ABSTRACT

GOLLIHUE, KRYSTIN NICOLE. Re-making the Makerspace: Bodies, Power, and Identity in Critical Making Practices (Under the direction of Dr. Helen J. Burgess).

Since Maker Media published the first issue of *Make: magazine* in 2005, Makerspaces have become recognizable fixtures in many universities as well as community spaces, housing technologies from 3D printers to Arduino boards to audio/visual equipment. Maker culture of the mid-2000s has valued practices like sharing, collaborating, and prototyping, often within a narrative of technological innovation, self-subsistence, and economic progress. While education and information science scholars have demonstrated the lack of evidence in the Maker movement’s claims for equality and opportunity through new digital tools, universities have perhaps uncritically adopted these same narratives, thereby devaluing the kinds of material and cultural practices that cannot be monetized or do not fit within these narratives: art, craft, survival, and generational making.

This study aims to reconfigure “making” as it has been adopted in educational environments by examining the embodied and relational practices used on a small farm in eastern North Carolina. By redefining “making” as a relationship rather than a set of tools, scholars and educators open up the opportunity for other ways of knowing and being to find agency and representation in technological and academic institutions. Agricultural space is often framed as antithetical to the progress narratives of technological innovation; agricultural practice is meant to be the precursor, not the contemporary, to digital tools, and therefore shows that even seemingly un-technological spaces engage in highly complex and coordinated material literacy practices. I consider the following questions: How are bodies made and unmade as “makers” through different material practices? What happens between human bodies and their materials during an act of making? How is power implicated in these material practices? And finally, how
might we make better Makerspaces that reflect the relationships and cultural practices of a specific place and community? Using participatory videoethnographic methods situated in the study of everyday practice, I present a case study and collaborative analysis of small-scale farming and show how it is an embodied, relational act that is its own “Maker” space.

I first trace a history of manufacture, art, and technology in the West. Beginning with the Feudal period and moving to the emergence of participatory technologies, I show that Maker culture draws from a constructed, linear history of manufacture that centers progress from hand tools to industrial objects to abstract machines and elides the complicated ways people were creating, appropriating, and moving within technological institutions. In reconfiguring the history of making as more complex, we are more able to see the ways power structures the necessity for something new and totalizing like the Maker movement. I then present an analysis of my data into two chapters: human making and nonhuman making on the farm. In these chapters, I show how there are complex arrangements of space, time, rhythms, identity, bodies, and collaborative forces that result in made things on the farm. I end by comparing the basic tenets of the Maker movement to material practice in small-scale farming and propose a strategic vision for a “Makingspace,” a space that centers culturally-situated practices and relationships over specific tools. This proposal demonstrates needed interventions into how we structure technologies and multimodality in formal and informal learning environments, specifically how we might center people’s own cultural practices as always and already technological.
Re-making the Makerspace: Bodies, Power, and Identity in Critical Making Practices

by
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To my dad, who is buzzing.
BIOGRAPHY

Krystin Gollihue is a PhD candidate in the Communication, Rhetoric & Digital Media program at North Carolina State University. Their research explores feminist approaches to critical making that account for the deeply historical and multimodal ways marginalized people have created communities of work, literacy, and communication. They hold an MFA in Poetry from the University of Alabama and serve as the Graduate Editor for the Philanthropy Journal, a program of the Institute for Nonprofits at NC State. They currently are the Extension Assistant at the DH Hill Library Makerspace, where they develop programming and curriculum around critical making.
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CHAPTER 1: The Cultural Institutions of Making

Since Maker Media published the first issue of *Make:* magazine in 2005, Makerspaces have become recognizable fixtures in many universities as well as community spaces, housing technologies from 3D printers to Arduino boards to audio/visual equipment. In composition and rhetoric, the Maker movement has coincided with an imperative towards multimodality, where students are encouraged to draw on their outside digital literacies to create what Kathleen Blake Yancey has called compositions “in a new key” (298). Adopting an orientation towards “critical making,” scholars and teachers alike have considered how the fabrication of digital objects engages students in critical understandings of the world. While critical making projects are not exclusively or even wholly electronic, the movement coincides with advances in microcontroller technology, networked objects, and the participatory web. Maker culture calls us back to the DIY (do-it-yourself) movements of the 1980s and 1990s, and positions us all as producers, inventors, and multiliterate ingénues of the digital age.

But makers have a history that stretches farther back than the first computer, a history that begins with the most traditional of materials: earth, metal, animal fiber, and food. Such crafts are socially situated entanglements with materials; as René Guénon writes, they are an inner world of a maker turned outwards onto their cultural contexts (188). Crafts remix and repeat old tropes taking the form of both written and non-written modes, enacting what Arola and Arola call creative repetition through multiple channels (215). These made things communicate cultural values and memories and represent an intimate relationship between process and product. While these “old” technologies are non-electronic, they are *digital* in an etymological sense—digit-al, as Angela Haas writes, meaning *of the fingers* (84). Electronic technologies are not definitive of a critical making practice: whether wiring circuits, harvesting
crops, knitting blankets, or constructing arguments using pen and paper, we are and always were engaging the body in gathering materials and creating something new.

Maker culture, even as it is characterized by mostly contemporary electronic technologies, is steeped in historical and institutional relationships that matter to how individuals live, move, and learn within technological spaces. Makerspaces are not simply places where one makes using digital tools: they are institutions of technology and power that affect who makes, how they make, and whether or not they can access and feel ownership over the means of production. Broader histories of technology and identity matter to how we have conceived of the Makerspace as an institution that serves patrons, patrons who are increasingly diverse in body and experience. The Makerspace more or less follows the same institutional blueprint wherever it might be found: studio fees, electronic tools, and a kind of rhetoric that privileges electronic making over all else. While other forms of making like craft and art are entangled with patriarchal and capitalist institutions as well, Maker culture holds a particular place of privilege in educational contexts while also drawing from a long history of Western skill, innovation, and entrepreneurship. It is both an institution of technology and entangled within other institutions of technology, where histories cover over the nuance of everyday practice in order to justify newness and erase the ways marginalized people have circulated, disrupted, and changed the future of technology.

Such power structures also reflect the relationship between institutional knowledge economies and the ways of knowing and being that everyday people practice outside of higher education and capitalist entities. Often, “Maker” communities claim a unique form of innovation, prototyping, and collaborative democracy, seeing it as an intervention into seemingly “low” tech, low access, or stratified communities. Such attempts at bringing technology to the masses only
serves to extract resources in the form of capital, human labor, land, and accolades. As Riley-Mukavetz, Rhodes, Powell and Yergeau argued in their 2016 Cultural Rhetorics Conference presentation titled “Three queer/feminist/Indigenist rants and a critique of heteropatriarchal colonialism in object-oriented theory,” the object-oriented theories that undergird Maker movements – the ones that argue for making because you can – sound a lot like colonization. “Can” implies a kind of privilege of making, but it also implies the power to supplant other forms of making with, for example, 3D printing. Meanwhile, makers outside of these institutions are making to survive, and doing it without the massive resources of a research university or corporate Makerspace.

In this study, I question the boundaries between institutional and non-institutional Maker communities and consider how broader and differently-oriented definitions of making might allow us to focus our analyses and enactments of Maker culture on movement, relationality, and exchange. What happens when scholars and practitioners move away from tools, predominantly electronic, and center the embodied ways that humans, nonhumans, and technologies (both non-electronic and electronic media) are constantly configuring and reconfiguring one another? What happens when we look to the grassroots ways women, people of color, and working-class people are already collaborating, prototyping, appropriating, and critically thinking about technology?

To answer these questions, I turn to one particular institution that represents a seemingly un- or anti-technological material practice: farming. Agricultural communities organize in many of the same ways as Maker communities, through festivals, fairs, and auctions that serve to promote and showcase farmers’ skill with vegetables or livestock. Like Maker communities, agricultural practice often uses the rhetoric of self-subsistence and DIY. Family and consumer science professionals have stated that their goals moving into the 21st century are centered on
technical literacy and preparing communities for the future, values that align with Maker culture (Carroll et al. 23). Despite these similarities, agriculture exists within a broader historical narrative of production and industry, specifically at the beginning, a point from which progress moves forward. We progress from agriculture to industry and manufacture and finally to the Information Age, so agriculture tends to be diametrically opposed to technological histories and institutions. While it may be the case that agricultural practitioners are less inclined to use Internet-enabled technologies to carry out their practice, as Bratich has argued, such “traditional” practices do not go away as technology progresses; it simply goes underground in order to survive (310). For agricultural production, practices do not go underground as much as they are reordered as less visible, existing as the backdrop to our daily lives as food-consuming human beings. Because agriculture is often set up as diametrically opposed to technological progress, it is a useful polemic for looking at how technical practice exists outside of institutions of technology like corporations and the university. In this study, I compare the multimodal making practices of agricultural space against the interventionist stance of contemporary technoculture, highlighting how farmers, rural Southerners, women, and others are practicing Makerly activities and yet doing so outside the boundaries of a Makerspace or the Maker movement.

To be able to see the ways agricultural making emerges from relationships with technologies, environments, and nonhuman living things, an approach is needed that can highlight the embodies and embedded nature of making. I use an ethnographic methodology called videovoice to document agricultural production on my family’s farm in rural North Carolina, I argue that such communities are always and already equipped with technical knowledge through cultural practices of survival and repair. In other words, instead of seeing Maker technologies as an intervention into marginalized cultures aimed at making life easier, we
should view marginalized people as an already-extant community of makers living at the margins.

In this introduction, I will begin by explaining the broader framework with which I aim to approach the rhetorics of Maker culture in and outside of higher education or corporate organizations. I describe Dorothy Smith’s process for developing an institutional ethnography by exploring the relationship between institutions’ relationships in everyday practice and everyday people’s localized coordination and resistance within and from that institution. I argue that “Maker culture” is what Smith calls an institutional text which we must read critically in order to understand how our localized technical practices circulate the ideologies of technological institutions (Institutional Ethnography 38). Further, an institutional ethnography seeks out the ways localized experience differs from, takes up, and disrupts institutional narratives. My goal in framing this dissertation as a form of institutional ethnography is to begin with the idea that there are stories everyday makers hear about technological making, and then there are stories that they know, live, and breathe about making. In discussing the tensions between institutions and everyday people, I pivot to a discussion of Maker culture itself as an institution of practice, suggesting that there are both institutional rhetorics and everyday practices of Maker culture that scholars must account for. I will give an overview of the characteristics of the current Maker movement and describe how it has been circulated throughout different educational contexts, including in my own field of composition and rhetoric through multimodal and design-thinking pedagogies. I will describe the definitions these scholarly, educational, and corporate communities have used to delineate Making-with-a-capital-M from more everyday practices of “making,” and suggest my own definition that I will use throughout this dissertation. Finally, I
will offer a brief overview of the moves this dissertation will make in developing a justification for more complex understandings of making and of Makerspaces.

**Institutional Ethnographies: Story, And**

In *Institutional Ethnography: A Sociology for People*, Dorothy Smith begins with the assumption that there are marginalized subjects who take part in the coordinated activities of the everyday but whose knowledge is subordinated to “objectified forms of knowledge of society or political economy” (10). These objectifications of consciousness are what Smith calls the ruling relations of institutions – systems of power that affect how everyday people practice and live. Smith proposes an institutional framework for ethnography which involves reorganizing the social relations of knowledge so that people’s local experiences, or actualities, play a part in that knowing. The goal of IE is to map ruling relations and institutional complexes through coordinating actions, specifically through language and texts. Through IE, we find how ideas that seem given and local “become reconstructed in objectified forms external to particular individuals” (69).

Within the framework of institutional ethnography, language organizes action as a relationship between speaker and listener or writer and reader. Institutional texts regulate this relationship, looping actualities, or lived experiences, into the larger institutional system and discourse, bringing the individual into an interindividual territory, one that transforms local experience into translocal knowledge (Smith *Institutional Ethnography* 138). Because texts are external to localized knowledge, Smith argues, they are “stable and unchanged by what they say…independent of the perspectives of participants in the talk” (93). Despite this objectification of knowledge, the reader of a text becomes an agent of the ruling relations. They are not prescribed or prescribing action through the text but are instead being provided “the terms under
which what people do becomes institutionally accountable” (113). Even resistance is coordinated “with and from the text’s agenda” (111).

Utterance, Smith argues, are the counterparts to institutional texts and serve as the language of an actuality, a local, situated, embodied, and embedded experience. Utterance is movable and gestural; it is the lived experience, the story of living within an institution. Smith argues that “experience must be spoken or written to come into being. It does not exist as an authentic representation of reality before its entry into language” (Institutional Ethnography 126). Utterances are not regulating, but relational and experiential of the actions of an institution. This kind of data - testimony of living within an institution’s discourse - is a way for marginalized subjects to go beyond the ruling relations. Experience is the coordinating action, not between individuals within an institution, but between a body and its telling. By looking for this kind of coordination across individuals, institutional ethnographies seek to find where institutions partake in generalized and coordinated erasure as well as where individual subjects resist.

Looking for erasure, Smith argues, means examining both primary documents of an institution (its texts) and secondary dialogue about an institution (the actualities of subjects within the institution) (Institutional Ethnography 38). Researchers aim to find examples of work knowledge through this process, which is an individual’s experience coordinated with others and through institutional texts. Systems do things, not people, and institutional discourse aims at capturing what is actual and making it institutional (186). But Smith argues that the gap between institutional discourse and actuality is where power can be found, so the differentiated experiences, the subjectivities of workers, are integral to institutional ethnography as well (79).
Smith’s description of a sociology for everyday people resonates with the goals of the present study, to recognize the importance of people’s stories in forming identities and communities as makers. While story is central to this work, it helps to understand how institutions form and circulate narratives that define what constitutes making, technology, craft, and art. Such “replicable and replicated” discourse matters to how people form as makerly subjects, how they see or take for granted their individual actions as extensions of or resistances to the ruling relations of Maker culture in the United States (Smith Institutional Ethnography 166). While few makers outside of corporate and academic networks know what a “Makerspace” is, they are still enveloped in those institutional texts while also producing their own utterances of making within craft communities, technical fields, and agricultural practices. I will return to the coordinating actions and texts of these branches of making in Chapter 2, but I mention them briefly here to highlight how Maker culture’s ruling relations are themselves extensions of other historical institutions.

Makerly Institutions: The Maker Movement

As a community, the Maker movement coalesces around specific shared beliefs and practices that stem from its early days as a large-scale coordination of hackers and tinkerers. In 2005, O’Reilly Media Group premiered its first issue of Make: magazine, the cover depicting a man adjusting his aerial photography rig, with references to DIY, “hacks,” and projects readers could take to their backyard. Of the 59 authors featured in the journal, 4 are women, 5 people of color, and 1 woman of color. Many of these authors are self-identified hackers themselves, though many have gone on to serve as marketing executives, tech journalists, and entrepreneurs. The volume included articles on hacking pre-existing technologies, exploring new technologies, reports on specific Makerspaces in the United States, and reviews of emerging toys and
components, among other topics. The issue was arguably one of the first publications whose sole purpose was to report and engage the activities of particular interest to technologists, hobbyists, and the growing “tinkerer” movement.

One year following, *Make:* hosted its first Maker Faire in San Mateo, where more than 10,000 makers and enthusiasts joined together to play, invent, and showcase their wares. As John J. Burke notes, these beginning moments of the Maker movement were characterized by an organized effort to bring together computing and crafting practices, even though these practices existed prior to the 2000s (10). Overall, “making” was seen as the process of creating physical objects with digital and Internet-capable tools; it involved woodworking machines, electronics, wearable tech, and even later incorporated fiber craft into its communities of practice. It embodied an ethic of ingenuity and inherent human desire to create and was, as Balsamo argues, open-source, democratic, and liberatory. Make and Maker Faire co-founder Dale Dougherty’s “We are all makers” TED talk exemplified the Maker movement’s goals: “Can I do it? Can it be done?” (1:06). There was a sense in these early days of organization that a Maker’s focus was on pushing the boundaries of what could be tinkered, hacked, or made - making for making’s sake.

*Maker Technologies & Spaces*

Generally, Maker tools incorporate a variety of technologies based around network systems, electrical circuitry, prototyping, and 3D manufacture. Such technologies center around a do-it-yourself (DIY) ethic, where the tools of production are easily accessible, both in literacy and price. David Kushner’s 2011 piece in IEEE Spectrum on the Maker movement details how in 2003, a small group of students and researchers at the Interaction Design Institute Ivrea in Ivrea, Italy began the Arduino project and developed a single-board microcontroller they named the Arduino. At the time, researchers at MIT were developing Processing, a simple language
meant for artists to learn code with an easy-to-use platform for coding. The Arduino project developed their own integrated development environment, or IDE, based off the work of Processing and created a cheap tool that would allow novices to quickly learn both the basics of electronics and coding. Since 2003, electronics companies have developed thousands of components to scale up the uses of the Arduino board beyond a simple input-output; enthusiasts can now purchase sensors, LED screens, WiFi and Bluetooth shields, and much more. In 2012, the Raspberry Pi Foundation developed another computing tool that is often found in Makerspaces, the Raspberry Pi. Like the Arduino, the Pi is aimed at teaching novices the basic principles of computing, with an operating system that allows for multiple programs to run. Another major fixture of the contemporary Makerspace is the 3D printer. Several manufacturers have developed consumer-grade machines that allow users to design 3D models and print them using plastic or other material filament. A short video from PBS’s Offbook studio in 2013 demonstrates how the aim of these machines is often to “democratize” manufacture so that a producer can scale up production easily and with fewer sustaining costs. Makerspaces like the NC State Library Makerspace are increasingly incorporating electronic textiles into their offerings as well, utilizing the accuracy and speed of machines like digital embroiderers as well as the hands-on physical computing capabilities of conductive threads, wearables, and sewable sensors (“Wearables”).

While early Maker communities gathered in disparate groups in unorganized spaces, one of the features of the Maker movement of the mid- to late-2000s is the fact that makers organize in one space. Building from “co-working” models for workspaces, Burke describes how Makerspaces often fit into three separate institutional spaces: as a part of a library or learning services initiative within a school or university, as a for-profit or benefit corporation, or as a
nonprofit space (11). Makerspaces come in many different spatial orientations, from a closet in a corner to a fully stocked warehouse and are structured so that shared tools are easily accessible and visible. Most often, Makerspaces have some sort of workspace separate from machines, like large tables or desks, that allow for movement and collaboration within the space.

_Critical Making in Composition and Rhetoric_

As Dale Dougherty and other tech giants continued to organize makers through media, fabrication labs, and annual gatherings, scholars have also been considering the possibilities that things, and particularly electronically-enabled things, could have to produce knowledge. Critical making resonates strongly with the educational and semiotic move towards multimodality in the 1990s and early 2000s, where education scholars begin to argue that communication and inscription are inherently drawn from multiple modes of knowledge production. In 1996, the New London Group, a collection of educators and thinkers, gathered to discuss the new kinds of literacies that students might need in order to move forward in contemporary, networked society. “A Pedagogy of Multiliteracies: Designing Social Futures” defines the mission of education as making certain that every child is equipped to participate in public life, where cultural difference and shifting communication systems change the ways we think about and teach literacy (Cazden et al. 61). The social futures that students face are characteristic of changes in globalist economies, networks, technologies, and migrations. New economies of flexible production are looking more like pedagogical spaces than ever before and are grounds for new relationships and new technologies (64). In addressing this social experience, schools must avoid market-driven education and tokenism while also responding to the multicultural diversity that has resulted from networked and globalized society (66). The authors put forth a new pedagogy of multiliteracies to address how new educational practices can account for the multiple
frameworks students must grapple with in their preparation for a public life (85). This new worldview incorporates new theories about multimodal semiotics, developed from Gunther Kress, who argues for a theory of semiotics that includes modes other than language representation. A social semiotic theory of communication therefore acknowledges that cultural environments, including the networked society we currently reside within, shape what we can say and how we can say it (11). Different modes result from specific material and social formations within a culture and serve ideational, interpersonal, and textual functions (87). Different modes offer distinct possibilities for transcribing the world, but no mode is totalizing; all accounts of the world must be made up of multiple modes, or multimodal, as semiosis is only ever a partial rendering of the world (79). Further, modes afford different relationships to others: other sign-makers, other interpreters, and systems of power (45).

In this moment where digital and multimodal texts become increasingly important, the New London Group suggests a new pedagogy for students’ new multiliteracies centered around design. Kress explains how design helps configure precise arrangements of the world through ensembles of modes, texts, and signs based on the designers particular interest (161). These ensembles are multimodal, multi-meaningful, orchestrated, and provide a grounds for what can be interpreted or selected by an audience. The New London Group’s suggested educational strategy, therefore, involves encouraging students to design using all available semiotic resources, to re-present and recontextualize relationships and, and to explore genre and discourses in order to understand how texts relate to one another (65). They propose four practices for employing a pedagogy of multiliteracies: situated practice, overt instruction, critical framing, and transformed practice (85). Similarly, Kress envisions classrooms as places where students see and choose from a variety of routes towards meaning (165). He suggests that students engage
with communication as a movement that is directed by different media and different contexts. In centering design as a classroom’s main pedagogical concern, choice becomes the most significant design element that students should look to. In assessing such multimodal compositions, Kress suggests that these learning environments should not be about adhering to expectations, as in most traditional assessment, but rather we should be looking for signs of learning, where a sign-maker’s interest meets an external ground and where the sign-maker has transformed semiotic resources (183).

Following from these moves towards assemblages, new technologies, and multiliteracies, critical making has very recently become a point of interest for compositionists interested in bringing the fabrication tools and processes of the Makerspace into the writing classroom. “Critical making,” coined by Matt Ratto in 2011, refers to the process of mapping abstract concepts onto physical-technical objects. It involves a three-tiered process of construction: first, the maker gathers concepts and materials and decides which ideas can map onto which materials (254). The second stage involves collaborative prototyping of objects, and the final stage is an iterative process of critical reflection and reconfiguration. Key in this approach is the way makers embed abstract ideas into material-technical objects in an effort to show how society and technology are intimately connected. Rhetoric and composition scholar David Sheridan argues in his 2010 *Computers & Composition* article that critical making in educational contexts affords students the possibility, effectiveness, value, and democracy of digitally-fabricated objects (261).

Critical making tools like 3D printers, microcontrollers, and video and audio production are readily available to students to make objects that have meaning and value in our current cultural moment. Not only that, but students have the rare opportunity to take ownership of the processes of fabrication and design (257). The cultural assumptions of the more popular Maker movement
are visible in these visions of new ways of doing scholarship: critical making involves something inherently different than mere fabrication: thought, ingenuity, collaboration.

*The Maker’s Manifesto*

One of the genres that has emerged out of the Maker movement is that of the manifesto, a written document detailing the goals, objectives, and philosophies of Makers in what Chris Anderson, former editor-in-chief of the technology magazine *Wired*, has called the New Industrial Revolution. While much has been written about what Makerspaces are and how they support student and amateur making, manifestos serve as a different kind of documentation of principles, perhaps more explicit than what analysts might take from describing the technologies and layouts of fabrication labs. In Anderson’s *Wired* article “In the Next Industrial Revolution, Atoms are the New Bits,” the basis for his full-length book on the same topic, he writes of the Maker movement in optimistic terms based around things like destiny and crowdsourcing. “It all starts with the tools,” Anderson writes, focusing the success and values of the Maker movement in terms of atoms and materials, individuals and their technological skill. Mark Hatch’s Maker Movement Manifesto lays out nine principles for what it means to make: Make, Share, Give, Learn, Tool Up, Play, Participate, Support, and Change. Maker Faire Africa, an offshoot of the Maker Faire organization in the United States, has written a manifesto specific to global makers in Africa:

1. We will wait for no one.
2. We will make the things Africa needs.
3. We will see challenges as opportunities to invent, and invention as a means to proving African ingenuity.
4. We will be obsessed with improving things, whether just a little or a lot.
5. We will show the world how sexy African manufacturing can be.

6. We will hunt down new skills, unmask locally made materials, keep our work sustainable, and be kind to the environments in which we make.

7. We will share what we make, and help each other make what we share.

8. We will be responsible for acting on our own ideas.

9. We will forge collaborations across our continent.

10. We will remake Africa with our own hands.

While Maker Faire Africa’s mission is centered in a responsibility to community, continent, and environment, woven throughout are the kind of capitalist, industrialist, Western idea about ingenuity and progress.

To date, while there are an increasing number of critical perspectives on the Maker movement, few female-identified makers, makers of color, Third World makers, or international/Global South makers have published in the genre of the Maker manifesto. As of 2018, Garnet Hertz’s “Maker’s Bill of Rights” includes the rights of women as makers and the acknowledgment that technology often causes more problems than it solves, especially for already-exploited people. Hackathons and Makerspaces geared towards supporting women, gender minorities, and people of color often couch these values in policies associated with conduct or harassment. For example, Tuscon’s Women Techmakers Hackathon abides by four rules: “Be excellent to each other,” “Speak up if you see or hear something,” “Harassment is not tolerated,” and “Practice saying ‘Yes and’ to each other” (“Code of Conduct”). These rules are not explicitly about technological making and what it affords, but the interactions between makers themselves, what makes for good interaction. In Em O’Sullivan’s reflections on how makers “strive to be excellent to each other” (49), they acknowledge that while feminist-themed
objects and workshops are apart of programming in spaces like Machines Room, Double Union, Seattle Attic, and Noisebridge, their manifestos for making are based in “a strong Code of Conduct that lays out what is expected of their members” (46). These manifestos reflect a different set of principles than mainstream Maker culture; not only do they create real, concrete, and sustained methods for moderating space and how bodies move through it, members are often vetted before becoming apart of the space. Just as in moderated online spaces where harassment is a central concern for people of color and women, Makerspaces specifically designed with accessibility in mind coordinate inclusive action through institutional documents.

**Definitions of Making**

One important move this dissertation will make is to complicate the notion of what and who constitutes “making” and “making technologies,” to discuss how such definitions fail to acknowledge the relationships between people, their cultures, and their materials during an act of making, and how this failure (sometimes purposefully) leaves out certain makers and certain kinds of making. What follows is a consideration of these definitions, how they fall short of an inclusive yet workable understanding of making practice, and a proposal for a broader, more relational idea of making on which we might structure our analyses of multimodal practice.

Critical making, defined by Matt Ratto in 2011, is an explicitly scholarly methodology aimed at tying physical objects to abstract concepts, an approach that assumes the separation between theory and material. The definition relies heavily on design thinking principles, which separate out the process of building an object into steps like ideation, iteration, and scaling. Critical making projects tend to use a very specific set of tools, namely electronic and Internet-enabled technologies such as Arduino microcontrollers, Raspberry Pis, sewn and paper circuits, and data visualization software. The Maker movement similarly identifies what Peppler et al.
argue is “the simple pleasure of figuring out how things work” through building, breaking, and reconstructing (4). Drawing from older practices that foreground ingenuity, resilience, and exploration, the Maker movement sees their version of making as a “resdiscovery, one that seems to emerge in reaction to social and economic trends that leave Americans yearning to use their hands” (Rose xxiv). In her taxonomy of tinkering practices, Balsamo defines “Makers Culture” in the same entry as “DIY,” arguing that Makers are “a loosely organized group of communities focusing mostly on technology, science, and craft projects…formed around the notion that making things oneself is better than using the mass-produced commodities that comprise our consumer-driven culture.” In the same taxonomy, arts and crafts are a single entry, while individual entries are allocated for different tools for electronic and digital manufacturing. Some definitions of practices and relationships, however, include artistic reappropriation and self-help. Broadly, the movement centers individualism, self-reliance, and making for its own sake or to combat the rampant materialism of American culture.

