Open Practices, Closed Realities? Archaeological Perspectives on Open Research Practices

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Abstract: Open research frameworks alongside encompassing principles such as FAIR and CARE have seen an increase in uptake across the global academic landscape in recent years. However, their implementation remains uneven, particularly within the humanities and social sciences (HSS), where disciplinary traditions, methodological diversity, and structural limitations present persistent challenges. This study investigates the integration of open research practices within archaeology through a qualitative research study based on in-depth interviews with archaeologists. We examine how researchers conceptualize open research; the extent to which they engage with it in practice; and the institutional, epistemic, and ethical factors shaping their engagement. Participants reported varying levels of familiarity with open research, often associating it primarily with open access publishing, while expressing uncertainty or concern about the applicability of openness to sensitive or context-dependent data, such as excavation records, material cultural heritage, and collaborations with descendant communities. Our findings reveal three main types of barriers to open research implementation in archaeology: (1) conceptual and disciplinary barriers, including tensions between openness and interpretive, context-specific scholarship; (2) practical and infrastructural constraints, such as the lack of repositories or guidelines tailored to the specific formats and sensitivities of archaeological data; and (3) socio-political concerns, particularly regarding the commodification of cultural heritage and ethical obligations to stakeholder communities. At the same time, the study highlights existing opportunities and initiatives within the field—such as digital repositories, data standardization efforts, and funding mandates—that are gradually facilitating more open practices. In conclusion, we argue that infrastructure and training are required to encourage and sustain meaningful engagement with open research and that a shift in ideology and practice is needed to ensure that researchers are active participants in shaping open research policies rather than passive recipients of mandates.

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Open research principles have gained significant momentum in recent years, driven by larger efforts to increase transparency, accessibility, and collaboration in scholarly work (European Research Council, n.d.; cOAlition S 2018; UNESCO 2021). The extent to which these principles have been adopted, however, varies significantly across academic disciplines. The humanities and social sciences (HSS) face distinct challenges that complicate the implementation of open research practices, involving research practices deeply rooted within disciplinary traditions, data management issues, a long-standing concern with prestige, and a lack of standardized infrastructure implemented for data sharing (Arthur and Hearn 2021).

In contrast to the quantitative approaches prevalent in many science, technology, engineering, and mathematics (STEM) disciplines, the humanities and social sciences tend to rely on qualitative and interpretive methodologies. HSS research outputs are likewise distinct, with monographs, book chapters, and long-form articles more common; such outputs do not always lend themselves to rapid dissemination through open access channels. In addition to these differences in methodology and research outputs, HSS scholars may work with sensitive historical or cultural materials, leading to pressing concerns about data ownership, privacy, and ethics. HSS disciplines prioritize theoretical frameworks, critical analysis, and context-dependent interpretations (Willig 2014) over the reproducibility that is foregrounded as a key element of research integrity in the experimental sciences (Resnik and Shamoo 2017). These distinctions in methodology, research outputs, and expectations about reproducibility make the concept of research transparency less straightforward for HSS disciplines than for STEM fields.

Although the implementation of open research practices in HSS disciplines thus faces distinct challenges, such practices still have the potential to foster broader collaboration and knowledge dissemination (Allen and Mehler 2019; Catalano et al. 2025; Eysenbach 2006). Elements of open research such as open access publications and digital repositories can enhance global access to HSS research, benefiting scholars, practitioners, and the public. However, the extent to which researchers are aware of, understand, and engage with open research practices remains underexplored. Using archaeology as a case study, this article addresses this gap by investigating how researchers in an interdisciplinary HSS field perceive open research. We also examine how, when, and why archaeologists implement open research practices and identify the primary obstacles to a broader adoption of openness within archaeology.

The discipline of archaeology represents a unique case within HSS due to its highly interdisciplinary nature. Archaeologists actively engage with both qualitative and

quantitative data and methods, combining historical records and material evidence with scientific techniques such as radiocarbon dating, isotopic analyses, and archaeogenetics. These varied methodologies present both opportunities and challenges when attempting to integrate open research practices within the field. While some archaeological datasets, such as excavation records, 3D models, and Geographic Information Systems (GIS) data, can be digitized and shared openly with the appropriate infrastructure already in place, concerns around cultural heritage, data sensitivity, and commercialization complicate the implementation of open research frameworks.

This study sought to answer several key questions: How do researchers define and practice open research? What barriers and challenges do they encounter? How do funding policies, institutional norms, and disciplinary traditions shape their engagement with open research? How is open research meaningful to and within HSS disciplines? The answers to these questions provide insights into the current landscape of open research in archaeology and identify the barriers within HSS disciplines that prevent the widespread adoption of open research practices.

This article first reviews existing research on open research practices in both STEM and HSS disciplines, highlighting the major differences in implementation and identifying the barriers faced by scholars in different fields. Next, we introduce the discipline of archaeology, detailing how the methodological diversity and interdisciplinary approach of this field influence the implementation of open research practices. After contextualizing our study, we detail our methodology, outlining our interview process and analytical approach, after which we present our results. Our findings section details archaeologists' perceptions of open research and their main challenges in implementing open research practices. This section also identifies key areas where academic, institutional, and community support are needed. The article concludes with a discussion of how open research can be integrated into archaeological practice, underscoring how improving awareness, infrastructure, and accessibility within open research across HSS disciplines needs to be taken seriously as the next step in a sustainable future for open research practices.

