Debates in the Digital Humanities 2019
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As noted by Galey and Ruecker, design and prototyping activities can now be considered digital humanities’ “scholarly primitives.” Unsworth defined this term to mean basic operations within an area of scholarly labor that are independent of disciplinary affiliation or theoretical orientation. It seems obvious that design and prototyping are such “basic operations,” particularly now that arguments over the relative epistemological strengths of “saying vs. doing” (cf. Ramsey and Rockwell) or “hacking” vs. “yacking” (cf. Nowviskie) seem to be receding. Given this state of affairs, it seems useful to engage in more granular examinations of what design and prototyping have to offer a critically engaged form of humanities work (cf. Jagoda). In this chapter, I offer a postmortem of a prototyping project from the Critical Making lab, using it to clearly differentiate between two forms of scholarly prototyping: “deconstructive” and “constructive” making. The purpose of this analytic distinction is to more productively think through how making fits within and might extend current understandings of humanistic scholarly labor, particularly in regard to broader forms of social intervention.

In 2013, we at the Critical Making lab at the University of Toronto, 3D printed a handgun. To be more precise, we printed a nonworking version of the Defense Distributed 3D printable “Liberator” handgun as part of a critique of the cyber-anarchic argument being put forth by its designers. This argument, most clearly articulated by Defense Distributed founder Cody Wilson, was that the existence of 3D-printable guns made current gun regulation policies obsolete. One of our goals was to engage with this argument and more generally to help law enforcement, regulators, policy makers, and 3D printing advocates to develop a measured response to the perceived problems associated with the 3D printing of guns. To this end, we printed our handgun publicly and connected with local media in order to initiate an open conversation on the issues that arise when 3D printing guns. As part of this move, we engaged in a more extended reflection on how theories of digital immateriality support particular political positions and regimes of regulation (Record et al.).
In doing so, we followed in the footsteps of scholars such as Katherine Hayles and Matthew Kirschenbaum, who have explored the theory and politics of information immateriality. Hayles has uncovered how formal definitions of intelligence, debated but ultimately naturalized in events such as the Macy Debates in the 1940s to the 1960s, can be linked to a wholesale reconceptualization of what it means to be human, including a politically suspect devaluing of the human body (1999). Kirschenbaum's focus on how computer systems “propagate an illusion of immateriality” provides a similar starting point (135). In this work, he notes (as have others) that buying into this illusion results in the idea that, once books and other textual materials have been scanned and digital versions created, then the physical “versions” can simply be thrown away. Both Hayles and Kirschenbaum therefore connect perspectives of information as immaterial to the political ramifications of such beliefs; intelligence as a property related to the formal manipulation of symbols rather than embedded in material action in the world results in an erasure of the embodied liberal subject and the devaluing of embodied constructs such as gender and ethnicity (Hayles, prologue). Equally, the illusion of immateriality supported by the design and functionality of computational systems allows decisions regarding the preservation of human culture to take specific directions (Kirschenbaum, introduction).

Three-dimensional printing calls attention to the fallacies noted by both Hayles and Kirschenbaum. It is obvious that the digital files used to produce a 3D-printed gun and the gun that results from this process engage with users in very different ways. The capacity to act using the printed gun, to threaten with it or shoot someone, is not reproduced by the files. Equally, the printed gun is not able to be transported and moved via digital networks; it cannot be stored on web servers or on USB sticks in the same way as the files that are used to print it. It seemed to us that the claims regarding the immateriality of the digital are harder to make when one could hold up a USB stick and a printed gun and ask, “Which of these makes you nervous?”

However, we did not want our printing of the gun model to be taken as either a wholehearted embrace of a cyber-anarchistic future or a reductive, “won’t somebody think of the children,” knee-jerk response. Instead, our hope was that the various media experiences and interviews that we did, and the academic writing that we later published, would extend the impact of our critical work on 3D printing. As both information scholars and as public intellectuals, our charge is to explore and debate new information technologies and the patterns of life associated with them. Cody Wilson’s claims regarding 3D printing and gun regulation required critical interrogation and debate.

