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On the cover: *The mythological phoenix, with its potent symbolism of rebirth from the ashes, has been used as a scientific metaphor for centuries, often embodying chemical reactions. On the cover of this issue of* Science Editor, *a phoenix reborn is at the center of an artistic representation of nuclear fission from a stamp honoring the opening of prototype nuclear reactor in France in the early 1970s. Courtesy of Science History Institute, Philadelphia. "First Day Cover Commemorating Phénix Fast Breeder Reactor." Bagnols-sur-Cèze, France, September 21, 1974. Witco Stamp Collection, Box 4. https://digital.sciencehistory.org/works/e4fkqyb*

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Introducing the Antiracism Toolkit for Organizations

Cason Lynley and Madelene Sutton

This article serves as a brief introduction to and context for the creation of the recently released Antiracism Toolkit for Organizations. The Toolkit provides guidelines that organizations can utilize when developing policies, processes, and procedures that support Diversity, Equity, and Inclusion (DEI) initiatives. DEI initiatives are essential to fostering an environment where people can thrive and be successful, thus furthering organizational goals and overall success.

The Toolkits for Equity project started with a 2019 proposal to the Triangle Scholarly Communications Institute as a way of providing resources for the scholarly communications community. The first toolkit, Antiracism Toolkit for Allies, was released in August 2020 and, a year later, the Antiracism Toolkit for Organizations[1] (TFO) came out. Several other toolkits are underway and all are hosted by the Coalition for Diversity & Inclusion in Scholarly Communications (C4DISC),[2] and all are led and created by volunteers. Once published, all of the toolkits are freely available and downloadable in PDF form.

The latest to be released is the TFO, which is a robust document full of specific information that points to additional resources. While incredibly useful as a whole, the toolkit may also be approached as a sort of Swiss-army knife of tools that may be utilized individually. As the scholarly communications industry has identified the need to broaden outreach to historically marginalized communities, this article focuses on recruitment and retention of Black, Indigenous, and People of Color (BIPOC) staff sections of the toolkit as examples of how an organization might dip in and out of the toolkit to find the tools and resources.

It may be helpful to define what we mean by antiracisim. Drawing on Dr Ibram X Kendi's work, an antiracist is: "One who is expressing the idea that racial groups are equals and

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none needs developing and is supporting policy that reduces racial inequity." An antiracism framework provides structure and support for the work of identifying and addressing racism and White supremacy within an organization.

Attracting and Retaining a Diverse Staff

In order to attract and retain staff from a more diverse group, there are some essential steps that an organization can take when recruiting. Perhaps one of the easiest changes is to expand existing advertising channels. Find ways to reach historically excluded groups, such as advertising with historically Black universities and colleges. By adopting new practices, an organization may effectively systemize antiracism into their hiring practices. Some of the most crucial include intentionality behind language used in the job descriptions themselves and training for hiring managers and search committees.

When preparing to attract a more diverse candidate pool, language matters. TFO identifies requirements in job advertisements that may seem innocuous on the surface but that perpetuate systemic racism. Privileging of White culture and values is so intrinsically embedded into our culture that recruiters need to be able to take a step back and learn how to identify it. The overall tone of the job description is important. Is the tone one of elitism reflective of prestige and perfectionism in the organizational culture? Or does it emphasize inclusivity and investment in all employees? Consciously choosing to prioritize inclusivity in the job description helps to send a message to applicants that the organization is committed to it.

Use of industry jargon and an implied preference for higher levels of education and competency than essential requirements for the job are other hallmarks of White supremacy culture. Jargon makes the description incomprehensible to all but those who are already in the know, perpetuating the recruitment of people similar to those already in the organization. Instead, job descriptions may focus on training rather than on competency, especially for entry level positions, and highlight organizational values that promote equity and inclusion.

Hiring managers and hiring committees may act as gatekeepers to organizations and industries. By helping make hiring managers more aware of their own biases,

an organization can help to counter those biases. A bias awareness checklist may be provided to managers to remind them of these biases and to help them catch themselves while interviewing. Preinterview training by a qualified human resources or DEI expert can engage hiring managers in thinking through how and why White candidates may have been previously privileged in the hiring process. As it is important to always include more than one person in the hiring process, hiring committees need tools and training as well. Organizational leadership should communicate their commitment to antiracism and explain why this is both necessary and beneficial. A useful tool for hiring committees may be postinterview score cards to be completed for each candidate that indicate minimum-level competencies for the open position to redirect the focus on skills rather than experience and background.

These are only a few examples of ways to systemize antiracism into recruitment practices—the TFO offers many more. Changes like these need to be seen as vital work, rather than extra work, confirming the commitment to addressing historical exclusions.

While the primary focus of human resources and hiring managers is to recruit a diverse workforce, retaining BIPOC staff is equally important and can be achieved through inclusive leadership.

At its core, inclusivity demands that leaders consistently recognize potential in and maximize the performance of BIPOC employees. Leaders must be cognizant of the unique narratives that BIPOC staff members possess and create an environment that allows them to be authentic in the workplace. By cultivating an environment where all employees are invited to share their ideas and perspectives, leaders create a workplace culture that thrives on value and respect.[3] The result is a work environment that inspires creativity and innovation where all people can do their best work.

Inclusive Leadership

A workplace like the one described above does not happen overnight. Inclusive leadership is a process that needs to be cultivated and consistently practiced by all leaders in the organization—from the board of directors to the executive team to the line manager.

So how can leaders become inclusive? In *The Six Traits of Inclusive Leadership*,[4] Juliet Bourke argues that inclusive leadership can only occur when

- People and groups are treated fairly, based on their unique characteristics versus stereotypes;
- Diverse employees are understood and valued as unique, while also accepting them as members of a group; and
- The diverse groups are leveraged for smarter ideation and decision making, reducing the risk of being blind-sided.

For leaders to be truly inclusive in their practices, Bourke further argues that they must demonstrate the following 6 signature traits:

- **Commitment:** aligning diversity and inclusion with a leader's personal values
- **Courage:** willingness to challenge inequalities and the status quo in the workplace
- **Cognizance of Bias:** awareness of personal and organizational biases and their impact on BIPOC staff
- **Curiosity:** being open and eager to learn and understand other perspectives without judgment
- **Culturally Intelligent:** being attentive to other cultures and recognize how perceptions and expectations of others, which may include biases, stereotypes, and generalizations, impact interactions
- **Collaborative:** empowering others and leveraging diverse thinking to create a space for psychological safety

The TFO includes more detailed information about each of Bourke's 6 traits and how engaging with them can help create a truly inclusive work environment. They provide a blueprint for leaders and introduce the question: What can organizations do to drive inclusive leadership and retain BIPOC staff?

Retention Strategies

When an organization hires BIPOC staff, it is essential to have a robust onboarding and retention strategy established. According to the Harvard Business Review, "Research has consistently shown that diverse teams produce better results, provided that they are led well. The ability to bring people from different backgrounds, disciplines, cultures and leverage all that they have to offer, therefore is a must have for leaders."[5]

Surveys show that BIPOC staff desire organizations to be inclusive and supportive by

- Providing BIPOC staff with an environment that is free of bias and microaggressions;
- Having psychological safety and creating safe space where they can come together to openly share their perspectives, ideas, and experiences, and to challenge the perspectives of others through healthy debate; and
- Having opportunities for growth and advancement.

The DEI efforts of an organization will only be successful if the organization takes specific measures to fill leadership roles with people who possess the qualities that Bourke outlined.

Creating leadership development programs to equip leaders with skills that they need to foster an inclusive culture and lead diverse teams is another mechanism that organizations can use to create more inclusive leaders and promote retention of BIPOC staff. Providing opportunities for professional development through training, sharing

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best practices with peers internally and externally, and participating in mentor programs are all effective ways to build inclusive leadership skills and capabilities.

This article provides a small taste of the wealth of information found in the full TFO. From getting an organization on the antiracism path to defining and enhancing organizational climate and culture, the full toolkit covers an incredibly wide range of topics to support and implement antiracism efforts in organizations of all types and at all stages of the journey toward creating an antiracist organization. By cultivating a workplace culture built on inclusivity, leaders will tap into their staffs' potential, maximize their performance, and live up to the true meaning of diversity and equality.[6]

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Council of Science Editors

Call for Diversity, Equity, and Inclusion Scholarly Resources

CSE has launched a repository of journal and organizational statements related to diversity, equity, and inclusion.

Many journals have begun working to improve editorial board diversity, evaluate peer review processes for implicit bias, revise guidelines for authors, or develop training opportunities, while others are struggling with where to start.

Has your journal or organization issued a statement about policies and practices related to diversity, equity, and inclusion? Please consider sharing your efforts with our community by completing the DEI Resources Submission Form on the CSE homepage under "Resource Library."

Submitted resources will be publicly available on the CSE website.

Left in the Cold: The Failure of APC Waiver Programs to Provide Author Equity

Sara Rouhi, Romy Beard, and Curtis Brundy

Introduction

The transition to open access (OA) is accelerating. An ever-growing number of libraries and publishers are signing agreements that cover read access as well as OA publishing. The variety of OA models can get complicated quickly. One helpful distinction is whether the model is based on an article processing charge (APC) or not. APC-based models, like many versions of Read and Publish, have become the most commonly used by publishers seeking to transition to OA. But APCs have always had a potentially fatal equity issue baked into their core. Authors not covered by an agreement, and without means to pay APCs, cannot publish OA. They must rely on publisher managed waiver programs in order to make their work openly accessible. APC waiver programs, unfortunately, have not been successful at addressing the problem of author equity with Gold and Hybrid APCs. Now these same ineffective and problematic waiver programs are being assigned the even heavier lift of addressing the rapidly growing issue of author equity associated with the new APC-based OA models. That waiver programs are not up to the task of solving the author equity problem has not stopped APC-based models from being adopted by publishers at an accelerating rate. Evidence suggests this is not because publishers lack interest and concern for issues of equity and inclusion.

In 2017, 10 organizations that work in scholarly publishing founded a new collaboration to raise awareness about the lack of diversity and inclusion in scholarly communication. The mission of the new group, the Coalition for Diversity and Inclusion in

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Opinions expressed are those of the authors and do not necessarily reflect the opinions or policies of the Council of Science Editors or the Editorial Board of Science Editor.

Scholarly Publishing (C4DISC), is to "…build equity, inclusion, diversity, and accessibility in scholarly communications."[1] As part of its values, C4DISC member and partner organizations seek to welcome diverse perspectives, learn from different communities, make space for marginalized communities, and eliminate barriers. Among the C4DISC members or partners are the Council of Science Editors, Society for Scholarly Publishing, Open Access Scholarly Publishing Association, Elsevier, American Chemical Society, Sage, Taylor and Francis, and Wiley, as well as two of the authors' own organizations, PLOS and the Iowa State University Library.

This article is about author equity and waivers, not about workplace diversity and equity, which is the focus C4DISC's efforts to date. But we believe concern over waiver programs and author equity aligns squarely with the stated values of C4DISC and with many of the stated diversity, equity, and inclusion values of its member organizations. We also believe it is insufficient for scholarly communication organizations to only pursue equity and diversity in certain aspects of their operations while ignoring it in others. Therefore, this is an article about inequity in scholarly communication. It is about the continued restriction of space for marginalized communities in scholarly communication. And it is about the growth of barriers and the exclusion of diverse perspectives in scholarly communication.

The authors will offer 3 perspectives on the issue of waiver programs and author equity: 1) Romy Beard, until recently, was the Licensing Programme Manager at Electronic Information for Libraries (EIFL), where she worked with libraries and consortia from developing and transitioning economy countries in Europe, Asia, and Africa; 2) Sara Rouhi is the Director of Strategic Partnerships at PLOS, where she focuses on building non-APC, inclusive business models to make publishing more equitable; and 3) Curtis Brundy oversees collections and scholarly communications at the Iowa State University Library, which has committed to transitioning its subscription spending to support equitable OA. We will include recommendations for improving waiver programs as well as for adopting open models that have equity built in, making waivers unnecessary.

Before examining waivers from these 3 perspectives, we would like to foreground our views by looking at the distinction between equity and equality.

Equality vs. Equity as a Lens for Understanding the Waiver Issue

By Sara Rouhi

The scholarship on equity vs. equality is vast and not the focus of this particular paper. That said, it's worth understanding the origins of this discourse in the context of early childhood education. Discussions unpacking the difference between these two concepts began to emanate from the early childhood education field in the early 2000s as researchers, teachers, and practitioners sought to understand the so-called "achievement gap" between Black and White students in American schools.[2] This framework has since been used as a lens to understand everything from gaps in public health outcomes to income inequality.

In the following, my coauthors and I use the same lens to understand the inequities in the scholarly publishing system as constructed in the largely Western, White, English-speaking, high-income world[3] to illustrate why waivers do not work.

At its core, the difference between equality and equity is about recognizing individual or group circumstances/differences and *not* assuming a level playing field. The Milken School of Public Health at George Washington University defines this distinction as follows:

> *Equality means each individual or group of people is given the same resources or opportunities. Equity recognizes that each person has different circumstances and allocates the exact resources and opportunities needed to reach an equal outcome.[4]*

The social justice component to this distinction lies in the recognition that differences in circumstances are often systemic and, historically, often intentional. The post continues, "It's critical to remember that social systems aren't naturally inequitable—*they've been intentionally designed to reward specific demographics for so long that the system's outcomes may appear unintentional but are actually rooted discriminatory practices and beliefs*" (emphasis added).

Over the years, artists have depicted this distinction visually to great effect. An illustration from Angus Maguire for the Interaction Institute for Social Change uses participation in the activity of watching a baseball game to articulate the difference (Figure 1).[5]

Giving everyone the same kind of "leg up" (via a booster box to stand on)—aka, "equality"—doesn't take into
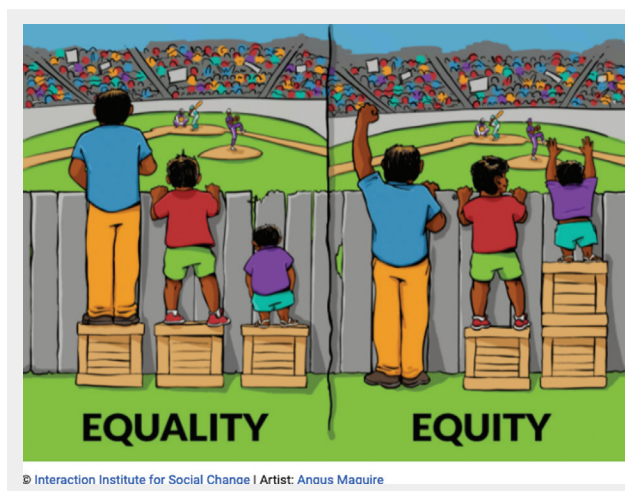
Figure 1. Equality vs. equity © Interaction Institute for Social Change (http://interactioninstitute.org/), artist: Angus Maguire (http://madewithangus.com).

account that the tallest viewer probably doesn't need it, and the smallest viewer is not aided by it.

Taking an "equity-focused" approach that recognizes their relative circumstances (and the reasons behind them), changes our approach to solutions. Perhaps we don't need to expend resources on the taller viewer; what we have available for the middle viewer is sufficient, but what we build for the shortest viewer needs to be enhanced. This more nuanced approach to *facilitating opportunity* is what the equality vs. equity distinction is about.

I have taken the liberty of augmenting Maguire's image—as many on the internet have[6]—to bring this discussion into the scholarly communication space (Figure 2).
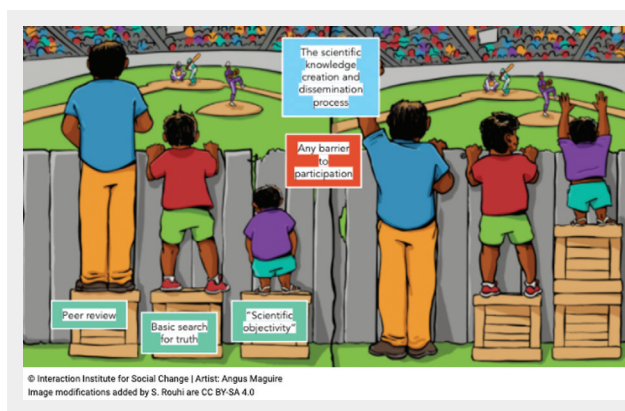
Figure 2. Equality vs. equity in the scholarly communication space. © Interaction Institute for Social Change, artist: Angus Maguire Image; modifications added by S. Rouhi are CC BY-SA 4.0.

