MINING THE AUTHORS CATALOG OF THE RUSSIAN ACADEMY OF SCIENCES: SOME STATISTICS ON LEONHARD EULER'S PUBLICATIONS

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ABSTRACT

Leonhard Euler, one of the most influential mathematicians of the 18th century, has been accredited for introducing a significant portion of modern mathematics. Since its founding, Euler has been an active member of the Imperial Russian Academy of Sciences in Saint Petersburg. With an emphasis on the era of Leonhard Euler's influence, this study explores the intellectual output of the Russian Academy of Sciences throughout the 18th century. Scholarly work published by the Academy was collected and analyzed by examining various aspects, including authorship and disciplinary trends. Our primary source is the detailed catalog of the Academy published in the nineteenth century by Paul Heinrich Fuss, the secretary of the Imperial Academy. Mining data in this catalog, our findings reveal key contributors, publication patterns, and the evolution of scholarly focus within the academy. Euler emerges as a dominant figure whose prolific output significantly shaped the academy's intellectual landscape. The study provides insights into the academy's development and the additional context of Euler's groundbreaking work.

KEYWORDS

Leonhard Euler, Russian Academy, Prussian Academy

1. INTRODUCTION

The eighteenth century was a metamorphic period for Europe. The concepts of reason and intellectualism gained widespread acceptance throughout the Western world. This era is commonly called the Age of Enlightenment, built upon the ideas from the Scientific Revolution of the preceding centuries. Experimentation, observation, reason, and critical thinking became central themes to the ideas of Enlightenment.

Several European countries established their scientific academies during the Age of Enlightenment. The most notable ones are the Royal Society of London, the Paris Academie des Sciences, the Prussian Academy of Sciences, the Royal Swedish Academy of Sciences, and eventually, the St. Petersburg Academy of Sciences joined this cohort. These academies facilitated the ideas of Enlightenment by publishing scientific journals and encouraging communication among scholars. Our academy of interest is the Imperial Russian Academy of Sciences in Saint Petersburg, where Leonhard Euler was an active member. He joined the St. Petersburg Academy in 1726 upon being invited by Daniel Bernoulli. He remained an active member until his death in 1783.

Our main source for this paper is the authors catalog of the Russian Imperial Academy: ”Registre alphabétique des noms des auteurs : dont les pièces sont insérées dans les différents recueils”, published by Paul Heinrich Fuss in 1846 [7]. Paul Fuss was a secretary of the Academy. Nicholaus Fuss's father was a mathematician in the academy working with Euler. Like Euler, Nicholaus Fuss was also of Swiss origin and was married to Leonhard Euler’s granddaughter Albertine Benedikte Philippine Luise Euler (1766-1822) [9].

Leonhard Euler was a Swiss mathematician active during the 18th century. Euler is considered to be one of the most prolific and influential mathematicians in the his- tory of mathematics [8, 12]. Euler’s work was a catalyst that shaped the intellectual development of the era, stimulating further contributions to the evolution of Mathematics. Euler’s work ignited a movement that fostered collaborations between renowned mathematicians which led to groundbreaking advancements in the field and laid a foundation for modern mathematics. We will understand his many contributions to mathematics via this study, many of which are still essential today. A third of all the mathematical and scientific research published as papers during the 18th century has been authored by Euler [12].

The origins of Euler’s revolutionary mathematical journey have been attributed to his early years as a student of Johann Bernoulli - one of Europe’s first formal mathematicians. His scholarly work began when he became an associate at the Russian Academy in 1727. When he joined the academy, the chair of mathematics was Daniel Bernoulli, but soon enough he took over that position. Euler actively contributed to the Russian Academy of Sciences publications throughout the 18th century. In order to understand the patterns of his development as a mathematician and the expansion of mathematics at the Academy, we examine his contributions to the Russian Academy and contrast them with events in his personal life.

2. RELATED WORKS: THE FRENCH ACADEMY OF SCIENCES

This study draws inspiration from ”The Academie Royale des Sciences, 1699-1793: A Statistical Portrait.” by McClellan [1]. We aim to present a statistical report on the well-known fact that Euler shaped mathematics in the eighteenth century. Similar to the referred paper, we delve into the catalogs of publications by Russian scholars to provide evidence of Euler’s groundbreaking work. The French Academy is also of interest to us because of the heavy influence it had on shaping the academic atmosphere in Europe.
Many scientific academies established in Europe in the eighteenth century (such as the Imperial Academy of Sciences in St. Petersburg and the Royal Academy in Prussia) were modeled after the French Academy of Sciences established in the seventeenth century by Louis XIV.

The French Academy of Sciences, or the Academie Royale des Sciences, from 1699 to 1793, was a prominent scientific institution. The Academy, which was founded under royal support, had a significant influence on scientific research and theory in eighteenth-century Europe.

The French Academy was set up with different divisions for specialized and multidisciplinary research, including chemistry, natural history, mathematics, astronomy, mechanics, and physics. This organizational structure promoted collaboration and a comprehensive approach to scientific investigation, creating a setting where theoretical study and real-world applications coexisted. Leading scientists and intellectuals of their era, the Academy’s members worked on various tasks, from the invention of scientific

tools and technology to astronomical observations and mathematical investigations.
Through its publications and journals, the Academy also contributed substantially to the dissemination of scientific knowledge and the concepts of the Enlightenment throughout Europe. It established rigorous criteria for scientific proof and rigor that significantly impacted scientific procedures outside of France.