At least initially, we felt we were successful regarding these goals: our printing of the gun garnered significant media attention, and for a few weeks, members of the lab were kept busy conducting interviews, appearing on local television and radio, and being quoted and photographed for newspapers and blogs. An article on the gun and its associated regulatory frameworks was published in an academic
journal and has served as the basis for a series of ongoing conversations with regulators and legal authorities. The printing of the gun also garnered a fair amount of attention from our faculty, engaging the university in conversations about what research topics are legitimate for humanities scholars and the legalities of scholarship that involves firearms. In all these senses, the project was a successful form of critical making as I and others have defined it in the past (Ratto and Hoekema; Ratto, “Critical Making,” “Making at the End of Nature”; Ratto, Jalbert, and Wylie; Wylie et al.). The project also supported additional reflection on the limitations of the scope of this term, given what we retrospectively identified as a lack of direct engagement with politics in the way that the Defense Distributed project clearly had done. However, while the scholarly work we did then and later seemed indicative of “success” at a local and academic level, we felt we were far less effective in using the project to participate productively in the larger conversation regarding gun control.

As part of the public outreach aspects of this work, I appeared on a local current affairs television show to debate Cody Wilson, the main instigator, cyber-anarchist, and gun advocate who had shepherded the development of the gun model that we printed. Steve Paikin, the host of the show, tried to focus the conversation on issues of safety and access, raising the question of whether 3D printing offered a dramatic new way for people, including criminals and youths, to get their hands on a gun. My response to this question was to leverage our prior conceptual explorations of 3D printing (Ratto and Ree) and our experience of printing the gun in the lab. I discussed the material realities of 3D printing, the costs and capabilities of current printers, and the difficulties in designing and printing functional artifacts. I compared this complexity to other ways of producing guns outside of standard regulatory regimes, highlighting the ability to go to Home Depot, buy some pipe and other bits and pieces, and make a “zip gun,” a device of similar capability to that of the Liberator model. When asked about the future capabilities of 3D printing and other digitally inflected forms of fabrication, I deferred the question with a quick flip of scholarly showmanship, referring the interviewer and audience to academic work on the “proximate future” (Bell and Dourish) and the complex processes through which new sociotechnical developments interpolate society in unexpected ways. I focused, in other words, on the mundane aspects of 3D printing, using these somewhat pedantic examples to counteract the hype associated with 3D printing in general, as well as the fear around the 3D printing of guns in particular.

Cody Wilson, in contrast, did not speak of the difficulties he faced in developing, testing, or printing his handguns. He did not mention the failures that must have occurred during development or the fear that he must have experienced when first firing a gun that had never been tested. Instead, he used the 3D gun to “prove” his more general political point: that government regulation had become inadequate, given the development of technologies such as the internet and 3D printers. Taking his lead from John Perry Barlow’s libertarian idea of cyberspace as an unregulated and unregulatable zone, Wilson described 3D printing and digital manufacturing
more generally as the wedge that would splinter extant forms of regulation and governance. For Wilson, the gun served as a compelling example of the limits of government, and he argued persuasively that the Liberator made gun laws immediately antiquated and unenforceable. Not only did Wilson have some very clear ideas about our sociotechnical future but he was also easily able to appropriate critical making as a form of political engagement, at least superficially, going so far as to call his Liberator work “a critical form of making.” At that moment, I felt like other science and technology studies (STS) scholars must have felt in hearing their own critical concepts and tools deployed to support things like “intelligent design” or to deny climate change science. (cf. Latour)

Since 2007, I have been using the term “critical making” to describe and explore modes of scholarly work that express a commitment to direct and productive material engagement with technology. This focus is not particularly unique to my lab, nor is it novel; there is a long history within the digital humanities of exploratory technical work (e.g., Drucker; Galey and Ruecker; Balsalmo; Sayers, “The Kits,” “Why Fabricate?”) But the term “critical making” seems to have struck a chord, and many scholars now use it to describe a range of scholarship that incorporates reflexivity, intervention, and technical work within fields like design, literature, computer science, and engineering. Equally, “doing” and the role of what Natalia Cecire describes as “embodied, experiential, extradiscursive epistemology” have become flashpoints for DH discussions.

At the Critical Making lab, we have mainly focused on unpacking the modes and practices that support or hinder the work of “doing,” what we understand as a critical material–conceptual engagement. Our intention has been to work through the role that material engagements can play in humanities and interpretive social science scholarship. This has been very mundane and tinkery work, often resulting in partial, ugly, obscure, and, in some cases, boring objects. The gun notwithstanding, “boring” projects at the Critical Making lab have included critical analysis and material explorations around the enclosure of the open web (Ratto and Hockema; Ratto, “Critical Making”), network neutrality (Ratto and Blanchette), changing mediations of citizenship (Ratto and Boler), privacy and surveillance (Tannenbaum et al.), and big data and information visualization (Resch et al.), to name just a few. This work fits into a longer trajectory of analysis, specifically the “deconstructive” critical acts well described by Derrida and the related goals of defamiliarization and estrangement that have been considered key practices within the digital humanities (manifesto). It also incorporates the emphasis on sociotechnical systems that has been a key component of STS and related fields, often focused on recovering the complexity of relations between natural and cultural systems.