If we understand "the baseball game" as the practice of scholarly communication at large, the fence represents any/all barriers to participating in that ecosystem.[7] Conventional wisdom says that things like double anonymous peer review and "scientific objectivity"—whatever that is—ensure that the system is equal and fair. "We're all searching for 'truth' so, of course the system is fair."

It is unsurprising that the establishment that built the system struggles to recognize that its structure and justification are systemically exclusionary. In Figure 2, the "scientific establishment"—or Western Research Industrial Complex—built the fence. *They are bought into why it exists, they benefit from it, and they genuinely believe it makes science better*, often without acknowledging its inequitable flaws (Figure 3).

These are the individuals who could comfortably see above the fence without any need for a booster box. The viewer who can just see and the viewer for whom the box does nothing represent the many thousands of researchers globally who try, in good faith, to participate in the "fair playing field" of academic research but can't seem to ever get over the fence.

What each stakeholder community in scholarly communication must do—funders, researchers, research administrators, publishers, libraries, consortia, technology providers—is thoroughly scrutinize their systems to identify opportunities for essential systemic change, acknowledging the inequities they may be perpetuating via their own work. In the case of examples provided in Figure 4, I have highlighted public commitments PLOS has made to remain accountable to our equity work[8] as examples of what this can look like for publishing stakeholders. Many other
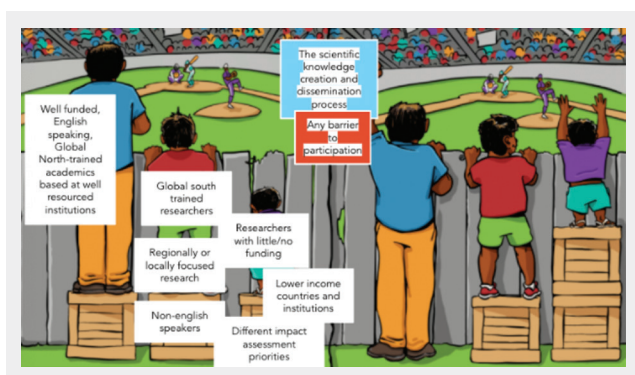

Figure 3. Those able to see over the fence (well or just barely) represent researchers for whom the current paradigm works. The individual unable to see over the fence represents those researchers for whom the systemic barriers built into the system are a blocker to participation. © Interaction Institute for Social Change | Artist: Angus Maguire Image modifications added by S. Rouhi are CC BY-SA 4.0.
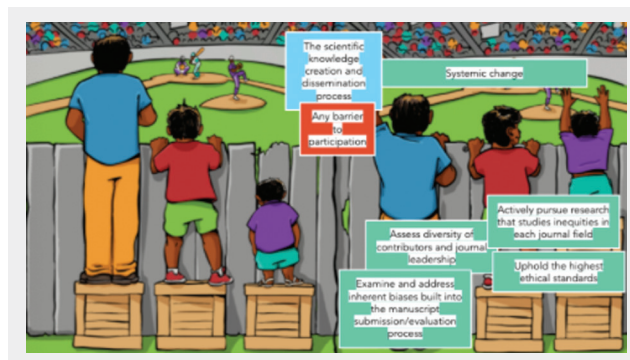
Figure 4. PLOS commitments to equity.

publishers are doing similar work and publicly sharing their commitments as well.

Waiver Issue From the Developing Countries' Perspective

By Romy Beard

One of the issues with moving from a "pay to read" to a "pay to publish" model is that it creates a different financial barrier for authors from developing countries.[9] Most universities, research institutions, and national research funding agencies from these countries do not have budgets to cover APCs, and authors have to pay from their own pockets. Many publishers recognize this, and have introduced a waiver or discount scheme for authors from lower income countries to allow them to publish their articles in OA without having to pay a full APC. Most publishers offer full waivers to authors from some countries, and a 50% discount to others.

However, there are a number of issues with these waiver and discount programs.

Firstly, the terms are not always fair: *in some countries, discounts simply aren't good enough, and the remaining APC is still too expensive.* This was also found in a recent study undertaken by EIFL.[10] The study, which analyzed the publishing output through 4 of EIFL's OA agreements and found that OA publishing had increased by 62% from 2019 to 2020 and identified a number of articles that were published in closed access in 2020 despite being eligible for an APC discount. In some EIFL partner countries, researchers earn $400 a month, so paying a 50% discounted APC is still impossible. The fact that policies don't always align with the realistic possibilities of authors in lower income countries was also made by the OA2020 Low-to-Middle Income Country (LMIC) working group,[11] which contacted authors in 4 countries to enquire about their APC payments. One researcher wrote: "We received a full waiver after we explained that we did not have funds

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available for the Article Processing Charges, and that the charges were higher than the monthly wages of some lecturers in Ghana."

Secondly, waiver and discount programs are *poorly communicated, and many authors are simply not aware of them*. The information on publisher's websites is not always clear; statements are often general and not linked to specific title lists, and there is no or little information on individual journals' websites. There isn't a single place where authors can search across journals from different publishers and see which journals might offer them an APC waiver or discount. Being aware of this might encourage them to submit their article to certain journals that offer waivers or discounts rather than closed subscription journals. The fact that the ability to pay an APC influences researcher's publishing decisions is also echoed by the OA2020 LMIC study: one respondent wrote that they "didn't pay any charges, [but] got a waiver. In fact, if they didn't waive the charges, we would have published it elsewhere." Many others echoed this statement.

Thirdly, *waivers and discounts are not automatically applied*. In many cases, authors need to know that they are eligible for a waiver; they might need to tick a box during submission, or even send an email to actively request the waiver or discount. One publisher's website[12] is covered by a large heading entitled "Automatic Waivers," which is then followed by the small print, "Automatic waivers will only be applied if the corresponding author requests a waiver at the payment step during the article submission." That is not an automatic waiver. The EIFL study also found that some articles were published in closed access despite being eligible for a full APC waiver because the publisher in question didn't have automatic recognition in place—authors needed to email the editor to claim the waiver. The need to "claim" a waiver complicates the process for authors and acts as a hurdle to OA. As one of the OA2020 LMIC respondents states, it makes the whole waiver process "a painful task." This is an additional burden put on unfunded researchers.

A fourth issue is that *terms can change unexpectedly as publishers move countries from the waiver to the discount category without notice*. Many authors from the OA2020 LMIC study—which spanned 3 years—found themselves eligible for waivers in 1 year, but only received a discount in the next year. Consequently, they continued to only submit their papers to journals where they knew they would receive a full waiver. Once again, we see that the author's decisions about where to publish their articles are influenced by their ability to pay APCs.

Finally, *hybrid journals are usually excluded from publishers' waiver and discount programs*. The argument behind this is that for those journals, authors can always choose not to pay the APC; however, this doesn't make OA publishing equitable—in fact, it pushes authors to publish behind the paywall in those journals. To make OA truly equitable, hybrid journals should be included in these programs.

What can be done to address these issues? Here are some suggestions for publishers to improve APC waiver and discount programs and make them more equitable:

- Publishers should research realistic local funding opportunities before deciding which countries fall in the waiver or discount group.
- Publishers should have clear presubmission information on waivers and discounts for authors. This might include a general page with a downloadable title list of eligible journals (ideally this should include subject information and journal metrics), information on each journal's web page, and clear information during the submission process.
- Workflows that allow for automatic recognition of eligible authors during the submission and postacceptance process—those publishers that do not currently allow this need to move fast.
- Publishers should also make it clear how long the terms on the offer are valid and when they might be updated.

At the same time, the question arises about whether APC waiver and discount models are effective for authors in lower income countries. Should authors from these countries even "see" an APC price tag? Perhaps authors could be offered free publishing through agreements like free Read & Publish that EIFL has signed on behalf of its partner countries with some publishers. Or are there other, alternative models that can solve the issues raised and make the process smoother?

Waiver Issue From the Publisher Perspective

By Sara Rouhi

To understand the challenges with waivers, it is vital to understand the assumptions publishers like PLOS made when launching the APC model. It is also important to keep in mind the differences in equity vs. equality, as previously outlined, when discussing issues of inclusion.

With respect to assumptions PLOS (and indeed all APC innovators at the time) made: at the time, in the biomedical space, charging authors fees to publish seemed fair and reasonable. Those authors were awarded huge grants and if a nominal fee meant that anyone could read and (appropriately) reuse the paper, it was a price worth paying.

Unfortunately, embedded in that thinking were "unknowns" that the scholarly publishing community didn't predict:

- We didn't anticipate how popular and successful APCs would be as a business model.

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- We didn't appreciate that the pressure to publish, coupled with inexperienced authors and a new business model, would yield predatory publishers. Their efforts would greatly undermine the credibility of OA publishing for many years.
- We didn't appreciate how much money was in the publishing ecosystem. With costs of publishing shifting to authors, libraries were still seeing exploding subscription fees for the same content their authors were paying to make open. Commercial and nonprofit publishers alike developed multiple revenue streams around the same content.
- We overestimated the ability of waivers to address inclusion and equity.

As Gold OA has taken hold as the dominant model in OA publishing, the inequities built into the model have exploded exponentially, shutting out large communities. Early career researchers, those in fields with no funding, and those based in low and middle income countries cannot afford to publish openly using this model. They rely on subscription publishers who charge reading fees to peer review and publish their research, often making their research inaccessible to their own communities.

Why Waivers Do Not Meet the Open Access, Open Science Moment

The reason publishers and other scholarly communications stakeholders (like libraries) need to examine and (ultimately, I argue) reject waivers as a vehicle for inclusion in publishing is that they fail to meet the equity standard.

Simply put, they do not address the systemic structures that lead authors to need waivers, and, as Beard outlines above in depth, waivers themselves are structured to ask those most in need of systemic change to jump through hoops that more privileged communities never see.

If waivers are meant to solve the problem of "APCs-as-a-barrier-to-participation" we must examine more deeply: Why are APCs such a dominant business model?[13]

The short answer to the first question is simple: for publishers, it is the easiest and most effective business model to make content OA.[14] Like any other "retail" sale, the "consumer" pays a one-time fee for a one-off service. In this case, the consumer is the author and she pays an APC upon article acceptance for the services of manuscript handling, peer-review management and facilitation, online dissemination, marketing/communications, and indexing of her work.[15]

For funders, it is the easiest way to disseminate publishing fees. Rather than radically restructuring how they support publication fees to ensure compliance with OA mandates, funders just incorporate publishing fees into the grants for which researchers apply.[16]

For libraries (mostly in Europe) that are reacting to funder mandates, their entire administrative infrastructure to support OA publishing (and now transformative agreements) is based on only one business model—APCs. As more publishers come into the marketplace with non-APC–based models, libraries and consortia are struggling to "turn the aircraft carrier" in the direction of more inclusive models.

So, for the progenitors of the Western Research Industrial Complex, APCs are a simple model that works for *their* well-funded researchers and institutions. These stakeholders argue: waivers are a simple, relatively inexpensive way to address the outliers *who exist within their system*.

But what about everyone else?

As Beard notes above, whether or not waivers *ever* functioned as they were originally intended, they absolutely do not now. Even for Western, English-speaking, US dollar publishers, waivers do not work anymore.

Publishers and the Unsustainability of Waivers in a Global Open Science Ecosystem

Simply put, there are three major reasons that waivers no longer "work" to address the barrier of publishing charges: the complexity of digital publishing workflows, the explosion in demand for support, and inadequacy of a "needs based" medium to build a community of inclusion.

Workflows. As publishing has gone digital and the entire submission, peer-review, and dissemination process has moved online, the technologies and know-how required to undergird them have become infinitely complex. Publishers have had to either become technology companies or pivot to integrate third party technologies—either route being complicated and expensive. Determining the technology workflows to support waivers implicates not just the manuscript handling process but also accounting, editorial operations, and customer support workflows.

As Beard notes above, the communications around how waivers work are obscure, obtuse, and often frustrating for authors. At PLOS, as of January 2022, we currently have 2 mechanisms for fee support,[17] one based on geographic location of the authors' funders and the other based on need, the PLOS Publishing Fee Assistance (PFA). Because of how our editorial submission system, Editorial Manager (a third party platform run by Aries, now owned by Elsevier), is built, as well as our accounting requirements as an annually audited nonprofit, authors must go through a lengthy process to "prove" they have no other source of funding for their publication fees, despite the fact they are only just submitting. This is even as 50% of authors (in the case of PLOS ONE's acceptance rate) will not ever be accepted for publication.

Once an author has successfully documented why they need fee assistance, internal teams within publishing

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and accounting have to evaluate the criteria they use for determining the amount of assistance PLOS can provide while ensuring that PLOS practices are audit-compliant and as consistent as possible. Accounting, particularly, hits snags when authors who had funds at submission cannot pay at acceptance. Those authors have little recourse other than to renege on their commitment to pay the APC, an unacceptable outcome for any organization committed to sustainable business practices.

PLOS is currently evaluating and completely overhauling our waiver system so we can continue to shed more light on our decision and best practices around this work and hope to share more of that work in 2022 and beyond.

Demand. Additionally, as awareness of OA has increased and open science has become the focus du jour (especially post-pandemic), the explosion in demand for waivers has made them very expensive. At the height of its waiver expenditures, PLOS was spending upwards of $3,000,000 annually to grant full and partial waivers to authors who could demonstrate need. As PLOS shifts to focus on underrepresented communities and regions, we have increasingly moved our waiver focus to geographies where partial waivers are insufficient. Many researchers often cannot afford any amount of discount on publishing fees—publishing has to be free.

Figure 5 represents the reduction in total waiver spending alongside the shift to underrepresented regions who need higher dollar support per paper. PLOS's decision to reduce total spending on waivers overall is the result of a shifting publishing landscape that has reduced PLOS's publishing revenues (from their peak in 2012–2015) and a commitment to more inclusive models that do not require authors to pay any fees.[18] PLOS's current work to reduce its own internal costs and regain market share via more equitable models should hopefully begin to reduce the need for a large waiver expenditure.

Also indicated in Figure 5 is the reality that Research 4 Life countries, countries on the African continent, and Latin America are seeing increased waiver support (despite the overall reduction in waivers spent) while PLOS reduces support in higher income regions. This is far from a perfect solution to address the near-term adjustments required to transition to more equitable models. PLOS is the first to call out that the geographic inequities we are trying to address in this adjustment *do not meet the needs of researchers in higher income countries who legitimately cannot pay APCs* (Figure 6).

Many researchers who urgently want their work to be OA and available to broader practitioner communities have no funding sources to pay publishing fees. This is true whether or not you're in a well-funded region or institution. Other researchers are still early in their careers and have not yet secured large grants to fund publishing fees. Academic libraries, departments, and administrators trying to support these researchers almost never have enough money to meet the demand for APC funding support. Figure 6 demonstrates how the need for full funded waivers (not just discounts on the APC fee) is ultimately a reduction in the total number of waivers you can provide. 2020 is the best example of that result.

Inclusion. Lastly, there is nothing about "demonstrating need" that is "designed for dignity," a term my colleague and friend, Dr Kamran Naim, Head of Open Science at CERN, refers to when speaking about equity in research. The effect of asking for a handout in a process that is already built on peer critique and (often) community rejection assumes unfunded authors are "out for what they can get." Many "needs based" efforts are built on an assumption often made of lower-income communities in other contexts that is based in racial prejudice—remember 1980s "Welfare Queens"?[19]

What Can publishers Do to Address These Issues?