The Academy's vital role in furthering research is highlighted by James E. McClel- lan III's statistical analysis of the organization [1], which thoroughly examines its membership, operations, and scientific output. His work demonstrates how the Academy has facilitated intellectual exchange and scientific innovation, positioning it as a crucial organization in advancing contemporary science. The Academy's model for scientific societies has had a long-lasting impact on scientific organizations worldwide, shaping their composition and operations.

The French Academy of Sciences (Academie Royale des Sciences) set a benchmark for the organization and operation of scientific societies across Europe. Its structured approach to scientific inquiry, rigorous standards for membership, and emphasis on empirical research became a model for other academies. Here's how it influenced the structure of other academies:

1. Sectional Organization: The French Academy's division into specialized sections for different scientific fields influenced other academies to adopt a similar structure, promoting focused and interdisciplinary research.
2. Rigorous Standards: The French Academy's commitment to empirical evidence and scientific rigor set a standard that other academies emulated to ensure the credibility and quality of their research.
3. Publication Model: Its use of publications and journals to disseminate research findings inspired other academies to establish their journals, facilitating the exchange of scientific knowledge globally.
4. Interdisciplinary Collaboration: The Academy's encouragement of collaboration across different fields influenced other institutions to foster cross-disciplinary research and innovation.
5. Integration of Theory and Practice: The Academy's blend of theoretical research with practical applications became a model for other scientific societies aiming to combine knowledge creation with technological advancement.
6. Institutional Prestige: The French Academy's status as a prestigious institution inspired other nations to establish similar academies to enhance their scientific reputation.
7. Patronage System: The success of the Academy under royal patronage influenced the funding models of other academies. It highlighted the important role played by state funding in the advancement of scientific studies.

2.1. Euler's Golden Era at the Royal Prussian Academy of Sciences

The Royal Prussian Academy of Sciences, founded in 1700 and later reorganized by Frederick the Great in 1744, was a pivotal institution in the scientific landscape of the eighteenth century. Under Frederick's patronage, the Academy became a hub for Enlightenment thought. The Prussian Academy attracted many prominent scholars, including Leonhard Euler, who contributed substantially to mathematics and physics during his tenure.

Euler's time at the Prussian Academy of Sciences (1741–1766) proved to be very

rewarding in terms of his academic output. Invited by Frederick the Great of Prussia, Euler joined the Prussian Academy to escape the political instability in Russia. His arrival marked the start of a highly productive period, during which he published a substantial body of work. In Berlin, Euler published several articles and influential books, such as ”Introductio in Analysin Infinitorum” and ”Institutiones Calculi Differentialis”. These works laid the groundwork for modern analytical mathematics and introduced many concepts, including the notation for functions and the expansion of trigonometric functions into series. His book ”Introductio in Analysin Infinitorum” is considered by many mathematicians as the most significant book in mathematics since Euclid's *The Elements* and Isaac Newton's *Principia*.

Interestingly, despite his absence from St. Petersburg for about 20 years, the Russian Imperial Academy of Sciences continued to regularly publish Euler's works.

3. MINING THE ”FUSS'S CATALOG”: THE DATASET

The main objective of this review is to study the works published by the Russian Academy of Sciences, during the 18th Century - when Leonhard Euler was one of the most influential members of the Academy. During this period (1728 - 1802), four separate multi-volume publications of the Imperial Academy were published:

1. *Commentarii Academiae Scientiarum Imperialis Petropolitanae* [3],
2. *Novi Commentarii Academiae Scientiarum Imperialis Petropolitanae* [4],
3. *Acta Academiae Scientiarum Imperialis Petropolitanae* [5]
4. *Nova Acta Academiae Scientiarum Imperialis Petropolitanae* [6].

To analyze these four publication series, we constructed a dataset from Fuss's catalog comprising the following three tables:

1. Author Information
2. Combined Index of all four series
3. Publication Details

A digital copy of the Fuss's catalog is made available by Columbia University.
https://catalog.hathitrust.org/Record/100463261

3.1. Author Information

The first part of our dataset details the focus of study of authors who contributed to the Russian Academy of Sciences during the 18th century. This data provides information on several authors and the disciplines associated with their specific study category. We tabulated the place of birth, years of activity, nationality, etc. for some of the authors.

3.2. Combined Index of all Four Publication Series

This dataset is our most comprehensive source of information, containing the key details required for our analysis. This dataset has been drafted using the Columbia University Catalog and completed using the actual papers published by the Russian Academy of Sciences made available by the Biodiversity Heritage Library [**?**].

Each paper published by the Russian Academy of Sciences during the 18th century is

recorded in our dataset as a separate tuple. Each record details the author's name, the publication name (C./N.C./A./N.A.), the associated volume number, the discipline, and the page numbers. This dataset serves as a comprehensive resource to analyze the output of the Russian Academy of Sciences during Euler's period of activity. A brief summary of this dataset as a snapshot is available in Table 1.

3.3. Publication Details

For each publication volume, we needed the year of publication and the length of each volume. This dataset allowed us to generate chronological visualizations of each of the trends we have analyzed.

Using these three datasets, we were able to gain an insight into the contribution of each author for the four publications. We could also recognize the fields of study that were most prominent and rising during this time.