Multimodality, while not explicitly “making,” is often invoked in writing and rhetoric studies when we discuss non-linguistic production of meaning. As such, the subfield defines multimodality based on “literacies,” envisioning makers as “active designers of meaning. And, as designers of meaning, we are designers of social futures” (Cazden et al. 65). Modes, argues Kress, are different ways of making meaning in the world and reflect different culturally-embedded processes for negotiating relationships with other sign-makers, other sign-interpreters, and systems of power. In her 2004 keynote speech for the Conference on College Composition and Communication, Kathleen Blake Yancey argues for a proto-definition of multimodality in writing studies, one that has been taken up by many scholars in the decade that has followed. Notably, Yancey defines “new” ways of teaching writing that acknowledges the different
processes and circulations that writing takes as students produce with new literacies (312). Here, too, modes operate as the tools of making meaning and making language, and because the digital produces a crisis in how compositionists approach the multiple literacies and modes students are familiar with, the digital often ends up being the focus of multimodal composition scholarship. Despite this, Shipka notes that

it is important to avoid equating "new" or "newness" with digitally-based or new media texts and practices. In so doing, we neglect to consider how the uptake of older, and perhaps more familiar, varieties of language (both verbal and nonverbal, English and non-English), tools, techniques, and environments might be used in new ways, remixed, transformed and put to new, creative purposes. (252-253)

Modality as a semiotic framework has been critiqued in other ways, as well. Kress’s conception of multimodality is based on separate distinctions of modes based on the five senses: sight, smell, touch, taste, and sound. Pink, citing anthropologists who have studied sensory perception in both Western and non-Western cultures, argues that such modes are culturally constructed through a Western lens, and that semioticians should “question assumptions about human perception that divide modes up as functioning through specific sensory routes” (265). These critiques resonate with similar critiques of Maker culture, which suggest that “making” has been more or less defined through tools rather than relationships or practices.

What is important about these definitions is that while they operate from an opening, a place of invention and movement, functionally, they break down in constructing institutional places of making and are interpreted as tool-based frameworks. In other words, while scholars have aimed to differentiate making as a relationship in order to avoid limiting definitions, they have often fallen back on a traditional notion of “modes” – tools that allow us to make meaning,
certainly, but still stable objects, designs, and methodologies imposed on material. I propose a definition of making that highlight *processes of making*, that configures making as a verb, i.e. a relational practice, as opposed to a noun. Shipka argues that looking at processes of making “helps illuminate the highly distributed, embodied, translingual, and multimodal aspects of all communicative practice, something that is often overlooked or rendered invisible when analyzing final/finished texts, products, or performances” (253).

In forming a definition of making that helps us illuminate these aspects of communicative practice, I argue that our definition of making should be nothing more and nothing less than the process by which we make – not the tools, not the materials, not the result of processes of fabrication, but the process of *collaborating with human and nonhuman elements to make something different*. While this definition opens up “making” to mean just about anything, that is in some ways the point. How do our more complicated definitions actually oversimplify what makers are creating? How could a more simplistic definition make room for more complex human making practices? How can it make room for the ways even nonhumans make? And how might a broader definition require us to be more accountable to the nuance of everyday practices?

**Toward a Makingspace**

Moving forward with this definition, I consider how the Makerspace can be re-visioned as what Malea Powell calls a Makingspace, a space that focuses on relations over tools and that acknowledges the everyday making practices of people systematically left out of technological culture. Throughout this dissertation, I will be focusing on the ways that movement and bodies, both human and nonhuman, are configured by various Maker communities and how those bodies are implicated within a notion of makerly identity. I will consider the following questions: How
are bodies being made (and disrupted) through their engagement with different material practices? What transfers between people, objects, tools, and space in a making event? How do different making practices become enmeshed in institutional systems of power? And finally, how can we make more materially and culturally inclusive Makerspaces that account for the deeply historical and multimodal ways that women, people of color, and working-class laborers have always and already been making technology?

In Chapter 2, I will offer a truncated history of technological institutions, from early definitions of *episteme* and *techné* to modern technology and labor systems. In drawing connections between pre-industrial handcraft, new labor systems of the 18th and 19th centuries, and the Maker movement, I demonstrate how Maker culture functionally emerges out of long histories of capitalism while co-opting the traditionalist philosophies of craft movements. I show that technology’s progress narrative is narrowly constructed and relies on linearity to erase both how technologies become coded with power and how practices used by women and people of color are marginalized as non-technological.

In Chapter 3, I propose a methodological orientation towards studying Maker communities and making practices. Building from embodied approaches to qualitative research and cultural rhetorics methods, I propose a diffractive video-ethnographic approach to collecting and analyzing data in spaces of making, called videovoice. This method is derived from already-established photovoice methods, a community-based participatory storytelling approach that asks participants to take photographs of their surroundings and experiences to better understand community issues. Similarly, videovoice involves participants (including the researcher) recording video data of their multimodal practice using a small handheld video camera attached to their body. Through qualitative interviews, participants work with the researcher to analyze
their video stories and draw collaborative conclusions from the data. In allowing participants to
attend to their making according to their own goals, purposes, and interests, videovoice methods
can change the interface with which we engage multimodal practice, scholarship, and teaching.
In this chapter, I describe the participants and research site of my study as it relates to cultural
rhetorics, storytelling, and videovoice methodology.

In Chapters 4 and 5, I use videovoice methodology to describe the collaborative analysis
my participant and I produced in this study. I highlight the following human making practices in
our conversations: hidden labor, time and rhythm, collaboration and survival, expertise, and
makerly identity. I show how farming practices are carried out seemingly external to
technological institutions, but still enact the basic tenets of Maker culture. I also propose that
nonhuman making is an integral and additional part of making in rural communities, and show
the ways bees, animals, land, plants, and other environmental factors interact with making
practices on the farm. I suggest that in addition to marginalized making communities, researchers
of multimodal practice must account for the ways nonhuman makers collaborate with us to
survive and create.

I end with a call for a more relational and embodied understanding of making, not only in
theoretical terms but in practice, in how our classrooms, Makerspaces, and community
workshops are designed and built. I return to the practices Maker culture claims and show how
making on the farm meets these definitions. I finish with a strategic vision for what Malea
Powell has called a “Makingspace,” one that responds to the cultural rhetorics of the community
it serves and operates from open definitions of making. I situate this Makingspace in the specific
context of my home community in rural Eastern North Carolina, demonstrating that
Makerspaces, which are relational and embodied, must be determined and built by the community in which they serve.
CHAPTER 2: Histories of Making

In this chapter, I take a step back from contemporary Maker culture and revisit its own self-proclaimed lineage of industrial ingenuity as a more complicated story. In drawing a historical connection from pre-industrial craft to technology of the 20th and 21st century, I consider how automated technologies of the industrial revolution produce new divided labor systems and show that the Maker movement functionally enacts the power structures of capitalism while co-opting the rhetoric of traditionalist craft movements meant to combat technological progress. As Bratich argues, marginalized people’s ways of making never died; they were simply reorganized – subsumed and bifurcated from the public means of production (310). The distinction between craft and the digital is a constructed boundary, one that subsumes the technological productions (and the bodies that produce them) of the past and reorganizes them as new, different, and better than before.

To demonstrate and counteract this separatism, I will describe a history of technological progress that shows the resonances between the manufacturing conditions of the past and the power systems that affect modern technology industries, including the Maker movement, today. In doing so, I will show that the aesthetics, epistemologies, production values, organization of labor, and socio-economics of different time periods in Western culture create a seemingly linear progression from handwork to machine-work, and deliberately erase the do-it-yourself and do-it-with-others ethos of non-white, non-male creators. Simultaneously, such a linear progression fixes progress into isolated events, failing to highlight the ways power builds and calcifies with each technological shift and culminating in a contemporary technoculture of “newness.” Drawing out the connections between then and now shows that while technology is not
dependent on a linear path, there are ways technologies become coded and solidified within power systems.

In this chapter, I will highlight several major movements in labor, economic, art, and media history that shed light on some of the claims of the contemporary Maker movement. By explaining how structures of capitalism, sexism, and even racism solidify throughout these histories and culminate in modern technologies, I will offer an overview of some of the emerging critiques of the Maker movement, drawn from feminist theories of embodiment, and how they coincide with my own critique of simplistic media history. I will conclude by proposing a stronger link between supposedly non- or low-technological practices and those practices that are claimed by Makerspaces and fabrication labs, specifically through practices of collaboration, prototyping, creative appropriation, innovation, and critical thinking. The goal of this organization is to create what Royster and Kirsch call a feminist historiography of technology by “tacking” in and out of the history of Western manufacture to disrupt its supposed linearity, show its power structures, and make space for other makers and other kinds of making.

**Episteme and Techné**

Before launching into this history, it will be useful to understand two terms that are often invoked in discussions of labor, art, and technology: *episteme* and *techné*. Aristotle’s *Nichomachean Ethics* defines epistemological knowledge as theoretical and abstract content knowledge, an overarching Truth that we all aim to capture and understand. Partner to *episteme* is *techné*, which is characterized as craftsmanship, the tacit knowledge associated with making a thing. *Techné* denotes changeability, contingency, and precarity: “Every art is concerned with bringing something into being, and the practice of an art is the study of how to bring into being something that is capable either of being or of not being” (Aristotle 1140a1-23). Similarly, Plato
argues that *techné* is related to *ergon*, or functionality, where the technological object is defined based on its use in the world (346e).

These definitions are important to start with, because while ancient rhetoricians saw *episteme* and *techné* as coexisting, the terms become abstracted in time, leading to a contemporary understanding of thinking as separate from doing. This think/do, mind/body split shows up across the following historical periods, but is especially significant during the Renaissance, which marked a major shift in how bodily knowledge related to abstract truths, where *techné* and *episteme* were compartmentalized into mutually exclusive modes. The *epistemel/techné* duality parallels other kinds of demarcations between both craft and art and handwork and automated technologies. These tensions are important to understanding many of the institutional ruling relations of technology throughout these histories, specifically what rules the gendered, classed, and raced divisions of labor that we see in design and STEM fields, and which trickles down into the institutional relationships of the Maker movement.

**Early Modern Makers**

In the Feudal period, roughly between the 5th and 15th centuries, populations in Europe were generally small and more tightly concentrated in single areas. As a result, lower classes of workers – serfs, bondsmen, and farmers – were easily coordinated under the household of a feudal lord. As economists like Alfred Kieser writes, this system evolved out of kinship relationships where direct interaction with one’s “household” – serfs, bondmen, etc. – was relatively easy (545). Mougeot describes the pre-capitalist system as the “face to face society” as opposed to philosopher Karl Popper’s “abstract society,” used to describe later periods such as the pre-Industrial Renaissance era (171). Coordination of exchange or transactions was personal, tied to the family of the feudal lord, which was itself an economic institution where goods and
services were exchanged for the right to live on the land. Because societies were derived from these kinship systems, the only available means of subsisting was through servitude to landowners, and the Church wielded such power as to deem profit for personal gain (outside of the noble class) sinful. As a result, Mougeot writes, there was little sense of personal freedom for those of the working or servant class, as there was no system outside of servitude to which one could aspire and live (170).

As towns grew, however, coordination of the lower classes became increasingly difficult for nobility to control, and the market arose as an avenue for both personal freedom and coordination of social class (Mougeot 170; Kieser 546). There arose among the serfdom a desire for the advantages of freedom, mainly the right to choose one’s own goals and to produce wealth for one’s own interests rather than that of the landlord. Historians generally fit their interpretation of the emergence of craft guilds into three theories, though modern historians tend to focus their analyses on a multitude of factors (Kieser 549-550). The feudal manor theory suggests that as populations became more concentrated in towns, feudal serfs began to move and settle there in order to become free citizens. Serfs could stay in certain parts of towns owned by their feudal lords, and eventually organized in these areas where people were generally independent from landowners. The office theory, alternatively, suggests that the evolution from serf to free citizen was so quickly achieved that guilds formed relatively independent from feudal influence. The origin of the guild in this theory is as an opposition to town “offices” that required handworkers to pay taxes to the town and church and protected poor town citizens from being taken advantage of by the new craftsmen. Finally, the unification theory, proposed by Georg von Below in 1912, assumed that there was an intense cooperative spirit in the Middle Ages that prompted newly-settled serfs to begin organizing and advocating on behalf of the group. These
different theories demonstrate that a variety of economic, social, and bureaucratic reasons could have prompted the emergence of early merchant guilds.

As early merchant guilds began to take hold, their roles replaced those of the landlord and were thus somewhat limited in their liberatory capacities. Economists have demonstrated that, just as the feudal lords who came before them, early guilds exacted power through quality control, regulatory compliance, and setting the prices and material qualities of items that entered the market (Epstein 155). Because craft and merchant guilds were recognized by local and national governments, they were able to exercise a good deal of political power, especially in terms of setting trade monopolies (Lucassen et al. 6). Kieser writes, however, that early markets faced many struggles in the formation of a public, economic sphere: “the value of money was ill-defined, formal procedures to solve conflicts arising from trade at the market had not yet developed, and the mathematical skills of the traders were very limited” (545). As a result, the few goods that were exchanged in these early markets were agricultural and craft goods as opposed to fully formed objects or art pieces.

During the rise of these early guild systems, handmade work was produced largely through single acts of production carried out by a single craftsperson, whose quality and technique was determined by the guild association to which they belonged. While a community may have a blacksmith, a cobbler, a carpenter, and a weaver, they were separated based on the materials they worked with, not the different things or pieces they made. A blacksmith would produce all kinds of metal objects, a carpenter would produce an entire wagon, from wheel to cart, and so on. The value of this work was attributed to the materials a handworker would use, not necessarily the value or beauty of their skill. Even painting was a practice rather than an object in-and-of-itself, used to decorate wooden paneling in builds. Fariello writes, “Medieval art
was applied art by virtue of its physical relationship to architecture and the artist’s contractual relationship to the client” (6). As such, craft objects, while beautiful and potentially ornate, were priced on the quality of their materials as opposed to the artistic skill they displayed. Further, a crafted object’s design was not necessarily pre-ordained; its form came from its material and the method the worker chose to use to fashion something out of it. Art historian and prominent figure of the British Arts and Crafts movement John Ruskin writes that the Gothic style and pre-Raphaelite aesthetics are most representative of craft prior to the Industrial revolution:

Its elements are certain mental tendencies of the builders, legibly expressed in it; as fancifulness, love of variety, love of richness and such others. Its external forms are pointed arches, vaulted roofs, etc. And unless both the elements and the forms are there, we have no right to call the style Gothic. (140)

He identifies the pre-Industrial style as perpetually changing and responsive to the environment and to the materials with which the handworker works (143). Similarly, Ingold describes how handworkers, particularly masons and carpenters, were focused on solving problems rather than imposing designs. The portfolios of builders from the Medieval era show not blueprints of buildings but descriptions of the kinds of manipulations employed. The structure, therefore, “far from being imposed upon the material, emerge from the process of building itself” (Ingold 55).

Ruskin argues that there is a truthfulness in the pre-Industrial style that is free and humble in its emergence, yet through its wandering technique is also abundant and ornate (141). Ruskin’s final characteristic of Gothic style is redundancy, more a sign of sacrifice and kindness than haughtiness (144). Ruskin’s reasoning here is stated as paradoxical: simplicity of design implies that an object or building “refuses to address the eye, except in a few clear and forceful lines.” In other words, Ruskin argues that the Gothic style is giving; it puts as much in front of the viewer
as possible and does not guard itself from roughness or richness; it embodies “a magnificent enthusiasm,” the kind of atmosphere of a bustling workshop, excessive and masculine. These architectural characteristics are not only matters of material; they reflect the (male) bodies who make things, who imbue their materials with the politics and morals of the time.

As an organizing entity, guild associations operated as a place for communities of handworkers to share information, expertise, and materials. Tacit skill of a craft was usually shared within the guild orally, and instructional documents, Adamson notes, were generally seen as aspirational and decorative, not actually signifying a transfer of knowledge from one craftsperson to another, which was one role of the guild (9-10). They also occupied a political space for craftspeople to organize and advocate as skilled citizens. Ogilvie suggests that at one point guilds operated as cartels, boycotting rulers that did not provide security and attacking the guilds of merchants who breached a contract (655). While a guild may have been seen as a skill-based organization, it had a variety of tactics to both share knowledge and protect that knowledge.

While guilds protected and supported a certain class of workers, those benefits were largely for “well organized interest groups” of white male masters as opposed to apprentices, women, foreigners, or ethnic minorities (Ogilvie 664). Ogilvie writes that guilds, while lauded in other fields as communistic and beneficial for all workers, “underpaid employees, overcharged customers, stifled competition, excluded women and Jews, and blocked innovation” (663). Soly notes that, in contrast to the view of open source knowledge and self-sustaining labor, guilds were often run by merchants who had already formed associations prior to the rise of the craft guild (50). In the Italian textile market, Soly argues, this tension between merchants and craftspeople reproduced economic power relations that had already existed between the ruling
and working class rather than changing them (46). These merchants advocated for systems that allowed the heads of guilds, often elites themselves, to expand, outsource labor, and bring in more capital, creating a much more hierarchical structure than previously believed.

Further, guild leaders’ exclusionary practices reified many of the power systems that feudal lords used to decimate any sense of personal freedom. Crowston notes that women in particular were excluded from guild systems due to the decreasing importance of familial structures prompted by policies of the Catholic Church (25). Only heads of household (male) were allowed to be members of the guild, and access was dependent on hereditary criteria. Despite this, female members of the family were required to partake in the craft according to the regulations laid out by the guild association; women could not participate in the public life of a craftsperson but were still beholden to and subsumed by it (21). For male members, voluntary withdrawal was impossible, as membership could only be dissolved by death or ostracism (Kieser 540). Like the social stratifications that kept lower class people from entering society during the Medieval feudal period, those who wanted to work as craftsmen could only do so by investing all their resources, by bringing their personalities and private life in toto into the guild. While the original impetus for organizing guilds was to seek out private economic and political freedom, no private sphere existed outside the guild.

While social and economic history have long situated guild structures as a strictly urban, Western phenomenon, there is much evidence for guilds being formed elsewhere across the world. In fact, when economists and craft historians broaden their definitions of guild-like institutions, they find that guilds have a set of characteristics that more or less show up across time and space: independence and self governance; members of the same occupations; the goal of furthering interests across the membership within economic, political, social, cultural and
religion areas of life (Lucassen et al. 9). The authors also note that urbanization does not always indicate the rise of guild-like institutions. While the Muslim world from the 8th century on was highly urbanized, researchers find little evidence of guilds forming as commerce becomes more distributed, but the craft guilds formed in urban Western Europe were so pervasive that they expanded to remote and rural areas (10). Across the globe, guilds formed from a variety of different relationships between people, their social organization, new economic forms, and the state. Often the state’s divestment from economic structures prompted a decentralized system to arise (14). While governments may have created environments in which guilds could thrive in Europe and Asia both, guilds sometimes formed as a result of higher levels of literacy, not necessarily urbanization or decentralization. Using literacy as a framework, historians see the emergence of merchant guilds before craft guilds on a global scale, but the structures trickle down even to journeyman guilds. While the dominant historical narrative argues that guild associations were centralized, Western institutions, it is clear from other evidence that handmakers do not just live and organize in one place, but emerge as a result of a complex arrangement of social and cultural phenomena across time and space.

**Industrial Makers and the Rise of the Machinic Body**

The history of industrialization, and making writ large, is often seen as a story about the linear progression of technology, devaluation of labor, and complexity of machines, but in actuality is more a demonstration of an increasing separatism between hand and mind within Western culture. Adamson writes that “the moment when craft began is perhaps the least well-understood chapter in its history” (43). Modern histories of craft have viewed the Industrial Revolution as the period of time in which technology, science, art, and social order coalesce to create a divided system of labor that, perhaps arguably, changes handwork and handworkers
forever. However, the Industrial Revolution has its beginnings in philosophy, with the rise of Humanist thought that privileges theory and observation, i.e. *episteme*, over applied arts and material understanding i.e. *techné*. In Linda Tuhiwai Smith’s historical tracing of imperialism through writing, history, and theory, they demonstrate how early Humanist thought in the West developed the notion of empiricism, whose goal was to both dominate and decimate the identities, resources, and knowledges of non-European, particularly Indigenous, people. They write, “The production of knowledge, new knowledge and transformed ‘old’ knowledge, ideas about the nature of knowledge and the validity of specific forms of knowledge, became as much commodities of colonial exploitation as other natural resources” (62). Through spatial metaphors of the line, the center, and the outside, the claiming of “new” worlds created a foundation for separating Western rationalism from Othered knowledge; abstraction through (Western) observation became the central organizing principle for how knowledge was deemed valuable. While Owen calls this new understanding of science, “a more complex understanding of existence and an acceptance of an unseen reality,” what it allows for is unseen theories of the world to dominate and negate the base realities of female and non-European bodies who are seen as inherently unable to abstract (27).

Aesthetic theory followed these lines and produced a delineation between abstract art (*episteme*) and its execution through craft (*techné*). Fariello writes of da Vinci’s attempts to define sculpture as a low form, as it could not be produced through adherence to scientific calculations of color, geometry, light, and perspective like painting could. The new techniques of pictorial representation transduced a three-dimensional reality into a two-dimensional form: it ostensibly separated the subject of a piece of art from its referent, made it abstract, and reproduced it in a new form. Ashbee argues that the modern aesthetic is one that “distinguishes
between goldsmith and sculptor, between craftsman and designer” (xi). In other words, whereas pre-Industrial craft was all-encompassing, craftwork leading up to the Industrial Revolution had already become divided between base, material production - aligned with bodies, women, and colonized people - and high, rational abstract art - aligned with the mind, men, and the West. As Fariello writes, “Up until the Renaissance, painting did not exist as a separate art form. Certainly there was painting the activity, but not painting the object” (10). Painting as an object, and then later as an industrial object, assumed the separation between thought and material execution and aligned the painter more closely with the philosopher than with the craftworker: “Cerebral understanding, removed from sensory and visual perception, was elevated above tactile experience…The painter shared tools with the scholar in using a brush, pen, and powdered pigments” (10). With the body removed from the act of painting, it became a secondary agent of colonialism alongside scientific and philosophic Humanist inquiry.

The introduction of the industrial machine to manufacturing systems in the late 18th and 19th centuries helped rewrite the role of craft and craftworkers in society in light of many of these scientific and philosophic movements. While guild organizations did not completely disappear during the Industrial Revolution, they changed form and became less powerful as factories and automation widened the gap between makers and managers. Along with breakthroughs in science, mathematics, and philosophy during the Renaissance came an increased understanding of innovative methods for production and economics. One of the major identifying outcomes of the Industrial Revolution is how machines were aimed at replacing, automating, and deskilling the labor of human artisans. Advances in technology allowed for the focus of labor to be the operation of objects, not the creation of object. This abstraction allowed manufacturers to replace the labor of artisans with that of unskilled workers; the effects of this
shift, Gaskell writes, meant that masculine labor, once seen as difficult and articulated, was replaced by the so-called unskilled, cheap labor of women and children (59). As machines erased the old material differences between skilled workers, Marx writes of the new value that different bodies had to the factory: children could access parts of a machine that older workers may not, and while men had the opportunity to raise their class to engineer or mechanic, women were still available to conduct the menial labor of observing (74).

While this shift from articulated handwork to automated and deskilled machinic action seems as if it is a simple reorganizing of labor, Marx identifies how the locus of control of a machine shifts from animals and humans to implements. What powers a working tool is no longer the human being, but steam, electricity, or coal. The worker’s role then becomes one of overseeing machinic processes rather than handling them. Marx uses the spinning Jenny as an example of how important the shift from handwork to sightwork is in this consolidation: the mechanized spinning wheel required “watching the machine with his eyes and correcting its mistakes with his hands” (71). In other words, an artisan’s value becomes not what their hands can do but what their eyes can catch. Marx’s observation about the new technologies of production has parallels with the Renaissance and Enlightenment ideals of observation, that the eyes are the means for scientific calculation of the natural world, and that the body is subordinate. He refers to this system as the “body of the factory” where the combined labor of conscious humans and unconscious automata work as the organs of a functioning body (74). These separations further mimic the separation of intellectual power from bodily labor that the Renaissance made possible. Further, the notion that workers “watch” rather than “make” focused production on abstract, not embodied, processes that were often relegated to women. The men
that stayed in the factories experienced what they felt was a simultaneous deskilling and feminizing of their labor, specifically in line with the body/mind dualism of the time.

The co-opting of handwork by the machine thus allowed for manufacture to become coordinated into a system of divided labor. Marx argues that the machine, fitted with multiple implements, is limitless: it can produce as many pieces as needed simultaneously, consolidating the work that would have taken multiple artisans to complete successively (73). Rather than the division of labor being one between parts, where one handworker relayed a made object to another or to another part of their workshop in order to build an entire piece, the production of an object was divided into mass, simultaneous, machine-based manufacture and human design. It was through this system of continuous production that the technological advances of the Industrial era allowed for fewer interruptions in the continuous manufacture of an object, more exploitation of workers in the form of menial labor, and in turn more profit for the capitalist (76).

In this new streamlined structure, there are two principal classes of workers: the workmen who have a technical understanding of the machines, and those who are simple attendants, often women and children (74). I would add a third class, the designer, who now plays a role in the abstracted processes of design and execution. For a machine to make an object, it must be given those instructions, whereas pre-Industrial workers may have been able to carry out both production and design simultaneously.

The new means of production during the Industrial Revolution created a change in the style of an object as well. Industrial and post-Industrial style can be characterized as a general move towards convergence rather than difference. Because all the machines within a factory were enlivened by the same prime mover, they could continuously produce the same object over and over again. Variation was the result of a malfunctioning machine rather than the unique
choices and skills of the artisan. Art historian David Pye attributes this shift to what he terms the workmanship of risk vs. the workmanship of certainty. Pre-Industrial craftworkers determined the shapes of their objects based on their own judgments, skills, materials, and care (342). As a result, the product of their labor was always in some way contingent - at risk - of failure or change during the process of making. Crafted objects that found their ways into patrons’ hands therefore were imbued with this spirit of indetermination. The workmanship of certainty, however, defines Industrial manufacture, and places all of these variables in the production of the machine that produces the crafted object (343). Industrial machines therefore store artistic energy and channel it into a standardized process whose goal is economic and certain, as opposed to aesthetic and risky. Simondon similarly argues that the technical object tends towards unity rather than the risk of variation, calling a machine’s integrated systems a “convergence” of functionality (356). In general, variation was eliminated as it was messy, inefficient, and kept the upper class from accumulating more wealth.

