial interests to disclose.

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Figures

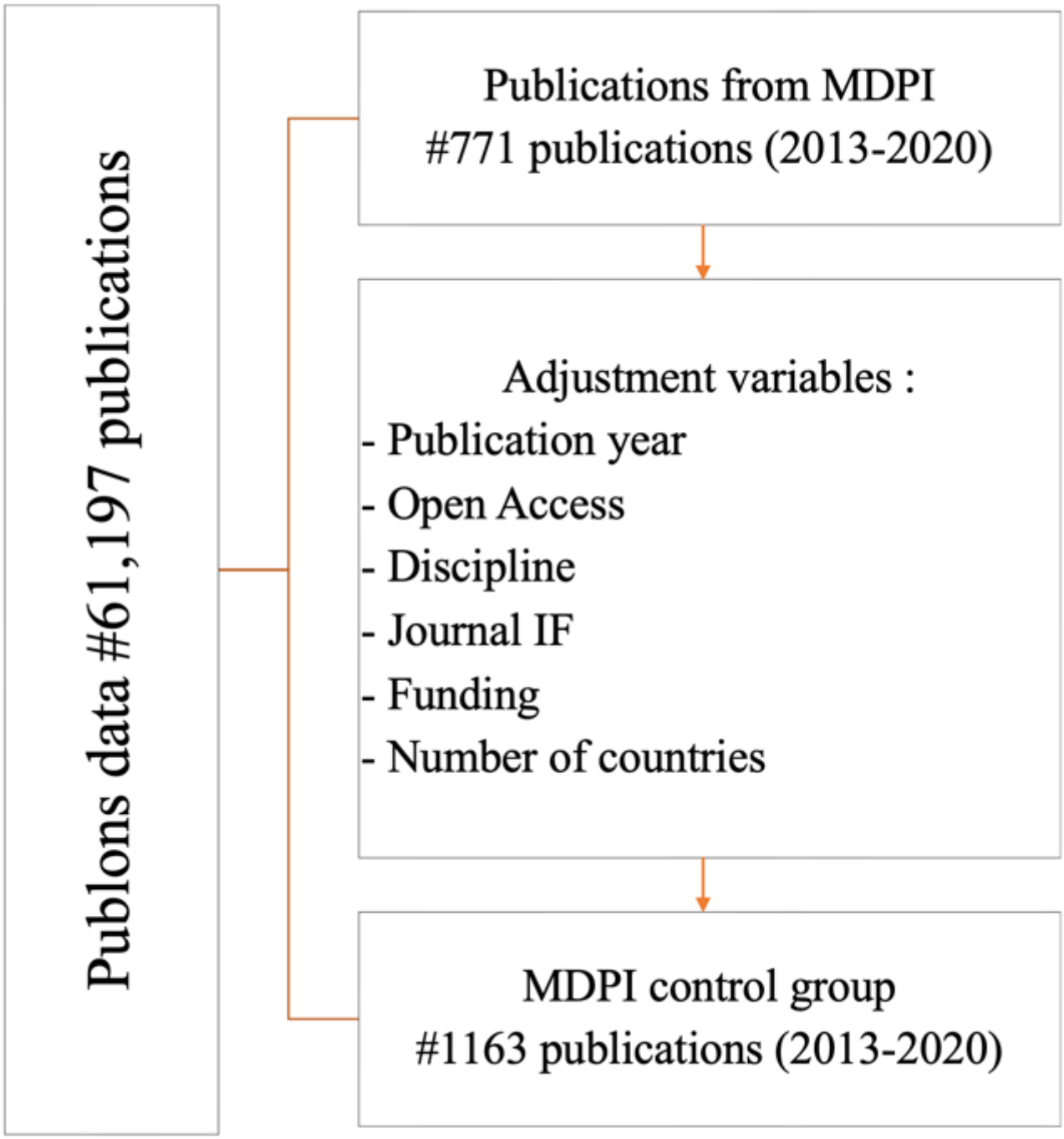

Figure 1

MDPI and control group data extraction method.