In his argument about the significance of the 3D-printed gun, Cody Wilson expresses a strikingly similar sentiment: namely, that technologies participate in and work to support particular social and political values (cf. Winner). For Wilson, the 3D-printed gun is not a neutral object, but instead leads to the end of gun control as
a political reality. But he nevertheless understates the complex interleaving of social and technical work that is necessary to render the 3D-printed gun a clear indicator of a particular politics. Despite Wilson's statements that 3D-printed guns essentially make worthless the regulatory efforts of governments, these governmental politics do not depend entirely on the physical form or capabilities of the 3D-printed gun. Instead they emerge from the relations between the form and capabilities of the gun, and the social and political work of Wilson (and other humans and nonhumans). One unspoken goal of Wilson's work is to naturalize the potential effects of 3D-printed guns on regulatory systems so as to make us believe that these effects are unquestionable and a direct result of the existence of such objects in the world. Wilson's work is, in Bruno Latour's words, aimed at turning a “matter for concern” into a “matter of fact.”

By reconstructing the object that Wilson used to support his original argument, we at the Critical Making Lab were also able to deconstruct how he naturalized his free-market anarchist politics and made the gun stand for a specific argument about the role of governments. In later academic work, if not in the moment, we successfully unpacked the “matter of fact” of 3D-printed guns and provided details regarding regulatory options for 3D-printed guns (Record at al.) However, our work still did not engage directly in a critique of Wilson's political position. In other words, while we were able to effectively criticize the method by which Wilson naturalized his politics through making, we did not critique the materialization of these politics through our own making.

It would be easy to blame our failure to fully confront Wilson and his work on the generic distinctions between academic articles and public media. But just as we were unable to fully debate Wilson's constructive activities on television, a similar failure attends our published work on this topic—at least prior to this chapter. This failure may follow from my own reliance on “social constructivist” forms of socio-technical analysis and a resulting lack of direct attention to the political. Langdon Winner, writing on the use of constructivist perspectives within technoscience, has pointed to the difficulty that these modes have in expressing normative and political points of view. His aptly named article, “Upon Opening the Black Box of Social Construction and Finding It Empty,” blames this lacuna on a variety of reasons, most importantly a lack of attention to the deep-seated political biases that constrain and shape technical choices. More recently, Phillip Brey has ascribed this lack of political engagement to a larger desire to avoid underanalyzed structural influences in favor of more immediate and context-specific causal factors. He has since termed this the “empirical turn” in the philosophy of technology and related fields (“Social Constructivism”).

Our focus on the mundane attributes of 3D-printed guns could be said to follow from this empirical turn. Our goal was to denaturalize the gun and to deconstruct it without engaging too directly with the structural influences that we could not directly analyze (e.g., Second Amendment politics and gun rights activism). Our
initial sense was that we could simply open the black box of the 3D-printed gun and show it to be a construction: that would be enough. But debating the politics of the gun and the associated move of Wilson to tie together emergent technologies and such structural influences requires more than deconstruction. Our political stance includes a role for governments, particularly with regard to the regulation of guns. Wilson’s does not. This is a crucial difference.

Two moves are necessary to fully engage with Wilson’s politics: first, we must reveal the sleight of hand that Wilson used to naturalize the 3D-printed gun’s relation to policy, but second, we should also provide an alternative instantiation that can combat Wilson’s material and his discursive modes. In other words, we must use deconstructive moves to first take apart the system under critique, but should also find new ways to put it back together differently. Scholarly making can in fact do both, but while the first move has long been considered legitimate academic labor, the second remains less typical of DH work. Good examples of the “putting back together differently” approach within the humanities include many of the projects described in Drucker’s Speclab, Rob MacDougall’s Tecumseh Lies Here (MacDougall and Compeau), and the Mapping Indigenous LA (MILA) project at UCLA. What makes these projects work as productive political engagements is that the authors and makers move beyond simple deconstruction and estrangement to produce hybrid objects, objects that imagine a different world from the one that currently exists. They both deconstruct and reconstruct.