Literature Review

The concept of open research has gained prominence within higher education in recent years, yet its adoption and implementation differ significantly between HSS and STEM fields. This literature review explores the development of open research within HSS versus STEM disciplines, investigates the barriers that have hindered the widespread implementation of open research, and introduces archaeology as a case study of an interdisciplinary field that intersects with multiple research traditions.

Historical Development of Open Research Within HSS Versus STEM Disciplines

The concept of open research has evolved significantly over the past few decades, rooted in a broader movement toward open access, open data, and open science. Its contemporary origins can be traced back to the late 20th century when advances in internet technology and shifts in scholarly communication began to challenge traditional models of research dissemination (R. Ma 2024, 3; Sheikh and Richardson 2023, 1). The scientific disciplines, particularly the natural and physical sciences, were among the earliest adopters of open research principles, and these "cultural legacies of European history . . . continue profoundly to influence the systemic efficacy of the scientific research process" (David 2008, 88). Such fields took part in preprint servers, open access journals, and data repositories to enhance the transparency and reproducibility of research findings (Umbach 2024, 68). In contrast, HSS were slower to adopt open research practices, due in part to fundamental differences in disciplinary methodologies, publishing norms, and concerns over copyright, peer review integrity, and academic prestige (Arthur and Hearn 2021, 829; R. Ma 2024, 4). Unlike the sciences, where journal articles and conference proceedings dominate as primary research outputs, copious HSS disciplines emphasize long-form publications such as monographs and edited volumes. These traditional formats have historically been less compatible with open access models due to copyright restrictions, production costs, and the business models of academic publishers (Ghanbari Baghestan et al. 2019, 6; Shaw et al. 2023, 70).

The advent of the Budapest Open Access Initiative (2002), the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities (2003), and the Bethesda Statement on Open Access Publishing (2003) marked key moments in the global push for open research. These declarations sought to establish open access as a standard for scholarly communication, emphasizing the importance of free and unrestricted access to research outputs (L. Ma 2025, 122–23). While these initiatives gained traction in STEM fields (Umbach 2024, 60–62), their impact on HSS remained uneven, as concerns over the sustainability of open access publishing, the credibility of non-traditional publishing outlets, and the reluctance of scholars to deviate from well-established academic publishing traditions persisted (Frankl 2023).

In more recent years, policy changes by major funding bodies have played a crucial role in promoting open research across disciplines. Organizations such as the European Research Council (ERC), the Wellcome Trust, and the National Science Foundation (NSF) have introduced mandates requiring researchers to make their publications and data publicly available (European Research Council, n.d.; National Science Foundation 2015; Wellcome Trust 2025). The implementation of Plan S by cOAlition S (2018), which requires immediate open access for publicly funded research, has made conversations about open research practices even more urgent for researchers. However, within

HSS, these mandates have been met with resistance, with scholars citing concerns over the financial burden of article processing charges (APCs), the potential erosion of academic freedom, and the lack of infrastructure to support open data sharing (Berkowitz and Delacour 2022).

Furthermore, the historical reliance on subscription-based publishing models has created disparities in access to research literature. While scholars affiliated with well-funded institutions enjoy access to a vast array of academic resources, independent researchers, practitioners, and scholars from lower-income regions often face significant barriers to obtaining the same materials (Arthur and Hearn 2021, 832). This recognition has fueled discussions of alternative publishing models, including diamond open access, which eliminates APCs for authors, and institutional repositories, which allow scholars to self-archive their work (Bergstrom et al. 2024).

Despite these developments, the transition to open research in HSS remains a work in progress. Key challenges include the need for greater awareness and training about open research practices, the development of disciplinary guidelines for data sharing and transparency, and the establishment of sustainable funding models for open access publishing. As discussions around open research continue to evolve, it is essential for HSS scholars to actively engage with these debates, ensuring that open research models are adapted to the unique needs of their disciplines.

Barriers to Open Research

While the principles of open research have gained traction in recent years, several persistent barriers have hindered the widespread adoption of open research practices across HSS. These challenges stem from barriers that are solvable, such as financial constraints and technical issues, as well as those that are unresolvable, such as ethical concerns related to data management and access. Understanding these barriers and their differences is crucial for developing strategies that facilitate a more inclusive and sustainable open research culture.

The high costs associated with open access publishing represent a major barrier for researchers in HSS. Unlike in many STEM disciplines, where research projects receive substantial funding from grants that can be used to cover open access APCs, HSS researchers frequently work with limited financial resources (Ojennus 2017). Numerous scholars, particularly those at smaller institutions, independent researchers, and researchers based in lower-income countries, struggle to afford the APCs required by certain open access journals (Newton 2020, 537).

