A Will to Experimentation:
Ecologies of Practice and the Workings of Design

by

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ABSTRACT

This thesis examines the work of three artists—Beatriz da Costa, Tomás Saraceno, and Andrea Zittel—whose practices engage strategically with design in ways that echo pedagogical developments at the German Bauhaus and later at Black Mountain College. These two, short-lived, schools were known for an integrative approach to art and design that concerned ideas of form, perception, and ecological thinking. I trace the radical potential of form and creative experimentation emphasized by these schools, and that da Costa, Saraceno, and Zittel produce experimental forms that require a slowness of perception to grasp, as they alienate us from social and ecological relations under capitalism. I thus consider the value of form for its capacity to speculatively expand our conception of daily practice *beyond* these relations by attuning us, however momentarily, to other ways of living and relating.

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This is a project that is especially concerned with pedagogy, which includes how we teach and learn on a daily basis outside of the university. I therefore owe everything to my parents Josée and Brad, my other teachers, for their support, generosity, and taste, as well as for always prioritizing a sense of openness and intellectual curiosity without which none of this would be possible.

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OBJECTS OF ATTENTION

"Each exercise is explained and illustrated—
not to give a specific answer,
but to suggest a way of study."[1]
-Josef Albers

In his introduction to *Interaction of Color*, Josef Albers warns against the definitiveness of a straightforward answer to questions of form. Instead, it is the process of arrival—the method of study—that is upheld as a site of value. It is with this lack of finality in mind, as well as the value of process over product, that I begin here. This thesis is not an instruction manual providing straightforward solutions to complicated questions. It is not, in the sense of Albers's own teaching, providing concrete blueprints that are to be systematically followed. Instead, I would like to consider what follows as a series of three provocations regarding artistic methods in times of ongoing crisis. In the case of each artist discussed, there is a marked emphasis on the role of art and design experimentation as a processual and situated method of engaging with the world. These methods culminate in the production of various objects and experiences that shape perception in certain ways and not others. They are experiments that create objects of attention through which our understanding of the world around us is challenged.

What is an object of attention? The term suggests that there is a relationship between a material object and its encounter with a subject, of a certain pull that draws us into its midst. The phrase is borrowed from philosopher J. M. Bernstein who invokes it as follows to discuss how particular artworks "demonstrate that sensual particulars can *mean*, can be hypnotic objects of attention, apart from and in defiance of any form of identifying mechanism other than the one

[1] Josef Albers, *Interaction of Color* (New Haven: Yale University Press, 2013): 2.

their sheer presence insinuates."[2] Although Bernstein is describing abstract painting here, this insight can be applied more broadly. An object of attention elicits a response that challenges conceptual understanding. It is intimately tied to the object at hand and relies on an embodied response in order to transmit meaning. One perceives such an object without quite knowing what to think. In this moment the object takes hold. It guides us in a process of perception.[3]

The work of Andrea Zittel, Tomás Saraceno, and Beatriz da Costa each engage us at this perceptual level. In what follows I attend to this closely, enfolding together a diverse set of art and design practices that seek methods to achieve perceptual shifts. In doing so I will consider how a focus on form—as both a work's material properties and its underlying methodologies—can work towards these goals. Chapter one begins by looking back to the German Bauhaus as a site that fostered an experimental pedagogy, harmonizing art and design towards ideals of an improved society. This pedagogy rests on a theory of form and its effects on perception, which was promoted by students and faculty at the school such as Josef and Anni Albers. From this context I will examine the work of American sculptor Andrea Zittel, whose *A-Z Wagon Station Encampment* (2003-) and *A-Z Living Unit* (1994) embody these formalist principles. Looking closely at the relationship of formal experimentation to perception I argue that Zittel's sculptures require a tactile effort by users to adjust to. This process opens up a space of creative

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[2] J. M. Bernstein, *Against Voluptuous Bodies: Late Modernism and the Meaning of Painting* (Stanford: Stanford University Press, 2006): 152.

[3] The description of this encounter relates to philosopher Maurice Merleau-Ponty's work on phenomenology. In *The Visible and the Invisible* Merleau-Ponty articulates a theory of 'flesh' that binds subject and object in a bi-directional exchange (Merleau-Ponty describes the example of self-touch, where one is both *touching* and *being touched*). This experience of being in the world, as Merleau-Ponty posits, is not one that can be reconciled through philosophies based in reflection (Descartes and Kant, for example), as these seek to rationalize intersubjective and affective experiences. While I invoke the work of Viktor Shklovsky in my discussion of perception (Shklovsky is associated with Russian Formalism, an early-twentieth century school of literary criticism that relates to theories of form at the Bauhaus), Merleau-Ponty's work also applies here. See: Maurice Merleau-Ponty, *The Visible and the Invisible*, ed. Claude Lefort, trans. Alphonso Lingis (Evanston, Northwestern University Press, 1968).

experimentation through which our living practices within capitalism can be explored otherwise. Her experimental work thus presents a model for situated practice that utilizes the perceptual effects of form to cultivate an ecological awareness rooted in daily practice.

In chapter two I investigate Berlin-based artist Tomás Saraceno's *Aerocene* project (2015-) for its relationship to experimental design and environmental perception. I argue that the question of form in Saraceno's work is an important point from which to consider the aesthetic and ethical implications of the sculptures, particularly for their ability to cultivate an attunement to multispecies enmeshments in our environments. I begin by looking to Saraceno's working methods alongside Buckminster Fuller's design pedagogy. Here, an emphasis on interdisciplinary knowledge formation and dispersed networks grounds Saraceno's work within Fuller's articulation of the role of the designer. That being said, Saraceno's work departs from Fuller's through a divergence from capitalist modes of production. Looking to this shift at the structural level, I outline a commitment by Saraceno to his participants' perceptual capacities, in turn cultivating relations enmeshed in practices that assert environmental connectedness.

Chapter three turns to the work of Beatriz da Costa, an artist who has sustained an interest in microbial and multispecies relations in projects across a variety of nodes. My discussion of da Costa focuses on *PigeonBlog* (2006-2008) and *Dying for the Other* (2012), two works that each raise questions pertinent to expanded frameworks of design. Here I outline da Costa's work on tactical biopolitics, as well as Donna Haraway's discussion of situated knowledges, in order to unpack the relationship between da Costa's practice and debates on the medical management of the body, as well as its multispecies corporeality. Finally, I look to Newton and Helen Mayer Harrison's environmental artwork in order to address their engagement with ecological care. Focusing on their research-based and process-oriented

practice—as well as its attunement to the fluxes of natural systems—I argue for the importance of death as a condition of life in da Costa's reflexive work.

Throughout these three chapters I argue that da Costa, Saraceno, and Zittel produce experimental forms that require a slowness of perception to grasp, as they rub against the grain of social and ecological relations within capitalism. Relations of capitalism, as environmental historian Jason Moore has argued, are premised upon the exploitation of human and non-human animals, as well as ecological systems as a whole.[4] From this context I consider the value of form for its capacity to speculatively expand our conception of what is possible *beyond* these relations by attuning us, however momentarily, to other ways of living and relating. What this suggests, to borrow Albers's framework once again, is the production of art as a way of study: as modes of practice that enable us to learn something different from the world than we currently know. The works in this thesis are thus equally bound to practices of pedagogy, of learning and teaching as goals of art practice. Josef Albers hired Buckminster Fuller to teach at Black Mountain College; Buckminster Fuller was engaging with the work of the Harrisons, and Newton Harrison was himself a student of Albers at Yale. These knots bind the figures in this story to contemporary practices that share a similar spirit of experimentation. Although each is distinct in their own work, all share a desire to push beyond current societal norms in order to explore possibilities of living differently. There is thus a commonality in difference that grounds these comparisons, given their divergences in both form and subject matter. This suggests an

[4] My use of the term capitalism stems from an engagement with the work of Jason Moore. Moore argues for an understanding of capitalism as a web of social, economic, and ecological forces. By framing the term as set of relations, rather than as a discreet set of practices, Moore accounts for differences within capitalism, as well as for its relationship to ecology. Moore's work is particularly useful with relation to the artists discussed in this thesis, as the development of environmental relations of non-dominance veer from Moore's account of capitalist ecologies. See my discussion of Moore's work on capitalism in chapter two, pages 76-77.

inability to isolate particular aesthetic codes or formal interests between the artists discussed. Instead, what binds them together is their experimental approach to art making that is tied to our perceptions of the everyday.

In his book *Revolutionary Time and the Avant-Garde* art historian John Roberts outlines a tension in modernist aesthetics between the category of the avant-garde as an aesthetic style versus a methodology.[5] Roberts's argument rests on the formulation of the avant-garde as a research programme with a set of core goals rather than established codes. He thus attempts to "lift the avant-garde out from its conventional art historical categories,"[6] shifting it into an "account of the avant-garde as an historically open-ended research programme, and thereby moving beyond discussing the avant-garde simply across stylistic and formal dividing lines."[7] Roberts's framing of the avant-garde as a research programme links the Albers, Fuller, and the Harrisons to Zittel, Saraceno, and da Costa, without abiding to a set historical lineage. Doing so aligns these in the sense that they each engage in research-based practices that raise important questions about the world around them.

The works discussed do not begin or end in the gallery as they are each closely engaged with an integrative approach to art and design. The term 'art' is commonly defined as "the expression or application of creative skill and imagination, typically in a visual form."[8] It also

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[5] The avant-garde is a term used to describe creative activity that is experimental and radical within the cultural milieus of its time. Originating from a military context, the term translates to 'vanguard,' and is used in association with groups such as the Bauhaus, De Stijl, Russian Formalism, and Surrealism. The neo-avant-garde is a related term that encompasses a similar spirit of practice in Europe and America in the 1950s and 1960s. Associated with groups such as Neo-Dada, Abstract Expressionism, and Fluxus, the term implies a return to the tools of the avant-garde as a mode of practice. For an overview of the term—including debates on its value—see: Johanne Lamoureux, "Avant-Garde: A Historiography of a Critical Concept," in *A Companion to Contemporary Art Since 1945*, ed. Amelia Jones (Malden: Blackwell, 2006): 191-211.

[6] John Roberts, *Revolutionary Time and the Avant-Garde* (London: Verso, 2015): 16.

[7] Ibid.

[8] *Oxford English Dictionary*, s.v. "art (n.)," accessed July 28, 2019, https://www-oed-com.login.ezproxy.library.ualberta.ca/view/Entry/11125?rskey=VmPv8R&result=1#eid.

implies "skill in doing something, […especially] as the result of knowledge or practice."[9] Design, on the other hand, is defined as "the process, practice, or art of devising, planning, or constructing something (as a work of art, structure, device, etc.) according to aesthetic or functional criteria,"[10] as well as "the preliminary conception of an idea that is to be carried into effect by action."[11] The sets of activities described by these definitions link the two terms through investigative and creative practice. This position for art and design has been traced by design historian Alex Coles, who writes of efforts to integrate art and design within Modernism, noting in particular the work of William Morris in Britain during the late nineteenth century, Soviet Constructivism, De Stijl in the Netherlands, and the German Bauhaus.[12] Coles asserts that in these moments "the result was a new form of practice wherein traditional boundaries between disciplines were negotiated."[13] In this thesis I engage with the work of da Costa, Saraceno, and Zittel through this integrated framework. I read design theory through artwork, and place designers in conversation with artists, not to collapse the two but to integrate them within their larger social and ecological goals. On this topic it is not only artists who engage with design, but design that also looks to art. For instance, design theorist Keller Easterling turns to the value of artistic practice in speculatively shifting the field of design. Importantly, Easterling's thinking rests on a definition of design *not* as the production of discrete objects, but as an interface of organizational principles that structure the world around us.[14] Just as the term 'designer' was

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[9] Ibid.
[10] *Oxford English Dictionary*, s.v. "design (n.)," accessed July 28, 2019, https://www-oed-com.login.ezproxy.library.ualberta.ca/view/Entry/50840.
[11] Ibid.
[12] Alex Coles, "Introduction: Beyond Designart," in *Design and Art,* ed. Alex Coles (Cambridge: The MIT Press/Whitechapel, 2007): 10.
[13] Ibid. *Designart*, a more recent term discussed by Coles, emerged in the 1990s to describe the work of contemporary artists who work from a similar methodology.
[14] Keller Easterling, *Medium Design* (Moscow: Strelka Press, 2018).

used to describe the work of an artist at the Bauhaus, the role of the artist is described by Easterling as an agent that actively engages with the material world.[15] The integration of art and design in this context does not serve to illustrate the importance of one discipline over the other, but rather to *think them together* in all of their productive overlaps.

While I will be presenting each artist's work within a larger history that stretches back to the early-twentieth century, they are each engaging acutely with the present, a time in which we have entered a new geologic epoch. Named the Anthropocene, and first suggested by atmospheric chemist Paul Crutzen, the term signals that "the stratigraphic scale had to be supplemented by a new age, to signal that mankind had become a force of telluric amplitude."[16] As historians of science Christophe Bonneuil and Jean-Baptiste Fressoz trace, "the Anthropocene is characterized by an unprecedented upsurge in energy mobilization: first with coal, then with hydrocarbons and uranium, which increased energy consumption by a factor of forty between 1800 and 2000."[17] While there have been debates on when to date the start of this epoch, it is clear that human impact has caused irreparable shifts in the earth's systems.[18] Humans are thus positioned as a geological force akin to an asteroid, a comparison that has become a contested site for critics of the term.

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[15] Easterling writes of active, as opposed to passive, form. This distinction is important to Easterling for the difference between an object and the larger medium that it operates within. An example of a passive form would be a single building or masterplan, an assertion by the designer that they have identified the 'right' answer to a set of problems. An active form does not seek right answers, nor does it isolate a single problem, but instead looks to the potential of shaping activities and relationship over a length of time. See: Keller Easterling, *Extrastatecraft: The Power of Infrastructure Space* (London: Verso, 2014): 84-85.
[16] Christophe Bonneuil and Jean-Baptiste Fressoz, *The Shock of the Anthropocene: The Earth, History and Us*, trans. David Fernbach (London: Verso, 2013): 3.
[17] Ibid., 9.
[18] The two most contested dates for the start of the Anthropocene are 1610, after the European conquest of the Americas, and 1964, the year of the first nuclear tests in the United States. For an overview see: Simon L. Lewis and Mark A. Maslin, "Defining the Anthropocene," *Nature* 519 (2015): 171-180.

