

Assembling an International Editorial Board
An Account of Diversity in a Scientific Mega-Journal

by

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ABSTRACT

This qualitative study examined how the scientific journal *PLOS ONE* assembled its editorial board, which is made up of more than 10,000 academic editors based in 131 countries. The study investigated how the board's geographic diversity is enacted by the human and nonhuman actors of the assemblage. *PLOS ONE* is an open-access (OA) mega-journal launched in 2006 by the nonprofit organization Public Library of Science (PLOS). It publishes over 16,000 papers yearly, covering more than 200 scientific subjects of science and medicine. I drew on Actor-Network Theory (ANT), which proposes that processes, ideas, organizations, or objects are continuously generated within a network of relationships between human and nonhuman actors. I used the case study methodology and employed two qualitative research methods. First, I conducted semi-structured interviews with 26 academic editors from different fields, including biology and life sciences, chemistry, medicine and health sciences, physics, and social sciences. These editors are affiliated with research institutions across 14 countries. Additionally, I interviewed PLOS leaders, staff members, and a representative from an external contractor. Second, I employed documentary analysis of organizational documents and online secondary data.

Findings showed that the human and nonhuman actors of the *PLOS ONE* editorial board reproduce biases in science based on authors' and editors' geographic origin, the journal's size and the low diversity of PLOS staff members. I also identified that APCs (Article Processing Charges) act as mediators that trigger betrayals among the actors, which has consequences on the stability of the assemblage, especially in terms of trust between the publisher and the scientific community. Finally, this study also identified

that publishing an OA mega-journal has contradictions and unexpected effects on the publishing landscape due to its large scale.

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CHAPTER 1

INTRODUCTION

In 2020, the SARS-CoV2 outbreak revealed that scholarly journals can both facilitate and hinder the communication of scientific results. On the one hand, scholarly journals speeded up the dissemination of academic papers and genomic data about the SARS-CoV-2 virus, eventually leading to the implementation of treatments and the development of vaccines (Leonelli, 2023). However, the proliferation of false, irrelevant, or inaccurate studies also exposed the flaws in the journals' mechanisms of knowledge validation, i.e., the peer review process (Piller, 2021; Piller & Servick, 2020). These issues illustrate the relevance of examining scientific journals' operation, production, and manuscript validation, especially within the global scientific production landscape. To contribute to this research area, the present dissertation, based on a case study methodology, focuses on how the multidisciplinary mega-journal *PLOS ONE* assembles and manages the operations of its editorial board (EB).

Scholarly journals are sociotechnical artifacts for the validation of academic knowledge through mechanisms of deliberation and consensus (Hollenbeck, 2008; Kaltenbrunner et al., 2021). Currently, in most science, technology and medicine (STM) journals, a governing body –the EB– is responsible for conducting and overseeing the gatekeeping work, i.e., the selection of manuscripts through the desk review and the peer-review procedures, considered the cornerstone of scholarly publishing (Eve et al., 2021; Kaltenbrunner et al., 2021). Editorial boards are commonly described as groups of active scientists–the academic editors– who lead and oversee those procedures and make publication decisions (Baruch, 2008; Coser, 1975; Fyfe, 2020; McGinty, 1999).

Scholarship in scientific journals highlights that the role of academic editors (AEs) allows scientists to exercise their influence in science and advance their academic careers (Coser, 1975; Shapiro & Bartunek, 2008; Topaz & Sen, 2016; Zuckerman & Merton, 1971). Hence, editorships are considered as positions of power and leadership in science (Addis & Villa, 2003; Shapiro & Bartunek, 2008). Despite the recognition of the journal editorships' relevance in science, there are ongoing debates around the imbalances in the allocation of editorial positions in international scientific journals (Metz & Harzing, 2012; Rouan et al., 2021; Salazar et al., 2021).

Those debates highlight that, despite journal editorships being presumably allocated on merit, (mostly male) researchers from Western, educated, industrialized, rich, and democratic (WEIRD) societies (Sabik et al., 2021) are overrepresented in EBs across journals in many science disciplines (Goyanes, 2019; Goyanes & Demeter, 2020; Harzing & Metz, 2013; Hedding & Breetzke, 2021). Therefore, in this study, I focus on how the mega journal *PLOS ONE* defines and implements diversity in the composition of its editorial board. More specifically, I focus on the geographic diversity of the EB of the journal *PLOS ONE*. Although there is no unique definition of geographic diversity in science organizations, it is commonly accepted to use the country of affiliation of a scientist as a proxy to determine how diverse a group is (Goyanes & Demeter, 2020; Metz & Harzing, 2012).

It has been argued that the issue of the geographic imbalances in the composition of EBs has broader implications beyond a journal or a discipline's realm. It might strengthen existing global asymmetries within the knowledge production landscape, deepening the Global North-Global South divide (Knöchelmann, 2021). For example, the

predominance of academic editors from high-income countries might strengthen the hegemony of specific theoretical approaches, languages, methodologies, or formats to communicate findings (e.g., positive results only), as “they are likely to share a common research paradigm and methodological preference due to their similarity” (Harzing & Metz, 2013, p. 1).

From a socio-critical standpoint, it has been argued that those populations are identified as not fully complying with the profile of the legitimate subject of knowledge from the modern Western science approach, which neglects their epistemic authority (Harding, 1991, 2015). Yet addressing the disparities in journal EBs primarily from this standpoint might be ignoring the material arrangements that facilitate (or hinder) the assemblage of EBs, including the role of digital technologies—such as editorial management systems and scientific databases— or editorial guidelines that frame the job of scientists in their role of journal editors.

In my view, the scholarship in Science and Technology Studies (STS) offers a more suitable set of analytical and methodological tools to address the problem as it investigates,

...the institutions, practices, meanings, and outcomes of science and technology. Scholarship in this field also analyzes the multiple entanglements with the worlds people inhabit, their lives, and their values (...) STS explores the transformative power of science and technology to arrange and rearrange contemporary societies” (Felt et al., 2016, p. 1).

In particular, for this study, I draw on Actor-Network Theory (ANT), which is a widely adopted analytical approach in the STS field. This framework takes into account the agency of the nonhuman actors in the processes of knowledge production—like the editorial work in scholarly journals—which implies recognizing that, as one of the leading

ANT theorists, John Law (1991) argues, the social order is not purely social but rather is a sociotechnical order where heterogeneous networks of actors come into play.

Problem Statement and Research Questions

The purpose of this case study was to examine how the journal *PLOS ONE* assembles its extensive editorial board and how diversity is enacted in the process. *PLOS ONE* is a multidisciplinary journal that aims to reach a global audience. It publishes over 16,000 papers yearly from authors based in 160 countries, covering 200+ scientific subjects of science and medicine. To achieve that goal, the journal's mission statement embraces a diversity and inclusion approach, expressed in their foundational and policy documents and in the organizational practices that the publisher PLOS implements to reduce bias in publication.

Especially since 2020, within the context of increasing societal calls for diversity, equity, and inclusion (DEI) in organizations in the U.S. and the rise of movements to address social inequalities—such as Black Lives Matter—PLOS has signed different commitments for action to improve the diversity of the internal staff and the external editorial board, particularly in *PLOS ONE*, the largest journal of its collection. For example, in 2020, PLOS joined the *Joint commitment for action on inclusion and diversity in publishing* led by the Royal Society of Chemistry, in which several of the biggest international publishers agreed, among other commitments, to achieve representation of the scientific community in the editorial decision-making positions. Likewise, PLOS became a global partner of the Coalition for Diversity & Inclusion in Scholarly Communications (C4DISC). This organization promotes diversity in leadership

positions and all the roles in the industry of scholarly communications, “including all staff, volunteers, and audiences.”

The publisher has indeed implemented some strategies to diversify its governing bodies. More specifically, *PLOS ONE*'s EB comprises active researchers based in 131 countries, an indicator of how the journal has achieved geographic diversity, which also might signal an increase in diversity among authors and reviewers. Academic Editors voluntarily oversee the peer review process for the thousands of submissions *PLOS ONE* receives yearly. Based on their own judgments and those of the reviewers, they provide publication recommendations to the journal's staff, exercising their epistemic authority. Academic editors negotiate their decisions with other human actors such as authors, reviewers, and in-house editors but also with nonhuman actors, namely material artifacts such as the journal management software, academic research databases, policy documents, training materials, research ethics guidelines, the Internet, among others. In other words, the EB is a heterogeneous network of social and material arrangements for the assessment of scientific manuscripts (Law, 1990).

Paraphrasing Latour (1999a), despite the indicators of the great geographic diversity of academic editors, the success of *PLOS ONE*'s assemblage of human and nonhuman actors and the stability of the network remains black-boxed as the internal complexity and negotiations between the actors of the EB are underexplored. The actors' interests and how they transform the network in which they are enrolled while simultaneously being transformed by the network—i.e., the translation processes, using ANT terminology—remain unknown, too.

The main research question that guides this study is: How is geographic diversity enacted in the assemblage of human and nonhuman actors of the mega-journal *PLOS ONE*'s editorial board? This question has the following sub-questions: 1) What human and nonhuman actors are assembled on the editorial board of *PLOS ONE*? and 2) What translations between the human and nonhuman actors of the editorial board of *PLOS ONE* can be tracked?

PLOS ONE is a multidisciplinary open-access mega-journal produced by the Public Library of Science (PLOS), a nonprofit publishing organization based in San Francisco, California, where it was founded in 2000. Besides its headquarters in San Francisco, the publisher is also based in Cambridge, U.K. Though, most of their editorial workforce, leaders, staff members, and other personnel are based in different parts of these countries. The +9,000 academic editors who made up the editorial board are researchers who are based worldwide. Thus, the study was mainly conducted in online settings and used semi-structured interviews and documents as the primary data sources.

The dissertation is structured in five more chapters. In Chapter 2, I present the background and context of the study, including a historical overview and a multidimensional profile of *PLOS ONE*. Chapter 3 introduces the theoretical framework and literature review of geographic diversity in scholarly journals. In Chapter 4, I outline the methods and research design. In Chapter 5, I present the findings of the study. Finally, in Chapter 6, I discuss my results and outline some concluding remarks.

CHAPTER 2

STUDY CONTEXT

In this chapter, I present the context of this case study. The chapter aims to provide a comprehensive description of the environment and stakeholders, which serves as the stage for further analysis of the case in ANT terms, which I present in my findings chapter. Though I used some interview data from my pilot study and fieldwork, documentary data was this chapter's primary information source. The chapter is divided into two sections. The first section presents a historical overview of the origins of PLOS and *PLOS ONE*. The second section provides a multidimensional description of the journal's profile using the bibliometric-based methodology proposed by Haustein (2012).

On the Origins of PLOS

In 2000, three biomedical researchers affiliated with highly reputable and resourced research institutions based in the U.S. authored and distributed an *Open Letter* addressed to biology and medicine researchers worldwide. Harold Varmus (Memorial-Sloan Kettering Cancer Center), Patrick Brown (Stanford University), and Michael Eisen (University of California, Berkeley) signed the document. Rather than just a letter, in fact, it was a call for boycotting for-profit scholarly publishing companies and establishing an online public library where the records of biology and medicine research could be freely available for anyone with an Internet connection (Varmus et al., 2000). The letter sought to convince scientists that a new scholarly publishing model was

needed, mainly because the so-called *serials crisis* was escalating¹ (Panitch & Michalak, 2005).

The *Open Letter*, organized in three concise, engaging, and straightforward paragraphs written in the English language, was not only a communication piece expressing the concerns of a small group of scientists, but it mobilized other scientists as well. The *Open Letter* was disseminated through email lists and eventually signed by more than 34,000 scholars (including Ph.D. students, postdoctoral fellows, librarians, active researchers, and retired professors) from 180 countries affiliated with higher education institutions, hospitals, laboratories, research centers, libraries, foundations, and governments, as well as independent researchers (Varmus et al., 2000).

It has been argued that the *Open Letter* marked the beginning of a radical change in the scholarly publishing landscape (Eve et al., 2021)—at least from a Western, US-centered perspective, as other parallel efforts were pushing for similar goals in different latitudes of the globe². Indeed, the letter—and the responses to it—ultimately sparked the foundation of the nonprofit organization Public Library of Science (PLoS, later PLOS), an advocacy organization for the right to access scientific literature that has influenced national and international policies on scientific publications while also changing the

¹ This term is used to explain how, since the 1980s, the subscription costs of journals were becoming unaffordable even for the wealthiest universities and libraries in the U.S. and other high-income countries, as a handful of commercial publishers controlled the growing market of journals (Keller, 2001).

² I am not assuming a monolithic OA definition or publishing model exists. I acknowledge that there are multiple genealogies of OA and alternative publishing schemes to the model led by mainstream commercial publishers. Coming from Latin America, I can account for the publicly funded systems that are, in fact, widely recognized as pioneer examples of “scientific information as a common good,” which is one of the underlying ideas posed by the Open Letter. Nevertheless, at the same time, I recognize that the changes introduced by PLOS directly or indirectly influenced even these systems as well (for the good or bad, but this is out of the scope of my research). Alperin & Fischman (2015) provide a comprehensive compilation of cases that depict the Latin American publishing landscape. For an alternative viewpoint of the origins of open access that introduces a feminist and decolonial perspective, see Kiesewetter (2020).

relations between researchers, funders, and publishers (Wakeling et al., 2017). The *Open Letter* presented the following three main ideas that paved the way for this change:

1) The integration of knowledge from “disparate communities” in the biomedical sciences was needed, which appealed to the participation of diverse scholars in the submission and peer review processes.

2) The ownership of scientific records “should belong to the public” rather than just to a handful of commercial publishers who, the letter posited, “have a legitimate right to a fair financial return for their role in scientific communication” (Varmus et al., 2000, p. 1) but not the right to the exclusive control over the archives.

3) The letter’s authors urged the audience, beginning in September 2001, to submit, edit, and review only for journals that “grant unrestricted free distribution rights to any and all original research reports that they have published, through PubMed Central [a digital library run by the U.S. National Institutes of Health] and similar online public resources, within six months of their initial publication date.” (Varmus et al., 2000, p. 1).

Those ideas were welcomed by the signers and supporters of the initiative, among which large research funders in the U.S. were outstanding (e.g., Bill & Melinda Gates Foundation, Open Society Institute, and Gordon and Betty Moore Foundation).

Nevertheless, the *Open Letter* was not enthusiastically welcomed by other stakeholders in the publishing arena, especially those well-established journals and publishers, both commercial (e.g., Elsevier) and learned society-run publishers (e.g., American Chemical Society), who saw their revenue interests challenged. The business

model implemented by those publishers relied upon subscriptions (paid by libraries, hospitals, universities, and individuals), which the *Open Letter* implicitly sought to dismantle³. Some of the most adversarial reactions came from highly influential publications in the medical sciences, such as the editor of *JAMA* (Journal of the American Medical Association), the executive director of the American Physiological Society, and officers of Elsevier, to cite some examples (Brower, 2001).

The *Open Letter* was regarded as a threat and coercion tactic by several of those subscription-based publishers as it implied that the signatory scientists would actually stop submitting and serving those journals as editors and reviewers, which would make the publishers' revenue drop (Keller, 2001). Although only some of the 26,000+ signers of the *Open Letter* as of August 2001 took immediate and traceable action to catalyze the desired change, the initiative resulted in a dramatic turning point.

Varmus, Brown, and Eisen, alongside seven other researchers based in the U.S. and the U.K., sent a follow-up letter on August 31, 2001. This time, the authors used a stronger and more definite tone to announce that, due to several publishers' scarce response and refusal to collaborate with the initiative⁴, PLOS would start operating as an independent publisher. They announced:

It is now time for us to work together to create the journals we have called for. We believe that it is now both necessary and *financially feasible* [emphasis added]

³ An important nuance about how PLOS' founders did not discriminate between the "unfairness" of commercial publishers and scholarly societies-run publishers' business models was raised by Michael Keller, founder of *HighWire Press*, a nonprofit publishing organization based initially at Stanford University. He argued that, by placing all the publishers in the same bag, PLOS overlooked that scholarly societies were not necessarily making big profits as their commercial counterparts. In fact, he argued, scholarly societies had a symbiotic relationship with universities. Thus, in his view, PLOS' initiative would weaken the scholarly societies' competition capacity and ultimately harm innovation in science (Keller, 2001).

⁴ Only a few medical journals agreed to deposit their archives in public sites after six months of the embargo period.

for scientists to create a mechanism for publishing their work - with responsible, efficient peer review and the highest editorial standards - while allowing free and unrestricted online distribution from the moment of publication” (PLOS, 2001, p. 2).

Similar to the *Open Letter*, this message provoked a great shock among scientists and publishers as PLOS officially entered the increasingly competitive scholarly publishing market in biomedical sciences. With the support of a five-year, nine-million-dollar grant awarded by the Gordon and Betty Moore Foundation (GBMF)—a philanthropic organization based in San Francisco—PLOS launched in 2003 the first journal of its collection, *PLoS Biology*, followed by *PLoS Medicine* in 2004. Both outlets would become PLOS’ flagship journals (Brown et al., 2003). The grant would cover the new publisher’s initial operation costs, including the editorial staff’s salaries and the technological infrastructure to manage and disseminate the content (Gordon and Betty Moore Foundation, 2002).

In a public statement about this support for PLOS, GBMF highlighted two key issues. On the one hand, the APC-based OA business model that PLOS transferred the publication costs to the authors and research funders. They would pay “modest fees” (Brown et al., 2003) per article published, resulting in the removal of financial barriers for readers to access journals’ contents. On the other hand, the new PLOS journals were endorsed by an advisory board consisting of “an international group of scientific luminaries,” as the GBMF described its members (Gordon and Betty Moore Foundation, 2002). In other words, to ensure trustworthiness, the GBMF emphasized that the initiative was backed up by prestigious academics in the biomedical sciences. In the following paragraphs, I briefly comment on the first issue.

After the GBMF's grant announcement was released, Brown, Eisen, and Varmus published a piece in *PLoS Biology* (Brown et al., 2003), including evidence of how the APC-based model was feasible. The evidence provided was that the Howard Hughes Medical Institute, a well-known American philanthropic organization, would fund 350 researchers to publish their work in PLOS (Candid, 2002). They wrote:

Because publishing is an integral part of the research process, *a natural alternative* [emphasis added] to the subscription model is to consider the significant but *relatively small costs* [emphasis added] of open-access publication as one of the fundamental costs of doing research...The institutions that sponsor research intend for the results to be made available to the scientific community and the public. If these research sponsors also paid the essential costs of publication...we would retain a robust and competitive publishing industry and gain the benefit of universal open access...*By simply changing the way we support the scientific publishing enterprise* [emphasis added], the scientific community and public would preserve everything we value in scientific publishing and gain all of the benefits of open access. (Brown et al., 2003, p.2)

Although the U.K.-based commercial publisher BioMedCentral (BMC) was the pioneer in implementing Article Processing Charges (APCs)⁵, some PLOS critics argued that the founders portrayed PLOS as “the one” (Davis, 2008) and implied that other publishers should follow them in the implementation of the model. This stance was described as arrogant “fiery rhetoric” and “impatient academic leadership” (Anderson, 2010). In spite of those critics, PLOS started to charge the APCs in *PLoS Biology* and *PLoS Medicine*. However, as we will see in the following sections, the new model was not a *simple* change nor a *natural* alternative to the subscription model, as PLOS' founders predicted (see, for example Appel et al., 2018; Budzinski et al., 2020; Halevi & Walsh, 2021; Klebel & Ross-Hellauer, 2023; Rouhi et al., 2022).

⁵ BMC was also the first publisher to offer payment models for authors and for institutions (Quint, 2002).

During my fieldwork, I interviewed academic editors who have served PLOS since its beginning. Participants were asked to talk about how they started volunteering at PLOS, what caught their attention, and how they decided to collaborate with the publisher. A senior researcher, who is in his last working months before retiring from the Department of Parasitology at the University of Sao Paulo, Brazil, joined the publisher from its launch. He shared:

I am an editor in PLOS since the beginning of PLOS. I joined when the first things began to pop up on PLOS. I thought the idea was very nice because one of the problems is the amount of money that you spend on buying the signatures [brand, name] of journals. There are journals that cost, well, \$50,000 a year. It's a lot of money when you think that you have thousands of journals that must be bought by libraries in the universities. And I thought that this kind of [business model] of PLOS, where you pay to publish and then you open to everyone, is much more fair. *But now I think it's not like this; now you have problems with open access.*

As this interview excerpt illustrates, some scientists who fully supported the pay-to-publish model in 2002 changed their minds 20 years later. My data show that some editors even stopped volunteering to PLOS because they disagreed with this business model. Others are hesitant about continuing for the same reason. In my findings chapter, I deepen on this issue. So far, it should be noted that several participants in this study were overcome with frustration, disappointment, and hopelessness at witnessing that the APC-based model eventually contributed to widening the stratification of science, which has disproportionately affected the most under-resourced scholars (Klebel & Ross-Hellauer, 2023; Knöchelmann, 2021).

Scientific Prestige and Reputation in the Assemblage of PLOS

To understand how PLOS' founders succeeded in running a nonprofit OA publisher despite the objections and resistance of many stakeholders in the scientific

community and the highly competitive publishing market (Björk & Solomon, 2014), I propose to include another actor in this account: scientific prestige. I understand this term as “the extent to which scientists are held to have contributed to the advancement of knowledge in their fields” (Zuckerman, 1977, p. 9). With that aim, we must hop back in time and look at the scientific background of one of the *Open Letter*’s authors, Dr. Harold Varmus.

Varmus is a biomedical scientist born in 1939 in the state of New York who built an outstanding career in virology under the auspices of several scientific institutions in the U.S., most notably the University of California San Francisco and the National Institutes of Health. In 1982, he was laureate of the Albert Lasker Basic Medical Research Award alongside Michael Bishop and three other colleagues “for the discovery that oncogenes are present in normal cells” (Hofschneider, 2022). The Lasker Prize is considered a precursor to the Nobel Prize (Lipsick, 2022). Indeed, in 1989, Varmus and Bishop were awarded the Nobel Prize in Physiology or Medicine for their research on the cellular origins of retroviral oncogenesis (The Nobel Prize, 1989). They discovered that cancer could be generated by the activation of an organism’s own genes, which was a significant milestone in molecular cancer biology research since it shifted the focus from external agents to the “enemies within,” as Bishop called the phenomenon (Lipsick, 2022).

The scholarship on scientific prestige has investigated how research awards, notably the Nobel Prize, can be helpful in predicting the subsequent path of a researcher’s career in the realm of the reward system of science (Zuckerman, 1977), which can range from their publication and productivity behavior (Chan et al., 2014) to the formation of

scientific elite networks (Ma & Uzzi, 2018). Others have followed the Mertonian principle of the Mathew effect (Merton, 1968) to point out that research awards contribute to strengthening the cumulative advantage processes, in which initial benefits of being awarded produce subsequent advantages that ultimately increase the inequalities of science⁶ (Headworth & Freese, 2016). My point here is to highlight that, indeed, Varmus's prestige, particularly nurtured by the Nobel Prize, increased his professional status and prompted his academic influence beyond the laboratories. In fact, he openly acknowledged it in his autobiography, a book which, by the way, received the prestigious Phi Beta Kappa Award in Science. He wrote:

Perhaps more significantly for my own story, my stature in the scientific landscape changed, most dramatically by an event beyond my control: the award of a Nobel Prize in 1989. Combined with my growing involvement with the politics of science and my long-term interests in public service, *the prize ultimately redirected my career* [emphasis added]...After 1989, I was increasingly asked to voice opinions, to make speeches, and to join and even lead groups engaged in the politics of science. This new level of *engagement with the forces that shape scientific life in this country* [emphasis added] led in a very short time, almost exactly four years, to the most important job I will probably ever have...(Varmus, 2009, p. 360)

Indeed, one of Varmus' career redirections was his appointment as the National Institutes of Health (NIH) director in 1993. During his six-year term in this highly reputable position, Varmus was involved in policymaking about AIDS, the Human Genome Project, global health, cloning, and stem cells that impacted health and research

⁶ Interestingly, Varmus and Bishop's Nobel Prize bestowal was somehow obscured by controversy due to the lack of recognition of another scientist, Dominique Stehelin, a French oncologist who worked as a postdoctoral researcher in the laureates' laboratory. Stehelin claimed to have done the actual work that led to the discovery. He wrote: "I did the work all by myself, from A to Z. I spent three years in their San Francisco lab, from 1972 to 1975, at a time when nobody other than me was working on the subject and I am not even associated in this distinction... I don't know why the scientific community refuses to attribute the discovery to me. Undoubtedly because *working in Lille is judged less prestigious than being a researcher in San Francisco* [emphasis added]." (Lipsick, 2022, p.13-14)

systems in the U.S. and at an international level (Varmus, 2009). Most importantly for this account, it should be noted that Varmus started to push for opening up access to scientific publications during his directorship at NIH. By the end of his term around 1999, he experienced a “conversion” (Varmus, 2009, p.128) from supporting the traditional commercial publishing model to advocating for OA, thanks to Pat Brown’s influence.

Brown had shared with Varmus the story of *ArXiv.org* in a café meeting in San Francisco (Varmus, 2009). *ArXiv* is a repository of preprints⁷ founded by the physicist Paul Ginsparg in 1991 at Los Alamos National Laboratory. The repository sought to make publicly available the manuscripts that physicists were already exchanging via an electronic mailing list created in 1989 by the astrophysicist Joanne Cohn at the University of California, Berkeley (Feder, 2021). *ArXiv* is considered a revolutionary innovation in scholarly communications in the digital era for enabling the free exchange of information between scholars (Silagadze, 2023).

ArXiv inspired Varmus and Brown to propose the creation of an OA electronic publishing system for the biomedical sciences to the NIH. In 1999, Varmus wrote a proposal to create *E-biomed*, a repository where scientists could deposit their preprints and papers accepted for publication. *E-biomed* would also host other types of manuscripts not usually published by journals, like negative results reports. The proposal summarized the ideals that Varmus, Brown, and Eisen later depicted in the *Open Letter* for the creation of PLOS: free access to readers, rapid dissemination of scientific reports,

⁷ A preprint is the author’s version of a manuscript before peer review.

copyright ownership granted to authors, and (allegedly) reduced costs due to the electronic format (Varmus, 1999).

The proposal received harsh criticisms, like PLOS' case. Moreover, scientific societies and commercial publishers interrogated the sustainability of *E-biomed*, and Varmus responded by outlining the seminal idea of funding the repository by charging the author “a *small* [emphasis added] fee at the time of submission and a larger one at the time of acceptance.”⁸ (Varmus, 1999, p.13). By “small fee,” they meant 1,500 dollars. These charges to authors seemed problematic even for those highly profitable publishing companies. Paradoxically, for instance, an officer of Elsevier wrote: “Such charges would penalize scientists from poorer nations and would not meet Varmus’ stated goal of free and easier access to scientific information.” (Kutz, 2002).

Yet, after some deliberations and negotiations with stakeholders in public forums, the initiative eventually became PubMed Central (PMC), one of the world’s largest full-text digital libraries for biomedical and life sciences, sponsored by the NIH’s National Library of Medicine⁹ (PubMed Central, 2023). In sum, Varmus’s career turning point from being a laboratory scientist to a political scientist helped move the needle in

⁸ Cancer research holds many privileges that other areas of science barely dream of, most notably the high budget assigned to it. Just as an example, the National Cancer Institute spent \$6.4 billion in 2021 (National Cancer Institute, 2022). With these numbers in mind, Varmus and colleagues’ word choice may be understandable, i.e., using “small” or “modest” to describe the author fees they proposed. In fact, Varmus admitted that for him and his team, research funding was never really an issue: “...my UCSF colleagues and I seemed to have few or no difficulties in funding our research; budgetary growth for the agencies I depended on was generally healthy in the 1960s, 1970s, and 1980s; political support for science was bipartisan; and science seemed to be rarely controversial.” (Varmus, 2009, p. 360) In further sections, I will show how contrasting this viewpoint is from my participants’.

⁹ The relevance of PMC lies in the access to its massive data about biomedical scholarly articles published by journals based worldwide. Currently, PMC indexes more than nine million archived articles containing XML (Extensible Markup Language) data, which allows numerous scholarly publishers to ease the editorial workflow as they harvest from PMC the information on potential authors and article reviewers (Huh, 2021).

developing technologies for OA publishing that subsequently influenced the foundation of PLOS and *PLOS ONE*.

Varmus's scientific prestige granted by the Nobel Prize not only redirected his career path but indirectly influenced other academics, too. More pointedly, it was a key actor in recruiting the editorial workforce that PLOS needed. As I mentioned above, PLOS' founders announced that they would recruit "an outstanding editorial board and staff" (Brown et al., 2003, p.2) to lead the operations of the nonprofit publisher. In fact, one of the first lead editors recruited to take the lead in *PLOS Biology* was Vivian Siegel, a geneticist who had been the editor-in-chief of the prestigious journal *Cell*.

When I conducted the pilot study for my research, I interviewed two staff editors of *PLOS ONE* who joined the journal after leaving academia. The first interviewee is a young scientist who left her job in a laboratory because she perceived an unhealthy competitive environment that was not good for her life. She called it a "toxic environment" and added: "I think that it was just that whole "publish or perish" mentality. The institute didn't offer a lot of support to early career researchers, and they expected all to just compete against each other for limited resources." The second editor, trained in genetics and molecular biology, made the tough decision to leave her scientific career. She worked as a postdoctoral researcher at a prestigious university in the U.S. when she realized some significant ethical issues were occurring in the laboratory. The issue was actually a highly publicized case of scientific fraud in cancer research. She was undermined when she tried to speak up; she recalled: "My PI just brushed aside my concerns, and I felt small. I knew the data were being cherry-picked, and there was no

biological explanation for some of the results that were coming out. I felt that my expertise didn't count for anything. I couldn't continue.”

These two editors are part of a category of PLOS staff members that one of my participants called *reformed academics*: young scientists trained in prestigious Western universities who decided to move away from pursuing a tenure-track professorship but were still willing to be affiliated with science. What I found in common among the *reformed academics* was that they could not find a job to fulfill their excitement and commitment to science, as well as job stability and work-life balance, until they got into the publishing industry. After leaving academia, some of them got jobs in commercial publishers like Springer Nature and BioMed Central. Coming back to Varmus's scientific prestige, this quote from one of the *reformed academics* illustrates its relevance in the process of assembling an editorial team for PLOS' journals: “I knew that PLOS was one of the places where I would be working for: it's a nonprofit, *it's founded by a Nobel laureate*.” In sum, the academic prestige accumulated by the founders influenced the growth of the publisher's positive reputation among the academic community, which was pivotal for expanding the organization, as I will present in the next session.

PLOS Financial Sustainability and the Launch of *PLOS ONE*

In the previous sections, I outlined some of the critical events in the foundation of PLOS: Scientists were invited to join the initiative through an *Open Letter* that effectively invoked their interests and resonated with their concerns about the need for reforms in the publishing systems. Academic prestige accumulated and deployed by PLOS' leaders sent a powerful message about how its model was feasible and reliable.

But to what extent would the publisher stakeholders' prestige render PLOS durable? How would a new publisher attract submissions when researchers were accustomed (and especially conditioned by the reward systems of science) to submit to long-established journals? (Merton, 1968; Zuckerman & Merton, 1971) And especially, how would PLOS cover the production costs of its ambitious operations?

Since its foundation, the sustainability challenge has been on PLOS' plate.

Although the organization relied on the grant from the GBMF, another one from the Sandler Family Supporting Foundation, plus other donations for the initial years, it was still a question mark whether the "modest fees" charged to authors would be a sustainable model in the long term. In fact, despite having increased the APCs for the flagship journals from \$1,500 to \$2,500, the revenues were insufficient to cover the costs, and the publisher even had losses of up to one million (Butler, 2006).

In October 2003, during the first meeting of PLOS' Board of Directors (BOD)¹⁰, the financial strategy the publisher would follow was heatedly discussed. In the meeting, Varmus revealed the concerns expressed by GBMF on the publisher's burn rate. Other BOD members highlighted that memberships could be another source of support, for instance, charging libraries for printed copies of PLOS journals, an initiative that was eventually rejected (PLOS, 2003).

¹⁰ The founding BOD was made up of the three founders of PLOS, some of the so-called "scientific luminaires" announced by the GBMF, and other influential stakeholders in the open access arena in the U.S., such as Lawrence Lessing, a Law professor at Harvard University who founded the initiative Creative Commons. Interestingly, this first BOD was almost completely composed of white male American scholars, except for Beth Weil, a science librarian from UC Berkeley. Interestingly, they addressed the topic of the composition of the board as follows: "Several members expressed the view that the board should be expanded to provide a broader spectrum of scientific expertise as well as geographic breadth. The board agreed that *we should add at least one European scientist to the board* [emphasis added]" (PLOS, 2003a, p. 1).

Yet, the BOD members agreed on organizationally strengthening the finance department and implementing other funding models, such as an institutional annual membership comparable to the subscription fees to existing journals. This membership would provide APC discounts for the institution-affiliated authors. Some additional strategies were also discussed, including posting commercial and job ads and offering individual memberships¹¹. The publisher even launched an online store in 2009 where “official merchandise” items were sold and shipped via a third-party company with “localized websites that enable lower delivery costs (available in the UK, Germany, New Zealand, Australia, Canada)”(Allen, 2009)¹².