**Handcrafted Identity After the Revolution**

As the factory and manufacture grew stronger throughout the 18th and 19th centuries, thinkers, artists, and laborers aimed to respond to the machine age with a preservation of the handcrafts, and by extension, art itself. As Tucker writes, “The nineteenth century desire for a so-called return (or, more accurately, retreat) to the past resulted from the fact that the present had become increasingly uncomfortable” (106). Figures like John Ruskin and William Morris were at the forefront of the British Arts & Crafts movement, which “hoped to reunite art and labor, mental effort and manual achievement, work and play, countering the fragmentation of social life endemic to the emerging corporate order” (Boris 3-4). To give a sense of the historical moment in which the Arts & Crafts movement arises, we can look to Alexis de Tocqueville’s
treatise on “How an Aristocracy May Emerge from Industry,” in which de Tocqueville argues that market freedom and democratic laws have degraded the worker to a state in which he is no longer free:

   It is in vain that laws and manners have been at pains to level all the barriers round such a man and to open to him on every side a thousand different paths to fortune; a theory of manufactures more powerful than customs and laws binds him to a craft, and frequently to a spot, which he cannot leave; it assigns to him a certain place in society, beyond which he cannot go; in the midst of universal movement it has rendered him stationary.

   (62)

As a democratic society expects equality across social strata, that society also sees an increased demand in manufactured goods, and in turn, a need for cheaper and cheaper manufacturing processes, including the worker de Tocqueville describes above. It is through this division of labor that some citizens grow less free in service to labor and others grow freer at the expense of workers. Gaskell argues that such acquisition of wealth by the elite, many of whom were once laborers themselves unaccustomed to such excesses, drove men to further indecency in the form of exploitation, sexual deviancy, and extreme excess (57). In the end, “Wealth, although burdened with blunt and coarse manners, was still an all-powerful agent for procuring worldly respect” which drove free people to devalue human labor in the name of a free market and personal freedom.

   In response to such crisis, the Arts & Crafts movement sought to elevate craft as a political identity that might help cure the ills of the late 19th century and the Industrial Revolution. In “The Revival of Handicraft,” William Morris writes that labor has been extracted from its product, and that while the ruling class laments the loss of handwork and handcraft, it is
largely unaware of the systems of capitalism that produce such separations of value. Morris attributes the devaluing of made objects to the Industrial Revolution and to the increase in machine-made things that are meant to replicate handwork: “As a condition of life, production by machinery is altogether an evil; as an instrument for forcing on us better conditions of life it has been, and for some time yet will be, indispensable” (151). His call, which drew strongly from Marxist theory, was for the working classes to claim their right to the culture and beauty of the ruling classes, and the ruling classes likewise to the joy of creation that the working classes are afforded. Ruskin, one of Morris’s contemporaries, while predominantly an art critic, also spoke of the need for the workman to find beauty in and benefit from his work. In describing Gothic architecture, he argues that the work of such architecture reflects the workmen of the time, who were free to instill their made objects with the “mental tendencies of the builders…as fancifulness, love of variety, love of richness and such others” (140). It follows from Ruskin’s architectural analysis that the industrial machine might also reflect the mental tendencies of its tenders, and that the manufacture of such industrial objects is imbued with ugliness, slavery, and dehumanization.

Other writers accompanied and followed Morris in their call for craft revival as a social and political movement. Ellen Gates Starr, along with Jane Addams, founded Hull House in Chicago as a settlement house for workers down on their luck. Hull House provided courses for residents based on traditional crafts like bookbinding, drawing, embroidery, and clay modeling, a move to democratize the practice and beauty of handcraft (156). In her essay on “Art and Labor,” Starr writes:

We have believed that we could force men to live without beauty in their own lives, and still compel them to make for us the beautiful things in which we have denied them any
part. We have supposed that we could teach men, in schools, to produce a grace and
harmony which they never see, and which the life that we force them to live utterly
precludes. (158)

One of the main tenants of the craft revival of the British Arts & Crafts movement was to
democratize the crafted thing, to allow for the aesthetic experience of objects previously only
accessible to the ruling classes to be disseminated across the working classes as well. It was, at
its core, a popularization of art as what Fariello calls a “meditative function….a spiritual guide to
counterbalance society’s growing dependence upon economic materialism” (11). Whereas the
Industrial Revolution had created a separation between the design of a thing and its execution,
the Arts & Crafts movement sought a deep political and spiritual connection between designers
(art) and handworkers (craft) outside of the control of the machine.

Despite such lofty ideals, Morris and others at the forefront of the British Arts & Crafts
movement famously benefitted from the patronage of wealthy citizenry, simultaneously railing
against the impoverishment that workers experienced in their inability to afford the very beauty
they produced in the world. Adamson also argues that while craft movements aimed to resist
capitalist systems of oppression, the Arts & Crafts movement gained momentum via these same
systems of manufacture, dissemination, and profit (136). While craft revivals provided cultural
transformations in the market and art, they also were often coupled with imperialist and fascist
movements to preserve the authenticity and purity of separate races. And while the movement
built from the political momentum of Industrial-era Marxism, many writers of this period assume
a much more historical presence of the “handcrafter” as a political identity than perhaps truly
existed. In many ways, Morris’s ideal of the lowly carpenter fighting for their political and
economic freedom was a relatively modern concept.
Further, Adamson argues that the British Arts & Crafts movement was a form of craft idealism that ignored some of the very real ways in which manufacture had always been apart of handwork, and vice versa (135). Simondon interestingly notes that handworked variation within a technical object can only occur in the elements inessential to its functioning (358). I have already discussed the ways craft and merchant guilds tended to hamper variation and innovation through intense regulation, but it is also the case that prior to the Industrial Revolution, handcrafted objects were not valued for their artisanship as much as for their materials. However, during the 19th century, Adamson argues materials became more cost-effective and value became attached to the art and skill of the craftworker rather than the quality of their materials (43). Berg notes that many industries like gunsmithing and agriculture still required handwork because implements were difficult to make by machine (21). Rather than automation replacing skillwork, machines often simply improved the kinds of hand tools that skillworkers could use (Adamson 44). These industrial histories are overarching and totalizing, but the ways makers are working on the ground are quite different, complicating the linear narrative of automation.

**Twentieth Century Makers: Artful vs. Useful**

During the 20th century, ideas about technology, industry, and made objects that had circulated in previous centuries continue to sediment into cultural practice and lay the groundwork for contemporary media technologies. Throughout the 1900s, the tension between design (thinking) and manufacture (doing) continued and was bolstered by several different movements at the turn of the century. In a return to pre-Industrial style, architecture and form in the early 20th century foregrounded the beauty of “raw” industrial material. An “International Style” emerged from these continued relationships with machines and materials that showcased large sheets of iron, glass, earth, and wood. Whereas the craft revival of the previous century was
aimed at preserving ornamentation as a symbol of handwork, the modern aesthetic, which could be found across cultures and continents, lacked that same intricacy that Morris and his movement had celebrated. Such attention to “truth in materials” meant that “artisans were no longer needed or desired” as hand skill shifted from the individual craftworker to research and design teams aimed at measuring value through efficiency models (Fariello 15-16). Many craftworkers went from individual shops to larger studios in order to survive and meet the demands of large-scale architecture, where the divisions of labor mirrored the factory floor and designs created by research teams were imposed on materials by huge numbers of handworkers. The Italian shoemaker Ferragamo’s famous couture designs were products of such mass-produced handcraft that exploited skilled labor while still creating something valuable and niche for the market (Ferragamo 245). “Handcraft” became an aesthetic concept rather than a process, one that could be mass produced and capitalized on by more research- and business-minded practitioners.

While such institutions like craft societies and expositions gave workers a place to show off handmade goods and develop a craft aesthetic at the turn of the century, these structures saw a quick demise as the Great Depression placed further economic and societal stress on artists and workers. The rise of the American Craft movement offered studio craftworkers an institutional setting in which they could communicate, organize, and set agendas, but this furthered the split between high art and low craft by creating a separate enclave (and separate, more depleted set of resources) for the “useful” arts. As Fariello writes, “Their efforts were spent and their activity cut short in the lull that followed” an economic disaster and two world wars (14). In the wake of the Great Depression and World War II, Barnard writes, craftspeople were split between the academy and the market through public service programs like the GI Bill and the rise of abstract expressionism in the art world (57). The fine arts camp refused the idea of function in defining
craft and only used traditional “truthful” materials like clay, metal, fiber, paper, wood, and glass, while the functional camp of soldiers learning a skill on the GI Bill valued the ways craft could make a living or could make good use out of made things. Essentially, thinkers went to the university to produce for the wealthy, and doers went to trade school to produce for the market.

The gendered and classed aspects of craft became more and more prevalent as the century progressed. Craft’s legitimacy was increasingly tied to its place as a domestic, unskilled, and therefore feminine, pursuit, and much of the leadership of the craft establishment was female as opposed to the art establishment, predominantly male. As Roszika Parker notes, “The art/craft hierarchy suggests that art made with thread and art made with paint are intrinsically unequal…But the real differences between the two are in terms of where they are made and who makes them” (5). At the close of the second World War, where many women had found empowerment through their involvement in manufacture and industry, wives and daughters were asked to return to their homes and to the domestic. Art museums were additionally founded, funded, and owned by the wealthy elite and relied on a constant cycle of innovation for progress and profit. As a result, the principles that the art world held dear became the principles of the upper classes, something the Arts & Crafts movement of the previous decades had worked so hard to upend (Owen 28). While the wealthy drove innovation, the heads of craft communities were continually restricting the boundaries of their art by defining craft through its materials, and these two phenomena hand-in-hand contributed to the further separation between low, material, bodily craft and high, aesthetic, abstract art.

Beginning in the 1950s and 1960s, conversations about what is made versus what is automated were subsumed by a broader public desire for common spaces where individuals might collaborate in the sharing of information, what we now recognize as networked
communication technologies like the Internet. As an extension of the mind/body split of the
Enlightenment, ideas about art vs. craft are subsumed by a delineation between art, which
includes craft, and science, which includes technology. Early in the 20th century, Vannevar Bush
imagined such a platform, called the Memex, which allowed for knowledge and media to be
stored as information, structured using associative indexing, and “callable” by a user. While
Bush’s Memex was a fantastical invention in the wake of World War II, its possibility was
realized in the development of the various network systems that transmitted messages and
information across airwaves as part of military and research advancements. Such projects as the
ARPANET, an information sharing network across mainframes at UCLA and Stanford, helped
lay the foundations for machines that could operate more and more complex abstractions.

Over the course of the 20th century, one of the major characteristics of society and the
economy was the shift from material to abstract, a continuation of the kinds of philosophies and
contexts that produced the crisis of the Industrial Revolution, where makers were increasingly
abstracted from the use value of their made things. McPherson identifies this as the lenticular
logic of early operating systems that pervaded mid-century cultural structures. UNIX, for
example, was developed out of some of the same military systems as the ARPANET, the first
network to implement a TCP/IP protocol. UNIX operates via “shells” which silo off certain sets
of information from others. The rules of UNIX value separation, discreteness, and modularity.
Difference is eliminated while separation allows for operators to avoid particular instances over
others. The whole operating system separates object from context, in that one does not need to
know the contents of a module in order for it to function. While the system supports multiples,
these multiples are compartmentalized. McPherson notably ties these characteristics of UNIX to
a more general cultural logic of the mid-1960s in which it was developed: racial separation and
liberal ignorance followed the same logics which made it impossible to see two realities, or instances, at the same time. In general, late 20th century technologies operated via abstractions: the digital object, however manipulated, was done so through various levels of protocols and screens, systems that were developed and standardized by larger military and research networks. Even in the early days of the World Wide Web, a decidedly homegrown community of programmers and hackers, users were required to have a host of abstract and difficult-to-obtain resources in order to create digital things: “To post a Web page,” Postigo writes, “a user would have to know HTML, have server space, and have access to expensive design software such as Adobe’s Dreamweaver” (182). Users of the World Wide Web were more often separated from the source of making, only able to access content rather than create it, and the methods by which creators could produce were clunky.

Making for the Participatory Web

Further advancements in modem technologies and Internet platforms ushered in what Darcy DiNucci has called the participatory web, a step beyond simply broadcasting information over the network, to responding and engaging. Whereas the World Wide Web used such platforms as listservs for discussion across time and place, Web 2.0 platforms were significantly more synchronous, with such participation being submitted directly to the platform rather than a hosting site. Both web platforms and machines were characterized by their ease of use, ability to organize more information, and a shift from users-as-consumers to users-as-producers (Postigo 182). As Postigo writes, “People may be 'friends', they may be 'experts', 'fans', or 'fakesters' but they are only these things through the production of information and its consumption in a massively networked architecture” (184). Blank and Reisdorf argue that one of the major tenets of new technologies in the late 90s and early 2000s were that the more people participated, the
more valuable those participatory structures become (538). The systems of the late 20th century had grown to such an extent that users could now operate as their own nodes, communicating to one another and creating new information structures through the network.

With increased connection came increased complications around the boundary between private and public. Barassi & Treré call this aspect of Web 2.0 technologies "an increased flow of personal information across networks," but along with that ubiquity comes “the emergence of powerful tools of peer surveillance, the exploitation of free labour for commercial gain and an increased corporatization of online social spaces and outputs” (1271). While personal pages of the World Wide Web in the early 90s allowed for users to create the web equivalent of their private bedrooms, Web 2.0 platforms like Xanga and Myspace created a new “mass communication of the self” where the lines between personal and public became more and more blurred (1272). Users of such machines are not only consumers of a networked object, but producers, whose labor was more or less a required part of their membership in society.

**Sedimentation of Power in Making**

What is striking about the Web 2.0 moment is that the shift from early instantiations of the Internet to the participatory web is largely designed, not descriptive. Web 2.0 was a new platform-based architecture of participation, tied to new business opportunities for conglomerates like O’Reilly Media Group, who coined the term. New media meant new ways to profit, new products or platforms to sell, and very specifically, new services in the form of collective activity to monetize. As Matthew Allen argues, the “versioning” of technology, and by extension technological history, is not a social discourse, but a market one. Allen writes that such a distinct move from Web 1.0 in the 1990s to Web 2.0 in the early 2000s is not only a retroactive "attempt to explain origins” but also a business discourse whose construction is a “means also to
authorize" (269). Such a discourse of versions is "an explicitly teleological narrative of development [that] could be built and propagated to legitimize what had come before, was current, and what was still to come.” Versions exist to legitimize consistency and difference, continuity between older and newer technologies and the need for something newer and better. This versional history is linear and conditional, which is not actually how people experience technology and its uptake. Even contemporary users still engage Web 1.0 and broadcast media practices as disruptive tactics to circumvent corporate marketing strategies.

Such versional histories of technology are important to highlight when discussing the ways the institutions of Maker culture come into being. A history of technology that begins with automation and moves linearly through to the early 21st century elides the complicated ways people were creating, appropriating, and moving within such technological institutions. Maker technologies coincide with Web 2.0 participatory platforms and often engage the same versional, corporate narratives that argue Maker culture is something new and better than what came before. As a culmination of so many communities of practice, including manufacturers, artists, designers, crafters, and programmers, the stories of contemporary Maker culture do not currently make space for non-digital making; when they do, traditional practices like fiber or paper craft are subordinate to electronic and digital objects. Allen’s discourse of versions reveals exactly the foundations on which the Maker movement is built: corporate discourse that constructs linearity where linearity might be too simple of a framework. Wacjman traces an example of how the path-dependence of technological history is not the full story. They examine the ways machines of the 20th century, designed almost exclusively by male designers but transformed within a feminine market, set up a gendered division of labor where complex machines are made to look simple in order to determine the kinds of machine labor women carry out as non-technical (37).
The microwave, developed as military radar technology, was one such machine, originally marketed towards bachelors when it hit consumer markets. The color of the machine aligned it with other high fidelity machines that were also considered masculine machines. Instead, the effect was that, despite male engineer’s assumptions about technology uptake and use, women saw opportunity in the machine as a household item and subsequently changed its device from the ground up. The microwave became cleaner, whiter, and simpler looking so as to accommodate the new market, but it was no less changed, and in fact created in its current instantiation, by women users. Wajcman’s historization of the socio-technical networks of early “brown” vs. “white” technologies speaks to the ways Maker technologies are constructed as “brown,” i.e. complex, new and better, but also suggests that there might be opportunities for marginalized makers to disrupt these networks using their own techno-historical practices.

Further, there is a prevailing assumption within the Maker movement that the Information Age is the force that abstracts the hand from its design, that if we were to only go back to the old days of wood and mechanics, that we would be closer to our materials, more self-sufficient, and more inventive. While traditional manufacturing does decline in the latter part of the 20th century, the contexts I have described above show that the separation of the body from the mind began much, much sooner than the invention of networked technologies, that in fact, such abstract computational machines build off of the divide-and-conquer mechanisms we see at play in the Renaissance and Industrial Revolutions. Simondon discusses this sedimentation by arguing that the construction of a technical object involves interrelated and interdependent subsystems that operate via systems of feedback (356). Integration of systems in a technical object amounts to a convergence of functionality, or overall structural unity. Simondon’s theory envisions modern technology as a genesis rather than an object, and through that genesis carries
with it the resonances of previous conflicting systems. Much like in a phylogenetic lineage, older craft traits get passed down as “residues of abstraction.” Technological progress is an evolutionary process in which such residues lessen over time, but are still present.

**Critiques and Disruptions of the Maker Movement**

In considering Simondon’s “residues” and Wacjman’s critique of path-dependence in technological design, I see resonances in very recent critiques of Maker culture. Critics of the Maker movement have pointed out how scholars have failed at any meaningful critique of its assumptions. Vossoughi et al. argue that there is no clear evidence that bringing the open source, self-resilient, DIY ethic of Makers into the classroom does, in fact, produce more lateral and democratic learning. They demonstrate that along with a same-is-equal mentality across cultural contexts, critical making as an educational and research method still operates from contained definitions of making. Makerspaces tend to create boundaries for what counts as making based on current electronic and Internet-enabled tools. Making requires explicit rather than tacit reflection, needs to be useful, and is seen as largely being “discovered” and practiced by white men in the technology industry. As such, cultural ingenuity, survivance mechanisms, and art are seen as useless aberrations. Vossoughi et al. argue that to make the Maker movement more equitable, educators must set aside definitions of what we think is making and truly allow any and all modes of practice to have a place in the classroom. Technology and the digital must be seen as broader than wired or wireless electronics: they are what we practice, what we make with our hands.

Vossoughi et al. further suggest a historical and cultural perspective on processes of making, where the craft and labor of communities of color, working class communities, women, and the Global South are seen not as mindless rote production but as creative reappropriation of
materials (Arola and Arola 215; Doris 275; Tinari 302). More public narratives like that of Make and Maker Faire, making skews “towards a developed-world, middle-class, even upper-class in some contexts, orientation,” partly because of the preponderance of Makerspaces in the developed world, but partly because non-white, non-male, and non-Western making does not fit the narrative of open source Maker culture that exists for its own sake (Armstrong et al. 14-15).

Maker movements do exist prior to and outside of the new technologies that characterize Western Makerspaces today. Ames et al. argue that global Maker practices “are diverse and situated, entangled simultaneously with local, national, and global processes” (2). Their coda in *The Journal of Peer Production* examines many projects that look at these global processes. Syed Ahmed, Nusrat Jahan, and Steven Jackson’s research on the South Begunbari in Dhaka, Bangladesh shows how a community has hacked the infrastructure of the more prosperous city to build a system of electricity and plumbing that, while faulty, allow for community members to access the necessities of everyday life (Ames et al. 5). Shaowen and Jeffrey Bardzell’s work on Treasure Hill in Taiwan show how governmental agencies interact with and contain unsanctioned making by old residents (Ames et al. 6). These older, more traditional makers had built houses, utilities, farming systems, and more, but were deemed “squatters” by city discourse, allowing for a new group of makers to intervene using Silicon Valley principles of the Maker movement. Lilly Nguyen shows how non-technical discursive practices in Vietnam’s open source software community entangled Vietnamese coders in a simultaneous negation of locality and degradation caused by locality: they were not seen as significant leaders because of their separation from an English-speaking community, and yet they acted in ways that shadowed their identity in order to contribute code (Ames et al. 9). Similarly, Ames found that hacker circles in Paraguay often reified systems of oppression like rurality, race, and gender despite ascribing to
the cosmopolitanism of the Maker movement (Ames et al. 11). And Silvia Lindtner’s overview of shanzhai production in Shenzhen, China shows how a local economy was co-opted by global technology businesses (Ames et al. 13). In Dias and Smith’s overview of Makerspace networks in Brazil, they show that there is an ethic of gambiarra in the Maker movement there that is characterized by “an intangible heritage…that involves temporary, often low cost, sometimes illegal solutions to daily problems, and which involves mixing and mashing together whatever things can be found to hand in order to make a working artefact” (50). Similarly, Medina-López defines rasquache rhetorics as that practice of making do. They write, “Recycling, upcycling, making do, and making new meaning through whatever is available is an explicit performance of rasquache” (2). Particularly, rasquache rhetoric is a geo- and eco-political orientation towards making and making-meaning, where a maker enacts the complex identities that Chicanx inhabit. Citing Ybarra-Frausto, Medina-López argues that rasquachismo, however, “isn’t a choice; it is the embodied epistemology of struggle, of “making do with what’s at hand” (qtd. in Medina-López 10). Rasquache is subversive because it is survival. Heritage, survivance, and generational healing play into many of these practices of making do. As Driskill writes, the sharing of cultural material practice is a practice of decolonizing the self, a way of making in order to both survive and resist, but also to heal the embodied scars of imperialism and colonization (58).

Prevalent throughout all these examples is the notion of making as a means of survival, not just production or progress, one that has very real political and economic consequences for global citizens. In a presentation at the 2018 Computers & Writing conference, Isidore Dorpenyo discussed the ways Ghanian citizens implemented design changes to their voter technologies that inevitably enfranchised them. While his presentation was not a specific commentary on global Makerspaces, he does build such an argument from the trope that users, in his case Ghanian
voters, are often cast as idiots and designers as heroes. In this case, however, the biometric
technologies that had been implemented to enfranchise voters failed to incorporate user-centered
design. Instead, Ghanian voters developed documentation for the technology and, as Dorpenyo
says, “reinvented the biometric to fit their own needs.” In a similar vein, Spinuzzi writes of the
ways citizen journalism allows bystanders of a political event to record and report the event
before professional journalists have any knowledge of the event (264-265). Spinuzzi explains
that until this moment in technological advancement, the means of production of texts are
controlled by the practitioners of these fields. Distributing the means of production through
mobile technology, digital cameras, and handheld recording devices transforms a Panoptic
discipline into the agora: “The consumers also produce; those who have always been represented
suddenly have the opportunity to represent themselves, to contest their representations, and to
represent their interrogators” (258). Coban similarly argues that Maker movements in Nairobi
have been co-opted by a survivalist narrative, one that requires making to be about suffering
rather than invention for its own sake, and in the United States, the Repair Café movement has
gained ground and argued for the idea that ownership is the right to fix something (61).
Throughout these movements, ideas, and scholarship is the idea that 1) the user is a maker,
producing and adapting technology as they go, and 2) that making should matter in and be
accountable to the world.

The fact that these survival and resistance (i.e. survivance) practices are not part of the
mainstream Maker movement suggests that Makerspaces and the Maker movement have
abandoned their DIY, anti-capitalist beginnings, or that the movement’s stated economic goals
were part of a discourse of versions from the start. One of the earliest and most influential
leaders in the Maker movement in the West was the O’Reilly Media Group, a multi-national
conglomerate whose interests lie in developing readers of technology who in turn can become targeted markets. While the Maker movement aims to blur the lines between producers and consumers, O’Reilly has a vested interest in creating more consumers who produce through the products O’Reilly offers. As the progenitor of Make: magazine and Maker Faire, O’Reilly has had a hand in constructing such a “versioning” of the Maker movement, corralling Makers that have always been making so that they will into a specific time, place, and set of technologies.

Further, in their overview of South African Makerspaces, Armstrong et al. find that the vast majority of spaces, whether governed and managed by private businesses, nonprofit organizations, or member volunteers, use the language of capitalism to establish their missions and visions: innovation, commercialize, consumer vs. producer, employment, entrepreneur, business, product, and value-add (20-21, 23-26). This is in contrast to Dias and Smith’s gambiarra, Ames et al.’s making do, Driskill’s decolonial skillshare, or Medina-López’s rasquache rhetoric, which all place making outside the market, and in some cases, despite and in spite of the market. These examples, drawn from a variety of fields such as cultural studies, design, and rhetoric, demonstrate that critical makers are theorizing and organizing outside of dominant Maker culture.

What is interesting about these collected critiques is that they rarely exist within North American or European conversations of Makerspaces and critical making. Perhaps due to a global, postcolonial standpoint, the above scholars unpack the ways that the Maker movement interacts with “new forms of exploitation and precariousness” and is a result of late capitalist economics and knowledge systems (Smith Decolonizing Methodologies 9). However, those systems of exploitation and precarity exist within the United States, too, often through the very same economic and political systems that I have described at the beginning of this chapter.
Handworkers – those that make to survive – are in rural communities, Black communities, Latinx and Chicanx communities, and Indigenous communities. Much of the rural United States is held up by the productivity of more central locations of capital and could technically be categorized as developing, some Third World. Despite this, the vast majority of discourse around the American and European Maker movement extends the narrative of open source, democratic, and liberatory technologies, of possibility and progress. Makerspaces are decidedly in urban locations, and those that do exist in rural communities are situated in public and private schools and inaccessible to the larger public, many of whom are adults struggling with employment and disability in their small, economically-depressed towns. There is little acknowledgment of the ways marginalized populations in North America are also engaging in knowledge economies that stem from long histories of survivance, craftiness, and non-institutional innovation.

**Beyond Maker and Toward Making**

As Vossoughi et al. argue, Maker practices that only use new technologies in urban, Western contexts will always find deficient and resistant makers amongst marginalized people, requiring “intervention” through technology despite long-standing and deeply multimodal traditions. These non-European, non-male, non-wealthy, and non-white makers will always be uninspired and recalcitrant outside of the cultural logics of the Makerspace. Riley-Mukavetz, Rhodes, Powell and Yergeau have argued that colonization is, in fact, an outcome of an object-oriented Maker ideology, one that aims at disconnecting the maker from their makerly relations, elders, and teachers, and erasing the ways that marginalized people have always and already been making.
I propose, however, that there are frameworks with which we might move forward (and backward, and outward) to disrupt the Maker movement’s linear path from automation to new media and its negligence of its own sedimented power structures:

1. We create definitions of making center the act of bringing together materials to make something new. In this way, we move away from isolated materials and tools and toward the integrated practice of bringing things (and people) together.

2. We focus on the bodies that are apart of a making practice. All bodies human, animal, environmental, material, and technological.

3. We not only acknowledge but center the historical practices, materials, and making-spaces that marginalized people bring with them.

