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Women's Work: Attributing Future Histories of the Digital in Architecture

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Abstract

Conventions of authorship and attribution historically excluded or erased women's contributions to the built environment. As frequent co-authors and collaborators, women's stories often do not fit into conventional historical narratives about how architecture is created. In response, this essay proposes a technology called "attribution frameworks": a digital method for creating a transparent record of architectural labor. The authors argue that the integration of digital tools into architectural design offers a new space for more equally attributing, documenting, and counting labor and contributions to the discipline. This space allows for a more rich and inclusive narrative of contributions to architectural production for the future.

Keywords

architectural labor, attribution frameworks, data collection, design scholarship collaboration, gender equity

Disciplines

Architectural History and Criticism | Architecture

Comments

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Women's Work: Attributing Future Histories of the Digital in Architecture

Shelby Doyle, Nick Senske

ABSTRACT - Conventions of authorship and attribution historically excluded or erased women's contributions to the built environment. As frequent co-authors and collaborators, women's stories often do not fit into conventional historical narratives about how architecture is created. In response, this essay proposes a technology called "attribution frameworks": a digital method for creating a transparent record of architectural labor. The authors argue that the integration of digital tools into architectural design offers a new space for more equally attributing, documenting, and counting labor and contributions to the discipline. This space allows for a more rich and inclusive narrative of contributions to architectural production for the future.

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Representational inequality is recognized as a problem in architecture. There continues to be a lack of diversity in gender (and race, class, and other areas) among those attributed with the creation of buildings, as well as leadership of firms and other forms of recognition.¹ The reasons for this condition have to do with the cultural biases in architecture that have historically limited diversity,² as well as the construction of architectural attribution.³ For example, even when women work to build or design architecture, they are not always credited for their efforts by peers, firms, marketers, journalists, and historians.⁴ Or their roles are under- or misreported.⁵ When the discipline's attribution methods exclude or obscure

these labors, it is not only unjust – it reinforces a lack of diversity in those recognized in the production of architecture.

As buildings and other designed objects create and share information as part of the emergent Internet of Things (IoT),⁶ the ways in which authorship is attributed to architectural materials and processes is of increasing importance as a social and ethical practice. Information technologies from hyperlinks to RFID (Radio-Frequency Identification) tags to cloud computing offer methods for changing cultural narratives about how buildings are made and who makes them (Fig.1). Today's architecture, like many other fields and industries, is becoming increasingly collaborative and multidisciplinary, as it seeks to address complex issues with more rigor than ever before.⁷ Technology has the potential to question and address these issues of attribution and authorship for the archives of the future. This is not to advocate for tokenism – that a few persons might stand in for the many so that the record might seem more “equal.” Rather, there is a disciplinary need for a more sophisticated, objective, and transparent system of attribution, one that recognizes the distributed nature of innovation and responsibility in today's architecture.

This essay is a thought experiment about the potential uses of data collection methods to provoke questions about architectural labor and its

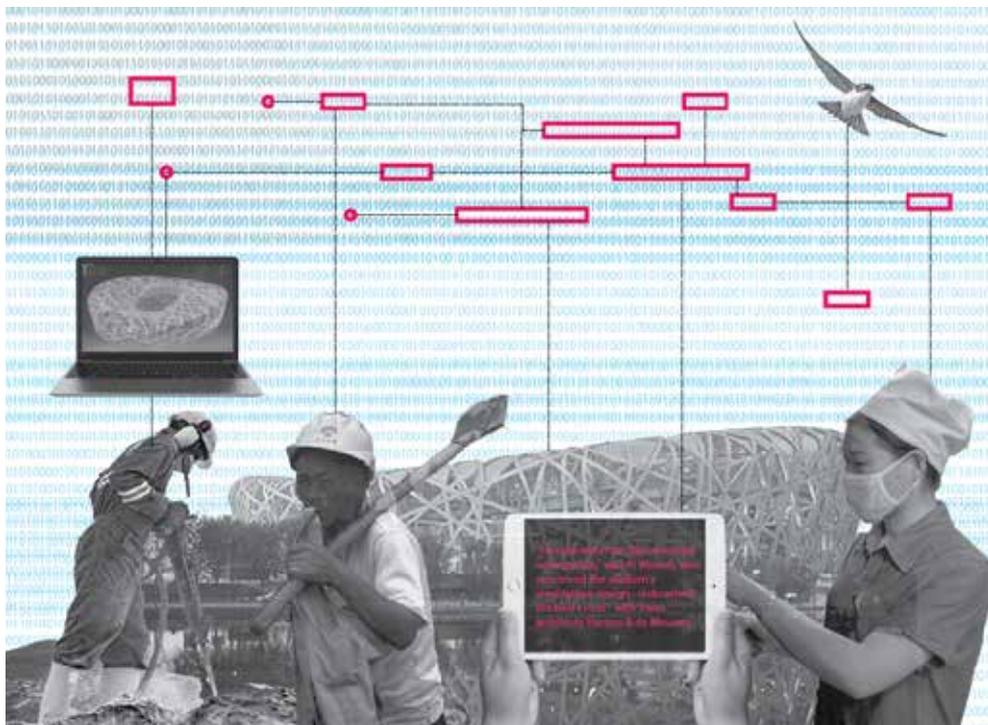


Figure 1. In between physical artifacts such as books and buildings, and digital artifacts such as software and simulation models, there is space to reconsider how architecture is attributed. In this space, people are fully acknowledged for their intellectual and physical contributions to digitally designed objects and will be represented accurately in current and future narratives of architecture.