4. Analysis

We analysed records of publications from the four volumes: *Commentarii, Novi Commentarii, Acta, Nova Acta* of the Russian Academy Of Sciences. These volumes were published by the Academy in the 18th Century, specifically during the time period 1726 - 1802. Table 1 describes the volumes, their editions, and the corresponding time period of publication.

Table 1 Publication Volumes and Time Periods

Publication	**Volumes**	**Time**
Commentarii	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14	1726 - 1751
Novi Commentarii	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14.1, 14.2, 15, 16, 17, 18, 19, 20	1748 - 1775
Acta	1.1, 1.2, 2.1, 2.2, 3.1, 3.2, 4.1, 4.2, 5.1, 5.2, 6.1,	1777 - 1782
Nova Acta	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15	1783 - 1802

Leveraging the extensive data, we began our analysis of the scientific output across the 18th century. Our analysis can be broadly divided into three subcategories: Authorship and Publication Distribution, Trends in Disciplines, and Euler's Contributions and Influence

4.1. Authorship and Publication Distribution

An Author's contribution to the works published by the Academy can be measured in terms of two parameters: the number of papers produced and the length of the papers. We first identify the top authors throughout the 18th century determined by the volume of papers published under their name. Figure 1 shows the trends in contributions by the top 5 authors throughout the decades in terms of the total number of papers published. Starting with this visualization we see how Euler's contributions tower and stand out at the Academy.

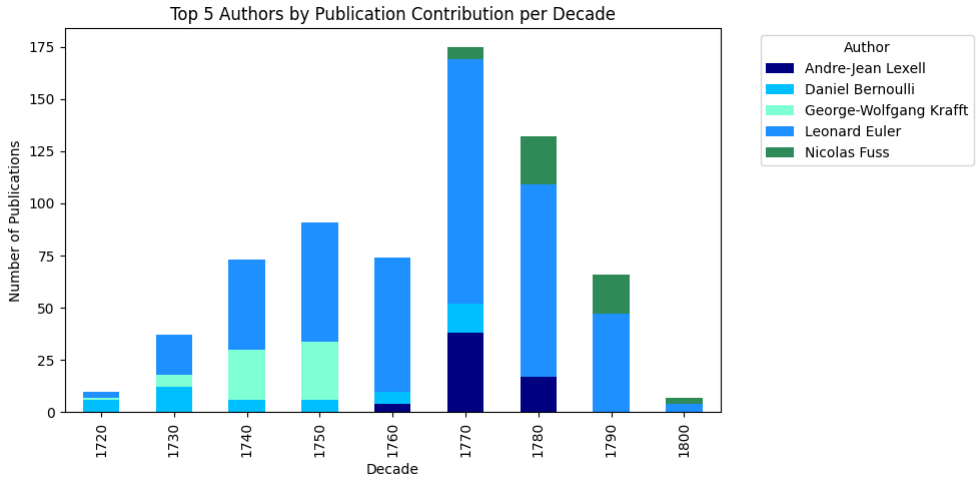

Fig. 1 Top 5 Authors by Contributions in terms of papers published through the Decades

The second part of this analysis identifies the top authors in terms of the total length of the papers they published. This is illustrated in Figure 2.

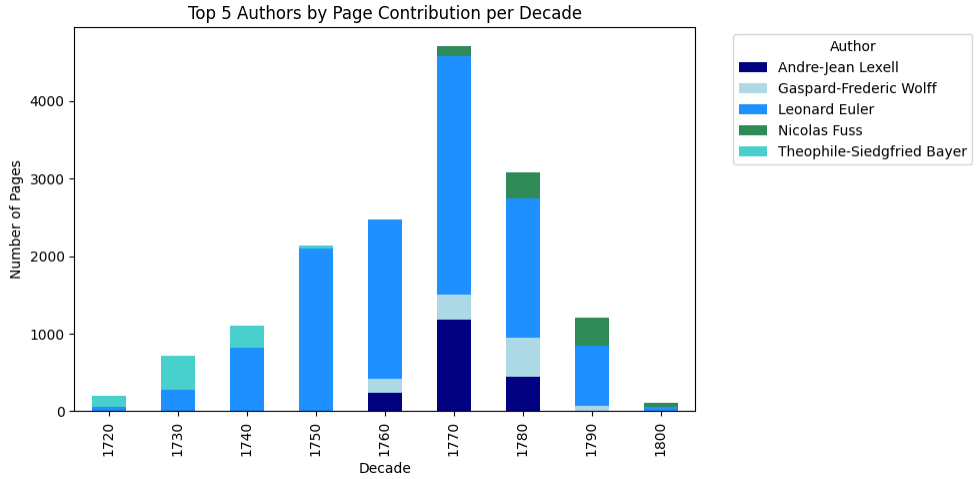

Fig. 2 Top 5 Authors by Contributions in terms of number of pages through the Decades

Figure 2 illustrates the length of the papers published by the top 5 authors for each decade during the 18th century. The authors with the most contributions in terms of the length and number of papers are Leonhard Euler, Andre-Jean Lexell, and Nicolas Fuss, each making multiple contributions to their respective disciplines.