4. We look for the stories of making that have been subsumed by digital-corporate narratives of technology.

Finally, while many have argued that power does not cede power even on its own terms, I argue that researchers of multimodal practice must look to other histories of making and highlight the practices that Maker culture has claimed. Not only must we demonstrate how craft, art, technology, and Maker culture are part of the same story of the devaluation of labor, but we must affirm the practices that staid hidden, that were not replaced by progress, and that transformed and were transformed by us and our communities.

In the following chapters, I claim the making practices that have occurred in my own communities, among farmers and rural, working class people. I consider how our agricultural practices, while seemingly devoid of electronic gadgets, engage in the innovation, collaboration, creative appropriation, and critical thinking practices of so-called Makers. I extend beyond stated Maker techniques, as well, showing how agricultural practice is uniquely situated to make and
survive with an ethic of care rather than control, of both human and nonhuman things. Through
these constellations, I continue the questions I have asked here of media history: Who gets to be
a Maker? Who gets to be a designer? Who must frame their making as labor, and who gets to be
leisurely? Who is on the other end of new media technologies, and as Isidore Dorpenyo writes,
“Why are they portrayed as idiots or victims, waiting to be rescued” by the Makerspace?
CHAPTER 3: A Cultural Rhetorics Praxis for the Study of Critical Making

In May 2017, my father passed away suddenly at the age of 55. The year before on his birthday, I remember him saying that he had lived longer than his dad, who had died at 53, but was still waiting to outlive his mom at 56. He was taking care of the two bee hives he kept on our property, 22 acres along Highway 58 in Peletier, North Carolina. He died from anaphylactic shock, alone on the hill overlooking the land. He died from a bee sting, my 250-lb mountain of a father, brought down by something so small.

I often imagine the moment that my mother found him: a last sliver of life together, my father the engineer and my mother the photographer. And all around, the bees were busy making their food, making their shelter, making their way towards a more cohesive unit.

My father was not a reflective man. I have many memories of him coaching several sports (many of which he did not play) and yet cannot once remember him reviewing a playback reel or talking over previous strategy with his team. In his many years as a project engineer, we figured there was a reason his employers put him in positions like “innovator”. He had no method, only action. My family wonders if it is for this reason that our bees attacked: he simply wasn’t being careful, methodical. Yet from the day he passed his beekeeping certification, he carried with him a GoPro camera strapped to his chest - his heart. In the videos he made, he talks to himself and to “the girls.” He wonders where tools are and what to do with them. He looks around; he pauses; he goes back to work. He negotiates his body with the camera, adjusting its position, testing to see what it sees. He is reflecting and reflexing; he is slowing down; he is listening.

I begin this chapter on methodology with story, for Story is what comes before Theory (Maracle 7). Story is the ground from which our critical understandings of the world grow, how
we orient ourselves to what Shawn Wilson defines as our relations: not simply those whose blood flows through us, but the land, the ancestors and relatives, the cosmos, and the ideas that give shape to who we are (83). I begin this chapter with the story of my father for many reasons: it provides a reason for a rhetorical study of critical making outside of the Makerspace; his method for understanding his hives has helped me theorize a methodology for makers across several sites of knowledge production; and perhaps most importantly, he walks with me every step of this dissertation. While I could relegate his and others’ presence to an acknowledgments section, they are here, in the ways this project aims to build a world in which human, animals, and objects coalesce around a desire to touch, to create, and to live.

These stories of my father, my mother, myself, and the bees making are remarkably ordinary. They involve pauses, small mistakes, talking to no one in particular, and the familiar ways we move upon the land. Makers exist in this everyday place and practice, and story is a telling of the everyday. Therefore, I argue that story is the place where we can most meaningfully study the making practices of different makers in their different spaces.

Storytelling might be an explicit telling of a making event, an embodied sensory experience of the making process, or even an apprentice relationship between maker and listener, a teaching of what it means to be in a specific place and practice of. In order to answer questions about the embodied experiences of making, in order to understand ways that spaces of making can better respond to the lived practices of everyday experience, we must be willing to tell and to listen to the unofficial record, the story of the ordinary, the story the body and the environment tells about our engagement within and through space.

In this chapter, I will suggest a methodological shift in how we study acts and events of critical making, one that centers the ordinary and affective experiences of both human and
nonhuman makers. I will first describe a cultural rhetorics approach to ethnography and discuss how we must decolonize our ethnographic methods in order to be able to attend to the everyday. Western approaches to ethnography have largely captured and contained those everyday practices that are the subject of research, subjects that are often decided upon a priori as a result of Western classifications of what counts as culture and what does not. However, a decolonized method must acknowledge histories of violence within research, resist ways of categorizing and erasing marginalized people, and allow for the people themselves to speak their own story. I will then describe the ways that research of the everyday also requires us to listen, walk, and talk with the environment instead of aiming to capture it. I will argue that making is not a process of design imposed on a material, but a movement with and alongside material and is therefore especially suited to sensory, walking-and-talking methods for ethnographic study. I will finally describe my primary data collection method I propose for critical making research, a method I have called videovoice after already-established photovoice methods in social science and humanities research. In this approach, makers themselves produce video of a making event by placing a handheld camera on their heads or around their chests and reflect later upon the videos they have made. Multiple makers within a single making event will then produce a multi-dimensional account of that particular event, what Taguchi calls a diffractive account, a study of “how differences get made in such a process and the effects that differences make; what is excluded and how these differences and exclusions matter” (270). This method demonstrates how 1) a single making event is actually a process of countless stories unfolding through time and space; 2) a space in which making occurs is a cultural space with particular practices that are informed by individual, institutional, and technological stories and histories; and 3) makerly identity is constituted within this cultural and material entanglement.
Throughout this chapter, I will situate the details of this study within the theoretical elements of praxis I have considered. While this will not follow a traditional methods-section genre, my aim is to deliberately build a methodology by moving between theory and practice, between abstract and concrete. In so doing, I will describe the particular site for this study of critical making practice and identity: my family’s farm, which offers many opportunities to understand the ways makers move through space and time, interacting with constellations of other humans and nonhumans in ways that shape who they are as makers and how they make. I will consider the particular institutional and cultural environments of agriculture space and explain why the farm’s technologies, users, and power systems provide a distinct entry point into the ways makerly identity and practice are produced within different institutions. The use of videovoice as data collection and analysis within this community is a way for critical making scholars to enact both a cultural rhetorics practice and to explore the place where cultural rhetorics happen. These entry points will complicate the notion that critical making only happens by *Makers* as apart of *Maker* culture in a *Makerspace* using *Maker* technologies. This construction of reality is one for solid, finite, stable, and often masculine, white, and wealthy, subjects. It is a space for individuals, tools, definitions, and boundaries. Instead, Makers are products of countless unfolding material and cultural entanglements that include non-electronic means of production like craft-work and farm-work, as well as the non-human practices of the environment and the nonhuman animals that survive alongside us. Makers emerge out of movements, exchanges, and embodied practice; if we are to understand how makers come to be, then we must listen to that story of movement, exchange, and embodiment.
Cultural Rhetorics as Methodological Framework

Making is a practice of drawing materials together and producing something different, a practice driven by specific material and cultural contexts. In this way, making requires us to pay attention to culture, as its products are situated within communities of practice that are informed by histories of production, knowledge, and even violence. I therefore begin a discussion of methods with a definition of cultural rhetorics: a field of study that recognizes cultural practices like making as inherently rhetorical. The ways people communicate and receive messages and the knowledge produced from this relationship are embedded within cultural histories of genre, discourse, ideology, and material practices. In “Our Story Begins Here: Constellating Cultural Rhetorics Practices,” the Cultural Rhetorics Theory Lab argues that a culture is “any place/space where groups organize under a set of shared beliefs and practices” (Act 1, Scene 1, para. 2). Cultural rhetorics researchers constellate the relationships between humans and their histories, material practices, and ways of telling stories to understand how meaning-making happens within the context of cultural communities of practice. In other words, our participants tell stories, we as researchers look at the relationships from which those stories emerge, and together we begin to understand those stories as knowledge.

Constellation, therefore, is the method of a cultural rhetorics practice that situates stories within their relationships to people, things, land, and ideas (Wilson 83). Story is the meeting place for these numerous elements that must be attended and responded to with care. Story is self-authorized, grounded in experience, shows a process of thinking, is exploratory, and is situated in specific time and place (Monberg “Writing Home” 24). It is concrete, unavoidable, and requires listening and response in ways that traditional academic ethnography (an act of telling rather than an act of listening) may not. Further, story as methodology prompts us to enact
what Celia Haig-Brown calls a different kind of listening. They consider “what happens when a research participant…takes us into the space of her own story. If we want to participate as fully as possible with her telling, then we adjust our assumptions and listen differently” (429).

“Opening space” for participants to tell their stories requires a specific kind of orientation towards impossible knowledge - knowledge that we as researchers have built no space for in our own knowledge production (417). As part of Royster & Kirsch’s feminist rhetorical practice, they propose a new paradigm for research, one based in critical imagination, strategic contemplation, social circulation, and a globalizing point of view. These tools, critical imagination in particular, help us

attend the twofold challenge of being aware, not only of what enters our field of vision - what we see and recognize - but attuned also to our blind spots in order to consider with critical intensity what may be more in shadow, muted, and not immediately obvious. (76)

A feminist rhetorical stance requires that we imagine Haig-Brown’s impossible knowledge and build our inquiry from that place. What questions might such a different relationship to the cultures we work with prompt? What new entanglements and forms might we enter?

_Cultural Rhetorics and Citational Politics_

Constellating in a cultural rhetorics tradition requires scholarship to be about relations, because it is out of these relationships that knowledge is produced. In the same way that cultural rhetorics sees the value in story as a meeting place, practitioners of a cultural rhetorics approach also view citation as a meeting and constellating of ideas. Rather than seeing scholarship from a scarcity standpoint, where researchers must “carve out a place” in the literature, cultural rhetorics begins from a place of abundance in intellectual relations and origins, situating research within families of scholars rather than separate or distinct from them. Part of the work of cultural
rhetorics is to decolonize academic practice by decoupling scholarship from the colonial practices that get carried out through publication, research, and writing. These practices produce a deficit model of critique which leads scholars to delineate what counts, or what has value, and what does not. In critiquing the preponderance of Deleuzian critique in philosophy, Braidotti writes, “I actively yearn for a more joyful and empowering concept of desire and for a political economy that foregrounds positivity, not gloom” (57). This resonates with cultural rhetorics practices that foreground connection rather than disconnection or separatism. Instead, scholarship can create sustainable frameworks that, while messy, lead to an affirmative model of critique that embraces difference as a product of cultural and material entanglements.

Other scholars outside the field of cultural rhetorics have enacted a paradigmatic shift in how we approach citation. Scholars Sara Ahmed and Kishonna Gray have called this move citational politics, and it involves the intentional choice to cite underrepresented scholars over an often white, male, straight, cis, able-bodied and upper-class canon (“White Men”; “#CiteHerWork”). In Living a Feminist Life, Ahmed writes, “Citation is feminist memory. Citation is how we acknowledge our debt to those who came before” (15). Citation, therefore, involves opening up our understanding of what legitimate knowledge means, historicizing our sources, and bringing to light the ways that underrepresented groups have often been erased by scholarly literature. While it is fairly low-hanging fruit in terms of maintaining relationships with one’s community, my citational choices in this work are deliberate, relational, and political. I am calling upon my relations through citation, and while I do not share the Indigenous, Chicanx, Latinx, and Black lineage of scholars of rhetoric who make up the majority of cultural rhetorics research, the concerns of this study are structured by the reflexivity, relationality, and most
importantly, responsivity central to the works of those scholars, especially with regard to land and place, which play significant roles in agricultural production and rural life.

In situating my work as sibling to rather than distinct from what scholars who have come before me have created for the field of cultural rhetorics, I follow a model for resisting a colonizing tendency in academia - to discover, to raze over what came before, and to build something on top and call it “new.” The choice to not cite the same sources is an attempt to bring to light the rich ways in which women and people of color have always and already been theorizing, in the same ways that the goal of this study is to show the ways those kept out of Makerspace communities have always and already been technological, been makers. My citational politics in this study require relationships to be made explicit, to the people - both scholars and non-scholars - that have taught me how to be a maker in the world. I will “keep all traditions/stories/histories in play as equally legitimate origins and progenitors of many simultaneous rhetorical traditions,” which will mean drawing on the knowledge of those who have not published, who have not been to school, and who spend their days laboring their bodies rather than their minds (Powell et al. Act 1 Scene 2 para. 21). While much research has been done on multimodal and collaborative ethnographies, for example, the impetus for videovoice methodology in this study comes directly from the communities of practice my father engaged in as a beekeeper, videoing his practice with a GoPro so he could upload it and share it to an audience of both experienced and inexperienced apiculturists on YouTube. His knowledge production stands as equally significant to the production of this research as scholars of rhetoric and anthropology, and he is cited often in this project as a source of information. Too often scholars take the knowledge of those they study without permission, implicitly understanding it as community-reviewed and valuable, but failing to lift it to the level of major researchers in the
field. This study will resist that by acknowledging that knowledge comes from all around, in informal and formal ways, from a variety of mixed-up and messy traditions.

Before moving on from citational politics, I want to acknowledge a problematic of positioning myself as the relations of non-white scholars and the theories they have created that apply specifically to their own communities of practice. In “‘Ontology’ is Just Another Word for Colonialism: An Indigenous Feminist’s Take on the Ontological Turn,” Zoe Todd complicates Bruno Latour’s use of Gaia as a metaphor for the force of nonhuman life, arguing that it appropriates the knowledge systems of Indigenous peoples towards white scholarly ends (5). They argue that scholars must enact an ethical relationality to their scholarship: it is not enough to simply cite underrepresented scholars, but research must necessarily be embodied and responsive to those people that came before the Western historical record. It is my aim in this work to situate my understanding of land, agricultural practice, making, and relationships in white communities as cognizant of their reliance on colonization, slavery, racism, and sexism. But Whiteness in research, as I will discuss in the next section, is also about the separation of mind and body, about distilling complex social relationships and practices into pre-determined, simplistic categories whose purpose are to dominate. This routinization of Whiteness in our methods, not only our subjects, do harm, even to working class whites such as those in this study. As a white scholar, my goal is not to comment on the ontological self-determination of non-white people, but to break down the monolith of Making so that it opens space for other ways of knowing and being. I study white farmers because they are the communities my body can be accountable to, but the questions, methods, and theories I work with come from scholars of color, whose questioning of Whiteness is what allows for a more complex understanding of how
race, gender, class, history, and violence operate in the construction of technical communities of literacy.

**Storytelling as Relationality and Accountability**

Constellation is a major component of cultural rhetorics methodology. In this way, storytelling methodologies are not only acts of constellation, but are a way to decenter ethnographic approaches that insist on separation, objectivity, and the description of reality as a rule. Storytelling emphasizes location, standpoint, and positionality in ways that bring the researcher closer into the tightknit community of a participant group. Knowledge is produced, not in abstract, disembodied, placeless places, but in the bodies of researchers and community members – in fact, *through* their bodies, *through* their material engagements with the world. Stories allow us to understand where knowledge lives, who constitutes it, and in what contexts it is produced. The stories of making are necessarily stories about specific bodies, specific cultural practices, and specific ways of knowing and being in the world, challenging the realities institutions argue as truth. Donna Haraway calls this specificity a situated knowledge, or a perspective of the world that, fit together with others, provides a clearer picture of a person’s life in situ (579). Similarly, documentary film-maker and ethnographer Trinh Minh-ha suggests that a story is an actuality rather than a reality – an open-ended dream-space where the individual can speak with intent about their own embodied experience rather than a representation of Truth (165). In discussing historical accounts of cultural events, Jones and Jenkins argue that stories are not interpretations of the same event, but in fact different events all together - multiple stories grounded in materiality that all actually happened (126). A story or materialization is not alternative; it *is* the event, situated in the real bodies of real people who live it.
In drawing out relationships and embodiment, stories stand in direct opposition to the totalizing narrative of traditional ethnography, which has its roots in the colonizing and destructive practices of white, Western academic traditions. In her book *Decolonizing Methodologies*, Maori scholar Linda Tuhiwai Smith traces the ways research has systematically categorized and conquered the cultural knowledges of Indigenous people in four stages: imperialism, writing, history, and theory. Each stage of colonial research practice builds upon the last and inevitably results in an academic research complex that served and continues to serve as a distancing and dominating mechanism between researcher - the highest of minds, the rational agent - and researched - the basest of bodies, the inhuman object. Decolonial research, by contrast, aims to “liberate and emancipate by…privileging the voices, experiences, and lives of Aboriginal people and Aboriginal lands” (Martin-Mirraboopa 205). Decolonial methods allow researchers to shift their understanding of what places and what practices count, to bring back “cultural memory to our bodies and communities” through an embodied storytelling practice situated in the cultural practices of the subjects of research (Driskill 57). These practices reshape and dismantle what lies at the center and the margins of research, and “[allow] for all the meaning-making practices and their relationships to matter (hooks 20; Powell et al. Act I Scene 2 para. 5). In telling stories, participants can resist the institutional power networks in which they are entangled and center their own practices, their own embodiments, and their own lived knowledge.

By tying knowledge or information to a concrete human experience, story is not only a way for researchers to explain the relationships of everyday life; stories maintain accountability to the people we work with, as they bring us into the constellations of the everyday lives of people we study. Shawn Wilson writes, “By getting away from abstractions and rules, stories
allow us to see others’ life experience through our own eyes” (17). Marilee Brooks-Gillies writes in “Our Story Begins Here” that stories, while useful for scholarship, inevitably belong to people: “People I know. People I spend time with. People I care about. People who have not only been kind enough to share their stories, but people who might not have shared those stories had I not been connected to them through the communities of the craft group and of graduate school” (Powell et al. Act 3 Scene 2 para. 4). In Smith’s Decolonizing Methodologies, they ask researchers to consider why they do research and who they do it for, specifically considering Western academic traditions of colonization and domination (16). It is the responsibility of researchers to make sure our theories and analysis are informed by the ways of knowing within those communities that we study. Our research should be guided by questions such as:

- How does this work enrich the people it’s about?
- How does this work thank them for their lived experiences, for their knowledge-sharing?
- How does this reflect on my own family, ancestors, and the knowledge-makers who have come before me?

Instead of research protocol being about legality, for Tuhiwai Smith, it is about ethics, about a relationship with one’s participants that centers their needs, questions, and research agendas above one’s own. This centering of respect is an effort towards reciprocity, presence listening, sharing, caution, and prudence, where the process is more important than the outcome (124). In order to maintain this respect, we must center those lived experiences, told through participants’ own languages and communicative practices.

In the study of everyday making practices, I argue that we must follow Indigenous and cultural rhetorics scholars in enacting what education scholar Shawn Wilson has called “relational accountability.” In this framework, the researcher is intentional about “fulfilling a role
and obligations in the research relationship - that is, being accountable to your relations” (77).

Maintaining relational accountability does not simply entail accounting for the people one’s research is about, but the land, the ancestors, the cosmos or spirit, and the ideas of those we research. Wilson suggests that Indigenous scholars tend to maintain accountability in four ways: through the topics they choose, the methods they use, the analyses they make, and the ways they present outcomes. He calls his approach to studying Indigenous subjects in education a “lifelong participant observation” with his community (128).

These scholars are specifically interested in the ways Indigenous researchers maintain relational accountability and therefore build sovereignty and ceremony around their own cultures into their research practice. Relational accountability, however, is a cornerstone of a broader cultural rhetorics practice. As Terese Guinsatao Monberg suggests, we must “move within [our] own borders of communities, [and] listen for the deeper textures present in the place(s) [we] call ‘home’” (“Listening” 22). The particular farming communities that serve as my site of research are at the many intersecting borders of what I call home: the farm is part of my cultural responsibility as a member of my family and as a person of working class lineage, but it is also a space where I have made things using fiber craft and carpentry as well as solar technology and Raspberry Pis. On the farm, I enact a triumvirate of technological practices, which draws from family histories of textile production, coal mining, and engineering. It is the site of an old concrete factory and likely a place that profited off of slave labor; it is stolen land of the Tuscarora, Catawba, and Coree nations. It is a place where I can enact what Kamala Visweswaran calls “homework” in addition to “fieldwork,” to reflect and question my own schooling as well as reflect something significant about making and makers that live outside the margins (104).
Such textures of making practices in the rural South deserve reflection, deserve to have their stories heard, moved within, and listened to. The assumptions of ethnographic study are based in an idea of researcher-as-outsider, but an approach centered in story-telling brings the researcher into the circle, implicates them, and calls them to be responsible and to respond. There is no inside and outside of research, there is only a constellation. An approach to research that is centered in storytelling therefore allows for scholars to grapple with how we are generously allowed to conduct research in and learn from our families and communities. The idea of giving back through research is central to a cultural rhetorics practice: it requires reflexivity and responsivity. It requires a relational accountability, a way of paying respect to the gift we have been granted to enter into a space of practice and make knowledge out of that experience.

**Constellations at Summerset Holler**

The following is a description of the constellations of the present research. Because of the interrelated nature of the people, land, ideas and contexts of the study, the description will lilt between histories, tangents, and threads as it goes, as a story might. The story of the location for this study was told to be by my mother Wendy, my central participant, who has chosen to be identified by her true name, and whose memory has been supported by stories my father, Ray, has told us of the land. Our neighbors, local community members, and old-timers often visit the site while we are present and have also filled in gaps in our knowledge. Other information, especially related to geography and names, come from historical maps of the area.

The site for this study is my family’s farm in Peletier, North Carolina in Carteret County, named Summerset Holler after the estate my mother’s family ran in Randolph County, North Carolina in the early and mid-20th century (Gollihue April 1). Summerset Holler is about 22 acres along Highway 58 and is 5 minutes from the Crystal Coast beaches, a tourist destination
for many in the state of North Carolina and elsewhere. The front 8 acres were purchased in 2006 and the back 14 acres in 2013. Wendy recalls that at the time of the first purchase, Ray was traveling for work despite needing to sign off on the paperwork. “I had to sign on it without the comfort of knowing that Dad had thought through the decision,” Wendy remembers, “– even so much as walking it, understanding problems we would run into or have to deal with before the purchase.” Before signing, she phoned her mother for advice, to which she received an adamant, “Just do it.”

After the purchase, we would often walk the land, trying to understand its features and topography. Early on, we would find a ladder leading up a tulip poplar close to the center of the tract, and it was here that we surmised that the land was probably used for hunting prior to us. At one point shortly after the purchase, a man stopped by from the Historical Society and notified us that the land came very close to an old deer trail where we would likely find artifacts from Indigenous populations. Members of the Carteret Historical Society sometimes have a faulty understanding of the history of Native populations of the area, mostly drawn from stories residents are told in school about the Roanoke Colony and the missing settlement. The area does, however, approach the traditional lands of the Tuscarora and Coharie tribes, both of whom have a strong presence through tribal governments and pow wows in the area.

The former owner, Herman Norris Jr., who lives nearby and visits occasionally, also told us that there was once a concrete factory on the property adjacent to ours. He hunted our land as a young man, and spoke of a place where the factory would dump concrete near the creek so that he could cross it. Mr. Norris also confirmed that there were several wild cultivars that he used to pick from: an American persimmon that still stands and an unknown variety of apple.
The majority of the property sits at sea level, with the local Wetlands Protection Agency designating most of the front 5 acres as wetland and swamp areas. Over the last 5 years, my family has planted garlic, herbs, sweet potatoes, potatoes, carrots, various cucurbids, and pole and bush variety beans on the land. We have also cultivated mushrooms, Tupelo lime trees, wild-growing American Persimmon, and various other fruit trees and native plants indigenous to North Carolina. Most of the property is populated by loblolly pines, live oaks, wild prairie grasses, passionflowers, wild blackberries, and a variety of other species. A perimeter road surrounds the property and allows us access to the Croatan National Forest and North Carolina game lands, and a creek cuts through the property that is called Meetinghouse Branch. This creek runs west to an old church building that we assume was the “meetinghouse” when white settlers colonized the area.

In 2017, Wendy and Ray became certified beekeepers through the Pamlico County Beekeepers Association certification program to help support the small local food system that they were interested in supporting in the area. They took care of two hives until May 2017, when Ray was stung by a bee, went into anaphylactic shock, and passed away. He had been working with one of the two colonies, and because their hive box was left open, the colony swarmed (i.e. the queen leave the hive and creates a new colony). While swarming is a natural process for bees, as they will produce so much that they can no longer sustain growth in the current situation, this swarm was likely caused by the open hive and the colony feeling threatened. The second hive vacated in February 2018, what we suspect is Sudden Colony Collapse, a phenomenon where a colony dies or absconds due to unknown reason. In this instance, the colony had survived an especially difficult winter, including a massive ice storm the week before, but absconded and left brood and honey in the hive box. In the wake of losing the two
hives, we have acquired a top-bar hive, which allows bees to form natural comb rather than rely on human-made inserts. In March 2018, Wendy acquired two new queens, both of whom absconded again as of February 2019, this time with several frames full of honey and brood, an uncommon circumstance for bees to leave. In the wake of two Sudden Colony Collapses and the death of her husband, Wendy has befriended another beekeeper who had been part of the apiary club Ray and Wendy attended prior to Ray’s death. They and Wendy work together on each other’s respective hives. In April 2019, one of her hives swarmed, and Wendy was able to catch it and transport it to one of her hiveboxes to start a new colony and try again (Gollihue April 1).

In addition to small vegetable production and beekeeping, Wendy and I operate a Massey-Ferguson 2635-series diesel tractor with front-loading bucket and a rear power take-off bush hog for moving large objects and clearing brush on the land. Wendy has cleared an area in the front of the property for a small house, two fields close to the highway, and the rear 14 acres are uncleared but for the perimeter road and three crossroads intended to split up grazing areas for goats.

While the selection of a farm as a site for critical making research seems outside the bounds of the “Maker” narrative, I have chosen it for this study in order to better understand how making is narrowly defined and yet broadly practiced. My interest in agricultural space as a Makerspace is our family’s relationship to beekeeping. Without much knowledge of how bees work or what they need, Wendy and Ray pursued apiculture through a reflective practice that I had not seen from them before. They became part of a community, the Pamlico County Beekeepers’ Association; they researched extensively; Ray filmed himself each time he opened the hive so that he could play back the film to himself and learn new things about the bees and his own practice. The ways that Wendy and I now work on the farm remind me of the classroom:
we leave the gate open so that anyone can drive through and learn something (or even teach us something), we have frustrations, we have a growing library of agricultural resources, we break down materials and bring them back together in new ways. Further, the bees themselves, as well as other animal life, reflect a complex makerly practice back to us. Theirs is a daily practice, one of journeying to find the materials for living, coming back to the home and feeding their hive with what they have found. In many ways, the farm is a polemic in contrast to the glass-walled Makerspaces of universities and corporate entities; it is societally viewed as the antithesis of technology, a callback to a seemingly simpler, more agrarian time. Despite these societal assumptions about what farmers and rural people do, there are complex technical literacies being enacted on the farm in small, big, hidden, and obvious ways.