attribution, specifically questions of gendered labor and gender inequity. While companies like Google and Facebook capture user interactions for the purpose of advertising, a similar type of data acquisition could be used, or is already being used, with BIM (Building Information Modeling) software and other platforms to offer a more accurate portrait of architectural labor: who designs, who builds, and what their process entails. Rather than assigning credit solely through traditional means and gatekeepers (such as editors and award committees), this information could be made available to anyone through a comprehensive digital record assembled from various types of data, such as design software operations, digital documents, and communications from mobile devices. This speculative essay proposes the development of protocols, processes, and policies – “attribution frameworks” – with the intention of addressing inequality of authorship through the creation of less biased, comprehensive digital narratives and archives (Fig. 2). The integration of these technologies has the potential to create a new space for more equitably documenting and acknowledging architectural labor, which can frame a more rich and inclusive narrative of contributions to architectural production in the present day and for the future.

MISSING STORIES

In architecture, as in many creative fields, there has long been a struggle over allocation and control of intellectual property rights and over the partition of credit for creating work.⁸ Where creation is collaborative but labor markets value individual creativity, the legal and cultural challenges in balancing individual and collective attribution are considerable, and the stakes are high.

Gender inequalities in architecture serve as a well-documented and specific example of the broader issue of attribution of architectural labor. Even the

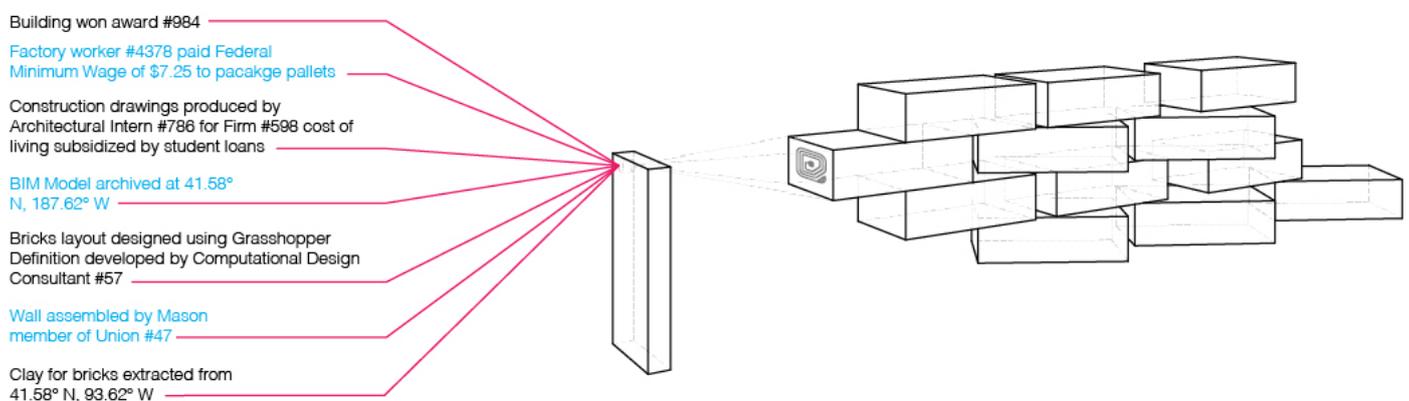


Figure 2. Embedded RFID tags or similar technology could be added to architecture to connect materials to attribution frameworks. Digital documentation of the full contributions and consequences of building design and construction makes space for conversations about gender and beyond; for example, the broader impacts of buildings from the environmental to the socio-economic.

use of gender singular, rather than as a plural, is exclusionary – it does not acknowledge a gradient of genders. Additionally, examining gender without intersectional context is also a form of exclusion. Feminist scholars from Roxane Gay, to Donna Haraway, to Audre Lorde write that there is no hierarchy of oppressions - a perspective which invites the recognition that all oppressions (of gender, race, class, sexuality, religion, ability, and more) are connected: commonly referred to as intersectionality.⁹ This is not only a semantic and conceptual concern but also one of data collection. There is a counterargument that these aspects of an architect's life should be irrelevant as they are identity markers and not architectural content. However, as long as certain identity markers in architecture remain avenues of privilege (i.e. white, male, cisgender, wealthy) creating alternative narratives will remain important – and technology is a tool in the production of these narratives.

The state of gender inequality in architecture offers an example of how unequal authorship and attribution exist and how this affects representation and perceptions of authorship across the built world. Women are underrepresented in architecture, not only in professional practice but also in its records. It is not that there are no women practicing architecture or that there are no histories of women, but rather the way narratives of architectural production are constructed that is responsible for the present state of the architectural canon.¹⁰ Conventions of authorship and attribution tend to exclude or erase women's contributions to the built environment. As frequent co-authors and collaborators, women's stories often do not fit into traditional narratives about how architecture is created. When those stories are not told, women are rendered invisible or obscured in the record of architectural attribution.¹¹ In real terms, lack of attribution prevents women from being promoted and awarded, and ultimately, remembered for their contributions to the discipline.¹² And so, through these long-held conventions and traditions of assigning credit for architectural works, women's lack of representation in the field has been perpetuated.