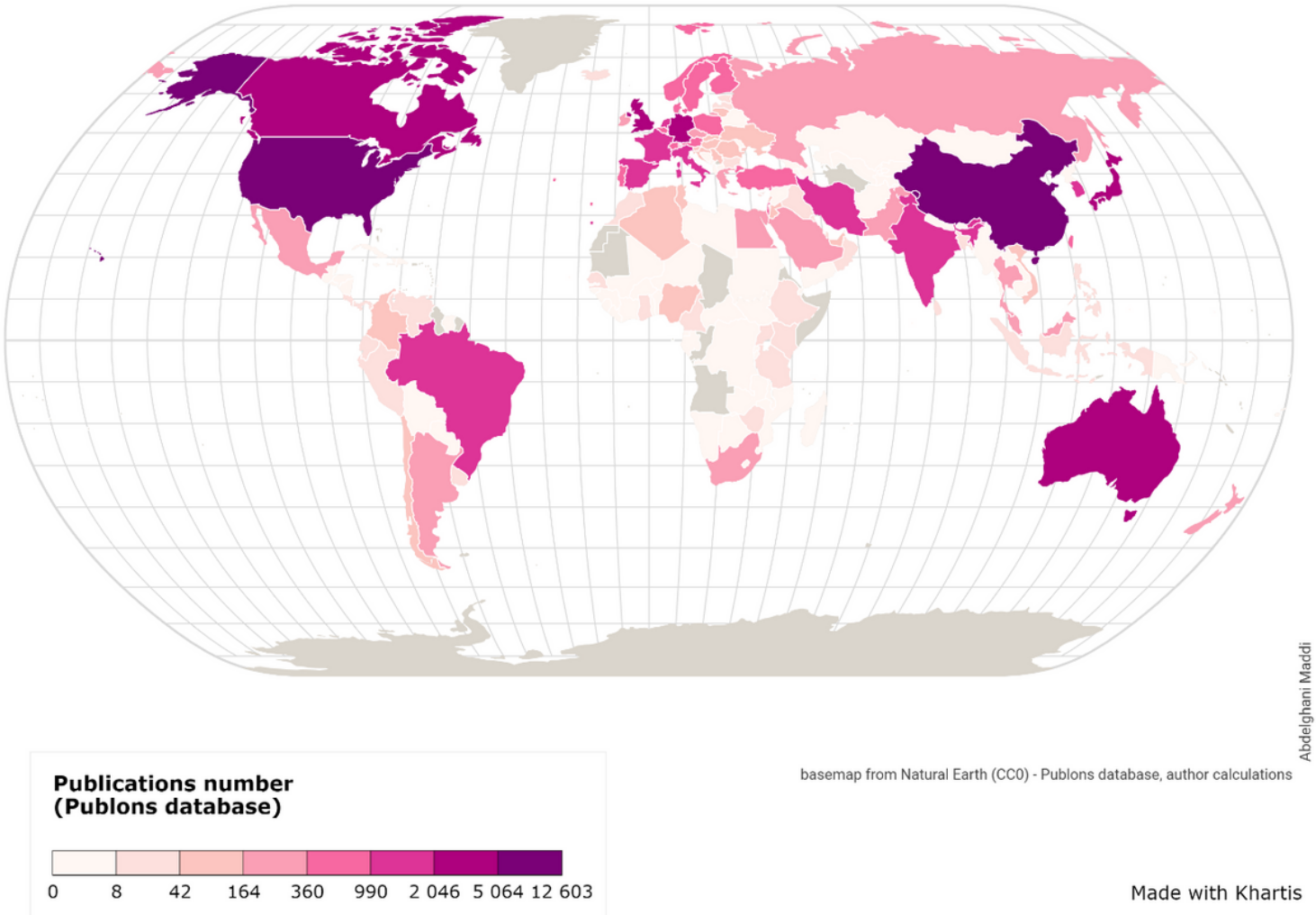

Figure 2

Geographical distribution of the publications in the Publons database

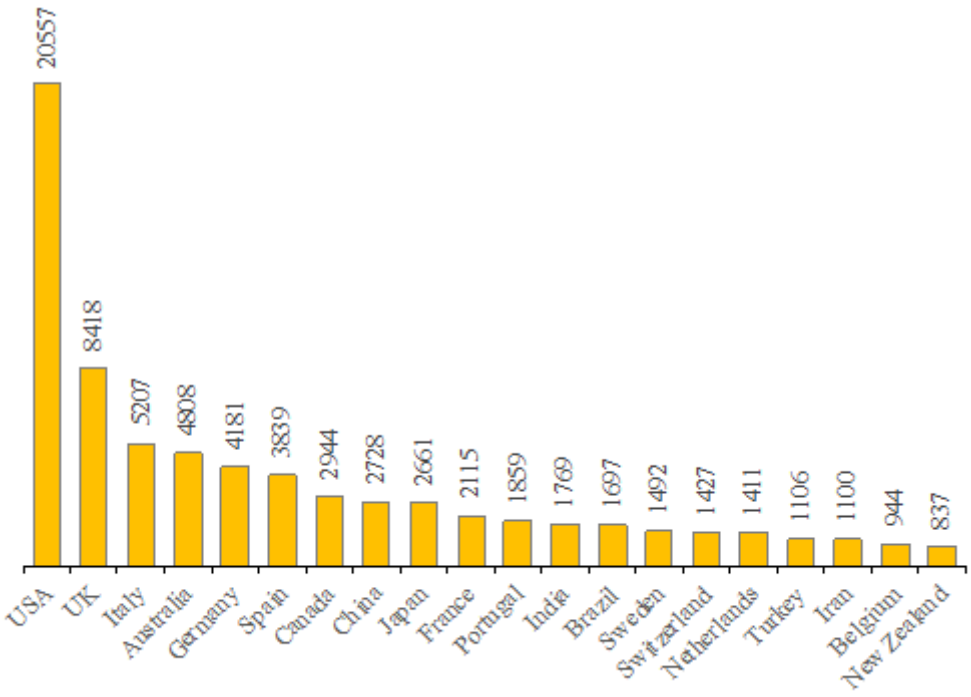

Figure 3

Distribution of the number of reviewers by country (top 20) in *Publons* database