Transformative agreements have been introduced as a potential solution to offset these costs. These agreements require institutions to pay subscription fees that both

cover access to paywalled content and allow affiliated researchers to publish open access in specific journals. However, transformative agreements also incur significant financial costs for universities and do not fully address the underlying inequities in the academic publishing system (Ma et al. 2023, 2). Moreover, there are researchers who remain unaware of the financial implications of these agreements, the high profit margins of commercial publishers, and the existence of alternative publishing models such as diamond open access, which removes both reader and author fees (Bobtcheff et al. 2023).

The economic structure of academic publishing exacerbates these financial challenges. Several major academic publishers operate under profit-driven models that prioritize the generation of revenue over knowledge dissemination (Trueblood et al. 2025). As a result, open access publishing in traditional, high-prestige journals remains financially inaccessible for a great deal of researchers, particularly those who are precariously employed or who are at institutions with limited funding for APCs.

Beyond financial and institutional barriers, technical and ethical challenges also play a significant role in limiting open research practices. One key issue is the management of sensitive data, particularly in disciplines such as anthropology and archaeology, where research often involves culturally significant artifacts, human remains, or confidential historical records. Openly sharing such data raises complex ethical questions about ownership, consent, and the potential for misuse or misinterpretation (Berkowitz and Delacour 2022, 9).

For example, archaeological research involving ancient DNA or human remains must navigate ethical guidelines regarding the treatment of culturally sensitive materials, particularly when working with Indigenous or historically marginalized communities (Wick et al. 2024). Researchers must balance the principles of openness with the need for responsible data stewardship, ensuring that data sharing does not infringe on the rights, traditions, or interests of the communities involved (General Data Protection Regulation 2016; Ulguim 2018, 211–13). In some cases, it has been suggested that measures, such as "governance, oversight and audit mechanisms," be employed in relation to the design of datasets in order to uphold ethical standards while still promoting research transparency (Rossi and Lenzini 2020, 20).

Data management infrastructure also presents technical challenges for open research in HSS. Many researchers lack training in best practices for data organization, preservation, and sharing. Unlike the sciences, where standardized repositories and metadata frameworks are widely used, HSS disciplines often rely on ad hoc or institution-specific data storage solutions that lack long-term sustainability (Barats et al. 2020; British Academy 2005). The absence of discipline-specific, agreed-upon guidelines for open data management makes it difficult for researchers to navigate the complexities of depositing and sharing their research outputs effectively.

The Case of Archaeology as an Interdisciplinary Field

Archaeology is unique in its interdisciplinarity as it integrates approaches from across the humanities, social sciences, and natural sciences, making it an ideal case study for exploring open research within HSS. Archaeology draws from and contributes to multiple disciplines, including history, anthropology, art history, geography, and even physics and chemistry (Kerr 2020, 1340). Methods such as stratigraphic excavation, typological analysis, and material culture studies often align archaeology with the humanities, while the use of techniques such as GIS, isotopic analysis, archaeogenetics, and radiocarbon dating frequently connect it with the sciences. Indeed, the interdisciplinary nature of archaeology has engendered a series of recurring and lively debates within the field, with practitioners variously arguing for alignments to the humanities, sciences, and social sciences (Hawkes 1968; Isaac 1971; Marwick 2025; Sørensen 2017; Stojanowski and Duncan 2015). As a result, the archaeological research environment requires collaboration across diverse fields, each with its own norms and expectations regarding data sharing, publication formats, and transparency, thus negating a discipline level of standardization.

Data complexity and diversity are two of the primary challenges of implementing open research within archaeology. Archaeological research can produce any number of various data types, such as:

Material data	Artifacts, ecofacts, and features documented in excavation records
Spatial data	GIS maps, site plans, and stratigraphic sequences
Chronological data	Radiocarbon dating, dendrochronology (tree-ring dating), and relative dating sequences
Biological data	Ancient DNA (aDNA), stable isotope analysis, zooarchaeology, osteoarchaeology, and paleobotany

(Nikita and Rehren 2023)

These data types each have distinct requirements for storage, sharing, and interpretation, thus creation and widespread adoption of set standards have not occurred (Faniel et al. 2013). Unlike controlled laboratory experiments, archaeological data collection is not reproducible. Once a site is excavated, its original context is destroyed. The reliance on excavation as a key method for obtaining archaeological data thus limits the applicability of traditional scientific open data principles, such as reproducibility and replicability, within this discipline (but see Lake 2012; Marwick et al. 2017; Marwick and Pilaar Birch 2018). As a consequence, archaeology is a particularly challenging field to address when attempting to standardize open research practices.