While corrective scholarship has improved the record, few historic women architects are well-known today, particularly those practicing outside of the last few decades,¹³ while the men they collaborated with have celebrated reputations and recognition. For example, Marion Mahony Griffin (1871-1961) was one of the first licensed female architects in the world. The renderings she made for Frank Lloyd Wright's projects are instantly recognizable, but she does not often receive credit for them, or they are assumed to be the work of Wright.¹⁴ Similarly, the designs of Modernist architect Eileen Gray (1878-1976) were often attributed to her contemporaries such as Le Corbusier. While her contributions were significant and unmistakable, her projects were overlooked by critics and historians of the time because she often collaborated with others.¹⁵ Anne Tyng (1920-2011) was one of the first women to attend the Harvard Graduate School of Design. She eventually became one of the first women

to receive a Graham Fellowship. While she produced her own innovative designs, she is primarily remembered as an influence on Louis Kahn, whom she worked with early in her career.¹⁶ These women's stories are known due to recent corrective scholarship which aimed to reinsert them into architectural history. Many more stories remain undiscovered and forgotten (Fig. 3).

Franklin Wright Griffin anonymous
Le Corbusier Gray anonymous
Louis Kahn Tyn anonymous

Figure 3. Clarifying architectural authorship involves abandoning heroic narratives in favor of blurred, entangled, records of who makes architecture. It is a value proposition regarding which stories are worth telling. Without an intervention, how can contributions to current technological practices not repeat these exclusions?

This essay posits that future methods of attribution and documentation will necessitate a change in how authorship is determined in architecture. Ideally, the volume of data collected would make the future obfuscation of individuals or groups unlikely. But there is still the matter of how the data is selected and woven into narratives. Scholars such as Stratigakos, Kingsley, and Allen document how the notion of authorship in architecture and other fields is closely entwined with the failures to tell the histories of underrepresented groups such as women and minorities.¹⁷ Upon examination of these gaps in the record, several trends in architectural attribution emerge.

First, in the 1980s and 1990s, feminist scholars criticized historians for emphasizing single authorship for works of architecture, disregarding collaborations in favor of a heroic monograph.¹⁸ The effect of this practice excluded many women architects from history, who often could not practice on their own at the time. Even when women were part of a full and equal partnership with a male, the male partner tended to receive the credit for their collaboration.¹⁹ Perhaps the most high-profile erasure of this collective practice is when the Pritzker Architecture Prize committee awarded the prize only to Robert Venturi and not to his partner, Denise Scott Brown (Fig. 4).²⁰ In their work together, Brown is careful to state how important and inseparable collaborations are with respect to her ideas and practice.²¹ Recognizing collective authorship remains a challenge in architecture today.

Another trend is the biased cultural attitudes that influence (and continue to influence) the attribution of architectural works for underrepresented

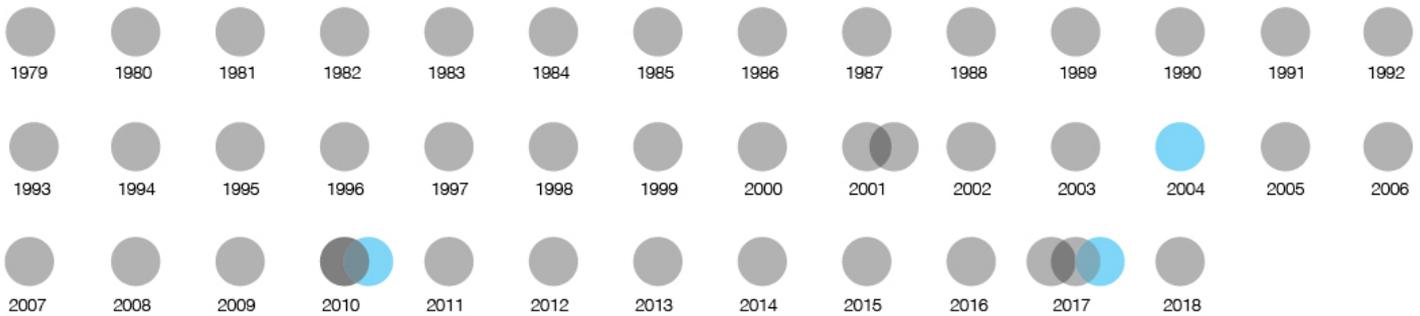


Figure 4. Awards such as the Pritzker Architecture Prize are typically attributed to individuals. During the Prize's thirty-nine-year history it has been awarded three times to a partnership (7.6%), two times to a woman in partnership (5.1%), and once solely to a woman (2.5%).

groups. For decades, women were taught that self-promotion of their contributions was inappropriate – so men took the credit.²² Indeed, a cultural expectation of Modernism was that only men were responsible for the creative act.²³ Women were once excluded from the architecture workshop at the Bauhaus due to the belief that women could think only in “two dimensions,” while men could grapple with three.²⁴ Ideas like this continue to persist today. Last year, an employee at Google wrote a manifesto arguing that there are biological reasons why women are underrepresented in technology fields.²⁵ It is telling that gender representation in STEM (Science, Technology, Engineering, and Mathematics)²⁶ happens to be a similar proportion to architecture: about 20% female.²⁷ Biases can and do impact the development of architectural narratives, and conversely architectural narratives can perpetuate bias.