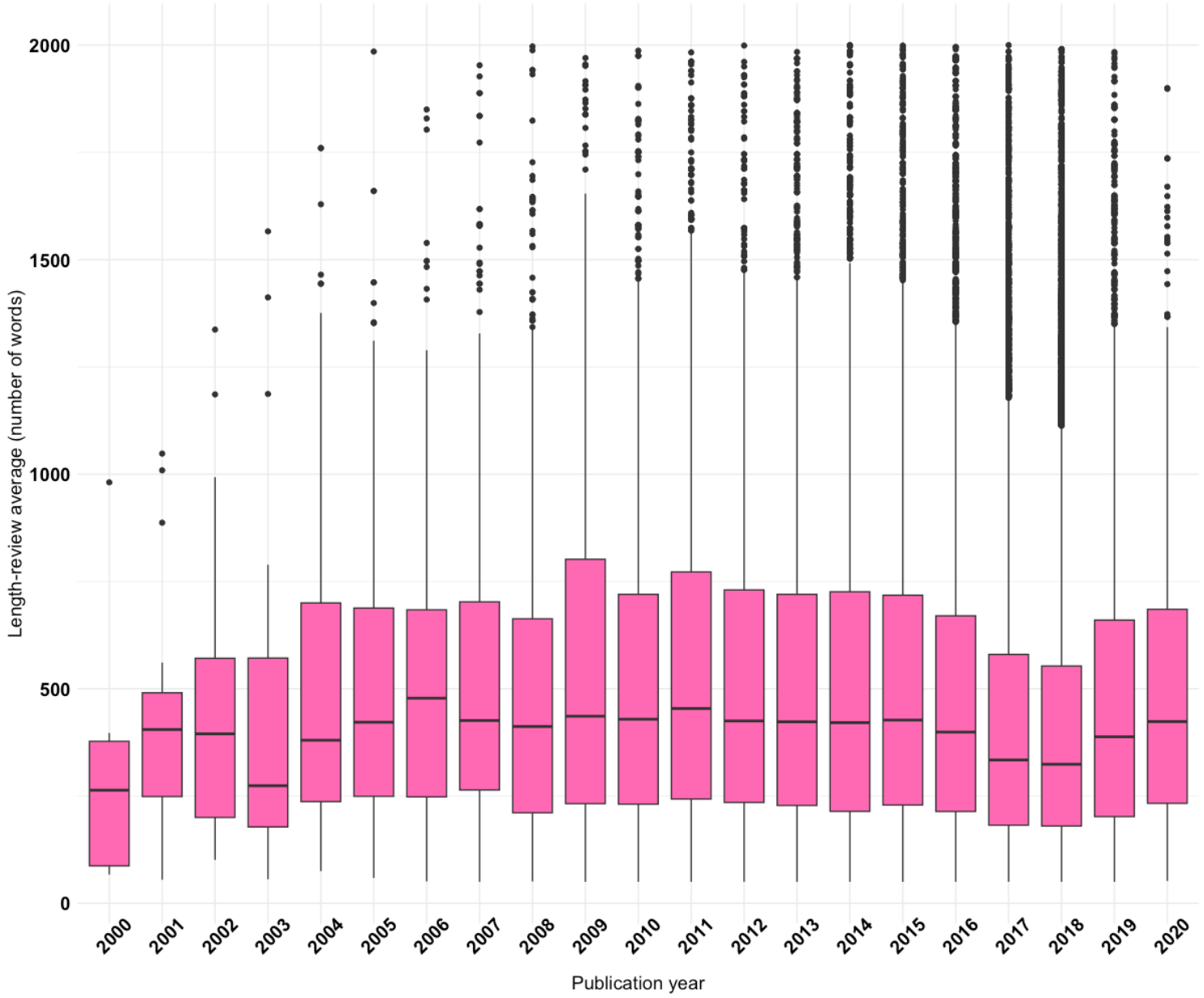

Figure 4

Distribution of length-review (number of words) by year