Archaeology as a discipline also presents distinctive obstacles when it comes to the ethical considerations that animate best practices in open data sharing. These obstacles include, but are not limited to, Indigenous and descendant community concerns, research involving human remains and aDNA, and commercial archaeology and data ownership. In regard to Indigenous and local community concerns, archaeological research often involves cultural heritage sites with deep spiritual, social, and historical significance to living communities. Openly sharing data without appropriate permissions or community involvement has the potential to lead to ethical violations and harm relationships between researchers and descendant communities (Fox 2020; Hudson et al. 2020; Reardon and TallBear 2012). This potential for harm is particularly pronounced where contemporary and historical issues of land ownership, cultural appropriation, and oppression are present (Fox 2020; Kansa 2012; Kansa et al. 2025; Wick et al. 2024). Research on human remains, including aDNA analysis, raises crucial questions about consent, ancestry, and repatriation. It is not uncommon for certain groups or ethical guidelines to restrict or inhibit the publication and distribution of data collected from human remains (Mulligan et al. 2022, 28; Ulguim 2018, 198–99).

Commercial archaeology and its relationship to data ownership also presents unique discipline-specific issues. Many excavations occur as a result of commercial businesses being contracted by land developers who are complying with heritage protection legislation. In contract archaeology, reports and datasets can often be restricted because of proprietary concerns, which limits access to potentially informative research findings (Kansa 2012, 508). The intersection between ethical responsibilities to descendant communities, a disciplinary mandate to protect and preserve heritage, and the legal liabilities of the commercial sector mean that open research in archaeology requires tailored policies that balance openness with ethical and legal responsibilities. It is for these reasons that archaeology makes a compelling inter-subdisciplinary case study for analyzing open research practices and the potential implications it has across HSS.

Methodology

In this study, we used semi-structured interviews to capture academic archaeologists' perspectives on open research. This method struck a balance between a flexibility that allowed us to explore or follow up on particular questions while maintaining a structured framework for later analysis. Through semi-structured interviews, we gathered data that provided in-depth insights into individual experiences, attitudes, and challenges related to open research practices in archaeology. We recruited participants via email, through both academic institutional channels and networks and direct invitations. The selection criteria for recruitment were deliberately broad. We actively sought

archaeological researchers from various different career stages and selected respondents with a broad range of experiences with open research practices. While respondents were drawn from the higher education sector, there were those who also had previous experience in the commercial sector. Twenty-nine researchers agreed to participate in the study. Interviews began in August 2024 and continued through January 2025. Participants were associated with academic institutions across Ireland, the United Kingdom, and the United States and included 11 faculty, seven postdoctoral researchers, and 10 PhD candidates.

Interviews were conducted through the video platform Zoom based on the participants' availability, schedule, and, in particular cases, time zone. Interviews lasted from 45 to 60 minutes and followed a semi-structured format. Key themes that were explored included definitions and perceptions of open research, current open research practices and experiences, institutional and funding-related influences on open research, barriers and challenges encountered in implementing open research practices, perspectives on potential solutions, and support mechanisms for open research adoption. Each interview was audio-recorded with participants' consent and subsequently transcribed verbatim while anonymizing any identifiers in advance of data analysis.

Once the interviews were conducted and transcribed, interview data were analyzed using a thematic analysis technique, specifically one that mirrored the approach outlined by Virginia Braun and Victoria Clarke (2022). This thematic analysis technique involved five key steps. The first step entailed familiarizing ourselves with the data collected, including reading and rereading the transcripts in order to identify patterns or themes. The second step consisted of creating an initial set of deductive codes that categorized emerging and recurring themes. Codes were then grouped into broader themes to more accurately reflect and identify participants' shared experiences and insights. The emerging themes were then reviewed and refined to ensure maximum coherence and relevance to the study's research questions. The final step within the data analysis process involved interpreting our findings through contextualizing themes within existing literature on open research practices in archaeology.

It is, however, important to address the limitations of our research design. First, this analysis focused on a relatively small sample of archaeologists. Though we were able to capture perspectives across career stages, participants were drawn from universities in only three countries. Our results thus do not reflect the full range of perspectives within the global archaeological community. The high level of methodological and theoretical diversity within archaeology as a discipline also means that we could not capture all sub-disciplinary perspectives. Finally, open research practices and policies are constantly evolving and currently in flux. As a result, findings from this study represent the moment in time in which they were collected and may not reflect future developments within open research mandates and infrastructure.

Findings

A key finding from this analysis was the extent to which archaeologists' understanding and engagement with open research are shaped by external requirements rather than by an intrinsic push from within the research community itself. Though most participants expressed support for open research principles, their actual open research practices were more strongly influenced by institutional and funding mandates than by positive and proactive community-driven efforts. Here, we discuss the major findings of our study, including archaeologists' perceptions of open research as a concept, the influence of funding mandates, a limited understanding of transformative agreements, and a lack of formal training in data management.

Perceptions of Open Research

Participants expressed a positive attitude toward open research, collectively agreeing that in principle openness enhances both knowledge dissemination and academic collaboration. "Transparency" was recognized as a key term associated with open research, particularly when participants were asked about the meaning of, or ramifications of, openness. For example, one participant explained that "it means transparency. It's about promoting accessibility, [. . .] It's about making data available for democratizing knowledge" (Interview 2, Postdoc). This is reflective of all interviewees' perceptions of open research as both publications and data are mentioned. These are the two components of open research that participants were most interested in, most vocal about, and most knowledgeable of. As a result, the rest of the study's findings are representative of this fact.