No discussion of what publishers can and should do to address this issue can exist outside of the context of recognizing
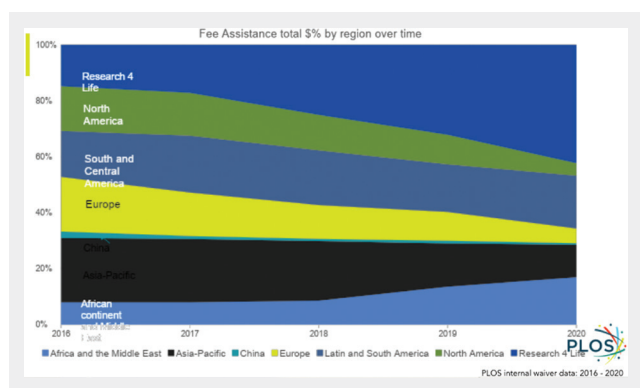

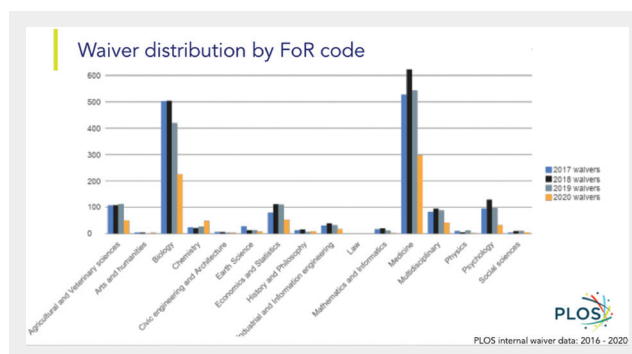**Figure 5.** The volume and geographic orientation of PLOS waivers in 2016–2020.

Figure 6. The shift in number of waivers granted by year across various field of research code areas. The reduction in 2020 waivers reflects that fewer waivers could be granted because more of them needed to be full waivers (as opposed to discounts).

the interconnectedness of the scholarly communications ecosystem and the role of all stakeholders to engage with this issue. Bringing equity to scholarly communications requires a cross functional approach that involves funders, research institutions, individual researchers, libraries, service providers, and publishers. No one group is going to solve this themselves.

That said, publishers can and must examine new paths to ensure access to publishing and peer-review services is as available to authors as OA articles are to readers. An inclusive publishing ecosystem makes *reading and publishing* completely open, eliminating fees for individuals wishing to participate in those aspects of the scholarly communications process. There are band-aid short term solutions and longer term efforts we must all examine.

For publishers like PLOS that still rely on waivers, we must:

1. Reexamine our waiver programs from start to finish and identify where we are creating unnecessary, burdensome hurdles for researchers. For most publishers, waivers are not the first workflow they are working to optimize. But if waivers are going to remain the near term mechanism to facilitate inclusion in APC publishing models, publishers must reexamine the entire process to identify ways to make it more transparent, accessible, and light-touch. In her section above, Beard has identified many areas where all publishers can improve.

2. Beyond just optimizing current workflows, publishers should transparently share their plans and strategies around increasing participation in APC publishing models via waivers. If publishers insist that APCs are their preferred business model to facilitate the "flip" to an OA paradigm, they must present a comprehensive strategy explaining how this will work. What are the communities they wish to target? How are they going to communicate the waiver options to those communities? What organizations are they partnering with to facilitate this (like EIFL or Research 4 Life)? What are their metrics for success and how are they going to measure progress?

The strategies around building inclusion through waivers should be as robust and transparent as those aimed at authors who can pay full fees. If publishers' commitments to diversity, equity, and inclusion are truly substantive, this is an essential part of that work.

3. Publishers should consider business models and partnerships that eliminate the need for waivers. This is, no doubt, a heavier lift. PLOS has spent over 2 years focusing its efforts here in the hopes to eliminate the need for waivers in the long term. Many publishers are experimenting with innovative new models that flip paywalled content to make it OA, but fewer are pushing models that shift fees away from authors entirely.[20] As demonstrated by PLOS,[21] these models can work successfully, but they often require the publisher to engage in price transparency work[22] (as

recommended by Plan S) and to reduce expectations around revenue maximization.[23]

4. Publishers must work collaboratively with libraries, library consortia, and funders to rethink the existing workflows that lock funder publishing fee support into individual grant funds with no mechanism for allocating those funds centrally. Libraries urgently want to support OA publishing efforts that shift fees away from authors (as Brundy outlines below). The current transition period of shifting subscription spending to cover publishing fees in the context of "transformative agreements" enables future OA publishing with existing collection development budgets. Jumping to support native OA publishers (with whom they've never had subscriptions) or models based on collective action (where they have no allocated budget) means that libraries are searching for *new money* in a budget landscape decimated by further pandemic-related cuts.

While their researchers are indeed spending to publish OA, often *that money sits in individual grant funds and is not accessible in a centralized way*. Ideally, in the future, most libraries will manage OA publishing budgets (as they currently do in the UK and much of Northern Europe) once subscriptions are a thing of the past. In the near term, funding is still locked within individual grants.[24]

As in any paradigm shift, the work can seem overwhelming, but small iterative efforts can pay off, and publishers that engage in good faith with this work see strong support from libraries, consortia, and funders. PLOS remains committed to supporting other publishers in any way we can to share what's working and what's failing so that others can advance from the work we have started and hopefully reduce effort duplication.

Waiver Issue From the Institutional Perspective

By Curtis Brundy

The Iowa State University Library is a signatory of OA2020[25] and, with unanimous support from our Faculty Senate, adopted new journal negotiation principles[26] in 2019. The principles prioritize openness and transparency and state that we will "work toward democratizing access to knowledge by reducing financial barriers inherent in traditional publishing practices." In 2021, the library's OA agreements allowed nearly 20% of Iowa State's corresponding authored articles to be published openly.

Iowa State has pursued an OA strategy that includes agreements utilizing APC-based and non-APC–based models. Several of our OA agreements have resulted from close partnerships with publishers on the development and implementation of new open models. In the last few years, this type of close collaboration[27] between libraries
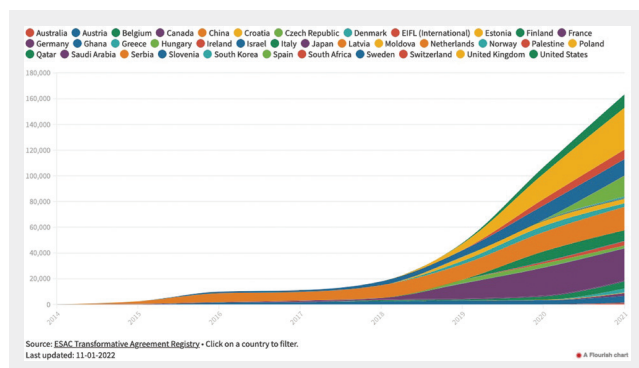
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Figure 7. Open Access article output by country. ESAC Transformative Agreement Registry Last updated January 11, 2022 (https://esac-initiative.org/market-watch/).

and publishers has had a significant impact on the number of articles published OA. The ESAC Initiative has provided a dramatic visualization of this growth, based on the OA agreements added to the ESAC Registry (Figure 7).

Adoption of OA agreements in the United States still trails that in Europe, but the pace, particularly for those built on APC-based models, is accelerating. Cambridge University Press has signed over 250 read and publish agreements with US libraries.[28]

As APC-based models such as Read and Publish have achieved wider adoption by publishers and greater traction with libraries, we have become disappointed by the lack of attention and progress towards improving author equity. Publishers have been quick to innovate in many critical areas as they seek to meet library interest in supporting OA: new OA platforms and workflows have been developed and implemented, exciting collaborations are taking place on joint infrastructure projects like the OA Switchboard, and targeted acquisitions to build capacity and fill gaps are announced by publishers with regularity. But to date, little-to-no energy and enthusiasm has been applied to addressing the author equity issue at the heart of APC-based models. The near universal response has been to point to existing APC waiver programs when questions of author equity arise. As my coauthors have already pointed out, however, existing waiver programs are completely inadequate for the task.

The Iowa State University Library remains committed to an equitable transition to OA and believes a diversity of open approaches will be necessary. In the short term, this will include APC-based models, which we will continue to adopt as part of our overall strategy. But we are actively working to raise awareness about waiver program issues and advocating for reform. Here are a few suggestions for how libraries can help ensure author equity during the transition to OA:

- Pursue non-APC–based OA agreements that have author equity built in, such as Subscribe to Open, Association for Computing Machinery's Tiered Open, and collective models such as Open Library of Humanities and those being adopted by PLOS.
- When making an APC-based agreement, address the issue of author equity and waivers directly by adding license language that commits publishers to fully and transparently working on the issue of author equity by implementing waiver program improvements.
- Continue to collaborate with publishers to iterate, develop, and adopt equitable open models.
- Support and lead inclusive national and international efforts to improve author equity.

Conclusion

We know that the transition to OA is happening, and that thousands of articles that would have previously been behind the paywall are now published in OA due to agreements such as Read and Publish. But how many articles are being published in OA by unfunded authors from lower income countries via waivers and discounts? How many are not being published in OA, and pushed to publish behind the paywall, globally?

Publishers have set up waiver and discount programs, are improving how their systems recognize authors, and are addressing some of the issues raised in this article—but is enough being done? Stakeholders across the publishing ecosystem have to ask themselves serious questions about how they wish to engage in this paradigm shift. Do publishers want to rely solely on waivers to facilitate inclusion? Do libraries want to spend funds supporting publishers lacking a specific inclusion strategy? To what extent is signing Read and Publish agreements en masse just further propagating models no longer appropriate for our current open science goals?

Organizations like EIFL, PLOS, and the Iowa State University Library are loudly asserting a position on these difficult questions and we, the authors, feel that we can collectively put more pressure on our respective communities to bring transparency to their answers around these questions.

While we hope that this article has offered some solutions, there still remain many unanswered questions that need to be discussed within the scholarly communications environment in order to agree on a more coordinated approach. The most important point is that these discussions should not be had without involving those concerned—libraries and authors from the lower income countries in question.

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2. H. Richard Milner provides a comprehensive overview of the questions in the following article: Milner HR. Beyond a test score:

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3. Elsewhere, I refer to this complex of stakeholders as the "Western research industrial complex." See Rouhi S. When metrics and politics collide: reflections on peer review, the JIF and our current political moment. Scholarly Kitchen. 2017. https://scholarlykitchen. sspnet.org/2017/09/18/guest-post-metrics-politics-collide-reflections-peer-review-jif-current-political-moment/.

4. Equity vs. equality: what's the difference? MPH@GW, the George Washington University online Master of Public Health program. 2020. https://onlinepublichealth.gwu.edu/resources/equity-vs-equality/.

5. Image and background of its development available at https://interactioninstitute.org/illustrating-equality-vs-equity/ with CC BY-SA 4.0 license.

6. The Evolution of an Accidental Meme. https://medium.com/@CRA1G/the-evolution-of-an-accidental-meme-ddc4e139e0e4#.pqiclk8pl.

7. These are, incidentally, the very barriers that the Open Science movement is actively working to undermine. See the UNESCO Recommendation on Open Science adopted in 2021 at https://en.unesco.org/science-sustainable-future/open-science/recommendation.

8. Heber S. Our commitment to diversity, equity, and inclusion. The Official PLOS Blog. 2020. https://theplosblog.plos.org/2020/07/our-commitment-to-diversity-equity-and-inclusion/.

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10. https://eifl.net/blogs/eifl-agreements-result-increased-oa-publishing

11. See https://oa2020.org/oa2020-lmic-project-brief/.

12. The publisher in question is Wiley. See https://authorservices.wiley.com/open-research/open-access/for-authors/waivers-and-discounts.html.

13. Related to this is the question of if Gold OA is the only mechanism for facilitating the current "transition to an OA world." That is a lengthier discussion for which there is no room in this piece. That said, it is important to acknowledge of course that Green OA and Diamond/Platinum OA are other vehicles for inclusion. They are just not nearly as dominant as the Gold OA—author-pays—business model.

14. It has also facilitated the practice of "double dipping" whereby subscription publishers charge libraries reading fees and then also charge authors publishing fees to make their content open—effectively generating two different revenue streams pulled from two different funding sources (libraries vs. funders) for the same piece of content.

15. There are other models looking at covering the costs of rejected papers by charging at submission rather than article acceptance, but these are nascent and there is little consensus on their long term viability.

16. Note: From the publisher and library perspectives, the challenge of publishing funding that is "locked away" in individual researcher grants is one of the biggest obstacles to support more equitable, inclusive OA publishing models like those pioneered by Annual Reviews, MIT Press, and PLOS.

17. A complete overview of PLOS fees and assistance programs is here: https://plos.org/publish/fees/.

18. See more about PLOS's non-APC–based business models for unlimited publishing Flat Fees, Community Action Publishing and Global Equity here: https://plos.org/resources/for-institutions/how-can-we-partner/.

19. For more on how Ronald Reagan propagated the racist idea of "Welfare Queens" during his 1976 presidential campaign, see NPR's "The Truth behind the Lies of the Original 'Welfare Queen'," December 20, 2013: https://www.npr.org/sections/codeswitch/2013/12/20/255819681/the-truth-behind-the-lies-of-the-original-welfare-queen.

20. Exceptions to this include Open Library of the Humanities, Knowledge Unlatched, Annual Reviews, and the many other publishers that have adopted the Subscribe 2 Open model. Additionally, as Curtis Brundy outlines in his section, many libraries are pioneering models to facilitate eliminating author fees. See the work of Community-led Open Publication Infrastructures for Monographs and LYRASIS' Open Access Community Investment Program.

21. In 2021, PLOS's work in new, non-APC–based business models was recognized by the Association of Learned and Professional Society Publishers' Innovation in Publishing award (shared with Coherent Digital and their Mindscape Commons VR work). That award was in recognition of the fact that PLOS's Community Action Publishing (CAP) model is actually generating more revenue than when PLOS relied on APCs and is aimed at cost recovery rather than revenue maximization. Learn more here: https://theplosblog.plos.org/2021/09/plos-wins-innovation-in-publishing-award/ and https://www.alpsp.org/news/winners-announced-alpsp-awards-september-2021/275591.

22. Plan S issued their Price Transparency Framework in 2020 and PLOS, Company of Biologists, and F1000 Research have all publicly shared their frameworks in compliance with Plan S recommendations. See https://www.coalition-s.org/price-and-service-transparency-frameworks/ and https://theplosblog.plos.org/2021/09/our-commitment-to-price-transparency/.

23. PLOS CAP actually shares a public revenue target that includes a cost target and a 10% margin. Once these targets are met, PLOS contractually commits to redistribute additional revenues above the target to community members of each journal. Details and targets are here: https://plos.org/resources/community-action-publishing/.

24. Funders and other #scholcomm stakeholders are beginning to have these conversations. In Fall 2021, Plan S did a retrospective on their Society Publishers Accelerating Open Access and Plan S work (in which PLOS and many other publishers participated) and issued an independent report calling for exactly this kind of cross-stakeholder alignment. See https://www.coalition-s.org/open-access-agreements-with-smaller-publishers-require-active-cross-stakeholder-alignment-report-says/.

25. https://oa2020.org/mission/#eois

26. https://lib.dr.iastate.edu/cos_reports/1/

27. An example of this type of collaboration is the work between 4 leading US university libraries and the Association for Computing Machinery: https://www.acm.org/media-center/2020/january/acm-open.

28. https://www.cambridge.org/core/services/open-access-policies/read-and-publish-agreements/americas

Toward Open Science: Contributing to Research Culture Change

Lisa Cuevas Shaw, Timothy M. Errington, and David Thomas Mellor

Advancing open science across the complex and decentralized research ecosystem remains challenging to fully enact for a variety of reasons. Specific open science initiatives, including journal policy changes, preregistration, and Registered Reports represent existing opportunities for publishers, societies, institutions, funders, and researchers to contribute to more coordinated culture change across research communities.