There are two primary participants for this study: myself and Wendy, as we are the primary and most consistent human “makers” at Summerset Holler. Wendy, now 58, was a homemaker for much of her life, spent time as a professional photographer in Northeast Texas, and now supports children of low-income families who have not yet met speech, motor, and cognitive benchmarks. She is a housewife, an artist, and a teacher, three professions that are often coded “feminine,” but in each role, she is making: a home, a photo, or a child who can communicate as they move through the world. Other community members, family members, and friends also show up in the data, sometimes as makers, sometimes as farmers, and other times as deterrents and nuisances. Additionally, I count nonhuman animals and plants listed above as participants in this study, as they engage Wendy and I in so many of the activities on the farm. They have an agency not dissimilar to that of the human producers that work and visit the land, and as such, I will dedicate a chapter to their own processes of making.
In the next sections, I will describe the methodology I have developed in understanding the constellations, practices, and relationships to making that I described above. I will explain the research methodologies currently used to study everyday practice and propose my own framework of “mentorship” alongside cultural rhetorics storytelling practices. I will then describe the process of data collection and analysis used in this study, videovoice methods, and explain how Wendy and I have collaboratively understood making practices on the farm and in our own communities.

**Researching the Everyday**

In the previous sections, I considered how constellation and storytelling as a methodology creates a relational accountability to the cultures we partner with in research, the cultures that allow us into their space to learn from and lay witness to the ways they produce knowledge. The stories of makers can help critical making scholars understand how makerly identity and knowledge gets produced. Stories privilege local knowledge, localized experience, and the materials of everyday life; stories are full of things, small conversations, and personal details. They are the meeting places, the constellations of the ordinary. I also briefly described the constellations that I see are present in this study – the *what* and *who* of the research.

In this section, I consider how storytelling is an embodiment of the everyday, and is therefore especially suited for researching everyday practice, i.e. making practices. I will provide the *how* of this study: a brief overview of sensory ethnographies, which privilege the everyday in a walking-and-talking method. Within this, I will also consider a ‘mentorship model for ethnography where researchers are doing and learning alongside their participants, learning from their expertise. In understanding sensory and apprenticeship models of ethnography as movement with the everyday, I consider the affective environments of ordinary practice, what it
means for a researcher to attend to something within the familiar. I end by detailing some research in the study of Makerspaces that draw from these models using first-person handheld videography.

Withness in the Research of Everyday Practice

Before exploring what it looks like to study ordinary places and practices, it will be important to define what is meant by “the everyday.” Feminist researchers have long been invested in the everyday as a site of study, as ordinary life spans across disciplines, publics, and perspectives. The everyday is a private space where the traces of bodies, labor, and consciousness can be found, especially the bodies, labor, and consciousness of women, who are systematically excluded from public space (Hartsock 164). Researching the everyday requires more than simple ethnographic observation, because the everyday is necessarily a private and hidden space of knowledge production that moves in ways that are not readily observable through traditional means. Royster & Kirsch’s feminist historiographic method calls for strategic contemplation and critical imagination to imagine what other worlds are or were possible beyond traditional rhetorical analyses. Though we are so obviously entangled with the everyday, it requires tacking in, rhetorically listening across space and time for its meaning to make sense (Monberg “Writing Home” 24). Our methods for collecting everyday data must therefore be something different than what we would use to study what immediately comes to mind, surfaces, or shows itself to us.

While the everyday is private and hidden, it also everywhere, what Kathleen Stewart calls “a shifting assemblage of practices and practical knowledges” that makes up the fabric of our experiences (1). The everyday reaches across fields of experience, textures, and semiotic boundaries, and therefore calls for multimodal methods that trace those shifts. Sarah Pink argues
that “to examine the phenomenology of everyday life…requires engaged methods that enable researchers to comprehend the detail of practice, the biographical and collective memories and meanings that it invokes, the non-verbalised ways of knowing that it entails” (41). While current ethnographies of everyday practice tend to use traditional methods of analysis and data collection through observation, Pink argues that multimodal and sensory ethnography shows us how everyday practice is constitutive of everyday place. They argue for a walking-talking-imaging approach that does three things: views practice and place as continual and contextual, as existing within social relationships, and as a route of embodiment that can be re-experienced, not analyzed, through video techniques. Pink’s multimodal approach is what Sikand has argued is a shared anthropology, a methodology that “makes the subject, the filmmaker, and the audience part of the creative process and has potential to build toward deeper, if messier, collaboration” (53). This sharing creates a *withness* with data and with participants that requires us to pay attention to movement through worlds, to the ways worlds grow up from the ground, rather than as frozen moments of stability meant to be captured. Interpretation of data in shared anthropology resonates with cultural rhetorics scholarship that centers the everyday as a constellation of things and relationships. Constellations are created through listening and witnessing the everyday lives people move through by tracing those relationships through *telling*, through story.

*From Everyday Practice to Everyday Things*

Many scholars that I have referenced so far are concerned with tracing, with lines, or with following alongside the growth of a moment. The everyday is full of materials that structure our relationships, and so to conduct cultural rhetorics research, one must also bring making and made things into the constellation. Gunther Kress’s multimodal theory of communication defines
communication as an interaction between sign-makers/intent and interpreters/attention (35). This act of semiosis is culturally constituted, and therefore is only ever a partial rendering of the world (79). For us to understand and assess what happens between makers and interpreters, we must look for traces of learning, lines where the sign-maker negotiates and transforms the semiotic resources available to them (183). Archaeologist Ingold is well known for his interest in the line; his *Making* explores what an archeology looks like that studies with and learns from as opposed to studying of and learning about, a digging that centers correspondence over accumulation (7). He argues that knowledge comes from being in the world, not being outside of it; we are always and already active participants in our material entanglements with the world (11). Researchers of the everyday are corresponding, following a line alongside our subjects or our participants, tracing their gestures in our paths, creating “meshworks,” lines in movement (132).

While Ingold refers to this particular kind of correspondence in terms of researchers and their subjects, he is specifically interested in the made object as a process of inquiry which gets absorbed through the act of making. He writes,

Though we may *occupy* a world of objects, to the occupant the contents of the world appear already locked into their final forms, as though they had turned their backs on us.

To *inhabit* the world, by contrast, is to join in the processes of formation. It is to participate in a dynamic world of energies, forces and flows. (89)

Ingold’s premise here is that participant-observation is a matter of becoming from the inside out and the ground up, and that active participation in the worlds we study is inescapable. As an example of this, Ingold discusses the ways Medieval buildings are designed as site-specific, contingent, and messy, things that grow from the ground up and respond to the immediate
surroundings. Drawings of these buildings that archaeologists and archivists study are actually descriptions rather than prescriptions or architectural designs (55). By examining Indigenous mound builders in the same light, Ingold argues that mounds grow with no foundation or plan (77). These are places of memory and history, but they are also a space of process, of following along. Craft scholars in particular have theorized how a made object is a visible constellation or tracing of making processes. Hermann Muthesius, a German architect influenced by the British Arts & Crafts Movement of the late 19th century, wrote of how the beauty of a thing was in the visibility of its process (113). Lethaby argued that art was a well-made thing that showed its making (161). Guénon also argued that the made object was a sign of its making, that it was the trace of exterior materials meeting up against the interiority of its maker (188). From these many scholarly fields comes a unifying idea of the things that make up everyday life: that by treating objects as materials and not static artefacts, we allow them movement and growth rather than containment and can ultimately learn more from them and their becoming.

**Ethnography as Mentorship**

While these scholars are specifically discussing the subject of made objects, their understanding of how a person corresponds with their materials of making or study resonate with how I aim to approach the research of everyday practice in everyday space. Where a traditional positivist conception of ethnography emphasizes capturing a reality of a community of practice, an ethnography “from the ground up” is about understanding cultural practice as in movement. In studying rural everyday life in Appalachia, Las Vegas, and other tucked away places of America, Kathleen Stewart defines her affective subject – her participants – as a “collection of trajectories and circuits” (59). To recognize that meshwork, Stewart suggests we “project it onto some kind of track to follow. Or inhabit it as a pattern you find yourself already caught up in
(again).” Our research is a “divining rod articulating something” (68). For those who have ever used such an instrument, a divining rod is used to find a source of water; it literally draws its user down; it articulates a line that you cannot help but follow. The method that I propose for this study is an attempt at such an obligatory correspondence. The researcher is not trying to better describe what is occurring, nor are they attempting to reveal what is “objective,” what is “really happening.” Instead, they are following along, they are responsive to the serendipity and entanglements of the world around them, to the joy of interaction and movement with other humans, nonhumans, technologies, and textures. In the ways making objects is about following along with the material, making research is about being led along a path with our participants.

Another model for this kind of engagement with our research and our participants, and one that fits well into the discourse of a making or Maker community, is that of mentorship. Millie Creighton’s study of craft vacations for upper class women in Japan uses an ethnographic approach modeled after the kinds of mentor relationships built into the weaving seminars they are studying. While the seminar is typically taught by a master crafter, there are usually individuals present who have already taken the course and serve as unofficial guides in learning the craft. In taking the seminar, Creighton is seen by other participants as a fellow classmate as well as a researcher and is brought into the community, not as a researcher, but as a student. This generational relationship to cultural knowledge, where more senior students mentor the newer additions, is a productive model for studying maker communities because it places the researcher directly within the community of practice, alongside her participants, learning from and with them rather than of and about them. This is remarkably similar to Ingold’s correspondence and Pink’s walking and talking methods, where the researcher is taught by participants, listens and learns, and understands the cultural practice as embodied and moving in a particular time and
place. While participatory action research and other participant-led forensic methods contribute meaningful work to the field by having participants lead discussion, develop questions and methods, or gather evidence of an experience, I argue that “mentorship” ties these methods to everyday practice more deliberately: by asking specific questions, by providing specific objects, by attending to specific phenomena and asking the researcher to follow along, participants teach us the fabric of their everyday production and prompt us to embody that practice. Mentorship as a paradigm also uses the practice of making to study making; it attends to the cultural rhetorical practices of makers in order to create knowledge about, with, and through making.

Where this discussion of the line, traces, trajectories, and apprenticeships leads me is to the general idea of “witness” or even “withness” in the everyday experience of informants. Earlier, I discussed how corporate and institutional narratives around Makerspaces erase over the granular, localized, and situated experiences of everyday makers, telling a story that is not quite liberatory, open-source, or democratic. What I argue here is that a methodological approach to making must be with the makers we encounter if we are to highlight those stories as important to an understanding of Maker culture. We must find a way to correspond, to follow along, to learn from, and to understand makerly practice as a story unfolding as it grows.

Videovoice Methods

Given this discussion of multimodal and embodied storytelling, relational accountability, and everyday cultural practice, I now turn to the methodological grounding I propose for researching making, a videovoice approach to research of everyday and multimodal practice. The method has its groundings in photovoice methodology and builds from the work of composition scholars researching multimodal composition as well as sensory ethnographers in the field of anthropology (Catalani et al. 21). In this method, I have diffracted established video
ethnographic methods such that an act of making in space and time might be materialized by multiple actors. The method can be characterized as quite literally participant-observation, where participants themselves observe their multimodal practices using video ethnographic methods. In keeping in line with hierarchical structures that often guide a making community, videovoice follows an apprenticeship model for ethnographic research, where through side-by-side engagement with participants, the researcher’s goal is to walk and talk and learn with and from and within participants’ own experiences of making.

Recent strategies for researching multimodality in composition studies, particularly in Maker environments, include three-dimensional interviewing, participatory video methods, and multimodal analysis. In Shivers-McNair’s dissertation work in SoDo Makerspace in Seattle, they wear a GoPro video camera attached to her head to record acts of making in real time and space. The 3D interviewing approach accounts for the movement of bodies along x, y, and z axes and allows the researcher to pay attention to the ways embodied, spatial, and technological boundaries are produced. The approach also acknowledges the ways that the research apparatus helps mark those boundaries, showing how her own body is implicated in the first-person videographic method. Shivers-McNair triangulates language-based meaning making in SoDo with other acts of making, focusing on what possible bodies are made in the Makerspace and how they are made through human and nonhuman interaction. Similarly, Rose and Cardinal have theorized a family of user experience methods, called participatory video (PV), that is “motivated by an ethical imperative to empower users to make positive change in their lives, their communities and their experiences with technology” (11). The authors’ use of video diaries during participant commutes provided context to lived experience and “allow participants to take us into their worlds,” placing agency in users rather than designers of users’ experience (14).
Other research by Pfannenstiel, Tekkobe & Opel has used multimodal and participant-led data analysis, where researchers asked participants to build 3D objects and video games and reflect with those same media on what they had created. Shipka’s early work on multimodality also asks research participants to respond to their own writing processes using multimodal methods. Students were asked to draw depictions of writing, both their primary space of work and their overall process (58). A recurrent theme among all participants was how their environmental selections structured their practice. In producing texts, writers used other humans and nonhumans to shape thought in the service of action (119). Shipka argues that writers cannot be limited in their mediational means if they are going to be adaptive and aware composers. These other possible means that students consider as they write and compose create other possible worlds (128). Implicit in Shipka’s study is how the multimodal methods for aggregating student experiences of writing is itself a creation of another possible world in composition studies, one in which writers rely not only on the page or screen in front of them but a complex of humans, nonhumans, and environments.

Similarly, a diffractive approach to qualitative data is important in a project meant to move with rather than separate from data. Diffraction comes from early experiments on light by physicist Niels Bohr, known for his work on atomic structure and quantum physics. These experiments showed that light changed based on how it was being observed: one apparatus produced waves while another produced particles. For philosophers, this meant that research played an important role in how information could be produced, that what we saw in observation was an entanglement of apparatus, researcher, and phenomena. In qualitative research, Taguchi has argued for an approach that understands phenomena as situated in specific contexts and produced by specific entanglements. Phenomena are effects of an environment of which the
researcher is a part (Taguchi 272). We look for these effects by watching for their traces, essentially following the phenomena back to its source and seeing what factors played into its production. In critical making research, we look for signs of learning, or material engagements with the world. A made object is the product of an entanglement between maker, material, and environment. Further, any one phenomena of making, or making event, is the effect of various human and nonhuman actors in that environment. Especially in a classroom or workspace, where multiple people are working, a diffractive approach would look at each of those perspectives as an entanglement that produces what we know as the classroom or the Makingspace.

Building from these embodied approaches to qualitative research, I propose a diffractive video-ethnographic approach to collecting and analyzing data in spaces of making. I term this method “videovoice” after already-established photovoice methods developed by Wang and Burris. Photovoice is a community-based participatory research method that asks participants to take photographs of their surroundings and experiences in order for researchers (and, arguably participants) to better understand community issues. It is what Wang and Burris theorized as “problem-posing education” built from critical pedagogue Paulo Freire’s methods (172). Typically, participants take photographs and discuss their choices with researchers in interviews. Image-making is a perceptual undertaking where the photographer looks through a lens at their phenomenological experience. Not only does this allow participants to reflect on their communities and how their communities are framed, but the images serve as a meaningful way to engage many different stakeholders, including the community itself (182).

Similarly, videovoice involves participants (including the researcher) recording video data of their multimodal practice using a small handheld video camera attached to their body. In allowing participants to attend to their making according to their own goals, purposes, and
interests, videovoice methods can change the interface with which we engage multimodal practice. The method also complicates the relationship between the researcher and the researched, as the researcher’s body shows up in the data as it is diffracted through other perspectives. A diffracted screen does not just show the researcher’s body at the edges as in researcher-directed videography. It shows their body in its entirety, a researcher fully present in the production of knowledge. Videovoice further dissolves the interface between researcher and object of study and allows for a more meaningful understanding of both research and multimodal composition as an embodied practice.

Videovoice is not only a data collection technique, but an analysis technique as well. As anthropologists begin to acknowledge how the study of cultures must incorporate those publics, their methods have become much more public-facing and collaborative. Lassiter writes that, while anthropology has always been collaborative between researchers and their subjects, only recently have its techniques foreground that collaboration (84). Public, participatory, and collaborative ethnographies incorporate participants into every part of the research process, from developing questions to analyzing data. Not only were participants of Stoudt et al.’s Polling for Justice project integral to data collection through distributing surveys, they read theory together, developed research questions, explored different components of the social justice issues they were concerned with, and participated in an exploratory data analysis and write-up (180-181):

The research team made connections from the personal to the social, and the youth researchers identified their own neighborhoods in central Brooklyn and the south Bronx as having the highest concentration of negative interactions with police. These observations led youth researchers and other members of the research collective to explore further; to continue to probe a wide range of literatures, interview judges and
criminal justice theorists, test out theories, conduct data driven focus groups and generate new questions about negative police interactions that needed asking. (182)

Videvoice methods approach data analysis with this same collaborative focus. In the same ways that a researcher might have a set of questions or codes they approach their data with, participants watch the videos they have produced and draw out themes and moments. Guided by the same “detective” techniques used by Tukey in early exploratory data analysis studies, participants of videovoice methods bring their questions, ideas, themes, connections, and threads to a qualitative interview. Through what Riley-Mukavetz calls a talking-circle dialogue, the participants, both academic and non-academic, work towards a shared understanding of their video data. Riley-Mukavetz writes, “The creation and development of the talking circles were always based upon the relationships the women were forming with each other, with me, and the Lansing communities” (114). Similarly, the creation of a dialogue to understand the data is derived from the familial relationships I have with Wendy as well as the ways people in our rural community have always attempted to solve problems. While we are proud people, we are also afraid of being wrong, and in many ways, checking our understanding with people we trust is an important part of our creation of knowledge.

In the following sections, I will explain how I have theorized a making event as situated in and across time and space as well as my process for choosing sites of everyday practice. I will then describe the site I have chosen for researching makerly practices and justify their significance to the present study.

**Defining the Event**

What constitutes a making event? In what ways should a videovoice study identify what constitutes data, what constitutes significance? We could easily say that it is the time in which an
object is made, as presumably all action in the space would coalesce around the production of a thing. The thing is the object of action and therefore the most significant action will take place in relation to its making. But this begs the question of whether an object has a beginning or an end. Jane Bennett, Karen Barad, and other new materialists would argue that an object emerges not from a start and a finish, but from an interrelation of maker, material, and cultural context and is constantly being remade as it passes from hand to hand. Such entanglements, according to Bennett, “swarm” rather than begin or end (32). In writing studies, Danielle Koupf has proposed a critical-creative tinkering model for composition where students see the composing process as a material process of modifying old texts and inventing new. In this, they acknowledge the itinerant nature of tinkering and how impermanence and change occur in the writing process. Instead of revision having an objective of bringing the composer closer to a “final” product, they become reversions, different iterations of a document that changes as the context does. Different constraints lead to different interventions and inventions, but nothing is ever quite “finished.”

The way that time and space are articulated within an act of production is quite different when we use a metric other than the time it takes from beginning to end of an object’s making. In a videovoice methodology, I argue that it is not a quantity of time that we should attend to, but a quality of time, rhythm in particular. Fogerty argues that rhythm necessarily implies change in time, force, and/or space. Folk rhythms, i.e. the making of a craft object, arise from instinct and bodies, which is always changing, whereas machine rhythms are swift, forceful, and never change (369). I resist this dichotomy between low technology and high technology, but I find it a useful place to begin thinking about how different material entanglements happen at different speeds.
Speed and rhythm imply the passage of time through space, and I argue that the making event cannot be defined by these factors because, as media theorist Sarah Sharma argues, they are differential across cultures and practices (6). I demonstrate this by considering some of the initial video I produced at my family’s farm. I began by turning on the camera when we opened the gate to the property. The camera turned off of its own accord - the battery life of this technology is only about 2 hours, and this will even fluctuate based on the memory storage of the SD card. After several sessions, it occurred to me that the making event may even start sooner, at the suburban house of my mother, gathering our materials and operating the GMC Ram 2500 4x4 pickup truck. It could be traced even farther back, to the original creation of those materials needed for work on the farm, the moment when we bought the new hive frames or the trip to the grocery store for powdered sugar to treat the varroa mite. The making event could have happened later, as well: laying seed for a winter cover crop, for example. But even this activity has an uncertain endpoint: the clover grows over time, us checking it each day to make sure it has taken root and that no pests or deer have ruined it. We might harvest the clover, at which point the making event stretches into the act of creating a medicinal tincture or salve, of gathering them together for a bouquet to sell, or some other use. Not only is the making event stretching and changing in terms of time, but space as well. As different makers produce made things in the same space, that space becomes much less bounded than the four walls of an institution. The space of the making event stretches and changes to beyond the glass-walled Makerspace, to the store where one buys the fiber, to the factory where the fiber is processed, to the barn where the fiber is sheared from the animal, and even all the way to the field where the fodder grows to feed the animal so that its coat is suitable for production. The line between raw material and made object is constantly bleeding, as is the line between the Maker “space” and the
vast, sprawling spatial interactions we engage in to make. In a word, we are always and already making, everywhere and all the time.

It is this unwieldy, unending, entangled notion of time and space that leads me to the argument that videovoice methods cannot be bounded by time, activity, or completion in their approach to data collection. The making event is serendipitous, happenstance, and dependent more on the maker’s attention than to an act of making or activity. In this way, the result of videovoice does not use a priori definitions of making to create boundaries around what gets recorded; what is recorded is what matters because it materializes the constellations of things, people, materials, land, and ideas that make up production in ways that simply looking and talking about artifacts cannot accomplish. Videovoice embodies and draws out the traces of making that reveal the larger, more sedimented networks of technology, history, and literacy that are hidden when all we do is comment on Maker culture through disembodied, abstract analyses.

Analysis of these videos, therefore, are aimed at highlighting those traces in the video that mark a making event based on decisions, attentions, goals, and desires. These are questions that may be posed explicitly to participants: Why did you pick up the camera and start recording here? Why did you stop recording here? It is in this answer that informants can articulate the ways they are guiding the research; at this moment, the researcher is asked to begin corresponding, to start following along - there is something to learn here, so pay attention. The end point of a video might be anything from, “It didn’t seem important for you to know,” or “I was unsure about what I was doing” - a performance of expertise, of master makership. Another answer might be that the battery ran out - in this way, technologies are counting time, creating fixed realities from ongoing, unfolding action.
While correspondence might be the driving factor for the boundaries of a making event, the researcher and participant together must decide what to pay attention to in parsing the data and constructing some actuality from it. This can be brought about via the qualitative interviews that ask the informant to reflect on the videos they’ve made. It might also be visible in the ways the camera pans to something. As Trinh Minh-ha has argued in response to the positionality of a video ethnographer: “Roaming about with the camera is not value-free; on the contrary, it tells us much about the ideology of such a technique” (117). Though the camera in this study may be operated by both a participant and a researcher, it still reveals much about the ideology of that informant’s movement in space, how her attention and choices reflect a cultural relationship to makerly practice and are therefore reflective of a particular ideology or orientation towards the world.

The notion of attention is central to what gets defined within the making event as significant, and Kathleen Stewart’s theory of ordinary affects is especially apt in defining those things that call our attention in this study, the things that participants will be asked to reflect on, the things that make them stutter or pause. Ordinary affects are surging public feelings that are in circulation in everyday places (104). To study the ordinary affects that circulate in a place, we must look for the pressure points, attentions, and attachments, of paying attention to where affect “jumps” and “snaps” to (42). While the individual maker in this study might easily be asked in qualitative interviews what jumps to, why they looked or turned the camera to this particular action, or what was surprising about this moment, ordinary affects are also a function of a public experience. Individuals experience a shared impact of affect which calls each person to loop it into a social order of meaning. Why a person acts in a particular way might in their making practice might be a function of a social order, so it is equally important to explore the ways
power structure, institutions, or cultural conventions play into what occurs on film. We can study ordinary affects by tracing their forces and performing the intensity and texture that makes them present. This involves resisting representation, mapping connections, seeking openings, and existing within contact zones, accomplished by asking some of the following questions:

- What happens when two participants record the same event?
- What happens when a participant talks to another interlocutor (human or nonhuman)?
- What happens when a participant changes their direction or path of action?
- What happens when time is somehow disrupted? Example: when space is recorded at different times and is visibly different while still obviously the same geographically; when a person that is no longer living is present in a video
- What happens when a person acts in a way they normally would?
- What happens when a person acts in a way that they would not normally act?
- What happens when an interlocutor (human or nonhuman) interacts with the research apparatus?
- What happens when a person performs acts or utterances when no one else is around?

These questions are all possible mappings or configurations of a making event that touches on ordinary affect - what jumps out when we are minding our own business, when we get into that groove while working, when we are “in flow.” Stewart writes:

> It’s as if a net has grown around a mutating gelatinous substance.

> It’s also as if the net is full of holes, so that little pieces or whole blobs of things are always falling out of it and starting up some new thing on their own. (88)

In videovoice methodology, the making event is neither necessarily bounded by activity nor attended to because of activity. By engaging informants in post-process reflexivity, we can slow
down the blobs falling through the net and examine them as constituted within a community of practice and as a cultural rhetoric.

**Videvoice at Summerset Holler**

In performing videvoice methodology with Wendy, I used the diffractive, collaborative approaches I have detailed above. In preparing Wendy for the process of videoing our practice, I showed her how to assemble, place, and record with a GoPro handheld camera. I provided her with both a head and a chest harness so that she could choose where she was most comfortable placing the camera; she noted in one of our first meetings about the study that it was as if she was choosing between her heart and her head. I chose a head harness, as I found the videography I produced more accurately performed the way my head and body looked, followed, and attended to different phenomena. Wendy chose to wear the chest harness once, and then moved to a head harness.

The videos taken for this study span from February 2018 to September 2018, the major season for vegetable production and bee activity. There are two videos, however, that were produced by Ray in Spring 2017 prior to his death (they have no time stamp but clearly depict his early activities keeping bees). They have been included in the corpus of this study. Rather than having Wendy reflect on these videos alongside me, I recognized that the image of her deceased husband might prompt extreme emotions, but I discussed them with her in our follow-up interviews. In total, I produced roughly 4 hours of video, Wendy produced 2 hours of video, and Ray had produced 30 minutes.

During recordings, I suggested to Wendy that she could essentially follow her intuition in terms of when she would start the video, when she would stop, and when she would pause. I suggested she think of what she would want someone to know about her practice, giving her the
opportunity to turn the data “off” if she was embarrassed, uncomfortable, or unsafe. Our recordings were generally over weekends during the season when I would travel home to help her with land and bee management. They depict our walk across the property, our process of putting new queens into the hiveboxes, checking on the colonies, and tending to a few small gardens Ray had left in his passing. Ray’s video depicts his process of tending the bees, and Wendy and I discussed in our interview that he likely was preparing to publish these videos on YouTube, which has a large community of beekeepers sharing knowledge.

Our recordings stopped along with the main growing season in North Carolina, so we dedicated about two hours in late September 2018 to discuss our videos. To prepare for the interview, Wendy and I reviewed our own videos, wrote notes on themes that we noticed in the data, questions we had for each other, and some contextual pieces of information about our histories as makers. I developed an exploratory schema directly from the transcript of our conversation and have highlighted those salient moments in Chapter 4 on human making.