David A. Kirby calls the objects that result from such novel reconstructions “diagetic prototypes.” He formulates his concept through reference to the sorts of objects that typically appear in science fiction films, objects that require alternative forms of government, social relations, or technical capabilities to exist. The Liberator handgun is another such example; in establishing its reality and its existence, Wilson calls (or attempts to call) into being the world that he imagines. He positions the gun as part of an established past, which includes a specific perspective on the Second Amendment to the U.S. Constitution (e.g., the “right to bear arms”). He also attempts to produce a future that involves specific social values and the role of government (e.g., cyber-libertarianism). As noted earlier, this is a future that we in the Critical Making Lab do not want to see become our present. Unlike Wilson, however, we did not produce our own vision of the world. We should have faced power with power and produced our own diagetic prototype. But we failed to suture our own object to an alternative political stance.

This failure begs two questions. First, is it truly the role of the humanities—digital or otherwise—to face power with power and produce alternative conceptualizations of the world, to make diagetic prototypes? And second, if so, what might this work look like?

Regarding the first point, humanities scholars have in fact long been engaged with the imagining of alternative worlds. Through narrative writing, poetry, and other forms of critical artistic practice, humanities scholars have sought to intervene
in the larger world. As we extend our repertoire to incorporate the scholarly primitives of design and prototyping, this history should be conserved and extended.

There is much to draw on regarding the second question. From Alexander Galloway’s description of play-oriented methodologies of scholarship, to Daniela Rosner’s critical “fabulations” to Carl DiSalvo’s “adversarial design,” novel models that blend world-making and academic reflection abound. Similarly, novel spaces are being constructed within the walls of humanities academia that allow such modes to find concrete purchase. Such spaces include Melissa Gilliam, Patrick Jagoda, and Alida Bouris’s Transmedia Story Lab at the University of Chicago, Jentery Sayer’s Maker Lab in the Humanities at the University of Victoria, and many others.

Garnet Hertz has proposed extending the original focus of critical making from process and reflection and into the domain of “actionable design strategies in a form that is accessible to the public.” Referencing work from the field of human–computer interaction (Wakkary et al.), Hertz highlights the need for “material speculations,” artifacts specifically created to engage publics in speculative and provocative reflection on possible futures with emerging technologies. Kari Kraus has argued similarly and used transmedia storytelling as a way to extend such future-oriented speculation to younger learners.

But Galey and Ruecker warn us, “The digital humanities must not lose sight of the design of artifacts as a critical act, one that may reflect insights into materials and advance an argument about an artifact’s role in the world” (407). Many DH makers already know this, often using the artifacts and systems they produce to “advance” a particular politics—the Mapping Indigenous LA project at UCLA, mentioned earlier, comes to mind. It uses digital mapping and storytelling to recover the hidden movements and layers through which indigenous peoples have been displaced and relocated through governmental policies. The “story-maps” produced as part of MILA act as diagetic prototypes in Kirby’s sense, providing alternative ways of viewing an established landscape. I have recently advocated similar outcomes, focusing on our complicity in creating, and therefore our responsibility in maintaining, a hybrid natural and cultural world (Ratto, “Making at the End of Nature”). In the Critical Making Lab, we have begun to produce such “material speculations,” including speculative wearables, data visualizations (Resch et al.), and 3D design software that instantiate new relations between clinical experts and material–digital bodies (coons and Ratto).

But this is not to say that all scholarly making projects are necessarily critical or, when they are intended to be, that they provide adequate resources to combat inequitable or other problematic aspects of present or predicted sociotechnical systems. Even with the best of intentions, it is easy to miss the mark, particularly when we focus on using making to deconstruct and not to provide constructive alternatives. Patrik Svensson has noted some of the multiple ways the digital humanities engages the digital directly: “as a tool, as a study object, as an expressive medium, as an experimental laboratory and as an activist venue.” While all these uses are
equally legitimate, my interest is in exploring how critical making can successfully extend from scholastic humanistic work and into the realm of public intervention. Here, I am specifically signaling the use of making as a critical interventionist tool. I want to generate work that bridges a number of Svensson’s categories: the use of the digital as an “activist venue” and as an “expressive medium,” “study object,” and “experimental laboratory.”

A rethink of our 3D-printed gun project can highlight the potential ways making can serve as such a bridge. How could we have extended the deconstructive work of the project and engaged critically but also constructively with the pro-gun and anti-regulatory politics of Cody Wilson? Thinking through what such “material speculations” might entail reveals both the novel possibilities of making as a critical, reflexive constructive approach and the need to extend many of our current practices into areas that many of us may find less comfortable.