From the two figures 1 & 2, it is evident that while some authors might have more publications, their papers may not be as lengthy. We arrive at this conclusion owing to the fact that the two plots feature different lists of the top five authors. George-Wolfgang Krafft and Daniel Bernoulli have made numerous and highly significant academic contributions. Still, when the lengths of their papers weigh their academic output, their contributions get overshadowed by other scholars who also contributed to extensive research for the Academy. Gaspard-Frederic Wolff and Theophile-Siedgfried Byer are examples of two such researchers whose contributions lie heavily in the length of their academic outputs.

The frequency of publications in the 18th century varied with each decade. The years through the 1740s and 1760s show consistency in the amount of papers published by the top authors. The plots suggest a period of stability starting from the 1740s to the 1760s, with relatively high and consistent published works. We observe a notable peak during the 1770s in both plots, primarily due to a significant increase in Euler's contributions. This peak coincides with Euler's return to Russia from Berlin. The post-1780s period shows these authors' general decline in contributions, which might be attributed to the emergence of new faces in the scientific landscape. As new researchers started to appear in the scientific world, it is fair to assume that the time of these well-known writers was coming to an end. This does not, however, mean that they were losing relevance or influence; instead, they left a lasting impact on the field and shaped the future of the scientific landscape.

The initial rise and stabilization indicate the growing phase of the academy. The Academy was established in 1724, with the commencement of work on the first volume of Commentarii occurring in 1726. During these initial years of publishing under the Commentarii series, the Academy was still in the process of solidifying its foundation. The 1730s ushered in a period of research instability, eventually giving way to stability as the academy's research practices matured. The same has been illustrated by the subsequent fluctuations in these years from Figures 1 and 2. The peaks during the 1770s highlight the periods of intense academic activity, which was likely influenced by prolific contributors like George Wolfgang Krafft and Euler.

Our analysis also ventures into the contributions of the top 10 scholars based on the length and number of papers they published, as shown in Table 2 and Table 3, respectively. This provides an insight into the distribution of scholarly work among the leading contributors to the Russian Academy of Sciences, highlighting the key figures who shaped its scientific output during the 18th century.

It is observed that Euler dominates the chart with a substantial margin, contributing over 10,000 pages. This highlights his significant influence and the breadth of his work during this period. Similarly, Euler's publication count is significantly higher, reaffirming his pivotal role. The other authors contributed between 500 and 2,000 pages each. While not as extensive as Euler's, their contributions were still significant and indicated active engagement with the Academy's publications.

Additionally, our analysis of author contributions throughout the decades holds here as well. For example, George-Wolfgang Krafft appears in the top contributors for papers but not for pages, indicating shorter but numerous contributions. Similarly,

Table 2 Authors with Highest contribution in terms of length of papers published

Author	Number of
Leonhard Euler	11,035
Andre-Jean Lexell	1,859
Gaspard-Frederic Wolff	1,066
Theophile-Siedgfried Bayer	899
Nicolas Fuss	884
Daniel Bernoulli	851
George-Wolfgang Krafft	91
Wolfgang-Louis Krafft	652
Joseph-Theophile Koelreuter	651
Frederic-Theodore Schubert	598

Table 3 Authors with Highest contribution in terms of number of papers published

Author	Number of
Leonhard Euler	446
George-Wolfgang Krafft	59
Andre-Jean Lexell	59
Nicolas Fuss	51
Daniel Bernoulli	50
Etienne Roumovsky	45
Joseph-Theophile Koelreuter	39
Jean-Albert Euler	36
Wolfgang-Louis Krafft	36
Gaspard-Frederic Wolff	35

Gaspard-Frederic Wolff ranks higher in terms of the number of pages contributed but not in terms of the number of publications, suggesting fewer but more extensive works. Several authors appear in both charts, indicating consistent contributions in terms of the number of pages and papers.

Figure 3 illustrates the contributions of the top 5 authors in terms of pages contributed over the years. Figure 3 chart showcases how different authors rose to prominence during different periods. Euler consistently maintains a significant presence in contrast to the shifting prominence of other key contributors.

We have already established that our period of interest is during the time when Euler was a prominent member of the Academy, as evidenced by his influence in Figure 1 & 2 and Tables 2 & 3 discussed above. However, it is noteworthy that from 1741 to 1766, Euler was an active member of the Prussian Academy rather than the Russian Academy. Even though he was not a formal member during that specific timeframe, his contributions were undeniable. This is further illustrated in Figure 4.

From Figures 3 & 4, we see a few peaks in contribution observed for the publication volume series C. and N. C. These peaks are attributed to two or more volumes published in the same year. As an example, in 1738, Commentarii volumes 5 and 6 were published. The other years saw consistency (one volume per year), with a few fluctuations.