For example, feminist sociologist Eileen Crist provides a useful intervention with regards to the term Anthropocene. In her work, Crist takes seriously the impact of words in forming discursive concepts, and considers that "this name is neither a useful conceptual move nor an empirical no-brainer, but instead a reflection and reinforcement of the anthropocentric actionable worldview that generated "the Anthropocene"—with all its looming emergencies—in the first place."[19] As she suggests, the discourse surrounding the Anthropocene "delivers a Promethean self-portrait: an ingenious if unruly species, distinguishing itself from the background of merely-living life, rising so as to earn itself a separate name (anthropos meaning "man," and always implying "not-animal"), and whose unstoppable and in many ways glorious history […] has yielded an "I" on a par with Nature's own tremendous forces."[20] The elevation of the human species to a geologic force suggests a process of universalization and a disregard for the differences of scale at which environmental degradation has occurred. For instance, there is no questioning of *which* humans have contributed to destructive relations on the planet. This narrative emerges from the very causes of the problem—that is, domination of the planet and its life sources within spheres of capitalism and colonialism. As Crist contends:

> And here also lies the Anthropocene's existential and political alliance with history and its will to secure human dominion: history has itself unfolded by silencing nonhuman others, who do not (as has been repeatedly established in the Western canon) speak, possess meanings, experience perspectives, or have a vested interest in their own destinies. These others have been de facto silenced because if they once spoke to us in other registers—primitive, symbolic, sacred, totemic, sensual, or poetic—they have receded so much they no longer convey such numinous turns of speech, and are certainly unable by now to rival the digital sirens of Main Street.[21]

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[19] Eileen Crist, "On the Poverty of Our Nomenclature," in *Anthropocene or Capitalocene? Nature, History, and the Crisis of Capitalism,* ed. Jason W. Moore (Oakland: PM Press, 2016): 14.
[20] Ibid., 16-17.
[21] Ibid., 18.

And so, the Anthropocene, with its global narrative and drive for technological progress, has occluded others living practices that relate differently to ecological systems. Crist asserts that the idea of human progress is never questioned, and that the underlying structural relations of human dominance over the planet's ecosystems are not disturbed by the term. What is important to emphasize here is not a critique of the Anthropocene per se—a term that has been useful in pointing to human causes of ecological devastation and mass-extinction—but for its framing of the undifferentiated category of human. A category that, elevated to a geologic force, often relies on master narratives of human progress and ingenuity that re-inscribe the very planetary relations that have driven us to this current moment.

In the face of such a narrative, in which the human species is elevated as a whole to act as a geologic force, various scholars have focused on sets of relations that embrace complexity and entanglement, in turn locating the human species within larger webs of life. Feminist philosopher Donna Haraway's work has a particular draw for me in this regard, most notably her employment of metaphors that speak to human entanglement in larger ecosystems. 'Composting' is one particularly useful term to think with here, through which Haraway is attentive to shared practices of pedagogy that are formed in collaborations. Haraway contends that to think with compost means looking closely at how "we require each other in unexpected collaborations and combinations, in hot compost piles. We become with each other, or not at all. That kind of material semiotics is always situated, someplace and not noplace, entangled and worldly."[22] What this statement suggests is not only the cultivation of situated knowledges, a term employed by Haraway to resist the idea that knowledge production is universal, but also that situated

[22] Donna Haraway, *Staying with the Trouble: Making Kin in the Chthulucene* (Durham: Duke University Press, 2016), 4.

thinking is a collective act.[23] To think with the metaphor of compost asks us to take seriously the collaborative forces at play when we engage with knowledge production. Specifically, it is a process by which no outcome can be predicted at the get-go, given the improvised and relational process this term demands.[24] To think with compost relies on responsive acts of kinship by actors who are always looking for inventive ways to flourish within the messiness of imperfect worlds.

Haraway's thinking provides a useful challenge to the type of human authority described by Crist, as it enables a collaborative, citational mode of working together that denies authority to any single individual.[25] Like compost, which forms from the sum of its varied parts, the human animal—as entangled within complex webs of life—works from within this position in order to think *with* complexity rather than against it. Haraway thus calls into question *how* we are to inherit and face the past and its entangled histories, in order to take the present seriously and take up multispecies relations well. We are called to *live* actively in situated places, and cultivate practices of care, risking the involvement of unexpected partners. Importantly, this care must

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[23] Haraway's work on situated knowledges will be explored in more depth in chapter three. For now, what is important to note is Haraway's commitment to the ways in which our knowledge is not universal, but always emerges from the fleshy particulars of our own bodies—and the nuanced ways in which these bodies exist in complex social webs. The notion that knowledge is objective and universal is described by Haraway as a "god trick" and is at the core of her critique of an objectivity "from nowhere." See: Donna Haraway, "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective," *Feminist Studies* 14, no. 3 (1988): 575-599.

[24] Haraway's work on compost is developed in chapter eight of *Staying with the Trouble*. In "The Camille Stories," Haraway describes the process of working collaboratively with a group of multidisciplinary thinkers. Here, the outcome of a writing exercise could not have been planned in advance. as it emerged responsively through the collaboration of the actors involved.

[25] Here I am referring to a politics of citation articulated in Haraway's work. Performing situated knowledges, Haraway has cultivated a practice of acknowledgment that situates her thinking as it has developed through entanglement with others (including students, colleagues, friends, animals). This way of working rejects the notion that work in the academy is done independently, and instead provides a window into the collective process of knowledge production that is often occluded in scholarly and artistic work. Sara Ahmed has also articulated a strong feminist politics of citation in her work. Ahmed writes of citation as "feminist bricks" that affect the academic worlds that we create. Citing becomes a way of situating oneself within an intersubjective process of knowledge production that is important to acknowledge. See: Sara Ahmed, *Living a Feminist Life* (Durham: Duke University Press, 2017): 16-18.

always take history and the present seriously. As Haraway states: "nature and culture are tightly knotted in bodies, ecologies, technology, and time."[26] Haraway's multifaceted and situated thinking brings attention to key aspects of multispecies relations, a framework that is latent in the work of Andrea Zittel and manifest in both Beatriz da Costa and Tomás Saraceno's work.

In their introduction to *The Multispecies Salon,* "Tactics of Multispecies Ethnography," artist Eben Kirksey, with anthropologists Craig Schuetze and Stefan Helmreich, introduces us to the concept of multispecies ethnography. This is a term that emerges within the context of Haraway's thinking, and that forms the basis of my discussion of multispecies collaboration in the works discussed. Multispecies ethnographers work with artists and biological scientists in the ongoing investigation of the intersections of organisms and political, social, and economic systems. Although skeptical of the role of the multispecies ethnographer in speaking for other organisms, the authors place hope in the value of an attunement towards multispecies entanglement, gesturing to the mutability of our bodies within larger ecological webs. This is an act that is reflected in the authors' discussion of poaching, a term that is invoked as a means of muddying one's research within flows of collaboration.

Seeking to foster "modest examples of biocultural hope,"[27] the authors think with the concept of poaching in order to identify practices of borrowing and gift-giving. Poaching, to the multispecies ethnographer, becomes a way of "pushing or poking pieces of one's research towards that of another, […] something of an offering, not an encroachment but a gift."[28] Through this act, the authors blur the positions of the artist and the ethnographer, complicating

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[26] Donna Haraway, "Speculative Fabulations for Technoculture's Generations: Taking Care of Unexpected Country," in *The Multispecies Salon,* ed. Eben Kirksey (Durham: Duke University Press, 2014), 251.
[27] Eben Kirksey, Craig Schuetze, and Stefan Helmreich, "Tactics of Multispecies Ethnography," in *The Multispecies Salon,* ed. Eben Kirksey (Durham and London: Duke University Press, 2014): 5.
[28] Ibid., 7.

the practices of each in order to account for a study of multispecies relationality.[29] What is important to note is this structure of poaching as it applies to an interdisciplinary method of working together, one that shares boundaries with the act of composting.

Important alliances can be made within this collective compost heap that alert us to the multifaceted yet deeply relational work that comes from an engagement with a multispecies ethics. This way of working—as performed by Haraway and Kirksey—is collaborative, situated, and tangled up in messy worlds. This is a position that does not flatten differences between subjects and instead seeks to understand the hierarchies at play in multispecies collaborations.[30] For instance, in Saraceno's and da Costa's multispecies work, the agency of non-human participants can be questioned. Multispecies collaboration, as it is framed here, does not seek to romanticize this encounter. Instead, by working from a position that assumes the inherent ongoing-ness of multispecies relations in our daily lives, collaboration is not framed as an external act. It is rather by drawing attention to these relations, as well as articulating these differently, that our engagement with non-human agents in our environments is explored. This points to material and durational entanglements, and concerns practice and theory inasmuch as thinking with these collaborations is always emergent from the work itself. In her article entitled "Practice in the Flesh of Theory: Art, Research, and the Fine Arts PhD," art historian Natalie Loveless (echoing Haraway's neologism natureculture) names this (interchangeably) practicetheory or theorypractice: an integration of theory and practice that insists on the

[29] Hal Foster has taken up the relation between art and ethnography, arguing that there has been an 'ethnographic turn' in contemporary art since the 1990s. As Foster traces, this position often relies on processes of othering, as well as primitivist assumptions of cultural authenticity. In the face of these concerns, Foster argues for the value of reflexivity as an integral component to this work. See: Hal Foster, "The Artist as Ethnographer?" in *The Traffic in Culture: Refiguring Art and Anthropology*, eds. George E. Marcus and Fred R. Myers (Berkeley: The University of California Press, 1995): 302-309.
[30] For a discussion of imbalances within multispecies collaborations, see: Kirksey, Schuetze, and Helmreich, "Tactics of Multispecies Ethnography," 2-3.

imbrication of practices of *doing* and *knowing.* Loveless posits: "Practice and research are messy and entangled. They are both deeply creative practices that emerge as a kind of thinking that can take many forms."[31] Here, the integration of practice and theory relates across boundaries as one mode of knowledge production bleeds into and develops the other.

The frameworks of compost and multispecies collaboration complicate narratives of universal progress that underlie the development of the Anthropocene as an all-encompassing term. These various nodes are held in tension with regards to human integration into larger natural systems and gesture to Albers's distinction between set answers and ways of study. On the one hand, we have universalizing narratives that are bound to ideas of unabated human progress. While with the latter we experience study as responsive, situated, and always in progress. This approach to the concept of study echoes Fred Moten's discussion of the term in which he outlines the way in which

> study is what you do with other people. It's talking and walking around with other people, working, dancing, suffering, some irreducible convergence of all three, held under the name of speculative practice. The notion of a rehearsal—being in a kind of workshop, playing in a band, in a jam session, or old men sitting on a porch, or people working together in a factory—there are these various modes of activity. The point of calling it 'study' is to mark that the incessant and irreversible intellectuality of these activities is already present.[32]

Study thus unfolds in and around the rhythms of daily life and situates living as a practice of learning. Rejecting the notion of study as disarticulated from the body, Moten's words are useful to think with when we consider the propositions modeled in the works that follow. These are practices that are inherently about cultivating methods for study. They are about learning how we live, and how we might live differently. What is demonstrated by da Costa, Saraceno, and

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[31] Natalie Loveless, "Practice in the Flesh of Theory: Art, Research, and the Fine Arts PhD," *Canadian Journal of Communication* 37 (2012): 103.
[32] Stefano Harney and Fred Moten, *The Undercommons: Fugitive Planning & Black Study* (Wivenhoe: Minor Compositions, 2013): 110.

Zittel's practice is a need for situated and relational methods of working and thinking. These engage strongly with the development of art and design methods that are intimately related to the artist's daily lives. Whether by living in the work, or siting the artist's own corporeality within it, there is a sense that each artist discussed makes their work their life. Each separate practice is bound to ideas of form and experimentation, through an attempt to engage at the level of perception, in order to dislodge normalized patterns of thinking and doing. As much as each artist undertakes the role of student, the pedagogue also emerges in each instance. To put it simply, they work in order to teach, and teach in order to learn.

CHAPTER 1.

A WAY OF STUDY:

ANDREA ZITTEL AND THE EMBODIMENT OF DESIGN

> "The technique of art is to make objects 'unfamiliar,' to make forms difficult."[33]
> -Viktor Shklovsky

> "I give you a small nucleus of harmony. You are calmer, more relaxed, peaceful."[34]
> -Andrea Zittel

In a 1921 essay, Russian literary theorist Viktor Shklovsky describes a child's excitement when confronted with a chair for the first time.[35] To Shklovsky, this excitement is the result of a difference in perceptual capacity between the child and the adult, with the former experiencing things with a degree of realness that is unmatched in the latter. He goes on: "for us, 'the chair' is a detail of 'furniture.' But a child does not know the category of 'furniture,' and 'the chair' is as huge and alive to him as it cannot be for us."[36] There is an important focus on perception in this statement, one that places a wedge between the tangible objects that surround us and the concepts we produce for them. The work of enacting this perceptual shift, "by violating categories, by wrenching the chair out of furniture,"[37] is a task ascribed by Shklovsky to the creative practitioner with a keen eye to form.

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[33] Viktor Shklovsky, "Art as Technique," in *Russian Formalist Criticism: Four Essays*, trans. and ed. Lee T. Lemon and Marion J. Reiss (Lincoln: University of Nebraska Press, 2012): 22.
[34] Andrea Zittel, quoted in Grace McQuilten, "Playing Zittel: Andrea Zittel's design for living," in *Art in Consumer Culture: Mis-Design* (Farnham: Ashgate, 2011): 53.
[35] Viktor Shklovsky is related to Russian Formalism, a school of literary criticism that engaged primarily with avant-garde artistic efforts during the early-twentieth century. Shklovsky's essay is often cited as the 'manifesto' for formalism. See: Emily Van Buskirk, "Russian Formalism," in *The Literary Encyclopedia*, edited by Neil Cornwell (The Literary Dictionary Company, 2006), https://www-litencyc-com.login.ezproxy.library.ualberta.ca/php/stopics.php?rec=true&UID=979
[36] Viktor Shklovsky, "Literature beyond 'Plot'," in *Viktor Shklovsky: A Reader,* trans. and ed. Alexandra Berlina (New York: Bloomsbury Academic, 2017): 103.
[37] Ibid.

A different chair, this one by American artist Andrea Zittel (fig. 1), wrenches the chair out of furniture through different means than the scenario described by Shklovsky. This one is constructed from plywood and steel, and rests on small casters. On the top is a crushed, forest green velvet that blankets the seating surface. While this work indeed functions as a chair, it is not limited to the practice of sitting. Zittel's chair is part of a larger assemblage of domestic forms. The 'chair' that I describe folds out from a larger surface—perhaps for sleeping—and is anchored in the center by a large storage module containing a cooking area, table surfaces that fold out from the center, and a bathing vanity. Zittel's sculpture is thus a chair and much more than that, comprising a re-articulation of domestic form that blurs the functional and the mechanical, furniture and household technology, questioning ideas about domestic design in the process. The term sculpture itself—Zittel's term of choice when describing the work—gestures to an integration of art and design that rests at the heart of her practice.[38]

Figure 1: Andrea Zittel, *A-Z 1994 Living Unit,* 1994

[38] Zittel works from an integrative art and design methodology, in which both art and design are not understood as separate fields, but as joint practices of form-making. My use of the term sculpture stems from Zittel's description of her work. While the term will be used throughout to describe various projects, these could equally be identified as furniture, architecture, and constructions.