The third trend is the notion that a completed building or proposal itself represents a single act for a client, rather than the labor of many individuals. This excludes not only the collective effort but also the many types of work processes involved, especially those roles often performed by women such as organizational labor, care-taking labor, or factory-work. Attribution and the historical record are entangled with the valuing and ranking of types of work. This dialogue finds precedent in Hannah Arendt's *Animal Laborans* (1958), manual workers enslaved by necessity, and in Max Frisch's *Homo Faber* (1957), the maker freed from necessity. Architecture has long attempted to separate itself from “animal laborans” and to firmly establish the architect as *homo faber*. In doing so, the work of *animal laborans* is devalued as lesser than that of *homo faber*.²⁸ This can result in those contributions which are not “creative” not being documented fully or ignored as less valuable than the creative act.

However, the controversy over collaboration and creative vs. other labor may be shifting towards a broader interpretation of co-authorship. As Jeremy Birnholtz writes: “the traditional model of authorship is fundamentally at odds

with contemporary collaboration and the nature of work.”²⁹ Traditions of recognizing individual genius – however romantic they might seem – appear to be increasingly out-of-step and inappropriate. This is illustrated by the growth in academic co-authorship among humanities fields – including design – where single authorship was once the norm.³⁰ In collaborations, diversity is recognized not only as fair but also for its value to improving both process and product.

While co-authorship continues to gain acceptance, the practice of attribution remains fraught not only because of the stakes involved but also because it can be difficult to determine how much credit to assign. Negotiating authorship hierarchies (whose name is first, and so on) can reinforce gender, race, class, and other inequalities through power dynamics. The order of contributors does not always reflect the scope and impact of one's contributions, and yet it can influence a person's recognition and career. And so, there is a need for a more sophisticated and objective system of attribution, one that recognizes the distributed nature of innovation and responsibility in today's architecture.

ATTRIBUTION FRAMEWORKS

With today's digital tools, it is possible to document how many people collaborate to produce architecture and the types of labor they perform. Traditional systems of attribution (awards, monographs, etc.), with their emphasis upon crediting individuals for collective work, have not adjusted to this reality. How might the full scope of architectural labor – intellectual, physical, and emotional – be recognized? And could a new model of attribution create a more inclusive record of the (often marginalized) individuals who contribute to architectural work: students, interns, draftspersons, factory workers, construction crews, and so on? This section offers a speculative study of how technology could provide a new narrative.

As the profession has moved away from paper to digital files and the costs of data storage decrease, architectural firms are no longer limited to crediting work using the amount of information that can be published within a title block. This presents an opportunity to define new attribution formats that could be more comprehensive as well as universally accessible. As an alternative to the current practice of assigning authorship for buildings to individuals or firms, imagine a set of digital protocols and algorithms – “an attribution framework” – that captures and represents the interactions of individuals working on a project.³¹ (Fig. 5) This is an extension of Bruce Sterling's SPIME concept in which everyday objects participating in the Internet of Things (IoT) can be tracked in “SPace and tIME.”³² In this version, buildings and other designed objects would become part of the IoT and maintain a digital record of their creation.

Attribution data could be stored within a project file, but it is more likely that it would be saved to the cloud,³³ so it would be retrievable anywhere. A person

or an algorithm could find the data by accessing a hyperlink or through information overlaid in physical space. Besides search engines, links could be found on digital maps, recognized from an augmented reality scan (e.g. your phone could tell you who made a stair detail), or connected to RFIDs or other technologies embedded into building materials themselves. Accounting for the accessibility of these records is important. It would not be of much use if there were an extensive record that only a few could access; architectural credits ought to be both human- and machine-readable without restriction. One way to do this would be to make the associative link for the attribution database a matter of public record. Or to link directly to the physical artifacts of architectural production – book, building, exhibit. In this manner, the output would be irrevocably entangled with the documentation of its creation: a physical hyperlink to the database of its labor. This data then could be included in project documentation, citations in histories, and available for other purposes. Describing exactly how the system would be implemented is beyond the scope of this essay. However, it is possible to discuss the scope of attribution frameworks more narrowly and to reflect on how these systems might help or hinder addressing the issues about authorship and labor raised in the previous section.

Attribution frameworks would help dispel the idea that architecture is the product of a single author, or a few authors, rather than the result of a wide range of labors from caretaking to ideation to assembly. An improvement over the present convention would be to embed information about the full project team into the files associated with the project. The particle-physics group Collider Detector at Fermilab (CDF) demonstrates how such an arrangement could work in practice. Papers authored by the facility include an alphabetical list of all researchers, assistants, and other staff as co-authors.³⁴ The list contains nearly 600 individuals on average. Persons working at CDF remain on the list for a year after leaving the facility. While practices like this have been criticized for straining the notion of co-authorship and increasing the material size of publications,³⁵ this practice nevertheless reflects the complexity of modern projects and serves as a precedent for how digital information can be used to create a more inclusive accounting of labor.

The scale and complexity of collaboration today makes it essential to reevaluate the meaning of authorship and how credit is assigned. Papers, such as those published by large organizations like the CDF, are not written by hundreds of authors, so is the title of “author” appropriate? At the same time, there are many other roles critical to CDF projects such as theorists, mathematicians, instrument makers, programmers, and others who deserve recognition. Differentiating between these roles, and their impact on the final product is difficult. One model for how to approach this comes from the film industry, which is also highly collaborative.³⁶ Entertainment and trade unions have developed extensive rules about title credits, end credits, etc.

