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DIGITAL REVIEW

Feminist Data Science in Archaeology?

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Overview

This digital review examines how feminist data science can inform, challenge, and reshape archaeological knowledge production in an era of expanding digital data infrastructures. Beginning with a historical analysis of the term "feminist" in *American Antiquity*, I demonstrate that although feminist perspectives have appeared consistently over four decades, such engagement remains limited in scope. Drawing from this context, I argue that the proliferation of online, publicly accessible archaeological datasets requires renewed feminist and decolonial scrutiny. I situate these challenges within broader conversations around FAIR (Findable, Accessible, Interoperable, and Reusable) and CARE (Collective benefit, Authority to control, Responsibility, and Ethics) principles, Indigenous data sovereignty, and moderated openness, highlighting tensions between expanding digital access and resisting colonial datafication. Intersectional feminist data science, particularly the framework proposed by D'Ignazio and Klein (2020), offers actionable principles for confronting inequities embedded within archaeological data structures. I illustrate these principles through a multimodal collaborative project with the Pueblo of Zuni and the Hopi Tribe, which uses film-based storytelling to reframe relationships to ancestral collections and places. The article concludes with a reflection on citation inequities and disciplinary gatekeeping, underscoring how digital data practices can either reproduce or dismantle structural biases. I argue that transforming archaeological data science requires collective courage and sustained commitment to feminist, Indigenous, and community-engaged approaches that expand the inclusivity and ethical integrity of our field.

Keywords: collaborative archaeology; data accessibility; data sovereignty; feminist science; gender

When I published "'A Mother for All the People': Feminist Science and Chacoan Archaeology" (Heitman 2016) as an early assistant professor, I did not know that the word "feminist" had never been used in the title of an *American Antiquity* article before (nor has it been since). I recall feeling slightly worried at the time that the term "feminist science" might be received by reviewers and the journal editor as anathema. That was not the case. But this new realization piqued my curiosity: how often *had* the term "feminist" occurred in the pages of *American Antiquity*? A search on *American Antiquity*'s Cambridge journal page produces 157 records containing that term. Excluding indices, front matter, back matter, and "editor's corner" records, I identified 65 articles (written by 58 unique authors) with 70 book reviews, six comments, and three responses. The term first appeared in the journal in 1984—the same year as Conkey and Spector's (1984) seminal paper "Archaeology and the Study of Gender"—and has been used in 1.6 articles a year on average for the past 41 years. This cursory analysis indicates that there has been relatively consistent (albeit low-level) engagement with feminist approaches or issues (positive, negative, or neutral) in the journal for the last four decades. This bit of historical context, enabled by online access to data about the journal, serves as our starting point.

Publicly accessible, nonpaywalled data about published research provide a critical disciplinary context for archaeological scholarship, as shown by many of the contributors to this issue. Digitally accessible data provide the intellectual scaffold (Chapman and Wiley 2016) for contemporary scholarship in our

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field—whether it is prior studies, museum collection data, or comparative datasets. In North America, digital archaeological data platforms come in three general varieties: context-specific (either temporally or spatially, e.g., the Chaco Research Archive, Digital Archaeological Archive of Comparative Slavery [DAACS], cyber SWM), data type–specific (e.g., Canadian Archaeological Radiocarbon Database [CARD], North American Repository for Archaeological Isotopes [NARIA]), and large-scale, multipurpose data repositories (e.g., the Digital Archaeological Record [tDAR], Digital Index of North American Archaeology [DINAA], OpenContext, Zenodo, Figshare, and institutional, state, or federal repositories [see Bollwerk et al. 2024]). Few would argue against the transformative impacts of these initiatives to expand research horizons through increased data accessibility. At the same time, we must also consider their context. I would like to highlight a few dimensions of web-accessible archaeological data that connect with the challenges and recommendations presented in this issue.

Positionality Required for Large-Scale Data Efforts

Comprehensive online data-sharing platforms require vision and resources to construct; strong relationship networks with stakeholders and contributors; thoughtful, long-term development timelines; and perpetual investment in terms of labor, infrastructure, and capital. In other words, projects like tDAR (McManamon et al. 2017) and CARD (Kelly et al. 2022) require a level of institutional investment and sustained engagement that does not conform to typical research cycles. Such projects are also built by large teams where conventional attributions of "credit" and "authorship" do not readily align with their complexity and scales of collaboration. In physics, for instance, all members of the Large Hadron Collider consortium are credited on all resulting research papers, which may then include 500+ authors. Mega-authorship causes its own challenges (see Dotson 2024), but it provides us with an example of disciplinary practice wherein data-sharing is consistently acknowledged as a dimension of authorship.

We have no such practice in archaeology for crediting the material contributions of data-sharing platforms outside of in-text citations and acknowledgments. Various scholars have advocated for shifting our disciplinary values to promote data quality and reuse in archaeology (Kansa and Kansa 2022) and a cultural shift toward data-citation practices (Marwick and Birch 2018) and reproducibility (Marwick 2025). "Computers have become a central field and laboratory instrument for much of our work," Marwick writes, "so we have an ethical duty to document how we change our data as it flows through silicon just as carefully as we document the operating parameters of a mass spectrometer or any other field or laboratory instrument" (2025:9).