Andrea Zittel is an artist who, since the late-1980s, has explored the field of industrial design in her practice. She designs furniture, housing, and domestic objects that depart formally from established design norms. The use of the resulting work requires an adjustment in daily practice that renders our naturalized, but socially-constructed, housing norms concrete. This adjustment can be described quite simply with a small work used in Zittel's daily life: The *A-Z Container III* (1993) (fig. 2). The *A-Z Container* is a single model of bowl that is used by Zittel for both eating and drinking. Adopting a standardized bowl for all eating and drinking purposes invites one to question what has always been considered by some to be essential in the kitchen. The rejection of excess plates and cups suggests a commitment to asceticism that grounds Zittel's design-based practice. Prior to 2000, Zittel was based at A-Z East—a Brooklyn townhome used as Zittel's studio and home, in which works were developed, used in daily life, and displayed.

Figure 2: Andrea Zittel, *A-Z Container III*, 1993

Zittel relocated her integrative art and design practice in 2000 to A-Z West, a parcel of land she purchased in the California Desert. At A-Z West, Zittel has continued—under her fictional design company, A-Z Administrative Services—to explore how we live in the world today, thinking with the desert as an isolated space that allows for ongoing experimentation with

self-sufficient practices and the re-articulation of domestic forms. A-Z West encompasses over fifty acres of California high desert near Joshua Tree National Park. The site includes Zittel's own home and guest cabin, the Wagon Station Encampment, and studios for Zittel's practice which includes the production of sculptures, textiles, and housewares.[39] The Wagon Station Encampment itself is composed of twelve A-Z Wagon Stations, a communal outdoor kitchen, open air showers, and composting toilets. Visitors to the Wagon Station Encampment are invited to stay on the site for one-week periods and live according to its formal and conceptual requirements. The enfolding of Zittel's artistic practice, residential space, and public programming, into a single site speaks to the artist's ongoing and collaborative experimentation with domestic forms. Discussing a visit to A-Z West, curator Richard Julin has described the following: "Driving here, you see this place up by the mountain. You feel it's far away from everything and once you're here you discover it's full of energy and people."[40] While Zittel retains creative ownership over the work produced, her practice very much relies on constant testing and re-working by others.[41] Week-long stays in the wagon stations are one way that Zittel invites feedback that can be integrated into future modifications.

In this chapter I will look to Zittel's *A-Z Living Unit* (1994) and Wagon Station Encampment (2003-)—which comprises a series of sculptures entitled *A-Z Wagon Stations*—teasing out the ways in which the work models a relationship to form and perception articulated

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[39] A-Z West also houses a guest cabin, a shipping container compound used as studio space, the Regenerating Field—a site used for drying recycled paper pulp used in work—and a ten-acre parcel of land used for the High Desert Test Sites project. The Test Sites project emerges from Zittel's own work in the desert and intends to foster dialogue between artists, thinkers, and the general public through site-specific work and public events.

[40] Richard Julin and Andrea Zittel, "Parcel # 0604-031-01-0-0000: 5 acres in Joshua Tree with house," in *Andrea Zittel: Lay of my Land,* ed. Jane Michael (Munich: Prestel, 2011): 14.

[41] The first series of Wagon Stations produced by Zittel were customized by friends and collaborators. The second generation of Wagon Stations are currently installed at A-Z West and have not, as of yet, been customized.

by Viktor Shklovsky in 1917. To do so I will look back to the unification of art and design in the pedagogical model developed at the German Bauhaus following the First World War, a set of tools later taken up by Josef and Anni Albers as they moved from the Bauhaus to Black Mountain College. An emphasis on form, material exploration, and experimentation situates Zittel's own practice within a larger, historical debate on the interplay of art and design. I then argue that the relationship between art and design in this pedagogy, as well as a focus on formal experimentation, is a useful point of intersection through which to consider the perceptual shift produced by Zittel's work as users are tasked with re-orienting themselves to the logic of the sculptural forms employed. The last part of this chapter will consider Zittel's work within an ecological framework—one grounded in the understanding of the degree to which our current housing models are rooted in extractivist and capitalist logics. It is from this context that I will consider the role of form in Zittel's work as it is organized around a perception-based experience that disrupts our domestic ontologies. This experience, I argue, is an encounter that fosters a speculative imagination whereby possibilities for living differently can be experimented with and experienced.

A-Z 1994 Living Unit: Approximations of a body

The *A-Z 1994 Living Unit* (fig. 1) expands outwards from its highly contained form. It is composed of plywood and steel and sits on casters that allow the sculpture to be easily moved around the room. Hinges bracket the edges, and with a little imagination we can picture a user folding them up and enclosing the interior space when not in use. While each sculpture in the series departs formally from one to the next—featuring different configurations of elements—their core composition remains similar. Within their forms we find areas for sitting and sleeping,

table surfaces for eating and working, as well as a spot for cooking and caring for the body's hygienic needs. An entire apartment is thus nestled into a compact design that is as practical as it is mobile.[42]

Beginning this chapter with mention of the living units emphasizes the practicality of Zittel's work in the sense that the artist lives with the objects she creates in her daily life. By producing formally distinct systems for the maintenance of human bodies, Zittel employs design-based experiments that re-frame the domestic interior along new formal and conceptual categories. Zittel, in discussing these earlier works, has emphasized her interest in exploring the needs of the body with relation to our domestic living practices.[43] The corresponding form of the living units has been carefully mapped out along these lines. Various household functions such as cooking, working, eating, sleeping, sitting, and washing up are accounted for in the compact design, with little to no excess with regard to space and material use. In each living unit we encounter architecture and devices that facilitate domesticity at a scale much smaller than current residential norms.

There is a proposition for a domestic architecture that is modular, mobile, and convertible in form in this example, reflecting Zittel's embrace of experimentation as always in relation to a user. It is within this framework of daily practice that Zittel embraces the modular, an idea that was a priority for Walter Gropius when he founded the Bauhaus in 1919.[44] In his quest to unify

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[42] For an overview of how this statement fits into principles of 'Small Design'—a term used to describe an emphasis on small-scale domestic architecture that makes use of spatial limitations—see Yenna Chan's introduction in: *Small Environments* (Beverly: Rockport, 2011): 8-13.

[43] Alex Coles and Andrea Zittel, "Andrea Zittel," in *The Trans-Disciplinary Studio,* ed. Alex Coles (Berlin: Sternberg Press, 2012): 360.

[44] This embrace of modularity, as well as the interplay between art and design, was also shared by members of the De Stijl group, founded in the Netherlands in 1917. The interior of Gerrit Rietveld's Schröder House (1924), for instance, is composed of modular components such as moveable walls and shutters that are designed to transform the interior space according to the needs of the resident. On a

art and industrial production—all while retaining the architect's position as an artist—"the factory-produced house would leave open not only a terrain for artistic invention but also for personal desires: 'The possibility of the assembly of these interchangeable parts satisfies the public desire for a home with an individual appearance.'"[45] The forms employed by the architect are thus seen as capable of satisfying a variety of needs for a potential resident. This interchangeability has since been taken up in architectural critic Reyner Banham's diagnosis of the death of monumentality in architecture. In an essay entitled "A Home is not a House," Banham denounces the idea of the architectural monument—seen as a work of genius that stands separate from the practical needs of housing—emphasizing instead the mechanization of domestic space.[46] In this re-imagining of the role of architecture, Banham asks us to consider the home as the amalgamation of wiring, vents, heating and cooling systems, and plumbing. Mechanized processes that envelop the body and meet basic needs. This is a design position that was a central concern for certain Postmodern architectural practices—with which Banham was engaging in his writing. For instance, Archigram's *Plug-In City* (1960-1974) merged the house and the machine, presenting a vision for home design revolving around the mobility of various technical apparatuses that would facilitate dwelling. Buckminster Fuller's Dymaxion House, although designed in 1927 prior to the theorization of postmodern architecture, presents many of the same propositions.[47] Manufactured off-site, transportable, and designed to utilized passive

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formal level, the house also shares similarities with Zittel's work in its use of geometric surfaces and color blocking. See: Paul Overy, *The Rietveld Schröder House* (Cambridge: MIT Press, 1988).

[45] Barry Bergdoll, "Home Delivery: Viscidities of a Modernist Dream from Taylorized Serial Production to Digital Customization," in *Home Delivery: Fabricating the Modern Dwelling*, eds. Barry Bergdoll and Peter Christensen (New York: The Museum of Modern Art, 2008): 17.

[46] Reyner Banham, "A Home is Not a House," in *Reyner Banham: Design by Choice*, ed. Penny Sparke (London: Academy Editions, 1981): 56-60.

[47] The first Dymaxion House was built in 1945. Thank you to Joan Greer for finding this connection between my discussion of Zittel and Fuller's work in chapter two.

energy systems, the design asserts the house as a prefabricated system of parts that would be spatially and cost-effective, as well as easily adaptable to the needs of its inhabitants.[48] To shift from Banham's emphasis on the industrial, we can identify a similar approach in the living units towards domestic forms that prioritize the basic needs of the body in a compact and transportable frame. The living units are, like Banham's anti-monumental and mobile architecture, structured around a series of modular elements that re-appear in the various iterations of the sculptures. Formed not from any preconceived concepts of architectural form, they take shape instead as the sum of their parts—practical considerations for comfortable living.

Given Zittel's strong emphasis on the physical requirements of domestic space with regards to the human body, there is an implicit connection formed between the user of the work—in many cases Zittel herself—and the requirements of the design. To design the domestic with a close proximity to the body pushes towards an understanding of design as deeply human. It connects our own biological reality to the ways in which we, as living beings, dwell in spaces that have been carved out of the world around us. Philosopher Peter Sloterdijk argues that "living always means building spheres, both on a small and large scale."[49] Domestic space is one such sphere, developed out of the needs of the human body in ways that direct us towards certain living practices over others. What is therefore modeled by the living units is an experimental re-framing of the domestic that pushes towards a close examination of what the body needs in order to live comfortably. By focusing on domestic space—one such sphere of human dwelling—Zittel maintains in her work a position that dissects dominant housing practices with a desire to re-shape these in a speculative manner. Zittel has maintained a keen interest in design with relation

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[48] See: Federico Neder, *Fuller Houses: R. Buckminster Fuller's Dymaxion Dwellings and Other Domestic Adventures*, trans. Elsa Lam (Munich: Lars Müller, 2008).
[49] Peter Sloterdijk, *Spheres: Volume 1: Bubbles*, trans. Wieland Hoban (South Pasadena: Semiotext(e), 2011): 28.

to the body in her later works, which have expanded the site of design from the individual dwelling to larger questions of community. I will now look closely at the Wagon Station Encampment at A-Z West in order to highlight the central role of form with regards to both the body and larger questions of dwelling.

Figure 3: Andrea Zittel, *A-Z Wagon Station Encampment*, 2003-

The Wagon Station Encampment

You travel to the Wagon Station Encampment by car. It is a constructed environment composed from Zittel's sculptures that are integrated into the landscape (fig. 3).[50] The site is difficult to see from a distance, but as you approach you can begin to spot small, rounded forms

[50] The Wagon Station Encampment shares similarities with other experiments in small-scale, portable architecture. The Drop City artist commune (1965-1973) in one such example. Drop City saw residents experiment with small-scale, sustainable building practices based on Buckminster Fuller's geodesic design principles—whose work is discussed in chapter two. The structures in both the Wagon Station Encampment and Drop City are modular, mobile, and integrated into a landscape without taking up much of a footprint, a similarity that is worth noting here. For a discussion of Drop City, in particular its relationship to radical design efforts concerned with ecological thinking, see: Simon Sadler, "Drop City Revisited," *Journal of Architectural Education*, no. 58 (2006), 5-14.

dotted about. Coming closer, they begin to resemble your own car in size. You exit your car nearby and continue to move toward the structures on foot. More details come into view. Rectangular steel legs hoist small, metal and wood structures above the ground. The front side of each is blanketed in a shiny aluminium that glows as it reflects the hot desert sun. The aluminium curves down the front towards the base and includes a small window on the right-hand side. The sides and backs are enclosed in brown, painted wood. The wood appears completely smooth, as do the structures as a whole in their surroundings. The steel, glass, and polished wood stand out amongst the timeworn rocks and desert dust. And yet they also blend in quite well, despite this fact. From a distance they are hard to spot, given their palette of light browns, greys, and white. Their colors don't confront you, and their scale is the opposite of monumental. They are barely noticeable from a distance as they do not assert their presence in the landscape from afar and instead rely on proximity to be noticed, quietly nestled between rocks and shrubs.

Figure 4: Andrea Zittel, *A-Z Wagon Station*, 2003-

One of the structures sits open. The curved wall on the front side of the unit has been opened up on a hydraulic hinge that propels it upwards, creating a domed roof that extends up and over the interior of the structure like a sun shade (fig 4). The inside has wooden walls painted a rich mustard yellow. The floor along the bottom platform holds a mattress that takes up the entire dimensions and is outfitted with linens the same color as the walls. A small wooden shelf sits about a foot above the mattress and extends across two thirds of the back wall. The white steel supports that form the skeletal structure of the unit are left exposed and slice down the back wall. The overall effect is sparse, the only other interior detail being an arrangement of small, white hooks along the top edge of the back wall, and a small doorway below the hooks. There is absolutely no excess, neither spatially nor materially. A short walk down from this cluster of shelters you see a larger, open-air pavilion made of slate grey cinder blocks that encloses an outdoor kitchen and long, rectangular tables and benches. The whole area is canopied under a grey, corrugated metal roof held up by steel beams. Nearby, a smaller cinder block shelter encloses composting toilets and outdoor showers.[51]

You are clearly in an area that approximates a campsite, but visually everything feels unfamiliar, slightly off. The small steel and wood pods don't resemble the homes typically found in cities across North America. They confuse your association with scale. They are more portable than a house, or a shed, or a camper, or even a car. Two or three people could easily move one. They are larger than most of the furniture you have seen but sit on small legs as would a sofa or a bench. In fact, their form is in some ways a mix of all of the above, an abstraction of furniture

[51] The Wagon Station Encampment is open to the public. Interested parties are invited to sign up for a one-week stay and pay a small fee to cover maintenance costs. Cooking is done in the communal kitchen on site and is the responsibility of residents—although meals are sometimes shared. Cleaning is also done by the residents, who must volunteer for one to two hours per day as part of their stay. There is thus a social aspect to the project that is tied to ideas of communal living.

and shelter not normally encountered and thus formally and conceptually fuzzy.[52] The A-Z Wagon Stations blur furniture and architecture, as well as art and design, resulting in a form that is hard to map onto discrete categories of sculpture, furniture, or architecture. This formal logic tenses the relationship of art to design, rendering the structures somewhat alien to us as they do not fit into our current taxonomies. Because of this, the works gain a sense of autonomy—a form specific to its own material and compositional properties—that exceeds immediate comprehension.