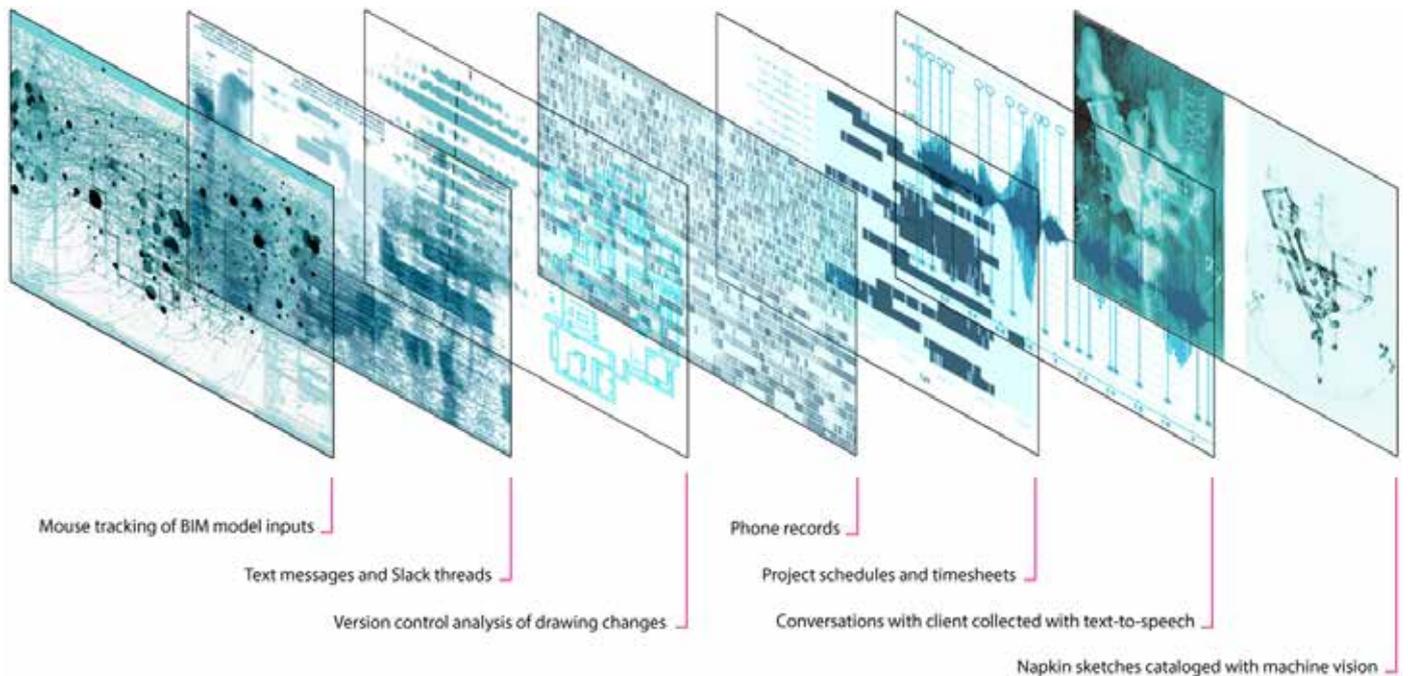


Figure 5. Attribution frameworks capture raw data throughout the design process in order to create a more comprehensive and objective record of labor. The above diagram represents a data “stack” of potential sources of information (but is not limited to these). In this example, sketches, conversations, texts, and software inputs are correlated and analyzed to create a transparent account of participation, contributions, and collaboration.

And so, in an attribution framework, it could be useful to expand the “credits” for a building similarly with job titles, assignments, and other information. However, this idea still invites potential bias, in that some individuals would be responsible for determining how the collaborators are entered into the record and then for choosing how and whether to commit the record to a database. As discussed in earlier sections, even the notions of participants’ titles themselves are fraught with hierarchies and the difficulties of classifying and valuing labor. Creating a more just system would require negotiation, but the dialogue itself could be a productive means of rethinking traditional assumptions about collective works.

As the list of designers recorded increases, this may cause problems with how credit is assigned. Not all contributions are the same, nor do they necessarily have the same value. For example, different tasks in a firm might have different billable hours; licensed professionals commit themselves to professional liability when they stamp a drawing. Moreover, assigning authorship is important because it serves to build reputation and identity and can be a basis for hiring, promotions, and awards. For this reason, in academia, there are often disagreements over which person is the first author on a research paper. Frequently, the most senior researcher is listed as the first author or otherwise determines the order of authors on a paper.³⁷ This practice is criticized as it introduces significant bias into

the process, which can adversely affect younger researchers, women, minorities, and other marginalized groups.³⁸ Some fields have adopted conventions to address this problem. For example, in the natural sciences and mathematics, lists of authors are often alphabetical.³⁹ This convention is more equal than arguing over priority but does not distinguish among contributions.