Interestingly, the minutes of that first BOD meeting reveal that PLOS officers did have a more effective plan in mind, acknowledging that the business model was certainly based on the APCs. As the purpose of the organization was to maintain highly selective journals (i.e., *PLOS Biology* and *PLOS Medicine*) that could compete with the top-tier

¹¹ The individual membership strategy was eventually implemented. Supporters could choose between five membership levels: *Innovator* (by donating \$1,000 and above), *Advocate* (\$500), *Idealist* (\$250), *Supporter* (\$100), *Friend* (\$50), and *Student* (\$25). Members were listed on the website and received some “official merchandise” items like a T-shirt, a mug and a bag. (PLOS, 2012)

¹² In a note posted in PLOS’ blog, the Director of Product Marketing and Sales announced the launch of the online store. As this announcement, titled “Feed your PLoS t-shirt obsession,” provides interesting information about the expansion of PLOS’ operations, I reproduce some of the note’s highlights here:

Today, we’re delighted to announce that the official PLoS Store is open for business – in time for the holidays. With a large range of t-shirts (including some designed specifically for the season of good-will) and other merchandise, you can let us solve your shopping nightmares...The PLoS t-shirt phenomenon was started by co-founders Pat and Mike who know that in the lab, comfort is everything. They started producing cool and funky t-shirts to get the word out about PLoS and soon folks started to ask them when new designs would be available...Realizing this was a popular and unstoppable trend, PLoS started using t-shirts to say thanks to the community for their involvement on our editorial boards. We also gave them away at conferences because it made people flock to our booth and we wanted to talk to them about open access and publishing with us. PLoS will continue to offer free t-shirts to the community – using store revenue to offset some of these costs...The only problem was that the more popular our t-shirts became, the more labor-intensive life was getting at PLoS’s San Francisco office. Often times, Allison, our Marketing Project Manager, had to organize top notch editors and publishers to stuff t-shirts by hand into envelopes (their only compensation was free pizza). On the busiest days, it felt like we had turned into a t-shirt supply company. Something had to give.(Allen, 2009)

ones (e.g., *JAMA*, *Nature*, *Cell*), the new editor, Vivian Siegel, presented the seminal idea for reaching self-sustainability that would eventually become a reality: launching other disciplinary “second-tier” and “third-tier” journals that could attract a large number of submissions (PLOS, 2003a, p. 2). Based on the economies of scale—i.e., decreasing production costs by increasing the outputs—the plan led to the launch of the journals *PLOS Computational Biology*, *PLOS Genetics*, and *PLOS Pathogens* in 2005, which initially were led by “volunteer academic editorial teams, rather than in-house staff” (Butler, 2006), which temporarily alleviated the rise of costs.

Continuing with the “second and third-tier journals” strategy, the organization later launched *PLOS Clinical Trials*, which operated for just one year. However, their breakthrough came with the launch of *PLOS ONE* in December 2006, thanks to the auspice of the Open Society Institute (PLOS ONE, 2007b). This journal would elevate the scale of journal publishing to a new level and earned the label of “mega-journal.” Initially conceived as a multidisciplinary database, *PLOS ONE* would introduce several editorial and technological innovations to the increasingly competitive OA marketplace: a soundness-only publication criterion to avoid subjective judgments about novelty, post-publication comments and annotations, article-level metrics, and so on (Binfield, 2013; Björk, 2018; Eve et al., 2021). To provide a general overview of my case of study, in the next section, I describe the journal *PLOS ONE* using some of the leading bibliometric indicators commonly utilized in library and information sciences to assess the performance of scholarly journals within their different dimensions (i.e., output, content, usage, etc.) (Fein, 2013; Haustein, 2012).

A Mega Journal Required a Mega Editorial Board

By the time *PLOS ONE* was launched, the publisher was already gaining a reputation, very likely thanks to the rise of *PLOS Biology*'s impact factor in a short time frame (Butler, 2006). PLOS' leaders had already stated their ambitions of having other publishers and journals follow their business model to disrupt the status quo enacted by the for-profit model. Further, three of the so-called foundational "Declarations" supporting the open access movement¹³, signed by PLOS and many other OA stakeholders primarily based in the U.S. and Europe, were being widely spread. More and more similar statements were signed worldwide. These factors combined might have allowed the publisher to take the risk of launching *PLOS ONE*.

The ambitious journal model had similarly ambitious goals regarding the procedures for selecting manuscripts. In order to accept as many papers as possible, the journal sought to select manuscripts that comply with international standards of biology and medicine publications (MacCallum, 2011). Yet, the papers would be selected on the basis of their soundness regarding novelty (Björk, 2018; Björk & Catani, 2016; Eve et al., 2021). As one of my informants mentioned, this criterion would allow researchers to submit their pieces even if they were not fancy enough.

Following the scaling-up rationale, a mega journal required a mega group of editors to curate those contents. In 2007, the journal recruited around 400 researchers, the

¹³ The Budapest Open Access Initiative (2001), pushed by the Open Society Institute; the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities (2003) supported by the Max Planck Society; and the Bethesda Statement on Open Access Publishing (2003) signed during an event hosted by the Howard Hughes Medical Institute are considered among the foundational documents in support of the OA movement. These documents showcased (supposedly) standard definitions and courses of action to be followed at a global level to achieve the objective of implementing an OA publication model. Briefly put, these documents depicted what OA was considered, what the role of copyright was within this framework, and how this model would work in terms of technology requirements.

majority of whom were based in high-income countries: the U.S. (45%), the U.K. (14%), Australia (5%), Germany (5%), and Canada (5%). The rest were based in 30 other countries across Africa, Asia, Europe and South America (PLOS ONE, 2007a). When I started my data collection in 2022, the editorial board was made up of 9,000+ editors. A year later, there are 10,400+ editors listed on the journal's website. I do not aim to investigate how they increased those numbers but rather to share what I found throughout the editors' accounts on how the journal defined an academic editor (AE) and the extent to which this definition matched the participants' interests.

A Multidimensional Profile of *PLOS ONE*

In this section, I describe the journal's profile using the multidimensional methodology for journal evaluation proposed by Haustein (2012). This methodology allows different stakeholders in the publishing process (i.e., authors, reviewers, editors, readers) to assess the different facets of a journal and move away from regarding it through the lens of the dominant quantitative indicator—the Journal Impact Factor (Haustein, 2012). In my research, the multidimensional methodology is also helpful for providing a comprehensive overview of the scale of *PLOS ONE*, as size is a crucial trait of the journal.

I retrieved the data from five primary sources: 1) the journal's website; the citation databases 2) Scopus and 3) Web of Science (WoS); 4) the Scimago Journal & Country Rank (SJR); and 5) Candid's GuideStar, a nonprofit organizations database. The data were collected between October 1, 2022 and March 31, 2023. The section includes descriptive statistics using bibliometric information, as those are the primary tools of the

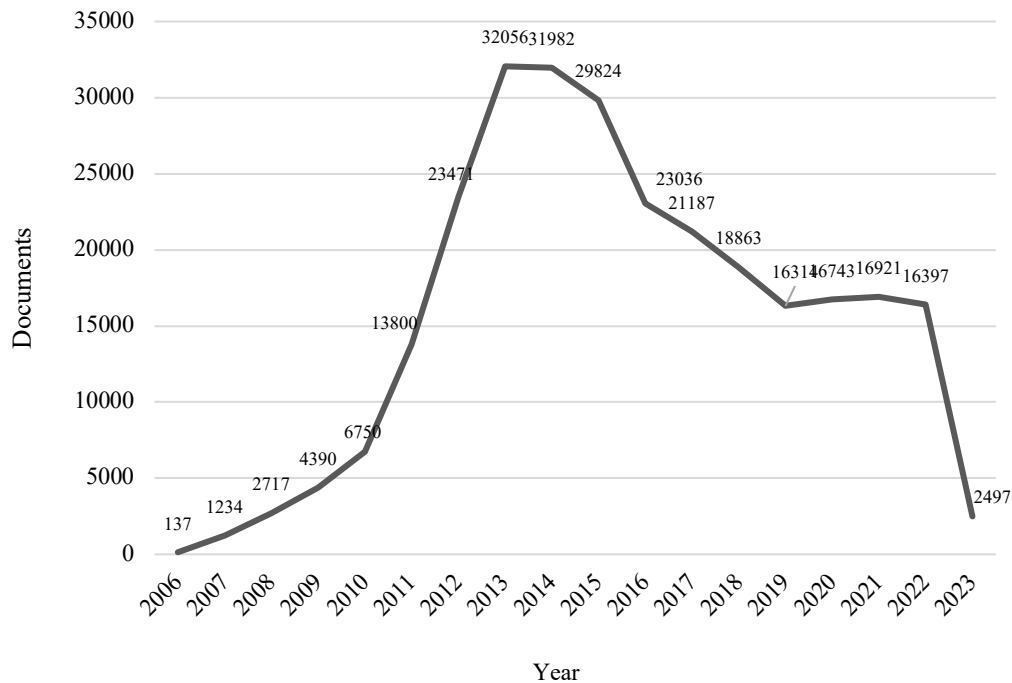
methodology; yet it is not a bibliometric analysis because it is out of the scope of my study.

Journal Output

This dimension concerns the number of publications per year and the publication frequency. As mentioned earlier, *PLOS ONE* is known for its unusual size and broad scope. It publishes, on average, 16,000 documents per year (Scopus, 2023). The journal uses a continuous publication frequency, i.e., articles are published on the website once the peer-review and formatting processes are completed. According to the Scopus database, the journal has published 278,319 documents since its launch in 2006 until March 1, 2023 (Scopus, 2023). Research articles are the main types of published contributions (94.6%). Figure 1 summarizes the journal's output by year. The journal's output increased by 1026% from 2007 to 2011 (Fein, 2013). It has been shown that this striking percentage might be related to its acceptance rate, which has varied over the years, but it is, on average, 50% (Fein, 2013). The output started to decrease after 2014, which has been explained by the emergence of other mega journals in the market (Björk, 2015, 2018; Spezi et al., 2017).

Figure 1

PLOS ONE Documents Published by Year

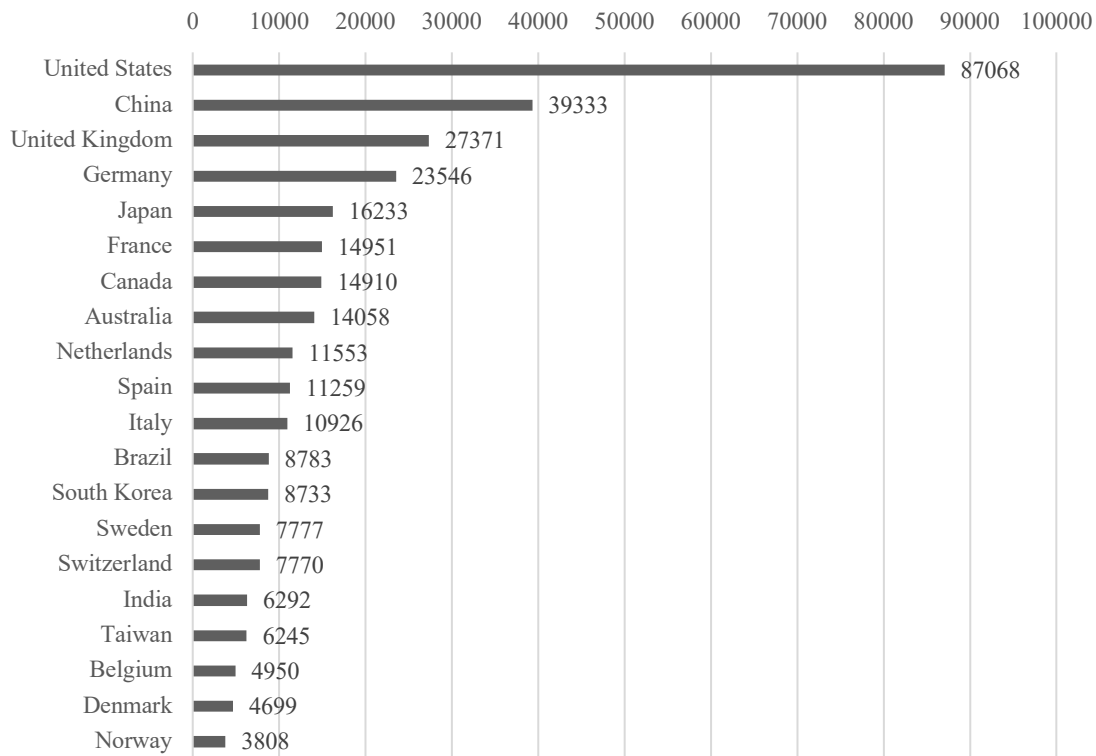


Note. Figure adapted from data available at Scopus (2023).

Most published contributions in *PLOS ONE* are authored by researchers based in high-income countries (HICs), as shown in Figure 2. According to the Scopus database, the five countries that have contributed the most papers to the journal are the United States (31.1%), China (14%), the United Kingdom (9.9%), Germany (8.4%), and Japan (5.8%). The output from low-income countries is less than 10% (Scopus, 2023). Figure 2 presents the top 20 countries with the most contributions published. Similarly, contributions in *PLOS ONE* are submitted mainly by authors affiliated with top-ranked academic institutions based in HICs (Scopus, 2023).

Figure 2

PLOS ONE Top 20 Contributing Countries

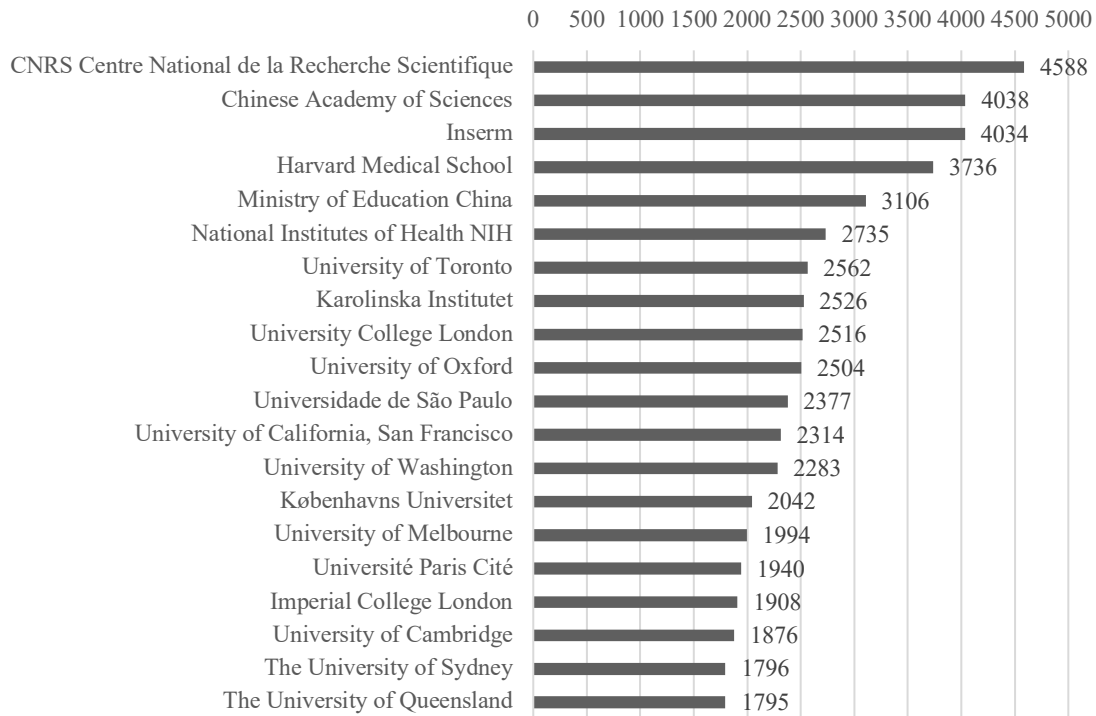


Note. Figure adapted from data available at Scopus (2023).

Figure 3 shows the top 20 institutions contributing to the journal. A salient characteristic of *PLOS ONE* is the rapid publication and high acceptance rate. According to the journal's website, the first editorial decision is made 14 days after submission, and the time to make the final decision is 168 days (approximately six months) (PLOS ONE, 2023c). In 2020, the journal reported an acceptance rate of 48.6% which is higher than most of the top-tier multidisciplinary journals, some of which may have acceptance rates of 5-10 percent (Björk, 2015). The high acceptance rate is linked to the soundness-only peer review adopted by the journal (Eve et al., 2021; Spezi et al., 2018).

Figure 3

PLOS ONE Top 20 Contributing Institutions



Note. Figure adapted from data available at Scopus (2023).

Journal Content

The publisher PLOS currently runs 12 science and technology journals.¹⁴ *PLOS ONE* is the largest journal of the publisher's portfolio and primarily publishes research articles presenting results of original, empirical research (95% of the content) (Scopus,

¹⁴ The 12 journals of the PLOS' portfolio are *PLOS Biology* (2003), *PLOS Medicine* (2003), *PLOS Computational Biology* (2005), *PLOS Genetics* (2005), *PLOS Pathogens* (2005), *PLOS ONE* (2006), *PLOS Neglected Tropical Diseases* (2007), *PLOS Climate* (2021), *PLOS Digital Health* (2021), *PLOS Global Public Health* (2021), *PLOS Sustainability and Transformation* (2021), and *PLOS Water* (2021). The journal *PLOS Clinical Trials* was created in 2006, but ceased its operations and was merged into *PLOS ONE* soon after its creation. The publisher has also launched other platforms throughout its history, such as PLOS Currents (2009-2018). This was an experimental initiative dedicated to publishing rapid communications and non-conventional contributions such as negative results and research protocols (PLOS, 2010).

2023). Other types of contributions, such as systematic reviews, notes, and protocols, are also accepted. All the contributions are published only in English, yet translated versions of papers may be published as supplementary information (PLOS ONE, 2023c).

Regarding the journal's publishing scope, the website states: "*PLOS ONE* accepts research in over two hundred subject areas across science, engineering, medicine, and the related social sciences and humanities" (PLOS ONE, 2023c). In spite of this variety of disciplines, there are two areas highly represented: Biochemistry, Genetics, and Molecular Biology (23.8%) and Agricultural and Biological Sciences (23%). The remaining published papers (52.5%) are classified as Multidisciplinary (Scopus, 2023).

Journal Citations

The number of citations is the primary bibliometric indicator to measure a publication's influence and impact within the scientific community (Haustein, 2012). *PLOS ONE* has 944,441 accumulated citations registered in the Journal Citation Reports (JCR)¹⁵ since 2009. This remarkable number makes *PLOS ONE* the second journal with more accumulated citations listed by the JCR, just behind the journal *Nature* (Journal Citation Reports, 2023). The journal's H-Index¹⁶ is 367, which reflects the high productivity and impact of the journal.

PLOS ONE is currently ranked in Quartile 2 of the JCR in the category of multidisciplinary sciences with a Journal Impact Factor (JIF)¹⁷ of 3.752, which makes it a

¹⁵ The JCR is a list of journals ranked by citations, and it is produced by the company Clarivate. The JCR reports the citations a journal has received from other journals included in the Web of Science (WoS). The main indicator reported is the Journal Impact Factor. See: <https://jcr.clarivate.com/>

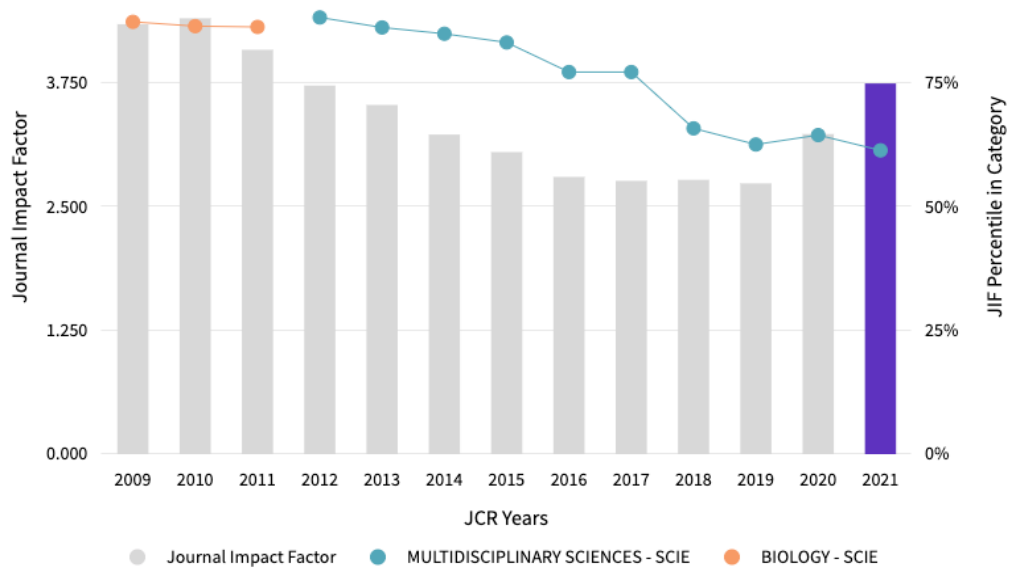
¹⁶ The H-index indicates "the largest number h such that at least h articles in that publication were cited at least h times each" (Dysart, 2023).

¹⁷ The JIF is a highly controversial bibliometric indicator. It was originally created in the 1960s to help U.S. librarians decide what journals libraries should subscribe, but the indicator it has been extensively misused

top-tier publication. From 2012-2017, the journal was ranked in Quartile 1 of the same category and in Quartile 1 of the biology category from 2009-2011 (Journal Citation Reports, 2023). Figure 4 summarizes the evolution of the journal’s JIF over the years since it was calculated for the first time in 2009. Using similar data, the Scimago Journal & Country Rank (SJR) database ranks *PLOS ONE* in Quartile 1 in agricultural and biological sciences, biochemistry, genetics and molecular biology, medicine, and multidisciplinary (Scimago Lab, 2023).

Figure 4

PLOS ONE Journal Impact Factor 2009-2021



Note. Figure retrieved from the JCR (Journal Citation Reports, 2023).

in research evaluation as it is considered a proxy of the quality of research. The misuse of JIF has led to global inequalities in the assessment of journals and the evaluation of academic careers. An overview of these issues can be found at: Archambault, É., & Larivière, V. (2009). History of the journal impact factor: Contingencies and consequences. *Scientometrics*, 79(3), 635–649.

Journal Management

Business Model. The publisher PLOS is a nonprofit publisher registered with the U.S. Internal Revenue Service (IRS) as a 501(c)(3) organization, which means it is exempt from income taxes and can receive tax-deductible donations (Coe, 2011; PLOS, 2021). The publisher annually reports its financial status to the IRS through Form 990. This form is a document filed by the organizations that provide the public with information regarding 1) activities and governance, 2) revenue, 3) expenses, 4) assets and liabilities, 5) service accomplishments, 6) tax compliance, and 7) compensation model and independent contractors (PLOS, 2021). The data of organizations' Form 990 are available through different websites such as the open-source database Open990.org or the nonprofit organization Candid¹⁸, a subscription-based platform that provides more granular data.

PLOS' primary revenue source is the APCs (PLOS, 2021). The amount of these fees varies depending on the journal and the type of contribution, ranging from USD 856 for a registered report article in *PLOS ONE* to \$6,300 for a research article in *PLOS Medicine* (PLOS, 2023d). The current fees for submissions in *PLOS ONE* as of March 2023 are the following:

- Registered Report Protocol: \$1,477
- Registered Report Article: \$856
- Lab Protocols: \$1,214
- Study Protocols: \$1,931
- All other articles: \$1,931 (PLOS, 2023d)

The publisher also provides funding support through different programs, such as the Institutional Funds, which consists of an annual payment made by institutions to cover

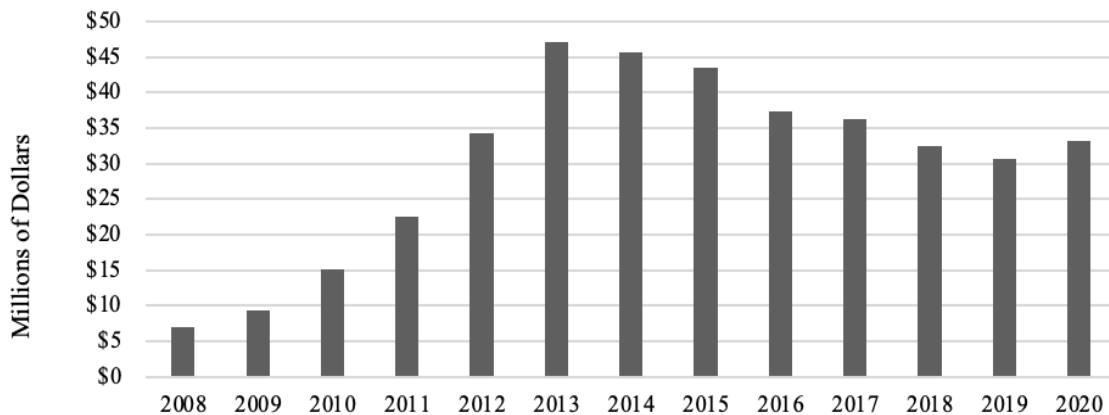
¹⁸ <https://candid.org/>

the APCs for their affiliated authors (PLOS, 2023d). As publishing in OA is a requirement from some research funders, PLOS also proposes to involve those stakeholders in the payment of APCs through other funding strategies, such as the *Community Action Publishing* program (PLOS, 2023a). Finally, PLOS offers free publication or discounts to researchers from low-income countries that are included in the program Research4Life.¹⁹

According to the Open990.org database, the total revenue of PLOS in 2020 (the last year for which information is available) was USD 33,237,815, of which 98.5% corresponds to the services offered by the publisher, i.e., the publication fees (APCs). Other revenue sources are contributions, government grants, investments, and royalties. Figure 5 summarizes the total revenues of PLOS from 2008 to 2020; the data is based on Form 990 filed by the publisher to the IRS.

Figure 5

PLOS Total Revenues 2008-2020



¹⁹ The platform Research4Life provides open access to research outputs for researchers affiliated with institutions based in low and middle-income countries. See <https://www.research4life.org>

Note. Information retrieved from Open990.org and Candid. According to Open990.org, the data for 2020 was provided by the IRS, although the source document (Form 990) has yet to be released.

Regarding the publisher's expenses, 82% corresponds to the salaries and compensation of officers, directors, and key employees (PLOS, 2021). The second category of expenses is for administration operations, such as accounting and legal services. The third most relevant item corresponds to the information technology expenses, which shows the entanglement and relevance of technologies for the editorial work. In this regard, it should be noted that the publisher has five main contractors:

1. Apex Covantage Llc²⁰ – a company based in D.C., VA (U.S.) that provides solutions for journal publishing, such as copyediting, typesetting, digital formatting, and metadata enhancement.
2. J&j Editorial²¹ – a company specializing in peer review management. The company offers services in four areas: editorial (submission systems management), production (workflow management), copyediting, and system support.
3. Editorial Office LTD²² – a company based in the U.K. that provides support services for peer review platforms.

²⁰ <https://apexcovantage.com/>

²¹ <https://jjeditorial.com/>

²² <https://www.editorialoffice.co.uk/>

4. Aries Systems Corporation²³ – a technology company that distributes publication workflow management solutions. This company developed the Editorial Manager, the software *PLOS ONE* uses to process submissions.
5. Kaufman Wills Fusting & Company²⁴ – a journal publishing solutions company that provides services such as copyediting, XML composition, proofing, and online hosting.

Governance and Organizational Structure. As stated by Coe (2011), “Nonprofit governance and management rest on three legs: the Board of Directors (Board), the chief executive officer (CEO), and the staff” (p.1). PLOS’ comprises the publisher’s CEO and nine high-rank officers supervising the publisher’s operations. They are responsible for assessing the company’s direction and strategy and making governance, control, and management decisions. Its members are nominated and elected by other fellow members. The Board members are representatives of technology companies (e.g., FlatWorld, PwC), universities (e.g., University of California, Pontificia Universidad Católica de Chile), and other organizations related to the publisher’s mission. They work on a voluntary basis except for the CEO (PLOS, 2013).

The CEO is a publication specialist with long experience in the publishing industry. She has worked for PLOS since 2017 (PLOS, 2023g). She leads the executive team, which in January 2023 was made up of five officers: 1) Chief of Staff & Chief Marketing and Communications Officer, 2) Chief Scientific Officer, 3) Chief People and

²³ <https://www.ariessys.com/>

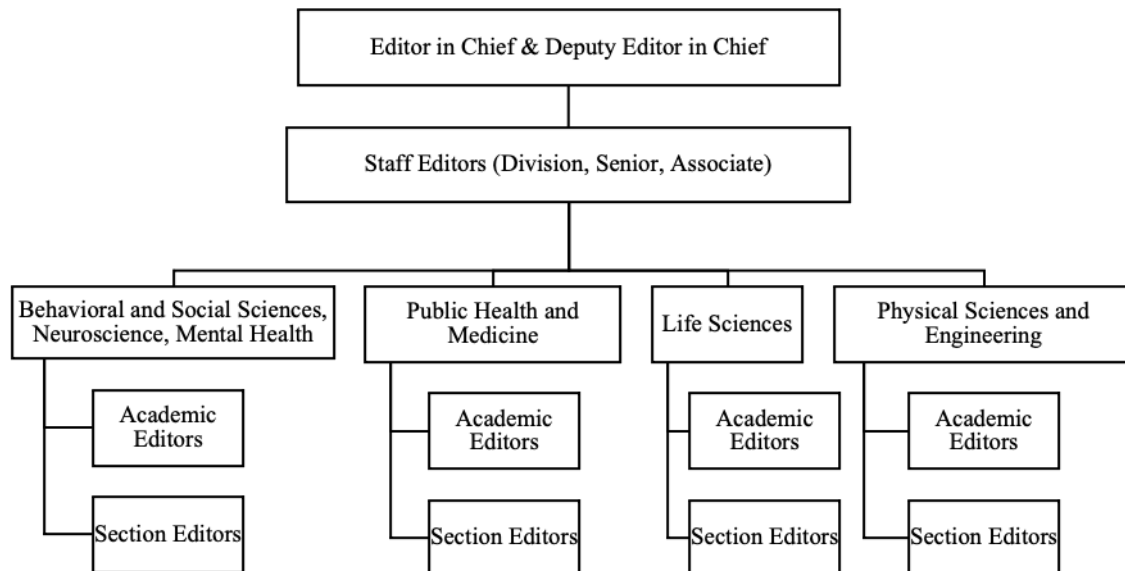
²⁴ <https://www.cjkgroup.com/>

Equity Officer²⁵, 4) Chief Financial Officer, and 5) Chief Publishing Officer. This team holds the operational leadership of the publisher and makes the major decisions, i.e., they are responsible for setting objectives, managing staff and resources, implementing changes, etc. (PLOS, 2023g)

The two groups above-described work at the publisher level. At the journal level, *PLOS ONE* is managed by an editorial team led by an Editor-in-Chief and a Deputy Editor-in-Chief (*PLOS ONE*, 2023e). The team is responsible for editorial operations, i.e., ensuring submissions are on track. This team is the focus of my analysis. Figure 6 summarizes the organizational structure of *PLOS ONE*.

Figure 6.

PLOS ONE Editorial Team



²⁵ The organization updated the structure of the executive team in late February 2023. The most notable change was the removal of the Chief People and Equity Officer position and the addition of the Chief Digital Officer position.

The in-house group of editors comprises 18 *Staff Editors* who are trained scientists in charge of defining and implementing the journal’s policies (PLOS ONE, 2023e). More specifically, they control the first round of submissions assessment and their distribution among the academic editors (PLOS ONE, 2023c). These publisher’s full-time employees are responsible for the first manuscript screening and editorial assessment process, i.e., they conduct the desk review to see if the manuscripts meet the journal’s submission criteria, particularly in terms of ethics and disclosures. There are three types of staff editors: division editor, senior editor, and associate editor. Table 1 summarizes the staff editors’ distribution by the journal’s four major sections.

Table 1

PLOS ONE Staff Editors

Section	Division Editor	Senior Editor	Associate Editor
Behavioral and Social Sciences, Neuroscience, Mental Health	1	1	3
Public Health and Medicine	1	1	2
Life Sciences	1	1	3
Physical Sciences and Engineering	1	3	0

Note. Based on the data available at <https://journals.plos.org/plosone/> in October 2022.

The Editorial Board is made up of external Academic Editors (AE) and Section Editors (SE), who oversee the peer-review process on a voluntary basis (PLOS, 2023c). Academic Editors conduct the editorial process: they find the referees, oversee the peer-review process, and draft a publication decision or recommendation about the submission (reject, major revision, minor revision, or accept). These individuals are active researchers affiliated with general or specialized research universities (e.g., medical universities) (PLOS, 2023c).

Section Editors (SEs) process regular submissions for the journal as well, but they also serve as advisors of the editorial staff when there are “special cases” to handle, such as manuscripts with ethical concerns. They advise the 11 discipline-based sections in which the journal is structured²⁶. There are 91 section editors in total.