An important contribution of this study is how it addresses nonhumans, specifically environments and animals, as entangled in making practices. However, how can videovoice methods be configured for bees, bugs, plants, wind, and water? In future research, I am interested in developing a method for using microcontroller technologies to attach Bluetooth cameras. My approach in addressing the nonhuman makers that show up in our farming practice is to consider ways that, as Stewart argues, their presence and making “jumps out” in the videos Wendy and I have produced. As such, the analysis of nonhuman making on the farm derives from a triangulation of Wendy’s commentary on her relationship with the land and the bees and the moments when nonhumans jump out, bump against, or face us head-on. These moments are
when nonhuman making makes itself seen and surprises Wendy and I, both as researchers and makers.

**Constellating Research**

In this chapter, I have described the feminist, Indigenous, and embodied theories in which this dissertation’s methods are situated. I have highlighted the ways everyday practice must be both embodied and diffracted, and must incorporate the collaborative cultural practices of everyday makers. I propose videovoice methods as an answer to one-dimensional, top-down ethnographies of critical making and explain how I have collaborated with my participant, Wendy, at our family farm at Summerset Holler to better understand how we make and move outside of academic and corporate technological institutions.

I end this chapter by suggesting that what I have proposed here is not simply a way to describe constellations of making; it is itself an explicit constellating of the research practice, of the researcher, participant group, research site, and the cultural logics each of those elements bring with them to the production of knowledge. I think back to the ways my father claimed his making practice with his bees through video documentation, a clear inspiration for the methodology I have developed for this dissertation. Not only was he describing his process through the GoPro; he was emerging as a practitioner *through* the making of a YouTube series. He was opening it up to interpretation, to other experts, to a continual process of learning, and to the everyday cultural practices of modern beekeepers in online space. He was *making* himself into a beekeeper; he was constellating his own work within a community of others. I conclude with a gesture towards this risky, messy, yet profound practice. How are we as researchers *making* ourselves through our methods? How are we constellating our research in light of the communities of practice we study?
CHAPTER 4: Human Making on the Farm

In following scholars’ critiques of the Maker movement and the many examples of making that is relational, purposeful, and healing, I focus this chapter on my own cultural communities of practice in farming and agriculture. Agricultural spaces, and small farm spaces in particular, require a complex network of making practices to be productive. Beginning from seed, plants are grown through various crop management systems, including fertilization, pollination, and pest management. The products of these labors are then washed and made presentable to a consumer, whether the farmer’s own family, market-goers, restaurants, or other buyers. Some plants are processed into other made things: preserves, fiber, cut flowers, etc.

Animal husbandry follows a similar process of management, presentation, and distribution, though perhaps one degree closer to human-ness than other carbon-based organisms. Aside from animal and plant products, farmers often are tasked with land management as well: cutting down trees for lumber, mowing, building structures, tilling soil, and working to control invasive species of both plants and animals.

These processes are both material and discursive practices that get carried out through both human and nonhuman interaction and relationality. Bodies are central to these practices: objects emerge as momentarily stable phenomena produced through embodied action and entanglement. In *Making: Anthropology, Archaeology, Art and Architecture*, Tim Ingold shows how archaeologists formerly perceived certain artifacts as designs imposed on a form. After reorienting their analysis towards the body, they found that objects emerged from human, land, and animal bodies: a mound emerges from the ground but is not built; a biface hand axe is not designed but is the result of convenience and bodily shaping in the moment. Similarly, making on the farm is not the end result of a farmer’s intention placed upon the land; it emerges as what
Anna Tsing calls a collaborative survival, as the meeting place between human action and “nature’s ongoing, material-semiotic intra-actions, actions that may well surprise, annoy, terrify, or baffle humans” (Alaimo 249). Agricultural production emerges from the complex entanglements that humans, animals, environments, and technologies find themselves living within.

These embodied experiences of the land, flora, and fauna of the farm are what Gabriela Raquel Ríos argues is a way of learning from specific material entanglements. Farmers, like other Maker cultures, share and create knowledge through distributed and embodied networks of literacy- and meaning-making. Co-operative extension offices, for example – funded and organized through the same institutions that build highly-technological academic Makerspaces – exist as distributed knowledge economies where everyday people can share and receive knowledge about their practice. The co-op extensions are specifically responsive to communities’ demands and agendas and are therefore sites for localized, situated knowledges:

“Program decisions are based on local demand” (Carroll et al. 26). These knowledge economies are what Ríos calls land-based literacies, “literal acts of interpretation and communication that grow out of active participation with land. While these literacies are predominantly extradiscursive, they are nevertheless rooted in relations among discursive phenomena” (64). Farm-based literacies are both material and discursive, carried out through active performance with and through the environment.

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1 In 2017, family and consumer science (FCS) professionals gathered for a summit on the centennial anniversary of the Smith-Levers Act, the establishment of the cooperative extension office. The result of the meeting was a manifesto that quite literally mimicked the language and claims of the Maker movement. In the document, FCS practitioners identified several futuristic goals of cooperative extension: Engaged Scholarship, University Integration, Learning Technologies, Demand-Driven Agenda, Open Source, Culture, and Identity and Staffing (23). I include this information as a footnote to highlight the resonances between agricultural communities and Maker culture, both institutionally and in grassroots iterations. As a graduate student, I unfortunately have not the time to delve into this rhetoric further, but place it here as a footnote to suggest that it deserves future consideration in agricultural rhetorics research.
And finally, farms are spaces where culture and power is reified, resisted, and upended by both human and nonhuman bodies. As Tuana writes in her discussion of the environmental and cultural aftermath of Hurricane Katrina, bodies are porous, and while technology is largely constructed as durable and stable, the machines, in our case of the farm, co-conspire with us (199). Farmers coordinate and collaborate with the tractor, the backhoe, and the irrigation canals, marking each other’s bodies and actions in the process. But there are histories associated with what it means to be on the farm and what it means to be marked in specific ways. Carolyn Sachs has studied the practices of female farmers across the late 19th and early 20th centuries, finding that farming is purposefully constructed through technological and institutional systems to be a masculine activity (Gendered Fields 57). In 1914 and 1917, the Smith-Lever and Smith-Hughes Acts’ established a gendered division of labor on farms through the co-operative extension office, which specifically marked women as “homemakers” and men as “fieldworkers. Along with advances in tractor technologies, women were transformed from belonging on the farm to unbelonging. In addition, Reconstruction-era laws that had removed ex-slaves from their “forty acres and a mule,” granted by General Sherman’s Special Field Order 15, created an entire system of sharecropping labor, where farmers of color were indebted to the landholders who had enslaved them and their ancestors for centuries. In other words, while they engaged in the cultural practices of an agricultural society, they were not agents of belonging.

While institutional laws and practices create the ruling relations of bodies on the farm, the everyday utterances of farmers are much more fluid. The roles women in agricultural communities are and always has been invisible and yet integral to the economic stability of the farm, with labor being divided in terms of needs rather than roles (Jensen 171). The roles that people of color have played on the farm is much more visible, having been enslaved in the
service of such an economy. Yet, farmers of color instill a deep connection to ancestors, relations, and lost practices through their making on the farm (Bowens 10). Farming is not just about power, just as making is not just about technologies.

Despite many attempts through government agencies to increase the numbers of women, people of color, and young farmers, there is little data currently being gathered on land ownership and farmholdings among non-white, non-male farmers (“Minority and Women Farmers and Ranchers”). As of 1990, 12% of farms were owned by female-identified farmers and 4% by farmers of color (Gilbert et al. 55). A simple Google Image search for “farmer” yields some diversity, but most women farmers and farmers of color are depicted as third world laborers. The agricultural field, both the practice and the place, is still predominantly white, male, elderly, and wealthy.

I provide this historical grounding to give the reader a sense of the contexts and ruling relations in which women in the South like Wendy and I, albeit white women who have some proximity to wealth, exist in relation to agricultural technologies and farming practices. It is still the case, as it is with Maker culture, that non-white, non-male bodies are unrecognizable within the technical and social networks of agriculture. In the next sections, I provide a detailed account of the video produced by my participant, Wendy, and myself to show the ways we work within those contexts. I ground my analysis in agricultural sociology, animal studies, environmental rhetorics and communication, and rural rhetorics. I place these scholars in conversation with Wendy and I’s embodied movements on the farm and our discursive reflection in our follow-up interview, both of which depict themes around makerly identity, hidden labor, collaboration and survival, time and rhythm, and expertise. I end with a return to the basic tenets of the Maker movement and draw connections between our cultural practices as rural people working the land
and the practices of Makers in academic and corporate spaces. I argue that through an embodied, cultural rhetorics lens, researchers of critical making can easily see that making practices are not exclusive to more privileged technical communities, but stand at the forefront of rural community literacy and knowledge.

Makerly Identity

Wendy has identified as a maker for a very long time. Her mother, my grandmother, was a master knitter and owned a knit shop in their small town in central North Carolina in the 1970s. My mother has grown up around fiber craft and in the early 2000s developed her own “style” of knitting shawls, scarves, and hats, a conglomeration of 1980s bulkiness and modern fashion. In the 1990s, she enrolled in a local community college and learned how to compose and process photos in a wet lab. She worked as a freelance photographic archivist, using the alternative processes she had learned as an artist to restore people’s deteriorating family photographs. She specialized in medium and large format film, platinum palladium processing, cyanotypes, bromoil printing, and other types of print transfers. When our family moved back to North Carolina in 2005, she kept her photography practice current by volunteering with the high school photography club. I have distinct memories of her purchasing Holga plastic cameras in bulk to hand out to students who wanted to learn more about analog processing. Without a lab to process photos, Wendy has been unable to continue her photography craft, but has joined a community of knitters at the Salty Sheep Yarn Shop in Swansboro, North Carolina. As she has become responsible for more and more at Summerset Holler, especially in the wake of significant damage from Hurricane Florence in late 2018, she has had less time to commit to these practices.

I also have a long history of making. Wendy taught me how to knit when I was very young, and it was an activity that we shared with my grandmother cross-country. We would
often commit to a knitting drive to help a charity of some kind, sending Mamaw our knitted hats, gloves, and blankets so she could send them off in a group to soldiers overseas or people in need in her church. Fiber craft was always tied to a sense of charity; while my grandmother owned her knit shop, rarely did I see the women in my family exchange money for the things they made. Knitting was something to be given away, for use and as an expression of love. I also spent much of my childhood serving as assistant, apprentice, and sometimes model for my mother’s photography practice. By the time I was in high school, I knew how to expose, fix, and mix chemicals in the wet lab, and was exploring some of the same alternative processing media that my mother was using in her photographs. These interests continued into college, but waned as I began taking creative writing courses, which were a path out of the high theory that my university required students to engage with. Writing became my material making: crafting poems and submitting to journals, organizing readings in South Chicago, spending evenings with friends reading aloud or conducting exquisite corpses. Writing was also my own making, separate from the practices others in my family engaged with, so I felt a particular kind of agency in continuing as a poet rather than a knitter or photographer. I entered a Master’s in Fine Arts program at the University of Alabama in 2012 after waiting tables for a year, and honed my craft through workshops, readings, and poetry groups. As I have spent the last seven years writing, theorizing, and thinking in graduate school, I have had little time for any other kind of making, though I began a practice of “wildcrafting” (turning wild and cultivated plants into medicines or other products) to help me through the incredibly intense allergy seasons in Alabama. It was not until I entered my PhD program and began taking classes at the university’s Crafts Center and Makerspace that I began thinking of myself more and more as agent in my own making – not
repeating the processes of my relations, but extending them, making new practices, and incorporating digital media into my craft.

I begin with these two personal histories of making because Wendy and I clearly have a strong foundation as crafters and makers outside of and prior to our work at Summerset Holler. I assume that most readers will have a history of making that looks somewhat similar: some were taught how to sew by their mothers, others how to cook by their fathers, others broke apart mainframes after school, and still others were expected to carry on the cultural practices of their families through the manufacture of some object. It follows, then, that Wendy and I carry these histories with us to the farm, despite never expecting to be responsible for such making. Our identities as makers are solidified before we even purchase the first tract of land in 2006; we have knitted, stitched, and made photographs for years, together. While my college years and our various moves separated Wendy and I in our respective making, the farm is a coming together for us, a return to those days of apprenticeship, of learning together, and of producing something that we would see have an effect on the world, whether artful or useful. I foreground this coming back to making through agricultural practice because it demonstrates how entangled Wendy and I’s makerly identities on and off, before and during, the farm are.

In her interview, Wendy strongly identifies as a maker, and while we have discussed my research interests and this project extensively in the context of the Maker culture in higher education, none of our framing questions were explicitly about Makerspaces or Maker culture. In several moments, she refers to the colony as a “makers space,” and she sees herself as apart of that community, playing the role of observer. She compares her making alongside her husband’s:

I was always and always have been a crafty, do-it-yourself maker person, very simple.

Your dad was always in technology. But out there on that land, we were both in the same
space, doing virtually the same kind of work. His was more complicated, though, and
mine was more simple. (Gollihue October 8)

Despite having a clear history of complex making, despite having taken care of the bees for a
year without any kind of direct mentorship, and despite repairing many of the machines that Ray
had left behind in his death, Wendy still identifies her making as “crafty” and therefore “more
simple.” This claim is striking in light of a later answer to the question, “Do you consider
yourself a maker?”:

Yes, I am a maker. Why? I made two children. (both Krystin and Wendy laugh) I think
that was my beginnings. It's the first time in your life that you take on a project…It's the
first time you make something and you have no clue how to do it. There's no directions.
And I'm talking about after birth, that you don't know how to raise a child. There's no
manual, there's no books. I mean, there's lots of advice, but you know. So it's the first
time in your life where you're given something that's highly important and you do the
best you can.

Wendy identifies as a maker, not because she has technical skill, though she clearly does in
photography, fiber craft, and even beekeeping. Her makerly identity derives instead from the
sense of making something complex without a “manual,” without knowing everything one can
possibly know about a specific subject. She links her identity as a maker to experience within
situated, embodied contexts, not discursive expertise or official learning. In discussing the birth
of her children, she uses terminology of process – project, do the best you can, manual,
directions. Rural women often identify their value in these reproductive terms. Carolyn Sachs
notes that this is particularly true in farming communities, where
Rural women's knowledge is situated in their particular localities and daily activities. In most cultural settings, rural women's situated perspectives come from their connections to the environment, from their work in subsistence, reproductive, and productive realms, and from the patriarchal nature of rural families. These experiences provide particular angles of vision or partial perspectives that offer the possibility of seeing differently than from dominant perspectives. (17)

I position Wendy’s responses to makerly identity within Sachs’s analysis of rural women living within patriarchal institutions because this passage sheds light on how Wendy might simultaneously see herself as a maker and not an expert. She knows how to birth children and feels a connectedness to other “makers spaces” like the bee colony, a symbol of not only environmental production but of feminine production. The vast majority of bees in a colony are female, with the queen heading the entire institution through her ability to reproduce. Wendy finds her agency within these particular elements of her makerly experience, but not these newer experiences more grounded in masculine practices of agriculture. In these spaces, she still feels she is a novice, without the clear institutional connection to farming or to machinery.

**Hidden Labor**

Labor on the farm is complicated: awareness of agricultural processes has been overshadowed by easily-accessible products whose creation is possible through an increasing availability of technology and global-capitalist economies. As consumers, we only see the “downstream” product of farm labor: the canned goods, the cuts of meat, or the vegetables for sale at market, if we are privileged enough to live in a robust food system. If not, farm processes are even further abstracted by grocery supply chains and state and federal regulations. But these made things, like any other, carry the traces of agricultural work: dirt still clings to them,
marbling in the steak shows the cattle’s eating and movement, bruises on the tomatoes show their handling, and truncated carrots show the depth at which the soil was dug. These traces are indicative of the hidden labor humans, nonhuman animals, and other living things invest in their making practices, specifically through the bodily force they enact on materials.

In my interviews with Wendy as well as the videos her and I both produced, that hidden labor becomes much more visible through videovoice methodology. The things made on the farm are the results of Wendy and I’s bodies tracing on our materials and illuminates the work (literally the force exerted on a material) involved in creating. For example, most of our videos depict a “setting up” process for checking the bees that takes at least thirty minutes: gathering pine needles, keeping the smokers lit, putting on the bulky beekeeper suits, filling a bag with disease control implements, driving to the secluded area where the hive boxes are placed, putting on muck boots, walking our materials up the path, and setting up those materials so that they are easily accessible.

![Figure 1. Wendy and Krystin put on their bee suits under an awning.](image)

This does not account for the act of extracting honey, checking the bees for parasites, planting and maintaining cover crops that will affect the taste of the honey, and any other variety of processes that help with honey production. However, these videos draw out the processes of making that go into easily- and quickly-consumed things. They extend the process of making and
being made beyond the moment the vegetable is picked, beyond the moment when the honey is extracted.

The sheer amount of labor that is made visible through videovoice data shows that the traces of making on the farm are much more time- and resource-intensive than Wendy previously felt, at least in the moment of making. She notes that there is a disconnect between what she sees on the camera and her phenomenological experience of working with the bees:

I move my head way too much for that GoPro. I just felt like it was, I was moving my head and talking to everybody, or attending to something. I’m constantly moving. I just felt like by watching the video, that I’m frantically moving about, but I don’t feel that way in the moment. What I feel like in the moment is I’m trying to execute a process.

(Gollihue October 8)

Her observation is in line with the idea of creative “flow,” where when a person is making, they enter a suspended state in which they hyper-focus on the task in front of them. While Wendy attributes her feelings of unawareness in the moment to having a preconceived goal for when she goes out to Summerset Holler, that goal is itself a means, not an ends. What she is aware of when she is out on the property is that she has a job to do, but the video she produces allows her to see what that job actually is, how it manifests, and what her decisions are in the moment. She notes many times that she has learned something about her beekeeping practice by re-experiencing the steps she took when placing the new queens in the hive. But what she also recognizes is that those steps are much more fluid and complex than having one goal or carrying out one action after another. By understanding how her body moves, what she orients towards that she may remember “seeing” with the camera, she sees how her body is tracing a path with and through her processes.
The movement of Wendy’s head contributes to another form of hidden labor tied to expertise. Wendy and I are constantly negotiating whether our understanding of processes on the farm is enough, and Wendy specifically ties this to what she saw in the video when we practiced and then ran through placing our new queens in the hive: “I feel like my head was moving so much because I was watching every detail. I was watching every hand move. I was watching everything being placed or moved and taking in” (Gollihue October 8). Without pausing, Wendy switches from discussing this frantic kind of attention to attributing it to her need to prepare, and then finally the presence of her neighbors, Mark and Trey, who were attempting to help with the queen process. She expressed an intense need to “get it right,” which she then attributed to fears about her abilities to work on the farm without her husband alive. She extended this line of thought and acknowledged that she could not have accomplished all that she had without her neighbors Mark and Trey, but that they caused her some irritation by interjecting into her process with what they felt was advice.

Figure 2. Wendy, Mark and Trey discuss an issue with the beehives.

Wendy felt that their involvement meant she had to negotiate her own confidence in the moment of homing a queen bee in her hive box, a daunting and dangerous task for a first-time beekeeper. That frustration was made visible through making the videos, while in the moment, her and I
both ignored the intervention. In our interview, I comment on my own reaction to Mark’s “input”:

This was my note for it [reading from the field notes]: A very weird interaction. You [Wendy] talk to me about the plans for opening up the hives, and then Mark interrupts me, and then you mention that I’m nervous. And I remember thinking in the moment, I’m not nervous, I’m annoyed, I need Mark to get out of my face right now. I could see that you were thinking that…the process we had gone through, that was authoritative.

(Gollihue October 8)

In Wendy’s and I’s individual videos, there is a follow-up moment to this internal dialogue, where I turn away from Mark and ask her directly how she would like to move forward. The imaging of this section of the video is exactly as Wendy describes it. While she is preparing, the video shows significant movement in her gaze. While Mark is making suggestions to us, she is looking back and forth between him and the hive box. But when I talk directly to her, when I look to her as a master of her craft and an authority on the subject of beekeeping, her head movement lessens. Wendy mapped the added labor of moving her head around onto her fears that she was not “getting it right” despite having thought of every possible detail and worked through every possible problem. This is compounded by our neighbor’s suggestions; though helpful, they place Wendy as a novice, and her body does even more labor in trying to attend to the things that might get lost amidst her lack of expertise. It is only when she is positioned by another (me) as expert does this labor subside. In both instances, the videos we have taken demonstrate a hidden negotiation of expertise that manifests in a bodily accommodation – to look and to attend in order to be expert.
Wendy and I are often sheltered from these invasions into our system of practice because she has only allowed certain people to be part of her life out on the farm. While in her interview, Wendy argued that working out on Summerset Holler “only draws in certain people, certain types of people, and it’s people like yourself who are makers or workers” (Gollihue October 8). However, Mark and Trey are both workers, former military servicemen who have a significant amount of knowledge about engines and plants. Despite this, she lets them in because she relies on their knowledge; with anyone else, she would “spend more time explaining to ‘em what to do. They don’t understand that world, and if they knew how much work that needed to happen…that’s probably why some of them don’t come out there” (Gollihue October 8). For Wendy, she is willing to let some people help her, despite the irritation they may cause, because she knows she can rely on them to not only be present but already have knowledge.

When Mark and Trey are not available or have overstepped their boundaries, though, Wendy relies heavily on the knowledge shared in her “bee book” – a book from the *For Dummies* series on beekeeping. She also watches YouTube videos from beekeepers and references them often. Finally, Wendy does have a community of beekeepers among the Pamlico County and Crystal Coast Beekeepers Association, but it is her close friend Sharon (name changed to protect identity) that comes up in her conversations. As of April 2019, Wendy had been helping Sharon with her own hives under the guidance of a mentor beekeeper, another woman (Gollihue April 1). Wendy trusts these sources as well, both the human and nonhuman sources, because they allow her to “get it right” on her own terms. This is a different relationship than what she has with her male neighbors, which is about assessing a cost: to what extent is she willing to have her boundaries crossed while still receiving information? With Sharon and her beekeeper mentor, the negotiation of affect is not quite as damaging, partly because there is more
relationality in the ways they engage with their own beekeeping literacies. Sharon and Wendy feel as if they are equals helping each other, working through a problem rather than asking for help from someone who is more knowledgeable. The mentor they both share has a mentoring style that is much more relational, as well, inviting the two to her hives to watch her process, providing several possibilities for why things like colony collapse happen rather than delineating what is truth and what is not. In these learning environments, the hidden labor of negotiating expertise is not as onerous because they are relational rather than situated within gender and expertise power structures.

I identify these more or less relational moments with expertise as labor, and hidden labor at that, because negotiating boundaries is quite literally work. According to Ranjana Khanna, it involves accepting the affects of others, which is a process of deterioration of the self (214). Difference questions and frames identity and subjectivity, resulting in what Khanna calls unbelonging (215). There are several layers of unbelonging that Wendy faces: the unbelonging after the death of her husband, where grief upends her sense of identity; the unbelonging during the process of learning, where another’s knowledge has the potential to completely undo the little confidence she has; the meta-unbelonging of being a female body in a masculine practice and place, constantly deterritorializing herself or the land through her material entanglements. Negotiating Mark, Trey, Sharon, her mentor, and even me are all processes in which Wendy faces unbelonging; that is an immense amount of affective labor that she must undergo in order for her to be successful on the farm.

An additional laboring that Wendy enacts on the property is that of emotional labor. By taking on the physical labor that her late husband once carried out, she must also face a very
personal, intimate form of grief. When Wendy mentions physical labor, she is in the same moment re-tracing the emotional labor she felt at the death of her husband.

All the walks we’ve always done all the way around, and the talks that we’ve had. The plantings, some of those plantings, the mushrooms, they come out and those were the…work of his and my hands together on those logs. I’m slowly doing my own thing out there, and I think maybe one day it’ll be a time capsule of just me. But I don’t walk across that area and remember that day as much as finding onions and garlic still coming up a year and a half later from your dad. (Gollihue October 8)

Walking the outer perimeter of the land, keeping up with mowing, mourning the loss of her two hives, and her concern over the new hives are all wrapped up in the loss of her husband. While the videos do not explicitly walk-talk-image her grief, when she re-experiences them in our interview, there is rarely a moment when she is not tying what she sees to the hidden emotional labor that gets carried out in her work. This grief is not only the loss of a husband and a father to her children, but one of having to re-learn her role as a woman in society, on her own, existing outside of gendered and classed power structure that are so broadly recognized in rural communities (Gollihue October 8). In viewing the processes of her making and of the making that has been ongoing at the farm, Wendy is able to articulate the emotional labor of loss and responsibility. She sees herself both as she was then and as she is now, and the land is a visible trace of that labor that she sees in the videos.

Finally, Wendy and I are constantly engaging in hidden labor on the farm through the act of tracking. I use the definition of tracking suggested by Anna Tsing in The Mushroom at the End of the World, a dive into the commodity chain of the matsutake trade in the Pacific Northwest and Japan. Matsutake exist both inside capitalist systems of control, in that they are
bought and sold through highly competitive and volatile markets, and outside of capitalism, in
that they cannot be controlled in their growth and are symbolic of freedom for those who pick
them (121). Tsing writes that when a person tracks matsutake, they are looking for something
elusive, an “underground city” where one “will find the strange and varied pleasures of
interspecies life” (137). Fungi, they argue, make worlds by breaking down organic material that
are then used as nutritious soil by other living things. They are generous beings, more akin to
animals than plants; they protect other organisms from disease and even “transmit” materials
through their vast underground networks (Simard et al. 580; Jung et al. 651). When a mushroom
picker hunts the fruits that erupt out of these meshes, they are “following worldly
entanglements” (Tsing 137). Tracking entails both an embodied feeling and a conceptual
understanding of how worlds collide, hide, erupt, and crack open foundations.

I want to use Tsing’s concept of tracking fungi as a heuristic for what Wendy and I’s
labor on the farm looks like. So much of our time depicted in the video data demonstrates how
we are tracing paths in order to engage different materials, and therefore different worlds. In one
example, Wendy notices something green popping up from the ground at the front of the field
closest to the highway. In my video, I am bending down, looking, and pointing, specifically
attempting to draw a line where I believe a row might be, engaging my body, but not explicitly
tracking through feeling. Wendy, on the other hand, bends down and touches the earth with her
gloved hand, pushing aside sand and debris to see if she can feel the shoots of an onion stalk
somewhere underneath.
Figure 3. Wendy feels a patch of grass with a gloved hand.

Figure 4. Krystin looks at the same patch of grass as in Figure 3.

Tracking, here, is the hidden labor needed to understand from an embodied lens rather than a discursive or ocular one. Because plants and mushrooms do not often show themselves readily, the work of taking care of them involves this kind of intimate engagement. Ramljak argues that such things serve as a transitional stage between interiority and exteriority: “Intimate objects with private parts speak to us in an insinuating, come-hither tone, instead of declaring themselves outright. Coyly introverted forms, they are seductive in their discretion” (188). Things foster such close, personal experiences, communicating private messages in difficult-to-parse ways. These small, almost feminine, intimate plants require closeness for understanding; they are meant to be sensed, perceived with the body.