To address the challenges of assigning credit, some researchers have tried to develop systems to reduce bias in determining authorship. For example, Harvard professor emeritus Stephen Kosslyn assigns points to collaborators for developing theory, setting up experiments, writing, and other tasks.⁴⁰ Authorship order is determined by the number of points awarded. Ostensibly, the use of points creates transparency and allows for negotiation. Teams can discuss and come to an agreement about their points. Unfortunately, the principal investigator remains responsible for assigning the points and settling disputes, and so this system may not do enough to address power dynamics and other implicit biases. Attempts to remove humans from the evaluation process have been unsuccessful so far. MIT (Massachusetts Institute of Technology) researcher Timothy Kassis studied the feasibility of an automated system for assigning authorship to academic papers. Despite his effort to normalize the value of various contributions, Kassis found this too subjective to properly quantify. The project was abandoned.⁴¹

The journals *Nature* and *Rethinking Ecology* use increased transparency to address how authors are listed on a publication. As part of the submission process, co-authors must document their contributions and certify them for the record.⁴² The implication is that there must be justification for inclusion and for the order of authors as they appear in publication. Policies like these can reduce some ethical problems such as senior investigators attaching their names without participating and the promotion of “ghost” authors, who may have written the submission but did not perform any research. At the same time, this practice depends on honest reporting and interpretation. As with the point systems, it is difficult to remove subjectivity from the process.

With more information, automation could increase transparency and remove some bias from the process of determining authorship. Instead of depending upon reporting from collaborators, attribution frameworks could track information collected in a raw state as project files are created and updated. At a high level, this could mean recording an encrypted signature from a person every time they review or save an email, model, or other project-tagged digital files. This data would be finer-grained than a list of collaborators and include information about access, input, team composition, coordination, and other details. This arrangement would be like the version control systems (VCSs) used in software development.⁴³ These programs track changes to programming code and require

developers to identify themselves anytime they make modifications. Researchers have created data visualizations of VCSs to understand the evolution of software as a reflection of organizational structure.⁴⁴ Architecture might discover similar analytical benefits. Some aspects of version control already exist in BIM platforms and some architecture offices already use VCSs, such as GitHub, as part of their working process.⁴⁵ A challenge would be to find ways to use this data to help interpret the value of each collaborator's interactions with the project. After all, the time or effort one spends on a task is not necessarily correlated with value. However, more transparent information could help architects and researchers understand how designs develop organizationally, and as attribution frameworks collect more data, it is possible that machine-learning could help determine where credit is due.

A lower-level option would be to capture digital operations *en masse*: every keystroke, line, and word produced for a project. The purpose of this would be to build an account of the development of drawings, models, spreadsheets, and other digital artifacts as an accumulation of inputs, changes, and multiple authors. This would provide a more complete picture of the true evolution of a design as the result of competing ideas, false starts, frictions, compromises, and revisions rather than the notion of a fully formed vision leaping off the screen and onto the project site.⁴⁶ Accounting for the actions of individuals could allow for more rigorous and fair reporting of attribution, not just "who works," but how, when, and on what.

In some capacity, much of this information may already be collected from software in the form of usage data sent to the vendor, ostensibly for bug reporting, but also for product development. Most users agree to this arrangement, knowingly or unknowingly, as part of the software licensing agreement.⁴⁷ Making use of this information would require extensive resources, but not impossibly so. Search engines and self-driving cars already train and improve themselves by interpreting large, continuously updated data sets.⁴⁸ Understanding discrete design operations and how they relate to the larger architecture project could generate opportunities for organizational improvements in efficiency, the development of expert systems (knowledge bases and artificial intelligence to assist designers), new conceptual theories, and more complex nuanced histories.

Regarding what is attributed, a digital-only system is limited and may over-privilege digital labor. It would be difficult, for example, for the attribution framework proposed so far to account for the non-digital communication that often occurs at the beginning of a project, such as a pencil sketch or interactions that were face-to-face. There would need to be some way to account for this – automated through machine-vision, speech-to-text recording. It may be possible with some future technology, but this requires more advanced data collection than is presently available. However, it raises another important issue with respect to marginalized groups and

labor. A problem with collecting data about labor, as a basis for determining authorship, is that the concept of architectural labor is fraught. Because computation requires specificity, developing attribution frameworks will require some deep conversations about the definition and ethics of labor: what labor truly is and what counts. For example, the current conception of the term does not include non-architectural labor or labors of care which make architectural work possible: feeding, clothing, housing, transportation – types of work which are often undertaken by women, but which do not fall under billable hours or paid work. This gap is recognized by Peggy Deamer and the Architecture Lobby who argue for an expansion of how architectural labor is defined.⁴⁹ Expanding the definition of architectural production – and indeed, architecture itself – is another way that attribution frameworks could address inequality by identifying women and women’s labor both within and beyond the profession.

DISCUSSION

Designing and implementing a universal attribution framework would be non-trivial, with not only technological challenges but cultural ones. Many questions remain: How much information should be captured about work processes? How can these systems protect privacy, even as they track labor? How are labor roles defined, identified, tagged, and tracked? Do open records expose individuals to liability that firm structures and systems are meant to shield? How can we limit the bias from the programmers, the designers, and the users of the system from propagating into the attribution framework? None of these questions has easy answers, but one can expect attribution frameworks will evolve and improve over time. Artificial intelligence will be a part of the process, both to develop the system and to help future scholars learn from it (Fig. 6). Because technology often outpaces culture, it is critical that frameworks be open source and rigorously reviewed to ensure the fairness and transparency of attribution data collected.