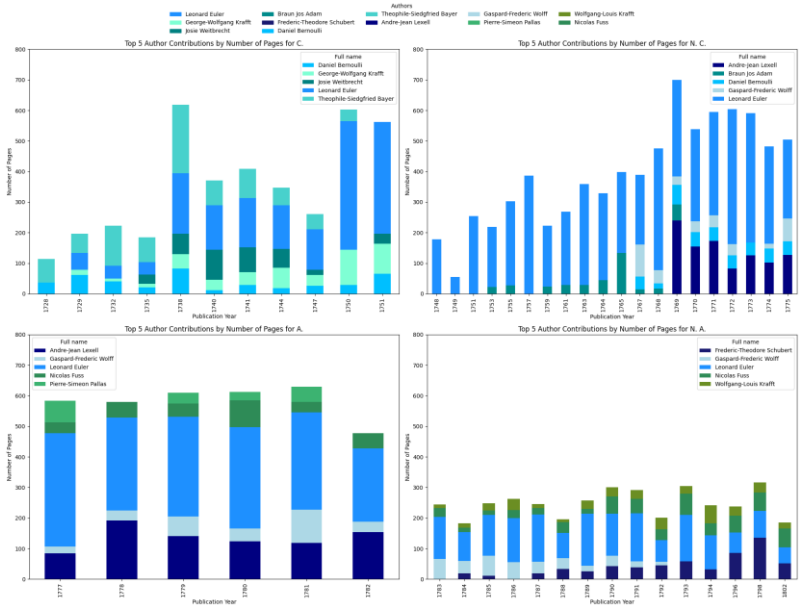

Fig. 3 Authors throughout the years in terms of page contributions

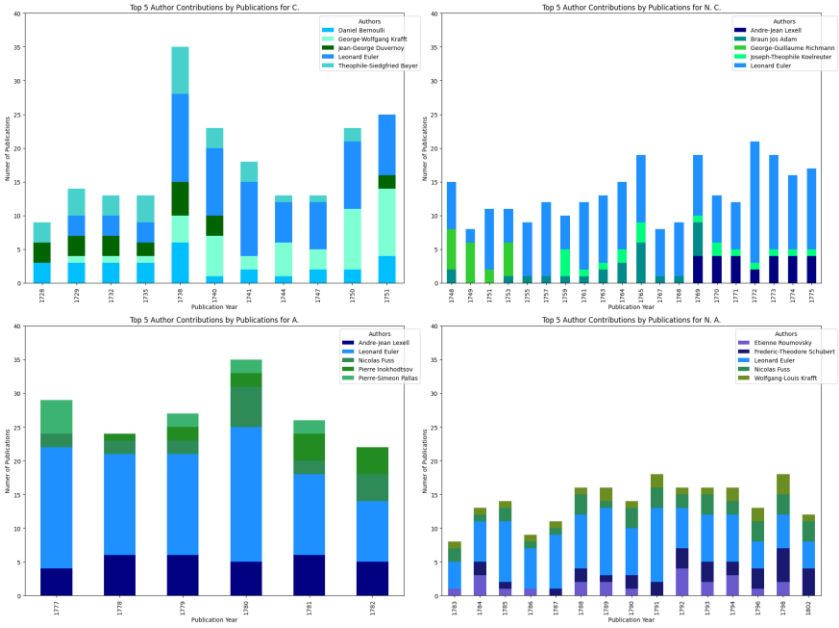

Fig. 4 Authors throughout the years in terms of publications

4.2. Discipline Wise Distribution

Each volume in all four publication volume series was divided into 4 broad sections according to the field of study. The four categories were:

1. Mathematics
2. Physico-mathematics
3. Physics
4. Astronomy

However, as per current standards of disciplines, these categories do not give us proper insights into the work carried out by scholars in the academy. In this sub-section, we attempt to identify the prominent fields of study during the 18th century at the Russian academy.

In this section, our first set of graphs in Figure 5 illustrates the top 5 disciplines according to the number of papers published.

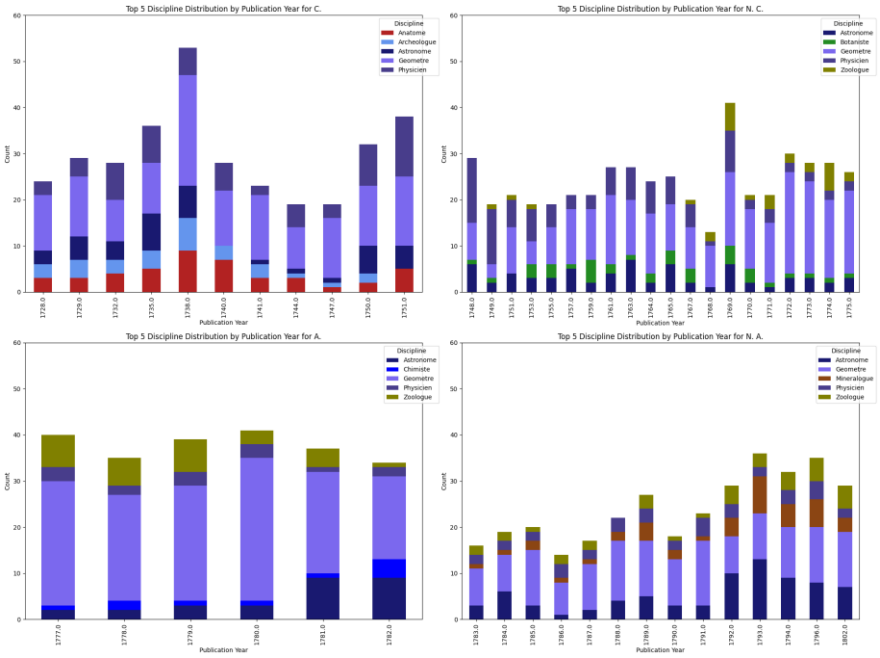

Fig. 5 Top 5 disciplines for each publication

Throughout the four publications series, Astronomy, Geometry, and Physics were the most researched disciplines. Zoology became more prominent after the 1770s. The highest amount of work has been done in the field of Geometry, and this can be attributed to Euler. Throughout the 18th Century, Geometry, Physics, Astronomy, Botany, and Zoology emerged as the leading disciplines in the academic community. The trends show a rising interest in Zoology and Astronomy, an established interest in Geometry and Physics, and fluctuations in the number of Astronomy papers. This is shown in Figure 6.