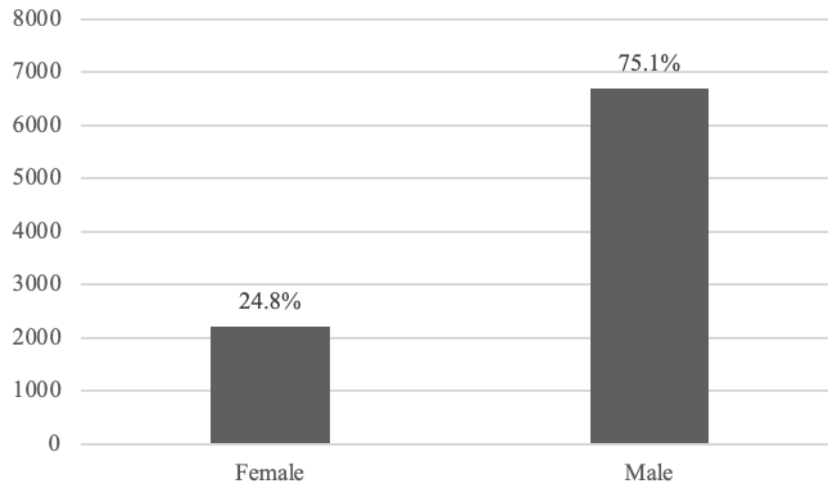
According to the journal’s website, as of October 31, 2022, there are 8,927 AEs based in 131 countries and affiliated with a variety of institutions. The journal keeps open its call for editors and requires that applicants meet these criteria: (1) be an active, funded principal investigator, (2) have a publication record of at least 20 articles, (3) have an institutional affiliation, (4) be able to handle up to two manuscripts per month.

The top five countries are the United States (N=2,473), Italy (N=683), India (N=546), China (N=475), and the United Kingdom (N=474). Figure 7 summarizes the distribution of academic editors by region. For analytical purposes, I used the seven geographic regions used by the World Bank (East Asia and Pacific, Europe and Central Asia, Latin America & the Caribbean, Middle East & North Africa, North America, South Asia, and Sub-Saharan Africa). This classification is based on the countries’ GNI (Gross National Income), an indicator commonly used to calculate Science and Technology investment.

²⁶ The 11 disciplines are subdivided in sections, which are 264 in total.

Figure 7

PLOS ONE Editorial Board Members by Gender

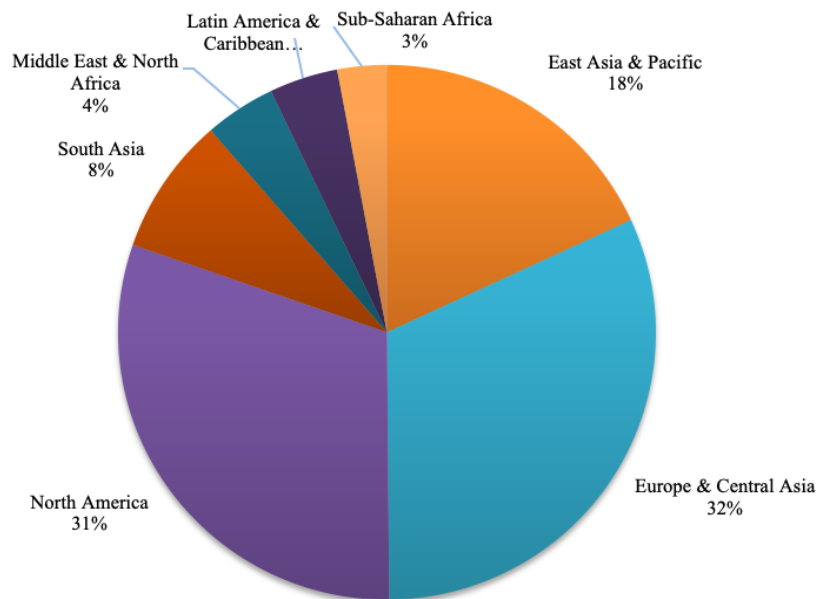


Note. Based on the data available at <https://journals.plos.org/plosone/> in October 2022.

^a Gender was determined using Gender API by introducing editors' first and last names.

Figure 8

PLOS ONE Editorial Board Members by Region



Note. Based on the data available at <https://journals.plos.org/plosone/> in October 2022.

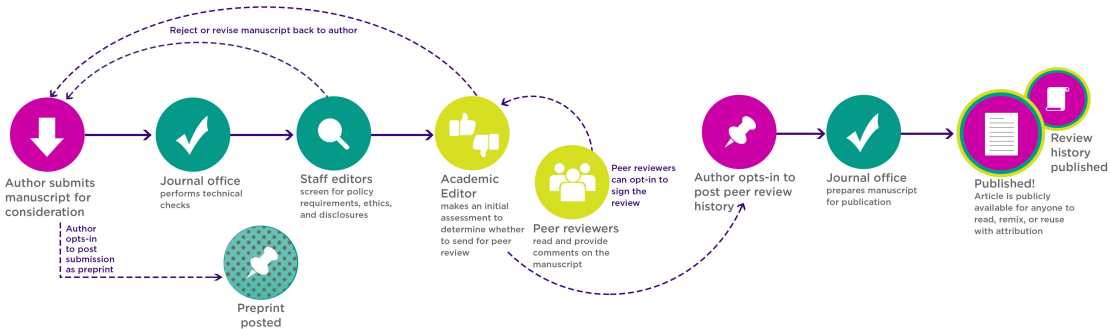
Additionally, *PLOS ONE* has an Advisory Board made up of scholars who provide methodological support on statistics (81 editors), research involving animals (8 editors), and research involving human subjects (13 editors). The Advisory Board members are active scientists affiliated with research institutes (10 scholars). They are responsible for developing recommendations and strategic advice to address different issues or challenges the publisher may face regarding publication decisions.

According to the information reported in Form 990 of 2019, the publisher employs 174 individuals and has more than 11,000 volunteers (editors). The ratio of employees and volunteers is 1:64, which makes the organization exceptionally dependent on the voluntary work of researchers based worldwide.

Editorial Workflow. Since the journal receives thousands of submissions weekly, the management of the editorial work requires the labor of different actors at the various stages of the process, which can be summarized as the internal review (i.e., when staff editors check for ethics and the journal's policy compliance), and the peer review process. Figure 9 shows *PLOS ONE*'s editorial workflow.

Figure 9

PLOS ONE Editorial and Peer Review Process



Note. Figure retrieved from <https://journals.plos.org/plosone/>

The journal’s workflow operations are performed through the platform Editorial Manager²⁷, i.e., the assessment of manuscripts by the staff editors, the allocation of manuscripts to academic editors, the seeking of reviewers, the peer-review process, and the editorial decision-making. The software is provided by Aries Systems Corporation (ASC), a technology company²⁸ that distributes workflow management solutions for journals and other scholarly publication outputs such as books and reference works. As stated on its website, the software is highly customizable and designed to meet the needs

²⁷ See: <https://www.ariessys.com/solutions/editorial-manager/>

²⁸ The company Elsevier acquired ASC in 2018. The acquisition of Aries has been framed as part of the broader monopolistic ambitions of Elsevier to take control of all stages of the knowledge production process “to leverage their disproportionate content ownership” (Posada & Chen, 2018, p. 16). Interestingly, for the ASC’s officer I interviewed, the acquisition has been very beneficial for the company and, consequently, their users as well. He commented:

I think in academia there’s always a fear of the big brother, big companies owning and being monopolies, but I can say from Aries point of view, I don’t think that’s the case. I think there’s probably more good that Elsevier does for Aries, which in turn Aries is able to invest more money into the platform and development In the last year and a half or so we launched an initiative to really improve the user experience, and it takes a lot of money to improve.

Moreover, in 2022 Elsevier and Aries announced that they are working on the design of a “diversity data system” to collect information from authors, editors and reviewers about their gender identity, race and ethnicity, which allegedly will contribute with the “collective effort to overcome inequity in research related to underrepresentation and bias along gender, race and ethnicity dimensions” (UKSG eNews, 2022).

of three main roles of the editorial workflow: authors, editors, and reviewers (Aries Systems Corporation, 2023).

In 2010, *PLOS ONE* adopted EM to manage the submission and peer review processes (Aries Systems Corporation, 2010; PLOS, 2010a). However, in 2015, PLOS announced that they started to work on the development of their own editorial management system, called Aperta. This system was supposed to “bring simplicity to the submission and peer review process” (Atkins, 2015). Its launch was framed as part of the publisher’s ambitious mission of accelerating progress and innovation in the science communication landscape. Aperta was intended to integrate different services. For example, in coauthored papers, every person’s contribution would be coded into the article’s XML to accurately identify their roles, which would help funders recognize the levels of participation of their grantees (Atkins, 2016). To that extent, the publisher also announced an increase of APCs prizes to invest in the development of the system: “PLOS invests millions of dollars in research and development to increase the efficiency, transparency and speed of scholarly communication for all its journals. The center of this investment is the platform Aperta” (PLOS, 2015).

Aperta was piloted with *PLOS Biology* and intended to be implemented in all the journals of the collection. Nonetheless, only two years after its launch, the CEO announced that PLOS would stop dedicating resources to these endeavors because of the unexpected development challenges (Mudditt, 2017). She also reported difficulties in implementing Aperta in all PLOS journals because of the differences among them in terms of the workflow and the unique preferences of each editorial team (Crotty, 2017). As a result, PLOS renewed its agreement with Aries Systems and returned to use EM in

2018 for all its journals (Aries Systems Corporation, 2018). In 2021, PLOS reported that the Aries Systems Corporation is its fourth highest-compensated independent contractor; the organization paid \$776,090 for a one-year service (PLOS, 2021).

CHAPTER 3

THEORETICAL FRAMEWORK AND LITERATURE REVIEW

Actor-network theory assumes that social structure is not a noun but a verb.

John Law, 1992

What is Actor-Network Theory (ANT)?

The theory that informs my qualitative study is actor-network theory (ANT). This analytical approach, rooted in the sociology of science and Science and Technology Studies (STS), posits that processes, ideas, organizations, or objects are continuously generated within a network of relationships between human and nonhuman actors (Latour, 1987). On this basis, ANT is a variant of constructivism (Justesen, 2020) because, for this approach, the reality is not ‘out there’ in the form of discrete entities with explicit attributes, but they are permanently assembled (and reassembled) into being through translation mechanisms (Callon, 1984; Latour, 1999a; Law, 1992).

Actor-network theory was developed in the 1980s. The framework draws on the ethnographic work of Latour & Woolgar (1986) that explored how scientists construct facts not only based on scientific theories or laboratory equipment (e.g., spectrometers to measure the mass of molecules). In the process of constructing facts, scientists bring to bear other elements that are “not strictly scientific,” such as their values and beliefs (Michael, 1996) and research finances. In other words, during the construction of facts in laboratories, there are ‘scientific’ and ‘non-scientific’ elements at stake that can be revealed if the researcher ‘opens the black box’ of what is taken for granted in the knowledge production processes. By “unblackboxing” phenomena, the researcher unveils

how actors apparently disconnected are “entangled in specific constellations in practice” (Justesen, 2020, p. 328).

The ANT’s leading theorists—Michel Callon, John Law, and Bruno Latour—claimed that they did not intend to create a theory. They argued that ANT is instead a set of analytical and methodological principles, borrowed from ethnomethodology (Latour, 1999a), that allows the researcher to study the composition of the world as made of the associations between human and nonhuman actors (Callon, 1999; Latour, 1999a; Law, 1999). In fact, the hyphen in the term actor-network denotes the relational nature of actors or “actants,” as Callon (1986) named them to stress their volitional nature²⁹. The actors’ identities and actions become meaningful only when they are entangled with other actors by negotiating their intentions and interests (Callon, 1984). In other words, “An actor’s agency depends on its networks. Actors only ever act within their networks, never in isolation.” (Justesen, 2020, p. 342)

In that sense, ANT sought to challenge various dichotomies of modern Western science and social theory, like subject/object, society/nature, micro/macro interactions, individual/structure, and technical/social. This dichotomic rationale tends to consider the material and the social worlds as separate spheres (Latour, 2005). According to ANT, this separation makes room for technological determinism and social reductionism (Law, 1991). As Law put it, ANT sought to respond to:

The problem [of] the absence of a method for juggling simultaneously with both the social and the technical (...) the social order is not a social order at all. Rather it is a sociotechnical order. What appears to be social is partly technical. What we

²⁹ As many other terms in ANT, “actant” was borrowed from semiotics, more specifically, from the work of the semiotician Algirdas Julien Greimas (Michael, 2017). Actant is used as a synonym of actor in ANT, and it highlights the capacity of an entity to act (to do something) or shift the actions of others (Akrich & Latour, 1992).

usually call technical is partly social. In practice nothing is purely technical. Neither is anything purely social” (Law, 1991, p. 10)

Take my case study, the scientific journal *PLOS ONE*. From an ANT approach, there is nothing *a priori* that allows us to clearly define it as a “journal.” Despite the existing numerous definitions of a journal (e.g., Baruch, 2008; Haustein, 2012; Siler et al., 2020; Ware & Mabe, 2015) that could match the characteristics of *PLOS ONE*, this actor is defined by its unique (temporary, contingent) relations with human actors, like authors and editors, and nonhumans, like digital technologies or science and research policies.

Thus, ANT allows us to identify the actors in a network, which only arises when the researcher looks judiciously at the associations between them. The researcher does this *by tracing the effects of associations* (Mol, 2010). In other words, to claim that an entity is an actor, evidence of its actions must be disclosed by thoroughly describing the connections. Moreover, ANT is a suitable approach to explore how these actors display and negotiate their interests and, by doing that, transform each other (Latour, 2005). In sum, this approach does not accept predefined constructs or already assembled groups, but instead, it invites the social researcher to explore the “peculiar movement of re-association and reassembling” (p.7).

In my case study, ANT allowed me to explore how the geographic diversity of the EB of *PLOS ONE* is not a fixed, narrowed concept that has to do only with the demographics of the Academic Editors. Rather, diversity is permanently assembled and reassembled by the relations between AEs and the authors, the staff editors, and the organizational documents that define the journal’s operations, the costs of publication and the AEs, and so forth. Most importantly, ANT allowed me to identify the effects of those

associations and the tensions they generate in the journal's knowledge validation process. I elaborate on this in the findings and discussion chapters.

What is not ANT?

Actor-network theory is not a framework to study networks as something taken for granted (e.g., telecommunication networks) simply because, for ANT, an actor-network emerges from the empirical analysis that the researcher conducts. In other words, for ANT, the network is the outcome, not the starting point of the analysis (Mol, 2010).

In other theories that might resemble ANT, such as Social Network Analysis theory (SNA), networks are webs of objects or people tied together (Downs, 2021). The difference is that for these theories, the researcher cannot necessarily trace the connections between the network elements. In other words, the dynamic interactions between the elements might be a black box. Moreover, SNA or other approaches to study networks may prioritize human agency in network dynamics. In contrast, for ANT, human and nonhuman actors may have the same capacity to shape the network (Bolz et al., 2023; Kennan, 2007; Sarker et al., 2006).

ANT Concepts Used in This Study

One of the characteristics of ANT is its plasticity, i.e., its capacity to be adapted for studying a myriad of social phenomena, from the use of libraries and repositories (e.g., Kennan, 2007; Kennan & Cole, 2008), to human-algorithm hybrids (e.g., Beckers & Teubner, 2023), or classrooms and schooling (e.g., Dussel, 2013; Verran, 1999).

Despite being elaborated 40 years ago, some concepts are still used and reinterpreted in ANT-based studies. Nevertheless,

...there is no coherence to it. No overall scheme, no stable grid, that becomes more and more solid as it gets more and more refined. The art [of ANT] is rather to move – to generate, to transform, to translate. To enrich. And to betray... Instead it introduces variations, sets up contrasts, and, time and again, proposes shifts. The art is not to build a stronghold, but to adapt the theoretical repertoire to every new cases. (Mol, 2010, p.257).

Indeed, the main concepts of ANT have mutated over time, and it is hard to stick with clear-cut definitions to apply them in analyzing a social phenomenon, as may happen with other social theories. In fact, several glossaries were created by the leading theorists and other ANT scholars where the terms and definitions vary (e.g., Akrich & Latour, 1992; Callon, 1986; Justesen, 2020; Mol, 2010). For example, a “primary actor” has been called a “focal actor” or an “actor world” (Callon, 1986).

As a result, Mol (2010) proposes to use the terms “ANT-type analysis” and “ANT-inspired work” to refer to research projects that embrace this framework. My goal is for this case study about *PLOS ONE* to be included in those categories. To that extent, in what follows, I present the main concepts of ANT that inform my study; these are summarized in Table 2.

Table 2.

Summary of the ANT Concepts Used in this Study

Concept	Definition
Actor / Actant	An actor is a human or a nonhuman entity (e.g., technologies, animals, documents, ideas) who <i>does something</i> within a group or a setting and <i>leaves traces</i> of its actions (Latour, 2005). In other words, actors have agency, which is only granted by their relationships with others in that group. An actor’s agency is relational and not necessarily derived from the actor’s individual will (Mol, 2010). Actors are not predetermined. Instead, they emerge from the analysis of the researcher, who identifies them by “following” a lead or central actor (e.g., the journal <i>PLOS ONE</i>).
Actor-Network	In an ANT account, an actor-network is the entanglement of actors (humans and nonhumans) that are linked through

Concept	Definition
	<p>“heterogeneous material arrangements” (Law, 1991, p.16). An actor-network “emerges” (Michael, 2017, p. 154) when the researcher traces the association of actors through the alignment of their interests. The hyphen indicates its collective, relational existence or flat ontology (Latour, 2005). Actors are capable of enrolling other actors around their goals and regulating those associations, which is what the term “assembling” refers to (Callon, 1986; Law, 1990).</p>
Enactment	<p>Enacted can be a synonym for performed (Michael, 2017). Actors acquire their characteristics and capacity to act through being enacted by other actors in a network (Law & Mol, 2008; Mol, 2010). Since for ANT actors do not exist in isolation, “If they are not being enacted, actors are no longer able to do all that much themselves” (Mol, 2010, p.258). There might be different enactments of an actor, enabled by different arrangements or interaction settings (Demant & Ravn, 2020). For instance, an academic paper is enacted differently whether it is used to support the development of a vaccine or to evaluate a researcher’s career progress.</p>
Mediators	<p>Mediators are actors that transport elements in the translation processes. They do it in a way that can complicate or disrupt a translation as they “distort, and modify the meaning or the elements they are supposed to carry” (Latour, 2005, p. 39). Mediators can influence the direction and outcome of the actor-network interactions or change how something is interpreted. Rodríguez Medina (2013) proposes that journal editors are mediators when they play gatekeeping roles, i.e., editors have the capacity to redirect the path of a manuscript, which at the same time affects the author’s career (McGinty, 1999).</p>
Obligatory Point of Passage (OPP)	<p>In order to enroll actors, a lead actor renders itself indispensable for solving a problem and assigns other actors their roles (Callon, 1984). Actors must pass through a kind of funnel or bottleneck to fulfill their roles and continue “to exist and develop” (Callon, 1986, p. 27) in the network. That funnel is another way to see the connections that actors must make with mediators to keep enrolled (Callon, 1984). Identifying OPPs is a way of analyzing a network’s vulnerabilities and contingencies.</p>
Program of Action / Antiprogram of Action	<p>This concept was originally introduced by Latour (1999c) to describe the agency of technological devices, more specifically, regarding the programming language of computers. It refers to the set of instructions that the artifact deploys about what another actor (e.g., a human) can do. But actors may have antiprograms of action, i.e., they can do things to prevent the action expected from happening (Latour, 1992). In other words, actors can end up</p>

Concept	Definition
	<p>“subverting the roles they were ascribed and betraying those networks” (Michael, 2017, p. 68) A program of action is also a concept with an enforcing trait, as it limits the options that actors may have, which is why it is possible to use it to understand power as a mode of ordering (Law, 1992; Rodríguez Medina, 2022).</p>
Translation	<p>Translations are the traceable associations between actors that, in any setting different from the one the researcher is studying, might not be connected (Latour, 2005). Through translations, actors define the roles and characteristics of others and the scenario in which they should act to be enrolled in the network. Actors translate each other by negotiating and aligning their interests, which creates a cohesive (yet always temporary) sociotechnical order (Law, 1992). Thus, there might be resistance within translation processes (Callon, 1986). Translation also means displacement because, through it, actors transport or move into space some materials, information, ideas, etc. (Michael, 1996).</p>

In sum, ANT is an approach that allows the researcher to address power issues within a group as it posits that a leading actor may enact its program of action or impose itself over other actors and speak on their behalf (Callon, 1984). In other words, the primary actor establishes specific paths, OPPs or “unavoidable conduits” (Michael, 1996, p. 54) through which the other actors must pass to be enrolled in the network, usually by overcoming specific difficulties or obstacles. For example, *PLOS ONE* is a journal entirely published in English, which is part of its program of action. Using this language for publication and communication between the actors is an OPP. Thus, AEs and other human actors whose native language differs from English must align their language skills (i.e., reshape part of their identity) “to fulfill their role within the network to achieve network durability” (Hunter & Swan, 2007, p. 407). Another example is the APCs. For any author willing to publish in *PLOS ONE*, paying those fees is an OPP.

As I describe in my findings chapter, AEs of *PLOS ONE* also displayed their antiprograms of action regarding the journal's editorial policies. For instance, AEs reject the APCs, and some of them organize with their colleagues to stop reviewing manuscripts for journals that charge APCs.

Why is ANT an Appropriate Framework for Studying Diversity in Scholarly Journals?

The concepts of translation and enactment are particularly helpful for addressing my main research question. On the one hand, translation refers to the assemblage of heterogeneous elements of a network. In essence, translation refers to the negotiations between actors and their programs of action to be enrolled in the network (Hunter & Swan, 2007; Uden & Francis, 2011). As Callon and Latour (1981) put it, “By translation we understand all the negotiations, intrigues, calculations, acts of persuasion and violence thanks to which an actor or force takes, or causes to be conferred on itself, authority to speak or act on behalf of another actor or force” (p. 279). In sum, translation processes involve interpreting other actors’ interests to construct common goals, eventually enrolling in the network, and forming a cohesive order (Justesen, 2020).

Michel Callon (1981) proposed four moments of translations that make the networks stable and durable: 1) *interessement*³⁰, 2) translation, 3) enrolment, and 4) mobilization. Michael (1996) summarizes the three first moments with a simple ‘quasi-syllogism’:

“This is what you really want to be (*Interessement*).
We are the ones who can help you become that (Translation).

³⁰ *Interessement* is a word borrowed from the French term *intéressement*. It was used by Michel Callon (1984) to explain how an actor “locks the other actors into the roles that had been proposed for them” (p.196). In other words, interessment means attracting and convincing other actors to align their interests with those of the focal actor (Islam et al., 2019).

Grant your obedience by your own consent (Enrolment).” (p.54)

Mobilization occurs when the program of action of a lead actor works. Hence, ANT explains how something works or why something happens (or not), which ultimately refers to the productive dimension of power, as ANT has its roots in Foucauldian thought (Rodríguez Medina, 2022). In fact, for ANT, power relations are the effects of sociotechnical articulations of heterogeneous actors with heterogeneous goals. These articulations might be asymmetrical, and the theory aims to reveal where those asymmetries come from and what they are made of (Rodríguez Medina, 2022).

In my study case of the journal *PLOS ONE*, I examined how those translation moments are enacted to assemble its large international editorial board. Moreover, the concept of translation helped me to identify the extent to which the interests and the program of action of *PLOS ONE* match those of the AEs and other actors, such as a software company like Aries Systems. Ultimately, the concept of translation helped me understand one of the sources of uncertainty about the social world suggested by Latour (2005): there are no groups, only group formation. This means discarding the idea that groups exist as a taken-for-granted association of individuals or things and, instead, recognizing that they are in constant formation through negotiation processes that are not free of tensions and disagreements.

On the other hand, the concept of enactment was helpful in identifying the various ways in which diversity is translated by the human and nonhuman actors of the network. In other words, rather than taking diversity as a normative concept that could be benchmarked in the journal *PLOS ONE* (e.g., analyzing the number of AEs from X or Y region, or the outcomes of diversity in terms of the journal’s output), I followed how

diversity was enacted by the actors and produced effects on what the actors do or do not do. I elaborate on this in my findings and conclusions chapters.

Criticisms to ANT: On Managerial and Unsung Heroes

One of the earliest criticisms against ANT argues that researchers tend to misunderstand the principle of “following the actors” by selecting mostly mainstream and powerful actors—humans or nonhumans—as a starting point to analyze the rendered connections of a sociotechnical assemblage. The first foundational and emblematic ANT studies likely influenced the development of that tendency, notably, for instance, Latour’s (1983) inquiry on pasteurization in France and the case of Louis Pasteur. Nevertheless, Latour intended to debunk the myth of the science hero. Moreover, he postulated that scientific facts, and even “heroes,” are the outcome of a network of forces, and nothing is inherent to them.

In the early years of the ANT’s development, John Law (1990) acknowledged and alerted about this managerial bias, i.e., being prone to unblack box only the stories of heroes because they are expected to triumph or be powerful, which may facilitate unveiling the socio-technical controversies of an assemblage. Law pointed out that selecting only the big and powerful actors has methodological and epistemic consequences or risks. On the one hand, the researcher tends to adopt the hero’s perspective to analyze the controversies primarily. On the other hand, other less powerful actors might be left out of the analysis. Both risks compromise the symmetry principle of ANT, i.e., the agency is distributed among several actors of a network rather than centered in “the manager.”

Among the most potent critiques of the risk of reproducing a managerial bias in ANT studies came from feminist epistemologists. Susan Leigh Star, for instance, pointed out there are other actors whose resources and strategies to translate or be translated by an actor-network are notably fewer than others. In other words, she highlighted that power differentials between actors should not be ignored when insisting on “‘levelling’ of human/nonhuman differences” (Star, 1990, p. 43). The question that should not be overlooked when depicting the assemblage of heterogeneous actors is—she insists—*cui bono*? Or, who benefits from the assemblage and stabilization of a network?

Other feminist scholars highlighted that starting off an STS analysis from the standpoint of less powerful actors maximizes the objectivity of science and counteracts the overemphasis on a managerial stance (Harding, 1995). Consequently, an oversimplification of the formation and stabilization of an actor-network may be prevented. I draw upon these feminist stances to develop this section focused on the viewpoints of academic editors who participated in my study. These actors are not “the heroic subjects” (Law, 1990), yet without them, the OA mega journal would have been only a dream in PLOS’s program of action about changing the status quo of the publishing system.

One of my participants, a 46-year-old physician from India, described his views on reviewers’ work as follows: “Usually people accept [to review], and sometimes they request for more time to complete it. Peer reviewers should be given the time according to their comfort zone because we are asking for their fair share of time for nothing; it is just like an *unsung hero* work.” During my data collection process, I realized that the participants also had this feeling about themselves. They agreed that their editorial labor

is not recognized enough despite its relevance for publishing a journal like *PLOS ONE*.

Thus, I decided to follow the AEs to avoid managerial bias.

Diversity in Scholarly Journals

After it was announced that Carolyn Bertozzi, alongside her colleagues Morten Meldal and K. Barry Sharpless, won the Nobel Prize in Chemistry in 2022 “for the development of click chemistry and bioorthogonal chemistry” (The Nobel Prize, 2022), she gave a speech at Stanford University, her current institution of affiliation. Bertozzi highlighted how the diverse composition of her first lab in Berkeley boosted the creativity of scientists:

I had people with different backgrounds, I had a preponderance of female grad students at a time where our representation in graduate program at Berkeley was 30%, I had people who identify as underrepresented minorities, and I think that diversity of people created an environment where we felt we didn’t have to play by the same old rules as scientists. We could do things like organic chemistry in living animals, why not? If there weren’t the right chemistries to get the job done, we could invent new chemistries, why not? We didn’t have to play by the rules.” (Maly Cosco [@malycat03], 2022).

Diversity is an “elastic and baggy concept [it] is simultaneously everywhere and nowhere. It is notoriously difficult to “pin down”” (Hunter & Swan, 2007, p. 403). Indeed, in the scholarly literature, diversity has different meanings, and it is context-dependent. Yet, I draw from an organizational standpoint that is commonly understood as Bertozzi described her lab, i.e., diversity consists of the inclusion of demographically different people within a group or team “to enhance problem-solving, creativity, and innovation” (Harzing & Metz, 2013, p.1).

Scholarly literature on diversity research and management focuses on the relationship between demography constructs (i.e., the demographic attributes of a person

or a group) and work outcomes to measure diversity in workplaces (Ashikali & Groeneveld, 2015; Joshi et al., 2011; Konrad, 2003; Yadav & Lenka, 2020). Over the past three decades, management researchers have examined the possible impact of diversity on performance, creativity, innovation, problem-solving, and decision-making in organizations (Ashikali et al., 2021; Konrad, 2003; Yadav & Lenka, 2020).

Broadly speaking, the different paradigms in the diversity research literature examine two main types of demography constructs: individual and task-related attributes. For example, from the relational demography standpoint, individual demographic attributes, both visible (e.g., gender, race, age) and invisible (e.g., personality, beliefs, values), are the most commonly used constructs or proxies to measure the variety or dissimilarity of individuals with respect to a group or organization (Avery et al., 2022; Joshi et al., 2011, 2020). This literature points out that the degrees of dissimilarity might affect the sense of belonging or quality of peer relations (Joshi et al., 2011). Regarding task-oriented diversity constructs, scholars have examined specific attributes or skills of individuals (e.g., educational background, professional experience) in relation to job outcomes.

Research has shown that findings using the above-mentioned approaches (i.e., using individual and task-related constructs) have demonstrated both positive and negative effects on work outcomes. Thus, the management literature also has argued that to have a more nuanced overview of diversity, articulating different levels of analysis is needed (e.g., from the individual to the team or organizational level) (Joshi et al., 2011). For example, studies at an individual level provide insights about individuals' satisfaction or commitment to an organization or help predict turnover rates (Joshi et al., 2011). On

the other hand, at a team level or group level analyses allow researchers to measure group integration, communication, or problem-solving. The integration of different levels of analysis might also be relevant for scholars interested in examining diversity in the context of the potential reproduction of social inequalities within organizations, including scientific ones (Acker, 2012; Amis et al., 2020; Bazner et al., 2021; Clark & Jagsi, 2021; Hofstra et al., 2020; Intemann, 2011; Leonelli, 2022).

For this study, I focused on the geographic diversity of the EB members at *PLOS ONE*. The main reason for this decision concerns the ANT's slogan "follow the actor." In other words, I did not focus on other demographic characteristics usually included in diversity studies, such as gender or ethnicity, because for the actor-network *PLOS ONE*, those are not as relevant as the geographic origin of editors. I came to that conclusion in the process of designing this study, especially through reading PLOS organizational documents and its historical background and analyzing the data of the pilot study I conducted in 2022 about the experiences of two women within this nonprofit organization.

On the one hand, the organizational documents revealed that PLOS explicitly disclosed its interest in diversifying its teams. For example, in their DEI (Diversity, Equity and Inclusion) Goals, the publisher states:

Open Access publishing began, in part, with equity in mind. PLOS began with a mission to transform science communication by making research content more accessible. Even though Open Access is now widely adopted, there are still key voices missing because the current system of scholarly communication was created by and for the experience of select groups, reflecting historic power structures and perpetuating inequity (PLOS, 2023b).

The publisher also discloses its program of action regarding diversity, by listing the following measurable goals:

- “In 2021 we will develop methods and metrics to understand the diversity of PLOS’ 10,000+ journal editorial board members, conscious of regional privacy laws and cultures.
- With the baseline created by the above activity, we will improve diversity on our editorial boards in 2022.
- In 2022 we will formulate recommendations for expanding diversity assessment and improvement efforts to other contributor groups based on 2021 research and pilots.” (PLOS, 2023b)

On the other hand, the pilot study was very informative to realize that, due to the scale of *PLOS ONE*, the organization’s interest in diversifying the mega-journal’s EB relied on the need to process the hundreds of thousands of submissions from many different countries. In other words, those sources of information allowed me to open the black box of what diversity means for the journal, at least in present times.

From a broader perspective, diversity in scholarly journals may be regarded as part of epistemic diversity, defined as “the condition or fact of being different or varied, which affects the development and/or understanding of knowledge” (Leonelli, 2022, p. 12). It has also been conceptualized as “the ability or possibility of producing diverse and rich epistemic apparati to make sense of the world around us” (Gobbo & Russo, 2020, p. 1). In other words, epistemic diversity is the recognition that there is not one only way of constructing knowledge but a multiplicity of possibilities for it.

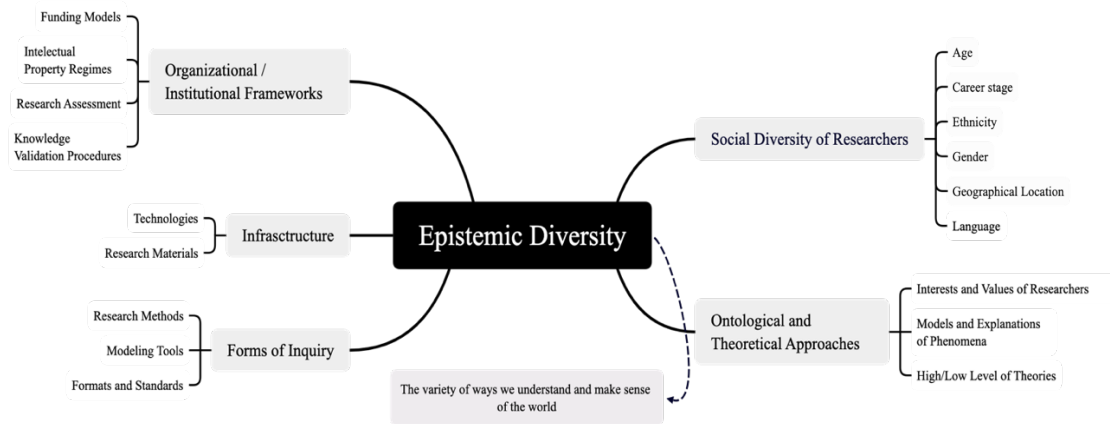
Epistemic diversity has been studied as a counter-narrative to the predominant, monolithic modes of scientific research that draw on Western modernity principles such as objectivity, neutrality, and rationality (Harding, 1991, 2015; Longino, 1990). Those epistemic principles led to the exceptionalism stance that shaped science policy and research practices during the 20th century, especially after World War II (Harding, 2015). According to this view, “no other science had ever existed or could exist that was better

able to develop the resources to represent nature’s order as it actually existed, and to intervene in it effectively.” (p. 9).