**Collaboration and Survival**

What also became evident through my interview with Wendy and watching the videos is how humans relate and coordinate with nonhumans in agricultural space. This took the form of interactions with the land and with the bees. Notably, Wendy’s discursive understanding of her
relationship with the bees was a disruption of typical domestication narratives: she related to the bees because they “captivated” or “captured” her, rather than her capturing and domesticating them. She discusses how nonhuman living things on the farm call her to act in certain ways, to follow them in certain ways. When asked about her relationship with the bees, she speaks of them as her mentors and teachers. The bees have knowledge of land and material that Wendy seeks to learn from and with:

> When I stand next to that society of the bees, I feel like if they could speak, I would be asking them questions like, “What do I need to do next?” I’m not—I just feel, you know, beneath that society for sure, and that world out at the property and all that it offers up, I really truly, it’s bigger than me. (Gollihue October 8)

Her relationship with the colony maps onto Anna Tsing’s concept of collaborative survival, where the world contaminates the boundaries of the self in ways that help both humans and nonhumans survive. Tsing writes of new relationships that result from the world encountering itself, especially amidst decay and death, which is the context in which the matsutake mushroom trade emerges:

> Perhaps…we need to tell and untell all our stories of death and near-death and gratuitous life are standing with us to face the challenges of the present. It is in this listening to that cacophony of troubled stories that we might encounter our best hopes for precarious survival. (34)

Wendy’s perspective of a flipped power structure between herself and the bees mirrors the ways matsutake are the result of a dying planet and a dying people finding solace in one another. Amidst grief, financial and emotional precarity, and new agricultural literacies, Wendy sees her encounter with the bees as saving her. While colonies do not need humans to take care of them in
the ways other byproduct-creating animals like cows do, pollinators of all kinds are experiencing massive losses due to pesticide use and varroa mite in the United States. For Wendy to survive, she needs to learn and care for something; for the bees to survive, they need someone to need them.

In the video data, Wendy and I both “bump” against the nonhuman world constantly, and such interactions are seen as collaborations in the production of my research and Wendy’s knowledge. The GoPro’s microphone is sensitive to close-range sounds, so when a bee lands on the camera, the buzzing is visceral. Similarly, when the camera scrapes against the hive box, a vehicle, or another human body, the sound is harsh.

![Figure 5. Wendy works a hivebox in her bee suit.](image)

Wendy and I do not have to be looking at the nonhuman world to sense it: our relationality is through nonverbal, nonvisible, and non-linguistic means. The bees sense our pheromones and react in certain ways depending on whether they can recognize us as belonging or unbelonging. They light on our bodies, which include our heads, ears, hands, and the GoPros, and buzz, just resting, sensing, or waiting. They collaborate with us in different ways depending on the weather, whether they have eaten, or even whether we have eaten. These moments allow Wendy and I to work with the bees to make something, whether that is a colony full of progeny or a hive full of honey, with particular care for the bees’ lived experience in the moment. This is all accomplished through non-verbal, nonhuman ways of communicating: through buzzing and
bumping. When Wendy considers what the bees might want to communicate to her, it is a bodily directive to slow down. She says, “If I work too fast and I feel a little frantic, like I’ve gotta get in and get out, you know, they read that, I think they read that.” These messages are communicated through bodies, through the bees beginning to fan their wings to signal defense and through Wendy’s sensing.

Additionally, there are ways in which the land itself collaborates with Wendy and I to create a deeper understanding of the soil-based making that happens on the farm. In each session, we begin recording at the front of the property, where we have been working to build biodiversity into the soil. In one video, we walk along, our cameras each pinned to the ground, watching our steps.

![Figure 6. Wendy looks at a patch of grass.](image)

What we find are serendipitous plants that had emerged as a result of our concerted efforts as well as some of our mistakes. We stop, stoop down to the ground, handle a bud of red clover that we planted the season before, and stand up again, surveying the whole field. Sometimes, the camera gives a little heave, as our bodies communicate that we are finally seeing the result of our collaboration with the land. Other times, we are simply walking and find something new, something unintentional that popped up from the ground. Garlic seeds from an old field 30 meters away have found their way to the front, and have sprouted scapes. The land is making a new world out of something Wendy and I never intended, but we are drawn to it as we walk,
stopping to examine and learn from the intricate pod that came from the ground’s own practice. This is a clear demonstration of Ríos’s land-based literacies, an extradiscursive human-nonhuman collaboration that results in human learning and plant survival. These nonhuman constellations that we are drawing are emergent, not from a particular goal that we have set in our minds, but a walking-talking-imaging with the land. Every video shows how Wendy and I begin at the front of the property and find our way, somehow, to the back, stopping countless times to pay attention to something the land has popped up for us to pay attention to. The bees direct us in the same way, showing us when we have overstepped our bounds, flying in from one direction so that we see where they are traveling for food. In this way, the farm and our relationship to it is emergent, relational, and most importantly, responsive and educational. It teaches us through our nonhuman interactions how to treat it, how to walk along, upon, and beside it.

**Time and Rhythm**

Wendy’s awareness of how time functioned on the farm is striking. There were many moments in the videos where one or both of us remarked on the traces that my father had left on the property. Wendy described this as the land being a “time-capsule” that she reconnected with each time she walked the property, a term that is reminiscent of Ríos’s argument that land offers a “different orientation to history” where “space, in this case, produces time rather than vice versa” (68).

When I walk across the bridge, that’s a time piece for me. He made it with his hands, as badly as it was made, he made that with his hands and his sweat, and by himself. I don’t think anybody helped him, I know I didn’t…I walk across that bridge and go up on that knoll, I’m always, almost always go to a year ago [when he died]. (Gollihue October 8)
In one video, we are clearing a brush pile together, and I find some old potato plants that Ray had planted that had never grown. When we clear away the grass and find the entire row coming up, we remark on how he would often throw plants in the ground, regardless of appropriate care or season, and they would pop up eventually, a testament to his naturally green thumb. It is in this way that the land is a layering of making histories: the bridge we walk over is built on the broken-up foundation of an old concrete factory; there are traces of Ray and Wendy’s old gardens and projects everywhere; where we composted Ray’s funeral flowers in 2017 is where my mother remarks in one video on a patch of irises that have popped up. The past carries into the present in these moments and creates an experience of time that is all-encompassing and relational, a sensing of multiple times simultaneously.

Similarly, time seems to work differently in different places on the property and through different activities. The videos of Wendy and I conducting a “dress rehearsal” of putting new queens in the hives are very choppy and quick. Their rhythms are confined to a small patch of the land and to very specific activities that are scaffolded; one tiny action leads to another. On the other hand, some videos feel much longer, much more drawn out. We move from the front of the property all the way to the back, stopping to pay attention to something that pops out at us. In these videos, we have no real direction but to be on the land, and the practice that results is much more visibly ongoing and emergent. These moments read onto Fogerty’s description of folk rhythms and machine rhythms, which suggests that so-called simpler craft tools are slower than seemingly more complex machines (369). I would argue, however, that Fogerty’s argument, like many conversations that presume a delineation between high tech and low tech, ignore the fact that there are even more differential temporal arrangements between different materials and tools. At Summerset Holler, time spent with just our bodies is slow, leisurely, and winding. Time
spent with the hive boxes, the spatulas used to remove excess propolis, and the jars of powdered sugar we use to remove varroa mites, all external to our bodies, is both quicker and heavier.

Finally, one of the more significant affordances of the videovoice data is being able to triangulate different practices that occur at the same site but across time.

Figure 7. Krystin looks at the camera.

Figure 8. Ray in his bee suit looks at the camera.

Figure 9. Wendy lifts up a hive frame with bees on it.
Through watching Ray’s videos alongside mine and Wendy’s, I observe what I am calling a *collation* of making practice, where places and movements layer over one another and entangle with each new interaction, producing an interface that stores each of those memories in the material environment itself. The recordings collapse the temporal distance between our movement, making it seem as if we are walking through time as well as space. Wendy mentions this concept in her interview as well:
I can walk through that property and remember when I had the electrician come out there… And I saw a turkey run across the road and there was a time when there was a turkey that – and it was right there where you cross the bridge for the bees, so right in that area, you know? And there was a turkey there years ago, and he would bed down over there and we named the turkey, Dad and I did. So when I saw it run across the road (cries), it was Horst P. Horst (laughs). So dad would tell me, “I saw Horst P. Horst today.” (Gollihue October 8)

These layers suggest that a memory of making is not only embedded in a human mind, but in materials, in practices, and in land itself. In her chapter on perceptual collaboration, Mortimer-Sandilands argues that meaning is a coming-together of body, mind, and world. Using Alzheimer’s disease as a site of inquiry, she argues that memory is situated in the body and landscape (270). In the loss of memory, the first knowledge to be lost is ideas, the last is the knowledge of our bodies. The link between those is land: Mortimer-Sandilands’s mother is able to reconnect with certain ideas and memories through a direct engagement with land (282). For Wendy, while she has not lost her memory, she accesses multiple layers of memory by walking the paths of Summerset Holler and engaging in the making practices of her husband on that land.

**Expertise**

Finally, expertise was a common topic of conversation during Wendy’s interview and was present in the human interactions we could see on the GoPro videos. Wendy was consistently unsure of her expertise on the farm. While she identified as a maker in her relationship to the bees, she identified as a novice in the broader knowledge economy of the farm. She remarks,
I really feel like I’m still novice. There’s just so much more to learn. I see it out there, I see the stuff that needs to be done, but there’s—you know, there’s certain things that I don’t know how to do yet, and so I really feel like in that whole space out there, I’m still a novice, even inclusive of the bees. I’m still doing research, I’m still learning a lot about the bees. (Gollihue October 8)

She mentions other beekeepers that have offered their knowledge to her, referring to the tasks they have already accomplished in their own practice like installing queens or checking brood cells in the frames. While the videos show Wendy and I preparing our own course of action for putting in our new queens, they also show Mark and Trey, our neighbors, showing up unannounced to aid us. Mark interjects, while Trey offers to help put things away or grab tools that we have forgotten. Wendy remarks on these two neighbors’ different approaches to interacting with her: the more involved neighbor just wants to “talk” while the less involved neighbor wants to “help.” Despite those differences, she believes that they both have more expertise than her. When I ask Wendy whether she felt like she knew what she was doing when she watched the videos, she compares her knowledge to others, her husband and her male neighbors most notably. She states,

I’m doing this without your dad. I was taking the lead and the reigns in something that he knew more about because of his first experiences of doing it. I think it made me a little nervous about being confident about what I was doing…Mark’s done this I think maybe three or four times, so taking his input but at the same time, I felt so versed in our process through the two dry runs that in a way it almost was—I don't know, I don't wanna say that, but it was. It was somewhat irritating, his input. But yet his input was vital. And so I know from previous experience…you never discredit someone, especially if they're there
to help you and they have experience. Don't try to do this on your own, listen, you know?

(Gollihue October 8)

While Wendy felt her inexperience in a discursive way—she needed to research more, she needed to read more, watch more YouTube videos, listen to our neighbors, remember what her husband had done, etc.—she did tie expertise to her body. She expressed that it was not until our neighbor began interjecting that she felt doubt about her knowledge of the processes she had already been through. We had embodied those processes the day before during our dress rehearsal, physically walking through the steps, picking up the things we would need to pick up, pretending objects were there that were not. In this way, she delineates between a kind of expertise that is stored in the body versus the mind; the books, the YouTube videos, and the research she has done is discursive and external, whereas her body is lived in and immediately accessible.

In other moments, Wendy discusses the ways her own body is the most reliable source of information and labor, mirroring Anne Frances Wysocki’s discussion of “our bodies—our primary media,” that are constantly emerging within their embeddedness (4). In discussing land management, she notes that she prefers hand methods to using the tractor:

I want to swing the blade. I don’t have anything that will mow anything around those trees like I want to, the base of the trees. I swingblade those. I’ve always done what I feel like I’m gonna get broke down to do anyway. If all of my mechanical equipment breaks, how am I gonna do this without it? Well, I’m gonna swing a blade. It’s the here and the now. My body’s here now, I can do it now. (Gollihue October 8)

I also see this when she discusses her relationship with the bees. She may talk about her need for a discursive understanding of life cycles, diseases, pests, etc., but when she reflects on the
moments she feels most expert at caring for the hives, it is a literacy she enacts through her body in concert with the bees, their structures, and the pathways she must trace to complete the needed maintenance tasks. In reflecting on “learning” the bees, she says,

If I work too fast and I feel a little frantic, like I’ve gotta get in and get out, you know, they read that, I think they read that. There’s times when I watch my hands moving those frames and I’m like, slow down Wendy, just relax, and I’m so nervous sometimes just trying to you know, make sure...I’m getting better, I’m getting more of a method, but not to the point that I wanna be. And so that’s when there’s times when like, I think I’ve even told you, I’m gonna go do it alone today. And it’s because I want to become more proficient at going in, moving my frames, you know, checking things out, and doing- doing all my little maintenance tasks, and then getting out and remembering what I did, what frames I moved, you know, what I saw on each hive. So I’m trying to get a method going myself. And that’s when I like to be alone sometimes. (Gollihue October 8)

Learning her method involves an affective experience of the hives, not one derived from her neighbor’s experience or the books she reads. While Wendy’s stated knowledge of agricultural practice comes from these external sources, it is her own body moving through the motions that tells her when something is working, is right, is certain. An affective relationship where her body listens to the messages the bees send reflects, through the ways the bees sense her bodily affect, her fear, or her anxiety.

Conclusion

The work of the farm gets drawn out through these videos and shows Wendy and I that our labor is embodied, affective, and intertwined with the frustrations of belonging and unbelonging. We are bringing materials together, collaborating with the bees, practicing
resilience, and understanding the land through our bodies. We are accessing different times, the
same movements made by different makers, and different iterations of the same place, where
new plants pop up in old places, places that hold memory. In this chapter, I have attempted to
explain what we can learn when two participants record or observe the same making event, what
happens when human and nonhumans collaborate over materials, and when time and space is
disrupted by and through making. These analyses describe the relationality of making on the
farm and how power structures enter into and in some cases frame those relationships between
humans, other humans, nonhuman animals, and land. In the next chapter, I will move away from
explicitly human making and the video data Wendy has discussed here, instead considering how
nonhumans engage in the transformation of materials into something new, in other words, how
Maker culture is not an exclusively human relationship.
CHAPTER 5: Nonhuman Making on the Farm

In the last chapter, I considered the ways humans in agricultural production engage in various relational, embodied, and material entanglements that indicate a deep critical making practice. In this next chapter, I switch to a discussion of the making practices that occur alongside human movement and production: animal making, environmental making, and technological making. While Wendy and I did not explicitly discuss nonhuman making in our interview, the video data shows many instances of plants, animals, and land drawing material together and creating something new. I will offer examples of these moments from the video and reflect on their significance to the field of critical making based on literature from animal studies, environmental rhetoric, and new materialist scholars. In the following sections, I describe the making of bees and other animals and insects on the farm, the making of both cultivated and uncultivated plants and land, and the making of technology, which gathers data from a variety of sources and creates new knowledge about the land. In showing the ways more than just humans are making in agricultural production, I shed light on how Maker culture misses an important element of critical making practice: the nonhumans that are intimately entangled with our materials.

Animal-Making

The Western honey bee (*Apis mellifera* L.) is one of the most cultivated species of bee in the world. They are social animals, meaning they live and produce as colonies of upwards tens of thousands of individual bees. While honey bees are kept by humans within artificial hives, they live in the wild as well, constructing honey and brood comb in any opening they can (Delaplane). Honey bees gather pollen from a variety of seed plants, including clovers, apples, lima beans, asparagus, buckwheat, cherries, pears, cantaloupes, watermelons, pumpkins, cucumbers, and
berries, but will harvest pollen from any seed-bearing source (MAAREC). Honey bees cooperate as a unit in order to forage and take care of brood (Delaplane). They organize according to three different roles within the colony: the worker, the queen, and the drone. The worker is a female who has not yet reached reproductive maturity, and its job is to gather pollen, create hexagonal cells in which the queen will lay eggs, and clean up the hive. Workers have a variety of occupations, depending on their age in the hive. The youngest worker bees clean the cells of the hive, then move to creating ventilation (heating in the winter and cooling in the summer) with their wings, then feed the larvae of the queen, then practice flying, then move to receiving foraged pollen, then guard the entrance of the hive, and finally achieve their purpose by becoming foragers themselves. Middle-aged and older worker bees come back to the hive at the end of their lives to serve as undertakers – to clean up the dead carcasses of other bees, pests, and parasites (Trumbo et al. 152). The function of the queen bee is predominantly for reproduction within the colony (Moore et al.). Worker bees and queen bees are impossible to tell apart up until the young larval stage. The queen only forms as a result of the workers feeding her a different diet consisting of a substance called royal jelly. Workers will produce this substance if they sense that their current queen is dead or not producing enough eggs. Royal jelly prompts the production of juvenile hormone, which helps queens develop quicker than worker bees. As she develops, she has a longer body, so the elongated, finger-like cell in which she grows is often an indicator to beekeepers that the colony is in need of a new queen. Queens begin mating with drone bees from other colonies within a few days of emerging, known as her “maiden flight,” and as a result develop organs which allow her to lay an infinite number of eggs. While there is a limit to her production, it is directly proportional to how much the workers feed her. Queens emit a variety of pheromones which affect activity within the hive, including inhibiting queen rearing
and swarming, attracting mates, preventing workers from reproducing, and inducing foraging activities in worker bees. In the case of a swarm, the colony has essentially become too large to operate under the natural pheromonal balance. In this instance, the old queen leaves the colony to establish a new colony with a portion of the bees already present. Prior to the swarm, workers will establish several queen cells, cap them, and leave. Once they have vacated, the emerging virgin queens fight to the death or produce pheromones that suppress the emergence of other queens. Virgin queens are often observed by beekeepers through a phenomenon known as “piping,” a high-pitched, electronic droning that is meant to organize her colony and to “announce” her arrival. Finally, drone bees are male bees whose sole purpose is to mate with queens from other colonies during flight. They are generally fatter and have no real purpose other than the successful reproduction of other queens. There are a variety of races of honey bees in the West: Italian, Carniolan, Cacuasian, German, and Africanized, a hybrid bee that is incredibly aggressive in relation to the gentler Italian and Carniolan varieties (Delaplane).

Colonies are susceptible to a number of pests, pathogens, fungi, and parasites, including mites, bacterial diseases of young bees called foulbrood, and pests like hive beetles and wax moths. Colony collapse disorder, a phenomenon where an otherwise healthy colony leaves the hive box and dies, has in recent years plagued hobbyist and large-scale beekeepers, and to date, there is no known cause or solution to the problem.

Honey production, the activity most relevant to human production, is only one part of a colony’s work. However, there are a variety of byproducts that result from the worker bee’s activity. The worker will collect one of two kinds of food: nectar from the center of a flower, and pollen that comes off of its anthers (Australian Honey Bee Industry Council). The worker bee gathers nectar and stores it in its stomach for transfer when she arrives back at the hive. It may
consume some of the nectar through a valve in the sac. In addition, it will gather pollen grains in
sacs that are located on the backs of her legs. The worker bee can carry up to its own weight in
pollen. When it arrives back at the hive, it will transfer nectar to a younger worker bee, and the
nectar will pass between several other bees, reducing its moisture content from 70% to 20%. The
product of this process is honey, and it is stored in cells and capped, to be used to feed brood or
the colony during winter. The pollen is used in a mixture with nectar to create “bee bread” to
feed to larvae. The worker bee will then clean itself and start the process again. Other byproducts
of the colony that have been used by humans are royal jelly used to develop queen bees and
propolis used to cap cells and smooth out inconsistencies in the architecture of the hive (Friedel).
Propolis operates much like a resinous glue and when hardened is incredibly strong, sometimes
cementing hive boxes together. It is made by combining the sap of different trees with beeswax,
another byproduct of colony activity that is used to build out the comb of the hive (MAARC).

Bee production is incredibly complex work and colonies are highly organized around that
work. I want to suggest, however, that what we observed in the hives at Summerset Holler was
more than just work; it was making, and perhaps even critical making, critical in the sense that
there is perception and translation of the world involved in the process of making honey. In
Rhetoric in Tooth and Claw, Debra Hawhee examines how animal presence and production has
been seen by theorists as an absence of logos. “Animals return time and time again in rhetorical
texts,” she writes, “carrying lessons, calling forth, engaging, and shaping humans' beastly sides,
serving as partners in feeling” (4). Animals “show what then gets told,” suggesting that in
ancient rhetorical texts, animals are still engaging in critical perceptions of the world by showing
humans how the world works (5). Hawhee describes how Aristotle’s construction of logos and
alogos has been theorized as a binary, but that alogos grammatically suggests not the lack of
thought but a different kind of thought, a critical sensing (13). Animals structure rhetoric through their ability to carry sensation, whether emotion, sound, expression, rhythm or movement. I propose, then, that animals engage in critical sensing of the world and do so through a process of material making. In particular, bee colonies are a stark example of complexity in design and production. So much of their making is done through the sensing that Hawhee describes, through pheromones and feeling sensation across the hairs of their legs and backs. It is through this sensing that they are able to gather materials together to produce something new.

I can see this at work in the videovoice data that Wendy and I produced, especially in late April and May when the queen was reproducing at a fast pace and the hive was visibly busy. We take out one frame in the lower hive box that seems to have a large number of bees on it, an indication that the queen is there and being protected by workers. When we pull the frame out, we see that the bees have formed a “pancake” of comb, an irregular protrusion that makes it difficult for the beekeeper to remove the frames without doing damage to the hive.

![Figure 13. Wendy lifts up a hive frame with pancake comb on it.](image)

Such a formation suggests that the frames were too far apart and the bees compensated for the extra space in the hive box. Their making of beeswax to produce the comb, propolis to seal the honey, and drone cells depicted here all are an indication that they were sensing the world and making within the constraints they had. This was not only rote production, but a creative appropriation of space. Colonies are known to produce comb anywhere they will fit: inside of a
car frame, up a tree, or even in the crawl spaces of a house. Here, the bees were sensing the world around them and translating that through the materials of their production.

While bees produce many things other than honey, honey is a readily-available example of how bees transduce materials into something new and different. Levi-Strauss, in discussing bee societies and science mythology, argued that while many see honey as a raw product, meaning it has not been processed, it is more aptly described as cooked, a sign that bees are using some kind of genetic recipe to do more than simply gather (289). In discussing their posthuman framework for theorizing apiculture, Richie Nimmo writes,

    The cooks here are non-human, and in this sense honey is still categorised as 'natural' because, apart from the work of managing the hives and periodically extracting the ready-made honey and putting it into jars, no human labour enters into its production; the alchemic work of converting nectar into honey is performed entirely by the bees. (188)

Nimmo’s analysis of bees’ “alchemical work” suggests that there is some kind of creation occurring in the production of honey, not just replication of materials, and that humans do not have to play a part in it for it to be a composition. As an example, the honey on Summerset Holler varies from season to season, depending on what local flora are available to the bees. In 2018, we planted two cover crops, crimson clover in the Spring and buckwheat in the late Summer. The honeys produced are very different: the clover honey is light in color and light to taste, while the buckwheat honey is dark in color and almost has a maple syrup or molasses taste. While these productions are not intentional, there are plenty of examples of Maker projects that were not intentional either; my own work on the Bare Conductive Touchboard resulted in sensory and sonic productions that I did not hardcode into the materials (Gollihue “Towards”). Marx famously writes in Capital that, “what distinguishes the worst architect from the best of
bees is this, that the architect raises his structure in imagination before he erects it in reality” (284). However, intentionality does not need to play a role for design and imagination to be present. The differential quality and taste of the honey our bees produce suggest that intention does not have to be apart of making; the Maker movement has even argued for the value of play and emergence in Maker production. But this difference in product determined by a different foraging pattern also suggests that bees are using the same processes in different environments and producing unique things out of each material entanglement.

The paths the bees take to different plants are indicative of the relationality I discuss in Chapter 4 on human making. As Nimmo writes, “Agency is not an exclusive property of human beings - in fact it is not a property of entities, but must be understood as relational,” meaning that intentional creation is an outcome of the whole, not of individual makers (179). Bees do not exist as individuals, but as colonies, and beekeepers do not have relationships with individual bees, only of the colony as a single making entity (187). The activity of a hive is the activity of a collective, moving together and taking care of one another for one purpose: to produce. In fact, bees are unique in this aspect, at least in relation to humans:

Other animals produce things of value to humans, but not through such highly organised collective activity that lends itself so easily to being categorised as 'work'; and other animals produce things through highly organised activity, but not things that are highly valued by human beings” (Nimmo 188).

Bees’ relationality is so totalizing that it is unrecognizable to humans; it does not fit within our, or at least Western, understandings of work, control, and creativity. While beekeeping is categorized as a livestock husbandry practice, bees are far from domesticated in the same ways sheep, cattle, or goats are. Our relationship with them is one based in trust, which Nimmo argues
is an offering without the expectation of anything in return (190). While beekeepers would like to see honey at the end of the process, we are mostly embedded in the immediate survival processes of the colony, of tending to the reproductive practices of the queen, of staving off pesticide poisoning or mite infestation. I highlight the collective nature of the hive in relation to the beekeeper to show that relational accountability is also a factor in nonhuman making practices. The individual bee is accountable to the whole; the beekeeper is accountable to the hive. This respect and trust is produced through an ongoing process of understanding the particular colony and their particular needs at any given place or time.

Finally, I want to highlight the morality of the colony and its role in their making practices. Beekeeping is a unique practice in that the success of the colony is completely irrelevant to the beekeeper’s involvement in the hive. Nimmo writes that

Kept honeybees are domesticated insofar as beekeepers routinely make interventions into their reproductive processes, enabling them to manipulate the rhythms of the colony, aiming, for example, to inhibit the occurrence of colony division through swarming and thus promote uninterrupted honey production. (186-187)

This suggests that the hive has its own cultural logic that is intervened upon by the human beekeeper. These logics do not make sense to us, as they operate through pheromones, sounds, and environments we do not have access to. Their semiotic resources – the tools they use to make sense of the world – are not only different from ours but relatively unknown to researchers of apiculture. For example, little is known about the pheromones the queen uses to suppress the reproductive hormones of workers so that she is the only individual to lay eggs. If the goal is to make more bees, why would a colony not want to also have all the resources possible to carry out that act? We could argue that the morality of making in the hive is not “open source” and
“democratic” as in the Maker movement because such suppression maintains the balance of nature. But we cannot know because we do not share the same communicative mechanisms as the honey bee. Further, the morality of the colony is most visibly that of the collective, an ethic that at times pervades histories of human making, and at other times is supplanted for more individualistic rhetorics. Nimmo writes that bees “do not concern themselves with the health or welfare - let alone the 'rights' - of any individual bee; every individual is a manifestation of a multitude, the colony” (187). This multitude is the institution that structures not only the hive’s making practices but also the beekeepers’ engagement with those practices. The morality of bees is constitutive of their critical sensing and making, just as our own morality of farming institutions, gender, expertise, and work create the plane on which human making at Summerset Holler can occur.