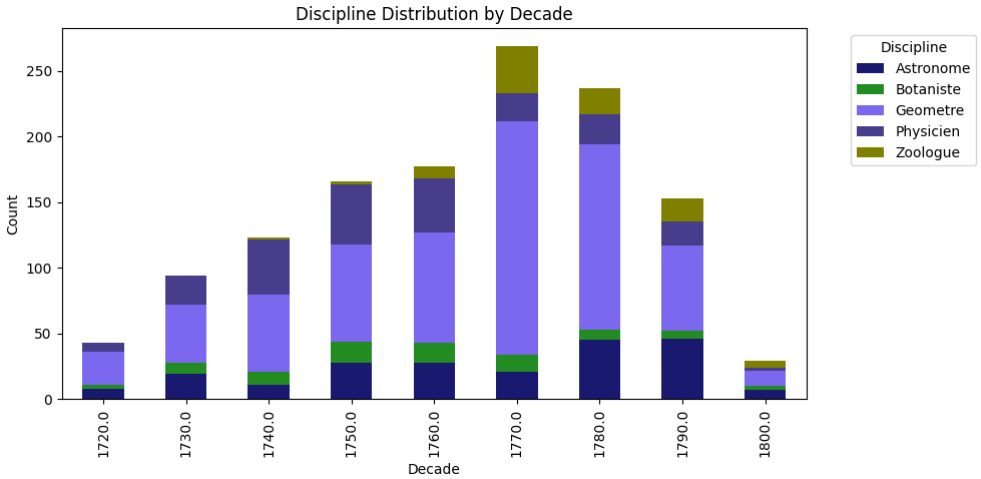

Fig. 6 Top 5 disciplines throughout the decades

Table 4 provides a breakdown of the number of authors in various academic disciplines.

Table 4 Distribution of the top Disciplines in each Category

Category	Discipline	Number of
Physical Sciences	Chemistry	20
	Physicien	39
	Minerelogue	9
	Geognoste	8
	Physiologue	4
Mathematical Sciences	Geometre	47
	Astronome	42
	Statisticien	3
Life Sciences	Zoologue	29
	Botaniste	25
	Medicine	6
	Anatome	6
Arts and Others	Historian	16
	Orientalist	13
	Juriste	6
	Archeologue	4

The following observations can be made:

1. Geometry, Astronomy, and Physics are dominant fields with the highest number of authors, reflecting a strong interest and focus in these disciplines. This observation aligns with the fact that these fields also appear among the top 5 disciplines with the highest number of publications. The number of notable authors in these areas suggests significant interest and, therefore, research activity in these key scientific disciplines.
2. Statistics, Physiology, Archaeology, Anatomy, and Medicine have fewer contributors, indicating these fields may have been less developed or less emphasized at the time.
3. Zoology and Botany are prominent fields with a considerable number of authors, which aligns with their ranking among the top 5 disciplines with the highest number of publications. This correspondence highlights the significant attention and

growing interest these fields received during the period in question.

4. History and Oriental studies are more prominent than other fields in Arts, suggesting a significant but smaller focus compared to the sciences.

4.3. Euler's Publications

Turning specifically to Leonhard Euler, let us recall a few facts about his work with the Russian Imperial Academy of Sciences [9]

1. Euler arrived in St. Petersburg in 1729. The first paper he published for the Russian academy was in 1729, for Commentarii vol. 2
2. Euler's involvement as an active member of the Academy seemed to have been unaffected by his move to Berlin in 1741. His contributions to the Russian Academy seem more or less stable throughout his stay in Berlin (1741-1766).
3. On September 18, 1783, Euler passed away after suffering a brain hemorrhage. This cannot be inferred from the data on his works published towards the end of the 18th century. After Euler passed away, his mathematical assistant, Nicolas Fuss kept submitting his unpublished works - which is why we see no decline in his contributions to the Academy.

Euler's contributions are marked by a high number of pages, a general increase in the number of pages, peaking in the mid-18th century. During his time at the Prussian Academy, Euler maintained substantial output. Despite primary affiliations with the Prussian Academy, his continued contributions to the Russian Academy are significant. This is illustrated in Figure 7.