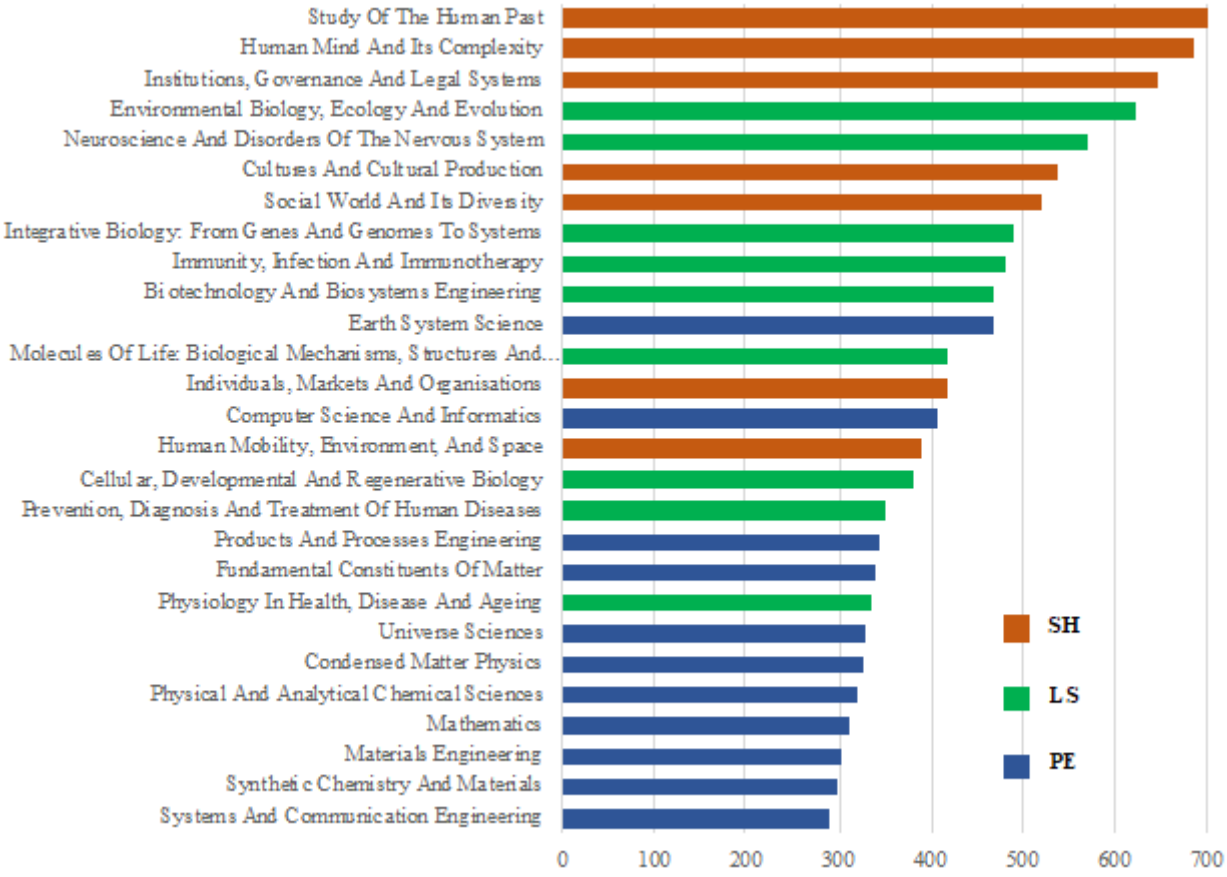

Figure 5

Length-review average by discipline

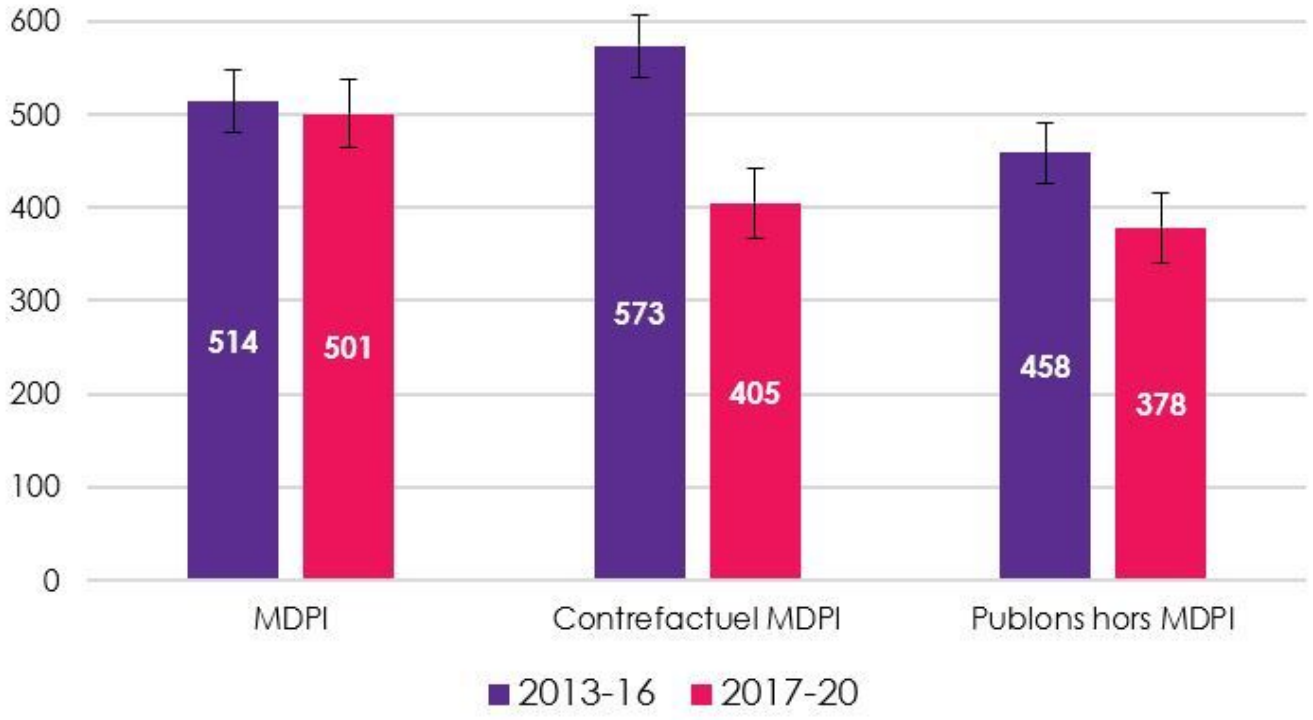

Figure 6

Average number of words per dataset, by period

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Appendices.docx