Interviewees' positive attitude toward the principles of open research were spoken about in terms of how its benefits aided both research and researchers. This was reflected in all career stages. PhD students spoke of benefits in relation to improving their own personal research: "I know it's made my research a lot richer and, like, more complex [. . .] the fact that I can compare my data with other data and the fact that I'm able to access so many different articles to support the context for my research" (Interview 18, PhD Student). Postdocs made reference to expanding the breadth of archaeological research as a whole, not just their own. Faculty members varied the most in their perception of a positive impact on areas outside of their research, such as public engagement and outreach. While they spoke of these benefits in conceptual terms, they actively acknowledged how their own research benefits as a result: "obviously on a, you know, kind of an individual, personal, selfish level. Having things open access means

that more people read it, so more people know about it. So it's better in terms of your career and your CV" (Interview 12, Faculty).

Most participants acknowledged what they referred to as their "privileged access" to academic publications due to institutional affiliations. They recognized that independent researchers and those working in commercial archaeology often lack access to essential research materials. Indeed, some researchers noted that they had been asked to access articles on behalf of other archaeologists who lacked institutional access to these publications (Interview 20, PhD Student). At the same time, our participants noted that they themselves faced difficulties accessing reports produced by non-academic archaeologists, illustrating a gap in knowledge-sharing across different sectors of the discipline: "If you really need a resource, you either end up not citing the kind of work that you should be citing, and then you get criticized by the reviewers, or you end up doing things in a different way. So in that sense, I think all research should be open, to be honest. If we're talking about really trying to share knowledge, I think that's where we should be" (Interview 5, PhD Student). Researchers themselves are conceptually aware of how disparities in access to research negatively impact *all* members of the archaeological research community, not only academics. However, while this uneven ability to access materials highlights ongoing disparities in the availability of research outputs, it can also be understood as how researchers are supportive of open access/research in principle.

Participants agreed with the ethos and core values of open research. When asked to expand on these definitions, however, participants often began to discuss the gap between the ideals of open research and what they considered to be the reality of open research practices. This gap is explained by researchers' perceptions that open research was positioned as complex and, at times, a burdensome exercise. As one participant explicitly stated, "we have come to a point where we're seeing the negative results of something that initially had positive ideals" (Interview 5, PhD Student). Others made a more implicit critique, noting, "I think sometimes there can be a cart before the horse kind of thing" (Interview 8, Faculty). Archaeologists noted that the reality of practically engaging in open research methods often entailed additional administrative efforts and compliance with institutional or funder policies, which was problematic in terms of both labor and financial support: "there's often not the kind of funding or time for people to do it to that degree. And then it falls on the lowest paid and the most precarious scholars to undertake the work" (Interview 6, Postdoc). Researchers consistently highlighted the inequities implicated in open research mandates. They were also skeptical about the feasibility of full transparency within archaeological research, citing concerns over intellectual property, data sensitivity, and the practical challenges of making all research outputs openly available. One researcher provided a particularly

eloquent summary, stating that "there is a sensitivity to having their material accessible through means that they control" (Interview 4, Faculty).

The Influence of Funding Mandates

Funding mandates were one of the most significant factors shaping researchers' engagement with open research. While participants generally agreed that openness is beneficial, their adoption of open research practices was primarily driven by external policies rather than personal or disciplinary motivations. The influence of funding mandates and bodies played such a pivotal role in defining researchers' relationships to open research practices that respondents noted that such institutions were the only available source of information and guidance. As one participant expressed, "some people find it more important than others, and maybe there's also some that find it a burden, saying, 'Oh, it's one of those tick-the-boxes exercises, one of the things that we have to do. But I just want to do research.' Basically, you know that they're more focused on that aspect of it rather than the importance for the wider world" (Interview 7, Postdoc).

Although researchers expressed a desire for broader access to research outputs—including monographs, textbooks, and data—few participants actively sought out open research avenues independently of funding requirements. The capacity of funding mandates to dictate open research practices was not always viewed in a positive light, with one researcher describing these dynamics as "hamstringing research," believing that the effect of such mandates was "an absolute, unmitigated disaster" (Interview 9, Faculty).

Additionally, institutional requirements and funding mandates were often described as coming into conflict with one another, with requirements lacking standardized, cohesive definitions or aims. Researchers stated that the lack of definitive terminology resulted in confusion when it came to formatting and finalizing their research outputs in order to meet mandates:

> [A]s part of the grant agreement there is the requirement to maintain the data in perpetuity. Which is an interesting thing, because I don't know if the funder really thought about what that meant, and [researcher's institution] certainly has two definitions of perpetuity. So the library sees perpetuity as 10 years and then other parts of the university see it as long as the university exists. And then our contracts manager actually pointed out that the assumption made in the grant agreement letter, so our legal counsel, said, actually, the assumption is that the internet will exist in its existing form in perpetuity. So you could argue that actually, the responsibility is just as long as the internet exists in its current form. (Interview 29, Postdoc)

These types of differences in terminology and definitions cause confusion for researchers when trying to meet funding requirements alongside those of their institutions. This confusion is a cause for concern if researchers believe funding mandates are the only source of information and guidance on open research practices, as outlined above.