Difficult Forms

To flesh out the concept of form here it is useful to consider the work of Russian literary theorist Viktor Shklovsky[53], who emphasizes the role of 'difficult form' in slowing down the process of perception. Shklovsky, who writes here of literature but whose arguments can be read alongside the visual arts, locates the role of form at the level of perception—championing the role of the arts to break habitual perception. As Shklovsky contends:

> If we start to examine the general laws of perception, we see that as perception becomes habitual, it becomes automatic. […] This characteristic of thought not only suggests the method of algebra, but even prompts the choice of symbols (letters, especially initial letters). By this "algebraic" method of thought we apprehend objects only as shapes with imprecise extensions; we do not see them in their entirety but rather recognize them by their main characteristics. We see the object as though it were enveloped in a sack.[54]

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[52] It was pointed out to me by Joan Greer that there is a link in this statement to disaster housing—small and portable dwellings that were designed to be assembled quickly and transported easily. For instance, following the Second World War, French architect and designer Jean Prouvé was commissioned by the French Government to create prefabricated housing for those who lost their homes by bombing in Eastern France. Easily assembled and measuring either six-by-six or six-by-nine meters in size, the project is a useful comparison to Zittel's work for its similarities in construction methods and scale. See: The LUMA Foundation, *Jean Prouvé: Architecture for Better Days* (London: Phaidon, 2018).

[53] Shklovsky's work is closely related to Reader Response theory, a school of literary theory that looks to the response of an individual to a work of art, rather than the work itself and the author's intentions. While I engage with Shklovsky's discussion of form, this is closely tied to the site of the work's reception inasmuch as Shklovsky is concerned with challenging our perceptual capacities.

[54] Shklovsky, "Art as Technique," 21.

Such habitual perception inhibits processes of embodied understanding. According to Shklovsky, our habituation in the world thus promotes a certain experience whereby "either objects are assigned only one proper feature—a number, for example—or else they function as though by formula and do not even appear in cognition."[55] Life, in this statement, is then "reckoned as nothing."[56]

Art is seen by Shklovsky as able to re-invigorate life with sensations of encountering objects rather than their concepts, troubling ease of comprehension. As Shklovsky suggests "The purpose of art is to impart the sensation of things as they are perceived and not as they are known. The technique of art is to make objects 'unfamiliar,' to make forms difficult, to increase the difficulty and length of perception because the process of perception is an aesthetic end in itself and must be prolonged."[57] The role of difficult forms in Shklovsky's analysis thus rests on the process of perception as a means of re-orienting the viewer away from pre-conceived and automatic cognition. Instead, perception of an artwork is elongated to allow for a newly articulated vision: "After we see an object several times, we begin to recognize it. The object is in front of us and we know about it, but we do not see it—hence we cannot say anything significant about it. Art removes objects from the automatism of perception in several ways."[58] In this regard, we can understand Shklovsky's call for difficult form as one that prioritizes an openness to experience that precedes the comprehension of a work. To slow one's perception in this way confuses straightforward models for understanding form and requires a responsive state from the viewer that is tied to the immediate experience of the work.

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[55] Ibid., 22.
[56] Ibid.
[57] Ibid.
[58] Ibid.

Shklovsky's discussion of form is useful when considering Zittel's work. There is a push in Zittel's sculptural exploration to challenge our associations with domesticity under capitalism. On this topic Keller Easterling has pointed out that "the process of assembling residential formations often resembles agricultural production in that large numbers of houses are executed simultaneously in uniform field,"[59] leading to norms for residential design that are prefigured by acts of shaping and controlling the landscape in which houses are sited. The house itself exists within this controlled landscape as a highly conventional and thus reproducible form. Architectural theorist Pier Vittorio Aureli has traced the development of the standardized house—a typology organized around the production and reproduction of the nuclear family—as closely tied to capitalist economies.[60] Space is organized in a highly regulated manner, with a typical single-family home often containing a number of bedrooms and bathrooms for family members organized around a living and dining spaces. Accompanying this spatial organization are endless acts of consumption through which the home is enhanced with the addition of domestic products. These associations with the house are complicated by Zittel's work. To return briefly to Shklovsky's description of "wrenching the chair out of furniture," by which he describes the perception of a material thing in the world and not it's concept, Zittel's work assumes a formal autonomy that challenges these cultural codes for domesticity. What is present is an embrace of the autonomy of the artwork that gestures away from current socio-political realities. This autonomy, however, is in relation to the work's livability, in the sense that its form is the direct result of Zittel's domestic experiments. That is, the artist lives with the work on a daily basis and extends this invitation to interested participants. The forms produced by Zittel

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[59] Keller Easterling, *Organization Space: Landscapes, Highways, and Houses in America* (Cambridge: The MIT Press, 1999): 3.
[60] Pier Vittorio Aureli, "The Dom-ino Problem: Questioning the Architecture of Domestic Space," *Log,* no. 30 (2014): 155.

resist the transparency we typically encounter in mass-produced objects, yet rely on use in daily life to be perceived. In doing so they require a shift in perception in which our dominant living patterns are re-calibrated by Zittel's sculptures. Before turning to the propositions modeled by this experience it is useful to first explore how Zittel's emphasis on formal experimentation, which merges the work of both art and design, is aligned with the pedagogical model developed by the German Bauhaus in its early history.

Art, Design, and Forms for Perception

The Wagon Station Encampment is a grouping of sculptures that forms a small, residential enclave in the desert. In this sense art and design are integrated: sculpture becomes architecture, constructions form a larger network of housing. This echoes a broader trend in Zittel's practice in which everything produced for A-Z Administrative Services is both used on-site and shown in a gallery, including the wagon stations. For instance, a recent exhibition showcases Zittel's sculpture *Planar Configuration One [#1]* (fig. 5) as a sculpture that is also used as a piece of furniture at A-Z West (fig. 6).

Figure 5: Andrea Zittel, *Planar Configuration One [#1]* [installation view], 2016

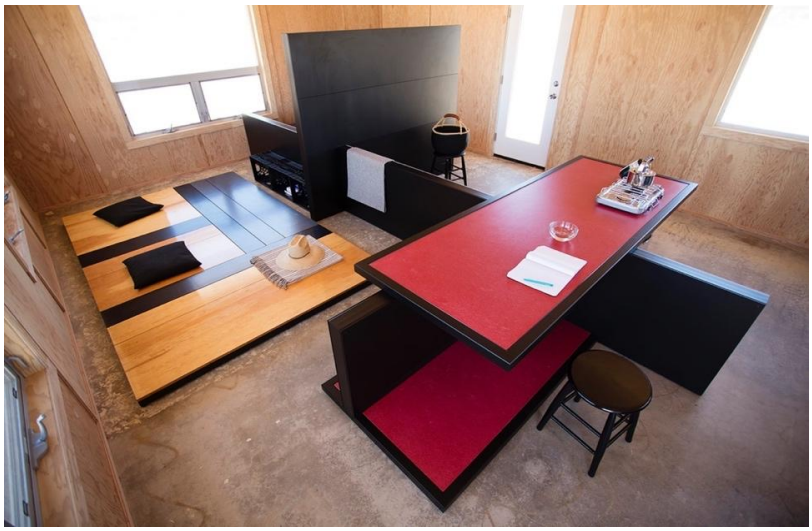

Figure 6: Andrea Zittel, *Planar Configuration One [#1]* [in situ at A-Z West], 2016

In the gallery installation, while examining the works, one might also notice another planar configuration that sits behind the sculptures. Produced at A-Z West's weaving studio and entitled *Parallel Planar Panel (gold, black, off-white, grey)* (2016), this weaving was made contemporaneously with the planar configurations as a means of testing out various formal compositions. On her engagement with design, Zittel has suggested: "I see design as a hybrid between fine arts and applied arts […] Working as a designer from the position of an artist is not a new strategy and was the position of groups like the Bauhaus, the Russian Constructivists and De Stijl"[61] The integration of weaving—a two-dimensional surface through which form and color are experimented with—with furniture design re-enforces Zittel's integrative art and design approach.

The German Bauhaus held similar views on the relationship between fine arts, craft, and design, with a position that sought to harmonize them along formal and material grounds.[62] As

[61] Benjamin Weil and Andrea Zittel, "Home is Where the Art is / Andrea Zittel Responds," in *Design and Art,* ed. Alex Coles (Cambridge: The MIT Press/Whitechapel, 2007): 118-119.
[62] For a comprehensive overview of the Bauhaus, see: Bauhaus-Archiv Berlin and Klassik Stiftung Weimar, eds., *Bauhaus: A Conceptual Model* (Ostfildern: Hatje Cantz, 2009); Barry Bergdoll and Leah Dickerman, eds., *Bauhaus 1919–1933: Workshops for Modernity* (New York: Museum of Modern Art,

pointed out by historian Michael Siebenbrodt, the school's program—which emerged in the traumatic period following the First World War—attempted to unify all artistic disciplines in effect eliminating hierarchies between various modes of practice.[63] The Vorkurs in particular, a foundational course first developed by Johannes Itten and later taught by Josef Albers, emphasized creative play with material, form, and color that sidestepped disciplinary conventions in pursuit of unified artistic activity.[64] Siebenbrodt suggests that "in free play with materials beyond traditional contexts of form and function, the students were to liberate themselves from the customary educational constraints and academic conventions."[65] Zittel's practice operates along a similar merging of art and design. The breadth of techniques used for A-Z Administrative Services works—such as ceramics, textiles, and wooden sculpture—speak to an embrace of a variety of material practices. All work produced under A-Z Administrative Services is equally non-hierarchical and includes clothing, furniture, bowls, and other daily objects. Inside the wagon stations are wall hooks, shelving, and linens, all designed and produced on site. In a sense, the cluster of workshops and studio spaces on site are tangible extensions that link back to the Bauhaus's pedagogical model. This is the result of a focus on formal experimentation and material (over any disciplinary bounds that uphold the distinction between art and design), which relates strongly to the experimental and play-based foundational training provided to students in the Vorkurs.[66]

2009); and Juliette Desorgues et. al., eds., *Bauhaus: Art as Life* (London: Barbican Art Gallery/Koenig Books, 2012).

[63] Michael Siebenbrodt, "The Bauhaus in Weimar: A School of Creativity and Invention," in *Bauhaus: Art as Life*, eds. Catherine Ince and Lydia Yee (London: Koenig Books, 2012): 35.

[64] For a discussion of the Vorkurs influence on art and design pedagogy, in particular Itten's role in developing the curriculum, see: Fern Lerner, "Foundations for Design Education: Continuing the Bauhaus Vorkurs Vision," *Studies in Art Education* 46, no. 3 (2005): 211-226.

[65] Siebenbrodt, "The Bauhaus in Weimar," 36.

[66] Itten's characterization of play is strongly influenced by the work of German pedagogue Friedrich Fröbel (Itten was himself a Fröbel trained elementary school teacher who taught from 1908 to 1909).

Artist and educator Josef Albers, himself a student at the Bauhaus in Weimar, developed the preliminary course at both the Bauhaus's Dessau and Berlin campuses. Albers's approach to the study of art and design was taken with him to Black Mountain College in 1933, a short-lived experimental school in rural Appalachia that became a hub of artistic experimentation.[67] Albers, who trained in the Bauhaus's glass-painting workshop, developed a model for art education that stresses the role of form and composition in shaping perceptions of the world. Art historian Eva Diaz has outlined Albers's pedagogical approach as one deeply concerned with the ways in which formal arrangement can draw out shifts in perception. Through the careful testing of a small set of variables, the subjective nature of perception was explored at Black Mountain with the belief that new forms could shift our understanding of the world. Colour and composition were continuously investigated by Albers and his students based on the idea that the creation of new forms through the manipulation of material variables could lead to "cultural transformation and growth."[68] In Albers's germinal study of color and perception entitled *Interaction of Color*, the relationship between art and the senses is explored in rich detail. Albers's study of color rests on its mutability, in particular the ways in which "a color is almost never seen as it really is—as

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Credited as the founder of the 'kindergarten system,' Fröbel characterizes play as a creative and material-based set of practices that form the foundation for early-childhood education. For Fröbel's discussion of play see: Friedrich Fröbel, *Friedrich Froebel's Pedagogics of the Kindergarten: Or, His Ideas Concerning the Play and Playthings of the Child,* trans. Josephine Jarvis (New York: D. Appleton and company, 1895).

[67] While my focus on Black Mountain College mainly concerns the pedagogy of Josef Albers and Buckminster Fuller, the school as a whole is considered to have contributed greatly to a broad scope of artistic and intellectual activities during the twentieth century. For an excellent anthology that traces the school's experimental engagements with art-making see: Helen Molesworth, ed. *Leap Before You Look: Black Mountain College 1933-1957* (New Haven: Yale University Press, 2015). For a history of the school that emphasizes the personal relationships and experiences of students and faculty, see: Martin Duberman, *Black Mountain College: An Exploration in Community* (Evanston: Northwestern University Press, 2009).

[68] Eva Diaz, *The Experimenters: Chance and Design at Black Mountain College* (Chicago: The University of Chicago Press, 2015): 19.

it physically is."[69] Albers's statement takes certainty out of the picture and instead assumes the differences in perception that shape our understanding of colors.

Interaction of Color does not present a cohesive color theory. Instead, Albers is concerned with the peculiarities of seeing—and how these practices can be re-trained to create new modes of perception. This prompts Albers to contend that "the aim of such study is to develop—through experience—by trial and error—an eye for color."[70] The emphasis on experience here "does not follow an academic conception of 'theory and practice,'" and instead "reverses this order and places practice before theory, which, after all, is the conclusion of practice."[71] Through compositional exercises with strips of colour paper, Albers's students were tasked with experimenting with various combinations—both formal and tonal—that explored the mutability of color within its larger context.

Albers's belief that form could lead to cultural transformation and growth was not bound to the fine arts but permeated everyday life as well. To Albers, art education did not teach specialized skills, but rather gave students tools for perceiving the world around them in new ways, which was seen by Albers to be a productive social force. As Eva Diaz contends: "Albers saw art as an epistemological project, as a *form* of knowledge; to him, the better 'vision' that attentive perception provokes can in fact increase awareness about routinely assigned meanings, and thus can encourage people to transform their customary patterns of comprehension."[72] What Albers thus promoted through his teaching was a desire for formal experimentation to extend far beyond the fine arts, and instead be of value to the world at large. Design, just like art, was to be explored in this approach with a strong relationship to form's radical possibilities.

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[69] Albers, *Interaction of Color*, 1.
[70] Ibid.
[71] Ibid.
[72] Diaz, *The Experimenters*, 26.

Albers emphasized in his teaching that form was a process and not a final result. His articulation of form "was not simply a set of rules, but rather a *reworking* continually, being a perceptual student of the complex organization of forms in the world."[73] A similar perspective is clear in a comparison between the *A-Z Wagon Stations* and the *A-Z Living Unit*. While the scope of the amenities included differ slightly—with the *A-Z Living Unit* providing areas for cooking and cleaning—many of the structural elements are starkly similar. The living unit is free-standing and modular, with a similar scale to the wagon station. It features a multipurpose cushioned surface for sitting and sleeping. A steel frame and legs are used, as is wood panelling and glass. Many other A-Z designs, such as blankets and bowls, are also used in both instances. What is highlighted here is the formal restraint Zittel has maintained in the development of her work. Rather than a total re-invention of form with every new experiment, Zittel employs many of the same material limits throughout her practice, iteratively manipulating these to suit the needs of various projects. Wood, metal, ceramic, cotton and wool, are slightly altered by Zittel through successive shelter configurations, as design solutions are tested and re-formulated through a constant process of modulation from a limited set of parameters.