Large-scale data-sharing efforts also do not bear fruit within the current productivity timelines required for the competitive hiring environment or the promotion and tenure clocks of early career academics. Thus, projects of this type often result from the leadership of senior scholars. This is not necessarily a bad thing, but it draws our attention to how existing structures of power, with their attendant networks and access to resources, transform the very foundations of data on which current and future scholars will rely. If we recognize that data are not neutral and not atheoretical (contra Anderson 2008), we must ask what is missing from these platforms and existing data structures? What knowledge systems are represented? And how might we shift our disciplinary commitments to value such contributions alongside journal articles and monographs?

FAIR and CARE Principles

As "big-data" aspirations in archaeology emerged alongside global, big-data initiatives in the early aughts, different groups of scholars were simultaneously sounding the alarm about online data accessibility and data sovereignty. In 2006, Berners-Lee was advocating for "5 star" open data through linked data approaches (https://www.w3.org/DesignIssues/LinkedData.html), while the Intellectual Property Issues in Cultural Heritage (IPinCH) project was exploring "the rights, values, and responsibilities of material culture, cultural knowledge and the practice of heritage research." A decade later, Wilkinson and others published the FAIR (Findable, Accessible, Interoperable, and Reusable) data framework (Wilkinson et al. 2016; see also https://www.go-fair.org/fair-principles/). CARE (Collective benefit, Authority to control, Responsibility, and Ethics) principles, created by the Global Indigenous Data Alliance

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(GIDA, https://www.gida-global.org/), followed a few years later (Lovett et al. 2019), with a focus on Indigenous data sovereignty and governance (see also Carroll et al. 2020).

In a similar and parallel fashion, Creative Commons (https://creativecommons.org/) licenses expanded into Traditional Knowledge and Biocultural labels (https://localcontexts.org/). And open-access content management systems like WordPress led to the development of sophisticated access protocols in such projects as Mukurtu and protected data platforms like the Digital Index of North American Archaeology (DINAA). These are examples of moderated openness (Heitman 2022). In the pages of *Advances in Archaeological Practice*, Nicholson and colleagues (2023) have reflected on FAIR principles for archaeological data, while Gupta and colleagues (2023) focused on operationalizing CARE principles. We might think of these parallel developments as interwoven commitments with an inherent tension: a pull toward enhancing access to archaeological data at larger scales through application programming interfaces (APIs), linked open data, et cetera, and a pull away from colonial datafication toward Native sovereignty, new data structures, and community-engaged research practices.

This is a brief synopsis of a much longer, and ongoing, story about how web-accessible data intersect with issues of equity and representation in archaeology. Who decides what archaeological data are publicly, digitally accessible? And who decides on the structures of those data: the fields, the values, controlled vocabularies, ontologies, nomenclature, and metadata? Our colleagues in the digital humanities have been confronting many of these same issues through postcolonial (e.g., Risam 2018; Risam and Baker 2021), cultural, and Indigenous studies (e.g., Cocq 2022; Guiliano and Heitman 2019) and intersectional feminist approaches (e.g., D'Ignazio and Klein 2020; Losh and Wernimont 2018). It may be heretical to suggest that "hard" science and "soft" science (Marwick 2025) converge, but this is precisely what our colleagues in Indigenous science have been advocating (e.g., the National Science Foundation Center for Braiding Indigenous Knowledges and Science; Atalay 2020). Their work asks, how can we "effectively and ethically braid Indigenous and Western science research, education, and practice" in areas such as cultural heritage? Cocq articulates the larger problem: "data harvesting, categorizing, and sharing in a digital age reveals how we are currently meeting the challenge of adjusting and adapting practices that carry Eurocentric and hegemonic values" (2022:341). What would it look like, Cocq writes, if we acknowledged the "diversity of technoscientific traditions" and could better render "the plurality of the cultural values, perspectives, and ethics" (2022:333)? This is, indeed, a challenge.

Data Feminism

Many scholars have proposed best practices to bridge structural and epistemic divides, including data manifestos, to push back against dominant forms of information architecture (e.g., Brown et al. 2023; Ventura et al. 2023). In short, there are various models for how to achieve greater equity and representation when it comes to cultural data. I will highlight but one here. In their 2020 monograph *Data Feminism* Catherine D'Ignazio and Lauren F. Klein (2020) articulate seven core principles. These principles, they argue, are at the heart of intersectional feminist thought and should be at the heart of any data science: Examine power, Challenge power, Elevate emotion and embodiment, Rethink binaries and hierarchies, Embrace pluralism, Consider context, and Make labor visible. The challenge for archaeology, which spans humanistic, social science, and science frameworks, is how we operationalize and value these approaches to data science such that they do not become a tax placed on early-career, especially Black, Indigenous, and People of Color (BIPOC), and especially women, archaeologists.