In summary, researchers' knowledge of open research practices was steered by what was required to meet funding mandates, which in turn is affected by institutional and funding mandates coming into conflict with each other. Despite a broad understanding of open research that referred to ideals of "transparency" and "democratizing knowledge," these ideals were not leveraged or referred to in descriptions of archaeologists' actual experiences implementing open research. The strong links between open research practices, funding mandates, and confusion revealed by this analysis also help to explain the next key finding of this study: archaeologists' limited understanding of the costs behind taking part in open access publishing.

Limited Understanding of Open Access Costs

Most participants expressed appreciation for transformative agreements (often referred to as "library agreements") as enabling broader access to, and publication of, research. Respondents, however, also did not seem to be fully aware of the actual costs of these agreements or the potentially exploitative practices of some commercial academic publishers. Transformative agreements were often spoken of positively and framed as eliminating the burden of APCs entirely. In effect, respondents appeared to treat transformative agreements as synonymous with or interchangeable with diamond open access models. As one researcher stated, "So sometimes you can get in if you're within good timing with the library list, and you can get in, when [it's] the free ones" (Interview 14, Faculty). Another responded, "I think the move to support the University being in agreements where you get open access already without having to [pay]. You know, it's just a no brainer" (Interview 10, Faculty).

Participants refer to being accepted and having their open access publication(s) paid for through transformative agreements while funds are still available, as "getting in," or "without having to [pay]." The implication of this is that they believe this process to be "free" and without allocation of payment in any form. Responses such as these demonstrated a limited understanding of how transformative agreements work, especially where costs and responsibility for those costs were concerned. However, the few participants who referred to the business models of commercial academic publishers made statements that cast processing charges in a negative light: "I almost, to a certain extent, don't see much of a distinction between their pay to publish model and that of the predatory journal" (Interview 11, Faculty); and "On the flip side it costs. So there's

that issue, it's not good that we've come up with a model that's prohibitively expensive for people that want open access, but when you can get open access, it's supporting a publishing model that is somewhat predatory, if not openly predatory in some cases" (Interview 6, Postdoc). Researchers were explicit in their comparison of the processing charges associated with certain types of open access publications and those of predatory journals, characterizing them as inherently exploitative. Furthermore, participants evinced little knowledge of alternative publishing models such as diamond open access, which eliminates author-facing fees (Normand 2018, 2). They either confused such publishing models with transformative agreements or were unaware of the existence of such options.

Lack of Formal Training in Data Management

One of the most consistent results throughout the study was the absence of formal training in data creation and management for archaeologists. Participants reported that most available training came from workshops offered by their institutions' libraries, general research support units, or their supervisors and principal investigators (PIs), rather than discipline-specific programs. The lack of structured training in open research practices means that researchers often relied on self-learning or informal peer guidance to navigate data sharing protocols. The absence of overarching standards for formal guidance and training means that researchers structured their work in ways that do not align with open research practices, resulting in an increased workload if they were required to restructure to meet funding mandates. Participants recognized the paucity of standardized methods for collecting data and creating metadata as an issue; it was repeatedly mentioned that "it's different every time" (Interview 21, PhD Student), noting that data collection became inconsistent as a result of everyone creating their own approach. Archaeologists opined that the interoperability of data being used in research was affected poorly by having no set disciplinary standards for collection, documentation, and publication. This assertion was reinforced with a number of examples of strategies for interacting with previously published datasets, including repositories, databases, supplementary information attached to articles, and "data made available upon request."

A lack of standardization and formal training found researchers trying to navigate data and metadata production themselves with little guidance. As a result, participants expressed a great deal of interest in discipline-specific training programs and standardized practices to better equip them with the necessary skills to manage and share data effectively. As one respondent noted, "I didn't put my PhD [data] research in any sort of open source form. I just put a thesis out and that was because [. . .] I didn't think

it was worth [publication], I didn't think it was clean enough. I didn't feel like it was something I wanted out there, so maybe if I had that training at the beginning [. . .] I would have been a bit more thorough with it" (Interview 21, PhD Student). Another said, "I would prefer to see more thought given to a standard level of reporting rather than forcing PIs to upload it as a matter of course" (Interview 8, Faculty).

These findings suggest that while there is broad support for open research principles among archaeologists, significant gaps in knowledge, training, and infrastructure continue to hinder its full implementation within the discipline. Addressing these gaps will require more targeted educational initiatives, increased transparency about publishing costs, and a more inclusive approach to data sharing across different sectors of archaeology.

Discussion

Our findings reveal that the persistent challenges associated with open research in archaeology as a discipline are solvable barriers pertaining to misinformation or a lack of education about open research practices. Though there is general agreement in archaeology that open research can enhance accessibility, transparency, and collaboration, in practice its implementation remains uneven, largely shaped by external mandates rather than by intrinsic disciplinary motivations. This finding raises critical questions about how open research can be meaningfully integrated into scholarly practice in archaeology in ways that go beyond mere compliance with institutional and funding requirements.