It is helpful to consider Albers's notion of experimentation here when considering the formal relationship of the wagon stations to earlier A-Z works. Zittel's material and structural vocabulary has remained consistent over her career, aligning her methodology with Albers's insistence on the continual repetition of key forms. Once again quoting Eva Diaz, "given Albers's interest in expressing the contingency of forms through repeated trials, this insistence on order may seem paradoxical, but to him art, at its root, possessed a crucial strategy—*design*."[74] Zittel's sculptures similarly possess design at their root as the artist methodically tests

[73] Ibid., 36.
[74] Ibid., 44.

out structural arrangements to produce simple forms that are economical with regard to their functionality and scale. The interplay of design and art in Zittel's practice is rooted in an expanded notion of form with relation to everyday life, one in which Albers's process of experimentation is explored.

The integration of intellectual activity within practices of the everyday implies the role of situated knowledges outlined by Haraway. Albers's insistence that form can affect at the perceptual level points to an understanding of working in integration with an environment. His teaching requires of students to slow down, to look at, and sense, what is around them carefully. This task is iterative in its method, and equally affirms the importance of limits when experimenting with form, of "the carefully tested permutations of a form's appearance that can continually be subjected to new permutations."[75] To further examine form in relation to everyday life in this pedagogical approach I will now turn to Anni Albers for her discussions of design and material. In doing so I highlight an emphasis in Bauhaus-related pedagogy on the importance of material exploration as a methodology that binds art to design, and to questions of perception and the everyday.

Material Exploration and Form

Similar ideas regarding the relationship between form and function are articulated by German textile designer Anni Albers. Albers, a student at both the Bauhaus' Weimar and Dessau campuses, and later a teacher at Black Mountain College, developed a body of writing on design that addresses issues of material, as well as the relationship between the fine arts, craft, and industrial production. In one particular essay entitled "Design: Anonymous and Timeless,"

[75] Ibid., 52.

Albers suggests the following about an object's form: "the complete form is not the mixture of functional form with decoration, ornament, or extravagant shape; *it is the coalition of form answering practical needs and form answering aesthetic needs"* [emphasis mine].[76] The coalition proposed by Albers reads the work of design as one that is both developed from practical function, as well as in service of an aesthetic function that is tied to, yet separate from, the use-value of an object. For instance, in Anni Albers's weavings, there is an equal emphasis on practicality and the aesthetic—in particular in terms of form, color, and the tactile qualities of material.[77] A design for a carpet takes account not only of the design's suitability for daily use, but the perceptual properties of the object. This is an experience grounded in an object's sensual pull, in the ways that color combinations affect one's vision, or how we respond to the tactility of materials under our touch. Such an emphasis rejects the idea that functionality alone marks the work of design. Josef's concern with color, as well as Anni's interest in the design of household textiles, both attempt to re-orient perception through form. In this scenario the design of a carpet, to return to my previous example, is an act intended to affect its user. The carpet is designed—by Albers with an eye to color, composition, and material—as a means of providing a practical function as well as eliciting a perceptual response in daily life.

I argue that Zittel's practice similarly unifies the functional, everyday nature of design with an aesthetic autonomy that is driven by formal exploration. In the case of the Wagon Station Encampment, careful consideration has ensured that the functionality of each unit is optimal.

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[76] Anni Albers, "Design: Anonymous and Timeless," in *Anni Albers: Selected Writings on Design*, ed. Brenda Danilowitz (Hanover: University Press of New England, 2000): 34.

[77] My use of the term aesthetic focuses on its engagement with sensory perception. The term originates from the Greek *aisthesis* (perception) and is distinguished from evaluations based on logic or intellect. For a useful introduction to aesthetics—which traces philosophical debates on the term through thinkers such as Immanuel Kant, Friedrich Schiller, and Georg Wilhelm Friedrich Hegel—see: Kendall L. Walton et. al., "Aesthetics," in *Grove Art Online* (Oxford University Press, 2003), https://doi-org.login.ezproxy.library.ualberta.ca/10.1093/gao/9781884446054.article.T000568.

Their small size—only large enough for one or two people to sleep comfortably—means that interior space has been carefully considered to fulfill the requirements of daily life. For example, the domed roof lifts on a hydraulic system in order to maximize space during daytime use. The small door on the back of each unit allows for ease of entry, and a single shelf holds a small number of essential items used by occupants. There is a consideration of passive energy systems to counter the lack of electricity. The small window provides natural light to filter in, and opens for ventilation at night, allowing the cool desert air to flow into the interior. This is one instance in particular that Zittel pays close attention to the integration of her sculptures within their particular environment. By carefully considering the surrounding ecology—in particular climate considerations—the wagon stations make use of natural processes in place of fossil-fuel driven heating and cooling. The striking lack of excess materials is one way in which the sculptures are de-familiarized from our associations with domestic objects, thus contributing to their sense of formal autonomy. Zittel's material and spatial restraints—an engagement with minimalism that sees just how much less we can live with—results in a form that challenges our designs for housing within capitalism. This logic speaks to the principles of form articulated by the Albers inasmuch as they emerge from a dual consideration of the functional *and* aesthetic requirements of the work. Here, one important element of form—as is the case with Zittel's broader practice—is the creation of ambiguity that challenges users when they encounter the work. What I mean here is that, while able to fulfill all practical requirements, the limits employed in the designs take time to adjust to. As pointed out by curator Paola Morsiani, "Zittel's form does not follow an immediately evident function. A Zittel Living Unit does not communicate any information in the way Western modern and contemporary design has accustomed us to expect."[78] In the

[78] Paola Morsiani, "Emancipated Usage: The Work of Andrea Zittel," in *Andrea Zittel: Critical Space*, eds. Paola Morsiani and Trevor Smith (Munich: Prestel, 2005): 25. The field of contemporary design is

Wagon Station Encampment, practical needs are considered alongside the aesthetic organization of the work. The wagons circulate as sculpture in a gallery and are used as shelter in the desert. Their ambiguous shapes and surfaces do not rely on hegemonic norms for architectural or industrial design, but instead require tactile interaction in order for their various functions to become evident. How one might utilize the frontal opening, multipurpose mat and storage capacities depends on individual needs once confronted with the work. Hierarchy is thus put aside in favor of a looser organization of form and function. The sculptures produced by Zittel do not negate form in favor of function, it is rather the user who must negotiate the tension between the two when they take shelter in the work.

I have emphasized up to this point that Zittel's practice is bound up in a pedagogical model that complicates disciplinary boundaries between art and design. Notably, the relationship between form as a means of both approaching and departing from design taxonomies causes the user, when confronted with this tension, to enter into an aesthetic experience whereby creative experimentation facilitates an engagement with the work. This creates conditions in which the body must tactically explore the work and re-adjust to its experimental form. This process echoes the work of anthropologist David Howes and cultural historian Constance Classen, who dispel the myth of disembodied sight by referring to the sensual encounters that emerge from an object's use.[79] To further flesh out the embodied process of experimentation required by the wagon stations, it is useful to return to the role of experimentation I have outlined in the Albers's work, in which creative play foregrounds the process of meaning-making.

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very diverse. In my reading of Morsiani I take this term to refer to the production of commodified goods—both products and buildings—that circulate in capitalist economies.

[79] David Howes and Constance Classen, *Ways of Sensing: Understanding the Senses in Society* (Abingdon: Routledge, 2014): 21.

Playful Experimentation

At first you might feel frustrated trying to get comfortable. You might not even know where to start. You are used to sitting on a chair or a sofa that has fairly standardized norms: three or four legs, a seat, a back, and maybe some arms. You don't typically have to think when you are sitting down on one of these, their form is familiar to you and your body adjusts instinctually to find a comfortable position. This is not as clear in the wagon station, but it doesn't take you very long to adjust. After some trial and error, you begin to familiarize yourself with the shape of the sculpture. You get creative. After a few days, if you've enjoyed the process of adjustment, you might not even miss your apartment full of furniture. By the end of the week, you have discovered innumerable ways of relaxing on a single mat. You have completely adjusted your daily pattern in order to maximize efficient use of your tiny shelter. It might even be strange to go home at the end of the week. If you have really embraced your surroundings, it will require a re-adjustment once again in order to return to your old habits. Maybe you will even get rid of a few things and try living differently once more.

The description above gives a sense of what one might experience trying to figure out how to adjust one's sitting and sleeping patterns on a single surface, an experience that emerges from Zittel's experimental approach to form. This approach departs from various design norms, and thus suggests the view that Zittel sidesteps current taxonomies of furniture in the hopes that a freer experimentation with material will lead to new experiences. We can look again here to Anni Albers, who, in her writings on design, emphasizes formal restraint and material play: "free experimentation here can result in the fulfillment of an inner urge to give form and to give permanence to ideas."[80] Materials are able to give parameters to this freedom of exploration:

[80] Anni Albers, "Work with Material," in *Anni Albers: Selected Writings on Design*, ed. Brenda Danilowitz (Hanover: University Press of New England, 2000): 7.

"They introduce boundaries for a task of free imagination […] within a set of limits the imagination can find something to hold to."[81] We see here again a desire for formal experimentation—articulated as a realm of play in which material limits are explored on a quest for new forms. What I mean here is that, by using a small set of materials—plywood, wool, powder-coated steel, and glass for example—there is an added emphasis on composition and form. This process echoes Josef Albers's color exercises, in which students used just a few sheets of colored paper to experiment with different configurations. Just as the Albers's set material constraints as a way of challenging the imagination, Zittel's careful material choice produces a similar formal rigour and re-invention.

In an analysis of Zittel's work as it exists ambiguously within systems of consumer capitalism, art historian Grace McQuilten has defined the production model at A-Z West as an "experimental playground,"[82] in which market-led design norms are subverted by Zittel's playful manipulation. McQuilten's analysis centers on Zittel's *A-Z 1994 Living Unit* and suggests that the works "point to no idealistic solutions, but instead to the alienating effects of late capitalism."[83] She contends that Zittel's ironic statements—the idea that her living systems will satisfy the practical and psychological needs of their users[84]—always seem to fall short, the systems instead being constantly re-worked by the artist. The failure of a perfect structure has led to "the constant reinvention and modification of its design—just like capitalist production, which is constantly revolutionizing its processes in order to expand."[85]

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[81] Ibid., 7-8.
[82] McQuilten, "Playing Zittel," 59.
[83] Ibid., 53.
[84] For a discussion by the artist on the desired satisfaction of practical and psychological needs, see: Andrea Zittel, "Andrea Zittel: May 4, 1998," in *Inside the Studio: Two Decades of Talks with Artists in New York*, ed. Judith Olch Richards (New York: Independent Curators International (ICI), 2004): 220.
[85] McQuilten, "Playing Zittel," 59.

By suggesting that Zittel's constant experimentation serves as a critique of the disposability of consumer goods in capitalist economies, McQuilten presents the work as a critique of design's utopian ideals subsumed within market forces. For instance, the marketing of Bauhaus designs as luxury furnishings is indeed far from the school's ideals of producing experimental works available to all through mass production. As Boris Groys reflects, the integration of art and life that was the basis of this model has resulted not in a changed society, but in processes of self-design. "By designing one's self and one's environment in a certain way," Groys contends, "one declares one's faith in certain values, attitudes, programs, and ideologies."[86] Designs produced by Bauhaus students, unable to change the world through form, have been reborn as agents of taste. As jan jagodzinski reflects:

> While Art Nouveau designers tried to turn the art object into a utilitarian object (for Adolf Loos the artistic urn was to be used as a chamber pot), the functionalist modernists wanted to elevate utilitarian objects into art (the chamber pot becomes an urn). In contemporary terms, the first is haute design of the interiority and exteriority of living: architecture (the designed house and designed landscape), art (interior decoration), and craft (ornamentation to develop taste, ambience, and atmosphere) once again become the *Gesamtkunstwerk* as envisioned by Art Nouveau, but now called *Better Homes and Gardens*.[87]

The development of a sellable Bauhaus 'style' that can be consumed and displayed in the home is another way in which McQuilten's analysis applies here. While not directly giving critique of the de-politicization of avant-garde design efforts into consumer goods, it is useful to consider the milieu in which Zittel's sculptures operate—one in which the identity of schools such as the Bauhaus has become a marketable commodity. The constant re-invention of objects in capitalist models of production and consumption, as well as the ways in which social and political design

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[86] Boris Groys, "Self-Design and Aesthetic Responsibility," *E-Flux Journal*, no. 7 (2009): 3.
[87] jan jagodzinski, "Pedagogy of Design in Reference to the Anthropocene," in *The International Encyclopedia of Art and Design Education,* eds. Richard Hickman et. al. (Wiley, 2019): 6. https://doi.org/10.1002/9781118978061.ead001.

goals are themselves subsumed by the marketplace, are both questions that can be raised from McQuilten's critique.

But there is also a second sense in which we can read Zittel's experimentation and re-development. If we consider the role of experimentation I have outlined previously, we can see a necessary element of play that invigorates Zittel's work. Rather than focus on the marketability of Bauhaus 'style," or modes of production that champion disposability, the playful, material and conceptual experimentation employed by Zittel returns us to the root of Bauhaus pedagogy. Zittel's experiments with materials never reach a final form, but this iteration does not serve capitalist production, instead recalling the Albers' interest in process and creative play. This brings us back to the work of Eva Diaz when we consider the implications of formal experimentation, in particular Josef Albers's insistence on "not simply following a set of rules, but rather *reworking* continually, being a perceptual student of the complex organization of forms in the world."[88] Such a mode of study is not bound to the functions of the market in which the sculptures operate. Zittel is instead engaged with a mode of working that never achieves stasis and instead embraces constant experimentation and development.

Zittel's sculptures not only emerge from formal experimentation and play, but also require a similar investigation by the user in order to be lived in. Re-adjusting living practices to fit the needs of the Wagon Station Encampment requires constant testing of the work's possibilities. There is nothing guiding your experience of the work and improvisation becomes a strong feature when adjusting to their requirements. Experimenting with the work disrupts our cemented living habits under consumer capitalism, but the work's aim also goes beyond a critique of existing systems and logics. With Zittel's work, form instead challenges our

[88] Diaz, *The Experimenters*, 36.

naturalized living patterns. It becomes difficult. It is a combination of experiment and play, then, that is required of us by the work first and foremost. This results *from* the work's form and engages our sensual capacities. David Howes and Constance Classen have argued that "the ways we use our senses, and the ways we create and understand the sensory world, are shaped by culture."[89] They suggest that hearing and sight have long been privileged in North America and Western Europe over the 'lower senses'—taste, smell, and touch. With regards to art this sentiment is elaborated:

> the public was confronted with the notion of an art that existed only to be looked at and not touched. Furthermore, the museum made it clear that looking at art was a concentrated act that should not be united to any other activities, such as praying, listening to music, or dining […]. This situation could not be made the subject of complaint, however, for it had become an accepted truism that the only meaningful perceptual act that can be undertaken in relation to art is seeing. Rather than wishing to do more with art, therefore, all one could wish for was to see more.[90]

This example reflects a prioritization of sight above the other senses in which vision is elevated to a privileged position with regards to knowledge. Rejecting this position, Howes and Classen posit the synesthetic implications of the senses as a whole to thought. That is, to 'see' the world has as much to do with smelling, tasting, hearing, seeing, and thus feeling our way through, and that these experiences have shaped, and are shaped by, culture.