Consider, for example, how some research outputs are more valued than others, such as research papers that report positive results over other types of manuscripts that describe negative results or the struggles of the researcher during the experiments, or how certain software for research purposes (mostly proprietary software) is preferred over open source as it signals “better quality,” accuracy and reliability in the data produced with it; or how the use of English in scientific communication seems as an inevitable choice to achieve the alleged “great conversation of science.” (Ankeny & Leonelli, 2016; Gobbo & Russo, 2020; Guédon, 2014). As the examples just cited show, there are multiple sources of epistemic diversity that I summarized in Figure 10.

Figure 10

Sources of Epistemic Diversity



Note. Prepared by the author based on Heesen & Romeijn, 2019; Leonelli, 2023; and Solomon, 2006.

Literature Review

Background of the Study of Diversity in Journal Editorial Boards

The origins of the scholarship about diversity in the governing bodies of scholarly journals can be tracked in the 1960s. Drawing on the foundational work of sociologists of science who highlighted the stratification of the research system (Cole & Cole, 1973; Merton, 1968; Zuckerman & Merton, 1971), a body of scholarship addressed how the editorship allocation in journals makes part of a broader cumulative advantage rationale in the social structure of science. This scholarship emphasized that rewards and leadership positions in science—including editorships—are disproportionately allocated to those researchers with already high recognition and access to institutional support. At the same time, researchers with less recognition tend to get less credit for their work overtime.

Merton and Zuckerman (1968, 1971) called this phenomenon “the Mathew effect” in science. In the 1970s, as the academic workforce started to shift and become more diverse, the cumulative advantage approach resonated with scholars who analyzed the imbalances in the editorial boards in psychology. The pioneering work of Teghtsoonian (1974) and Over (1981) on the distribution of editorships by sex showed that despite the fact that women were increasing their presence in the discipline—measured by publication patterns—they were not being appointed editorships at the same pace, which suggests the reproduction of the Mathew effect in publications (Metz & Harzing, 2012).

Later on, within the context of the expansion of the scholarly publishing industry in the 21st century, critical studies on diversity in editorial boards have proliferated.

Recent analyses focus not only on the gender distribution in EBs (Cho et al., 2014; Metz & Harzing, 2009; Røstvik & Fyfe, 2018) but also analyze the underrepresentation of other social identities, such as scholars from low-income countries (Bhaumik & Jagnoor, 2019; Espin et al., 2017; Hedding & Breetzke, 2021; Kuebbing et al., 2022).

Overall, these studies assert that the disparities in EB memberships might affect the researchers' careers as the lack of access to sit on editorial boards hinders researchers' networking opportunities (Feeney et al., 2019). Moreover, as editorships signal recognition of excellence, it might limit scholars' chances to build academic prestige (Addis & Villa, 2003; Metz & Harzing, 2009; Pan & Zhang, 2014). This literature also suggests that the lack of diversity might affect the disciplines as well since it narrows the scope of research.

Due to the increasing importance of journal metrics, another trend of studies on the composition of EBs points out the potential correlation of the diversity of their members with the publication outcomes. From a bibliometric-oriented approach, these studies have tested hypotheses to prove how editors' profiles might influence citation patterns and journal ranks (Goyanes & Demeter, 2020). For instance, Petersen et al. (2017) showed that gender and nationality negatively correlate with the five-year Journal Impact Factor (JIF), SCImago Journal Rank, and Google Scholar h5 index of management journals. Nevertheless, the affiliation of editors with a small group of prestigious institutions is positively correlated with high-impact metrics.

Likewise, a study of "editormetrics" in African journals indicated that the JIF and the h-index of editors are positively related, which suggests that the prestige and credentials of editors influence the journals' citation rates (Mendonça et al., 2018). This

trend in the literature implies that the reputation and impact of journals keep dominating the publishers' agendas despite the calls to prioritize diversity and inclusiveness in the governance of journals to mitigate potential epistemic injustices (Knöchelmann, 2021; Rouan et al., 2021).

The trends cited above focus on the proportions and disparities of the EBs' members and their effects on the researchers' careers and the publication outcomes, yet both foci are out of the scope of my study. The literature has barely touched on the potential tensions, contradictions, and challenges in managing diversity, especially in multidisciplinary journals. Moreover, as journals rarely describe the division of labor between the EB members (Mendoza et al. 2018), I argue that further thorough research is needed on how publishers deal with diversity throughout the editorial workflow and how editorial positions are allocated.

Geographic Diversity in Scholarly Journals

Regarding the geographic diversity of researchers, the literature underscores the underrepresentation of academics from the so-called Global South in scholarly publications, which might be a form of epistemic injustice (Fricker, 2007). From this standpoint, when primarily members of a homogeneous dominant group (in terms of gender, class, ethnicity, age, etc.) occupy the decision-making positions of scientific organizations, the research agendas reflect the same group's interests and values, leaving out those from marginalized groups (Haraway, 1988; Harding, 1993). In particular, within scholarly journals, this issue can be described as follows:

[the] discrimination of scholars on grounds of their origin, exclusion based on the power of citations and evaluations of journals governed by Anglophone editorial boards (which is further connected to the marginalisation of languages other than

English in scholarly communication—a trend non-native-English scholars within the Global North increasingly come to experience first-hand” (Knöchelmann, 2021, p.76).

For instance, Hedding & Breetzke (2021) documented that 80% of the editorial board members in 126 Geography journals are located in Mainland Europe, North America, and the British Isles, which reveals how certain groups of academics remain in control of scientific content distribution venues as they hold the academic capital required by the Anglophone, allegedly international journals, i.e., English language skills, high publication record in top tier journals, citation networks, academic degrees from reputational institutions in the Global North, among others.

The scholarship on geographic diversity in EBs is also informed by the approach to journal internationality. Those studies underline the geographic location of editors, editorial board members, and authors as an indicator of global publishing labor division inequalities. Some studies draw on theories of academic dependency (Alatas, 2003), the geopolitics of knowledge production and academic imperialism enacted in citation indexes, impact factor, and journal rankings (Canagarajah, 2002; Canagarajah, 2014). This scholarship underscores how the governing practices of scholarly publishing widen the gaps between Western and non-Western societies.

For instance, a series of quantitative studies on communication journals (Goyanes, 2019, 2020; Goyanes & Demeter, 2020) highlight the correlation of the nationality of the EB members with the Journal Impact Factor (JIF) and the journals’ publisher. In those studies, the authors demonstrated that out of 2,715 editors of 40 communication journals indexed in the first two quartiles of the Journal Citation Reports, 64% are from the United States and 15% are scholars from other high-income countries (HIC) such as the United

Kingdom, Australia, Canada and Germany, which suggests a structural limited geographic inclusion.

Moreover, the results of these studies show a negative correlation between geographical and gender diversity in the EBs and the JIF. That is, the better ranked the journal is, the fewer women and scholars from non-HIC (more specifically, non-U.S.) countries make up the EBs. This scholarship demonstrates how the intersection between power and knowledge is dominated by a handful of countries and academic profiles, strengthening the domination of mainstream epistemic cultures and consequently reinforcing the Mathew effect in science (Merton, 1968).

Likewise, in another study about international diversity in EBs of 24 leading biology journals over three decades, Espin et al. (2017) found that despite the community of editors quadrupled in that period, 67.18% of all editors were based in either the United States or the United Kingdom (p.1). The authors highlight that, as expected, editors from those countries have (maybe implicit) biases that might affect the evaluation of manuscripts submitted by scholars from the Global South. For example, biases when inferring race using authors' name-based approaches (Kozlowski, Murray, et al., 2022), or reviewers' biases based on the (perceived poor) language skills of authors from non-English speaking countries (Romero-Olivares, 2019). Ultimately, insights from these studies elucidate the relevance of having a plurality of scientific perspectives in EBs to reduce publication biases throughout all the stages of the publication process (Rouan et al., 2021).

Studies on Open Access Mega Journals

Open Access Mega Journals (OAMJ) are online peer-reviewed publications that emerged in the early 2000s. In exploring the disruptive emergence of OAMJs, the seminal work of Björk (2015, 2016, 2018) provided a substantial framework for analyzing the political economy of these journals. This author proposed a definition of the OAMJs that, up to now, is the most acceptable and broadly used in the literature. Shedding light on the work of Binfield (2013) and others, Björk established primary and secondary criteria to define OAMJs, which are summarized as follows:

Primary definition criteria

1. A large volume of papers published yearly
2. Peer review process based only on scientific soundness
3. Broad publishing scope
4. Full open access to contents (predominantly via APCs)

Secondary criteria

- Rapid publication
- Use of altmetrics³¹
- Portable reviews³²
- Commenting (i.e., allowing comments from the audience to articles within the journal's platform)

³¹ Altmetrics are tools for tracking the article-level usage through indicators like number of downloads, shares on social media and platforms like Wikipedia, bookmarks, and others. They were created around 2010 as an alternative to the Impact Factor (IF), which is based on citation counts of the journal.

³² Portable reviews refer to the feedback comments that journal reviewers give to any author of a manuscript that eventually is not published but which the author can send to a second journal where he or she intends to publish the manuscript.

Björk also proposed other criteria that were later refuted because of their vagueness (Spezi et al., 2017). For instance, he asserted that OAMJs charge “moderate APCs” yet did not provide a clear estimate of what amount he considered moderate; likewise, he proposed that the OAMJs are published by “prestigious publishers” but, again, this assertion was vague as the prestige of publishers is highly contested in the scholarly publishing arena. In further work, Björk and collaborators have explored the evolution of OAMJs, focusing on their proliferation (Björk, 2018), and the peer review in OAMJs compared with traditional journals (Björk & Catani, 2016).

Another relevant body of scholarship on OAMJs was published by a group of scholars from UK-based institutions who ran the project entitled “Open-Access Mega-Journals and the Future of Scholarly Communication” from 2015 to 2017. This research group did extensive work using both quantitative and qualitative methods to analyze the role of OAMJs in academic communities (Wakeling, Spezi, et al., 2019), the motivations and experiences of authors who publish in OAMJs (Wakeling, Creaser, et al., 2019), and bibliometrics analyses of OAMJs (Wakeling et al., 2016), among other topics.

These authors conducted an interview study with 31 senior publishers and editors of OAMJs. In the first part of the study, they reported the scholars’ perspectives regarding the soundness-only peer-review process. They found some tensions among interviewees as some dismissed this review model while the majority supported it, arguing it is a path for ‘democratizing’ science. The point I want to highlight from this study is the challenges for the journals’ governance of having an extensive and highly diverse editorial board, and how a horizontal model of decision-making actually represents a burden for the quality assurance procedures. In other words, when the

editorial board comprises hundreds or thousands of (diverse) scholars, the acceptance rates vary significantly between editors, making it very hard for the journal to hold accountability for the decisions made. As one of the interviewees asserted: “there is nobody at the head who is going to get fired if something goes wrong” (Spezi et al., 2018, p. 148). This case shows that fostering diversity in journals is accompanied by organizational challenges that ultimately affect the journals’ gatekeeping mission.

A second part of this interview-based study reports the cultural and technical challenges of operating OAMJs perceived by the editors (Wakeling et al., 2017). The organizational structure of these journals was described as ‘flat’ or ‘federated,’ which means the distribution of work is done by assigning manuscripts to a large number of editors who are usually outside the publishing organization. As a result, the challenges of monitoring and training editors are significant, especially because their labor basically consists of processing the manuscripts only. Thus, they have very little involvement or influence on the journal’s editorial policy. Thus, the governance model of OAMJs shows contradictions of diversity as even when the journals can maintain a broad participation of the community in the decision-making processes, there is little room for the agency of editors in terms of their contributions to the governance of journals. In my study, I build upon this literature to contribute to “opening the black box” of editorship by examining the organizational practices that frame the participation of editors in the gatekeeping work.

Several studies have focused on *PLOS ONE* as it is the pioneer and paradigmatic case of the OAMJ phenomenon (e.g., Björk & Catani, 2016; Eve et al., 2021; Fein, 2013; Siler et al., 2020; Spezi et al., 2018). These studies include *PLOS ONE* in their sample or

have deepened in the journal's profile from a bibliometric perspective. For example, Fein (2013) conducted a multidimensional metrics-based evaluation of the journal, focusing on its output, content, perception (readership's behavior), citations, and management. Regarding the latter, the author stressed how the journal is managed internationally by editors and external reviewers from several countries. Others have focused on the journal's readership (Wakeling et al., 2020), authorship (Solomon, 2014; Wakeling, Creaser, et al., 2019), content (Siler et al., 2020), business model (Ellers et al., 2017) and peer review (Björk & Catani, 2016; Spezi et al., 2018). With the present study, I aim to offer novel insights on a previously unexplored facet of *PLOS ONE*, i.e., its sociotechnical nature and the entanglement of its heterogeneous constituent elements.

CHAPTER 4

METHODOLOGY

The qualitative methodological approach that guides this work is case study (Stake, 1995; Yin, 2009). In this qualitative methodology, the researchers investigate “a real-life, bounded system to generate an in-depth, multi-faceted understanding of a complex issue” (Creswell & Poth, 2017, p.153). Single case study methodology is suitable for investigating exemplary cases of a particular phenomenon or puzzling question (Yin, 2018). I employed this methodology to study the assemblage of the EB of *PLOS ONE*. I focused specifically on *PLOS ONE* as it is one of the largest OA mega journals with a similarly extensive and geographically diverse EB, which makes it a unique example of an “on-going process made up of uncertain, fragile, controversial, and ever-shifting ties” (Latour, 2005, p. 28) within the realm of knowledge validation processes in science.

It has been argued that rather than a theory, ANT is a heuristic or methodological model to study social phenomena because the researcher primarily must ‘follow the actor’ to identify and track its relations with other actors and the consequences of those connections (Latour, 1999a; Law, 1992). The researcher does this by studying empirical cases from a qualitative standpoint using ethnographic methods for data collection and analysis. The most common qualitative methods used in ANT studies are observations, documentary analysis, and interviews (Justesen, 2020).

Following the actor helps researchers to focus on group formation instead of studying a group as something taken for granted (Latour, 2005). This approach helps to explain the *whys* and *hows* a network may or may not be stable and durable. Given that

the case of the journal *PLOS ONE* is exceptionally unique in its scale, ANT is particularly useful for identifying the actors involved in the group assemblage and management to achieve the common goal of publishing thousands of papers annually. The actors include but are not limited to academic editors, staff members, technologies, documents, and other nonhuman actors with diverse backgrounds who have an agency in the assemblage of the editorial board. As Latour (2007) put it,

A good ANT account is a narrative or a description, or a proposition where all the actors do something and don't just sit there. Instead of simply transporting effects without transforming them, each of the points in the text may become a bifurcation, an event, or the origin of a new translation. (p.128)

In this chapter, I outline the methodological principles of ANT guiding the study, the study context, the data collection methods, and the analysis process. My positionality statement is presented in Appendix D.

ANT Methodological Principles

According to the relational ontology of ANT, the main methodological principle to conduct empirical research based on this approach is the slogan 'follow the actor' (Latour, 2007). This principle involves tracing the interactions between actors to establish associations and alliances rather than assuming that these associations exist or that the actor-network 'has' pre-determined characteristics. In other words, following the actor implies that the researcher remains open to identifying actors and interactions between humans and nonhumans that might be surprising or unexpected.

In order to follow the actor, ANT relies upon three methodological principles: 1) generalized symmetry, 2) generalized agnosticism, and 3) free association (Callon, 1984).

1. *Generalized symmetry*: This tenet ensures that human and nonhuman actors are described equally by using an abstract and neutral vocabulary (Michael, 1996) as ANT recognizes that the actions of both types of actors have equal significance in a network. This principle is reached by avoiding the “impositions of an asymmetry between intentional human actions on the one hand and a non-intentional material world on the other” (Babri et al., 2018, p. 5).

This principle also emphasizes that the researcher must avoid the predefinition of actors and remain open to account for all the actors of a network. In the case of EBs, despite the human actors can be clearly identified, especially those who exert their epistemic authority in the editorial process, such as editors and reviewers, other nonhuman actors are trying to make their viewpoints recognized. Within online journals, operating systems, software, the Internet, and other digital technologies are examples of nonhuman actors with a stake in the editorial process.

2. *Generalized agnosticism*: This principle highlights that the researcher must remain impartial regarding controversies between human and nonhuman actors. That is, the researcher should not take sides with one or the other type of actor or, as Callon (1984) put it, “No point of view is privileged, and no interpretation is censored” (p. 200). This corresponds to one of the main characteristics of ANT: the social and the material have equal relevance in the analysis of social phenomena. In the case of academic journals, technologies, and editorial policy documents establish specific paths in the editorial process to be followed by human actors, and sometimes the latter do not agree with the former. For example, Artificial Intelligence tools for searching reviewers for manuscripts might urge editors to select people from a certain pool. In contrast, editors

might refuse to do it for several reasons, including conflict of interest. The principle of generalized agnosticism must remain impartial when analyzing the controversy.

3. *Free association*: This tenet holds that the researcher should avoid not only a priori divisions between the social and the material (i.e., nature, technologies or other nonhumans) (Michael, 1996) but also lock the actors into fixed roles (Callon, 1984). From a methodological standpoint, this means that the researcher must follow the (sometimes unpredictable) relationships in a network of heterogeneous actors in the analysis of controversies. For the analysis of *PLOS ONE*'s editorial board operations, this principle guides the examination of the workflow in which humans do not always have the last word about the submissions' acceptance. For example, the journal uses software to detect duplication in text or images; the screening outcomes may ultimately set the conditions to accept or decline submissions.

Research Design and Methods

Actor-network theory has its roots in ethnography. Therefore, the qualitative data collection methods commonly used in ANT studies serve the researcher to provide thorough descriptions of the actors, their actions, and interconnections. Qualitative methods such as observations or in-depth interviews are commonly used in ANT because they help the researcher to account for “the material, physical, spatial or temporal aspects of a phenomenon” (Demant & Ravn, 2020, p. 346). In my study, I use two methods for data collection—semi-structured interviews and documentary analysis. I chose these methods because they allow me to track the interactions and the types of translations that

occur within the recruitment processes and the management of the work that editors perform for the journal.

Although the publisher PLOS is based in two cities—San Francisco, California, and Cambridge, United Kingdom—most of their editorial operations are conducted online. Thus, using observations is a less appropriate data collection method for this case despite the fact that it is highly used in empirical cases using ANT. Moreover, when I started to establish rapport with the publisher’s employees, they highlighted that after the COVID pandemic hit, they moved to remote work and kept this modality until now. The following section presents a rationale for using my data collection methods.

Data Collection

I used semi-structured interviews and documents as my primary sources of data. However, *PLOS ONE* has received considerable attention in traditional and specialized media, allowing me to gather data from multiple sources, such as academic blogs focused on libraries and scholarly communication (e.g., LSE Impact Blog, The Scholarly Kitchen). Table 3 summarizes the collected data.

Table 3

Summary of Collected Data

Data source	Type of data	Quantity of data
Semi-structured interviews	Participant’s experiences and perspectives about their relationship with <i>PLOS ONE</i> (e.g., volunteering for the EB, working for the publisher).	26
Organizational documents	The publisher’s and the journal’s policies, procedures, and records of events (e.g., bylaws, reviewers’ guidelines, publication criteria)	37

Data source	Type of data	Quantity of data
Media documents	Blog posts about PLOS and <i>PLOS ONE</i> 's news, events, updates, policy shifts, etc.	20

Semi-Structured Interviews

Semi-structured interviews help track and map the interactions of humans with other nonhuman actors. Demant and Ravn (2020) point out that despite some objections about using only interviews in ANT studies because of the apparent bias of their human-centered nature, interviews help examine “how elements are connected in a network in time and space” (p. 346). The authors also highlight that interviews help the researcher understand how actors affect each other through their interactions. In other words, interviews are helpful to show how actors do not act by themselves in isolation, but their “capacities are established, limited or otherwise mediated by its network” (p. 348).

In my case study, interviews helped me track the links between AEs and other human actors, such as staff editors, reviewers and authors, with the materials, technologies, documents, and other nonhuman actors that intervene in selecting and curating manuscripts for publication. For example, search engines and databases are crucial to identifying potential reviewers, which is one of the core tasks that academic editors must complete.

Academic Editors are active researchers affiliated with higher education institutions, so their connections with other actors are multiple and complex. To identify these connections, I chose to conduct semi-structured interviews because they are adaptable as, despite being based on an interview script, they leave the room open for

free dialogue with the participants (Esposito & Evans-Winters, 2021; Ravitch & Carl, 2019).

I took the following steps to create the interview protocol for AEs. First, I retrieved the information about the recruitment and training processes for AEs and their roles and responsibilities from the organizational documents. This information allowed me to draft some preliminary interview questions to explore how the editors joined and remained active volunteers, as well as their experiences in performing their roles.

Second, I triangulated the preliminary questions with the findings from a pilot study I conducted in the Spring 2022 semester and added more questions to the protocol. In that study, I identified some interactions between the different actors in the editorial workflow of *PLOS ONE*. For example, I learned how staff editors distribute manuscripts to AEs and interact with them through the Editorial Management (EM) software.

Third, I piloted the preliminary interview protocol with three respondents. Based on these data, I narrowed some questions and reorganized others to reach more coherence. For instance, I reordered some questions about the responsibilities of AEs and added some probes. The final interview protocol is in Appendix 1.

My pilot study from 2022 was also helpful in identifying some interactions between departments within the organization. As an example, I learned how the journal's staff editors communicate with members of the publishing ethics team at PLOS to address misconduct cases of submissions and published papers. Those findings helped me elaborate the interview protocol for the staff members and the contractor, which was similar to the protocol for AEs but included probing questions on their roles and responsibilities in the organization. For instance, when I interviewed a person from the

publishing ethics team, the probe questions focused on the procedures for conducting misconduct investigations and the level of involvement of AEs in those procedures.

I also had the opportunity to interview a Business Development Manager of ASC, who covers sales operations in the U.S., Canada and Mexico. He shared his thoughts from the corporation's side, which was informative to "make the system talk." The data from this interview helped me map the interests and interactions of EM with the human actors, especially since this person is directly involved with the configuration and customization of EM to meet the journals' needs and with staff training to use it effectively.

Sampling and Recruitment Procedures

I used three sampling methods for the interviews: purposive, stratified-random, and snowballing. The purposive sampling method allowed me to select *PLOS ONE* staff editors because my goal was to focus on their experiences concerning managing the journal's editorial process. I started by inviting a staff editor with whom I had previously been in contact via Twitter when we met at an online academic event. He became a key informant as he participated in designing the editorial policies at *PLOS ONE*, besides their role in the desk review process as a staff editor. This key informant helped me with the snowballing sample, too. I also invited other staff editors from all the sections listed on the website (behavioral and social sciences, neuroscience, mental health, public health and medicine, and life sciences).

For AEs and SEs, I used the stratified random sampling approach to ensure the geographical representation of editors in my sample. First, I downloaded the list of the 8,927 EB members on October 31, 2022. Then, I identified the regions where the AEs

and SEs are based following the World Bank classification of countries. I used the regions as the strata to identify potential regional differences in the editors' experiences that could help answer my research questions. I also used the gender of AEs and SEs as an additional criterion for selecting participants to ensure a more comprehensive and nuanced representation of editors in the sample. Gender was assigned using the digital tool Gender API, a service that predicts the likely gender of a person using their first name and last name. I assigned each editor a random number in an Excel sheet and sorted them by region. I took the first ten editors from each region, looked for their contact information, and invited them to participate in the study. If they did not reply, I took the next record and repeated the steps.

Lastly, through snowball sampling, I contacted a member of the BOD, two staff members, and a representative of the external contractor Aries Systems Corporation. My key informant suggested interviewing someone from the EB services team and the publishing ethics team, which I did because those departments are directly involved in the enrolment and monitoring of AEs' performance in *PLOS ONE*.

My interview sample included 26 individuals. The sample consisted of six types of participants: 1) PLOS leaders, 2) PLOS staff members, 3) *PLOS ONE* staff editors, 4) Academic Editors, 5) Section Editors, and 6) one external contractor. Table 4 presents a summary of the sample. The demographic characteristics of the sample are summarized in Table 5.

Table 4.

Summary of Interview Participant Sample

Participant Category	Sampling Type	Number of Participants
PLOS leaders	Purposive	1
PLOS staff members	Purposive	2
<i>PLOS ONE</i> staff editors	Purposive	1
Section Editors	Stratified-Random and Snowball	6
Academic Editors	Stratified-Random and Snowball	15
External contractor	Purposive	1

Table 5.

Interview Participant Sample Demographics

Characteristic	N=26
<i>Gender</i>	
Female	11
Male	14
<i>Age</i>	
30-40	5
41-50	11
51-60	6
61-70	2
71-80	1
<i>Country</i>	
Australia	2
Bangladesh	1
Brazil	3
Canada	1
India	1
Korea	1
Mexico	2
Nepal	1
Nigeria	1
Spain	2
South Africa	1
Sweden	1
United Kingdom	2
United States	7

It should be noted that I tried to include some Chinese editors in my sample as China is the fifth country with more editors in *PLOS ONE*. However, despite the multiple invitations and reminders I sent to Chinese editors, I received no response. I followed the suggestion from a Korean participant. She warned me that many Chinese people lack self-confidence when it comes to their English language skills, especially regarding oral interactions. She suggested I email them, offering the option of replying by email only, which I did. Still, none of the invitees replied. The 22 interviewed AEs and SEs are affiliated with the institutions presented in Table 6. Their subject areas are summarized in Table 7.

Table 6.

Institutional Affiliation of Academic and Section Editors

Institution	Number of participants
Arizona State University	2
Georgetown University	1
Indira Gandhi Medical College	1
Karolinska Institutet	1
Liverpool John Moores University	1
Seoul National University	1
Shahjalal University of Science and Technology	1
Stellenbosch University	1
Tribhuvan University	1
Universidad de Monterrey	1
Universidad Nacional Autónoma de México	1
Universidad Rey Juan Carlos	1
Universidade de São Paulo	1
Universidade Estadual de Ponta Grossa	1
Universidade Regional do Noroeste do Estado do Rio Grande do Sul	1
Universitat Politècnica de Catalunya	1
University of Ibadan	1
University of Montreal	1
University of New South Wales	1
University of Queensland	1

Table 7

Academic and Section Editors by PLOS ONE Subject Area

Subject Area	Number of Participants
Biology and Life Sciences	8
Chemistry	1
Medicine and Health Sciences	10
Physics	2
Social Sciences	1

Regarding the recruitment process, I invited participants for an online interview via email and LinkedIn. Most editors' email addresses are publicly available in their publications. In cases where I could not find the information, I also used their ORCID (a persistent digital identifier for scholars) to identify their current affiliation and looked for their institutional online profile. Since I got the IRB approval for my study (November 2022), I sent around 200 invitation emails and reminders. I conducted the interviews between November 2022 and April 2023.

A participant from the U.S. sent me her responses by email because, when she agreed to participate, we could not find a suitable date to meet for an interview. However, later, she emailed me agreeing to hold the interview, which lasted three hours. Apart from that exceptional case, the interviews lasted between 50 minutes to two hours. Most of them lasted one hour. Participants verbally consented to have the interview audio recorded.

Of the 26 interviews I conducted, 21 were in English. Even though the participants were English speakers, most individuals from Latin America and one participant from Spain expressed a preference for speaking in their mother tongues (i.e., Spanish and Portuguese). As a result, I accommodated their requests and conducted the

interviews in their preferred languages. As a native Spanish speaker and skilled in Portuguese, I agreed with their request because, according to Welch and Piekkari (2006), it helps build rapport and a sense of connection with the interviewees. I analyzed those data while keeping the original language in which the interviews were conducted, but I translated only the excerpts I used to present my findings into English.

The interviews were conducted over the conferencing platform Zoom using the license provided by ASU. I used this software's feature of automated audio transcriptions to get text files in VTT format, which I then converted to doc files for analysis. I took notes throughout the interviews, and after finishing each one, I wrote a memo about my first impressions. Additionally, I jotted some entries in my research journal. These materials helped me support the trustworthiness of my study (Denzin & Lincoln, 2017).

Documentary Analysis

Documentary analysis is a qualitative research method that serves to review and assess documents in order to elicit meaning or make sense of the data they comprise (Bowen, 2009). It is commonly used to triangulate information with other sources such as interviews and observations. Documentary analysis is a particularly appropriate method because documents “serve as substitutes for records of activity that the researcher could not observe directly” (Stake, 1995, p. 68), which helps the researcher ensure credibility and reduce potential biases (Bowen, 2009). Moreover, as documents are produced within a specific context, the analysis should focus on the content and their production and consumption processes (Esposito & Evans-Winters, 2021).

For this qualitative case study, documents helped me to “hear the voice” of the journal *PLOS ONE* in terms of its organizational structure, mission, business model, and,

most importantly, its vision of how science should be validated and disseminated. To conduct the documentary analysis, first, I identified the documents on PLOS' operational status available online. To that extent, I searched the documents in the following sources:

1. The current active publisher's website (plos.org) and journal's website (journals.plos.org/plosone).
2. Internet Archive – Wayback Machine³³, a digital database that preserves web pages over time (all PLOS and *PLOS ONE*'s archives have been available on Internet Archive since 2001 and 2006, respectively).
3. Candid/Guidestar³⁴, a database that provides information about nonprofit organizations in the U.S.
4. The National Institutes of Health/National Library of Medicine. More specifically, The Harold Varmus Papers collection.

According to Esposito & Evans-Winters (2021), prior to the analysis, I used my memos to describe the scope and coverage of each document, as well as provide a contextualization in which the documents were created, i.e., why they were written, who was the target audience, what/whether changes or amendments have been made over time.

Following ANT, documents can be considered actants because “[they] serve not merely as containers of content, but as active agents in episodes of interaction and schemes of social organization” (Lee, 2012, p. 391). In other words, they are helpful to trace translations as ANT acknowledges that documents have “mediated in –and helped

³³ <https://archive.org/>

³⁴ <https://candid.org/>

to constitute– social actions” (p. 404). In this sense, documents are epistemic objects (Gitelman, 2014) since they reveal bureaucratic procedures or behavioral and interaction patterns, which shape material and semiotic processes that ANT focuses on. I included the documents in my overall dataset alongside the interview data and coded them using the same scheme to follow ANT’s symmetry principle. Table 8 summarizes the documents I used for the study.

Table 8

Summary of Analyzed Documents

Type of documents	Sources	Data Points	Number of Documents
Nonprofit Incorporation and Regulatory Information	Federal and California state records	Form 990 – i.e., 501(c)(3) tax-exempt document PLOS’ Bylaws – i.e., the publisher’s regulations for internal management	9
		PLOS corporate governance documents * Board committees charters - Executive Team - Board of Directors - Scientific Advisory Council	3
Publisher’s Policy Documents	PLOS website	PLOS’ services documents: * Terms of Use * Privacy Policy * Publication Fee Policy * Payment Terms and Conditions * Diversity, Equity and Inclusion (DEI) Statement	5
	<i>PLOS ONE</i> website	<i>PLOS ONE</i> ’s services documents: * Publishing policy documents - Journal Information - Criteria for Publication - Submission Guidelines - Editorial and Peer Review Process - Guidelines for Reviewers - <i>PLOS ONE</i> Academic Editor Handbook - Staff Editors - Editorial Board - Ethical Publishing Practice - Code of Conduct for Editorial Board Members	10
		Internet Archive	* Historical documents - PLoS Open Letter - Minutes of the First Meeting of the PLoS Board of Directors (October 1, 2003)

Type of documents	Sources	Data Points	Number of Documents
		<ul style="list-style-type: none"> - E-biomed proposal - Historical versions of PLOS and <i>PLOS ONE</i>'s service documents 	
Secondary Information	Blogs	<ul style="list-style-type: none"> * Posts from the following specialized blogs: <ul style="list-style-type: none"> - PLOS News Blog - Retraction Watch - LSE Impact Blog - The Scholarly Kitchen - Open and Shut? - PLOS Union website 	20

Data Analysis

For the data analysis procedures, I used an iterative and recursive approach, beginning as soon as I started conducting the first interview and continuing throughout the data collection process (Ravitch & Carl, 2019). Concerning the data analysis approach, I used thematic analysis, a qualitative research method commonly used to identify, analyze, and report relationships, patterns, similarities, and differences within a dataset (Braun & Clarke, 2006). A rigorous thematic analysis ensures trustworthiness and insightful findings (Nowell et al., 2017). In this section, I document the procedures I followed to analyze my datasets and the decisions I made throughout the process to show how I reached trustworthiness.

Following the framework proposed by Braun and Clarke (2006), I conducted the thematic analysis in six steps: “1) familiarizing myself with the data, 2) generating initial codes, 3) searching for themes, 4) reviewing themes, 5) defining and naming themes, and 6) producing the report” (p.87).

Step 1: Familiarizing myself with the data.