Multimodal Approaches

My colleagues at the Pueblo of Zuni (Octavius Seowtewa, Curtis Quam, the Zuni Cultural Resources Advisory Team, and the Zuni Tribal Council) and the Hopi Tribe (Karen Charley, the Hopi Pottery Oral History Project, and the Hopi Cultural Preservation Office) and I are currently exploring how narrative storytelling through film can help disrupt conventional archaeological approaches to their cultural heritage. (Re)Connections through Time: Developing a Model for Multimodal Storytelling about Indigenous Communities and Their Collections (2022–2025, the Andrew W. Mellon Foundation, Grant: 2112–11888) has various goals. First and foremost, we wanted to amplify Zuni and Hopi perspectives regarding important ancestral objects and ancestral places like the Chaco Culture National Historical

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Park, Salmon Pueblo, and Aztec Ruins National Monument, among others. We also wanted to create more opportunities for Tribal community members to visit ancestral collections at geographically distant repositories (e.g., New York and Washington, DC).

(Re)Connections through Time involves partnerships with the American Museum of Natural History, the National Museum of Natural History, and Skyship Film. Through short-form films, we aimed to document and share stories of connection between ancestral and contemporary descendant Indigenous groups in the American Southwest—focusing on the Pueblo of Zuni and the Hopi Tribe. The choice of medium was also about audience and accessibility. We wanted to develop online digital resources to help Hopi and Zuni youth understand their inalienable connection to ancestral places and cultural heritage collections and meet young people where they are: consuming media content online. By producing public-access films alongside restricted-access films in the A:shiwi and Hopi languages, we also aimed to support language and cultural knowledge preservation and inspire the next generation of Native artists, museum curators, and cultural resource managers.

The films are not a solution to the challenges posed above. Rather, they are our attempt to communicate the harms that archaeological collections and their descriptions pose for descendant communities and the opportunities that exist for healing. In the Zuni Connections through Time film, Curtis Quam says it best: "While we can't correct the wrongs of history, we can build something better for the future." To date, the films have only been shared with select audiences, but the open-access films will be made publicly available later in 2026. In Data Feminism terms, the films are our attempt to examine and challenge power, elevate emotion and embodiment, rethink binaries and hierarchies, embrace pluralism, and consider context.

Conclusion

With some trepidation, I will end this review with a personal anecdote that underscores some of this issue's themes. "'A Mother for All the People': Feminist Science and Chacoan Archaeology" appeared in the July 2016 issue of *American Antiquity*. My article leveraged online-accessible legacy data from the Chaco Research Archive to demonstrate "that women had important and undertheorized roles to play in the social transformations that defined emergent Chacoan society" (Heitman 2016:471). In February of 2017, Kennett and colleagues (2017) published "Archaeogenomic Evidence Reveals Prehistoric Matrilineal Dynasty" in *Nature Communications*, in which they presented evidence for "an elite matriline that persisted between 800 and 1130 CE in Chaco Canyon" (2017). The complementarity of our findings is self-evident. And while the visibility of their *Nature Communications* article (five-year journal impact factor of 17.2) far exceeds that of *American Antiquity* (five-year journal impact factor of 2.1), one might reasonably assume that the 2016 study might have been referenced in their article alongside the numerous other 2016 science journal citations. It was not.

Is this a demonstration of structural inequities in our discipline? Is it an example of prestige bias for hard-science publications? Is it an example of gender citation bias like those shown by Hutson (2002, 2006)? Was it an oversight? Or did they just think my work was irrelevant to their argument? Who knows. What I do know is that if they had cited my work, it would have increased its visibility at a critical pre-tenure moment in my career. Such is the nature of networked citation data. Instead, my work felt invisible, which was then followed by a hostile comment by Joan Ware (2017). While I was crafting my response to Ware (Heitman 2017), the *American Antiquity* journal editor repeatedly asked me to "tone down" my language. The requests felt highly gendered. I was not being allowed to respond in kind to both the content and tone of the critique. I said as much at the time and stood my ground. But, to be candid, it all came at a steep personal cost and made me feel like, "Why bother?" These personal and professional experiences pale in comparison to the micro– and macro-aggressions marginalized archaeologists face at every stage of their careers. I offer it in the hopes that sharing invites change.

In addition to the measures offered by Kurnick and Fladd (2026), our digital data structures and platforms also require collective, and courageous, attention in the ways D'Ignazio and Klein (2020) suggest. Without the courage required to speak out about existing inequities, nothing will change. The contributions to this special themed issue of *Advances in Archaeological Practice* provide us with

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examples of and recommendations for how to achieve all six principles of data feminism. The editors and authors are helping us envision a more welcoming, supportive, and inclusive field of practitioners that will yield richer understandings of the past. And many of these authors are speaking out at vulnerable moments in their careers. They are to be commended.

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