Using the data from attribution frameworks to increase the visibility of underrepresented work may not be enough - at least not at first, or perhaps ever. Research has shown that transparency in attribution does not necessarily lead to greater diversity in representation. For example, open-source software development communities (ostensibly meritocracies, where the community judges the quality of contributions) are even more male-dominated than commercial software companies.⁵⁰ According to a study by Josh Terrell, et al., when a woman’s gender is established in open-source projects, her code is less likely to be accepted. When women submit code anonymously, it is approved more often than men’s code.⁵¹ This same effect of negative gender bias has been found in academic research papers, Wikipedia edits, and professional music auditions.⁵² Attribution frameworks for architecture can help the profession identify inequalities and understand its problems better, as in the aforementioned studies, but the

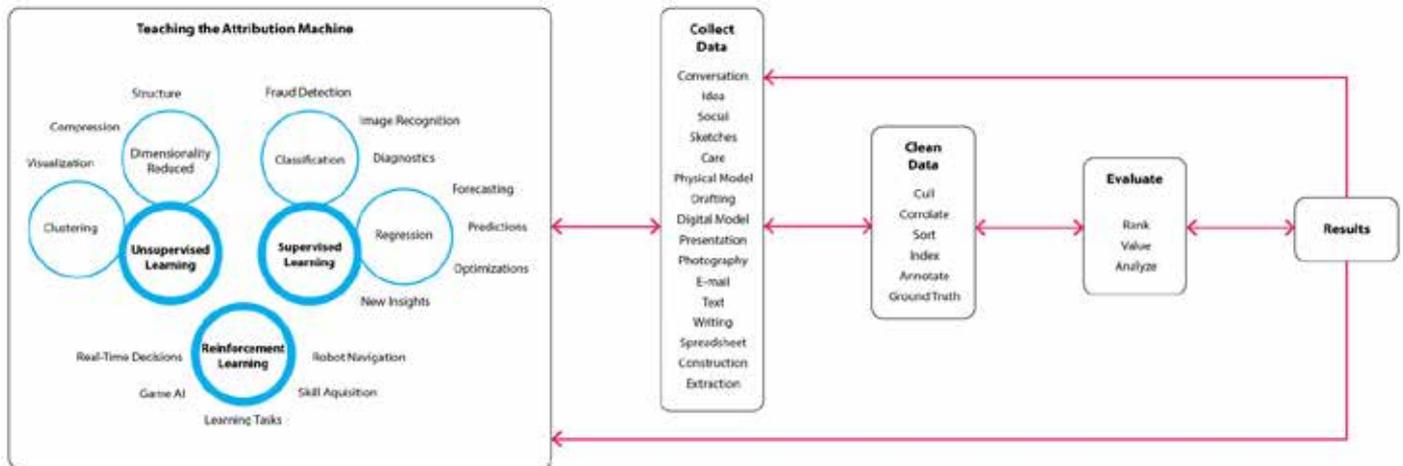


Figure 6. The diagram proposes a potential system of machine learning and artificial intelligence, which would underpin a new attribution framework. The attribution engine evolves by collecting, sorting, and evaluating architectural data, then feeding these results back into machine learning algorithms.

framework itself is not a solution. Data reveals that meritocracy, like lone genius, is a myth. It will take new policies and changes in architecture’s culture to act upon this information and use it to improve equity.

Even so, it is critical to begin collecting more and better data. The stakes of failing to attribute work equally are not only gaps in the record, but, more importantly, less inclusiveness in architecture. For example, today more women than ever participate in architecture schools and the profession, but the “pipeline problem” persists. Even when women do participate, they do not receive licenses, promotions, or awards in the same proportion as men.⁵³ Some reasons for this are that women do not see themselves equitably represented in these roles.⁵⁴ Recent efforts in STEM demonstrate how correcting the historical record has helped improve gender equity in fields like computer science.⁵⁵ By improving the visibility and fair representation of women’s accomplishments – and those of other marginalized groups – there is evidence that attribution frameworks can help architecture become more diverse and equitable.

Despite the intent to produce a database to promote equity, the result could very well be a digital panopticon (Fig. 7). What is perhaps more important, though, is that the panopticon is already under-construction, regardless of whether architects or society-at-large consented. Much of this data collection is being constructed outside of the domain of architecture. Data is being captured on everything from how many steps we take each day, to what we eat, to how long we spend e-mailing, or on social media. Architecture must develop robust attitudes regarding how and what information is recorded because neutrality is too dangerous a position. Perhaps there also remains room to subvert the inevitability of a perfect data collection system. Maybe the attribution machine will necessitate