In a November 2021 post[1] in *The Scholarly Kitchen*, Roger Schonfeld suggested that the current model for scientific scholarly communication may be ill-suited to improve and sustain public confidence and trust in science as it moves toward greater openness and transparency. The increasing politicization of science,[2–4] along with related challenges in effectively managing the public communication of science, intensifies the need to build and sustain trust in the scientific process. After outlining proposed priorities for the scholarly communications community to contribute to trust-building in science, Schonfeld ultimately points to the need for greater coordination and collaboration across stakeholders in the global knowledge system—publishers, senior research officers, policy makers, institutions, funders, and libraries— to sustain a trusted information environment.

System-level coordination and collaboration is a convergent theme across the open science reform movement.[5–7] The recent adoption[8] of UNESCO's Recommendation of Open Science[9] by all 193 member states offers a new signal of intentionality and a normative framework for global system coordination. The COVID-19 pandemic spurred coordination and implementation of open initiatives among various stakeholders across the scholarly communications system who aligned to thwart a global crisis. Specifically, the statement issued in January 2020 by the Wellcome Trust on "Sharing research data and findings

relevant to the novel coronavirus (COVID-19) outbreak"[10] was signed by 160 organizations worldwide, including research funders, publishers, infrastructure providers, and research institutions. In April 2020, a group of publishers and related organizations launched the COVID-19 Rapid Review Initiative[11] to maximize the efficiency and speed of peer review of COVID-19 research.

In June 2021, the Research on Research Institute[12] published a report[13] of their study evaluating whether these coordinated initiatives did, in fact, change the scholarly communications system by accelerating open access, preprinting and related peer review of preprints, data-sharing, and publication times of COVID-19 research. They found that COVID-related research was made more open and freely accessible, and that preprinting increased. However, they also found that little had changed in the way of sharing data related to COVID-19 research and, furthermore, that efforts to peer review preprints remained low in proportion to the research output.[13] The contributors reinforced system coordination and collaboration by explicitly recommending that "all stakeholders in the research system should recognize that improving scholarly communication is a joint responsibility that requires collaboration and coordinated action across stakeholders, including the development of policies with accompanying monitoring and accountability mechanisms."[13,p75]

Yet, system coordination to advance open science, even for the dissemination and verification of the scientific record, let alone for the full research lifecycle, remains challenging to fully enact for a variety of reasons. The research ecosystem is decentralized with socially constructed community norms, so widespread adoption of behavior change is complicated. Furthermore, institutions, scholarly societies, publishers, and researchers themselves often have limited resources and core objectives they must deliver on to sustain their work, making broader ownership and engagement in the practice of science either unappealing or seemingly untenable. Institutionalized incentive structures are misaligned with the values of openness and transparency, rewarding researchers for being published, sharing novel results, and ultimately, downplaying or ignoring null or negative results over getting it right.[14,15] And, systems generally prefer homeostasis, especially when incentive structures are not designed to promote change.

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Therefore, when proponents of open science reform urge for system coordination and collaboration, it can be daunting for individual leaders or stakeholder groups—publishers, societies, funders, institutions, and others—to know where to begin, how to contribute, and how to make a difference, especially as one actor in a complex and dynamic system. For that reason, we aim to demonstrate how specific open science initiatives can be part of an effort for more systemic culture change across research communities and stakeholders.

Theory of Research Culture Change: A Systems-Level Approach

At the Center for Open Science[16] (COS), we have developed a theory of research culture change[17] in service of open, transparent, and reproducible[18] science that employs 5 levels of intervention represented by the pyramid in the Figure. These levels are progressive, reflecting the fact that successful implementation of higher levels depends on successful implementation of lower levels.

To scale adoption of open behaviors by researchers, COS focuses on 1) providing open infrastructure through the open-source Open Science Framework[19] (OSF) that makes it possible to do the behaviors; 2) conducting user-centered product development to make it easy to do the behaviors; 3) supporting grassroots organizing through training and community-building efforts to activate early adopters and make their behavior visible;[20] 4) offering solutions to journals and publishers, funders, societies, and institutions to nudge their incentives to make it desirable to do the behaviors; and 5) providing and promoting a policy framework for stakeholders to make the behaviors required. Effective policy implementation requires effective infrastructure for practicing the behaviors, and community buy-in to treat the behaviors as good practice rather than administrative burdens. These 5 levels of intervention are highly interdependent, each necessary, and none sufficient on their own.
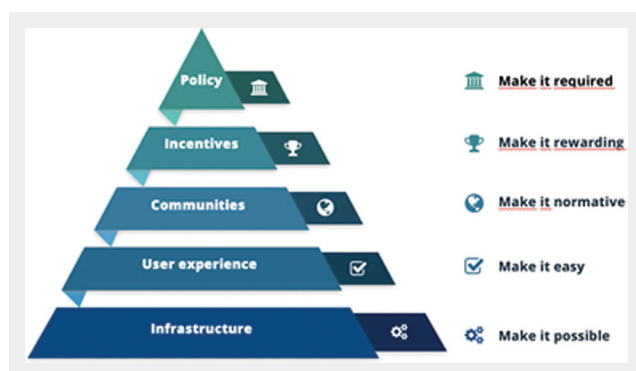

Figure. Center for Open Science theory of change model.

When behavior change requires culture change, it is essential to consider the structural features of the culture and how they enable and constrain individuals to behave according to their intentions and values. Successful, normative, incentive, and policy interventions require effective infrastructure that provides easy transitions from how they behave today. Likewise, enacting that behavior change requires sensible incentives and policies that align with the behavioral tools available to individuals. For widespread embrace, the changing behavior must be visible to the community to stimulate the diffusion of innovation.

Open Initiatives That Can Support System Change

It is relatively easy to state that systems need to change in order to reform scientific practice. However, such visions require specific, actionable steps that can be supported and implemented. COS points to such specific actions that individual researchers or policymakers at journals, publishers, societies, and funding organizations can take to begin to make this idealized vision a reality. These steps derive from the goal of ensuring that empirical research evidence can be reproduced (verified through checking the collected data and reported findings) and replicated (verified through conducting the reported methods a second time).[18] The practices that we focus on to achieve those goals are outlined in the Transparency and Openness Promotion (TOP) Guidelines[21,22] and include transparency of underlying data, research materials, analytical code, and study design; citation of research data used in studies; preregistration of study plans, sometimes with a specific analysis plan; and use of policies or workflows that incentivize replication studies, namely Registered Reports.

Our philosophy comes from the optimization of 2 needs: 1) to meet stakeholders where they are by not pushing to perfection at the expense of any improvement, and 2) to create clear success criteria for ideal results. This optimization is reflected in the tiers provided by the TOP Guidelines in which the first level requires that research outputs *disclose* whether or not any given open practice occurred (e.g., data sharing, code sharing, or preregistration), the second *requires* transparency for the standard, and the third *verifies* that the practice occurred to a high standard (e.g., through computational reproduction).

Once any given policy covers an open science practice mentioned by a publisher, funder, or individual journal, a suite of tools is available to enable the practice. Below are examples of such tools that we use to promote adoption of data sharing, preregistration, and a publishing format known as Registered Reports.

Materials generated during the course of a project are all too often lost when curation is left as an afterthought at the

end of a study. Protocols, datasets, research instruments, and analytical code end up on individual drives that may walk away within the normal course of turnover in a research lab. Using an online project management space that also enables persistent sharing (when the project is ready to be made public) reduces costs for the lab that is focused on getting results into the published literature. The OSF enables project management and is connected to built-in registries, data repositories, and preprint servers. Furthermore, it connects to versioning platforms such as GitHub and large online data storage providers such as Dropbox to enable curation. It also offers long-term preservation in partnership with Internet Archive.[23]

Preregistration is a process by which a researcher asserts that a study is about to occur and includes the main research questions and processes by which the study will be conducted. By submitting such declarations to a public (perhaps after an embargo period), searchable registry, consumers of scientific knowledge can better understand how much research is conducted in a field and can open the proverbial "file drawer" of conducted, but not necessarily published, research.[24] When the preregistration also includes a specific analysis plan, it can address some poor research practices such as selective reporting or cherry picking of an unrepresentative dissemination of research findings.[25]

Preregistration, along with easy to use study registries, *enables* better research practices. Registered Reports[26] (RR) is a publishing format that *incentivizes* this process. When a journal offers RRs, it commits to reviewing proposed studies (i.e., the preregistration) for possible publishing.[27,28] If a journal reviews and provisionally accepts the proposed study, it commits to publishing the final results *regardless of the main outcomes of the study*. Preliminary evidence finds that RRs are working as intended, by reducing publication bias,[29] increasing rigor of reported findings,[30] and still being cited as often as standard-format papers.

Over 300 journals offer RRs as a publishing offer, but several funders also engage with the format by funding research that has been given an in-principle acceptance for publication.[31] This eases outcome reporting enforcement because it is tied directly to a publication, and there is a strong, existing incentive to publish in the research community. Importantly, this coordination between journals and funders creates a broader system that is promoting culture change in the academic research community and is central to our systems-level approach to interdependent forces.

The examples above highlight the simple fact that new expectations in any community can turn into new norms only if they are rewarded, verifiable, and used. Furthermore, the decentralized nature of science requires coordination between researchers, institutions, funders, and publishers of scientific knowledge in order to make meaningful progress toward shared goals.

Lessons Learned in Coordinating the System

Coordinating system change is difficult, especially when incentives are not aligned with the desired normative behavior. Coupled with variations of community and disciplinary terminology, among other challenges, changing research culture can seem insurmountable at times. Navigating these complexities requires an agile and experimental approach. Pilot studies enable exploration of ideas before implementation, metascience (or science of science) research provides a mechanism to study intended and unintended consequences of change, and open communication and feedback allows systems to adapt early to enable eventual policy approaches to be aligned with the desired practices. Community engagement is critical to enabling reform movements to gain any traction, and coordination and participation across stakeholder groups can create a mechanism for continuous improvement and acceleration of change. A key consideration is constantly considering the users' workflows and experience so that behaviors can be easier and more efficiently implemented rather than being perceived as a bureaucratic hoop to jump through. Finally, training and education are important to sustain and increase adoption of change. Systems prefer homeostasis, and it is easy to default to prior behavior, even when we know it is a behavior we want to change. Simply telling researchers to implement open science practices is insufficient.

Let us consider RRs. As mentioned above, RRs continue to grow in their adoption since first being implemented. There are community efforts to grow this adoption[32] and innovations to combine RRs with funding and regulatory review.[33,34] This success did not occur in isolation by a single stakeholder or without adaptation. For example, early evaluation efforts highlighted challenges in the implementation of RRs, such as lack of protocol transparency.[35] These challenges led to opportunities to improve and align the process, specifically leveraging infrastructure to enable users to easily deposit their protocols, under embargo if necessary, so the accepted stage 1 protocol is openly available to interested readers.[36] For this open science reform initiative to continue to grow and advance, stakeholders had to adapt it. There are many future possibilities for RRs, most of which require continued coordination across stakeholders.

Time to Scale and Sustain the Change

Sustained research culture change will come when, together, we move past early adopters of open science practices to several agents within the system coordinating and

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supporting change. Specific open science initiatives that are now gaining traction and greater support across funders, publishers, societies, and institutions can be part of the more systemic culture change effort across research communities and stakeholders. Even small steps to pilot these initiatives within communities can garner needed insights to minimize friction at the outset and maximize outcomes and scalability over time. Greater coordination of these initiatives across all stakeholders can enable a bigger return on investment and minimize the burdens that are inherent to change.

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ScienceWriters2021: Some Highlights for Science Editors et al

Caleb Hess, Madison Semro, Danielle Gillen, Abagail Chartier, and Barbara Gastel

Although titled ScienceWriters, the annual conference of the National Association of Science Writers (NASW) and the Council for the Advancement of Science Writing (CASW) also has much to offer professionals in science editing and related realms. The following are highlights of some editorially related sessions of ScienceWriter2021, held September 28–October 8, 2021. Initially designed as a hybrid in-person and online event, with the in-person aspect in Boulder, CO, the conference was moved to online-only because of a resurgence of COVID-19.

Science in a Fact-Free World: Applying Lessons from the COVID Crisis to Climate Communication

By Caleb Hess

A word cloud populates in real-time; near the center, words submitted most frequently appear in progressively larger fonts: Scared. Hopeless. Overwhelmed. These were the audience's submissions when Katharine Hayhoe, chief scientist for the Nature Conservancy, asked for their one-word thoughts on climate change.

Hayhoe's presentation focused on the lessons gleaned from the COVID-19 pandemic about effective science communication. Specifically, it addressed how communication of politicized science can be reframed to appeal to cultural and political values.

Failures in communicating about climate issues and COVID, Hayhoe stated, stem from relying excessively on data to sway people's opinions. Instead, she said, values influence what information people are open to accepting more than data does.

Hayhoe noted that in the United States, political affiliation, which signals values, is associated with the most

polarization in individuals' stances on popular issues. The most scientifically literate individuals, she said, are just better at "cherry picking" facts that fit their worldviews. This means that the most scientifically literate Republicans aren't more open to considering climate change than their less scientifically literate counterparts are; rather, they are more likely to identify facts that reinforce their inaction.

Hayhoe said the most important step in developing more effective conversations about climate change is to make issues more concrete and more relevant to people who feel distanced from the effects of climate change. She said, "I was asked, 'How do we talk about polar bears in Iowa?' and my answer was, 'You don't!—If you're in Iowa, talk about corn.'"

Not only does climate communication require a more strategic approach, Hayhoe said; these conversations need to include concrete solutions. Communications about the effects of climate change need to acknowledge that people and organizations around the world are engaging in proactive and impactful behaviors. Feeling that one can take action, she said, inspires hope.

As the presentation drew to a close, Hayhoe once again asked the audience to submit their one-word thoughts on climate change. Another word cloud stirs to life. In the center, spelled out in bold green font, is a new word: Hopeful.

So You Want to Put Your Science on Social Media?

By Madison Semro

Social media is "all about connecting with your audience," said Maynard Okereke, the man behind @HipHopScience

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on Instagram and a panelist at this session. "You need to meet people where they are."

The panelists, who also included Rachel Butch and Ayanna Tucker (communications specialists at Johns Hopkins Medicine), gave tips for growing one's social media presence. The tips centered around 5 key ideas: trends, niche, story, consistency, and engagement. For example, tie-ins with trends can grab the attention of people so that they engage with your content, Okereke said. By incorporating them, you can reach more people—Okereke uses hip-hop trends and hashtags on his science posts to reach a broad audience of people who otherwise would not see his posts.

But, the panelists suggested starting by finding a strong voice and niche. Doing so can guide content development and keep the message consistent. The content should target a specific audience and respond to its interests, said Butch, who is behind the @JHMFundamentals Instagram account. For her science-interested audience, she has gradually increased the complexity of content, in keeping with her audience's demands.

In addition, you must know how to best use your platform, the panelists said, and curate your content for it to maximize your account's impact. For example, short videos are currently preferred on Instagram but may not perform the same on Facebook, panelists mentioned. And, the platform you choose may influence how you analyze your account's growth and success.

Tucker, who is behind the @JHMFundamentals Facebook account, pointed out that these metrics may not be consistent among platforms. For example, the way she analyzes the data for the @JHMFundamentals Facebook account differs dramatically from how Butch does for Instagram: Tucker analyzes her posts by type, while Butch does so by content. Still, the panelists said the most important metric usually is engagement, as it shows how many people are interacting with your posts.

The session concluded with a workshop in which participants developed plans to incorporate these tips into their own content strategy, followed by a general question-and-answer segment. A worksheet to help develop a social media presence was provided.

Editing Experts: How to Help Scientists Meet Journalism Standards

By Barbara Gastel

Many periodicals and presentation venues in the sciences now include articles or talks in which scientists address broad audiences. Helping the scientists communicate with nonspecialists can pose challenges. At this session, editorial experts shared experience and advice in this regard.