Regarding the interviews conducted in English, first, I retrieved the verbatim transcripts from the audio recordings provided by the Zoom platform. For the interviews

conducted in Spanish and Portuguese, I used the online version of the Microsoft Word transcription tool and then translated the transcripts using the software DeepL. This process allowed me to familiarize myself with the data and clean up the transcripts from the grammatical mistakes, misspelled words, and other inaccuracies of the Zoom tool; in some cases, I used the audio slow motion tool to fix any errors. It should be noted that the variety of accents of participants was considerable because, for most of them, English is not their first language, which posed an additional challenge to the cleaning-up process. In other cases, I noticed people used the syntax of their languages to express themselves in English (e.g., informants from Korea and Bangladesh), which made it hard to make sense of some sentences. Likewise, their use of local terms or acronyms to name certain phenomena or actors sometimes complicated my understanding of the informants' experiences. For instance, a researcher from Spain mentioned the word 'POPE,' and it was a little confusing for me until I searched and discovered it is the acronym for *Programa Operativo Plurirregional de España* [Spain's Multi-regional Operational Program], a funding program for research and development. The audio quality was not so good in some cases due to connection issues. Therefore, cleaning up the dataset took me a significant amount of time; however, this was also helpful for starting to interpret participants' responses.

Second, I uploaded the transcriptions in MAXQDA Analytics Pro 2022, a software for qualitative data analysis. As the transcription process evolved, I jotted to help myself recall my observations about key events, details, patterns, complementary information about the participants' accounts, and the like. For example, when a participant told me about how other journals reward peer review, I jotted it down and

added a link to that journal's website to check later. I also wrote more extensive memos using some jottings, dataset observations, and potential preliminary codes. To that extent, I used MAXQDA memo tools that allow the researcher to add different kinds of memos, e.g., theoretical, methodological, related to the research question, linked to a document or code, and the like.

I realized that editors sometimes talked about their experiences in *PLOS ONE* as reviewers, but sometimes they focused on their experiences with other journals and talked about them interchangeably. In their narratives, they also referred to their experiences and memories as authors and reviewers as they “constantly cycle” (Kaltenbrunner et al., 2021, p. 674) through those different roles. I made some notes and coded the data accordingly.

In this step, I started to identify the actors of the network and how the agency is distributed among heterogeneous actors beyond humans (Law, 1992). Indeed, through the accounts of my participants, I noticed that artifacts came to the fore without expecting it. The more salient example is the software Editorial Manager. Academic Editors mentioned it to describe their editorial tasks, but it was not only through casual comments but as an actor that did something during those interactions.

Step 2: Generating initial codes.

I conducted a first round of open coding by reading each interview line by line to start identifying potential themes and subthemes across the dataset. This first round was mostly inductive; that is, I intended not to follow any analytic preconceptions or theoretical category, but rather I let the data speak for themselves (Saldaña, 2015). This approach allowed me to identify some (unexpected) actors in the network and start to

follow them. For instance, when describing their difficulties in ensuring reviewers for papers, participants repeatedly mentioned databases such as PubMed and Google Scholar, which are nonhuman actors that are key to carrying out the responsibilities of the role of editor because participants use them instead of the database provided by *PLOS ONE* as they find it useless or confusing. Nevertheless, in this first round of coding, I also used a few interview concepts as codes; in other words, I coded deductively as well, although I did this only for a few questions that helped me unpack concepts from ANT, such as translation. For example, I asked participants about their motivations and interests for joining the editorial board of *PLOS ONE* (or other journals). I used those terms to create the code with the same name, i.e., “motivations and interests for serving as an editor.” This code was refined in the second round of coding, as in this stage, it was useful only to collate the participants’ responses.

During this first stage of the analysis, I started to create my codebook on MAXQDA. While reading, I created a list of codes and coded excerpts of the interviews. Some codes were saturated early on, i.e., while reading the interviews, I identified that a given code was persistent across the transcripts, which helped me decide what codes would stay in the codebook. An example is the most frequent burden the editors mentioned regarding their job: “struggles to find reviewers.” I also started to group codes that relate to each other. For example, participants expressed their feelings about the business model of *PLOS ONE*; more specifically, they talked about the APCs. Thus, I created the code *business model* and included the subcode *APCs*.

Step 3. Searching for themes

In this step, I clustered some codes that related to similar topics. Some of them were repetitive. Thus, I merged them using the MAXQDA features, which allowed me to keep the coded segments in the newly merged code.

As suggested by Braun and Clarke (2006), I created some visual representations of my preliminary themes using digital tools like Xmind (a mind mapping tool), and a whiteboard. Some of the preliminary themes I created were: “The nightmare of finding reviewers,” “Technologies might hinder editors’ job,” or “Inequalities of publishing in the era of *science as a farm*.”

After organizing these preliminary themes, I discussed them with my advisor and some academic peers researching similar topics. Their input was helpful and informative in reflecting on whether these were the themes or there were underlying, broader topics that I was overlooking. I also continued reading some ANT-type studies, which helped me realize that I needed to look closely at the material arrangements within the interactions between actors, as well as the agency of some nonhuman actors that I was undermining, such as the APCs.

Step 4. Reviewing themes

I began this step by discarding some of the preliminary themes, breaking down some others, and reorganizing themes into subthemes. This implied recoding some parts of the dataset. Yet, this was minimal as I was aware of the potential risk of coding *ad infinitum*, as Braun and Clarke (2006) warned. In this step, I also focused on using the ANT terminology to present the data in alignment with the framework. This was a challenging task because, as I explained before, this approach is fluid, and some terms or

concepts have mutated over time. I also challenged myself to follow Latour’s (2005) advice for ANT researchers: to avoid presenting the social as a sort of “external force” to explain why actors do what they do. In other words, Latour recommends avoiding the use of concepts or terms that might not represent the particularities of the case, such as “power imbalances,” “racial inequalities,” and the like. This means tracing how the actors form groups, negotiate their interests, and translate each other, by which “the social” pops up from the account.

Step 5. Defining and naming themes

In this step, I eventually defined the themes for writing my findings chapter.

Table 9 presents the themes, codes and examples of the interview excerpts that illustrate them.

Table 9

Themes, Codes and Examples of Coded Segments

Theme	Examples of Codes	Excerpts
	The “nightmare” of finding reviewers	“Finding reviewers these days is becoming a nightmare. Yeah, I cannot put it in any other way. I mean, just to give you an idea: I do get, on average 3, or 4 requests to review per day. Not from <i>PLOS ONE</i> , of course not, globally.”
1. Human and nonhuman actors reproduced biases based on authors’ and editors’ geographic origin, likely due to the journal’s size.	Dealing with controversial manuscripts	“One time, a paper that truly seemed to have been generated with a random word generator was sent to an AE, who got 2 reviews of it. all 3 recommended publication. The editorial office was like, “I think this paper wasn’t written by a human. can you confirm or deny?” and it took me an hour to figure out there was no way the paper could have been written by a competent scientist”
	Helpfulness of the Editorial Manager software	

Theme	Examples of Codes	Excerpts
		<p>“They sent sometimes biology science papers and because I am a chemist, it is really a hard task for me. The system tells me “Please go through the manuscript, and you can give the decision to whether this is acceptable or not”, for chemical science is no problem, but for biological sciences it was difficult, and I used to write them.”</p>
<p>2. “<i>Você tem que vender o carro para publicar</i>” [You have to sell your car to publish]: APCs as mediators that trigger betrayals among actors</p>	<p>Academic prestige and recognition</p> <p>Global South/Global North inequalities in science</p>	<p>“<i>PLOS ONE</i> doesn’t have a super strong reputation in the field that I have a background in. So, in cancer research and Life Sciences, it’s not a particularly well-respected journal. It’s got a fine impact factor, but people really care about impact factor in these in these areas.”</p> <p>“You have to be aware of the context in which the article was produced because we cannot judge with the same yardstick people who have sequencing units in their laboratories and those who are badly working with a light microscope. What I do is to suggest to the authors the adjustments that they can make. Because their results are very useful for their environment and we should realize that sophisticated methods and tools are not necessarily the ones that have more social impact.”</p>
<p>3. Translating the Open Access Mega Journal comes with contradictions and unexpected effects for the publishing landscape</p>	<p>Open Access and Open Science practices</p> <p>Readership</p>	<p>“The first reason why I joined <i>PLOS ONE</i> is that is open access, and that’s very important for researchers or clinicians in lower resourced countries or in private practice who do not have access to journals on the subscription basis, because they’re not connected to a research center.”</p> <p>“In some fields, there may be thousands of people reading your paper but in a small field I could probably count them with my one hand that probably read the paper. I think it’s just too much out there, and that balance we might be losing the balance of quality, perhaps to some extent, but it is probably the quantity</p>

Theme	Examples of Codes	Excerpts
		it just so enormous. That I'm not sure if we are having any impact. "

Step 6. Producing the report

The sixth step is the write-up of the report. In the book *Reassembling the Social*, Latour (2005) challenged social scientists to write descriptive, “risky accounts” as part of embracing the uncertainties that come with adopting an ANT standpoint. I must confess taking that risk was a big challenge for a researcher like me who was trained in the more traditional approaches in social sciences—even in qualitative research—where the use of specific vocabulary is expected when not compulsory. Nevertheless, I accepted the challenge of writing a risky account about the editorial board of *PLOS ONE* as I took the risk of coming to one of the hottest deserts on earth to pursue my Ph.D., where I came across the most dangerous plants I have ever seen. My hope is that the next chapter has captured the main findings of following the assemblage of human and nonhuman actors to produce this unique journal with an encyclopedic ambition and undeniable influence on the scholarly communication field.

Limitations of the study

There are three main limitations to this study. The first limitation concerns my lack of direct access to PLOS and *PLOS ONE* leadership. Although the staff editors and the EB services and publishing ethics team members I interviewed had an influence in the publisher’s policy decision, this is true to a certain extent. They work mainly at an operational level, though they do not necessarily influence the implementation of organizational strategies that might change certain practices such as the language of publication, for instance. Despite the fact that I invited other leaders at the publisher and

the organizational levels (e.g., the Editor-in-Chief and the CEO), they did not respond to my emails, likely because of time constraints. It would be interesting to see how the outcomes might differ had they been included in my interview sample.

Secondly, the study was limited by the null response from researchers based in certain countries or regions. Despite my efforts to reach the representation of Academic Editors in my sample in accordance with the regional distribution of the EB members presented in Figure 8, individuals from some of the top countries represented in the EB did not respond, including China. This is a particularly significant omission as China has a large number of editors in *PLOS ONE* EB and published papers in the journal. Had I been able to include responses from Chinese researchers, it would have brought more nuanced insights regarding the regional differences in science publishing that I developed in Chapter 5.

Lastly, observations are considered a hallmark of ANT. If I had had the opportunity to conduct in-person observations, I would have had more data about the material conditions and interactions of staff members and the work of gatekeeping. Also, I would likely have had the chance to look at their systems and interoperability. In-person observations, for example, at a conference, would have allowed me to look at the interactions about the recruitment process. Several AEs mentioned having had conversations with PLOS officers at academic events. This would have been very helpful in understanding the first enrollment process.

CHAPTER 5

FINDINGS

Introduction

The main research question that guided my study is: How is diversity enacted in the assemblage of human and nonhuman actors of the *PLOS ONE* editorial board? By adopting an ANT lens, this study revealed the intricate interplay between human and nonhuman actors, such as technologies and publication fees, that shape the complex processes of knowledge validation in journals. My findings also showed some effects and implications of diversity policies in the global publishing arena. A summary of my findings is presented in the table below:

Table 10

Summary of Findings

Theme	Rationale
1. Human and nonhuman actors reproduced biases based on the authors' and editors' geographic origin, the journal's size and the low diversity of PLOS leadership.	Editorial decisions may inadvertently be influenced by the human actors' own cultural or academic background, e.g., language. Because of <i>PLOS ONE</i> 's scale, software and algorithms may hinder translations instead of enabling them.
2. “ <i>Você tem que vender o carro para publicar</i> ” [You have to sell your car to publish]: APCs as betrayals trigger mediators among the publisher and the scientific community.	Despite being depicted as a practical solution for enabling OA, APCs have subverted the assemblage in different ways, which has had consequences on its stability, especially in terms of trust between the actors
3. Translating an Open Access Mega Journal: Contradictions and Unexpected Effects for the Publishing Landscape.	Academic Editors may join <i>PLOS ONE</i> in order to provide stability to their own OA network. Despite AEs successfully translating PLOS OA mission, mega-journal publishing may have adverse effects on the readership due to its scale.

Finding 1. Human and Nonhuman Actors Reproduced Biases Based on The Authors' and Editors' Geographic Origin, The Journal's Size, and The Low Diversity of PLOS Leadership.

As if a damning curse had been cast unto things, [objects] remain asleep like the servants of some enchanted castle. Yet, as soon as they are freed from the spell, they start shuddering, stretching, and muttering. They begin to swarm in all directions, shaking the other human actors, waking them out of their dogmatic sleep.

Bruno Latour

This theme addresses the various biases actors might be reproducing in the editorial process of *PLOS ONE*. As I outlined in the methods chapter, the editorial workflow of *PLOS ONE* consists of two main stages—the internal review and the peer review process. The former is led by the in-house editors, and the latter by the EB members. Both types of editors deploy their expertise and skills in reviewing science to determine the manuscripts' adherence to *PLOS ONE*'s publication criteria. Yet, those core processes would not be feasible without the participation of other nonhuman actors in the network, in particular, digital technologies and organizational documents that help organize, record, and manage the interactions, negotiations, and decisions about the validity of knowledge claims stated in the submissions.

First Stage: Sub-Scanning Manuscripts for “The Journal of All of the Things”

In the first stage of the editorial workflow—which staff members internally call “sub-scan” for submission scanning—the manuscripts are triaged by a staff editor. One of my interviewees shared that *PLOS ONE* receives around 120 submissions a day. Hence, to comply with one of the publisher's commitments –timely publication– staff editors

must complete the internal review stage of every manuscript in 15 days on average (PLOS ONE, 2023c).

The staff editors do the first checks that mainly involve scope, ethical criteria, such as competing interests and financial disclosures, and English language level (PLOS ONE, 2023c). In this phase, they also might spot manuscripts that address sensitive topics—especially regarding human health issues or clinical implications— or could get the media’s attention and flag them for monitoring throughout the entire process. The staff editor I interviewed quoted some examples of this type of manuscript in the behavioral and social sciences:

[we pay attention to] manuscripts about anything that’s political or has to do with racism or questions like that. Even though the study is valid, we know it could be used by someone with an agenda. So, we have to make sure that the limitations of the study are underlying and make sure that the framing doesn’t invite politicized reactions that would not be justified.

In ANT terms, staff editors become mediators since they define, in the first place, the direction a manuscript will take, whether it will be published or not. Their influence affects the network in several ways as they serve as the first gatekeepers in the editorial workflow. In other words, they set boundaries between what is valid and what is not (Rodríguez Medina, 2013).

Although the PLOS’ publishing ethics team focuses on addressing issues regarding the already-published papers, sometimes the flagged manuscripts might be monitored by this team as well. However, those cases are rare. Occasionally, if the staff editors require more specific advice regarding statistics or ethical guidelines, they may reach out to section editors or any members of the advisory groups on statistics, animal research, or human research. Those interactions with the SEs or advisors might happen

via email, but for the most part, everything is tracked and recorded within the EM system for transparency purposes, as a staff editor commented.

Despite the relevance of this mediation/gatekeeping process, staff editors might see their role as a tedious job. Due to the size of *PLOS ONE*, its soundness-only criterion, and its broad scope, most manuscripts are not necessarily that “splashy,” as an editor called them. Thus, the in-house editors’ job can be monotonous, as this narrative suggests:

When I joined the journal, I envisioned developing projects a bit more than I’m doing now. Then I realized the work is more pedestrian in a way. So, it’s very repetitive, you’re just looking at one paper, then next, then the next, then the next. You might have a lot of expertise in one particular area, but for almost all in-house editors, you’re being asked to review manuscripts that are not exactly in your expertise. Some of them are quite far out. So, you have to become good at analyzing just science and research in general.

After the first checks are completed, staff editors proceed to search for a suitable academic editor to handle the peer review. To achieve this task, other nonhuman actors intervene, particularly some digital technologies.

PLOS has an algorithm (the PLOS match algorithm) that does an initial pairing of incoming submissions to AEs using some keywords that describe them. In ANT words, the algorithm has a program of action to translate both actors and create a stable association between them. The algorithm has a code to match the data. However, my data shows this is more a human-algorithm job because if the algorithm is unsuccessful in the matching after some time, there is human, manual intervention from someone in the EB services team. The team leader highlighted, “Some people on my team really enjoy manuscript matching: getting really into the science, looking at the data, and finding that good match.” Nevertheless, several participants complained about this regard.

From the staff editors' side, the challenge lies in managing two things: the vast amount of data the journal has about the AEs' areas of expertise and the siloed systems they use to collect the data³⁵. In other words, the data is not interconnected. This issue makes it challenging to ensure that the algorithm translates research interests and manuscript topics with editors as it does not receive the most accurate information.

As a result, AEs may get multiple editorial requests that fall outside their scope or that relate to their past work. Several AEs described this as an annoying trait of *PLOS ONE*'s workflow. For instance, a biology editor from Brazil complained, "I receive requests regarding topics that were chosen from my CV from 20 years ago when I worked on the methanogenesis of amphibians. But now I work on free-living nematodes." The EB services team member explained how the algorithm works:

Editorial Manager is a pain point. This is a challenge because of our algorithm. The way it works is we upload a bunch of papers that AEs authored when they joined the board, and that builds out the initial profile. Then it uses that kind of bag of words to provide a ranking system for the words that are most frequently appearing and then compares that with the incoming submission. So, maybe AEs published one paper looking at hospital administration in Ethiopia, and then the algorithm goes: "Oh, Ethiopia! You like Ethiopia," and so it'll send them all these papers from Ethiopia that aren't necessarily about hospital administration. Or like the classic example I always give, is because it's *PLOS ONE*, and *it's like the journal of all of the things*, we have dentists on our board, and we have paleontologists on our board, and they both have the term teeth. So, sometimes paleontologists are getting all these dentistry papers. So that's a big frustration on the board.

³⁵ For example, the EB services team uses *Salesforce* (i.e., a customer management software) to handle the large amount of information regarding who is invited to the EB, who joins, who steps down, what subject areas require more coverage, and so forth. The team leader described the software as a significant ally in keeping the records up to date, which is a major priority for the team because the journal has a high turnover rate. The software was adopted after several years of struggling with managing the nonstop-growing board. She mentioned that when she joined the organization, the editorial board services team was using some rudimentary tools that were no longer able to cope with the demands for information structuring, "it was very what...I'm gonna use a Tech Bay area term, it was very "scrappy" at that time," the participant said.

From the AEs' side, indeed, the mismatching is a source of frustration and annoyance. Some of them referred to this burden as a black box as an editor from the U.S. said, "They have a somewhat obscure process for matching papers to academic editors."

Other AEs wondered whether this black box issue is linked to the perceived high turnover rate of internal staff. For instance, an editor based in the U.K. said she has noticed cycles of improvement in the matching process when new staff editors are in place, but then they change again, and the mismatching problem is back. An AE who studies complex networks in physics in Spain guessed if the algorithm has "unlearned" over time because she also noticed a sudden worsening of the mismatching issue. She pondered whether the problem could be addressed by using artificial intelligence tools. Despite being barely discussed by the participants, this topic is growing in relevance within the scholarly publishing landscape, especially as burdens like the above described are more salient within the context of the rapid growth of the number of publications annually (See, for example, Irfanullah, 2023; Kousha & Thelwall, 2023).

The annoyance of receiving papers out of their scope discourages and exhausts AEs to the point of giving up the job, as some of them admitted. For staff editors, it is frustrating and overwhelming, too, and they acknowledged that the scale of the journal increases their workload, as a staff member commented, "I want to spend so much individual time on papers. But you know, there's just so many there. There are always papers." In sum, as ANT suggests, the algorithm is not a neutral object or a simple tool to connect people and ideas but acts as a mediator of collective action. It is important to note that the thread that keeps AEs connected to *PLOS ONE* is very fragile, as I show in

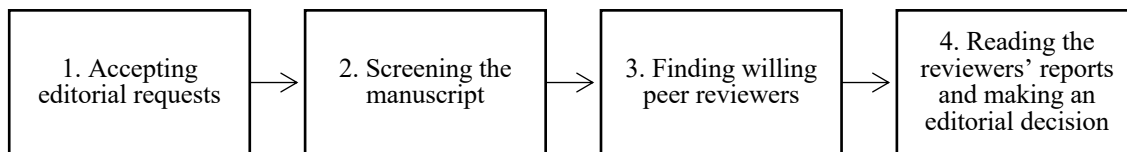
further sections. In that sense, my data suggest that the agency of the algorithm (or the human-algorithm) might compromise the stability of the network.

Second Stage: The Peer Review Process

When staff editors successfully distribute the manuscript to an AE, and this person accepts to handle it, the second stage begins. The core process of this stage is the peer review, which I divided into four steps for the analysis. Nevertheless, before it even starts, there are some other relevant interactions and negotiations among actors that I outline in this section. Figure 11 summarizes the four steps in which those interactions take place.

Figure 11

Peer Review Process Steps Followed by PLOS ONE Academic Editors



There is no minimum requirement for the number of manuscripts an editor must handle for the journal. Some young or less experienced editors told me that when they joined *PLOS ONE*, their enthusiasm led them to accept handling several manuscripts simultaneously. Nevertheless, soon, they realized the amount of work it takes, and they accepted fewer editorial requests or reduced their availability dates for the journal.

The number of manuscripts handled per AE varied across my sample. Most participants said they typically agree on handling between one and three manuscripts simultaneously per month. In a year, AEs said they handle between ten and 20

manuscripts, but this depends on their time availability, which is one of their main limitations in doing the job they reported. Section editors reported working less than that. In fact, some of the SEs seemed surprised when they were promoted to this position as their workload decreased dramatically, and the journal barely contacted them.

Still, in general, most AEs and SEs shared that time availability for the job is a significant limitation, mainly because they have other responsibilities in their workplaces. Moreover, many AEs pointed out that, as this is a voluntary position, they have to prioritize, as a dental editor from Australia mentioned: “It’s all nice to serve as an editor for *PLOS ONE*. But at the end of the day, you gotta decide what’s more important. And this job is important, but it’s not going to pay my home loan and my expenses.”

Some other AEs said they even had to pause working for *PLOS ONE* for some time because they had to focus on their tenure-track processes or family issues. Nevertheless, a social sciences editor from Bangladesh said he handled 60 manuscripts for *PLOS ONE* in a year. I was very impressed by this number, especially because most AEs mentioned they usually dedicate between three to four hours of work per manuscript³⁶. I asked him what his strategy was to handle his time and his motivations to reach that number. He mentioned:

I was so passionate about finding time to handle this sort of thing. I was so curious, and I really wanted to perform well. I also intended to increase my experience handling this sort of thing in a very limited time because when I grow up as a professor, I will have even more responsibilities. I also wish to find a faculty tenure track position in the United States or in Europe. So, to compete in the international arena, I have to have this sort of editorial reviewing and editorial experience.

³⁶ A thoroughly comprehensive study about the cost of peer review used the indicator of six hours as the average time reviewers take on reviewing a manuscript and writing a report. Using a dataset of 87,000 journals retrieved from the *Dimensions* database, the study calculated that, in 2020, reviewers spent 130,800,757 hours on reviewing, which is equivalent to almost 15,000 years (Aczel et al., 2021).

This narrative suggests that volunteering for *PLOS ONE* is translated differently by the AEs and SEs. My data also implies that the variation might be related to the geographical location and the career stage of the AE or SE, which, for the leaders of *PLOS ONE*, can be challenging to address. The final section of the findings chapter delves deeper into these insights.

Step 1. Accepting Editorial Requests, or The Work of “Deciding What’s Science and What’s Not”

Academic Editors receive email notifications containing the title and abstract of a manuscript assigned to them, which is helpful for deciding whether to accept or reject the request. According to my interview data, AEs decide to accept handling the manuscript if:

- 1) The subject is interesting enough for them, and if they consider it is relevant for the field
- 2) They believe their expertise is strong enough to assess the peer review process and make an editorial decision
- 3) They anticipate finding willing reviewers for the topic
- 4) They have time availability for the job

In this section, I focus on the first point and address the rest in further sections.

First, AEs mentioned that the abstracts give them enough clues about the relevance of the topic and compliance with the publication criteria³⁷. Thus, some AEs mentioned that

³⁷ Since the main focus of *PLOS ONE* is publishing experimental research papers, the publication criteria are:

1. The study presents the results of original research.
2. Results reported have not been published elsewhere.

making the decision to continue reading the full manuscript is relatively easy. An editor from the U.S. pointed out:

There is a lot you can tell from an abstract. I am disinclined to accept handling a paper unless it is interesting and has the potential to be published. So, I will decline invitations about 96% of the time [laughs]. If I read an abstract and feel the paper will irremediably fail any of the publication criteria, and 1, 3, and 4 are the easiest to fail irremediably, I wouldn't send that out for review.

Despite the focus of *PLOS ONE* on publishing manuscripts regarding their novelty, several AEs mentioned that judging the relevance of the topic is somewhat simple for them at this stage. Many AEs mentioned “easy-to-reject cases” where the authors only applied an already published methodology to a new dataset. Others brought up the fact that they have received “edge cases,” which are manuscripts where “there is no science essentially,” as an American physics editor put it. He referred to manuscripts where no experimental work was involved, i.e., data and results were missing. As he mentioned, “[I read a paper where] someone had done a lot of work of deriving mathematics. They derived equations for some distribution, and that was it. There's kind of no application to real data.”

Biology editors offered similar comments. They highlighted there is a trend of “data-driven life science manuscripts” that do not match *PLOS ONE* publishing criteria despite the sophistication level of the data analysis methods and materials. A biology editor based in Sweden explained:

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3. Experiments, statistics, and other analyses are performed to a high technical standard and are described in sufficient detail.
 4. Conclusions are presented in an appropriate fashion and are supported by the data.
 5. The article is presented in an intelligible fashion and is written in standard English.
 6. The research meets all applicable standards for the ethics of experimentation and research integrity.
 7. The article adheres to appropriate reporting guidelines and community standards for data availability. (*PLOS ONE*, 2023b)

These days, if you want to be competitive, you need to have access to technological tools. There is a lot of discussion now about data-driven life science. When you do all these omics³⁸, and then you get the result, and you make sense of it. I am totally against it because I think that the important thing is to start with a hypothesis and a question and then apply the tools to answer this question, not first look at everything and then try to make sense of the data. It's like you put a lot of fruit in the blender and then you try to make sense of it.

This excerpt suggests there might be underlying asymmetries between authors in terms of their access to research infrastructure and data availability, which is widely addressed in the literature (e.g., Leonelli, 2020, 2022; Verhulst & Young, 2022). Many AEs reported receiving weak manuscripts in that regard, as a Canadian biology editor commented:

If you don't have access to the equipment that we have in North America or Europe to even reproduce results that are currently published and if you come in with, let's call it, "old fashioned" techniques, there's not much interest in the science. I mean, it's fine to reproduce things, but nobody would want to reproduce stuff that was published 50 years ago, for example. You do that in the teaching lab, but you wouldn't want to publish your students that report [laughs].

The paradox of assessing manuscripts based on "technology-based data generation" vis-à-vis "old-fashioned techniques" is just an example of the complexities of the editorial job related to the global scope of *PLOS ONE*. AEs must judge the pertinence of sending to review manuscripts, based mainly on their scientific merit and relevance, as mentioned in the publication criteria and other organizational documents. Yet, in practice, other non-scientific factors influence their decisions, even at this early stage of the workflow.

³⁸ "In biology the word omics refers to the sum of constituents within a cell. The omics sciences share the overarching aim of identifying, describing, and quantifying the biomolecules and molecular processes that contribute to the form and function of cells and tissues." (Rogers, 2023)

I noticed some of those factors might have to do with unconscious biases regarding how science is produced in different countries. Interestingly, for instance, some editors mentioned their impressions regarding the manuscripts from Asian countries. An editor based in the U.K. admitted:

There are many submissions from Asian authors. I usually read through them when I have time. Most of them, I just decline as many as they are coming from. I just decline them because I don't have time, but when it's an interesting topic, and I have time, I usually read the abstract, and I decline it because I see that there will be a lot of work [to do].

The case of China was widely mentioned in the interviews with AEs and staff editors similarly. On the one hand, AEs acknowledged some assumptions about the research conducted in this country, especially in biomedical sciences, that affect their willingness to handle papers from Chinese authors. On the other hand, this is a crossroads for staff editors as they implement international quality and research ethics criteria for all manuscripts regardless of the author's country. Still, the prevalence of misconduct cases among Chinese researchers has made them implement stricter policies in this sense. A publishing ethics team member shared:

We had a series of articles that were retracted from China, where researchers had been using organs that were donated by prisoners who could not consent. That may be something acceptable in China, but it is not acceptable by *PLOS ONE*'s standards, and although we appreciate that the Chinese Ethics Committee may have approved this, we take the hard stance and say this is not people who can consent, and this is not something that the journal will accept.

She explained that the publishing ethics team is not necessarily picking cases for retraction or other sanction measures based on where the authors are based. However, some issues are very region-specific³⁹. She added that PLOS had received multiple

³⁹ Unfortunately, I did not receive any response from the Chinese editors I invited for an interview to know their thoughts on this issue. However, the scholarship on research misconduct in Chinese biomedical

complaints from authors based in Pakistan, arguing that the publisher was racist because they retracted about 100 articles primarily from authors affiliated with Pakistan and China⁴⁰. However, in the same month that happened (July 2022), she was working on the retraction of an article linked to a French research project that affected over 80 articles. Ultimately, they had to publish an expression of concern on 50 of them in one go. In sum, it should be noted that in the early stages of the peer review process, when AEs deploy their epistemic authority and expertise, diversity is enacted in controversial ways that create some tensions and challenges for the journal that compromise its mission of inclusion, as stated in the DEI goals of PLOS: “Increasing the number of historically underrepresented external contributors (e.g., authors, editors, reviewers) and strategic partners.” (PLOS, 2023b).

Step 2. Screening The Manuscript, or “English Becomes the Lingua Franca If That’s What You Demand All the Time”

In this step of the peer review process, AEs read the full manuscript and focus on judging whether it meets the journal’s publication criteria and is worth sending to

research is informative in this regard. For example, an interview-based study with Chinese researchers based in Europe showed that in China researchers are limitedly aware of the general concepts of research integrity which leads them to engage into unethical practices like data falsification and gift authorship. The “publish or perish” rationale was the main reason for engaging in research misconduct (Yi et al., 2019).

⁴⁰ While I was collecting my data, a case of a massive retraction of papers published in *PLOS ONE* came out. The website Retraction Watch shared that staff editors detected that an author had submitted over 40 manuscripts in 10 months, and a further investigation revealed that several AEs were involved in issues of conflict of interest with other 300 submissions. The people involved in this case were based in Pakistan, China, Turkey, Saudi Arabia and India. Although retractions in *PLOS ONE* are not uncommon, a publishing team member at PLOS said, “This is probably our biggest case that we’ve seen in several years.” (Kincaid, 2022) The EB services team member I interviewed told me the AEs who were involved in that case were removed from the EB. The publisher also eliminated its policy about authors having able to suggest an AE to handle their papers, because that is exactly what happened in the cited case.

reviewers. If they make the decision to send it out, then they start looking for suitable (and willing) reviewers. I will focus on that in the next section.

If the decision is to decline the manuscript, AEs are required to write a thorough explanation because, as a physics editor said, “really nothing should be rejected [in *PLOS ONE*] unless it is not publishable anywhere.” The responses of the research participants in this regard were, to some extent, homogeneous regarding the publication criteria for the experiments, methods, and conclusions. They all agreed that *PLOS ONE* does not receive the highest quality manuscripts, and that can make the assessment a challenging task, but if the science is sound, they send them to review in accordance with the journal’s mission and publication criteria.

Nevertheless, I found some discrepancies in AEs’ responses regarding publication criterion #5: “The article is presented in an intelligible fashion and is written in standard English.” (*PLOS ONE*, 2023b). Several AEs who are non-native English speakers acknowledged their own challenges in communicating in this language. The *lingua franca* policy that *PLOS ONE* has in place sharply contrasts with my sample, as at least ten languages besides English are spoken by the participants⁴¹. They admitted struggling to write their own papers in English, which, according to the literature, can also be extended to other scientific activities such as reading, preparing presentations, or attending conferences held in English only (Amano et al., 2023; Canagarajah, 2002). In fact, a recent study by Amano et al. (2023) revealed that non-native English speakers take

⁴¹ My research participants are from countries or regions where the following languages are spoken: Bengali, Catalan, Dutch, French, German, Hindi, Italian, Korean, Nepali, Portuguese and Spanish. They mentioned being native speakers of those languages throughout our conversations.

twice the time to write their papers than their native speakers' counterparts. They are also more likely to have them rejected due to language proficiency issues.

In spite of that, AEs highlighted that it is the author's responsibility to take steps to make their manuscript readable and ready for submission; otherwise, it is hard for them to assess the scientific merit. Although it is uncommon to receive manuscripts with too many language errors, since the staff editors have previously filtered those, their reflections about language in science were insightful for acknowledging the implications of this *lingua franca* policy that seems somehow dissonant with the journal's program of action regarding diversity.

For some AEs, the way of coping with the challenge of writing their own papers in English is by asking their colleagues for support. Some of them are lucky to access it easily, as the editor from Canada mentioned, "I'm not an anglophone, but I'm lucky enough to be in Montreal. I have a lot of colleagues or students that are native English speakers that are willing to proof [read] my manuscripts." Yet, again, AEs underscored that the case of authors from Asia might be more complex. The following interview excerpts of AEs from Brazil, Canada, and the U.K. reflect some common views on the issue:

[Screening manuscripts with language flaws] is a lot of work, and sometimes I would reject those [manuscripts] when I don't have enough time, but obviously, it's not really in the idea of EDI [equity, diversity, and inclusion goals at *PLOS ONE*] because I would say more often than not, this hits Asian people. You see more and more Asian publications, at some point, I think they just won't bother publishing in English anymore. Publishing in Chinese is going to be okay.