For instance, one idea we have discussed is the redesign of the Liberator 3D model to require special ammunition to be made for it. Wilson’s original design has a technical issue: there is a danger of the gun exploding when firing, due to the explosive force of bullets designed for metal weapons. We could solve this technical problem by designing ammunition specifically for a 3D-printed weapon and by redesigning the weapon to only work with this specialized ammunition. We could borrow an idea from automated single-serve coffee makers and embed recognizable codes or RFID tags to allow for the verification of the proper ammunition to the weapon. This technical fix overcomes the limitations of Wilson’s gun and, by doing so, defends its right to exist as an instrumental—and not just aesthetic—object. But the design also importantly reopens 3D-printed firearms to a new regulatory regime, one that would be based on the regulation of ammunition rather than on the weapons themselves. The RFID tags or codes used to verify the proper fit between ammunition and weapon could also be used as unique identifiers that raise the possibility to track purchase and use. Regulating ammunition rather than the weapons themselves has been proposed by regulators and gun safety advocates. Our work could have extended beyond our deconstructive making of the Liberator handgun to critique Wilson’s strategies and produce a novel constructive reconfiguration of 3D printing, weapons, and regulation. This doubled move would have better supported our denaturalization of Wilson’s claims and provided a constructive response that advances an alternative politics and associated world. Such a combined discursive and material argument could have potentially solved the problem this chapter explores: namely, how our project addressed Wilson’s strategies, but ultimately not his politics.

To be clear, the knowledges, practices, and resources—not to mention the legal permissions—required to engage in such a material speculation might seem like a far cry from the traditional labor of humanities scholarship. Should we and do we really want to make functional 3D-printed weapon systems? Such work seems fraught with undesired consequences. But if the digital humanities is to address
what it means to be human in a digitally inflected world, then our scope is already much more expansive than traditional scholarly work—as are our responsibilities and commitments. As the gun example demonstrates, there are both opportunities and dangers associated with constructive activities, with politics that is not always so clear. If the objects we produce are supposed to act not just as instantiations of theory (cf. Bauer) but also as “actionable strategies,” then one danger seems necessary to address: How can we, as scholars, remain reflexive and attuned to the constructed nature of the world we inhabit when we ourselves are often complicit in the processes of such construction? Addressing more comprehensively both deconstructive and constructive making is an important piece of this continuing puzzle.

NOTES


3. As noted by our academic publishing and press coverage on the topic, we were certainly interested in facilitating this deeper conversation on weapons and 3D printing (Record et al.).

4. The debates included a thread on the faculty email list where other faculty members reflected on what constitutes legitimate and appropriate topics for research, as well as a strongly worded letter from the then-provost of the university reminding me that research on firearms was restricted. Both the email conversation and the call and response with the provost were productive in the sense that they offered a chance for me to communicate my research interests and methods to colleagues and administrators and receive feedback in response.


6. Rather than attempt to make these objects available to others by making them less conceptually opaque, aesthetically more approachable, or even instrumentally useful, we have reveled in their mundanity, following Leigh Star’s guidance to study “boring things.” The “boring” was Star’s attempt to recover the understudied or naturalized aspects of built environments—to highlight in other words, the “infrastructures” of modern life. Bowker and Star called this move “infrastructural inversion,” “making visible” and understandable the invisible and inaccessible aspects of our built environment in order to surface the social, cultural, and political work that also remains hidden. Others such as Shannon Mattern have highlighted “infrastructural literacy” as a way to recover not just the invisible but also the affective, ideational, and richly varied world in which we live. Critical making, as I construed it initially, engaged directly with the general notion of “infrastructural inversion,” adding exploratory material work with the infrastructures and materialities in question as a resource.
7. For an overview of some of the core texts that have addressed the nature/culture divide within STS and why this is currently so relevant, see Ratto (“Making at the End of Nature”).

8. For a similar but more contemporary approach from within the digital humanities, see McPherson.


10. A recent article in Nature (Roes and Pint) notes the long-standing use of artistic practice within scholarly work, but also highlights a need to foreground such work as legitimate. I agree and see design and prototyping as part of this longer trajectory.


14. See Kraus’s NSF-funded project Dust as an example: https://fallingdust.com/.


BIBLIOGRAPHY