Organized and hosted by Monya Baker (from *Nature*) and Hannah Hoag (from *The Conversation Canada*), the session featured speakers Michael Lemonick (*Scientific American*), Tamara Poles (Morehead Planetarium and Science Center), and Fenella Saunders (*American Scientist*). At the beginning, the hosts and panelists each stated a pet peeve. The list: thinking one can write the same for all audiences, believing that just ending a piece equals writing a conclusion, neglecting to analyze the publication site before writing, requesting further changes after approving the editing, and objecting to "dumbing down" the science. Poles said she counters the objection to "dumbing down" by saying that instead she wants the scientists to build structures such as ramps and elevators to aid access.

In the main part of the session, the hosts posed a series of questions that they and others then addressed. Among the questions: How do you obtain scientists to write or speak? How do you set expectations? How do you explain the edits? Setting clear expectations at the outset received particular emphasis and was deemed time well invested. Baker noted the importance of explaining up front to the scientists that their work would be edited to help ensure accessibility. Other aspects that panel members mentioned included making clear to the scientists that the editors understand the audience well, describing to the scientists the phases of editing that their work will undergo, having authors sign an agreement, and checking in regularly with the authors. Saunders emphasized "invoking the reader" in justifying edits. Baker observed that talking with authors often yields wording clearer than that written.

After the question-and-answer period that followed, each speaker received a chance to offer a closing tip. Again, speakers stressed serving readers. "The audience is your primary interest," Lemonick said. Likewise, Hoag stated, "It's all about the audience."

Sketching for Science Writers

By Danielle Gillen

Make sure you have a notepad and something to sketch with, advised Bethann Merkle, the speaker for this workshop. At the beginning of the session, we received 45 seconds to sketch a tree. What does sketching have to do with writing anyway?

Merkle, director of the University of Wyoming Science Communication Initiative, created this session to focus on drawing as a communication strategy. Although many people believe that drawing is only for "creative" people, Merkle emphasized that anyone can learn to sketch. Through this session, Merkle taught tools for sketching and explained how they can aid science writers in reporting and storytelling.

When sketching, I envisioned a "classic" tree—a tree trunk with a cloud on top to resemble all the leaves together.

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At the end of our 45 seconds, many others commented in the online chat that they had created a similar image. Merkle noted that it is important to distinguish between stereotypes and real details. She told us to think about a specific tree, perhaps one from our childhood. She also told us to come up with 3 words or phrases indicating the details of the tree.

For our second sketch, we had 1 minute to draw a specific tree with our words or phrases in mind. Texture, branches, and leaves were my focus. With 1 minute and 3 words, I created an image very different from my first sketch.

Why should I use this technique in the field? Merkle explained that observational sketching helps condition our eyes to notice atmospheric details and that it is a device for memory recall. Merkle also described sketching as a creative process. She emphasized that creativity is a whole-brain process that anyone can learn with practice.

Finally, Merkle touched on 6 tools that can strengthen our sketching abilities. *Contour drawing* teaches us to focus on the edges of an object. *Words and phrases* help us connect new and existing knowledge. *Tracing* provides an outline that can be sketched into. *Framing* reminds us of spatial placement. *Marks* are like an alphabet—different tools create different patterns. *Historical context* promotes understanding the subject.

Making the Invisible Visible: Challenges to Explaining Deep Tech

By Abagail Chartier

Deep technology, the hidden tech that makes things in our lives work more easily, can be especially difficult to report on, in part because its jargon is difficult and pop culture perpetuates misconceptions about it. An hour-long panel discussion the last day of ScienceWriters2021 addressed overcoming this challenge.

Organized by science writer Anne McGovern, of MIT Lincoln Laboratory, the session featured 3 speakers: Kenna Castleberry, a science communicator at JILA (formerly the Joint Institute for Laboratory Astrophysics); Brandie

Jefferson, senior news director at Washington University in St. Louis; and Emily Mullin, a journalist teaching at Johns Hopkins University.

The speakers addressed coverage of topics such as quantum computing, cybersecurity, encryption, and biotechnology. They emphasized demystifying the technology and making sure its depiction was accurate. In Hollywood, they observed, quantum is often linked with that which seems magical and used to refer to anything complex. This misuse of the term merits correction, Castleberry indicated.

Castleberry suggested using analogies to make the topics more relatable to readers. She advised, however, against using too many, lest they overwhelm the other content.

Mullin called for using plain language where feasible. "If the term isn't necessary for the reader's overall comprehension of the story, then don't use it," she said. "If you can describe something in everyday terms … then do it!"

During the question-and-answer segment, an attendee asked how technology reporters know whether content and language are at a level a general audience can understand. "You need a very patient person in your life who has no concept of the underlying science," Jefferson replied, suggesting that the communicator refine the explanation until it is clear to the person.

In addition to the sessions on communicating science, ScienceWriters2021 included sessions on scientific topics. It also included the presentation of NASW awards, including the Science in Society Journalism Awards and the Excellence in Institutional Writing Awards. At the awards session, it was announced that the Sharon Begley Science Reporting Award was being established in memory of science writer Sharon Begley. The annual award, administered by CASW, will recognize the accomplishments of a mid-career science journalist. It will include a grant of at least $20,000 for the winner to pursue a substantial reporting project.

ScienceWriters2022 has been slated for October 21–25. Epidemiologic conditions permitting, the conference will be in Memphis, TN.

Baking Accessibility Into Your Process

Lorenzo Milani

In baking, to achieve good results, key ingredients must be mixed using the right proportions and in the correct sequence, then left to cook at the ideal temperature for a certain amount of time. With patience and good techniques at every step of the process, one can turn those ingredients into a great cake or pastry. The same holds true when it comes to implementing digital accessibility into an organization's product and content development processes.

The term *specialist* might come to mind in relation to digital accessibility, just like a pastry chef in the field of baking. By *specialist*, I mean someone who has the expertise and knowledge on implementing accessibility requirements and making sure that accessibility is considered at every stage of design and development. Having a specialist on a team is extremely beneficial: they can be a source of knowledge and can easily spot when a feature or a piece of content is inaccessible. On top of that, their experience with in-depth testing ensures no barriers have been introduced once everything is ready for launch.

However, organizations must not fall into the trap of over-relying on specialists and "dumping" all their accessibility needs onto a few people. Accessibility is often not considered at every stage of design and development, and more often than not, it is "bolted on" after launch, which is costly and time-consuming.[1] Some organizations might not even have access to specialists, in which case accessibility could be deprioritized altogether.

To properly "bake" accessibility into a process, it must be a collaborative effort. Accessibility needs to be considered and implemented with the right techniques at every stage of the process until it becomes a natural part of the process. To illustrate this, I will use some examples from my work as a specialist at SAGE Publishing (SAGE), highlighting approaches used to embed digital accessibility into our workflows.

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My Role as a User Experience Accessibility Specialist

SAGE has been seriously considering platform and content accessibility for about 7 years. We have come a long way since then. There have been efforts made to embed accessibility in multiple departments, such as design, development, production, and testing. They cover both accessibility on the platform side (for our various platforms) as well as the content side.

The key challenge is making sure accessibility remains a priority, especially when people leave the organization, and teams change. This requires constant training and knowledge-sharing across departments that have fewer accessibility experts. For example, when hiring for designers, we have recently added accessibility awareness and knowledge as part of the job description to make sure that it remains an integral part of their work.

I have learned a lot in my 4 years at SAGE, and my involvement in digital accessibility has deepened and grown to include multiple responsibilities. Resourcing for accessibility is not always easy, so advocating for accessibility alongside my specialist colleagues is one of my main priorities. However, we wear multiple hats and accessibility is not our only responsibility, so this advocacy work across the business is key in ensuring that we can evenly spread the work across teams. Initially, this was focused on the product management and development teams, but recently, my role has expanded to include advocacy, training, and support for various departments based in both the UK and the U.S.

We also need to keep accessibility awareness high across departments so that it does not get deprioritized. To do so, we constantly create accessibility documentation and repositories that can then be applied to our suite of products by various departments. By making sure that multiple teams have a strong accessibility foundation, we can then fill in the gaps where more technical expertise is needed.

Short-Term: Start Small

The smallest steps in embedding accessibility can ensure a strong foundation when tackling more longer-term approaches and strategies. As mentioned before, one of the main principles to follow is not to leave accessibility work until the end, but to consider it at every step, from ideation,

to design, development, and release or publication. This principle can also serve as a useful personal mantra for anyone: "Have *I* considered accessibility implications in my work?"

It is much more expensive and time-consuming to go back and fix accessibility issues after a product or a piece of content has launched.[2] Furthermore, consciously and continuously considering accessibility at every step allows a team to be more granular in identifying opportunities for improving the accessibility of a feature.

Everyone involved in a project should be considering accessibility, not just the experts. Teams can be tempted to relegate specific accessibility requirements to 1 or 2 people, but having more people involved in considering accessibility is much more effective, and the key is starting small. For example, elements of accessibility such as color contrast[3] and alternative text,[4,5] which can be easily reviewed and tested, are a good place to start.

A small step we have taken early on to make sure accessibility is always being considered is adding accessibility sections to technical requirements that need to be completed before being sent out to developers. Over time, these requirements have become more detailed and are not just being left to the specialists to fill out. I usually review requirements that have been written and change or add to them where appropriate.

Short-Term: Education

Training and education are a key part of raising and maintaining accessibility awareness that can be implemented early on in developing an accessibility process. There are plenty of free educational websites and tools anyone can access to learn about the tools for testing and evaluating the accessibility state of a site or application, as well as best practices, guidelines, and insights into what other organizations are doing.

Many of these resources are meant for anyone, not just experts, and can be a continuous source of knowledge as well as inspiration. Here are five of my favorites:

1. Web Accessibility in Mind[6] (WebAIM): a fantastic resource from Utah State University's Institute for Disability Research, Policy and Practice. They provide accessibility guidance, tips, commentaries, and training in a practical and easy to understand format. They also have a strong social presence and community and have developed the free to use Web Accessibility Evaluation (WAVE) Tool.
2. A11Y Project[7]: the A11Y Project "is a community-driven effort to make digital accessibility easier" and takes a very hands-on approach to getting started with digital accessibility.

3. 24 Accessibility[8]: an "advent calendar" style blog with tips and stories about working with digital accessibility.
4. AccessibiltyOz[9]: an Australian consultancy founded by Gian Wild with offices in both Australia and the US, they also provide excellent training resources and webinars.
5. UX Movement[10]: a user experience site that publishes very specific and practical articles. Their accessibility articles debunk many myths surrounding accessibility.

We also encourage colleagues to attend free webinars and training sessions. These tend to be practical and cover concepts that are immediately applicable, and even more importantly, give the audience a chance to ask questions. Deque,[11] TPGi,[12] and Level Access[13] have some excellent free webinars.

At SAGE, we've run accessibility training sessions for different groups. The most effective of these have been the "Accessibility Bootcamps," where we start by building empathy and making the case for accessibility, then we move on to more technical guidelines. These inclusive training sessions offer a great starting point for colleagues who have little experience with digital accessibility.

Medium-Term: Effective Communication

Having raised awareness for the need to design and create accessible products, the ongoing challenge in the medium-term will be making a smart and effective case for accessibility. Although it is necessary to highlight the legal implications of having inaccessible content, framing accessibility work as a positive ethical and business benefit rather than a burden is much more effective for a sustainable process.[14]

> *...framing accessibility work as a positive ethical and business benefit rather than a burden is much more effective for a sustainable process.*

On top of that, when designing with accessibility in mind, the experience will improve for all users.[15,16] This has helped us multiple times when making the case for an accessibility feature to be added to a page. For example, if you are making the case for video captions, do not just say, "We need captions on our videos or else we will get sued." Legal action might be a strong motivator to introduce captions, but it usually leads to quick fixes that will not be sustainable in the long run. Instead, frame the need for captions as a strong benefit for everybody, "Captions are now widely used across video streaming services, and people use them for many different reasons. Adding them would make our videos more accessible and usable by everyone." This way, captions become an expected and usable feature for videos rather than a one-time fix.

As your organization starts to incorporate more accessibility features, the requirements needed for these features will become longer and more granular. A side effect is that these requirements can become confusing. Describing expected behavior for keyboard and assistive technology can lead to lengthy documents and the need for clarification. An effective way of solving this issue is using visual annotations on wireframes or screens to visually indicate elements such as headings, alternative text, landmarks, and reading order.

This makes it much easier to show where elements need to go and how they should be marked up, as well as demonstrating how an assistive technology and/or keyboard user might navigate the page. Deque have an excellent guide[17] with getting started with these annotations, which can then be tweaked to suit specific needs.

Long-Term: Reuse, Share, and Improve

There is no need to reinvent the wheel every time a new project, feature, or collection is launched. Reuse what has already been created to set a standard process for

Figure. An annotated screen from our SAGE Knowledge platform, which includes landmarks, heading structure, alternative text, and expected reading order for a search result.

accessibility and to create a knowledge base that everyone in your organization can tap into.[18]

We have added accessibility and inclusive design to our Design System. In short, a design system is a collection of reusable components, standards, and guidelines for building products. This not only ensures that the whole organization has access to an agreed-upon set of accessibility standards for different design elements, but also includes other factors that can influence the accessibility of a page, such as typography and language. The Design System from telecommunications company Orange[19] is a fantastic resource for getting started.

> *Was accessibility considered at every stage, and if not then why?*

When a new feature or product has launched, it is also worth running accessibility-focused retrospectives. These are sessions during which a team evaluates a recent project and considers what went well and what could be improved. Was accessibility considered at every stage, and if not then why? Running these retrospectives with a focus on accessibility is a useful tool for everyone involved to understand the small steps needed to constantly improve the accessibility workflow.

Long-Term: Avoid Silos

One of the most difficult long-term challenges will be communicating these accessibility developments to the wider organization in order to share knowledge and demonstrate the impact of the work surrounding accessibility. The latter is always problematic, as sometimes the impact of an accessibility development is not immediately demonstrable compared to other features, which often rely on usage data to show their impact.[20]

A practical way around this is to set meetings focusing specifically on accessibility. At SAGE, I attend a monthly Accessibility Working Group (AWG) meeting. Representatives from different departments who are involved in accessibility work meet to share updates, coordinate new projects, and discuss developments in the industry. We have also run quarterly Stakeholder Meetings of the AWG, where we have updated stakeholders on different developments across the business, demoed new accessibility features, and opened the floor to questions.

Awareness of and attendance at these meetings are something we are trying to improve. We want to make sure the attendees are engaged and cascading the information presented to their respective teams, and to do so we often tweak the format and seek feedback on how to make these meetings more informative. Even at this stage of accessibility maturity, it is essential to adapt and keep accessibility high in the organization's priorities.
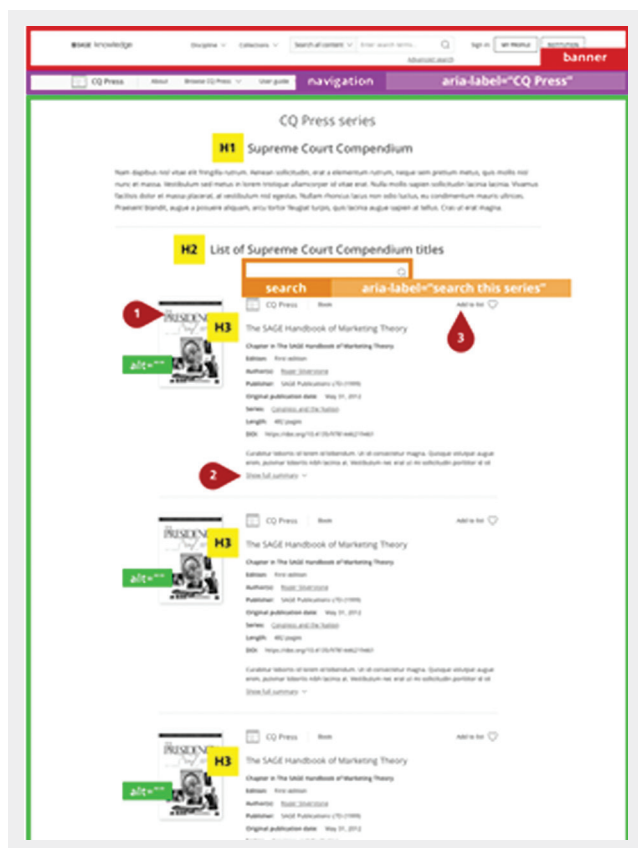
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Accessibility Is a Continuous Process

All these process improvements for baking-in accessibility are things my colleagues and I are constantly working on to improve and adjust to fit user needs, the business requirements, and our resources. In the context of an organization, this is similar to security and privacy where ongoing investments and maintenance are needed in order to maintain a strong level of safety.