Here, we identify and discuss the prevailing barriers that prevent the widespread adoption of open research in archaeology and assess how these barriers will affect the future of open research if left untreated. This section examines structural, financial, and disciplinary challenges that limit engagement with open research. Obstacles include inadequate training and institutional communication structures that disincentivize openness, unclear or costly publishing models, and differing sets of priorities that stem from an assumption of a baseline knowledge of the open research movement that does not exist.

The first major barrier that hinders the widespread adoption of open research within archaeology is how top-down approaches are used as the main source of information about, and promotion of, open research practices. The term "top-down" is used here to describe how institutions and organizations attempt to enforce open research practices through signing declarations and statements, such as the Barcelona Declaration on Open Research Information (2024), without providing further support or infrastructure. Without proper support, training, basic knowledge, infrastructure, standards, guidance, or best practices, the ideals of open research practice cannot become reality.

These top-down approaches result in a specious understanding of open research as being value driven when, instead, compliance with funding mandates or institutional requirements are the actual motivating force behind participation for the majority of researchers. This is reflected in the perception that open research practices benefit research itself, such as how it is conducted and how others can engage with the research for their own research purposes. Transparency, accountability, and collaboration were all listed as benefits of open research practices but in terms of what they could do for research improvement and for researchers. The overall discussion reflects interest in what open practices can do for researchers and research conducted, not for greater community outreach or engagement.

Given these dynamics, open research practices have become tokenized, motivated by larger economic and political agendas or national priorities rather than by their intrinsic value for the discipline. It is concerning that there is relatively limited discussion within the field of archaeology as to how openness can be of value to researchers, students, commercial and community archaeologists, and the general public, nor is there standard guidance about how various research outputs should be made open. We cannot ask researchers to engage in open research practices without actively informing them of the professional benefits and providing them with the support they need for implementation. The only way that the ideals foregrounded in declarations and policy can materialize in actual archaeological practice is through researchers' practical implementation. If there is to be no infrastructural support, outline of best practices, development of standards, or provision of support, then openness remains an empty gesture.

Another major challenge pertains to how open access publications have become a necessity but are not well supported across the discipline. While researchers appreciate the importance of making their work openly available, they are often unaware of the high costs of transformative agreements. Researchers are often not completely "conscious of the total costs of their relationships with publishers (subscriptions and APCs)" (Pinfield 2015, 620). Whereas APCs are seen as obstacles to open access, most participants found "library agreements" (i.e., transformative agreements) as satisfactory solutions, unaware of the struggle of many institutions' libraries to sustain costs for multiple methods of open access systems (Dodd 2024). In conjunction with a lack of appreciation for the hidden costs of transformative agreements, few respondents were informed about the profit-maximizing motives of commercial academic publishers, and there was little awareness that publications could be made open access by diamond or green open access models. There seemed to be little recognition for the potential for researchers to pivot to mission-driven, scholar- or community-led journals, or other alternatives.

Academics' logical preoccupation with research assessment leads to perceiving "free" open access as beneficial for their careers, without recognizing how transformative

agreements incur considerable costs to universities and increase inequities between researchers, institutions, and regions. The attitudes and understandings expressed by our respondents suggest that it is necessary to reconsider how open access and open research practices should be promoted to researchers. Openness should not be the goal in and of itself, and it cannot and should not be achieved at any cost. Without acknowledging and understanding the hierarchies that undergird the academic publishing industry—especially when and how such hierarchies are structured by profit motives—researchers will be hard pressed to make responsible choices about open access publishing.

The final major barrier to the widespread adoption of open research within archaeology is the lack of standardized training and guidance as to how to effectively and efficiently implement open research practices. The preponderance of top-down mandates deployed without investment in infrastructure or formal training in best practices requires researchers to invest time and energy figuring out individualized approaches. Without formal education in data sharing, metadata standards, and reproducibility frameworks, researchers understandably struggle to navigate open research requirements. A reliance on self-learning or informal support, while well intentioned, generates inconsistencies in disciplinary practice, with knock-on effects for interoperability. The absence of standardized methods and practice prohibits the achievement of some of the major goals of open research, such as transparency, access, and replicability.

Issues of ambiguity are not limited to data sharing or publications access but pervade understandings of even the most basic terminology. In our interviews, researchers described misinterpretations of requirements due to an absence of standardized definitions within mandates. Some participants even experienced conflicting requirements between their projects, their institutions, and their funders. The core issue at play is that top-down mandates fail to provide standardized education about open research practices; education "creates an important basis for the expectations and actions of others because individuals are able to assume that others, whom they might engage with, are educated too" (Vanderstraeten 2021, 735). Our interviews demonstrated that there is little to support the assumption of a shared and baseline level of knowledge about open research within archaeology. The establishment and communication of standards allow for interoperability within open research, but such standards can only be realized through set training protocols. Even when researchers are aware of the FAIR principles (findability, accessibility, interoperability, and reusability), they may not know how to actually enact them. Instead, participants view and describe open research practices as tick-the-box exercises imposed by top-down mandates. Although most archaeologists interviewed agreed that openness is of potential benefit to the field, open research practices will only be beneficial if there are coherent and programmatic approaches to make such practices understandable, reusable, and interoperable.