Zittel's is not a practice that encourages disembodied sight. More than to be looked at, the work demands a tactile encounter. The Wagon Stations are meant to be slept in and the containers used in your home,[91] an invitation that is at odds with museum and gallery display

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[89] Howes and Classen, *Ways of Sensing,* 1.
[90] Ibid., 20.
[91] *The A-Z Containers* are now produced in ceramic at A-Z West and commercially available in limited quantities. The proceeds from the sales go to support A-Z West Works, which provides access to collective resources for the local community in Joshua Tree, as well as opportunities for local artists to generate income.

conventions.[92] Planar configurations are used as tables and beds, suggesting that to engage with the work means to be in contact with it. It is through this tactile process that our capacity for sensing is challenged as we re-adjusting to concepts for domesticity that are in tension with dominant practices. While a critique of capitalist production models can indeed be one takeaway from this experience, I argue that this is not the work's guiding principle. Experimentation instead emerges as an invitation to consider domestic design otherwise. This pushes the development of new and unexplored forms that do not simply critique current design norms within capitalism, but also increasingly serve as an invitation for play, one in which the perceptual effects of form can be re-configured and experienced.

Material use in Zittel's work is managed in a similar way to the formal configurations. Zittel's method results in a carefully considered set of limits employed, ones in which the experiment is prioritized in order to create new solutions within these parameters. On this topic, the artist states: "What makes us feel liberated is not total freedom, but rather living in a set of limitations that we have created and prescribed for ourselves."[93] In the case of the wagon stations, the limitations employed are severe. The material exploration required to produce functional and versatile forms establishes limits such as the ability to live comfortably without electricity, running water, and air conditioning in the desert,[94] which speaks to Zittel's interest in exploring the de-stabilization produced when we veer away from resource extraction.[95] Conveniences like running water and electricity, relatively recent systems that we now rely on

[92] Zittel discusses the contradictions involved in siting her works in museums and galleries, and argues for the importance of having experiences with the sculptures outside of the context of art institutions in order to facilitate tactile engagement. See: Coles and Zittel, "Andrea Zittel," 364.
[93] Andrea Zittel, "These things I know for sure," in *Andrea Zittel: Critical Space,* eds. Paola Morsiani and Trevor Smith (Munich: Prestel, 2005): 14.
[94] Alix Browne and Andrea Zittel, "Andrea Zittel," *Apartamento,* no. 18 (2016): 60.
[95] Ibid., 49.

without thinking much about, are severed in an attempt to explore how this affects our experience of shelter. This act of imposing limits in order to produce a playful zone for the user to reflect on resource and material need is not prescriptive, and Zittel's words on this matter are worth quoting at length:

> Really good art simultaneously reveals both good and evil. It brings up complicated questions rather than proposing smug answers. […] It is an interesting exercise for people to examine their own day-to-day lifestyles and consider what they could live without, or live with. […] Little of the current mentality [dealing with sustainable living] has to do with thinking about actual needs. Do you really need a car? Do you need all the clothes? Do you need a new computer every two or three years? Without being moralistic or preachy, I hope that these are questions my work will inspire.[96]

Here, Zittel's aversion to a straightforward 'solution' is echoed in her experimental, and ongoing, study of form. While this includes a critical engagement with domestic practices emergent within capitalism, the work moves beyond critique to structure domestic practices differently. Zittel's constant—and always unfinished—study of form is the basis of her experimental model. The ambiguous nature of the sculptures fails to fit preconceived notions of function, and instead requires an openness to experimentation and play on behalf of the user, an experience that proves to slow perception as the work encountered goes beyond our ability to immediately make ourselves comfortable. This results in an invitation to familiarize ourselves through tactile use, making us work. In play, we can figure out just how many ways we can use a horizontal plane, or an *A-Z Container* that lines the shelf of the outdoor kitchen. It is the work's form that prompts an openness to experience, inviting us to experiment with differently embodied domestic practices.

Experiments in Political Form

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[96] James Eischen and Andrea Zittel, "500 Words: Andrea Zittel," *Artforum,* June 23, 2010, https://www.artforum.com/interviews/andrea-zittel-discusses-her-work-for-ima-s-100-acres-25893

It is precisely this ambiguity—Zittel's desire *not* to tell people how to live, or to provide a direct social critique through the work—that results from her carefully considered designs. The formal choices made by Zittel invite us to experiment with the language of design in order to de-stabilize our routine habits. In Zittel's world, one simply needs a horizontal plane for sitting and sleeping, a shelf and a hook, multi-functioning doors and open space. The work is both autonomous in its own formal logic and always firmly planted in the world, activated by Zittel and others as they are put to use. Zittel's sculptures embrace the resulting tension of function and form in order to craft, without knowing how exactly this might turn out, new perceptions of what living outside of the logics of capitalism might feel like.

To return to the tensions I described at the start of this chapter we have, on the one hand, Viktor Shklovsky's call for art to complicate perception—to make comprehension difficult. On the other, we have Zittel's promise that A-Z Administrative Services will "give [us] a small nucleus of harmony,"[97] an ironic statement given the temporal and conceptual *work* her sculptures invite. There is certainly a sense of continuity between Zittel's various tasks. Works such as the Wagon Stations and the Living Units raise questions regarding the role of design in the management and maintenance of the body. They utilize formal experimentation, and material and special restraints, in order to destabilize domestic concepts. But they do not, as would be suggested by Zittel's words, provide harmony and comfort in the sense that commodity goods are often presented to us. They might instead provide a refuge for their users particularly through their effects on our perception. The Wagon Station Encampment, in looking to address our needs, creates the possibility of living differently within a particular set of material conditions. The promise that this will bring harmony might perhaps best be read as a belief in the effects of

[97] Zittel quoted in McQuilten, "Playing Zittel," 53.

form—that a constant formal experimentation might lead to a better way of doing things. That being said, what is more important than this ideal is instead not the end result—a congealed and unchangeable design—but the process by which new forms emerge through the constant work of re-invention and experimentation. In this case Zittel's work pushes us to explore the assumptions behind our domestic 'necessities,' inviting an open-ended re-invention of daily living practices.

What is at stake in this perceptual experience? In particular, how might we consider the function of form in the structuring of our lives? In identifying the root causes of our massive ecological effect on the planet, geographers Simon Lewis and Mark Maslin highlight the intensification of fossil-fuel use and industrialization as a result of colonialism and imperialism.[98] Networks of global trade also lead Jason Moore to highlight the role of capitalism in the development of what he terms the 'Four Cheaps'—"food, labor, energy, and raw materials"[99]—predicated on "*a way* of organizing nature premised on endless commodification."[100] To shift our practices away from the destruction of the earth's species and ecosystems requires radical shifts in thought and action towards modes of living in the world that defy extractivist and capitalist logics. Feminist philosopher Hasana Sharp has suggested that "thinking and acting in the face of genuinely global, planetary problems, with deep historical, biological, and chemical roots, *is a task for which we do not yet have the concepts and tools* [emphasis mine]."[101]

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[98] Lewis and Maslin, "Defining the Anthropocene," 175.
[99] Jason W. Moore, "The End of Cheap Nature. Or How I Learned to Stop Worrying about 'the' Environment and Love the Crisis of Capitalism," in *Structures of the World Political Economy and the Future of Global Conflict and Cooperation,* eds. C. Suter and C Chase-Dunn (Berlin: LIT, 2014): 289.
[100] Ibid., 286.
[101] Hasana Sharp, "Not All Humans: Radical Criticism of the Anthropocene Narrative" (unpublished manuscript currently under review, in the author's possession, 2018), 17.

Zittel's work—infused with methods for working and thinking emerging from Bauhaus experimentation—can speak to this task. Promises of personal fulfillment are insufficient here only if we hold true the notion that the acquisition of property and goods will one day make us happy. There is instead a promise of fulfillment made in a broader sense that points to the possibility of creative experimentation and the resulting shifts in thinking and acting beyond our current domestic ontologies. Zittel's work might, in this context, illustrate a processual mode of experimenting with the production of new forms. Her work engages strongly with perception inasmuch as it invites viewers to adjust to its domestic propositions and allows one to imaginatively contemplate what is at stake in their own daily practice. They are also speculative, as this experience invites a consideration of living practices that disrupt current frameworks emergent within capitalism. In this sense, the Wagon Station Encampment sets up a space in which forms are produced in order to provoke complex questions about how we can live in the world.

But no straightforward answers are provided by the work. In their place, we are left with a heightened sense of the possibilities of design, which, to borrow design theorist's Tony Fry's words, is about the "radical, affirmative and continuous *making of a home in the world* (and as such, the reverse of creating 'another world within the world.'"[102] Our perception of form is what sets this process in motion, and relies heavily on experimentation as both a process and a goal. Zittel is not suggesting that we give up our homes and move into wagon stations, an idealistic view at best. What she asks of us instead is to spend time in the work as a process by which we become defamiliarized from our domestic norms. Zittel herself lives within her work—a blurring of art into everyday life, and, perhaps, a process of designing the self that is pushed to the limits.

[102] Tony Fry, *Design as Politics* (Oxford: Berg, 2011): 252.

Zittel's intimate relationship to the work also suggests a design trajectory linked to her own life. That the work emerges from her own sense of needs is one way in which it retains a unique sculptural organization. Due to the limits employed, we are re-introduced to what a low-emissions lifestyle might look like, but we are also invited to imagine how many other possibilities for habitation are not currently being explored. Zittel's work is one instance of experimentation, a mere representative of countless possibilities of ways of living otherwise. Drawing out similar conclusions regarding an openness of perception, art historian James Voorhies highlights the critical efficacy of an art that "does not point to what is wrong, politically and socially. Instead, the artist stirs the spectator—and their senses—from a passive position of looking to a new position of feeling, an active state in which the viewer is absorbed through a complicity in the meaning of the work."[103] Voorhies's discussion is helpful when considering the lack of didacticism in Zittel's work, as an invitation to radically shift our ways of living. While engaging in opposition to understandings of domesticity shaped by capitalist economies, the critical efficacy of the Wagon Station Encampment never escapes questions of form and perception, of a will to experimentation. Zittel points to no clear problems and does not identify any clearer solution. We are instead stirred, borrowing Voorhies's language, through the logic of the work—its specific conditions created by the artist as a provocation—to experiment otherwise with domesticity. We are not asked to imagine a better future enabled by these sculptures, but instead to experience a perceptual space firmly rooted in the present tense in which our hands-on, creative experimentation becomes a learning strategy by which alternative approaches to living are embodied.

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[103] James Voorhies, "The Efficacy of a Critical Art," in *Beyond Objecthood: The Exhibition as a Critical Form Since 1968* (Cambridge: The MIT Press, 2017): 165.

By this point I have made clear that this chapter deals primarily with a situated and embodied approach to perception, to understanding our placement within political and economic systems that shape our living practices. I end with this provocation: what Zittel does is set up the conditions for an encounter—based primarily on the formal logic of her sculptures—that complicates domestic concepts in order to raise questions about the ways in which we live. Zittel's forms are thus much more than modifications to already-established conceptual categories of furniture and architecture. Instead, Zittel pushes the boundaries of design taxonomies in the pursuit of domestic forms-lived-differently. An increasingly critical function is opened up when we consider this experience, produced by the difficulty of assimilating the sculpture's form within our established cultural codes. Instead, Zittel presents us with a much less scripted situation in which ambiguity is embraced as it enables experimental play as a means of remapping the domestic. This mode of thinking is drawn out through an experience formed by the work, one separated out—and yet always in relation to—the world in which we live now.

CHAPTER 2.

THE AIR IN OUR MIDST:

ON TOMÁS SARACENO'S *AEROCENE*

"Shut down a coal plant, and you can slow global warming for a day; shut down the relations that made the coal plant, and you can stop it for good."[104]
-Jason W. Moore

"Wherefore living only on our energy savings by burning up the fossil fuels which took billions of years to impound from the Sun […] is lethally ignorant and also utterly irresponsible to our coming generations and their forward days."[105]
-R. Buckminster Fuller

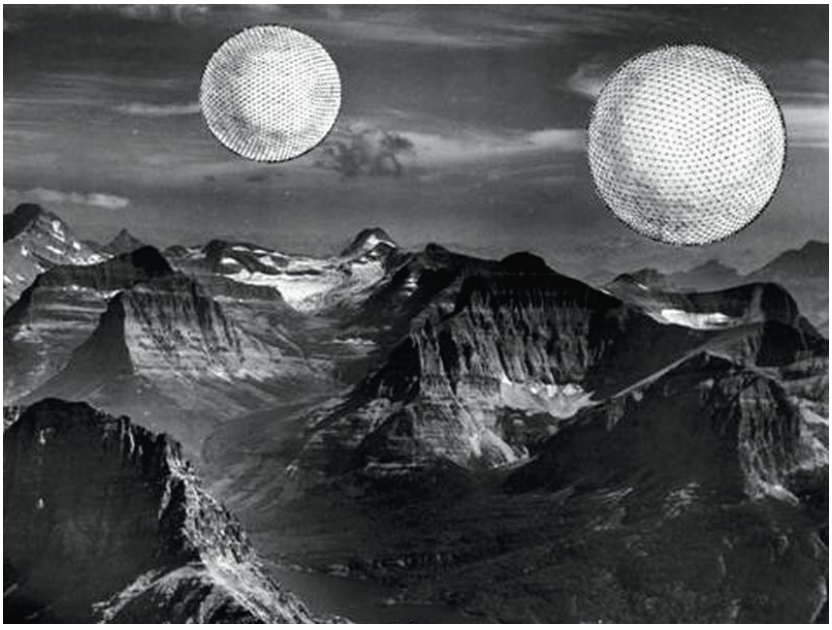

Figure 7: Buckminster Fuller and Shoji Sadao, *Project for Floating Cloud Structures (Cloud Nine),* 1960

In 1960 Richard Buckminster Fuller and Shoji Sadao imagined *Cloud Nine* (fig. 7)—a speculative vision of a floating city in which thousands of people would dwell in spheres that float above the horizon. Fifty-five years later, Studio Tomás Saraceno, along with a group of

[104] Jason W. Moore, "The Rise of Cheap Nature," in *Anthropocene or Capitalocene? Nature, History, and the Crisis of Capitalism,* ed. Jason W. Moore (Oakland: PM Press, 2016): 94.
[105] Buckminster Fuller, *Operating Manual for Spaceship Earth* (Zurich: Lars Müller, 2008): 94.

participants, flew a large, balloon-like device in the sky, carrying seven passengers by wind currents in state of atmospheric immersion (fig. 8).