Ultimately, the challenge is making sure that people are aware of the importance of designing with accessibility in mind, and the major driver for this is collaboration. As soon as teams become siloed or accessibility becomes relegated to 1 or 2 people, accessibility goes back to being a checkbox feature rather than a foundational principle. Through continuous training, improvement, communication, and standardization, accessibility can remain at the forefront of priorities and become "baked-in" into an organization's workflow.

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Publishing Accessible Content

Nina Amato

Introduction

Equal access to web content is long overdue. Publishers must ensure that content is accessible to people who are blind, deaf, neurodivergent, color blind, lack contrast sensitivity, or who use tools other than a mouse to operate their computer.

I am a user experience designer and a former web developer. As a developer, I spent years coding accessible content for U.S. government websites. This article will identify some coding conventions that will make websites more accessible.

Publishers can begin to address the needs of all users with coding conventions that make websites more accessible. These efforts will be furthered by an understanding of how people navigate the web with screen readers, and an awareness of how different people view color. This article will focus on strategies around color and for screen readers.

Test Your Site Without Using a Mouse

As a first step in reviewing a website for accessibility, consider that some people navigate websites without a mouse. A customer with quadriplegia may use a mouth-operated controller, and a reader with a broken arm may tab through a website.

It's easy to test a website without a mouse and it's critically important to do so. Tab through all of the elements and make sure that all parts of the navigation, all form fields, and all other elements can be accessed without a mouse. Elements that cannot be accessed without a mouse should be recoded to make them accessible.

Screen Readers

A screen reader is a software program that reads content aloud. Screen readers are utilized by people who are blind or who have reduced vision or dyslexia. Screen reader functionality is built into several operating systems, including Microsoft Windows 10/11, Apple's macOS, Google's

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Chrome operating system, and on mobile devices running iOS or Android.

Test Your Website With the Screen Reader on Your Computer

Every publisher should test their website with a screen reader. Below are tutorials for using the screen readers native to different operating systems:

- Microsoft Windows screen reader tutorial[1]
- Chromebook screen reader tutorial[2]
- Mac screen reader tutorial[3]
- iPhone screen reader tutorial[4]
- Android screen reader tutorial[5]

After you watch one of these tutorials, turn on your screen reader and navigate your website without a mouse.

When testing with a screen reader, it's important to test the functionality commonly used by screen reader users. Many screen reader users are blind and do not use a mouse, so it's important to avoid using a mouse when testing. It's also important to test commonly used screen reader functions including the Links List and the Headings List. These lists allow screen reader users to jump to a specific heading or link on a web page.

Headings

When this article first loaded in your browser, did you skip past the introduction and jump down to another section? Scanning articles for headings is a common reading behavior.[6]

When I conduct usability tests with people who are blind, I ask them: "What is the first thing you do on our website?" Each person has told me that they open the headings list in their screen reader. When you first look at an article, such as this one, chances are you scan it and look for section headings. Screen reader users do this, too. However, screen readers only detect headings if they are coded as headings. To be coded as a heading, the text must be contained in HTML heading tags such as <h1>, <h2>, <h3>, <h4>, <h5>, or <h6>. This is reviewed in the following examples.

Example 1.
`<h1>`**Title of the Article**`</h1>`

Figure 1. Example 1: HTML for H1 tags.

CONTINUED

```
Example 2.
<h2>Abstract</h2>
```

Figure 2. Example 2: HTML for H2 tags.

Level 1 headings. Level 1 headings have the highest hierarchy on the page. On an article, the title of the article should use a Level 1 heading (Figure 1). This means that it should be coded with <h1> tags. Level 1 headings often have the largest font size on a page to help people identify their importance in the hierarchy. There should only be one level 1 heading on each page.

Level 2 headings. Level 2 headings come after a level 1. On an article page, the headings for "Abstract," "Introduction," and "Results" should be coded with an h2 tag (Figure 2). There is no limit to the number of h2, h3, h4, h5, or h6 headings on a page.

Text that is coded with heading tags will appear in a screen reader's headings list. This allows screen reader users to jump to each of those headings. If they choose the "Abstract" heading, their screen reader will move to the abstract, and if they choose the "Results" heading, the screen reader will move to the results section of the article.

Unfortunately, sometimes developers code section headings without using heading tags. Big, bold text that breaks up a section may be visually attractive to sighted users, but screen readers will not detect it as heading text if it is not coded correctly, preventing users who depend on screen readers from navigating the article. Developers must avoid using alternate tags to code headings, and publishers should establish coding standards to ensure that WCAG guidelines[7] are followed.

Headings in Word Processing Programs

Word processing programs such as Microsoft Word[8] and Google Docs[9] use headings. Adding headings to documents makes them more accessible to screen reader users. Utilize the headings options with this software to make documents accessible to screen reader users.

Links Should Be Understood out of Context

Scholarly articles have links to references near the end of the document. Sometimes readers open articles they've read before just to get to that list of references. Imagine that you were one of those readers—and that you were blind. You've loaded an article in your web browser. You know the references are linked at the end. Do you really want to listen through an article you've read multiple times just to get to the links at the end?

Screen readers have a solution for this: the Links List. Similar to the Headings List, the Links List reads aloud all of the links on a page. It reads the link text that sighted readers usually recognize as blue and underlined. The problem is that the Links List only reads the hyperlinked text; it doesn't read the text before it or after it. Thus, the Links List does not provide additional context outside of what is linked.

Imagine that an article has 35 references. Each of those references is listed in paragraph text (i.e., nonlinked text) with links to that reference in Google Scholar, PubMed, etc. Screen readers only read the hyperlinked text. This means that a screen reader user will hear something like this: Google Scholar, PubMed, Google Scholar, PubMed, Google Scholar, PubMed. It will read "Google Scholar" 35 times without knowing which reference that link is referring to.

Developers have a couple of workarounds for this. The preferred method[10] is to add hidden text to each link[11] that is read aloud by screen readers but hidden from the view of sighted readers.

Or, they can add an aria-label attribute to each link. Aria-label attributes contain hidden text that is read by screen readers; that text provides context to the hyperlink text. One drawback of aria-label attributes is that some browsers may not translate aria-label text when the browser translates that text to another language.

A common mistake developers make is relying on the title attribute to add context to a hyperlink. This is a mistake because some screen readers do not read the text in the title attribute on hyperlinks by default.[12] You don't need to understand HTML to check for this functionality. Test your website with a screen reader and open the Links List. If the links cannot be understood out of context, ask your development team to add hidden text to those links.

Alternative Text

Images can be described to screen reader users if alternative text (i.e., alt text) is provided. Alt text is an attribute added to the code for an image. This can be challenging for complex scientific figures, but it's important to provide a text alternative for screen reader users.

Use Text Instead of Images of Text

Avoid placing text on an image. I've seen publishers convert data tables into images; this should be avoided. Text should be coded as text to be accessible to more readers.

If the image must include text, as is common on websites like Instagram, add alt text to the image. Below are resources showing how to add alt text to images in Microsoft Word, Twitter, Instagram, and Facebook:

- How to add alt text to Word documents[13]
- How to add image descriptions in Tweets from Twitter[14]
- How to edit alt text for images on Instagram[15]
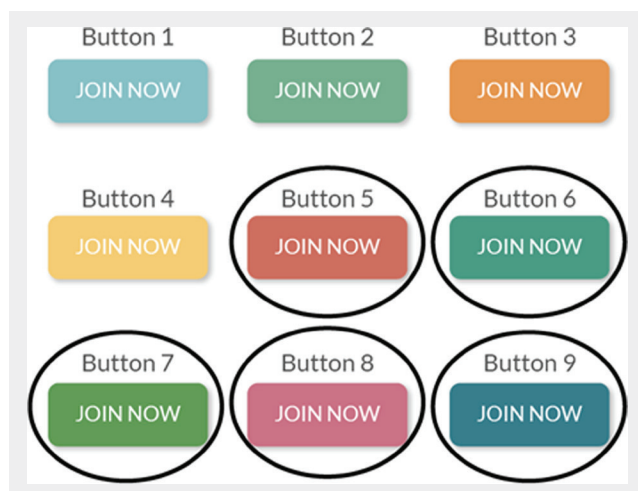- How to edit alt text for images on Facebook[16]

Figure 3. Nine calls to actions (buttons) in varying colors, each with white text reading, "JOIN NOW." The lighter colors lack sufficient contrast between the button color and the text. The last five buttons are circled because they have sufficient color contrast.

Accessibility for Non-Screen Reader Users

Color Contrast

Text needs to have sufficient color contrast compared to its background. For most articles, the text color needs to have a contrast ratio of 4.5:1 compared to its background color.[17] Your designers can test their typography colors with a tool such as WebAIM's contrast checker.[18]

Maintaining a legible text color is easy for articles. It gets trickier when designing calls to action that need to stand out, such as buttons to "subscribe," "join," or "learn more." Figure 3 illustrates nine calls to action with white text and the words, "JOIN NOW," each in a different color. The first four calls to action have pale backgrounds: light aqua blue, muted light green, orange, and yellow. These all lack sufficient contrast compared to their white text. The last five calls to action are darker and include brick red, deep muted green, a dark spring green, dark pink, and rich teal. These color combinations have sufficient color contrast while the first four lighter colors do not.

Links Should be Underlined

Links should be easy to identify for everyone. They should not rely on color alone or on a hover state to be identified. Links that are only identifiable by color may not be recognized by people who are color blind or with a lack of visual contrast sensitivity. Links with an underline that only appears on hover may not be recognized by people who navigate without a mouse and therefore cannot hover over them. The easiest solution to this is to underline all links.
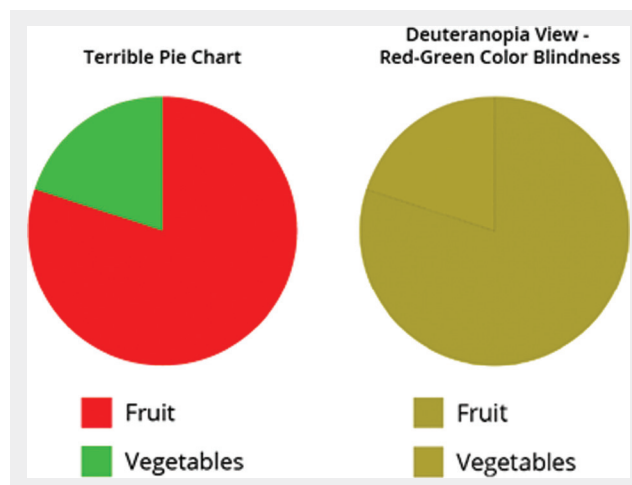

Figure 4. A terrible pie chart, without labels, shown in the designer's view and a red/green color blind view.

Link Color Contrast

Links should also be in a color with a contrast of 3:1 compared to their surrounding text.[19] For example, if the article text is black, the link color should be a bright blue that stands out, as opposed to a dark muted blue that is harder to detect.

Don't Use Color Alone to Convey Information

One of the WCAG accessibility guidelines warns us to avoid using color to convey meaning.[17] Avoid assigning meaning to colors because some people in the audience identify colors differently. This can be challenging with scientific figures. Figure 4 is an example of a pie chart that uses color to convey meaning. In this fictional pie chart, the large red slice represents a large quantity of fruit, and the small green slice represents a small quantity of vegetables. The image on the left shows this pie chart in red and green. The image on the right shows the view for someone with deuteranopia (red/green color blindness). The two slices are difficult to differentiate in the deuteranopia view.

Figure 5 is a pie chart with the same quantities and similar colors. The key difference is that the quantities are listed in text in Figure 5; fruit: 80%, vegetables 20%. Listing the quantities makes the information accessible to people without relying on color. When an image like this is presented on a website it must also have alternative text that includes the quantities to make the data accessible to screen reader users.

Figure 5 has a couple of visual improvements over Figure 4. In Figure 5, the pie chart slices are separated by a thick white border. This helps differentiate the pie slices
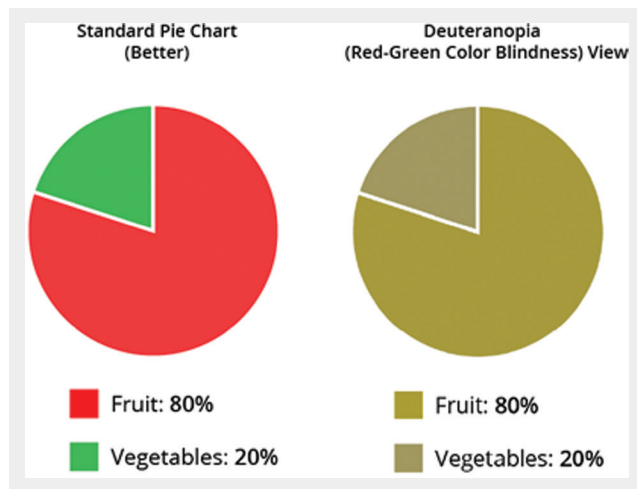
CONTINUED

Figure 5. This improved pie chart lists the numeric values for each pie slice and separates each pie slice with a thick high-contrast border to make it easier to read.

for people with color blindness. Using Adobe Illustrator to simulate the deuteranopia view also allowed for adjustment to the shades of red and green, making them a little more distinguishable.

Technical Standards: WCAG

This article highlights some easy changes to help publishers make websites more accessible.

Development teams should carefully review the WCAG standards[7] (the current version, as of January 2022, is WCAG 2.1). These include topics not covered in this article, such as captioning for videos, keyboard traps, etc.

Test your website with a screen reader—and without a mouse!—and follow WCAG standards to make your website accessible to everyone.

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Scholarly Publishers Unite to Stake Their Position in the Research Enterprise

Nina Hoffman and Erin Landis

The value scholarly publishers provide their communities has become a source of debate for more than a decade. Consider that in 2012, Kent Anderson of Caldera Publishing first penned "A Proposed List—60 Things Journal Publishers Do"[1] for the *Scholarly Kitchen*, which has been regularly updated to currently include more than 100 attributes in its most recent version (2018).[2] Yet, here we are at the start of 2022, and we still find ourselves in the position of needing to prove the worth of scholarly publishers to the scientific community at large.

Pressures on scholarly publishers have come to bear from various directions. Funders who want and need to have their funded research published are now becoming publishers themselves and doubting the significance of publishers' peer-review processes; for example, the Wellcome Trust encourages its grantees to publish their research on the Wellcome Open Research Platform. Funders are also questioning the significance that publishers bring to disseminating research; these same funders often want to dictate the publishing ecosystem and invalidate the editorial process that curates the content and provides access to the data in multiple formats. In some cases, these funders remove the ability for an author to select their journal of choice for publishing their research. Given the continued reliance on the Impact Factor in the academic promotion structure, forcing authors to publish in less-regarded journals could negatively affect their career. When these actions are considered in relation to the rise of the CC-BY license[3] (a Creative Commons license that allows use of content without permission so long as attribution is provided), it calls into question the merit of protecting intellectual property by negating copyright credit; this dismisses the role publishers play in protecting an author's right to their scientific discoveries. Copyright protection is an author's first line of defense.

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Opinions expressed are those of the authors and do not necessarily reflect the opinions or policies of the Council of Science Editors or the Editorial Board of Science Editor.