I am not a native English person, so my English is not the best one in the world. But I received papers from China and from Japan that even I knew that the English was not good. The results were okay, but the English was not good, and I could not correct the English because I'm not a native speaker. So, do you accept,

or do you reject? Or you say to the guy, “Try to find someone who knows English and writes the paper for you.” But if the guy is, I don’t know, in the center of China, he will not be able to do that.

The excerpts expose that AEs might be taking the many nuances regarding science production in Asia for granted, which may lead them to (consciously or unconsciously) reproduce biases regarding the mainstream-peripheral divide in knowledge production (Canagarajah, 2002; Rodríguez Medina, 2013). Some of those assumptions involve imagining Asia as a homogeneous continent where everybody will publish in Chinese in the future. Interestingly, an AE from Korea shared that the aspiration to be published in an English-language journal in her country is part of the broader dynamics of scientific knowledge production driven by a need for recognition from international scientists. Thus, although they also might struggle with it, publishing in English is not a burden. She explained:

We in Korea really prefer publishing in English-written journals because we think it’s more competitive and more recognized by the researchers because researchers [worldwide] cannot read the Korean language. So, we want to publish articles to the whole world. But in our field [public health], it is very important to write in Korean, for example, [about] Korean populations, like disease trends. Still, people try to publish English-written papers to be recognized by others than Koreans, and also, they think it’s more honorable to publish because it’s more competitive, it’s less acceptance rate. So, if somebody publishes in very good journals, we kind of envy them, so it’s that kind of environment.

From the journal staff’s side, the language issue is also a sensitive topic that may lead to tensions and disagreements, especially when trying to meet *PLOS ONE*’s diversity and inclusion goals. A staff editor—whose mother tongue is not English—told me they are aware that the quality of writing at *PLOS ONE* is “not great,” and there is a tension between what they would prefer and the journal’s inclusion mission.

Furthermore, the journal does not provide copyediting services. Hence, he said, “It’s not always easy to be proud of the end product.”

Interestingly, this staff editor suggested that the low linguistic diversity among the staff members of *PLOS ONE* might be a considerable limitation in adapting the editorial policies to the multilingual reality of scientific production worldwide. He also stressed that the fact that PLOS’ leaders are mostly native English speakers makes it hard to be more flexible in this regard. Even the expansion of PLOS to countries in the Global South might reinforce the English language predominance. He explained:

I think we should be a bit more open and accessible and have guidelines, not in that many languages, but, like, I don’t know, in Spanish and Chinese and Russian and Arabic, you know, something like that. *We tweak our guidelines and policies very often, yet we don’t want to do that...* The leadership staff is very Anglo, and they’re not sensitive to that. They don’t see, they don’t care, and their response is, “Well, English is the language of science.” Yeah, of course! if that’s what you demand all the time, then *de facto*, that’s what it becomes!... For the projects we have of global development, I mentioned Singapore and Berlin. Kenya would be one of them outside of Berlin. They’re English-speaking countries, or you know, in Singapore, English very largely is the main business language, so there is some diversity, but in some ways, *it’s just reinforcing the English language*, and I think that’s not great for global author service.

To summarize, my data suggests that the program of action of *PLOS ONE* regarding diversity might be colliding with the researchers’ antiprograms of action, paradoxically linked to their geographical location and belonging to different research cultures. I discuss this finding more deeply in my final chapter.

Step 3. Finding Suitable and Willing Peer Reviewers, or “The Biggest Nightmare”

For *PLOS ONE*, one of the goals of increasing the diversity of the EB members is to increase the diversity of the reviewer pool accordingly. A staff member from the EB services team told me, visibly hesitating, “I might be assuming here...I was going to say

that most reviewers are direct contacts or, like in the network of the EB members, which is, to some extent, true, not always. But they would just increase the diversity of comments that come into the peer review process.” This person was very careful about these statements, especially because of the retraction case mentioned above, where there were conflicts of interest between editors and reviewers. However, I perceived that the participant was also hesitant about that statement because of her awareness of the challenges for AEs to find suitable and willing reviewers for *PLOS ONE*, even within their “personal networks.”

Across my interview dataset, I found that all the 21 AEs, with no exception, expressed concern, annoyance, and frustration about finding willing reviewers for manuscripts. In fact, they agreed that the other stages of the process are straightforward and exciting as they engage with “reading science.” But finding willing reviewers is, as one of them put it, “the biggest nightmare” of serving as an AE, not only for *PLOS ONE* but other journals as well. All the AEs mentioned the difficulty of getting positive responses from potential reviewers or any other type of response at all. Some of them told me they send even 50 or more invitations for a single manuscript. They usually get a “horrific response rate of 10%,” as an editor from South Africa commented. In this regard, several participants noticed the reviewer response rate dropped for *PLOS ONE* and other journals since the COVID-19 pandemic hit, which has been corroborated by several studies that pointed out this issue affected especially disadvantaged populations in science, such as women and scholars in LMICs (e.g., Messaoud et al., 2023 and Squazzoni et al., 2021). Moreover, a recent study confirmed that the review acceptance rate has declined globally from 37.5% in 2020 to 32.3% in 2022 (Aczel et al., 2021).

Editors expressed that finding reviewers is a burden partly because the EM software is a hindrance instead of an ally for the task. The search engine of EM is not helpful for them, which might be due to the size of *PLOS ONE*'s reviewer database. When AEs use the search engine, the results could be a massive list of people, which is hard to handle. Oftentimes, the results are also very imprecise. Moreover, although the system provides a list of potential reviewers, editors must check one by one to ensure the person matches the manuscript's topic, if they have previously sent invitations to the same person, if the reviewer has reviewed in the past, and so on.

As the representative of Aries Systems told me, the EM system is customizable. Yet, for AEs, it is time-consuming to do it, as a medical researcher from India commented. As a result, several AEs end up using other more (perceived) reliable databases such as PubMed and Google Scholar. PLOS ONE's staff members also supported this statement. One of them explained, "Because of the scale of the journal, we have a setting that allows staff and editors to proxy register reviewers. So, the database is huge and messy. It's full of duplicate accounts. We don't encourage people to use it as an actual searchable database". In fact, they use alternative strategies as an AE from Nepal commented, "I search on my own system manually."

Interestingly, the reviewer database uses information from two sources: the Web of Science (WoS, owned by the company Clarivate Analytics) and Scopus (owned by Elsevier). The EM representative explained that although the former is their competitor,

they still integrate the *Web of Science Reviewer Locator* as part of the customization services Aries offers to their customers, like PLOS⁴².

The goal of integrating those resources is to help the EM's users match up article keywords with potential reviewers, a common trend in the use of artificial intelligence and machine learning tools for peer review (Kousha & Thelwall, 2023). The EM's salesperson explained how they help in this task via their algorithm:

If you want a reviewer to check certain things of your taxonomy⁴³, you would have to tell the system, "This is the information we want to collect from the reviewer." They would have to enter it, and then once that's in the system, we can help match it up... But if you're having trouble getting the reviewers in the first place and you don't find our tools useful, there's going to be some issue with getting the number of qualified reviewers. I think there's a problem with how to incentivize reviewers, and that's maybe more out of the scope of what Aries can control.

In other words, the machine learning tools provided by EM are useful to an extent. Academic Editors might find the best reviewers for the manuscript, but as an AE added, "If they are not willing to review, *no system can change that unless there's some incentive for people* to say, "Yes, I'm happy to do this." I address this point later in this chapter.

Since AEs act as reviewers in *PLOS ONE* and other journals, they speculated that the low reviewer response rate might be due to the overwhelming number of requests they receive daily and the time constraint to contribute to this endeavor, as mentioned

⁴² Since 2020, PLOS has included the company *Clarivate Analytics Llc* in their list of contractors. The company was the fifth highest compensated contractor in 2020 but in 2021 it became the third one. The services provided as described as "Author connect services" (PLOS, 2021) which might be linked to the integration of the *Web of Science Reviewer Locator* in the EM system.

⁴³ In the context of machine learning algorithms, a taxonomy is "the classification of data into categories and sub-categories" (Innodata, 2020). Taxonomies use controlled vocabularies to train algorithms to learn how to match up data.

before. An editor from Spain said, “I get inundated with review requests; it’s ridiculously unfeasible.” This phenomenon is known as “reviewer fatigue,” which Breuning et al. (2015) defined as “statements indicating scholars decline [to review] because they have other reviews to complete and/or cannot take on an additional review” (p. 598).

While the responses of my interviewees can confirm the reviewer fatigue phenomenon, they mentioned three other reasons for declining review requests themselves as evidence of what might be happening at *PLOS ONE*. The three reasons are 1) low incentives in the reward system linked to the perceived low journal prestige, 2) resistance to the APC-based business model, and 3) biases regarding the quality of manuscripts.

The first reason is the low incentives for reviewing in *PLOS ONE*. Several AEs mentioned that reviewing manuscripts for journals is barely recognized by the reward systems of university tenure-track positions. An editor from Australia mentioned that at his institution, they even lack a place to record their reviewing contributions because it is useless for promotion purposes. However, if peer reviewers get credit for the job, the perceived prestige of the journal—commonly linked to their Journal Impact Factor—matters and makes a difference in the decision of reviewers to accept review requests.

One of the problems that most of the AEs based in HICs mentioned was that *PLOS ONE* is not as reputable as other journals, especially in medicine, such as *JAMA* (Journal of the American Medical Association), *The Lancet*, *The New England Journal of Medicine*, or *PNAS* (Proceedings of the National Academy of Sciences). They explained that those venues have significant influence in the field since they publish manuscripts that can change the course of the use of any widely used drug, as one of the editors

highlighted. Hence, the probability of getting positive responses from potential reviewers decreases considerably for *PLOS ONE* because of its policy of publishing papers regardless of their perceived novelty or impact (PLOS ONE, 2023b).

This opinion contrasted with the views of a few AEs based in LMICs, who shared that *PLOS ONE* is a well-recognized outlet in their countries. A couple of editors from Brazil acknowledged that researchers tend to accept reviewing for *PLOS ONE* over the local journals. One of them added, “It’s a problem of culture; we value more referees and papers from foreign journals. That’s a Brazilian thing.” Yet still, most AEs admitted that compared with top-tier journals, *PLOS ONE*’s prestige might not be attractive to reviewers in terms of career progression. This narrative from an AE based in India exemplifies this:

I got one opportunity to review an article for The Lancet! That was an out-of-the-box for me. The timeline given was 15 days. I completed that peer review during the first year of the COVID-19 pandemic. I thought that I should have been given some more time, although I could not deny the opportunity given by The Lancet because I wanted to improve my CV.

The second reason for the low reviewer response rate quoted by the AEs was that reviewers tend to reject PLOS’ APC-based publishing model. This model is perceived as unfair and inequitable because authors pay for publishing, but nobody gets paid or rewarded for reviewing. Some AEs said there are some calls among their colleagues (e.g., through emailing lists) to stop reviewing manuscripts for journals that charge APCs. In other words, if the publisher’s program of action included the APCs as an obligatory point of passage, some AEs are displaying their antiprogram of action, which might be jeopardizing the durability and stability of the network.

The third reason for the low reviewer response rate concerns biases against manuscripts from authors based on LMICs. Most AEs agreed that finding reviewers for those manuscripts is even harder. For some of them, this situation might be linked to the perceived low quality of science produced in those countries. A social sciences editor from Bangladesh commented that in his experience, reviewers' responses come faster if the manuscript is authored by an academic in a "reputed university" or a "developed country." The following interview excerpt summarizes some of their perspectives on the issue:

When reviewers do a review of a paper from developing countries, sometimes they don't want to make detailed comments. For papers from, you know, African countries, Middle Eastern countries, South Asian countries, Latin American countries, it takes a long time to find reviewers and to provide a decision on that paper. I think reviewers see that if it's just too many errors or if you have to spend a lot of time on the review comments sheet, you just decline the review request.

Step 4. Reading the Reviewers' Reports and Making an Editorial Decision, or "PLOS ONE As the Last Resort for Papers"

The last part of the peer review process comprises reading and assessing the reviewers' reports and making an editorial decision. Academic Editors must determine if the reports are informative for them and the authors, whether the reviewers' demands are appropriate, and if amendments suggested are feasible. Then, they recommend one of the available editorial decision options: Accept, Minor Revision, Major Revision, or Reject (PLOS ONE, 2023a).

Some AEs complained about the low quality of the reports and the burden of having to start over the search for a new reviewer in those cases. They mentioned some reports are "superficial." An editor highlighted how this issue scales with the journal's size. In the responses to the interview questionnaire that she emailed me, she wrote,

“Since mega-journals require a LOT of reviewers, they obtain a LOT of useless reviews.”

Yet, most AEs commented on having received thorough review reports as well. In general, AEs agreed that they do not see much difference in the reports they receive for other journals in which they serve as editors or where they publish. An American physics editor shared, “When I’ve submitted to these “big name journals,” myself, and I got these horrible, two-sentence reviews that make no sense. So, I haven’t seen much of a correlation. You get good and bad in both places.”

In contrast, a comment from an in-house editor revealed there might be region-based patterns or considerable cultural differences regarding the peer review process at *PLOS ONE* that might require more attention from the leaders. He told me that in discussions with several section editors in East Asia, they have noticed contrasting reviewing practices from scholars based in Europe or North America versus those in LMICs. Editors said reviewers from the former group are used to being more adversarial or much more direct in assessing papers but provide thorough reports. On the other hand, reviewers from LMICs tend to send much shorter reviews⁴⁴. The staff editor wondered, “Maybe we should communicate the expectations a bit better, and maybe they [reviewers in LMICs] are not used to this adversarial peer review process, not comfortably enough to criticize papers. Anecdotally, I think it matches my experience as well.” Although the journal clearly communicates its expectations to reviewers via the publicly available editorial policies, training materials and guidelines, this issue coincides with other

⁴⁴ The study on the peer review reports at *PLOS ONE* conducted by Eve et al. (2021) revealed that the average length of reports is 500 words.

challenges regarding the variability of research practices⁴⁵ or concerning trends the staff members observe across countries. A member of the publishing ethics team said that regarding ethically problematic manuscripts, “It’s not necessarily that we will only [flag manuscripts] from Asian countries. We’ve had a whole bunch of articles from Italy or France that we look at the same time. So it is more of an issue that we find in a region regardless of where this region is.”

Regarding issues of reviewers’ misconduct, a few AEs mentioned some cases they came across, such as having encountered “harsh and not very empathetic” comments in the reports, although they mentioned those cases are rare in *PLOS ONE*. An editor said that when she faced this issue, “I gave the reviewer the lowest possible score (that is one awesome thing, AEs must score reviews and reviewers). I reported it to the editorial office.” Overall, AEs commented positively about receiving support in the peer review process from the journal’s staff members to address these concerns.

When it comes to the usefulness of peer review reports, AEs discussed the various ways reviewers address the scientific soundness-only principle implemented by *PLOS ONE*. Although this principle is not explicitly part of the seven criteria for publication, editors and reviewers are asked to follow it, as stated in the guidelines⁴⁶. The study

⁴⁵ For example, a member of the publishing ethics team shared that the cases of plagiarism from Asian scholars are not necessarily due to their lack of awareness of citation practices, but to an idiosyncrasy of honor and respect. She commented that they handle many cases of “small bits of plagiarism” from researchers based in China or Japan because researchers would see it as disrespectful to reword the text by someone who is more senior than them. She added that when the team handles misconduct cases, they reach out to the author’s institutions to ask for a more thorough investigation, and they receive this type of responses, especially from Indian institutions, “This researcher has published 180 articles. They’re very honorable. How dare you question them?”.

⁴⁶ The *PLOS ONE Academic Editor Handbook* states: “Judgements about whether the manuscript is “high impact,” “sufficiently novel,” or relevant to a broad audience must not play a role in editorial decisions” (*PLOS ONE*, 2023a, p. 15). When it comes to resources for reviewers, it is stated in the *Guidelines for Reviewers* as follows: “Unlike many journals which attempt to use the peer review process to determine whether or not an article reaches the level of ‘importance’ required by a given journal, *PLOS ONE* uses

conducted by Eve et al. (2021) using a dataset of 2,049 statements from 78 peer-review reports sent to *PLOS ONE* between 2014 and 2016 is very informative in this regard. They found that reviewers are far from ignoring the novelty when reviewing manuscripts, as it was mentioned in 77% of the analyzed cases. Eve et al. (2021) highlighted that significance and novelty “appear thoroughly embedded in academic expectations and norms... reviewers’ behaviors turn out to be far more resistant to change” (p.20), which makes it hard for editors to navigate the peer review process following the principle. My findings provide some additional insights into this discussion.

On the one hand, some AEs made positive comments about the soundness-only principle by linking it with reproducibility and “science progress.” For example, an editor from Canada highlighted that eliminating the novelty makes room for reproducibility and conducting studies that:

...revisit past results with a different perspective. So, it’s never not novel. Very high-impact journals are looking for papers that they know are going to be in the news. That’s not how science necessarily evolves or makes progress. No, it’s from the less glamorous but necessary little steps.

Another participant, an ophthalmology editor from Mexico, highlighted that removing the requirement for novelty allows researchers to deepen their knowledge about a well-known phenomenon in specific populations, which can be very valuable for practitioners. To highlight the value of the soundness-only principle of *PLOS ONE*, he compared it to local journals’ mission, which is to disseminate knowledge that can be used in situated ways. He explained:

peer review to determine whether a paper is technically rigorous and meets the scientific and ethical standard for inclusion in the published scientific record” (*PLOS ONE*, 2023d, p. 3).

The average corneal thickness is 520 microns. But that was studied in Anglo-Saxon, European, or African populations. In Mexico, it turned out to be 525. Does that make a clinical difference? No, but it allows the readers to know our population, and thus for us, it is of great value because it might help them apply that knowledge in other ways.

Nonetheless, other AEs expressed their frustration and annoyance about the potential negative consequences of the soundness-only principle, especially regarding the perceived low quality of manuscripts submitted to *PLOS ONE*. Some of them even used derogatory language like “[*PLOS ONE*] attracts lots of useless crap,” as an editor from Spain put it. He added that the high acceptance rate of *PLOS ONE* (50% according to their documents) reflects the problem, “there are millions of people trying to publish stuff, I mean, no way! For me, the approach of *PLOS ONE* is just a natural acceptance of the status quo, in a sense.” Likewise, another editor from the U.S. said the soundness-only principle—which has also been dubbed as “peer-review lite” in the literature (Eve et al., 2021)—might depict the journal as a “*place of last resort* [and authors can think] “it didn’t get accepted anywhere else; we can submit it to *PLOS ONE*.”

Academic Editors also reflected on the contentious meaning of the term “novel,” and some of them suggested focusing on “relevance” instead. A biology editor based in Sweden mentioned the term means having a significant question or hypothesis, robust data and methods, and conclusions supported by the data. In her opinion, if everything is aligned, the study is relevant and worth publishing, even when the results are negative. Many other AEs supported this view. Nevertheless, she also added that novelty is ubiquitous in grant and funding application requirements, which, she said, *PLOS ONE* should not ignore.

The last step of the peer review process is making the editorial decision. If revisions are required, the authors send the revised manuscript, and AEs read it and assess whether it met the reviewers' and their own requests. In some cases, a second round of peer review might be needed, which implies (the burden of) looking for another reviewer. Academic Editors may act as reviewers as well if their expertise matches the topic⁴⁷. In more contentious cases, the staff editors may ask SEs to step in, analyze the manuscript and the peer-review documents, and make the final decision. A SE said this assignment can be “harder and easier than being an AE” because the workload is lighter, though she said, “Not everyone communicates clearly, so it can be very challenging to get a firm idea of what reviewers meant, what authors meant, and how best to apply the awesome list of publication criteria.”

But if there is “nothing too contentious” or “major dramas,” as the editors called the cases that require special attention, they make a decision and prepare the editorial decision letter (*PLOS ONE*, 2023a). Academic Editors send the letter to the staff editors, who review it and make the final publication decision. My interviewees from the latter group said they try not to make decisions “about scientific issues” internally and leave those resolutions to the EB members as much as possible. Nevertheless, for matters of research ethics, they make in-house decisions. Thus, AEs' editorial decisions are not always applied or supported. The following narrative of a medical editor from Nigeria is a case of this issue:

I accepted a manuscript, and then I got a letter from the management team saying they needed to reject the manuscript that I had accepted because they realized that the authors had not obtained proper ethical approval before conducting the study.

⁴⁷ This has been a subject of disputes in *PLOS ONE* because some AEs have reviewed manuscripts that are not necessarily within their scope, which has resulted in several retractions, as a staff editor explained.

I mean, I saw that they had obtained ethical approval, but I did not try to explore whether it was a proper IRB. Apparently, it was just a committee within their school. I wondered why they waited till the very end to check and make sure that everything was in order. Since then, I carefully look at the ethical committee that approved their work and make sure that it sounds like a formal ethical committee [laughs] because I know that *in Nigeria, many of our ethical committees may not appear on a list*. I felt bad for the authors because it had really been a very long process, and just when they had finally responded to all the reviews and gotten someone to do editorial work just to make the language easier to read, the paper got rejected. That was a bit painful for me.

In a blog communication, two PLOS employees admitted that a significant number of the editorial decisions in PLOS journals are made by AEs primarily located in HICs, particularly the U.S., Canada, the U.K., and Australia (Puebla & Dunbar, 2018).

This was also acknowledged by one of the staff members:

We make sure that an editorial decision is never made by a single person or a single team. But it also should be noted that we are a very Western company, a very white company. So, we try to make sure that we actively look for peer reviewers and board members, and we need external inputs that are very diverse. We're not necessarily looking at a researcher from an American or a European institution (...) It's very difficult to think of what we actively do to mitigate the bias, and in a way, some of our practices probably might bring in more bias. So yeah, it's kind of difficult, but it's a discussion that we very frequently have. So at least, we're aware of it. We are not quite sure what to really do about it.

To summarize, this finding indicates that the journal's efforts to expand the pool of reviewers by including scholars from all over the world often end up adding more complexity and burden in decision-making for staff members, who have the final say. Moreover, paradoxically, the contrasting geographic diversity of academic editors compared to that of PLOS's staff members and leaders may be reinforcing the global asymmetries in science production and contradicting the publisher's statements and goals about inclusion: "(...) the current system of scholarly communication was created by and for the experience of select groups, reflecting historic power structures and perpetuating inequity. [we are working on] building a framework for equitable participation and

distribution of knowledge that is truly inclusive and Open to all.” (PLOS, 2023b). That is, my data suggest that the visible separation of tasks in decision-making and the homogeneity of the leading teams potentially weaken the effectiveness of the PLOS and *PLOS ONE*’s diversity program of action.

Finding 2. “*Você Tem que Vender o Carro para Publicar*” [You Have to Sell Your Car to Publish]: APCs As Mediators That Trigger Betrayals Among the Publisher and the Scientific Community

We are nonprofit, we are mission-driven, we are completely Open Access. Reviewing for PLOS should mean something different than reviewing for Elsevier, right?
PLOS BOD former member

When I interviewed a former member of the BOD, she underlined that PLOS aims to create a sense of community among editors and reviewers. She emphasized: “We are nonprofit, we are mission-driven, we are completely Open Access. Reviewing for PLOS should mean something different than reviewing for Elsevier, right?” This finding might contradict that goal, particularly because of the influence of a nonhuman actor: the Article Processing Charges (APCs).

During my interviews with the AEs, I noticed a common discontent regarding the APC-based business model utilized by *PLOS ONE* and most other OA journals they serve or publish in. This contentious topic was extensively mentioned across the entire interview dataset. Although there are some nuances in the ways the AEs approached the issue, they shared their frustration, disappointment, and anger over the perceived unfairness of charging publication fees to authors –like themselves– when the bulk of the

editorial work is done by a vast number of volunteer editors and reviewers –like themselves–.

As an editor from Australia put it, “I just see this as a bit of a perfect business model where everybody else does the work and the publishers make the money.” Indeed, the APC-based model has been at the center of significant debates among the academic community because of the disparities between the actual per-article production costs—particularly the labor costs regarding peer review—and the APC prices (Klebel & Ross-Hellauer, 2023; Knöchelmann, 2021; Rouhi et al., 2022). For example, Grossmann & Brembs (2021) have calculated that, despite many differentiation factors between journals, such as the size and prestige, the per-article costs in journals comparable to *PLOS ONE* are around US\$400. Yet, some publishers surcharge at least two or three times those costs (Budzinski et al., 2020).

Translation of the Nonprofit Organization: “If They’re a Nonprofit Organization, What Does It Mean?”

I brought up the fact that PLOS is a nonprofit publisher to probe the AEs’ thoughts on this difference with regards to other for-profit journals or publishers they quoted, especially *Elsevier*, *Nature*, *Science*, or *Cell*, which are among the outlets with the highest APCs in the biomedical sciences publishing market⁴⁸. A physics researcher based in Spain replied that the fact that PLOS is a nonprofit “makes a complete difference. I mean, for me, it does. That’s the reason I was kind of happy to join them.”

⁴⁸ STEM journals charge a varying range of APCs that depend on various factors such as the publisher’s prestige, geographic location, editorial services offered, and type of publisher (nonprofit, for-profit, university press, etc.). One of the most expensive APCs are charged by the *Nature* group. For example, an article published in *Nature Biomedical Engineering* costs €9,750 / \$11,690 / £8,490.

Other editors shared this opinion and acknowledged that *PLOS ONE* charges “relatively cheap publication fees,” as a researcher based in the U.K. stated. She also mentioned that the publisher’s institutional partnerships program works well for some universities.

Through this program, institutions pay an annual lump sum to enable their researchers to publish in *PLOS ONE* or other journals of the collection.

Nonetheless, the difference between for-profit and nonprofit publishers like PLOS was not meaningful for most AEs as they judged the APC model based on their editorial or review labor, which essentially does not vary among journals. Furthermore, some editors used harsh expressions to describe the dimension of the problem they perceive in *PLOS ONE* precisely because of its size. The following interview excerpts underscore those assessments:

If they’re not for profit, what does it mean? On what basis does it cost \$2,000 or \$3,000 to publish a paper in the journal? How is that calculated? I have no idea who owns PLOS and who makes the money. I know that the shareholders but clearly, *the OA platform is getting bigger and bigger, and I don’t know who sees the money.*

The *money-making machine* that is the mega journal *PLOS ONE* is, well, opaque, to be honest. *It’s a black box*, and that makes me think that it can be more transparent and accountable, and allow for better social responsibility for academics and authors, for the people that are contributing to the knowledge generation of the world, to support them and being able to do it in a way that isn’t predatory, financially predatory. And I know the term “predatory journal” is quite specific, but I’m referring to a predatory trait in its financial outlook and the burden it places on authors. *I see PLOS as its equivalent to what I would look at as a big farm kind of narrative.* They’re there to make lots and lots of money and exploit me and exploit their authors and ask for lots of money.

Furthermore, a few AEs compared the APCs charged by *PLOS ONE* with other nonprofit OA journals in which they work within their home countries. In particular, the voices of Latin American editors were very critical of the imbalance between the amount

of the fees and the services that authors receive in return. In other words, they highlighted the disproportion between the prices and the costs.

According to Grossman and Brembs (2021), to have a more accurate full picture of the per-article costs, the production costs (e.g., submission and communication systems, plagiarism check, DOI, etc.) should be combined with indirect costs such as staff salaries and real estate. In the Latin American region, most of the science journals are run by research institutions, and those organizations cover the indirect costs (Alperin & Fischman, 2015; Appel et al., 2018a; Delgado-Troncoso & Fischman, 2014; Vasen & Lujano Vilchis, 2017). Thus, the indirect costs are hardly comparable to PLOS.’

My point here is not to present a detailed comparative analysis of those costs, as it exceeds the focus of this research. Rather, I want to highlight that for these experienced AEs, nonprofit OA models that serve an international community involve implementing inclusive and sustainable strategies. In contrast, the PLOS model was described as closer to the corporate approach of for-profit publishers. The following interview excerpts highlight the views in this regard of an editor from Mexico and another from Brazil:

I think it is inappropriate to pay to publish. In [Mexican journal’s name], for example, the learning society pays all the money. You don’t pay anything to publish in OA. The society pays for the English translation, and the article is published online in English and Spanish. People from Russia, Pakistan, and the United States send their manuscripts to us in English, and we translate them into Spanish. And in *PLOS ONE*, you pay to publish, and it has to be only in English, right? So, it seems to me that paying for publishing is not the right formula for a nonprofit.

Two years ago, a fee of 300 BRL was charged by [Brazilian journal’s name]. That’s \$60 or \$50 more or less. This fee is used for the maintenance of the editorial and technical operations of the publishing house. It’s a small fee, right? While in *PLOS ONE* we’re talking about \$1,500, so it’s impractical. So, yes, in Brazil, they are starting to charge for publication as a matter of sustainability and to improve the professionalization of the services, right? If you want the abstract written in a proper English version, you have to hire someone to do it. Same for

having the references to be suitable for citation, publishing in a continuous flow, and so on.

As highlighted by the last narratives, AEs seem hesitant about the extent to which PLOS is adhering to its preached principles, mainly regarding financial equity and transparency. Above all, AEs suggested that the publisher could do better in terms of the compensation options for editors and, thus, be consistent with its mission. A SE based in the U.S. who works in a private, wealthy institution straightforwardly suggested: “APC charges should be waived by PLOS for at least one article per year for AEs and SEs!”.

A common claim in this regard was that PLOS does not offer them APC waivers or any other form of reward as other journals do⁴⁹. In *PLOS ONE*, AEs only get a public acknowledgment by having their name mentioned in the metadata of the articles they handle or linking their reviewer account with their ORCID record to confirm they completed a review for the journal (PLOS ONE, 2023d). In other words, if they want to publish in *PLOS ONE*, they must pay APCs or apply for the funding support options offered by PLOS, as any other author. A dental editor from Australia mentioned: “Even

⁴⁹ Some editors mentioned that other OA publishers provide them with different reward options for their editorial work. Some of those practices have been criticized for allegedly being part of opaque business practices (Siles, 2020). For example, a sociology and demography editor based in Bangladesh mentioned Frontiers’ system in which “if the editor crosses the threshold of maybe 120 handled articles in a year, they have a remuneration, an honorarium.” Similarly, a biology editor based in the U.S. also mentioned a journal that waives him the APC of an article after complying with any editorial duties, like guest editorships for special issues. He said the benefits also might involve his collaborators: “I can invite other authors who can also contribute to that special topic. They can also contribute for free so that also encourages other authors to submit their work to that special issue.” This person also mentioned the case of MDPI, a publisher that offers reviewers an APC discount per manuscript reviewed. It should be noted that Frontiers and MDPI, both publishers based in Switzerland, have been involved in various polemics regarding their editorial and business practices. They have been dubbed as “predatory” and “grey publishers” for their “excessively permissive peer review and subordination of academic functions to business interests.” (Siles, 2020) Nevertheless, those terms are blurry nowadays, as the diversification and complexity of the market is making it harder to define what commercial practices can be considered predatory and what others not. Although this is not the focus of my research, it provides some nuances about the challenges for PLOS regarding the implementation of policies that address the editors’ claims.

for me as an editor, I can't remember if I was given a discount or a free publication in *PLOS ONE*. I did ask some time ago, and I did not get anything." The same issue was confirmed by another researcher in the U.S.

The APC Waivers: "A "Fair Amount" Is a Whole Month's Salary to Pay the APC"

PLOS offers authors a list of options to cover the APCs. One is waiving the fees to researchers based in one of the 69 countries classified into two groups (A and B) by the *Research4Life* initiative⁵⁰. This classification uses indicators from the World Bank, such as the Gross National Income (GNI), the Human Development Index (HDI) created by the United Nations, and the Healthy Life Expectancy (HALE) developed by the World Health Organization (WHO).

This APC-waivers policy was another sensitive issue addressed by the AEs, especially those based in LMICs. In particular, editors from Brazil, Nigeria and South Africa pointed out that the parameters used by PLOS for classifying countries to receive the benefits of waivers are arbitrarily set. Moreover, the classification does not reflect the complexity of the uneven distribution of wealth within countries, and thus, it does not address the inequity challenges accurately. The following excerpts encapsulate those concerns:

So, this understanding that Brazil is a rich country... It's an understanding that, OK, it has a big contribution, a big GDP [gross domestic product], right? But that doesn't mean that the disparities in the country don't affect our reality as professors. Let's say that we have to spend two salaries to publish an article: that's our reality. Just to give you an idea, the minimum wage in Brazil is something like \$220. As much as I would like to publish once a year, twice or more, in journals like *PLOS ONE* or Scientific Reports, we can't afford it. So

⁵⁰ Research4Life is a platform that offers institutional access to scholarly information resources thanks to a partnership scheme with international organizations such as the World Health Organization (WHO), the Food and Agriculture Organization (FAO), among others. Institutions are eligible to receive the benefits depending on their location.

even if you reach a high scientific level to publish in those journals, it is unfeasible. *You have to sell your car to publish.*

Many people have the wrong impression of Nigeria. We're a very rich country, but we're also very poor because the wealth is ill-distributed. Only a very small percentage of people have the wealth. I mean, I'm a physician, and I also have a PhD, and for me, it would still be a full month's salary [to pay an APC for *PLOS ONE*]. I mean, even though I get a clinical supplement and I also get a salary as a lecturer, it's just too much. It's much more than I could afford. Now Nigeria has moved to...I think they now classify us as an LMIC, which means we do get a discount, but we still pay a fair amount. And the fair amount, given our exchange rate, is like me putting a whole month's salary to pay for a manuscript to get published.