Figure 8: Tomás Saraceno, *Aerocene Human Flight, White Sands, NM, United States,* 2015

Saraceno's travellers appear in images in a state of vulnerability to the atmosphere. They are neither contained nor walled off by an outer perimeter but are instead enveloped within the air streams they travel with. They exist *within* the atmosphere rather than in states of isolation, both embracing the air—and embraced by it as well. In this chapter I am interested in the questions that arise between this comparison—between Buckminster Fuller's utopic design proposals and Tomás Saraceno's speculative transportation system *Aerocene* (fig. 9). While Fuller's floating city and Saraceno's buoyant sculptures share similarities on the surface, a closer analysis reveals divergences in the project's scope and ambitions.

In the previous chapter I began to interrogate the function of defamiliarized form in Andrea Zittel's sculptural exploration at A-Z West, focusing on the process of perceiving her sculptures for their ability to break from established norms and taxonomies of design. In working

towards a design practice that goes beyond models that facilitate endless consumption by requiring an adjustment in daily practice, Zittel experiment with form in ways that do not conform to capitalist domestic frameworks and stem from earlier efforts of social transformation that were emergent within Bauhaus pedagogy. This chapter continues my investigation of experimental forms as they bracket the fields of art and design. In doing so I now shift my attention from concerns with perception and defamiliarization to Buckminster Fuller's interest in interdisciplinarity as an ecological set of practices. Fuller was hired by Josef Albers to teach at Black Mountain College, their time overlapping during the years 1948-1949 in the context of the Cold War.[106] During Fuller's tenure he shared the college's larger goals germinating during the mid-twentieth century in which, as Eva Diaz describes, "experimentation […] provided a shared terminology for College members to view their specific endeavors in relation to different though aligned efforts in other disciplines. At Black Mountain, experimentation was professed to be a practice that could be shared by *all* creative producers."[107] This chapter investigates the way that Saraceno's *Aerocene* is indebted to an experimental framework that departs from Zittel's in many ways, yet the two—like the variety of practitioners and theorists who attended Black Mountain College—explore the value of art and design as a process-based methodology that has the potential to re-shape ways of living in the world.

In this chapter I link Fuller's design pedagogy to Saraceno's goals for the *Aerocene* project—looking closely at the productive role of art and design in forming connections and ecological relations on Earth. As I will go on to discuss, there is an important point of disagreement between Fuller and Saraceno that is reflected in Fuller's belief in the benefits

[106] Having fled Nazi persecution prior to the outbreak of the Second World War, many artists and thinkers—including Josef and Anni Albers—relocated to the United-States.
[107] Diaz, *The Experimenters,* 4.

capitalism to achieve a technologized planet built for the benefit of the human species[108] Keeping this in mind, can Fuller's larger goals be useful in addressing our current ecological relations of exploitation and dominance? How might Saraceno's work embody Fuller's ideals all the while steering clear of his belief in industrial and extractivist technologies? In what follows, I argue that the question of form in Saraceno's work is an important point from which to consider the social and ecological propositions made in *Aerocene*. Fuller's experimental and geometric design theories are particularly apt in considering *Aerocene*'s ability to cultivate a working method attuned to environmental and multispecies connectedness through collective endeavors in working and thinking.

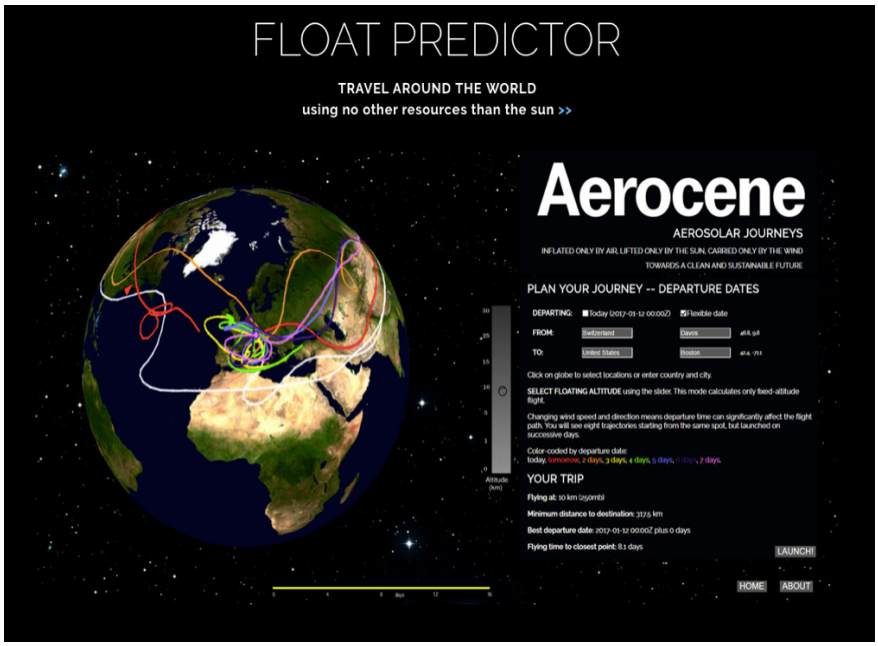

Figure 9: Tomás Saraceno, *Aerocene Float Predictor*, 2017-

[108] For instance, Fuller's central metaphor of 'spaceship earth' likens the earth to a machine for human habitat. This is a metaphor that drives many of his designs, which align themselves with industrial methods of mass-production. While Fuller acknowledged the presence of diverse life on 'spaceship earth' in his writing, it is his enthusiasm towards corporate management and capitalist economies that lie in contrast with ecological flourishing on the planet. For a discussion of Fuller's embrace of capitalist systems see: Wong Yunn Chii, "Fuller's Corporate Soul," *ANY: Architecture New York*, no. 7 (1997): 45-47.

Aerocene in Three Acts

1. There is a small bag in front of you. It is composed of black nylon and rests on your shoulders when you are transporting it. The bag opens up into a cross-shaped blanket on which its contents sit. There is a notebook and a pen, as well as a clipboard with relevant information on how to use the items in the bag. These also include two pairs of gloves, a compass, a bundle of black cord, and a small clear bottle with wires erupting from its opening. Inside, various sensors are placed so that, once airborne, they will track data such as temperature, air quality, and humidity. A large black nylon bundle is also included, which inflates to assume a triangular shape upon which the other objects are attached. The final product resembles a kite. All the hardware has been attached and you can now direct your attention upwards. Depending on the day, the wind conditions might be more favorable than others. You are told that today the wind conditions are well suited for flight, and so you begin the process. Inch by inch, you watch the black nylon inflate ever so slowly. It is beginning to rise with the heat of the sun, and it gently lifts off of the ground in order to hover slightly in the air. With each passing minute it lifts up even more until it appears completely buoyant; weightless. As it rises higher and higher, the test nears completion. You are working with the wind and the sun in order to make something fly. You yourself are not rising with the contents of the bag but learn instead to notice atmospheric conditions inasmuch as they facilitate flight. More than this, the information included presents an invitation: to modify and test out changes to the current process, and to report back with your own findings.

2. Spiders fly with the wind. Or, to put it another way, they ride the wind. This is a completely separate scenario than the one described above but is linked through Saraceno's study of spiders. They rise into the air, for instance, by raising themselves off a blade of grass

and lifting their abdomens towards the sky. They then start to spin threads of silk—impossibly thin in diameter—that are enveloped by breezes and electrical circuits.[109] These lift the spider off the ground and upwards, until they are high above the surface of the earth. In this scenario, that spider can rise upwards of five kilometers in the proper atmospheric conditions and travel for thousands of miles. This process of 'ballooning' is a weightless act that relies on a set of ideal meteorological conditions as well as the ingenuity of the spider's silk. Travelling by silk balloon, utilizing wind currents and electrical circuits formed by thunderstorms and other atmospheric conditions, the spider takes flight without expending much energy at all. If the experience of flying a balloon with the heat of the sun and the power of the air seems new to you, you are in fact engaging in a process that spiders have been doing in their own way for millennia.

3. This time the backpack containing flight test supplies has been replaced with a larger infrastructure. Now, Tomás Saraceno guides a larger group of participants through a flight exercise. We are in White Sands, New Mexico, on a clear and sunny day. Here, there is a sense of energy deriving from participant efforts to raise a much larger balloon from the ground. This one is black as well, roughly the size of a hot air balloon. There is no basket affixed to the base, nor is the flight powered by a flame. This balloon—a larger *Aerocene* sculpture[110] that follows the same flight principles as the version described above—carries a passenger. Harnessed to the base of the black balloon, a body is suspended in the air. The balloon hovers here for a while; held relatively still until it begins to propel forward, taking its passenger for a ride. There is no steering, but data-gathering back on the ground has identified the trajectory based on wind currents. This is the first human flight, and while there will be longer trips taken in the future,

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[109] See: Moonsung Cho et. al, "An observational study of ballooning in large spiders: Nanoscale multifibers enable large spiders' soaring flight," *PLoS Biology* 16, no. 6 (2018): 1-27.
[110] Saraceno, like Zittel, uses the term sculpture to describe the *Aerocene* devices. This suggests once again an integrated approach to art and design that runs throughout this thesis.

after a few hours, at sunset, the passenger is brought back down to the ground gently as solar heat diminishes. The day has been a success; all the participants are buzzing with energy. Most, if not all, look forward to the next advances that might take them farther in the air, perhaps even sharing space with spiders a kilometer or two in the sky.

A Design in Motion

Tomás Saraceno—who originally trained as an architect—has developed an artistic practice that speculatively investigates issues of shelter and transportation through a multidisciplinary and multispecies framework. For instance, part of Saraceno's research includes long-term collaborations with spiders, through which he studies their web formations and sensing practices in order to build forms that are based on arachnid design strategies. Saraceno's work brackets the fields of design, engineering, science, and art, and seeks to expand our practices of dwelling in, and sensing, the environments which we inhabit.[111] Much of Saraceno's work outside of the *Aerocene* project has involved the creation of lightweight and mobile structures formed from a combination of woven elastic rope and clear, bubble-like spheres. One particular example entitled *Galaxies Forming along Filaments, like Droplets along the Strands of a Spider's Web* (2009) (fig. 10) takes formal cues from both the construction of a spider's web

[111] My use of the term dwelling refers to the work of anthropologist Tim Ingold. Ingold theorizes dwelling as the continual process of making one's home in the world. Environments are never static, nor complete, but exist in a continual process of re-making. Ingold's discussion of dwelling echoes Sloterdijk's theory of spheres, in particular for both authors' emphasis on the relational production of space in the making of our worlds. See: Tim Ingold, "Building, Dwelling, Living: How Animals and People Make Themselves at Home in the World," in *The Perception of the Environment*: *Essays on Livelihood, Dwelling, and Skill* (London: Routledge, 2000): 172-188.

and the sponge-like composition of the universe recently described by scientists,[112] emphasizing the structural connectedness that forms the basis of both models.

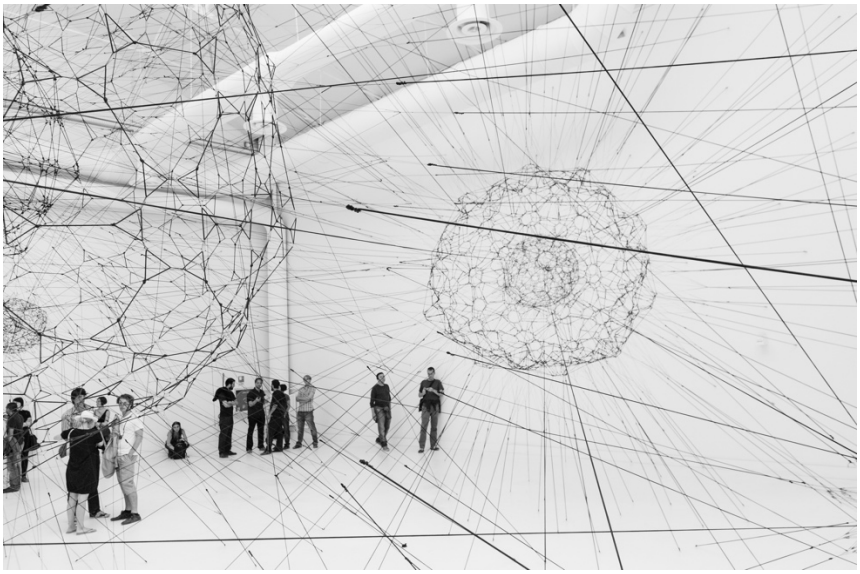

Figure 10: Tomás Saraceno, *Galaxies Forming along Filaments, like Droplets along the Strands of a Spider's Web*, 2009

As viewers walk within the installation and bump into its parts, the entire thing begins to pulse and shift responsively. Taking this exploration of environmental connectedness out of the gallery, Saraceno has maintained collaborative design efforts through *Aerocene.* The open-source, multi-disciplinary project comprises sculptural exploration that leads to the creation of transportation devices that hover and move in the air without the need for fossil fuels or solar cells. Saraceno's blurring of biology, engineering, design, and art, has earned him connections to experimental artists and designers such as Ant Farm, Archigram, and Buckminster Fuller, who all equally engaged with new and increasingly experimental structural forms. Only, in Saraceno's work, experimentation is pushed beyond anthropocentrism in order to experiment otherwise with the atmosphere and the other species with which we share a home on the earth.

[112] J.R. Gott III et al., "The Sponge-Like Topology of Large-Scale Structure in the Universe," *The Astrophysical Journal,* no. 306 (1986): 341-357.

Saraceno's *Aerocene* sculptures are lightweight, geometric forms that hover above the earth's surface in a fragile choreography with wind currents and solar energy. The *Aerocene* project—of which these sculptures form the basis—is a collaborative, interdisciplinary investigation that dwells within Saraceno's larger project of environmental connectedness and collaboration. *Aerocene* revolves around the testing of lighter-than-air sculptures that rely on solar energy and infrared radiation to float. The sculptures have been developed as an alternative mode of transportation, forming a speculative infrastructure that asserts the air as a democratic space beyond national sovereignty. This is a crucial part of *Aerocene's* activities, given the current state of the atmosphere as a militarized and highly state-controlled space. Saraceno's grassroots approach to the development of new technologies, coupled with the project's rejection of fossil-fuels and its global strategies of research and development, raises important questions about our collective right to mobility, the necessity of extractivist transportation logics, and the specialization of design and engineering as a set of practices only accessible to trained experts.[113] The sculptures are themselves strikingly simple, roughly pyramidal in shape and composed of black nylon. Affixed to their base is a small GPS tracking device to facilitate travel, as well as a monitoring device for greenhouse gases. While there are logical nodes to the project—to develop a mode of transportation that does not rely on fossil fuels—much of what *Aerocene* transmits to participants is a collaborative and playful experience with atmospheric attunement. Not offering a logical solution that conforms to current norms for human travel, Saraceno instead offers a playful prototype that allows us to dwell with the possibilities and stakes that this proposal

[113] My use of the term science draws on its associations with objectivity and trained expertise. The term is often contrasted with art, and implies the systematic application of scientific principles as a method of studying objective 'truths.' For a useful discussion of scientific objectivity—in particular its emergence within the history of science—see: Lorraine Daston and Peter Galison, *Objectivity* (Cambridge: The MIT Press, 2007).

offers. Solutions are not always found, and the sculptures do not always lift off the ground. Images of the *Aerocene* sculptures floating still in the sky are simply documentation of a larger string of events. The failure of these images to transmit the temporal and affective registers of the project suggests that here, design's goals become less and less about the finished product. *Aerocene* instead enables a participant-based process of experimenting and thinking otherwise that drives the its material results.