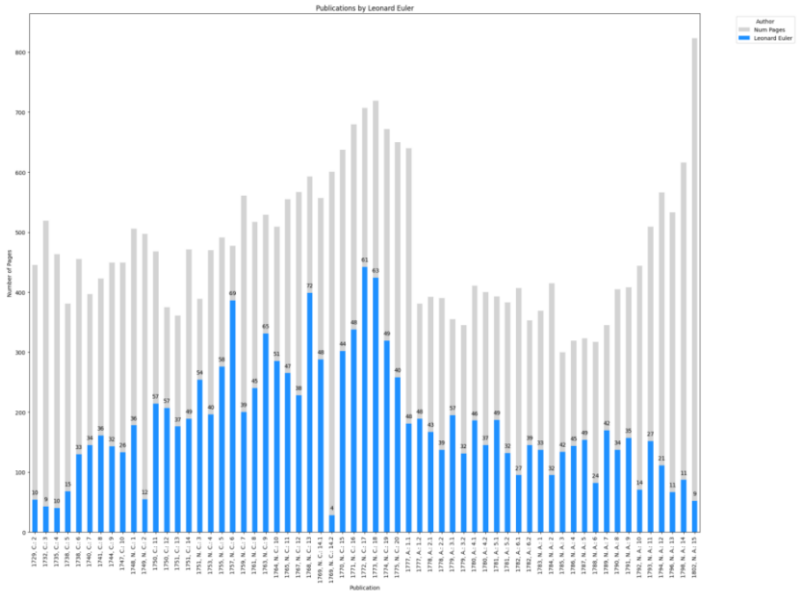

Fig. 7 Euler's contribution to Russian Academy

After his return to Russia in 1767, Eulers' output remained significant, gradually declining after 1775. Consistent contributions after 1770 demonstrate his involvement in research despite advancing age and health challenges. Even in times when he produced fewer papers, his total contributions are still unmatched, establishing his central role.

Euler moved to Berlin in 1741 and lived in Berlin for about 25 years. During this period, he became an active member of the Prussian Academy. The years Euler spent in Berlin, 1741 - 1766, marked the period of his peak productivity in terms of scientific output. About 125 of his papers during this period were published by the Prussian Academy. Therefore, we also wanted to do a comparative study on Euler's publications to Berlin and Russian Academies of Sciences. Figure 8 displays Euler's contributions to the Russian and Prussian Academies over the years, showing the number of papers he published in each Academy.

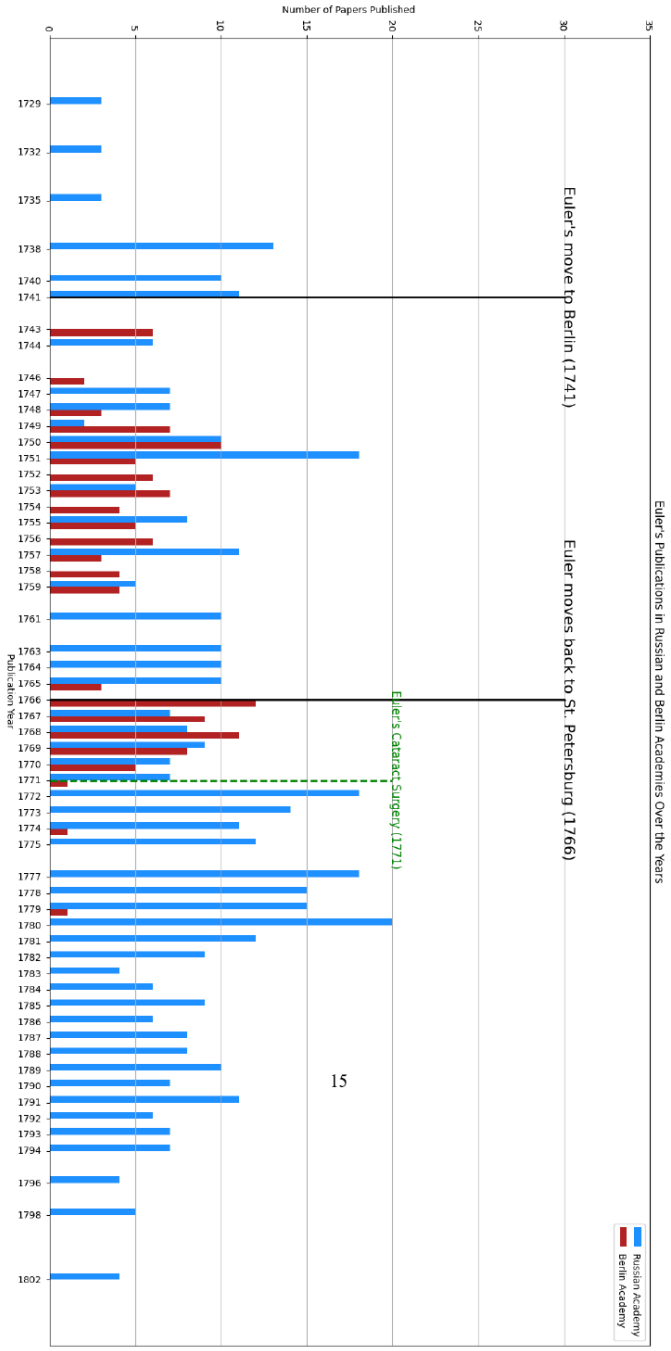

Fig. 8 Comparative study of Euler's Contributions to Prussian and Russian Academy of Sciences

We observe that the frequency with which he published papers varied drastically through the years. In the early years of 1729 - 1741, he published several papers, but these were not periodical. This can be attributed to the fact that the Russian Academy was not publishing a volume edition every year while establishing its footing. In the following years, his frequency of publication became more stable, with his work being published by both the Prussian and Russian Academies. The only exception was the time from 1760 - 1764 when the number of his publications saw a minute decline, but only in the Prussian Academy and not the Russian Academy. This could be because of the Seven Years' War's disturbances, which had an impact on his capacity to work with colleagues as well as the general stability of educational institutions. Another reason for the minute decline can be attributed to the political tensions, specifically the deteriorating relations between Euler and Frederick the Great of Prussia. The strained relationship with the Berlin monarch might have contributed to the temporary decline in Euler's publication frequency with the Prussian Academy. Another reason could be his declining vision. In 1766, a cataract was discovered in Euler's left eye. Although the surgery initially provided some temporary improvement in his vision, complications ultimately led to near-total blindness in that eye. Despite this significant setback, Euler's productivity remained remarkably unaffected.