I, as a South African, publish in a journal, some fancy journal like *PLOS ONE*, and unless you're in a LMIC, generally, you don't get a waiver. The WHO classification of income is all fine and well, but the research funding distribution across the world isn't, irrespective of what the WHO has classified your country as. I don't think that should be the only indicator of whether you get subsidized or whether you get waived for your APC cost. I do think there needs to be more thought around who should be getting waiving or reduction in APC costs beyond the WHO income country classification.

The concern about the difficulties in paying APCs was, to some extent, shared by AEs from high-income countries as well. They provided other interesting nuances about the difficulties of taking economic indicators at a country level as a proxy to waive the publication fees. In particular, they highlighted that institutional funding conditions also matter, and, in fact, they vary significantly within countries. A biology researcher from Canada commented that on one occasion, she had to pay an APC of CAD\$3,000 out of her pocket because she did not have a grant, and the laboratory where she works was running short on research money. Likewise, a researcher based in the U.K. shared that,

I know that the more developing countries have 100% waivers. For Europe, for example, I think the highest waiver you can get is a 30% reduction, possibly. When you're very insistent, maybe 50%. But I think that's an issue, too, because, for example, in England...I mean, you obviously classify as a rich industrial country, but my university isn't. The university simply doesn't have the money for publication fees, and so for quite a long time, you had been excluded from

publishing in open access papers because you couldn't fund it, except you collaborated with others who have some money.

Several narratives reflect the same puzzling question, "*Where am I supposed to get the funds to pay for publishing in OA?*" I noticed interviewees felt very anxious about it, especially since there is growing pressure in many countries for government-funded research to be made available in open access (e.g., Plan S for Europe, the OSTP Public Access Memo and NIH Public Access Policy in the U.S., UKRI open access policy in the U.K., among others). Nonetheless, much debate still surrounds whether publication costs should be included in grant applications or funded separately (De-Castro & Franck, 2019; Zhang et al., 2022).

In this regard, very few editors shared that their institutions are willing to cover the APCs. For example, a Mexican editor affiliated with an elite private university explained:

My university has a department that is dedicated to that. It is not that the funds they give you for a research project include the APCs. Rather, the university pays its researchers—regardless of whether it funds their research or not—if the journal meets some specific requirements: to have an impact factor "X," to be in the classification of journals, Q1 or Q2 [in the Journal Citation Reports of Web of Science].

Similarly, another editor highlighted that private universities are willing to pay APCs, and she linked that with an institutional interest in academic prestige. She pointed out, "There are a few Nigerian institutions that do [pay APCs]. They are usually private institutions, and that's because they really are interested in improving their rankings, and they find the funds to pay for publication for their academic staff."⁵¹ Likewise, a Korean

⁵¹ Although the correlation between the willingness of private institutions to pay for the APCs to increase their ranking positions is out of the scope of my research, this interesting nuance opens a new avenue for analyzing the relationship between university prestige and their investment in research. The study

researcher working in nutrition sciences mentioned that she sees a trend of willingness to pay APCs among her peers, who are motivated by a prestige and competition rationale.

She explained:

A lot of Korean researchers publish in OA journals because they can pay, as their research funding covers the expenses. The fees are still high for Koreans, but I think they are willing to pay. The reason is that they see other colleagues right next to their [office] door, who have published so many papers, and people praise them. So, those who have never published, even though they are full professors, say, “They can publish in international journals! Even though it’s not *JAMA*, or *The New England Journal of Medicine*, but they are praised by others.” Then they think, “Oh, I also want to publish papers in OA journals.”

Nevertheless, the vast majority of my research participants mentioned they struggle to access publication subsidies and, thus, have to look for other options by themselves. For example, a Nigerian scholar remarked that she relies on her collaborators from universities in the Global North who can access funds for APCs. However, this might involve some trade-offs in their careers, as she explained, “Sometimes that means you don’t get to be the first author. Otherwise, we just go for less prestigious journals”.

One last but not least significant issue mentioned by a few AEs regarding the potential exclusion of scholars from the APC-based publishing systems in the medical fields concerns clinical researchers, i.e., physicians who conduct research in hospitals, medical centers, or other settings focused on patient care. As an editor from the U.S. commented, this population does not necessarily receive research training, which can be a significant impediment when they prepare manuscripts for publication.

conducted by Olejniczak & Wilson (2020) on the OA-APC articles authored by researchers in American universities provide some significant clues on this relationship. They found that, indeed, authors affiliated with private institutions are expected and more likely to author articles with APCs than their counterparts in public institutions. (Olejniczak & Wilson, 2020)

Nonetheless, they still submit to OA journals for reasons different from pursuing research career pathways. For example, in a previous section, I cited the case of an AE who led a COVID-19 vaccination campaign in India and was keen to share his report to inform the implementation of policies and actions to mitigate the pandemic in other locations. APCs are entirely out of the radar of those researchers, as a Mexican editor remarked:

Now I am a member of the SNI [the National Research System of Mexico]. I already have a research career, but when I was a researcher at the hospital, I did not even consider paying \$1,000 or \$1,500 for a publication at all. There are many of us physicians, who are or were clinical researchers, and I think, “Besides the fact that I invested a lot of time [writing the manuscript], I stopped working or spending time with my family, you also want me to pay for publishing?”, it sounds very illogical to me because I am not going to gain anything.

In ANT terms, APCs are an obligatory point of passage for researchers who do not have many options if they want to publish in OA journals under this model to advance their careers. However, it might not even be the case for clinical medical researchers as they are less prone to access research funds than their counterparts in research centers or universities, especially in LMICs (Jain et al., 2020; Klebel & Ross-Hellauer, 2023). In other words, the data indicate that clinical practitioners are less likely to be enrolled in *PLOS ONE*'s network.

Trade-Offs, Trust and Betrayals

In its public documents, PLOS states that the APC-related revenues are used to cover the publication expenses including “the cost of peer review management, journal production, and online hosting and archiving” (PLOS, 2023d). The publisher also discloses its financial overview on its website, and the tax-exempt documents that are filed to the IRS (Form 990) are publicly available as well. In those documents, the

publisher discloses some indirect production costs, like the salaries of officers and the highest compensated employees (i.e., the CEO, chief financial officer, marketing officer, etc.) (PLOS, 2021). The 990 forms also list the direct production costs, such as the compensation for the leading independent contractors, which are basically technology companies that provide hosting and editorial services, as I outlined in Chapter 2. In other words, the data indicate that the publisher is committed to ensuring financial transparency and accountability.

Moreover, the EB services team staff member I interviewed explained that an underlying rationale for APCs has to do with the in-house editors' workload. She also pointed out the challenges they still face in this regard:

We want to do lots of checks to make sure that everything is perfect. At the same time, we also want to make sure that publishing is affordable. If we were to implement every single check that we would want to put in beforehand, then publishing would be completely unaffordable for all of the richest institutions in Europe and the States. As a result, *there is a bit of a trade-off between how much we can check before an article is published and how much we need to trust the authors on what they say is true.* PLOS ONE literally publishes tens of thousands of articles a year. You just can't check every single one of them manually without massively increasing the cost because we would probably have to quadruple, at least triple, our editorial team, which would go into APCs, and consequently, people from poorer regions would no longer be able to publish.

In other words, from the staff members' standpoint, the APCs help the publisher ensure the quality of the publications. However, this is true to some extent because, as I previously mentioned, they do not provide copyediting services, for instance.

The AEs' generalized disagreement about the APCs suggests that the business model PLOS founders implemented 20 years ago, which was depicted as innovative and fairer than the commercial companies', (Ashburner et al., 2001; Brown et al., 2003) was translated differently by the stakeholders in the research community. For authors, editors

and reviewers worldwide, the implementation of this model has had unfortunate unintended consequences.

My data indicate that while the publisher's ethical commitments to the democratization of knowledge through OA were translated by the AEs in an uncontested manner to some extent, as I show in the next section, the practice of charging APCs very soon met with their resistance. Yet the publisher continued its implementation, which had significant unintended effects in terms of trust, as my data denote.

This issue is not being disregarded by PLOS staff members and leaders. In fact, their most recent statements about moving away from APCs reveal they are making efforts to remedy what once seemed to them to reverse the abusive practices of the subscription model⁵². To close this section, and in keeping with ANT's principle of generalized symmetry, it is worth mentioning a narrative shared by a former member of the BOD at PLOS. Her account shows how this problem has also been a problematic crossroads to address inside the publishing house. She shared:

I think PLOS has wanted for a very long time to innovate in the OA arena. I'm not a biomedical scientist, and I don't necessarily have these massive grants that I can write APCs into all the time. Also, being an early career person, I was very conscious of the equity issues as it relates to APCs and who can and can't pay for them. From my own standpoint, the APCs, especially its cooption by for-profit publishers, is just a total mess. Many times, on the PLOS board, we talked about how imitation is the nicest form of flattery, right? So, I guess PLOS had a good idea because lots of people adopted it, but now I think PLOS is actively trying to get out of it because maybe there is a role for APCs for some people and some disciplines but for a lot of science, it's not. Actually, even probably since the beginning, if I could channel the founders in my head, I think they would say

⁵² Throughout my document data collection and analysis, I tracked PLOS leaders' stances facing the criticisms against the APC model. Recently, the CEO has declared at the United Nations Open Science Conference (July 2023) that the publisher is moving towards new funding models to eliminate APCs. In addition to the institutional partnerships already in place, they launched the *Global Equity* and the *Flat Fees* models. Brief, these models are based in annual payments by institutions which are calculated based on their location and research output.

APCs are a disaster, and they never intended for them to become the dominant business model or be adopted by traditional publishers to make more profit. It can't be a viable business model, and it's also not viable for issues around equity and diversity.

In short, this finding shows that APCs act as an obligatory point of passage for authors but also act as mediators in the network since they carry different meanings in the translations of what it is to publish in *PLOS ONE*. For staff editors, they represent the means to support their job to ensure quality in the journal's output. For most of the AEs I interviewed, APCs are a form of labor exploitation. For some scientists, they mean prestige and recognition. For others, APCs are the main obstacle that prevents them from joining the network. For the leaders of PLOS, they represent a mistake despite having initially promoted and depicted them as a solution to the "high subscription fees" (Varmus, 2009, p. 125) charged by commercial publishers. In other words, the APCs have subverted the assemblage in different ways, which has affected its stability, especially regarding trust between the actors. In ANT terms, these nonhuman actors could be triggering various betrayals between actors, as the calls to stop reviewing for *PLOS ONE* and other journals that charge APCs cited by my interviewees or the lack of response from reviewers suggest.

Finding 3. Translating an Open Access Mega Journal: Contradictions and Unexpected Effects for the Publishing Landscape

PLOS ONE Translates AEs by Assigning Them Epistemic and Moral Attributes

During my data collection process, I checked PLOS and *PLOS ONE* websites' versions since 2007⁵³. I realized that how an AE is defined was translated differently across the years. From an ANT standpoint, the definition of who an AE is and what they can or cannot do are relational and have changed over time according to different factors. For instance, the journal started to recruit more AEs from LIMCs in 2013 when the journal published +30,000 papers, and the growth of submissions from authors scattered worldwide increased (*PLOS ONE*, 2013). Likewise, the misconduct case of 2022 I mentioned before, which involved a large number of AEs, made the journal reinforce its conflict-of-interest policies (Kincaid, 2022). Currently, *PLOS ONE* defines the composition of its EB website as follows:

The *PLOS ONE* Editorial Board is powered by thousands of academic experts from all over the world. Our board comprises working scientists who are established principal investigators/group leaders with extensive publication records (PLOS, 2023c).

To investigate how *PLOS ONE* enacts the diversity of the EB's members, I interviewed a staff member of the EB services team. She explained the recruiting procedures for AEs and pointed out that the journal invites researchers using a *diversity-minded recruitment framework*. The goal is to have an EB that represents the subject and geographic coverage of *PLOS ONE* and ultimately triple down to sourcing a diverse peer reviewer pool, too, as the AEs are the main ones responsible for securing reviewers.

⁵³ I did this using *The Wayback Machine*, which is a tool of the Internet Archive, an organization that provides access to archived versions of websites (See <https://archive.org/web/>)

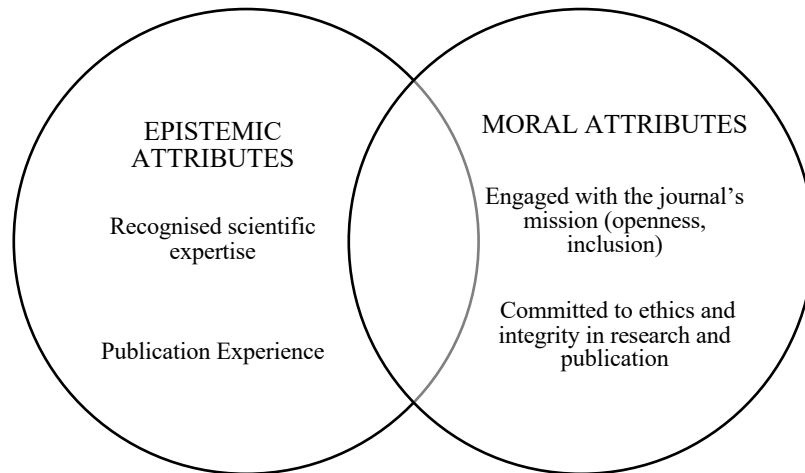
The staff member also pointed out that, in accordance with its DEI goals, PLOS has an interest in including editors from underrepresented populations in science (PLOS, 2023b). Nonetheless, there is a legal burden to recruit editors on this basis, especially when it comes to collecting demographic information. She mentioned that PLOS' legal department warned her that there are countries where some questions cannot be asked, like those related to gender or ethnic diversity. Thus, the staff is still in the process of designing an appropriate strategy to achieve that goal.

Regarding the recruitment procedures for AEs, the staff member explained that they use several methods. One of the most effective ones is to invite researchers who have been already enrolled as authors, reviewers, or guest editors, as “they are already familiar with the mission and the ethos of the organization, so it’s just an easier bridge to cross.” In ANT words, it means translating an already enrolled actor by assigning a new role, which potentially ensures the stability and durability of the network (Callon, 1984). The EB services team also identifies and invites researchers to apply or join the board directly. In both cases, the team vet the potential candidates based on their academic profile. Another “colder” recruitment method, as the interviewee called it, is the application form on the website. Finally, as some AEs mentioned, the journal might invite them at conferences or through snow bowling invitations.

As I outlined in Chapter 3, from an ANT standpoint, during translations, a focal actor defines the attributes of the actors to assign them their roles in the network. By triangulating interview and document data, I identified two types of attributes that *PLOS ONE* assigns to AEs for translating them: epistemic and moral attributes, which I summarize in Figure 12.

Figure 12.

Academic Editors Attributes Translated by PLOS ONE



The epistemic attributes include 1) the editor's level of expertise in their research area and 2) their familiarity with the science publishing systems. Although the journal requires AEs to provide a CV, the epistemic attributes are vetted primarily through the editor's publication record. For *PLOS ONE*, AE's publication record signals the recognition of the AE's expertise by the scientific community at local and international levels, as well as their understanding of the publishing workflow, especially the peer review process. This allows the journal to predict that AEs will expand the network by finding and persuading other scientists to act as reviewers.

The second group of attributes of AEs concerns a moral dimension. I identified two types; one is the commitment of AEs to handle the peer review process by adhering to ethical standards in publication, which implies that AEs will avoid misconduct. The other moral attribute is related to the embedded values in the journal's mission: commitment to OA and inclusion in research. This attribute might be identified as "being

an idealist⁵⁴ scientist.” I borrowed the term from the first PLOS lead editor, Vivian Siegler. When she left *Cell* to join *PLOS ONE*, she commented:

What self-respecting *idealistic* editor wouldn't jump at the chance to be a part of this? The goal of Public Library of Science to make the world's scientific and medical literature a public resource is both worthy and ambitious. Eliminating barriers to the access and use of scientific information *is the right thing to do* and will greatly benefit both the scientific and lay communities. (PLOS, 2003b [emphasis added]).

In this last section of the chapter, I present how the AEs depict themselves in relation to these attributes and their role in the journal. To put it another way, I describe some ways AEs translate *PLOS ONE*. I anticipate that some narratives demonstrate what Star (1991) pointed out when criticizing ANT tenets: networks are stable, but only for some actors.

Building a Publishing Record among AEs in LMICs

My interview script included some questions about AEs' academic background. These opening questions allowed me to create rapport and make room for AEs to talk about themselves. Interestingly, some editors—notably the majority of whom are based in HICs—took a relatively short time to answer those questions. With a few exceptions, they barely mentioned any information about their personal and academic background. They talked about it following a linear structure like this: I got my PhD→I did a postdoc→I got a position at the university.

⁵⁴ I am not using this term referring to the philosophical movement from the 18th century (and derived theoretical approaches), which posited that “the reason” or “the mind” was the fundamental basis of reality (Guyer & Horstmann, 2023). Instead, I am using the term “idealist” in a descriptive and colloquial sense because 1) it was used by an actor to talk about her motivations to join an initiative openly opposed to the corporation-driven model, which aligns with ANT principle of letting the actors deploy their own world (Latour, 2005) and 2) it captures the interests expressed by other editors as well. At the same time, it is a reference point to identify how some others move away from that perspective.

Contrastingly, scholars from LMICs were eager to share their accounts and how their careers evolved. Overall, academic mobility was a common theme across the interviews with AEs based in LMICs. They provided rich data about their experiences navigating international research and publication settings, which eventually led them to join *PLOS ONE* and other journals.

However, not all the AEs were motivated to increase the internationalization of their careers in the first place. For instance, a professor from Nigeria whose research focuses on women's health shared how she "was chosen" by the field rather than having a career plan in advance. She explained,

It really wasn't me choosing the areas. It was the areas choosing me. So, for my very first research on professional support for breastfeeding, I started my master's program with a six-week-old baby. My son was six weeks old. So basically, we went through the program together, so that informed my interest in professional support for breastfeeding because I didn't feel like I got any, and I had to figure things out on my own.

She got a PhD at a prestigious university in the U.S. and became a leading researcher in Nigeria. Currently, she leads a research team in Lagos. She publishes sometimes with different international collaborators, some of whom pay for the APCs as they are more likely to access grants than her. She joined *PLOS ONE* with an interest in supporting the inclusion of reproductive health within the journal's broad scope, as she perceived these topics are not well covered in mega-journals. A similar concern was shared by other scholars working on subjects that occupy relatively peripheral spaces in medical journals, such as public dental health.

Other AEs emphasized that academic mobility was crucial for publishing in international journals. A chemistry researcher from Nepal told me that his academic trajectory started in India, where he got his PhD degree. Lately, he went to Poland for a

short-term exchange thanks to an Erasmus Mundus scholarship, where he started focusing on nanotechnology and nanomaterials and collaborating with other researchers from Europe. Some years later, he got a Fulbright scholarship, an opportunity that changed his career's path, as he explained:

I spent 50 days in the U.S.A. I had an interesting time with my friend, professor [name], and thought to apply for a scholarship to the U.S., and he said: You need to learn computer simulation. For that, I needed to go somewhere else. Fortunately, I got a chance to get an invitation from Mexico City. From my country to go to Mexico City! It is very far, and I needed to be sure to get the visa. For that, I needed to go to India, which was too much hard for me, too much difficult for me. And I saw the website. If someone has a U.S. visa, no need to get the visa once again for Mexico, and I went.

The AE commented on how navigating those different academic worlds led him to publish his work in “high-profile publications,” as he mentioned. During his journey in the U.S., he heard about *PLOS ONE*, applied to join the EB because he considered its Journal Impact Factor was good, and got accepted.

Interestingly, at the end of the interview, he took some time to tell me about the Nepali journal he leads as a chief editor. He even asked me questions about how to index the journal in Scopus, as he knew about my background in indexing services by visiting my online profile. My point is that being an actor-network himself, he was seeking to translate others to advance the local journal he leads. Other participants shared the same interests. Further, I elaborate more on this point.

Likewise, another AE, a young scholar (31) from Brazil, also took some time to tell me about his academic mobility journey; in this case, within the country. He started his career in odontology at a federal university in a southeast state of Brazil, Espírito Santo. Then he moved to the state of São Paulo, where he did a master's and got his doctorate. He specialized in public health at a university in Piracicaba—also in São Paulo—

and then got a position as a professor at a state university in Ponta Grossa, a city in the southern state of Paraná. As this position was temporary, the AE applied for a full tenure-track position in the state of Bahia, in northeast Brazil, where he currently works.

This dynamic journey allowed the participant to get an insightful perspective of the Brazilian health system; but most importantly, he highlighted that this academic mobility experience was key to engaging in the international publishing market. He explained: “Sometimes, only the students who have money can publish, right? As I said, I went to study in São Paulo because that’s where the money is, you know? So that’s when I managed to publish in *PLOS ONE*, and that’s how they invited me. Today, as a researcher in the Northeast, I can’t submit to it anymore because I don’t have any money.”

The last example I include here concerns the epistemic attributes of another type of AE profile—those scholars who are not full-time university professors and perhaps whose publication record is less prominent than their counterparts, yet they are experienced practitioners. This is the case of a community medicine specialist affiliated with a health department in India.

His journey as a physician includes serving in hospitals and tribal district health centers in north India. In 2019, he joined as the chief medical officer of the health department in the state of Himachal Pradesh, which has one of the country’s largest public delivery health systems. When the COVID-19 pandemic hit, he was assigned to run and manage a vaccination center.

He mentioned that back in 2018, after finishing graduate school, some publishers approached him and offered to publish his manuscripts. Unfortunately, he did not realize

these publishers were unreliable and admitted, “Some of my publications are in predatory journals, which is an issue in India.”⁵⁵ The participant told me that he was more careful afterward, and published some opinion and comment pieces in journals indexed in PubMed. He continued, “And straight away, I’m landing in the editorial board position of *PLOS ONE*! It was very unexpected because even my mentors and faculty members have not held that position. So, it was an elation for me. It was just like a blessing.”

Although this AE originally applied to join *PLOS Global Public Health*, a newer mega journal, an editor from PLOS emailed him to explain that they could not include him but would accept his application for *PLOS ONE*. The participant mentioned that in the email, the PLOS editor said, “This editorial board position is offered to those people who have some research projects behind them or a few publications, but we are offering the position because of your experience of more than 15 years in the field.”

The participant saw this position as an opportunity to resume his career in publication. He shared that after his experience managing the pandemic in Himachal Pradesh, he wrote a paper presenting the case of how a public health system handled the emergency. He got a first rejection from a journal and thought:

When I got an opportunity to be an academic editor for *PLOS ONE*, I thought that I should send my article to this journal. *PLOS ONE* is not looking for novelty. They focus on that the scientific processes and methods followed are sound. I thought that in my manuscript...I wanted to tell the world about how in Himachal Pradesh, India, we handled the situation successfully, as 5.5 million people got their eligible vaccine at the fastest pace in the country. But then came the hindrance of publication charges. This is what I’m trying to say. I was ready to take this manuscript to a global platform. But the accessibility and affordability

⁵⁵ Indeed, healthcare researchers from the country are prone to fall into the trap mainly because of the pressure to publish for promotion purposes and lack of research support, which may prevent them from identifying the pseudo-benefits offered by those journals (Kashyap et al., 2023).

draw me back. I had to offer it to a local journal which is not so quick in delivering the publications, and there is a huge load.

As I showed before, several AEs had the same complaint about how APCs hinder their publishing opportunities. In spite of that, they keep volunteering for *PLOS ONE* or other similar journals, which suggests there are often oscillations and contradictions in actors' motivations and interests to translate and be translated by others (Hunter & Swan, 2007; Latour, 2005).

In fact, a common interest emerged among some editors from LMICs regarding the trade-offs for their editorial labor: volunteering for a journal that might prevent them from publishing their work serves to acquire the skills and knowledge to run or support journals in their countries. The following interview excerpts capture these views:

As a Brazilian researcher, I want Brazilian journals to grow as well. So, I have this “maturity bias” of being in a great journal so that later, locally, we can advance our journals, which here have a much cheaper cost and are much more associated with institutions rather than a publisher. Thus, the volunteering work (of editors and reviewers) is even more necessary for their operation since the subscription or APC-based models receive the money that might cover the entire Brazilian publishing system.

[When I joined the board] I wanted to know how the international publishing system works because I also had to work on the Korean journal system, which is kind of behind the international journal system; but we really try to improve it too.

PLOS ONE is just a journal. It has no inherent value to me, you know what I mean? The [African journal's name] I grew up with it, I nurtured the journal. It is now the leading journal in Africa that I was part of as an editor, not leading, but part of the group. I have an organizational obligation and bind; I have no bind in PLOS. I see them as a means to an end because I want to keep supporting African journals.

In sum, for scientists to build a publishing record that is considered acceptable by international journals such as *PLOS ONE* in terms of editorial capabilities involves more than having published in (English-language) journals. As actor-networks themselves, it

actually involves enrolling many different actors such as visas, travel, fellowships, and other scientists. For those living in LMICs, this does not guarantee publication success, though. However, when they do manage to enroll in the international publication system, their interests might go beyond career advancement and volunteer service. My data suggest that their interest in absorbing knowledge in the publishing field may be more of a priority, thus translating *PLOS ONE* as a source of training from which their local communities will benefit. In other words, they set themselves up as OPP for *PLOS ONE* in order to provide stability to their own network.

Is publishing Open Access Mega Journals “for the good of science”?

Since PLOS is a nonprofit organization, its operations are guided by a mission, which is, as stated on the website, “empowering researchers to accelerate progress in science and medicine by leading a transformation in research communication” (PLOS, 2023e). Likewise, in Form 990, PLOS claims that one of its primary goals is to “work alongside research communities to break down barriers in making research communication more open, effective, and fair” and to make the journals “reflect the research interests and values” of those research communities they work with (PLOS, 2021).

In the study context chapter, I discussed how PLOS marketed its OA publishing model as *the* alternative to the subscription model of the for-profit companies, which were depicted as “parasitical on the work of academics” (Bacevic & Muellerleile, 2018, p. 8). The parasite argument posits that these companies take advantage of the academics’ research outputs (i.e., the manuscripts), which were usually funded by their institutions. At the same time, the publishers benefit from the academics’ free labor to edit and review

the content that is sold through library subscriptions. Thus, opening access to scientific literature was the counterargument that PLOS presented to face that double appropriation. If the contents are freely available, then society at large would benefit from all that work, not just those individuals or institutions who can pay for subscriptions (Brown et al., 2003; Varmus, 2009). Borrowing Siegler's words, this model was portrayed as *the right thing to do*.

Furthermore, the mega journal *PLOS ONE* appeals to this moral motto to recruit volunteer editors and reviewers: “Academic Editors uphold journal policies and ethics standards and work to promote the *PLOS ONE* mission to provide free public access to scientific research” (PLOS, 2023c). Most interviewees mentioned that the OA mission was the primary motivation for joining *PLOS ONE*'s EB, as they also have experienced the burdens of lacking access to information resources. In other words, the translation between the publisher and the AEs regarding OA has been successful. For example, an AE commented how even in HICs like Australia, researchers and practitioners struggle to access journals via their universities or hospitals, and, thus, she was happy to join an OA organization.

Other AEs appealed to the liberal-democratic argument of OA, which “posits that knowledge should be accessible to the public because it is funded through taxes.” (Bacevic & Muellerleile, 2018, p.9) underlying PLOS' and other similar organizations' missions. She shared:

I mean, PLOS is the Public Library of Science. So it is for the public, and as most of our research is funded by the public or with money from the government, with taxes, I think they have a right to read about it. So yeah, I think it's a great concept, and they changed a lot.

Following the liberal-democratic argument, other AEs highlighted the benefits of the PLOS OA model for the broader publishing landscape. They emphasized that other publishers and journals followed PLOS and OA became the by-default way of disseminating knowledge. The following excerpt from an interview with an AE based in Spain underscores this point:

I think PLOS had a huge effect on the landscape. When you look at how many online OA journals exist now and how many of the traditional ones have OA options, then you see the extent of the pressure they put on others. Some years ago, everybody went to *PLOS ONE*, particularly when you had grants that required publishing in OA. You were basically forced for quite a while to go to PLOS because nobody else would do this. Nowadays, I don't know the case in the U.S., but within the European case, if you have any European funding—and that's most of the funding for research—you need to go for OA journals. So, open access was a kind of natural home for my skills as both editor and reviewer, and I was happy to join.

This optimistic standpoint was also shared by editors in the Global South. Some of them highlighted the influence of PLOS on opening other outcomes and practices of research beyond publications, clustered under the umbrella of Open Science (OS). These practices include open data (sharing datasets supporting a research project), open peer review (authors and reviewers' identities, and/or review reports may be available), preprint publication (posting the author's version of a manuscript before peer review), among others. Indeed, PLOS has led the implementation of those practices worldwide, arguing that the more outcomes are publicly open, the more transparency in research is reached to fight issues like the reproducibility crisis⁵⁶ (PLOS, 2023f).

⁵⁶ The reproducibility crisis refers to the failures in replicating experiments and their results under the same conditions as reported by researchers in publications due to the lack of available data to support their claims (Leonelli, 2023). This issue is common in biology and medical sciences but to some extent in other science fields like physics and chemistry too. The issue has been largely reported as one of the major problems regarding the credibility and reliability of science, and it is claimed to be the main motivation for implementing open data (OD) policies (Higman & Pinfield, 2015). Although there is a relative consensus about the need for OD initiatives, framed by the OS rationale, a more critical stance argues that the

Two AEs from Brazil underlined the leadership of *PLOS ONE* in implementing OS as some of their motivations for assisting the journal. The first AE, a sports medicine scholar, shared that his commitment to OS was strengthened when he experienced the benefits of posting a preprint about COVID-19 and social distancing measures in Brazil, a controversial topic in the country during the early stages of the pandemic. He reported having received helpful (and open) comments from his peers. He also acknowledged that the record of that exchange served him as a teaching tool, “I think this can also be used in a class on scientific writing to show students how scientific debate works. It’s also about transparency.” As an AE of *PLOS ONE*, he ended up submitting the manuscript to the journal, acknowledging that it accepts preprints, and he supports the journal for implementing open peer review (OPR), too.

The second Brazilian editor also shared a positive experience with OPR. Before joining the editorial board of *PLOS ONE*, he had served as a reviewer under that model. His name was disclosed alongside the review report. Thanks to that, the author emailed him to thank him for the valuable comments on the manuscript.

Despite the common trend of optimistic views on OA and OS approaches supported by *PLOS ONE*, some contesting narratives also emerged. Several editors were very critical about what they thought might be the unintended consequences of opening up research outcomes, especially since it has become the norm or is enforced by research policies at institutional or national levels, in part thanks to the influence of PLOS and similar stakeholders.

conditions for reproducibility cannot be generalized for all fields. Moreover, if taken as a generalizable epistemic criterion for quality in research, OD and reproducibility mandates might affect some methodological traditions, such as qualitative approaches. See, for example Leonelli (2018).

One of the criticisms came from a researcher affiliated with a private research university in the U.S. She has served *PLOS ONE* for over twelve years, first as an AE and now as a SE, a position that allows her to provide support on challenging cases, especially regarding statistics. She described herself as a “steward and a gatekeeper of science” and pointed out: “That term is usually used in a derogatory way where they say like ‘we only want people from Harvard or we only want white people, or we only want X or Y.’ I only want good science.”

During the interview, she talked extensively about her views on quality assurance processes in research and publishing. She shared her concerns about how many physicians who submit manuscripts to *PLOS ONE* and other journals she serves are low-skilled in conducting scientific research due to their poor training, especially regarding experimental design. Despite her commitment to *PLOS ONE*, she brought up the idea that it is fallacious to depict OA and OS *per se* as characteristics of good science, even when using the democratic argument. This excerpt summarizes her stance:

I think if you explore the democratization construct regarding openness in science, it is super buzzy. It’s a buzzword, it’s an easy solution so people can say, ‘I’m super ethical because everything I do is open. It’s transparent.’ But when they write a paper, it’s not transparent. They don’t disclose that they did 700 t-tests, one of which was significant. That’s the only one they report. What open really means is sharing what you did. If what you did was bad, make sure you share that. If what you did was poorly reviewed, ineffectually reviewed, or not rigorously done, share that. So, I don’t believe that open publishing affects the goodness of science at all. The problem is that mega-journals create pressures that encourage “crappy” science to be done and written about, then submitted to overworked and underappreciated, under-committed reviewers.

She expressed her support for PLOS’ approach to OA and OS regarding the disclosure of negative results and supporting datasets for papers. However, she recognized that the quality of research may be compromised *due to the large scale of*

paper publication in OA mega journals, a concern shared by other AEs as well. For example, an AE from Brazil said it is very common to see “lots of papers that could be summarized in one,” which he said is an advantage for mega-journals as submissions increase. The AE concluded, “This is good for business, but it’s not good for science.”

Other AEs criticized the massive publication of papers in OA mega-journals vis-à-vis the readership. They pointed out that readers, both inside and outside academia, cannot keep up with the vast number of articles permanently circulating on OA platforms. In other words, they questioned the alleged benefits of OA for the public preached by stakeholders like PLOS. The underlying question here is, for whom is it good to publish more research outputs in OA? The following interview excerpts cluster some of the AE’s main concerns in this regard:

It’s just the overwhelming amount that is now being published with this opportunity to OA and make things online. My big concern is who is even reading all of this. Are the right people reading it? I probably don’t read a fraction of what’s published in my small area of public health. So yes, it’s good for researchers to have that opportunity to publish. It’s good for their personal CVs and opportunities for promotion or grants, which I think is a good thing. The potential impact simply because readership might be so limited, I think it’s being diminished.