There are also the pressures stemming from the Open Access movement and the momentum it has gained, spurred largely by cOAlitionS and its myriad demands of researchers funded by its signatories. Additionally, cOAlitionS stipulates that publishers share their cost structure to prove their services are worth the price. Furthermore, the growth of predatory publishers in the marketplace also threatens the scholarly communications system, leading to confusion among readers and authors. Then there's SciHub, which scours the Internet looking for ways "in" to co-opt content from respected scholarly publishers because it too knows and values the contributions made by established brands. All told, these various sources of threat ultimately devalue publishers, ignoring the "Good Housekeeping Seal of Approval" that brand association brings. Arguably, this results in diminished confidence in science.

It was against this backdrop that the Publishing Professional Group (PPG) of the Council of Medical Specialty Societies (CMSS) set out to educate the scholarly communications community of the value scholarly publishers bring to the research enterprise. A small workgroup of the PPG tackled this issue over the better part of 2020, engaging in a deliberative process to carefully define the value scholarly publishers bring to the table. The members of that group are Nina Hoffman (American Society of Hematology), Christine Laine (American College of Physicians), Erin Landis (American Gastroenterological Association), May Piotrowski (American Academy of Ophthalmology), and Justine Turco (American College of Cardiology). The workgroup set out to accomplish 3 goals: 1) reach a common understanding of the unique value of scholarly publishers; 2) educate the various stakeholders in the publishing enterprise about that value; and 3) create standard language to articulate that value across formats and scholarly publishers.

To begin our work, we first identified the various stakeholders in scholarly publishing. The list we developed was exhaustive, leading us to realize that we needed to start small and focus on a select number of stakeholders. How did we narrow our focus? We used an "Interest vs. Power" matrix (see the Figure). We plotted each of the 30+ stakeholders against the axes of Interest (the degree of interest a stakeholder has in the scholarly publishing process)
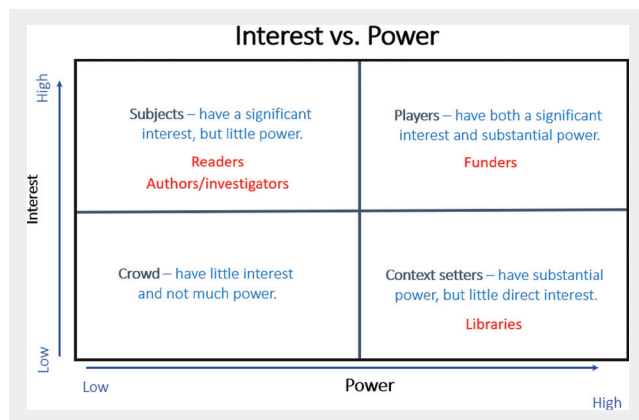
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Figure. Interest vs. Power Matrix used to help prioritize stakeholders in the scholarly communications ecosystem.

and Power (the degree of power, or influence, a stakeholder has to affect the scholarly communication process). We then determined we would develop value proposition statements for any stakeholder that fell in the "Players" quadrant—these are groups that have both significant interest and substantial power. As a result, we chose to focus on readers, authors/investigators, funders, and libraries.

Our next step was to engage in a process to develop statements for these specific groups. A value proposition statement is defined as a "promise of value to be delivered, communicated, and acknowledged."[4] With this definition in mind, we used a value positioning template designed by Geoffrey Moore, who is an organizational theorist, management consultant, and author.[5] In brief, the template asked us to identify our "target customer;" their main "problem" or need; how we, as scholarly publishers, solve that problem; and our key elements of differentiation from others in the field attempting to solve the problem. We ran through this cycle for each of the 4 stakeholders.

From there it was on to the writing process. After we drafted the statements, we shared them broadly with the full CMSS PPG for their review and feedback. After incorporating that feedback, we finalized the statements and sought endorsement from the president of CMSS. The final statements are below:

Readers
For readers who need high-quality, trustworthy information related to their areas of expertise, scholarly publishers deliver peer-reviewed journals of curated and relevant content that is scientifically vetted, easily discoverable, and accompanied by important supplemental content.

Authors/Investigators
For authors and investigators who need their research reviewed, published, and disseminated, scholarly publishers provide peer-reviewed journals that offer fair and constructive feedback, provide production value, and promote the published work.

Funders
For funders that need the research they support to be published and disseminated, scholarly publishers deliver peer-reviewed journals that provide a home for scientifically vetted research output, help authors comply with access mandates, and augment visibility of the published work through promotion.

Libraries
For libraries that provide scientific and medical literature to researchers in varied disciplines, scholarly publishers supply peer-reviewed journals that provide a reliable, ethical, archived, and easy-to-access source of vetted content.

We are now in the process of collecting endorsements of these value proposition statements from the 40+ member societies of CMSS. These statements are discipline agnostic—although developed under the auspices of a medical specialty society, societies, publishers, and journals from any field of study, whether they be in the life or physical sciences, humanities, or biomedicine, can endorse these statements. We encourage you to ask your leadership if your society will consider becoming a signatory. To express your interest, please include your society or publisher details on this list.[6] In the early spring of 2022, we will provide all signatories with a social media toolkit so that we can collectively publicize the value proposition statements.

As stewards of the scholarly publishing enterprise, it is incumbent that we stand united and use our collective voices to demonstrate the value we add to the research ecosystem. We hope that you consider joining this critically important effort. For questions, or to let us know you have included your details in the above link to become a signatory, please email us at elandis@gastro.org and nhoffman@hematology.org.

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Rising Again in Phoenix!

Kelly Hadsell and Heather Staines

The 2022 CSE Annual Meeting will take place May 1–3 in Phoenix, AZ, and we have the honor of serving as this year's Program Committee Co-Chairs. Along with our dedicated Committee members, we are working diligently to carry on CSE's tradition of outstanding educational content and networking opportunities.

We're thrilled to announce that the theme for this year's meeting is "Phoenix Rising: Adapting, Collaborating, and Learning in Scholarly Publishing." As the first in-person CSE Annual Meeting since 2019, this year's conference will offer attendees the opportunity to meet new industry colleagues on site. As we have all learned during the past few years, both professionally and personally we must be willing to adapt to changing circumstances, imagine new ways to collaborate, and consider each other as vital sources for new learning. Breakout sessions presented by expert speakers at this year's annual meeting will be a mix of tried-and-true topics with universal interest to editorial offices, journals, authors, and reviewers, and will include lessons learned during the pandemic.

We are looking forward to 2 keynotes this year. First, undoubtedly, you've noticed a lot of activity in the mergers and acquisitions space, with publishers buying services companies and long-time service providers buying platforms and technology startups. The Program Committee was curious about how all of these developments would affect publishers, especially society publishers. Lisa Janicke Hinchliffe, Professor and Coordinator for Information Literacy Services at the University of Illinois at Urbana-Champaign, and Roger Schonfeld, Director, Libraries, Scholarly Communication and

Roger Schonfeld

Museums at Ithaka, have kindly agreed to help us make sense of recent changes and to share some of their thoughts on the longer-term impacts of these developments.

Our second keynote will feature Zoe Swann, a cognitive neuroscientist and PhD Candidate at Arizona State University with an advanced knowledge of stroke, neurotrauma, and neurolinguistic disorders. Zoe is also a contestant in this year's "Dance Your PhD" contest, sponsored by the American Association for the Advancement of Science. Zoe will talk about unique methods in scholarly communications intended to help lay audiences make sense of science advances. She will share some of her novel teaching strategies, as well as her own journey in creating her submission video detailing her research in rehabilitation for stroke patients.

We hope you'll join us in Phoenix as we come together as a community for the first time in 3 years! We're looking forward to having the opportunity to collaborate with and learn from our peers in the exciting and ever-changing world of scientific publishing.

Lisa Janicke Hinchliffe

KELLY HADSELL is Managing Editor, *Journal of Medical Regulation*, Federation of State Medical Boards. HEATHER STAINES is Senior Consultant, Delta Think..

Zoe Swann

Introducing Ask Athena

Athena was the Greek goddess of wisdom. Ancient Greeks would visit her temple in Athens to seek answers to their most troubling issues. Modern times are no less complicated, and lacking pilgrimage to a temple as an option, we turn to other sources for advice. This may mean a friend, a therapist, or perhaps… an advice column.

Science Editor is pleased to introduce Ask Athena, an advice column where you can bring your most challenging questions. Have a problem managing staff? Ask Athena! Struggling with your own performance rut? Ask Athena! Need ideas to make your publication the best it can be? Athena can help with that too. This column will address all questions related to publishing, whether they be about internal office issues or external journal wide challenges.

So bring us your questions. Let *Science Editor* be your temple of wisdom. All questions can remain anonymous, so you need not reveal your identity for sensitive issues. Submit your questions to scienceeditor@councilscienceeditors.org. We will attempt to answer them as quickly as we can, and post answers online ahead of print so that time sensitive questions are not delayed.

Ask Athena: How can I improve publication speed at my journal?

Dear Athena,
How can my journal improve its turnaround time: from date of submission to print and online publication? Our current process takes about 12–15 months. Once a manuscript has been provisionally accepted following peer review, a scientific editor will substantively edit the manuscript and review with the author, a copy editor will review and layout the manuscript in Word, the same scientific editor will re-review the manuscript, a second copy editor will review and layout the manuscript in galley form (PDF), the same scientific editor will re-review again, and then the day before the manuscript is sent to the printer, the editor-in-chief will review. A major complaint from authors is the long turn-around-time. This is the premier journal for the profession, is managed in-house by an association, and is a benefit to all members (>95,000) of the association. Articles are not online ahead of print.

—*Need for Speed*

Answers to Ask Athena questions are a group effort by members of the CSE Education Committee.

Dear Need,
The problem of slow turnaround time is one that many journals struggle with. Many authors say they want to receive decisions on their manuscripts faster, while many reviewers feel they need more time to submit their reviews. Balancing the interests of those two groups is important, but also a significant challenge.

There may be several places within your process that you could consider changes to improve your turnaround time. Common bottlenecks in the peer-review process include an editor's first look at a paper, and the time it takes to make a decision once the reviews are complete.

My first recommendation is to be clear with the editors regarding expectations. How quickly do you expect them to attend to a paper after it has been assigned to them? How quickly are they expected to make a decision once the reviews are complete? Many journals ask their editors to attend to these tasks within 48 hours.

Once you have clearly established expectations, report on them. Many journals send the editors a regular report on their turnaround times, so they can see exactly how timely they are and how they compare to the agreed standards. Some journals even show how the individual editor compares to the other editors. A little peer pressure can go a long way. No one wants to be the slowest editor, and being the fastest definitely comes with bragging rights!

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> **The editor-in-chief needs to make sure editors understand the priority of being timely.**

Make sure that these mandates on timeliness are coming from the editor-in-chief, and not just staff. The editor-in-chief needs to make sure editors understand the priority of being timely.

If there are delays early on in the peer-review process, the difficulty may be in identifying reviewers. Luckily, there are options to help the editors with this task. If you are using one of the major manuscript processing systems, work with your account manager to see what kind of reviewer discovery programs are available to you. They may even be fully integrated with your manuscript system already.

Next, don't be afraid to nag. Again, let your manuscript system work for you, and make sure you are utilizing all the available automatic reminders to editors. Are you reminding editors to suggest reviewers? Reminding them to suggest additional reviewers when needed? Reminding them to make a decision on a paper?

Another common place papers get delayed unnecessarily is when authors submit a revised paper, and the editor sends it back to the original reviewers. Often this is necessary if the authors have made extensive changes. In those cases, the editors will want input from the reviewers a second time. However, if the requested changes were minor, and the authors have addressed them all satisfactorily, encourage editors to make a decision on the paper without sending it back to the external reviewers.

As for your postacceptance processes, it sounds like you may have some redundant steps in place. I count 4 people touching this manuscript during the editing process, over the course of 9 different steps, so make sure that each person and each step is adding value, and enough value that it is worth taking the time for it.

Also, consider how you might consolidate those steps. For example, could the first editor after acceptance take care of the substantive editing, copyediting, and layout, so that the author next sees the paper in galley form? That would allow the author a final look at the paper before publication to ensure accuracy. Also, it may be better to move any substantive editing to preacceptance, so that the paper is in its final form before copy editing begins.

And finally, consider moving to a publish-ahead-of-print model. That can reduce the time to publication significantly and has become standard in many fields. There are many things to consider when switching to a publish-ahead-of-print model, but the benefit in terms of time to publication means a lot of time saved and most importantly, happier authors.

Ask Athena: Is it ever okay to edit reviewer comments?

Dear Athena,
Is it okay for me as an editor that manages the peer-review process to remove comments regarding how well the manuscript is written? For example, reviewers will first write that the manuscript is "well-written" when it is not. Examples include nonnative English speakers using incorrect grammar or authors who ramble, or are repetitive, etc. It seems like reviewers write this before providing any criticism, as a way to soften the criticism. Is it ever appropriate for an editor to remove content from a reviewer's comments to the authors?

—*Hesitant Editor*

Dear Hesitant,
There are two questions at play here, and I will answer them both in turn. The first question is whether it is ever okay for journals to edit reviewer comments. The second is whether this particular use case is acceptable.

All reviewer comments should at least be given a light copyedit to make sure grammar and syntax are correct before being sent to the author. The difficult part is how much control journals should exert over the actual content of the review.

Kent Anderson wrote about this recently in his e-mail newsletter The Geyser.[1] He said, "Many journals [will] clean up typos, remove ad hominem attacks, tone down vitriol, smooth out bad syntax, or remove formatting problems. These types of edits are harmless and helpful, and they're typically done quickly by experienced editorial staff."

Some comments can, and probably should be, removed. One example would be comments regarding the acceptability of a paper. Reviewers should not say, "This paper should be published in this journal once some changes are made." That is the purview of the journal, and it could also leave the journal open to rebuttals if the paper is rejected. For that reason, I feel it is appropriate to remove comments regarding acceptability, especially if the journal has asked reviewers not to comment on it. Any comments regarding acceptability should be kept to the confidential comments to the editors.

In addition, journals should be careful regarding the tone of the language used in reviews. Most reviewers use language that is helpful and collaborative. They are reviewing at least in part because they have an interest in helping authors improve their papers, and the language and tone of the review should reflect that. But, in cases where reviewers may not be at their best, and their language may be unnecessarily negative, I believe it is okay for journals to either remove the comments completely (if needed) or rephrase them in a more positive

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way. As much as possible, the reviewers' intent should be preserved even if the wording is different. Journals should make the smallest changes possible so that the reviewers' intention remains intact.

Other items journals should look for in reviews include possible identifying information. If your journal uses a single-anonymous system in which the identity of the reviewers is unknown to the authors, there should not be any information in the review which might inadvertently indicate the identity of the reviewer. Those comments should be rephrased or removed if needed.

Finally, the content of a review should be in keeping with the recommendation of the reviewer. A reviewer who is recommending rejection but includes only positive comments to the authors could cause some real confusion for those authors.

And that brings us back to your original question. Is it okay for the reviewers to say the paper is well written if it is not? And should the journal remove that comment before it goes to the authors?

The answer to the first question is probably not. That seems a little disingenuous. Unfortunately, you can't stop them from saying it, even if you advise against it.

> *If the reviewer has said a paper is well-written when it is not, your next steps may depend on what else the reviewer has to say to the authors.*

The answer to the second is perhaps not to remove it, but ensure it fits into the larger picture of the review overall. If the reviewer has said a paper is well-written when it is not, your next steps may depend on what else the reviewer has to say to the authors. If there are additional comments regarding grammar and syntax, the journal could safely remove the "well-written" comment and change that to say the paper would benefit from language editing for clarity. In this case, the meaning is preserved, but while the first way is negative, the other is positive, and more importantly, actionable. If the reviewer says the paper is well-written but then goes on to say that it focuses on the wrong things or is lacking important information, then the tone and content of the review should reflect that, including comments about what specific changes could be made to improve the paper. Assuming that information is included, it is safe to remove the comment about the article being well written, because that idea is not relevant to the overall message of the feedback and may ultimately end up being somewhat confusing for the authors.