However, his contributions to the Prussian Academy resumed in 1765. In 1766, Euler accepted an invitation to return to the St. Petersburg Academy. Despite his move to Russia, Euler continued to publish papers in Berlin. However, his publication output started to decrease after 1770. This reduction might reflect the increased demands of his role at the St. Petersburg Academy, his advancing age, or other personal and professional factors. The most publications appear to occur in the Russian Academy in the early 1780s, with 20 papers published.

The graph illustrates a tapering off in Euler's publications after the early 1780s, with only a few papers appearing in the late 1780s and 1790s. This decline likely corresponds to Euler's death in 1783, after which his assistant, Nicholas Fuss, took on the task of publishing the remainder of Euler's papers.

5. CONCLUSION

Our work examined the statistics of contributions of Leonhard Euler, primarily to the Russian Academy of Sciences. This was accomplished by data mining the Academy catalog. Through our work, we have illustrated an example of how data mining can be used to correlate a scholar's academic journey with concrete evidence of their scientific output. Our work aims to take well-established facts about a prolific mathematician like Euler and provide concrete evidence of his journey in shaping mathematics. In the future, we can use this template to study the impact and growth of other revolutionary scholars. We can obtain many additional insights about well-known scientists by analyzing corresponding scientific catalogs.

We propose expanding the dataset to include catalogs from the French Academy of Sciences and the Prussian Academy of Sciences. This broader dataset would enable a more comprehensive assessment of Euler's academic influence across multiple institutions, allowing for comparative analyses of his work in different scientific environments. Additionally, integrating multiple catalogs would facilitate studies on collaboration networks, publication trends, and institutional impacts on scientific progress.

DECLARATIONS

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REFERENCES

[1] McClellan, James E., III. "The Académie Royale des Sciences, 1699-1793: A Sta- tistical Portrait." *Isis*, vol. 72, no. 4, 1981, pp. 541–567. The University of Chicago Press on behalf of The History of Science Society. https://www.jstor.org/stable/ 231248.

[2] The Euler Archive. http://eulerarchive.maa.org/.

[3] Commentarii Academiae scientiarum imperialis Petropolitanae. https://www. biodiversitylibrary.org/bibliography/9482.

[4] Novi commentarii Academiae Scientiarum Imperialis Petropolitanae.https://www. biodiversitylibrary.org/bibliography/9527.

[5] Acta Academiae scientiarum imperialis petropolitanae. https://www. biodiversitylibrary.org/bibliography/9526.

[6] Nova acta Academiae scientiarum imperialis petropolitanae. https://www. biodiversitylibrary.org/bibliography/9519.

[7] Fuss, Paul Heinrich. Registre alphab´etique des mati`eres contenues dans les 40 volumes des m´emoires de l'Acad´emie Imp´eriale des Sciences de St.-P´etersbourg, imprim´es depuis l'ann´ee 1726 jusqu'a` 1803 inclusivement. St.-P´etersbourg, 1846. https://ia600607.us.archive.org/cors get.php?path=/26/items/registrealphabti00fuss/registrealphabti00fuss.pdf.

[8] Guatschi, Walter. Euler's contributions to mathematics. Department of Com- puter Science, Purdue University., 2006 https://www.cs.purdue.edu/homes/wxg/ EulerLect.pdf

[9] Calinger, Ronald, Leonhard Euler: Mathematical Genius in the Enlightenment, Princeton University Press, 2015.

[10] Abalakin, V. K., and E. A. Grebnikov. 2007. "Euler and the Development of Astronomy in Russia." Translated by Robert Burns. In Euler and Modern Science, ed. N. N. Bo- golyubov, G. K. Mikha˘ılov, and A. P. Yushkevich, pp. 245–263. Washington, D.C.: Mathematical Association of America. LEJA 7.

[11] Alexanderson, G. L. 2007. "Ars Expositioni: Euler as Writer and Teacher." In The Genius of Euler: Reflections on His Life and Work, ed. William Dunham, pp. 61–69. Washington, D.C.: Mathematical Association of America.

[12] Ball, W.W.R. 2007. "Euler's Output, A Historical Note." In The Genius of Euler: Reflections on His Life and Work, ed. William Dunham, pp. 89–91. Washington, D.C.: Mathematical Association of America.

[13] Barbeau, E. J. 2007. "Euler Subdues a Very Obstreperous Series (Abridged)." In The Genius of Euler: Reflections on His Life and Work, ed. William Dunham, pp. 135–147. Washington, D.C.: Mathematical Association of America.

[14] Barrow-Green, June. 2010. "Euler as an Educator." British Society for the History of Mathematics Bulletin 25, pp. 10–22.

[15] Bashmakova, I. G. 2007. "Euler's Contribution to Algebra." Translated by Robert Burns. In Euler and Modern Science, ed. N. N. Bogolyubov, G. K. Mikha˘ılov, and A. P. Yushkevich, pp. 137–153. Washington, D.C.: Mathematical Association of America. LEJA 7.