I once went to a conference, and one of the speakers, a Nobel Prize laureate, said that if you want to keep something secret in molecular biology, publish it because no one will read it. Now you have this *Nature Briefing*⁵⁷ as well, with ten lines about the results, and you don’t even read the paper. So, opening up things and making knowledge available to more and more is a good thing. But if more and more are even to be looking at it, I’m not certain.

In conclusion, these results show that editors successfully translated *PLOS ONE*’s OA mission. Even their “idealism” might have increased at the rate at which PLOS has implemented other OS strategies, which might be a good sign for the durability of the

⁵⁷ *Nature Briefing* is the news section of the journal *Nature*.

network. In short, the editors do believe that OA “is the right thing to do,” despite the contentious positions on the APC model that I developed earlier.

However, the scale of the journal is not always regarded positively by the AEs. Not only because of the workload and lack of compensation issues I addressed in the previous section but also because of concern for readers, who are overwhelmed by the unmanageable amount of information published daily. Although this topic is out of the scope of my research, my results might contribute to the discussion on the possible adverse effects of mega-journal publishing on the economy of attention (Hyland, 2023).

CHAPTER 6

DISCUSSION AND CONCLUSION

This dissertation sought to understand the complexities of assembling the editorial board of the mega-journal *PLOS ONE*. It brought some insights into the heterogeneity of actors that negotiate their interests in reaching a consensus about what science is worth publishing. Some of the fundamental questions ANT scholars posit helped me unravel this tangled story: How does an actor-network render the group durable? What makes it enroll other actors and keep their associations stable? (Callon, 1984; Latour, 1999a; Law, 1990).

Like Eve et al. (2021), my dissertation interrogated the utopianism of *PLOS ONE*. It focused on the humans and nonhumans involved in an OA publication model with diversity and inclusion at the core of its principles. My work provided insights into the goals of PLOS and *PLOS ONE* to distribute decision-making about the validation of scientific knowledge into the hands of scientists worldwide. In this chapter, I present the discussion of my findings and some final remarks.

Discussion

I want to stress that my work does not undermine the current remarkable efforts and the clear commitment of PLOS as an organization to fight the multiple inequities in science and the global publishing landscape. In fact, I acknowledge that it is noticeable that there is a culture of reflexivity within the organization, as all the research participants from PLOS recognized the relevance of discussing the issues brought up by my research on an ongoing basis. In fact, the findings of this dissertation allow me to confirm that this

culture of reflexivity is part of the organization's outstanding characteristics that have guided its innovation developments, which have impacted the OA publishing ecosystem in a very significant way. Hence, I hope my work provides insights that advance the publisher's efforts to transform research communication towards an inclusive publishing model, as outlined in the organization's mission statement.

The first topic I want to discuss here is that in order to maximize the diversity of external contributors (i.e., authors, reviewers, and editors), it is also essential to diversify the leadership of the publisher, whose homogeneity contrasts sharply with the heterogeneity of the editorial board. Second, with regard to support for academic editors, it would be worthwhile to implement mentoring and support strategies for the editorial career development of researchers who voluntarily contribute to the journal's processes. Third, my findings suggest that implementing procedures to group editors by disciplines and subjects, such as reviewing manuscripts that require more thorough revisions, could be convenient to generate greater collaboration. Given the size of the PLOS ONE journal, grouping editors by discipline could also help create a sense of community, as communications are somewhat impersonal and could affect motivations to continue collaborating with the journal.

A significant consideration regarding the implications of my exploratory study is that it is focused on the case of *PLOS ONE*, so it is difficult to generalize or transfer the results to other cases or larger samples of journals. The vast variability of existing scientific publication models also makes transferability difficult. However, the qualitative results of this research could be valuable to inform the implementation of diversity strategies in scientific mega-journals. Specifically, I identified some potential practical

implications that could be informative for journal leaders and publishers, decision-makers in science policy and research evaluation, as well as academic editors and researchers at different stages of their scientific careers who are involved in review processes in scientific journals. In the following, I discuss the possible practical implications of my study in four areas: 1) Recruitment, Training and Support for Academic Editors; 2) Publishing Ethics; 3) Multilingualism in Scholarly Publishing; and 4) Open Access Publishing Models. Finally, I outline some specific recommendations for PLOS ONE that may also be of value to other scientific mega-journals.

Recruitment, Training and Support for Academic Editors

This research provided evidence of the relevance of designing and implementing comprehensive academic editor recruitment processes that consider the makeup of the academic communities targeted by the journals. Hence, various demographic indicators (e.g., gender, age, career level, institutional affiliation) should be taken into account within editor recruitment procedures so that the goals and outcomes of diversity strategies are more effective and eventually monitored on an ongoing basis. It is also recommended that the results of such strategies be publicly displayed to reinforce the transparency of the organization's decisions and strengthen the academic community's trust. For data collection, publishers or journals must use efficient information systems with updated data on the profiles of researchers and clear protocols for the protection and use of the data.

As discussed in Chapter 5, my study also revealed that aligning interests among the actors in scientific publishing endeavors is a multidirectional process of agreements and negotiations. Therefore, publishers and journals should consider the needs and

demands of the invited editors who voluntarily agree to collaborate with the journal. To this end, periodic consultations can be conducted with editors and research management stakeholders (e.g., authorities of research evaluation agencies at the institutional or national level). Academic editors must be clearly informed of volunteer work expectations to prevent high turnover rates.

Regarding in-person recruitment of academic editors, my research showed that the presence of journal representatives at scholarly events is an effective strategy, which also fosters a sense of belonging and can contribute to community building. Thus, journals and publishers should consider diversifying the events they participate in, for example, attending conferences beyond those held at HICs or by the more prominent or recognized scientific associations.

My research suggested that different levels of familiarity with publishing practices due to cultural factors such as language or the career level of researchers are determinants of their performance as volunteer editors. Hence, journals should provide clear resources and recommendations on the expectations of peer review editors' work and notably support those editors who might present more significant challenges as ECRs or practitioners. This could be reinforced with editorial mentoring programs.

My first research finding showed that some biases that may occur in peer review have to do with factors such as the geographic location of the researchers. Therefore, researchers must recognize and mitigate their biases for which journals or publishers should provide practical and concise training, for example, through case study analysis. My dissertation's findings also allow me to suggest to educational institutions that they strengthen the knowledge and skills of future researchers to give feedback rigorously and

ethically. This could be addressed by including workshops or ongoing training programs within doctoral curricula.

One of this research's main results shows researchers' profound nonconformity regarding the conditions of volunteer work that most scholarly journals require. I also showed a widespread sense of frustration with the lack of compensation for editorial work, especially in the context of the increasing commodification of scientific research. Therefore, rewarding these tasks should be strengthened on several fronts. On the side of research evaluation systems and funders, the work of reviewers or editors must be weighted according to the demands of scientific production. In other words, when publication is evaluated as an indicator of productivity, it should be recognized that the review task is a fundamental condition for this, and incentives should be given to researchers to perform it. As for the journals' side, a clear reward should be given to academic editors. Financial compensation is controversial. Therefore, it is necessary to evaluate the results of initiatives that have implemented monetary compensation for editors and reviewers to make more informed decisions on whether to apply this measure or not. In Chapter 5, I also presented how a way of acknowledging and motivating editors that has nothing to do with financial compensation is to add their names to the metadata of the articles they handled. This practice could be implemented by other journals to gradually have robust data on the voluntary tasks of editors and to design rewarding models accordingly.

Publishing Ethics

The findings of this dissertation also revealed the complexity of the implementation of research ethics standards in the international scientific publication

arena. One of the main data in this regard is that some practices that are very common in HICs are unknown or difficult to implement in other countries. For example, the implementation and operation of IRBs in institutions located in HICs, which are dedicated to ensuring that research complies with ethical research regulations and standards, stands out. My data confirm that the limited or non-existent presence of IRBs in LMICs could be a source of exclusion that exacerbates asymmetries in publication at the global level. Addressing this problem is not a simple task and requires the articulation of various stakeholders. Therefore, in the first place, research institutions must prioritize the creation or strengthening of these committees, which could use available information resources and networks such as COPE (Committee on Publication Ethics), specifically regarding scientific publication. Secondly, research funders could commit to disseminating the ethical guidelines among the potential grantees and supporting their implementation, particularly among researchers in regions with greater challenges in this regard. Thirdly, journals and publishers could also reinforce their role as disseminators of ethical guidelines and maintain a clear area and/or procedures for the ethical review of papers. Anti-plagiarism systems and more recent IA developments have proven to be useful tools, but it is necessary to support human work in this area too. Finally, the ethical commitment of authors, editors and reviewers is crucial, so they should keep themselves informed and updated on the regulations in their respective disciplines and fields of research.

Multilingualism in Scholarly Publishing

Another of the main results of my research concerns the linguistic inequalities in science based on English as the *lingua franca* of science. The fact that a language is the

means of communication of the final results of research, such as papers, does not mean that it is the only language in which the knowledge claims of these papers are produced, discussed and agreed upon, much less that it is the language of the readers who can benefit from research outputs (del Rio Riande et al., 2022; Siversten, 2018; Tsoukas, 2008). Hence, publishers should generate and strengthen the conditions for multilingualism in scholarly publishing. Some strategies that could be implemented include providing materials in different languages for authors, editors, and reviewers, including but not limited to submission guidelines and peer review guidelines. The publication of abstracts in other languages should be strengthened. It is also essential to offer copyediting services for authors, especially when payment for publication is involved.

My data also confirmed that the level of proficiency in English is a decisive factor in participating and thriving in making publication decisions as academic editors, which puts researchers from specific regions or countries where the language is not fluent at a disadvantage. Journals should encourage and facilitate empathetic interactions among stakeholders so that everyone becomes familiar with interacting with people with different language skills.

Open Access Publishing Models

This study presents multiple evidence of the numerous negative consequences of the expansion of the APC-based model. In particular, my study showed how this model might be discordant with the amount of voluntary work made by editors and reviewers who perceive the publishers as virtually the only ones who benefit from the income from the APC revenues.

This is currently perhaps the most complex and challenging issue to address in the global scientific publishing arena. Recent data show that the amount of funding paid to publishers via APCs for researchers to publish in open access could jeopardize the sustainability of scientific systems (Butler et al., 2023). Therefore, coordinated stakeholder actions should be taken to seek alternatives to this model that are less exclusionary and fairer. In particular, policymakers and research funders should analyze and deliberate the convenience of channeling resources for publication towards existing non-profit models in which there is no payment for publication or the fees are reasonable in relation to the services offered by publishers.

The recent initiatives on the formation of a global federation for the promotion of Diamond OA journals is a pivotal point to strengthen publication systems managed by academic institutions (SPARC Europe, 2023). However, equitable participation in the discussions and decision-making must be ensured to prevent negative consequences for regions with less scientific development, as has occurred with other global open-access initiatives. In particular, my study can contribute to highlighting that the voluntary work of academic editors cannot be neglected to achieve an open-access ecosystem without publication fees. Otherwise, there is a risk of maintaining a status quo where the production of scientific knowledge is sustained by the growing precariousness of the research profession.

Concluding Remarks

One of the ways the journal *PLOS ONE* seeks to achieve its diversity goals is by offering scientists from around the world a seat on the decision-making board on the

validity of the scientific results it receives through manuscripts. The journal's leadership team assumes that the diversity of the editorial board will cascade into the diversity of reviewers who volunteer to review manuscripts in detail. According to this logic, these two channels of diversity (editors and reviewers) would ultimately make the journal different from its competitors, which may widen the gaps between researchers from HICs and LMICs. Nevertheless, as my first finding showed, the multiple (perhaps unconscious or unintended) biases regarding the quality and value of science produced in LMICs are replicated throughout all phases of the editorial process at *PLOS ONE*. More importantly, biases are reproduced by the organization's leadership teams, which lessens the expected effects of their DEI goals and ultimately reinforces the asymmetries in the production and circulation of knowledge (Canagarajah, 2002; Rodríguez Medina, 2013).

My work also showed that in the current scenario of hyper-productivity and competition in science, framed by scientific reward systems that prioritize the number of publications and the prestige of journals despite their critiques (Archambault & Larivière, 2009; Chapman et al., 2019), it is a significant obstacle for editors even minimally to fulfill their role in the journal. The difficulty of obtaining reviewers is a big obstacle that ends up, in many cases, discouraging editors from continuing to collaborate with the journal. This finding raised some questions about the future of the scientific editor's job. My data showed that the epistemic tasks attributed to this role often fade into the background. Editors spend more time finding and convincing people to review manuscripts than analyzing the science's relevance, methods, findings, etc. In other words, their scientific attributes and capabilities, and, in sum, their epistemic authority, are often secondary.

In this sense, the skills of editors to deal with information systems and scientific databases sometimes become more relevant. This topic also highlighted the role of digital technologies within decision-making processes in science, more specifically, those that allow editors to connect information efficiently, which can even change the course of a journal publication decision. Given the massiveness of the data used by mega journals such as *PLOS ONE* and the concentration of information by a few companies with significant technological and economic power that control a large amount of information on scientific publications (Albornoz et al., 2018; Okune et al., 2019; Posada & Chen, 2018), it is very complex for a journal to decide which instruments to use and even, as in the case of PLOS, to desist from developing its own tools. As a result, the human editorial work for discussion and consensus on the validity of science becomes more difficult.

An important strategy that PLOS and *PLOS ONE* implemented early on to achieve the goal of having an inclusive journal that would publish papers regardless of their novelty was to convince scientists that their OA model would provide the platform for the scientific community to judge that novelty for themselves through post-publication review (Eve et al., 2021; Spezi et al., 2017, 2018; Teixeira da Silva et al., 2019). This, in turn, was depicted as a way to increase the diversity of participants in evaluating science's relevance. Despite the criticism, this argument was convincing at the dawn of open access (Adams, 2007). However, my data revealed that the soundness-only criterion is interpreted in very different ways around the world and does not always result in the intended inclusiveness, especially as the “impact” rationale continues to

predominate in the culture of science evaluation (Archambault & Larivière, 2009; Erfanmanesh & Teixeira da Silva, 2019; Eve et al., 2021; Spezi et al., 2018).

Another of my main findings concerns the interpretation that human actors have of OA, especially regarding the APC model. The founders of PLOS proposed a funding model that they presented as viable, fair, and innovative (Brown et al., 2003). Despite criticism of this model as potentially excluding researchers with little available funding, it was adopted by thousands of journals around the world (Alencar & Barbosa, 2021; Klebel & Ross-Hellauer, 2023; Rouhi et al., 2022). Even today, many people, governments, policies, etc., consider OA and the payment of publication fees as inseparable (Cardoso et al., 2019; Hart, 2016). My findings confirmed the concerns expressed by thousands of scientists and organizations around the world about the unsustainability of this model (Klebel & Ross-Hellauer, 2023; Rouhi et al., 2022) and even the democratization myth that OA based in APCs represents (Knöchelmann, 2021). The original contribution of my study has to do with the level of contribution in terms of editorial labor that researchers are willing to provide to sustain this model.

I intended to open the black box of editorial work to show the minutiae of volunteers' tasks for *PLOS ONE* and other journals where they serve as editors. Although I do not address the costs of this work, as it is beyond my scope, my results can be informative in calculating them. Moreover, they may be meaningful for making decisions about the value of editorial work in scientific reward systems, which are often scanty in assessing whether a researcher is a reviewer, editor, or lead editor.

I firmly believe that it is essential that editorial work be valued fairly because it seems that when researchers are asked to publish, reward systems assume that the work is

provided by external agents when, in fact, it is the researchers themselves who do the job. I think the “service” rates requested by some hiring and promotion systems do not necessarily reflect the amount of work that researchers perform in journals. However, I recognize that this requires further investigation.

On the other hand, my findings also showed that, however annoyed and dissatisfied researchers may be about this OA business model, they continue to enroll in journals that will provide them with concrete benefits in their career progression. These benefits may not be monetary, which is another vein of analysis of the problem, but concretely have to do with recognition and prestige (Blackmore & Kandiko, 2011; Merton, 1968). Moreover, one of my unexpected results is that none of my participants admitted to taking concrete actions to alleviate the problem. Many of them even admitted that they “don’t have time to make this their cause of struggle.” They seem to be observers (not participants) of what is being discussed in some forums or e-mail discussion lists. Their personal interests seemed more critical even though they disagreed with the APC model. This result can be compared with the literature about the managerial university, which highlights that the competition rationale and significant time burdens might prevent scholars from taking action to reduce the effects of pressures for productivity and the “publish or perish” mandate (Anderson, 2006, 2008; Fischman et al., 2022).

Another important implication of my work has to do with the work of specialized editors who are hired by publishers to manage the editorial process. Those scholars embrace the concerns and worries of many scientists who cannot find a place in the competitive academic job market that is driven by cumulative advantage (Headworth &

Freese, 2016). Despite these “reformed academics” finding a more welcoming and motivating environment at PLOS, the steady increase in submissions and the difficulties of editorial review associated with the enormous geographic and disciplinary coverage of *PLOS ONE* make gatekeeping increasingly difficult. In fact, during my data collection work, the news of the unionization of PLOS workers came out. This fact adds to the wave of protests by several unions in the United States demanding fair working conditions in the face of threats of unemployment posed by the increasing use of artificial intelligence in the workplace. Therefore, my research can also warn about the effects of this threat on the scientific publishing industry.

My research suggested that geographic location as a proxy for diversity has limitations. Although increasing geographic diversity on editorial boards is a relevant and, in many ways, beneficial practice for science, it does not by itself challenge the status quo of asymmetries in decision-making in scientific publishing globally. Even as my findings suggest, greater participation of researchers from diverse countries as a successful indicator of diversity may neglect other less evident asymmetries. For example, those related to inequities in the distribution of research resources within countries. Ignoring these nuances may widen the gaps between institutions in the same country. Another example is that considering the country as a proxy for diversity could overlook the conditions related to English language proficiency for publication and even reinforce the hegemony of this language, which has been widely discussed in the literature.

I have incorporated some research in my literature review for this paper, which shows positive correlations between the diversification of editorial boards and journal

authors and reviewers. Many of these papers incorporate principles derived from social network theory (e.g., Metz & Harzing, 2012). According to this scholarship, phenomena such as homophily suggest that journals continue to implement diversity strategies because researchers tend to network with other researchers in the same country due to, among other factors, proximity and local collaboration. Therefore, according to this reasoning, it increases the likelihood that they will invite more people from the same country as reviewers, for example. That is indeed one of the rationales that have led *PLOS ONE* and other journals to implement geographic diversification strategies. According to my data, this journal may also be assuming that researchers located in a certain country know their context more deeply and can, therefore, provide more appropriate insights for the manuscripts they evaluate.

However, my research also encourages the acknowledgment that editorial boards also involve other non-human actors who play a role in the decisions and courses of action taken by editorial board members. Actor-network theory allowed me to show some nuances in this regard that could inform analyses beyond the category of country or region as a proxy for diversity. For example, the technologies researchers use to collect and analyze data could influence methodological diversity or analytical and theoretical approaches that indicators of geographic diversity do not necessarily ensure. In this regard, I agree with the approaches that highlight the need to look at the challenges of equitable participation in scientific publications from an intersectional framework, as shown by some trends in the most recent research (e.g., Kiesewetter, 2020; Kozłowski et al., 2022; Sabik et al., 2021). From my perspective, the journal subject, gender, and the institution of affiliation are fundamental indicators to have a more comprehensive vision

and thus evaluate the convenience of diversifying the editorial boards and implementing strategies accordingly.

My study provided some insights for studying editorial work in scientific journals. I hope that my dissertation contributes to analyzing asymmetries and possible adverse effects of the “publish or perish” rationale from the editors’ point of view. Also, because my work interrogates the supposed benefits of large-scale publishing in terms of inclusiveness, I hope that what I have presented here will inform on the possible ambivalences and precariousness that diversity strategies in science can bring globally.

In conclusion, the indisputable influence of PLOS in the global scientific publishing ecosystem demonstrates its ability to enroll heterogeneous actors and stabilize a broad network that has endured over time, expanding its possibilities for implementing open science initiatives. The lessons learned about the effectiveness of some features of its model and the failure of others also represent an important input for the design of scientific and publishing policies consistent with the global challenges facing humanity. Ultimately, this is how science operates, through successes and failures, and PLOS has provided invaluable insights to continue pursuing fair and responsive scholarly publishing models.

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APPENDIX A

INSTITUTIONAL REVIEW BOARD EXEMPTION



EXEMPTION GRANTED

Gustavo Fischman
MLFTC: Educational Leadership and Innovation, Division of
480/965-5225
fischman@asu.edu

Dear [Gustavo Fischman](#):

On 11/9/2022 the ASU IRB reviewed the following protocol:

Type of Review:	Initial Study
Title:	Epistemic Diversity and Journal Editorial Boards: A Case Study of an Open Access Mega Journal
Investigator:	Gustavo Fischman
IRB ID:	STUDY00016869
Funding:	None
Grant Title:	None
Grant ID:	None
Documents Reviewed:	<ul style="list-style-type: none">• Consent_Form_IvonneLujano.pdf, Category: Consent Form;• Interview Protocol (Academic Editors), Category: Measures (Survey questions/Interview questions /interview guides/focus group questions);• Interview Protocol (Staff Members), Category: Measures (Survey questions/Interview questions /interview guides/focus group questions);• IRB Diversity in Editorial Boards_ILV.docx, Category: IRB Protocol;• Recruitment_Material_IvonneLujano.pdf, Category: Recruitment Materials;

The IRB determined that the protocol is considered exempt pursuant to Federal Regulations 45CFR46 (2)(ii) Tests, surveys, interviews, or observation (low risk) on 11/9/2022.

APPENDIX B
INTERVIEW PROTOCOL

CHECKLIST

- Enter participant information where appropriate
- Check backup recorder
- Check zoom settings to allow voice recording and transcription to cloud
- Double-check that you set the transcription to CLOUD
- Open zoom meeting 5 minutes before scheduled interview
- Check camera, background and lighting
- Have pen ready to take notes or mark questions
- Make sure to have water or anything you may need during the interview

[When the participant enters the Zoom room, greet the person, and follow the script]

Hello _____. My name is Ivonne Lujano. I am a doctoral student at Arizona State University. Thank you for agreeing to participate in this interview.

As I mentioned in my previous communications, this interview makes part of my dissertation project, which focuses on open-access mega-journals. Questions will cover your editorial experience at *PLOS ONE*.

The interview will take about 60-90 minutes and will be recorded. Your participation is voluntary; you can skip any questions you do not want to answer or stop the interview at any time. Do you have any questions?

[Answer any questions the participant may have]

I will now turn on the recorder.

Press Record Button

Turn On Backup Recorder

Today is _____ (date) and it is _____ (time).

This interview is with participant _____ (enter participant's Study ID #)

Before we get started, can you please answer the following questions?

- Do you voluntarily agree to participate in this interview?
- Do you consent to have the interview recorded?
- What's your age?

Thank you.

Section I. Research and Editorial Background

1. Can you please introduce yourself?
 - a. Can you talk about your research background?
 - b. Can you talk about your current job?
 - i. How is a 'normal day' in your job place?
 - ii. Can you describe the setting(s) where you perform your job?
 - iii. What tools and materials do you use to perform your job on a daily basis?
2. Can you please talk about your editorial experience?
 - a. When and how did you start serving as an academic editor?
 - i. Why did you choose to be an academic editor?
 - b. Besides *PLOS ONE*, have you served other journals in the past?
 - i. What is similar? What is different?

Section II. Editorship Appointment

3. What made you interested in joining *PLOS ONE*'s editorial board?
 - a. How relevant is the journal in your field?
4. Did you apply to join the editorial board?
 - a. If so, how was the application process for you? Was it difficult or easy? Why?
5. If you had a different recruiting experience, can you describe how you joined the journal's editorial board?
 - a. What were your expectations when you joined the editorial board?
6. What is the impact of the appointment on your career?
 - a. Can you provide an example?
7. Do you have any expectations of promotion in the journal?
 - a. If so, can you explain this further?

Section III. The Editorial Role at *PLOS ONE*

8. What is your role in the journal?
 - a. Please describe, as thoroughly as possible, everything that you do to handle a submission for the journal.
 - b. What tools and materials do you use to perform the job?
 - i. Can you provide an example?
9. How did you learn about your responsibilities in the mega-journal?
 - a. What support, if any, have you received from the publisher to perform your responsibilities? E.g., online/in-person meetings, mentoring, etc.
10. How do you make decisions on the acceptance of a submission?
 - a. What tools and materials help you make a decision?
11. How is the "scientific soundness-only" criterion relevant to you?
 - a. Have you had to explain this criterion to the reviewers?
12. How do you deal with controversies, if any, when you oversee the peer-review process?
 - a. For example, have you experienced any disagreement with an author or reviewer? If so, what did you do?

- b. For instance, have you struggled with including/excluding any particular topic, methodological or theoretical approach?
 - c. How do you ensure consistency across the editorial and review process?
 - i. Can you explain this further?
13. How do you address your own biases in the editorial process?
- a. Can you provide an example?
14. Have you found any difficulties in complying with the journal's expectations?
- a. If so, can you explain this further?
15. If you have served other journals, what are the major differences with *PLOS ONE*, in your opinion?

Section IV. Diversity Policy at *PLOS ONE*

16. Are you aware of the journal's diversity policy? If so, what do you think about it?
- a. Do you agree or disagree with the policy? Why?
17. Do you think having a policy on diversity in academic journals is important?
- a. Why? Why not?
 - b. What tools and materials do you think help to foster diversity in journals?
18. Do you think you have contributed to pursuing the journal's diversity goals?
- a. If so, can you explain further?

Section V. Wrap-Up Questions

19. Do you feel mega-journals are changing the dynamics between authors, readers and publishers?
- a. In your view, what are the major challenges mega-journals face now and in the near future?
20. What do you like most about working for *PLOS ONE*?
21. If you had the chance to improve anything at *PLOS ONE*, what would it be?
22. Is there anything else you want to share that I did not ask?
23. Could you recommend academic editors that I might interview?

Closing the interview

That's all the questions I have.

STOP RECORDING

Thank you very much for your time and willingness to share your experiences in the journal.

Finally, I would appreciate it if you could refer me to other editorial board members or key staff.

[Wait for his/her response]

Thank you again for your time. Please feel free to contact me if you have any questions about the study.

Have a great day!

APPENDIX C

INTERVIEW INVITATION FOR ACADEMIC EDITORS

Subject: Invitation ASU Research Study

Dear [Potential participant],

I am a graduate student under the direction of Professor Dr. Gustavo Fischman at the Mary Lou Fulton Teachers College at Arizona State University. I am conducting a research study to investigate how the academic editors and leaders of *PLOS ONE* foster diversity regarding the composition of its extensive international editorial board.

I am inviting your participation, which will involve an interview that will take between 60 to 90 minutes. The interview questions focus on your experiences as an academic editor/staff editor of the journal *PLOS ONE*.

The interview will be conducted online through Zoom (or by phone if internet is not available) at a date and time of your choice. Your responses will be confidential. Depending on your willingness and availability I might invite you to participate in a follow-up interview.

Your participation in this study is voluntary. If you have any questions concerning the research study, please email me at ilujanov@asu.edu.

APPENDIX D
POSITIONALITY STATEMENT

POSITIONALITY STATEMENT

I have decided to study diversity in scholarly journals because I strongly believe science should be a social activity framed by equality and social justice values. My interest also comes from two primary sources: my experience as a publication specialist and my role as a (former) student editor at Arizona State University.

First, I have over ten years of experience in scholarly journal assessment. I have worked for some international initiatives that promote open-access publications. One of the most relevant professional opportunities I have had in this regard is working as an ambassador of the Directory of Open Access Journals (DOAJ) in Latin America. DOAJ is an influential organization that has established international standards for scholarly publications in a digital environment. In 2016, the Directory received a grant from the International Development Research Centre (IDRC) in Canada to promote best practices in scholarly journals in countries from the Global South. This program's inclusive approach motivated me to strengthen my commitment to tackling the multiple inequalities in the international publishing landscape. As an ambassador and evaluator, I have had the opportunity to collaborate with many editorial teams and stakeholders across the region, as well as analyze and discuss the challenges that publishers face in other Global South regions.

I acknowledge that this and other professional opportunities I have had the privilege of enjoying are framed by my social identity. I was born and raised in Mexico. I come from a middle-class family based in the capital city of the State of Mexico, Toluca, an urban, industrialized settlement with a population of almost one million. I am a

heterosexual woman; hence, I have never felt forced to explain myself to others. Further, even though in the U.S., I am considered part of a minority group (Latina), in Mexico, I am seen as a white woman, which is an advantage for social mobility in my country, as Mexican society is stratified by skin color. Living in a middle-class household, I never experienced a lack of shelter and food. Moreover, I had the privilege of attending private schools for my K-12 education, where I learned English and other foreign languages. I had the tremendous opportunity to study for my bachelor's degree in education at the largest public university in my hometown. In Mexico, only 16% of the population has access to higher education, and the opportunities to access public institutions might be lower. After some time working as a lecturer and editorial assistant in a couple of research centers in my hometown, I was granted a scholarship from the Argentine government to pursue my master's degree in the Latin American Faculty in Social Sciences (FLACSO) in Buenos Aires. That academic experience was a pivotal point for becoming familiar with an international context of knowledge production. More specifically, during my master's, I had the opportunity to network with scholars from several countries in the Latin American region—editors, researchers, librarians, and journalists—which helped me connect with international organizations in scholarly publications.

Second, my interest in editorial labor in scholarly journals is informed by my role as a student editor of *Current Issues in Education* (CIE), a student-led journal produced at Mary Lou Fulton Teachers College at ASU. I was a student editor from 2020 to 2023. This opportunity allowed me to see 'inside the black box' of journals and be aware of the organizational structure and interactions of a journal governing body, an invaluable

source for my study. Serving CIE was one of the greatest experiences in my doctoral journey, and it informed my dissertation writing process in different ways. It helped me understand and empathize with the reflections shared by my research participants. Although there are several takeaways from this academic experience, I can highlight the following three lessons learned that hopefully can be helpful for other researchers interested in editorship of scholarly journals.


The first lesson learned concerns publication language. As an international student in the US, when I joined CIE's editorial board, I had little self-confidence regarding my English language skills, which made me reflect on the identities of many authors who struggle with similar issues. I received the kind support of my peers and professors to overcome this issue, but I also learned to make some technologies my allies in the writing process, such as translators and generative AI. In my view, journals could do a better job of orienting authors about how to improve their skills in a similar way. Nevertheless, as it is documented in the literature about peer review, it was hard for some of my American peers to avoid assessing the language correctness of submissions and focus instead on the knowledge claims, methods, findings, and the like. Thanks to some collaborative workshops we led, we had the opportunity to learn about actively recognizing our biases in this regard and accommodated our training resources for reviewers to keep acknowledging the relevance of cultivating empathy with authors.

My second lesson learned as a student editor concerns the importance of ethics of care in scholarly journals. One of our faculty advisors for CIE expressed her commitment to ethics of teaching based on feminist principles, to which I feel connected as well. Her constant advice on cultivating empathy towards all the people involved in the publication

process in the first place was eye-opening for me as it made me understand the relevance for editors of acknowledging the different challenges authors might have in the writing and submission processes, which shouldn't be ignored in the name of objectivity or neutrality of publications. Some of my research participants also highlighted this issue. I believe that journals should provide guidelines to cultivate caring interpersonal relationships to counteract the misconduct cases that have been reported in the literature, especially regarding harsh peer review.

Lastly, I learned how crucial it is for journals to include editors and reviewers who are familiar with authors' cultural context. After two years of serving as an associate editor, I thought I had accumulated enough knowledge and experience to lead the decision-making in the position of editor-in-chief. I handled several papers and learned how to assess manuscripts based on the journal's guidelines and insights from workshops and our editorial meeting discussions. Nevertheless, when I handled a manuscript describing the experiences of education Arab students having their practicum in Jewish schools in Israel, I learned the relevance of diversity in the editorial board. The manuscript was well written, and the alignment of research questions, methods, and results seemed fair to me, so I decided to send it for review. However, the student reviewer I invited to review, who is deeply aware of the political and educational context in Arab countries, pointed out that the Arab students mentioned throughout the manuscript were Palestinians, yet this was not mentioned at all by the authors. My lack of awareness of this made me understand that diversity in editorial teams is not only a matter of representation and participation but of epistemic justice, and hopefully, this lesson could serve other journals as well.

BIOGRAPHICAL SKETCH

[Ivonne Lujano Vilchis](#)  earned a bachelor's degree in education from *Universidad Autónoma del Estado de México* (UAEMEX) and a master's degree with an emphasis in Education from *Facultad Latinoamericana de Ciencias Sociales* (FLACSO), campus Argentina. She has taught in public and private universities in Mexico for over ten years. Ivonne has worked in scholarly communication and open-access publishing initiatives since 2011. She served as the Editor-in-Chief of *Current Issues in Education* (CIE), a student-led journal published by Arizona State University. Her involvement as an ambassador of the Directory of Open Access Journals (DOAJ) in Latin America has allowed her to collaborate with several universities and government agencies on the adoption of best practices for scholarly publications and open science policies. Her research interests focus on higher education systems, research evaluation, science policy, gender and science, scholarly communication, open access, and open science. Ivonne also has a background in dance, she is currently an amateur tango dancer.