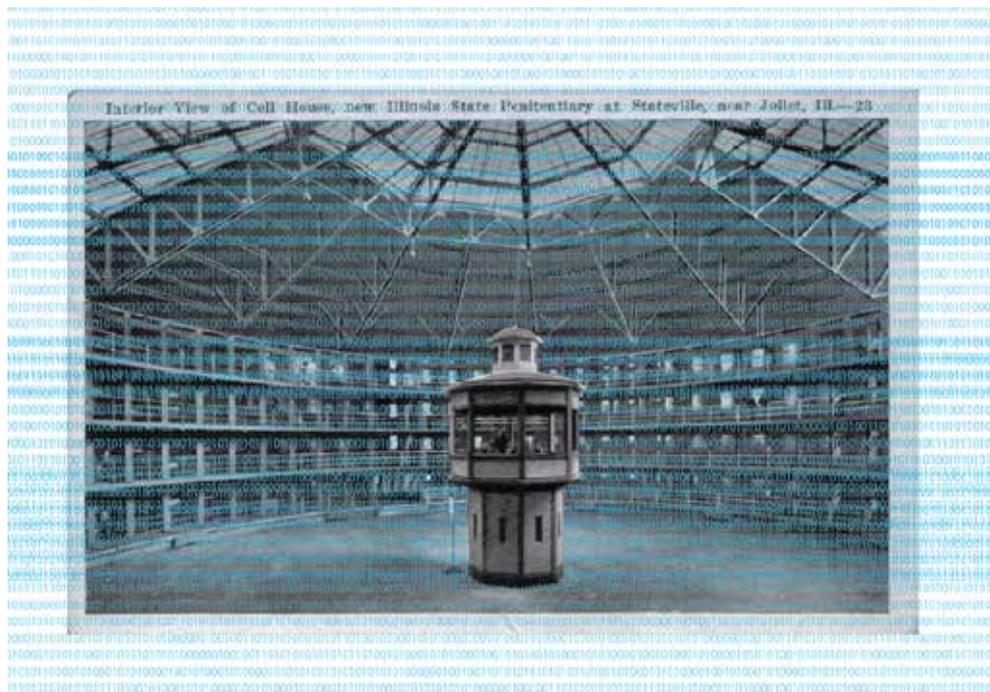


Figure 7. Despite the intent to produce a database to promote equity, the result could very well be a digital panopticon. What is perhaps more important, though, is that the panopticon is already under-construction, regardless of whether architects or society-at-large consented.

a counter-machine, a conceptual (or literal) Faraday cage designed to prevent the all-seeing-artificial-intelligence.

Regardless of the technical challenges and the cultural work yet to be done, ensuring a fair record of authorship matters to those beyond the architectural profession. Now that search engines shape so much of how algorithms – and we, in turn – process the world, collecting good data is an important step towards improving the state of architecture moving forward. The expansion of data collection in architecture is inevitable, as it is increasingly exploited to make processes more efficient and profitable. As we move forward, it is critical to include in our conversations how this resource can and must also be leveraged to make things more equitable for all.⁵⁶

CONCLUSION

Correcting the record is not just a question of adding a few names or even hundreds to the history of architecture. It is not just a matter of human justice or historical accuracy, but of opening the field to its own productive complexity.⁵⁷ (Beatriz Colomina)

The details of attribution frameworks, such as the technologies involved and how they are implemented, are outside the scope of this speculative essay. However, it is safe to say that elements of the framework are already being developed at this moment from fields outside of architecture. For this



Figure 8. Attribution frameworks could also be used to capture and communicate equity successes in architecture. For example, architect Jeanne Gang closed the gender wage gap at her firm and calls pay inequity “architecture’s great injustice.” Would we value buildings differently if we could not view them outside of the context of whether architects were paid fairly? Or construction workers were kept safe?



Figure 9. Could attribution frameworks change the way architecture is evaluated? For example, Junya Ishigami received the prestigious commission for the Serpentine Gallery but was also recently criticized for using unpaid interns to document and design his firm’s work. Do these labor practices change how architecture is viewed, valued, and credited? What would happen if each project had a digital shadow which included a full accounting of its creation, including the social and environmental costs?

reason, it is important to ruminate upon how a system for architectural data (like attribution frameworks) might develop and what kinds of questions we might ask of it – before such a system arrives without our input or consent. The data we choose to collect tells us something about what we value and what we are willing to measure about ourselves and our work. It is part of a broader dialogue about data that is not collected (or cannot be) and the limits of data itself.

Society tends to value collective data over listening to individuals and anecdotal stories. In a post-#metoo culture, listening is more important than ever, but perhaps data can also lend more support to the ongoing conversation about women's roles and experiences in the workplace. If women are working more billable hours, or contributing unpaid extra work, or getting paid less, and so forth, then greater transparency about labor and attribution can be a step toward equity (Fig. 8). At the same time, we must be careful. It could be just as easy to collect data that do not account for non-quantifiable labor (such as organizational labor, emotional labor, etc. as described in earlier sections), and to use this as justification for paying women less. Data itself is not the solution. It might also reveal truths about architectural labor that we would prefer not to acknowledge, from underpaid staff to enslaved construction workers (Fig. 9). Nevertheless, we cannot change what we cannot see for ourselves. A record of attribution that is more objective, nuanced, and timely is preferable to biased (intentional or not) assumptions, traditions, and gatekeepers. Indeed, the former might serve to further expose the latter.

Gender equity in architecture is a continuing challenge, and a lack of fair attribution for labor is one of its principal causes. Research has shown that recognizing the contributions of women – in history and in today's practice – improves gender representation in professional fields. Toward this end, attribution frameworks are a proposal to apply technology to challenge conventions of labor and authorship and address the realities of contemporary collaboration in architecture. While data and the ways it can be used are not free of bias, access to comprehensive and transparent digital records will help to better define issues of gender equity and create more opportunities for scholars, leaders, and individuals to confront biases and correct them. Collecting digital records through attribution frameworks can begin the process of acknowledging the broad scope of contributions in the production of architecture that were formerly unrecognized and undocumented. The histories of the future will be written from the records we keep today.

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Credits

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