While the bees are of central concern for this section and this study, I want to suggest that there are other animals that make on the farm. At one point, Mark brings his dog Neo up to the hive boxes to help him get acclimated and to ease his anxiety over being stuck in the car. Neo’s barking is clearly sensed by the bees, who increase the fanning of their wings and become more agitated as soon as he arrives.

In other videos, my dog Woody runs across the dirt, kicking up sand and creating new places for plants and insects to reside. In other, faraway places in the Croatan forest, where our property

![Image](image-url)
line ends, beavers and nutria are making dams, homes and food for their families that also create new rhythms in the waterways. While honey bees are the pollinators we help cultivate, other pollinators – carpenter bees, butterflies, and dragonflies – dart around us, sensing and making the ecosystem. It is important to note that these animals are often at the edge of the frame, or are not even pictured, not entirely visible but still contributing to the ways making happens on the farm. I end this section with a simple note on these other nonhuman making practices, acknowledging that they are important in the making of worlds, but that other work is needed to examine their particular roles and critical sensing/making practices.

**Technology-Making**

I turn now to the second set of nonhuman making practices that were involved in this study, that of technological making. Here, I discuss exclusively digital technologies such as the GoPro and mobile phones, but other machinery like the tractor and our vehicles are also engaging in a making practice. This section will discuss the particular ways that the technology at Summerset Holler helps structure our making practice, how it makes our making possible. In the next section, I will move one step further and discuss the ways land and environment make the world in which humans are able to tinker and create.

The first instrument of technology we used at Summerset Holler was for this study, the GoPro cameras that structure the data of Chapter 4 and parts of this chapter. In her analysis of material entanglements, Karen Barad argues that the measurement of data, not necessarily data itself, creates the conditions for emergent realities. Our instruments read back our data to us and have particular ways of framing our world. The research tool is a “dynamic (re)configuring of the world,” meaning that measurements are not representations of things but *are* things, phenomena that result in certain realities played out in certain terms (816). The GoPro
technology used in this study produces a specific frame of making; it *makes* making through its particular translation of light through the lens and onto a microchip that converts what is seen into binary code. There are several layers of making occurring here: not only the framing of reality, but the production of image through gathering light data and using digital materials to produce something new. Just as Wendy gathers her tools and makes on the farm, just as the bees are producing honey from pollen and nectar, the GoPro makes this research from a set of physical materials.

In addition, Wendy and I use other technologies to help us produce on the land. In one frame of the videovoicete data, she checks the weather on her phone, which gathers geographic location data and information from the National Weather Service to produce a readout of an approaching storm. This interaction helps create the field on which we can engage our beekeeping practice. If the storm lands while we are out at the hive boxes, the bees will become agitated and potentially fight us as we open up their hive. If the storm clears, we have the ability to move forward in our process. This is not a simple tool for us to use to make our practice more efficient. As Barad argues, the weather data is a material entanglement that assembles our practice for the day. I also use a geotracking application that allows me to drop a pin on a map wherever I find something that I want to return to at a later date. This application gathers location data along with my own perceptions and structures other making events, where I might return to that location and gather a wild plant or edible mushroom. The making here is not picking the plant, but the network of practices that allow for a particular space to emerge where materials can come together to be produced.

These technologies are nonhuman makers who play a significant role in our human making practice at Summerset Holler. Their making, however, is more akin to how a
Makerspace might be built in order to provide the foundations for critical making practice. These Internet- and electronically-enabled devices structure space, time, and information so that Wendy and I, as well as the bees, might find new materials or new ways of bringing materials together. In short, these technologies help make making. As I will discuss in the next section, relationships with such fields of experience are integral to a relational making practice, whether those fields are physical land or incorporeal digital space.

**Land-Making**

As discussed in Chapter 4, the land on which Summerset Holler sits is steeped in history and feeling for Wendy and I. Plants produce a specific kind of making relationship with the land that make the gathering of materials into a memorial practice. They are also small and inconspicuous things that structure a closer, more intimate relationality with the land, requiring a softer and more careful touch. But plants are also makers themselves, sensing and synthesizing materials to grow and to reproduce. The process of photosynthesis is one of gathering sunlight and carbon dioxide to produce growth and oxygen. Plants will sense these materials out in the world, and while they are not mobile, they have physiological reactions to the location of the sun or to the amount of carbon dioxide in the air. Anthropologist Natasha Myers has studied the lives of plants through a socio-cultural lens and has found that a variety of plant practices are highly coordinated and complex arrays of sensing the world. In one case study of a plant sensing lab, they were told, “Even as they can grow, move, and sense from so many distributed nodes, [plants] cohere in a way that suggests that each root tip is connected to the meristem of each growing branch or bud” (37). Tomato plants can sense different kinds of light that reaches through clouds, row cover, and other leaves (36). Sunflowers track the sun and prepare themselves overnight to be in positions in the morning where they can receive the most light.
Male orchids throw off their stamens at passing bees, which corrals them to the female flowers to pollinate. Pollination itself is an interspecies making: the bee gathers the pollen from flower to flower, leaving traces of it behind. It returns to its hive to start the process of honey production and the plant reproduces. While not plants, fungi engage in a similar practice of pulling nutrients from decaying soil and producing fruiting bodies. While these practices are centered around reproduction, they still demonstrate how nonhuman living things are sensing the world and making from it.

Plants also operate in the same ways as technologies in that they structure the plane of experience on which making takes place. Tsing writes of the ways mushrooms “extend themselves in nets and skeins, binding roots and mineral soils, long before producing mushroom” (viii). They are sensory living things that produce fruiting bodies outside of the controlled framework of industrial capitalist agriculture. They make the seasons perceptible through their pungent apricot and rotting leaves smells. Mushrooms are not the cause of seasons, but they do make the landscape on which seasons are produced and experienced by humans and nonhuman animals. Other plants like poison ivy affect human and nonhuman animal movement across space, blocking intervention and gathering in order to provide shelter for the forest to renew itself. And still other plant species are resilient in their making; they lie dormant underground, popping up when the conditions are right, when the warp of the sun and weft of the rain leave an opening for something to emerge.

Finally, land and environments are agents of making, as they produce the possible material entanglements that might exist between humans, nonhumans, and nonliving things that result in a momentarily stable thing. For example, the floods that plagued Summerset Holler during Hurricane Florence in late 2018 restructured the waterways and pathways that humans
and nonhuman animals took to access certain places and gather certain materials (Gollihue April 1). Not only that, but the floods changed the material makeup of the landscape to allow for certain plants to grow and to decimate other environments in which other species could thrive. Tornadoes, while destroying habitats for some, broke apart the pine trees, making sunlight where once there was not, creating piles of wood that served as the foundation for new species to arrive and take hold. While the force of a tornado is devastating for many humans and nonhumans, restructuring our understanding of what material entanglements do in the world suggests that such phenomena are making new foundations for making.

This brings me to a discussion of the role of nature and morality in our human-nonhuman making relationships. In discussing the ways environments distribute themselves across bodies, Stacy Alaimo argues, “Wilderness may well be defined as nature's ongoing, material-semiotic intra-actions - actions that may well surprise, annoy, terrify, or baffle humans, but that nonetheless are valued by environmentalists as the very stuff of life itself” (249). Nature is an agent: “it acts, and those actions have consequences for both the human and nonhuman world” (Alaimo and Hekman 5). Alaimo’s transcorporeal ethics drives our attention away from a blank-slate conceptualization of the wild and towards the kinds of environmental and bodily dwellings that are mutually constituted. In that, we must reckon with how human belief about attention, agency, and intention meet up against nonhuman morals. In discussing multispecies kinships, Donna Haraway writes,

Nature is not just a physical place to which one can go, or a treasure to fence in or to bank, or an essence to be saved or violated. Nature is not hidden and so does not need to be unveiled. Nature is not a text to be read in the codes of mathematics and biomedicine. It is not the Other who offers origin, replenishment, and service. Neither mother, nurse,
lover, nor slave, nature is not matrix, resource, mirror, or tool for the reproduction of that odd, ethnocentric, phallogocentric, putatively universal being called Man. (158-159)

In the same ways that bee morality dictates a different relationship to material production, I argue that we should consider our conceptualization of environment and Nature in light of the ways our own intentions structure the possibilities of nonhuman land-making. When we remove our desire for digital tools, for open source knowledge, for a making-for-its-own-sake and do-it-yourself-instead-of-with-others ethic, we open space for new desires of making, including the desires of land itself.

To end this chapter, I want to suggest that this notion of morality drives our understanding of making. Throughout the rhetorics of Maker culture, there resides a strongly-held belief that making is a uniquely human act, with intention, individual agency, and desires to be whole or complete, or to share with others. But plants, animals, and technologies do not have morality, or at least do not share the morality we have constructed through long histories of manufacture and handmaking. Nonhuman makers have drives, potentials, senses, but these do not fit within our definitions of material making, not only the material gatherings and assemblages we engage in, but the philosophies and morals that structure our institutional making practices. Our own human drives come from our heads and our hearts, not necessarily our genetics. Despite Maker figures arguing that making is inherent to what it means to be human, making is perhaps more inherent to nonhuman living things; it is quite literally built into their DNA to gather materials and make something new (Hatch 2). To make a Makerspace, therefore, scholars and practitioners must pay closer attention to these nonhuman makers who make alongside us and build the structures and materials that allow us to create. In the next and final chapter, I will return to the claims and moralities of the Maker movement and suggest ways
that we can work with humans and nonhumans, in specific times and places, to create new institutions of making.
CHAPTER 6: Toward a Relational and Embodied Maker Ethic

In this dissertation, I have developed a critical understanding of critical making in academia and the Maker movement in corporate and public society. I have shown how makers have a complex history tied to Humanist separation of the mind and body, automation during the Industrial Revolution, and the increasing devaluation of supposedly feminine technical practices. I have also shown how the Maker movement relies on a versional history of technology that erases the multimodal and technical literacies of marginalized people prior to the Web 2.0 revolution in the early 2000s. I have argued that making can no longer be functionally defined through tools, as those tools come steeped in power structures that relegate women’s and people of color’s making practices to the margins. I suggested a methodological orientation to critical making research that is centered in the cultural rhetorics of makers: apprenticeship, embodiment, and tracing. Finally, I have considered agricultural space in light of what Malea Powell has called a “Makingspace”: a place where makers are intimately entangled in their cultural and material relationships, including nonhuman relationships, where the goals of making are equally to make community through material practices.

In this conclusion, I return to the major claim of this dissertation, that the making practices of often marginalized communities meet the definitions the Maker movement has used to create boundaries around who and what gets to make. In the following sections, I will return to the manifestos that Maker communities have used to define themselves, namely Mark Hatch’s claim that Makers make, share, give, learn, tool up, play, participate, support, and change. I will consider how our practice on the farm meets these imperatives and complicates them in ways that shed light on the flippant, sometimes imperialist vision of making that more privileged makers carry out. I will end this chapter with a call for more culturally inclusive Makerspaces
that build their practice through foregrounding relationality and accountability. I propose a strategic plan, complete with mission and vision statement, core values, and long and short term objectives. These elements can be applied to classrooms-turned-Makerspaces, library Makerspaces, and other spaces aimed at building community through multimodal, restorative, and relational practice.

Make

Making is fundamental to what it means to be human. We must make, create, and express ourselves to feel whole. There is something unique about making physical things. These things are like little pieces of us and seem to embody portions of our souls. (Hatch 1)

Agricultural production in this study is a creative act, one that involves the negotiation of interiorities and exteriorities. We are producing multimodal compositions through the activities of the farm: colonies, honey, vegetables, and occasionally machines or appropriations of machines. Agriculture is a relatively new human practice, so it complicates the notion that making is inherently human; we have not been farming for the entirety of our existence, but we have been gathering environments and bringing them together to make something new, different, and/or useful. While Hatch and other leaders of the Maker movement have argued that making is an inherently human practice, agricultural production demonstrates how making is also a nonhuman practice, one that integrates animal production, plant production, and technological production. It reveals the ways nonhumans are integral in a making practice. More than that, farming suggests a flexible intentionality in nonhuman’s engagement with making. As Jane Bennett has suggested, nonhumans engage in a distributive agency, which “does not posit a subject as the root cause of an effect” with “an advance plan or an intention” (31). She argues that
there are instead always a swarm of vitalities at play. The task becomes to identify the contours of the swarm, and the kind of relations that obtain between its bits…this understanding of agency does not deny the existence of that thrust called intentionality, but it does see it as less definitive of outcomes. It loosens the connections between efficacy and the moral subject, bringing efficacy closer to the idea of the power to make a difference that calls for a response. (32)

Hatch’s definition of making suggests a definitive and moral intentionality, but agricultural production reveals that making is much more distributed and involves different moralities – the intentions and goals of things that are outside of ourselves but no less apart of our material entanglements.

Share

Sharing what you have made and what you know about making with others is the method by which a maker’s feeling of wholeness is achieved. You cannot make and not share.

(Hatch 1)

As has been discussed, sharing materials and knowledge plays a significant role in the practices of the farm. Wendy’s literacy practices on the farm are wholly dependent on the networks of material knowledge that immediately surround her and that are accessible through distributed networks. She relies heavily on her neighbors Mark and Trey for labor, knowledge, and machines she does not have access to, but she also has found networks that are less laborious for her to engage with, peer mentors and elders like Sharon and the master beekeeper her and Sharon meet with regularly. She reads instructional documents, watches YouTube videos, and has made contact with the local cooperative extension office to help her with land management, itself a distributed network that translates the central node of academic knowledge for use at the
community level. These are all practices that Makers of the Maker movement engage with as they share knowledge and materials. Despite this important practice of sharing resources and knowledge, many making communities, including farms, are intimately and perhaps even coercively apart of competitive networks of capitalism, in which the very self-reliance that defines the Maker movement requires a conservation of knowledge. Arola and Arola have also argued that there is an ethic to appropriation: “The world is not full of concepts just waiting to be plucked from their contexts” (219). To share and take without an acknowledgement of the cultural and material entanglements from which knowledge comes is to ignore the very foundations of that literacy. If a farmer takes too much of a plant or a mushroom, nothing grows in its stead; this helps us theorize in new ways how sharing must not only be reciprocal, as Hatch suggests, but respectful and accountable.

Give

*There are few things more selfless and satisfying than giving away something you have made. The act of making puts a small piece of you in the object. Giving that to someone else is like giving someone a small piece of yourself. Such things are often the most cherished items we possess.* (Hatch 1)

The gift economies of the Maker movement are an interesting claim, as they simultaneously suggest selflessness and self-reliance, even feeding into settler-colonial messaging like, “Do it because you can.” Making on the farm is also framed around gift economies, however, I argue that the videovoice data of this study suggests the impetus for giving in farming is survival. Farmers know that their precarity requires needing from others, so while the Maker movement operates a gift economy from a place of having, farming communities are often giving because they do not have. As an example, Mark and Trey share
their knowledge willingly with Wendy, often out of respect for Ray, their late friend (Gollihue April 1). They may also have a business venture in mind that Wendy’s property, which may be able to grow different species because of its proximity to water, can afford. The giving networks of farming communities are much less selfless than the claims of the Maker movement, in many ways because farmers do not have much to give in the first place. Factoring in gender into this equation compounds the precarity that makes giving less feasible. As Carolyn Sachs writes, “Women produce the majority of the world’s food, but they share limited control over, ownership of, and access to land” (45). Women and minority farmers, therefore, may have to preserve what little they have to survive, or at least choose wisely in whom they share with. For example, Wendy is much more comfortable sharing with Sharon and her mentor because they have demonstrated precarity of their own. While giving is much more complicated and precarious in farming communities, I argue that Hatch’s claim suggests a privileged positionality, and that if the Makers of the Maker movement were situated as not having agency in the ways marginalized makers often are, that this claim would be somewhat different. More research is also needed to determine whether this giving spirit is a functional ethic of the Maker movement; as I have argued early in this work, Makerspaces are often constructed out of a specific rhetoric that does not play out in real life.

Learn

You must learn to make. You must always seek to learn more about your making. You may become a journeyman or master craftsman, but you will still learn, want to learn, and push yourself to learn new techniques, materials, and processes. Building a lifelong learning path ensures a rich and rewarding making life and, importantly, enables one to share. (Hatch 1)
Hatch’s directive to always “push yourself to learn” is again an ethic of the Maker movement that maps to other making communities, but in counterintuitive ways. As a member of a Makerspace or Maker community, a person will likely have progressive access to newer technologies. Few Makerspaces exist in rural communities, and those that exist for underserved or marginalized communities are often still inaccessible due to monthly fees. Learning, again, is a kind of privilege that Makers have, already being integrated into institutional networks that have resources at their disposal. Farming communities are also always pushing to learn, as demonstrated by Wendy’s enthusiasm to learn from a variety of sources, including humans, formal and informal instructional texts, and even nonhumans. But this “lifelong learning path” is always in the shadow of progress that threatens to subsume cultural practices. Farmers learn because they have to, because available land is scarce, and because the agricultural technologies that big business farms use are constantly creating market competition that is almost impossible to meet. Despite this need, many “ag-tech” practices are in fact derived from older practices; farmers in Southeastern North Carolina, for example, are expected to pay thousands of dollars a year to maintain organic certification when many were never able to afford pesticides in the first place (Hunt). Learning is absolutely an ethic of other, marginalized making communities, but those of us who study critical making must recognize that following new literacies is not simply about knowing and having more, but about maintaining and surviving.

**Tool Up**

*You must have access to the right tools for the project at hand. Invest in and develop local access to the tools you need to do the making you want to do. The tools of making have never been cheaper, easier to use, or more powerful.* (Hatch 2)
Hatch’s directive to “tool up” demonstrates at least one reason why Makerspaces are often functionally defined through tools rather than practices. While a DIY ethic pervades Maker communities, those relational practices are not as concrete as a definition based on tools. To “tool up” makes it easier for Makers to organize and coalesce in specific space and time, but that also ignores the very real ways that tools can serve as affective specters, materially reproducing the power structures that relegate belonging to male bodies only. While there are many possibilities for Maker tools like moisture, light, and other sensors to be used in agricultural production, they are still inaccessible to the vast majority of people due to their place in academic and corporate networks. This does not necessarily mean that farmers do not also “tool up”: each Winter, the local farm and feed store in Carteret County receives countless orders for seeds, machines, and fertilizing or watering implements. Again, the tools of these making practices are often tools of survival or resilience, tools that a producer might need to “re-up” in order to save themselves from natural disasters, tariff conflicts, and disease and pests.

Play

*Be playful with what you are making, and you will be surprised, excited, and proud of what you discover.* (Hatch 2)

I have already discussed the ways the Maker movement’s claim to play and sharing requires a level of privilege rather than precarity; farmers rarely have time to play, and this is demonstrated in this study in the fact that Wendy uses her off days from her regular job to work the land on the weekends (Gollihue April 1). There is an ethic of risk in Maker culture that cannot apply to many other making practices because those communities do not have the space to take risks. However, there is an ethic of experimentation, of figuring out what works with the given material and semiotic resources. Wendy’s own practice centers experimentation, as she
does not have the formal training to fall back on. As an example, she has used copper taping in the hive boxes to mitigate the risk of varroa mites, a parasite that has wreaked havoc on bee populations in the United States. She has no academic learning associated with ionic properties or the biochemical reactions that might keep varroa out of the hive if copper is present, but the strategy demonstrates an appropriation of other knowledge about copper IUDs and copper being used in photographic processes, that the element keeps microorganisms from invading. While play is not always possible on the farm, experimentation is constant, as both the need for newer solutions to more devastating problems and the lack of access to resources increases for people in rural America. Further, Hatch’s claim that play is at the center of Maker culture suggests at the very least an attention to the immediate material entanglements in which makers find themselves.

**Participate, Support, and Change**

*Join the Maker Movement and reach out to those around you who are discovering the joy of making. Hold seminars, parties, events, maker days, fairs, expos, classes, and dinners with and for the other makers in your community. This is a movement, and it requires emotional, intellectual, financial, political, and institutional support. The best hope for improving the world is us, and we are responsible for making a better future. Embrace the change that will naturally occur as you go through your maker journey. Since making is fundamental to what it means to be human, you will become a more complete version of you as you make.* (Hatch 2)

The final three goals of the Maker movement, according to Hatch’s manifesto, is to participate, support, and change. These practices resonate with a cultural rhetorics framing for making, one that centers embodiment and relationality in material and cultural relationships. Not only is making about creating space for relationships to form and strengthen, it is also a place to
be changed by those relationships, to be called to support those practices, and to continue participating, supporting, and changing beyond the individual making event or making project. Maker culture’s call to support other makers in material and immaterial ways suggests that the institution recognizes its limitations and has hopes of being more flexible and inclusive. But think pieces like *The Atlantic*’s “Why I Am Not a Maker” are more and more common in both the public and academic sphere, shedding light on how individuals resist or leave Maker institutions and call out their toxicity and exclusivity. Farming institutions have a similar issue with their adherence to masculine, white, “good old boy” institutions, but farmers of color and female farmers are actively seeking out and creating inclusive communities that participate in relational making, that support one another in financial, political, and emotional ways, and that embrace environmental and societal changes that make them better farmers and better community providers.

**A Note on Nonhuman Making**

Because a significant contribution of this dissertation is showing how nonhuman animals, environments, and technologies are also engaging in making practices, I end this analysis of Mark Hatch’s manifesto by addressing how nonhumans play into the claims of the Maker movement. So much of what Hatch and others have claimed for Maker culture revolves around an ideology or morality that pushes for open source knowledge, individual production, and tool-based literacies. But these perspectives do not hold up in the same way when applied to nonhumans. Individual honey bees do not exist outside the collective; plants are secretive and sometimes protective of their making while environmental forces like tornadoes are more “giving” (and in that, more destructive). There are boundaries to participation, support, and change – these practices may seem laudible, but they carry a small trace of the Humanist’s
imperialist drive to control and dominate by knowing the Other. Nonhuman animals and environments above all else demand respect and trust, are not always reciprocal but sometimes are, and do not make outside of relational and embedded systems of production. While this study has focused mostly on human and nonhuman animal making, I call for scholars across the fields of critical making, media studies, and environmental studies to consider the ways our ideas about material production and making cultures separate us from the foundations and structures of our making and their own moralities and drives. After all, we cannot make without making space, and it behooves us to consider what space wants to make, how we can or cannot integrate our own practices with the distributed agencies of land and environment.

A Strategic Vision for a Relational and Embodied Makingspace

The following is a shortened strategic plan for what Malea Powell has called a Makingspace, a space for making that centers bodies, relationality, accountability, and the myriad ways an individual, local community practices making. As I have argued, Makingspaces must reflect the relationships of a specific place and community, as cultural practices are derived from specific relationships with the people, ideas, concepts, and land. This Makingspace is a strategic vision for Eastern North Carolina, a coastal community whose practices come from histories of fishing, boat-building, weaving, quilting, and agriculture. A Makingspace need not simply replicate the practices that already exist among the community, but support those practices with resources not readily accessible. Important to an Eastern North Carolina Makingspace, as well, is literacy-learning opportunities that will help community members re-imagine their traditional practice within modern contexts of technological progress, climate change, and increasing development along the coast. It is a paradox within the community, but
an important one to consider when structuring community space: that we resist progress but know how much we need it.

I have developed the mission, vision, and core values of this hypothetical Makingspace, which I call Rural Lab, out of an embedded relationship to the community, my community, as well as continued conversations with community members and leaders about what questions or problems might be answered with such an initiative. It is integral to the creation of a Makingspace that technology and progress not be used as an intervention, but built from the ground-up, by and for the community. Additionally, such an approach and strategic vision might be useful for other contexts such as library Makerspaces, multimodal and digital classrooms, and other spaces where formal and informal learning interact. Students bring literacy practices to the classroom, whether they are extracurricular digital practices like social media and test messaging or cultural practices like those I have listed above. I provide guiding questions for how administrators and organizers outside of an explicitly nonprofit or corporate network might approach their own institutional spaces in their own communities. These guiding questions are developed from participatory action research methodologies that center participants’ own knowledge and desires in the production of knowledge and action-oriented solutions (Pain et al. 2). The goal of this strategic vision is to move the present conceptual discussion about making from theory to praxis, to a potential for a relational and embodied maker ethic.

Rural Lab’s Mission

1. What problems does our community face?
2. How does making solve them?
3. What barriers do we face in accessing the resources we need?
4. What barriers do we face in accessing knowledge we need?
5. What interventions from non-community members are helpful and what are not helpful?

Rural Lab is an organization that offers free access, literacy, and community to makers in Eastern North Carolina. It mobilizes people to practice the crafts that have been passed down to them by their families and neighbors, and to learn new techniques and technologies to help them achieve their learning and economic goals.

Rural Lab’s Vision

1. What kind of world do we want to live in that can be structured by a common place to make?
2. Why do we want to make?
3. How do we support each other?
4. What kinds of relationships do we want to foster?
5. What does success look like?

Rural Lab’s vision is that every person in our county can have a safe place to find community, make things, and learn, produce, and tinker according to their own goals.

Rural Lab’s Core Values

1. What does it mean to be apart of this community?
2. What does this space offer that other spaces have not yet provided?

**Kinship:** We value the kinds of connections and relationships that are built between people, things, and the land through making.

**Resilience:** We have survived many things as a result of our ability to make.

**Local:** We are accountable to every member of our community, from the bottom up, including the woods and beaches we call home.
Rural Lab’s mission statement specifically foregrounds several elements important to community members in Eastern North Carolina: low-cost access, new places to learn, and a sense of community that is grounded in tradition. It also centers people’s already-lived practices while offering resources to develop new skills or make for profit. Because the community has a long history of agricultural and maritime practice, the make-for-its-own-sake mentality of many Makerspaces will not apply. Community members need to be assured that they can have a purpose in coming to Rural Lab and will be supported in developing or supporting small businesses or production for the market. While this may operate in some ways as a business incubator, the language of innovation and entrepreneurship is often seen by coastal communities as an intervention into their way of life. It is for this reason that the strategies used by Rural Lab must center community over technological progress and give space for a less direct path to learning.

Rural Lab’s building, programming, codes of conduct, tools, donor or patron relations, and any other programmatic, developmental, or strategic work must be done from the ground up, because such work must be both relationally accountable and directly embedded into the lived realities of the humans, nonhumans, and land that it serves. This dissertation has been an attempt at showing how Maker culture, the Maker movement, and critical making methods in research environments are not embodied or accountable, how they have elided the long histories of multimodal practice by women, gender and racial minorities, working class people, and global makers. Moreover, these movements reflect a broader problem that affects marginalized communities, including my own: that technology is supposedly an intervention, but in reality carries with it the traces of imperialism, settler-colonialism, gentrification, and extraction. How do we resist such totalizing narratives, of both making and of technology? And how do we
actualize those not-so-new stories of making, building relationships with our own communities, our own practices, and our own nonhuman collaborators, providing material support for the spaces that are already making and making community? I argue that an approach to making that centers relationships over tools at least begins to answer some of these questions, by showing that there are countless already-extant communities of makers living at the margins, just there, at the edge of the frame.
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