In sum, our findings highlight an overarching disconnect between the open research movement and the discipline of archaeology, especially in regard to communication of standards and the logistics of implementation. Our results suggest that institutions, organizations, and funding bodies assume a level of baseline knowledge that does not always exist. This dissonance between assumed and actual knowledge can lead to a widening gulf between open research ideals and open research practice within archaeology. Though top-down mandates seemingly incentivize open research, failure to provide infrastructural support or formal training in best practices leads researchers to hold conflicting opinions and understandings about open research. Open research in archaeology cannot move beyond its current compliance-driven approach, or become a successful and fundamental part of scholarly communication, without addressing the dissonance between the lofty ideals of open research and the logistic limitations experienced by researchers operating without formal training, standardized guidelines, or infrastructural support. Resolving these issues requires financial and institutional support and also a shift in how researchers perceive and engage with open research practices in their day-to-day working lives.

Conclusion

The challenges surrounding the adoption of open research in archaeology highlight a fundamental disconnect between the top-down policies imposed by funding bodies and institutional mandates and the day-to-day reality of research practices. While there is broad agreement that openness can enhance accessibility, transparency, and collaboration, the implementation of open research remains uneven, driven more by compliance with external policies than by intrinsic scholarly motivations. Structural barriers such as top-down mandates, financial constraints, and a lack of standardized training and guidance hinder meaningful engagement with open research practices.

There is an urgent need for greater institutional support, clearer educational initiatives, and sustainable open access models that prioritize equity over profit to bridge this gap. It is also essential that proponents of open research raise awareness about the diversity of models, choices, and motivations involved in contemporary open research practices. Within archaeology, practitioners need to be better informed about the costs and inequities of transformative agreements and the potential of not-for-profit options such as diamond open access. Without addressing these issues, open research in archaeology risks remaining a token or an empty gesture rather than an effective and integral part of scholarly communication. Moving forward, the field must foster a more researcher-centric approach—one that not only acknowledges the value of open research but actively

provides the necessary resources and frameworks to enable its practical and sustainable implementation. Only through such efforts can open research transition from a compliance-driven exercise to a meaningful and lasting transformation in archaeological scholarship.

The results of this study raise questions and concerns that go beyond a single discipline. If archaeology—a field that bridges the sciences and humanities—struggles with the practical implementation of open research, then there is the potential for these problems to be even more pronounced in disciplines in which research outputs are less standardized and funding structures are less robust. Challenges such as the lack of training, the influence of top-down mandates, and the dominance of commercial publishing likely reflect broader trends that affect disciplines across the humanities and social sciences. The widespread assumption that researchers already possess the knowledge and resources to engage in open research effectively is a fundamental flaw in existing approaches, one that must be taken into account and explicitly addressed across HSS disciplines in order to improve their adoption and implementation of open research principles.

The challenges faced within archaeology foreground deeper questions about the purpose and future of open research within academia as a whole. If open research continues to be shaped primarily by compliance with institutional and funding policies, rather than by genuine scholarly engagement, then its transformative potential may remain unrealized. In the humanities and social sciences—where research is often deeply contextual, interpretive, and diverse in format—open research must be tailored to the specific needs of researchers, rather than be forced into the more rigid models developed to conform to STEM disciplines. While there are many barriers that present themselves as solvable (lack of infrastructure or training), there are areas that need more specific accommodations depending on the discipline. For example, the ethics of data sharing within archaeology is not a barrier that can be removed; as a result, adjustments and compromises must be made in order to uphold both responsible and open research practices. Such a reconfiguration would include rethinking the ways in which openness is defined, promoted, and supported and would work to ensure that researchers are active participants in shaping open research policies rather than passive recipients of mandates.

For open research to succeed in archaeology and beyond requires a fundamental shift in ideology and practice. Institutions, funding bodies, and scholarly communities must work collaboratively to build an open research ecosystem that prioritizes sustainability, equity, and meaningful engagement. This requires not only financial investment but also cultural change in which openness is redefined as a scholarly practice rather than a procedural requirement or box-ticking exercise. If these challenges remain unaddressed, open research risks becoming an empty ideal rather than a transformative force

within academia. By acknowledging and actively working to resolve these issues, the open research movement has the potential to foster a more inclusive and accessible scholarly landscape, not only within archaeology but across the humanities and social sciences as a whole.

Open Peer Review Reports

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Lai Ma is Associate Professor at School of Information and Communication Studies at University College Dublin. Her research is concerned with the interrelationship between epistemology, research infrastructure, and their cultural, historical, social and political affordances. Her recent work focuses on authority and responsibility in knowledge production, involving epistemic injustice, epistemic diversity, and information boundaries. From 2025–2030, Lai is leading a project, "Sustainable and Collaborative Research Information for Bibliodiverse Ecosystems: A Transnational Study" (SCRiBe) funded by the ERC Consolidator Grant. The project examines the

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