Consider adding some brief instructions for reviewers that ask them to focus largely on the content of the paper, and not the quality of the writing, unless they are offering the suggestion in a way that is actionable for the authors (see above).

Ultimately, it is up to the discretion of editorial staff to determine when a reviewer's comments should be removed or edited, but hopefully this advice will help you better recognize comments the authors do not need to see.

Reference and Link

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Are You Fluent in Emoji?

Jennifer Regala

In my Twitter profile, I state that I'm "fluent in emoji." When I wrote that originally, I was mostly joking. I am not laughing any longer. I have come to learn the power of the well-placed emoji, and I am here to explain to you why emojis matter. I believe emojis make our messages more accessible and approachable. They tell a story when used well. They attract the valuable attention of a reader. And they make a message more fun, approachable, and consumable!

The impact and reach of a journal are about a lot more than the Journal Impact Factor. Authors are expecting us to do far more than publish their papers. They want us to make their papers immortal and to ensure that their research is talked about and remembered for years to come. An editorial office that is making great use of varied social media platforms to amplify authors and articles is equally as enticing to submitters. When an editorial office shows off an author's work, that author remembers how well they were taken care of. Not only was their paper published, but it was celebrated!

But what makes a tweet or a Facebook post or an Instagram story or a LinkedIn blurb stand out from a social media user's endless scrolling possibilities? There is only so much time in the day. Your social media post needs to stand out from the crowd. Creating videos and graphic assets are important tools in social media, but it's not feasible to create those for every post. Cleverly selected emojis are an easy way to get eyes on your messages.

Emojis in the Wild

I spend a lot of time thinking about social media for my job. Not only that, I spend a lot of time on social media in a professional capacity. It's important to understand what other organizations and individuals are doing well. The more I scroll, the more I am convinced of the power of the emoji. I share with you here some examples of stellar emoji use.

The American College of Cardiology, an organization I hold in extremely high regard for their important work to improve heart health, uses the beating heart emoji in their Twitter profile (@ACCinTouch; Figure 1). Simple, tasteful, perfect placement. I give this emoji use a 10 out of 10. I share

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Opinions expressed are those of the authors and do not necessarily reflect the opinions or policies of their employers, the Council of Science Editors, or the Editorial Board of Science Editor.

Figure 1. The American College of Cardiology's Twitter profile, March 3, 2022.

this example because I see this organization as very serious—focused on the business of saving lives. However, this one simple heart emoji tells me a lot of things in one single character. They want their community to feel welcome. They want a patient researching a heart condition to belong. They want a physician to feel proud to be a part of their mission.

When I worked at the American Society of Plant Biologists, I bonded quickly (via Twitter, of course) with Dr Juniper Kiss over our shared adoration of emojis. Dr Kiss is a brilliant scientist, but what really makes her stand out is how she makes science accessible to everyone who follows her. Looking at her Twitter profile (Figure 2) provides amazing

Figure 2. Dr Juniper Kiss's Twitter profile, March 3, 2022.

Figure 3. Dr Casey Seideman's tweet, March 3, 2022.

insight into how Dr Kiss communicates. Scrolling through her Twitter feed, which is visually beautiful and very compelling, what makes Dr Kiss remarkable is her ability to translate her work to anyone and everyone. Using emojis draws her readers in, but then they stay because her messages are fun to read yet informative. Using the perfect blend of emojis and concise, clear writing, Dr Kiss is able to translate complicated scientific concepts into easily comprehensible nuggets for anyone who follows her, not just scientists. To be a PhD scientist involved in complex research is challenging enough, but Dr Kiss translates that research so anyone outside of plant biology "gets it."

> *Using the perfect blend of emojis and concise, clear writing, Dr Kiss is able to translate complicated scientific concepts into easily comprehensible nuggets for anyone who follows her, not just scientists.*

Another tweet that I think is a perfect 10 (Figure 3) is from Dr Casey Seideman, a urologist. On National Women

Physician Day, Dr Seideman used emojis to convey her call to action: support women in medicine. This tweet is the chef's kiss of all tweets. The message is serious and important, yet the emojis made her thoughts stand out and reach far more people than if she had used a text-only approach. I immediately stopped my scrolling when I saw this tweet and really thought about what she was saying.

To Emoji or Not to Emoji?

Like with any other language, you need to be attentive to when it is appropriate to speak emoji. Here are things you will want to consider before you get too crazy with the emoji keyboard:

1. Do your research. Who is your audience? Who will be consuming your message? Do you see users in your target community using emojis, too?
2. Is there a different way you can entice your audience? Would an excellent visual or a video do a better job of capturing attention?
3. Would using emojis be inappropriate or inconsiderate? If you're trying to draw attention to a sensitive topic, be thoughtful in how you use emojis, if you choose to use them at all.
4. Consider your strategy in using emojis. For instance, if you're tweeting an announcement, you might want to use the siren. If you're sharing an excellent editorial, I personally suggest the 100 symbol.
5. Have fun and experiment! See what kind of engagement you get when you use emojis vs. when you don't.

Embrace the Emoji

We live in challenging times right now. The people of our world have been suffering through an ongoing global pandemic, war, intense workloads, a polarized country, and so much more. Emojis add a little light to our world. Used well, they provide a visual means to tell a more complicated story. And they are just fun. It's fun to figure out which ones to use, it's fun to see how other people use them, and it's fun to use them creatively. Come find me on Twitter and show me your emojis!

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Writing the "Right" Words

Stacy L Christiansen

In some instances in our work with scientific topics, there is *the* term to use, one that conveys clarity, consistency, and scientific accuracy; one that seems to have achieved consensus. Such terms might describe a disease or condition (COVID-19), a procedure or treatment (appendectomy), a specific entity (left ventricle), or an observed object or phenomenon (atom, molecule), among many others.

In other instances, however, the term used depends on both speaker (writer) and audience. Do you talk about hypertension or high blood pressure? Myopia or nearsightedness? Myocardial infarction or heart attack? Chronic renal failure or chronic kidney disease?

The second example in each of the aforementioned pairs is better aligned with language appropriate for patient communication. Except what about that last one: chronic renal failure and chronic kidney disease? What's the difference?

Seeking Consensus on Nomenclature

I was fortunate to be invited to participate in a global initiative organized by KDIGO (Kidney Disease: Improving Global Outcomes). A number of people involved in nephrology research and journal publication gathered in Amsterdam (yes, prepandemic) as part of a consensus conference on nomenclature for kidney function and disease. Our charge was to come up with a standardized approach to kidney-related terminology for scientific publication and develop a glossary that could be used in medical communication.

Why was this meeting necessary? Because the nomenclature for describing kidney function and disease has not always been consistent or clear. Some years ago, a survey of hundreds of journal articles and meeting abstracts reported a broad array of overlapping or confusing terms for chronic kidney disease (CKD). Those authors advocated adoption of clearer terminology.[1] Yet, terms pointed out in that analysis as problematic, such as "chronic renal failure" and "predialysis," are still in use.

The terms used to describe bodily function and disease should be understandable to all parties. The *AMA Manual of Style* encourages use of patient-centered language,[2]

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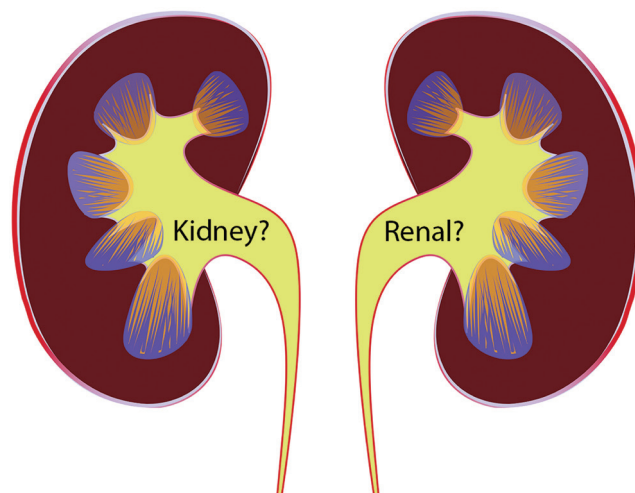
and this was a guiding principle for the development of a kidney-themed glossary, including the general description of acute and chronic kidney disease and kidney measures.

Findings and Recommendations

As described in detail in the published report,[3] conference attendees reached general consensus on a collection of terms and recommended their use in English-language scientific journals.

- Use "kidney" rather than "renal" or "nephro-" when referring to kidney disease and kidney function (but not necessarily for anatomical or structural terms, such as renal cell carcinoma or renal cortex)
- Use "kidney failure" or "kidney disease" with appropriate descriptions of symptoms, signs, and treatment rather than "end-stage renal disease" (Note: end-stage renal disease is still used when referring to eligibility for medical care under U.S. legislation or other regulations)
- Use established classification of acute kidney diseases and disorders as well as chronic kidney disease
- Use specific kidney measures, such as albuminuria or decreased glomerular filtration rate, rather than "abnormal" or "reduced" kidney function to describe alterations in kidney structure and function.

The full 13-page report[3] from the conference details much more, including terminology applicable to journals that focus on kidney disease, as well as terms useful to general medical journals, researchers, clinicians, and patient advocates.

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The glossary, which is freely available on the KDIGO website,[4] outlines preferred terms, abbreviations, descriptions, and terms to avoid. It is noted that journals may choose which of the recommendations to implement, and that style among journals will vary to be consistent with nomenclature for other diseases.[3]

The glossary and full report are an important starting point, but like all nomenclature, the recommendations will require future expansion and updating. The findings from this conference, and the glossary in particular, will be used to inform an update to kidney disease nomenclature in the *AMA Manual of Style*.[5]

Conclusions and Takeaways

Although the recommendations are not likely to answer all concerns, the consensus among conference attendees was that standardizing scientific nomenclature is a necessary first step to improving communication among clinicians, researchers, and public health officials, as well as among patients, their families and caregivers, and the public.

As scientific communicators, we need to use the most precise, consistent, and appropriate words to convey research, clinical findings, opinions, news, and a wide variety of other content to individuals across the globe. Added to those aims, it is imperative that we use terms that emphasize respect and clarity in the language used to discuss human beings.

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End of an Era: The Passing of Two Science-Editing Pioneers

Barbara Gastel

This past autumn, 2 longtime leaders in science editing died, each in their late nineties. Each had played prominent roles in what is now the Council of Science Editors (CSE), serving in the post now termed president and receiving what is now called the CSE Award for Meritorious Achievement. Each had witnessed and contributed to the developments in science editing in the second half of the 20th century. Each also had mentored and educated editors and authors, both personally and through their writings. This article pays tribute to these 2 editors: Edward J Huth and Robert A Day.

Edward J Huth (1923–2021)

Edward J Huth was chairman of CSE's predecessor, the Council of Biology Editors (CBE), in 1973–1974. He received the CBE Meritorious Award in 1987. His acceptance address[1] included a call for "a single society for editors of all sciences"—a vision fulfilled in 2000, when CBE became CSE.

In keeping with this vision, Huth chaired the CBE style manual committee when it produced the edition that was the first to be titled *Scientific Style and Format*.[2] Whereas previous editions had focused on the biological sciences, this much-expanded edition, published in 1994, encompassed the physical sciences as well. Huth also was a founding member of the International Committee of Medical Journal Editors, which developed the Uniform Requirements for Manuscripts Submitted to Medical Journals.[3]

On a lighter note, Huth coined the term *salami science*,[4] used to designate reporting different parts of a single study in separate papers to inflate one's publication record. And it was observed that "[r]ed editing pens were always scattered about his office and home."[5]

Huth graduated from the University of Pennsylvania School of Medicine in 1947[5] and completed his internship, residency, and nephrology fellowship there.[4] Huth became assistant editor of *Annals of Internal Medicine* in 1960 and
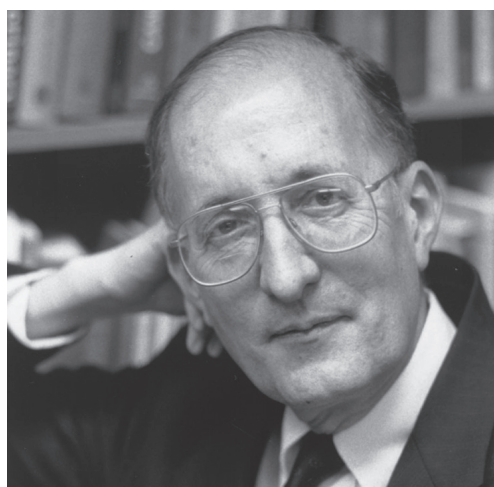
Edward J Huth. Photo Credit: *Annals of Internal Medicine*, used with permission.

associate editor in 1965; he then was editor of the journal from 1971 to 1990.[6]

After retiring from *Annals of Internal Medicine*, Huth became the first editor of the pioneering online journal *Current Clinical Trials*.[7] He also continued to write about science editing and related subjects for 19 years.[6] His 2007 *Science Editor* article "Editor, Keep Your Eyes Open to the Rest of the World"[8] describes 3 instances, all from his editorial career, in which attentiveness to outside voices led to important editorial improvements.

Huth's publications include the books *Writing and Publishing in Medicine*[9] (which in previous editions was titled *How to Write and Publish Papers in the Medical Sciences*) and *Medical Style & Format: An International Manual for Authors, Editors, and Publishers*.[10] PubMed lists some 90 articles by Huth, largely on editorial topics.

My recollections of Huth's kindness and commitment date back to the 1970s, when I was a medical student. A dean suggested that I contact Huth because of my interest in an editorial career. Huth arranged for me to visit the *Annals* editorial office and meet with him. Years later, when I was editor of *Science Editor*, he remained generous with his time and wisdom as a contributor to the Council's periodical.

Robert A Day (1924–2021)

Robert A Day was chairman of CBE in 1977–1978. He received the organization's Meritorious Award in 1988. In

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Robert A Day

keeping with his distinctive style, his acceptance address[11] had a historical bent and began and ended with a joke.

Day joined CBE in 1960. Two years later, he chaired the local arrangements committee for the annual meeting (total registration: 32). He was one of the first managing editors in the organization, which at that time consisted almost solely of scientific editors. He recalled that the 1975 annual meeting included vigorous debate over membership criteria; those favoring inclusiveness won, and the membership requirements were revised to allow all types of editors, including copyeditors, to join.[12]

Day came to science editing from librarianship, having earned a graduate degree in the field and worked as librarian-editor at the Institute of Microbiology at Rutgers University.[13] For 19 years, starting in 1961, he directed the publishing program at the American Society for Microbiology. He then became director of ISI Press.[14] From 1986 until his retirement in 1999, he was a professor of English at the University of Delaware, where he taught scientific and technical writing and editing.[15]

Day's publications include the book *How to Write and Publish a Scientific Paper,* which first appeared in 1979[16] and since his retirement has had coauthored editions, including one now in press.[17] (Much has changed since the first edition, which had a section on how to package and mail a manuscript and a chapter on how to order and use reprints.) He also wrote *Scientific English: A Guide for Scientists and Other Professionals,* the most recent edition of which was coauthored by daughter Nancy Sakaduski.[18]

As noted in his obituary,[14] "Bob was a big man with a big heart and a real zest for life." He excelled at, and clearly relished, both the intellectual and the interpersonal aspects of being an editor. A favorite memory of him comes from his

ISI Press days, in the early 1980s, when he was waiting for me to submit the manuscript for my first book.[19] At the time I was an assistant professor subsisting on a meager salary. During a visit to town, Bob treated me to a dinner (complete with chocolate souffle) that probably cost more than I spent on groceries for the week. I returned to my writing with new enthusiasm—and maintained that enthusiasm in our subsequent collaborations.

Edward J Huth and Robert A Day saw many changes during their careers, which began in the paper-and-pencil days of science editing, and they did much to advance CSE and the field. I was fortunate to know both of these members of the Greatest Generation. May we maintain their legacy.

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