Various scholars have written about Saraceno's practice with relation to ecology and social theory.[114] *Aerocene* retains a publishing node as part of its activities, which reveals a theoretical component that is important to consider when outlining the project. Environmental studies scholars Sasha Engelmann and Derek McCormak—who both spent time at Studio Tomás Saraceno as residents—have written extensively on the project's interdisciplinary and multispecies framework. In their work, Engelmann and McCormack discuss the *Aerocene* project in relation to its orientation towards the elemental—defined as categories of matter such as air, earth, water, and fire in which lifeforms are immersed. To the authors, perception as a concept is useful in considering its role as a "domain of sense-making [that] is critical to how the material dynamics of the world are sensed and take shape as matters of concern."[115] The authors take interest in Saraceno's project for his engagement with solar and atmospheric energy. Saraceno's collaborative approach at experimenting with, and sensing, elemental conditions is argued to model an ethico-aesthetic experience in which bodies and more-than-human agents are re-configured and attuned to differently. The philosopher Bruno Latour, in a similar vein, has also embraced Saraceno's work as a model for social theory in which the breadth of relations

[114] Bruno Latour and Eva Horn have looked to Saraceno's work as a metaphor for social theory. For Latour's discussion of Saraceno's work see pages 60-61, and Eva Horn's on page 79.
[115]Sasha Engelmann and Derek McCormack, "Elemental Aesthetics: On Artistic Experiments with Solar Energy," *Annals of the American Association of Geographers* 108, no. 1 (2017): 242.

between aspects of the work speaks to a productive disorder. In Latour's model, the work is seen to resist attempts at "nesting all relations within one hierarchical order,"[116] and that there are instead multiple local hierarchies inextricably bound up in the work. While on the one hand Engelmann and McCormack's work looks to material properties and attunement in describing the perceptual possibilities for *Aerocene*, Latour's focus is on Saraceno's practice as a model or metaphor for social theory. In both cases, therefore, there is an emphasis on what Saraceno's work *can accomplish* with regards to social relations and politics. In this chapter I will work from a position prior to the ethical and political implications described above. I will posit the importance of form in *Aerocene*, in particular how the project models an interdisciplinary and experimental framework for artistic production with links to art and design pedagogy at Black Mountain College—a small school in rural Appalachia that became a hub of artistic experimentation in the 1940s and 1950s. A consideration of form—a term here referring to an active process able to give shape to both a work of art and its mode of reception—is a useful point through which to investigate *Aerocene*'s ethical and political goals. Buckminster Fuller's tenure at Black Mountain College in the late 1940s will be a primary focus in my analysis, and a good place to begin.

Buckminster Fuller's Geometry as Method

There are striking similarities between Saraceno's approach to the design of transportation systems and that of designer and pedagogue Buckminster Fuller, who, in the mid-twentieth century championed a working approach that saw the role of technology and unspecialized knowledge as crucial to the bettering of design's impact in the world. It will be

[116] Bruno Latour, "Some Experiments in Art and Politics," *E-Flux Journal*, no. 23 (2011): 4.

useful here to consider Fuller's pedagogical efforts to shape an alternative design praxis, developed through his writing, design projects, and the various teaching positions that he held throughout his career. Fuller's primary pedagogical aim was to develop a theory of comprehensive design described through his work on 'synergetics,' a theory of knowledge that upholds the "behavior of whole systems unpredicted by the behavior of their parts taken separately."[117] Fuller's belief in this type of total thinking asserted the importance of connectedness. In this model, there is no simple relationship of cause and effect between things in the world. Instead, the world is embraced in all of its dynamic complexity, leaving the comprehension of earth systems in the hands of perceptive subjects able to understand complex natural processes through careful observation. Fuller continued to develop his methods of experimentation throughout his tenure at Black Mountain College in the late-1940s. In his writing he rejects specialization, and upholds a negative view of disciplinary conventions that syphon various spheres of knowledge into distinct categories.[118] Specialization, according to Fuller, makes clear that "society does not think that there are behaviors of whole systems unpredicted by their separate parts,"[119] leading to "society's formally-accredited thoughts and ways of accrediting others [that] are grossly inadequate in comprehending the non-conceptual qualities of the scenario 'universal evolution.'"[120] In the face of this apparent failure of specialization, Fuller champions the productive role of the designer—a figure articulated as a creative experimenter. As argued by Eva Diaz, Fuller based his pedagogy at Black Mountain

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[117] Buckminster Fuller and E. J. Applewhite, *Synergetics: Explorations in the Geometry of Thinking* (London: Macmillan, 1975): 100.01.
[118] For an outline of the origins of specialization according to Fuller, see chapter two of *Operating Manual for Spaceship Earth* (Munich: Lars Müller, 2008). For a discussion of how such specialization must make way for a more comprehensive study of Earth systems, see chapter 6 in the same volume.
[119] Fuller, *Operating Manual for Spaceship Earth*, 79.
[120] Ibid.

College on the form of the experimental test, which "leveraged the creativity of the artist and the technological innovativeness of the scientist to completely rethink acts of and objects of design."[121] It is implicit in Diaz's statement that, to Fuller, mistakes are made when we manipulate and divide the world into distinct spheres—such as physics, biology, design, and education.[122] Rather than isolate these categories and rely on institutional structures to legitimize their forms of specialization, Fuller instead emphasizes the need for a more open form of experimentation. Suggesting that "society operates on the theory that specialization is the key to success, not realizing that specialization precludes comprehensive thinking,"[123] there is an implicit tendency in Fuller's writing to become more adaptable. That is, to cultivate an openness to non-specialist ways of thinking and acting. To Fuller, one does not need to be a formally trained and accredited designer in order to explore and experiment with the processes of the field. The comprehensive designer—one who works synergistically within an interconnected world—takes on a radical position in Fuller's pedagogy for her ability to "overturn conventional, inefficient habits of specialization and inequitable resource allocation."[124]

Eva Diaz has argued that Fuller saw the importance of the experimental test to be a radical alternative to legislative politics. In carefully testing and designing new technological structures the designer becomes an agent of change in the world through the creation of

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[121] Diaz, *The Experimenters,* 101.

[122] The notion that everyone, and not just formally trained design experts, can take on the role of design is echoed in the work of Ezio Manzini who has been omitted, for the purposes of space, from this section. Manzini's theory of open-design is one in which everybody can take on the role of a designer and work towards shaping a better world. While not discussed in this paper, it is a useful theory to mention that further strengthens Saraceno's belief in design's transformative potential at the grassroots level. See: Ezio Manzini, *Design, When Everybody Designs: An Introduction to Design for Social Innovation* (Cambridge: The MIT Press, 2015).

[123] Fuller, *Operating Manual for Spaceship Earth*, 24.

[124] Diaz, *The Experimenters*, 106. I deliberately use female pronouns in contrast to Fuller's masculinist gendering. While gender is not the focus of my analysis, it is important to note that Fuller's belief in capitalist systems was also shared by a deliberately masculinist perspective and is a shortfall in his thinking.

emancipatory forms and systems. To Fuller, the role of the artist was idealized in his experimental pedagogy given her "unfettered freedom to pursue broad-minded investigations of society against a culture of professionalization and specialization."[125] We can, in this sense, consider Fuller's comprehensive designer—sometimes referred to in his writing as an artist-scientist figure—as modelling a praxis that is collaborative, and beyond disciplinary hierarchies.

In what follows, I will trace the affinities between the comprehensive designer and the *Aerocene* explorer[126]. While these affinities bind Saraceno's work to Fuller's earlier form of experimentation—raising questions that relate to debates surrounding art and design at Black Mountain College—the comparison also leverages an important distinction between the two. Fuller's techno-utopianism marks a break in this comparison, even while *Aerocene* works from the Fuller's articulation of comprehensive design. Outlining the relationship between the two practices will help us distinguish Fuller and Saraceno's work with relation to their ecological provocations, ones in which Fuller's embrace of technology and capitalism are problematized by Saraceno's engagement with ecological forms for utopian, networked, and interdisciplinary design.

Aerocene is conceived not with any set group of participants in mind but is instead an ever-evolving network of specialists and untrained enthusiasts dispersed across the globe. Institutional collaborators are chosen by Saraceno, while the public is invited to participate through events and workshops. In addition to workshops led by Saraceno and his team, the *Aerocene Backpack* (fig. 11) is available freely to borrow for individuals to test out the project

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[125] Ibid., 111.

[126] The *Aerocene* explorer is Saraceno's answer to the figure of the comprehensive designer. Individuals who participate in the project are considered 'explorers' who seek to engage with the project's design problems—and are therefore accorded a stake in the project. In keeping with Fuller's utopian goals, the *Aerocene* explorer is a position that can be taken up by anyone interested in devising new ways of living on Earth, and I argue, is a direct extension of Fuller's pedagogical model.

on their own, an invitation to experimentation in daily life that Andrea Zittel invites her viewers to explore as well. This fact echoes architectural historian Mark Wigley's statement that Fuller's "major innovation was not only the geodesic structure as an interconnected system of equal elements sharing all loads, but the idea of an interconnected system of researchers distributed across a series of nodes in different cities to work on parallel on domes—an interlaced network to study interlaced networks."[127]

The *Aerocene* project inhabits many of the same nodes as Fuller's dispersed and collaborative model. Saraceno has, to this effect, formed a non-linear network of research clusters that work towards the development of the project.[128] Thus far Saraceno's institutional collaborations are focused in two major nodes—the Max Planck Institute and the Massachusetts Institute of Technology, where researchers are working on developing technologies that will be utilized in the scanning and three-dimensional modelling of complex spider webs. I will outline the connections between Saraceno's study of the atmosphere with his research with spiders later on, but at this point it is worth noting the institutional affiliations that connect *Aerocene* to various locations around the world. In addition to these two long-term collaborations, *Aerocene*'s literature describes a wide array of institutional partners around the world, for instance a residency at NASA and collaborations with the Natural History Museum in London.[129] Saraceno's goals here are similar to the networked structure established by Fuller. In this regard, we can begin to link *Aerocene*'s collaborative engagement with the co-production of research

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[127] Mark Wigley, *Buckminster Fuller Inc.: Architecture in the Age of Radio* (Munich: Lars Müller, 2015): 146.
[128] Saraceno has collaborated with scientists, artists, researchers, and untrained enthusiasts globally. A detailed list of collaborations can be found on the *Aerocene* Foundation's website (aerocene.org).
[129] Kimberly Bradley, "With Spiders and Space Dust, Tomás Saraceno Takes Off," *The New York Times,* October 19, 2018, https://www.nytimes.com/2018/10/19/arts/design/tomas-saraceno-palais-de-tokyo.html.

alongside Fuller's goals of networked research clusters as they share an embrace of collective working and thinking.

While Saraceno works closely with institutions, he also collaborates with individuals from non-specialist backgrounds and makes use of a variety of working models to investigate the project's core questions. Amongst the various thinkers included are artists, geographers, engineers, physicists, philosophers, balloonists, and enthusiasts of any of these various disciplines. This interdisciplinary formation models a rejection of single-discipline authority, in particular the idea that any single discipline will provide the knowledge or tools to satisfy the problem at hand. Instead, Saraceno relies on a loose hybridization of practices. *Aerocene*, in stringing together knowledge from diverse participants across the project's nodes, embraces productive mixing of disciplines and thus partial perspectives in attempting to resolve the project's ambitions.

A similar ideal for cross-disciplinary collaboration is articulated by Fuller, despite his emphasis on a synthesis of diverse practices contained within the figure of the comprehensive designer. According to Fuller, specialization as it is practiced within the academy, industry, and culture at large precludes a more holistic view of earth systems. It is instead the child's creativity and the artist's freedom of exploration that are assumed by Fuller as a model for a more open form of experimentation that rejects the exclusivity of disciplinary practices and protocols to be accessed only by trained professionals in the respective field. What is important to emphasize here when thinking with Fuller's concepts is his embrace of partial identities and collective thinking that can be located as an instance of *Aerocene*'s 'comprehensive' formation. In both cases, strong ties to art practice—seen as a space for experimental modes of practice—is key. Fuller's rejection of disciplinary specialization is apt at describing Saraceno's collaboration

across various forms of knowledge. But Fuller's figure of the artist-scientist—a comprehensive designer able to collapse categorical distinctions within her singular practice—assumes that any person, let alone profession, can master a comprehensive framework of thought. This condition suggests a view of the designer as an 'expert,' able to solve complex global issues with ease. That is, Fuller's polemic against specialization finds itself strapped once again to anthropocentric ideals whereby a single human is seen as able to 'fix' the world's problems. It is useful to consider the interdisciplinary methods bound to Fuller's concept of the comprehensive designer,[130] yet a comparison to Saraceno reveals a distinction between interdisciplinarity and collective thinking. Rather than approach social and ecological complexity as a puzzle to be solved by an outstanding individual, Saraceno looks to the productive overlaps in disciplines that are able to work together to co-produce knowledge towards the project's goals.[131]

The Amateur and the Expert

Saraceno's engagement with both amateur and professional participants echoes cultural historian Marjorie Garber's discussion of the terms. In her book *Academic Instincts*, Garber articulates a tension between the categorical distinction of 'amateur' and 'professional.' In particular Garber brings attention to the ways in which these two terms have shifted status over time. That is, that there are certain positions in which an amateur or non-professional status is valued—for instance in politics, seen as a sign of virtue—while on a broader basis we

[130] Diaz, *The Experimenters*, 111.
[131] This mode of thinking about the co-production of knowledge is related to the work of Donna Haraway. Harway articulates a theory of *sympoiesis*—of making-together—that can be a model for ecological relating, both within and beyond species boundaries. For an in-depth description of sympoiesis see Donna Haraway, "Sympoiesis: Symbiogenesis and the Lively Arts of Staying with the Trouble," in *Staying with the Trouble: Making Kin in the Chthulucene* (Durham: Duke University Press, 2016): 58-98.

nevertheless "live in a world of professionals and professionalization."[132] Historically, the position of the intellectual was reserved for untrained enthusiasts in positions of privilege who cultivated diverse knowledge on a range of topics. However, as traced by Garber, over time—and through the American education system's siphoning of knowledge into discrete disciplines—"pleasure and self-education, the amateur intellectual tradition, gave way to a desire for professional 'work.'"[133] In this transition, the profession of science emerged in a position of authority, trained specialists considered more knowledgeable and legitimate than their untrained counterparts. But rather than stop at the distinction between the amateur and the professional, Garber asks us to consider how these categories are understood commonly as separate subject positions, but in fact are formed in relation to one another. The amateur and the professional, to Garber, "are always in each other's pockets. They produce each other and they define each other by mutual affinities and exclusions."[134] This relationship is made tangible by Saraceno as various amateur and professional participants work together at various levels. Doing so does not dissolve their differences. For instance, the participation of meteorologists at the Massachusetts Institute of Technology remains separate work from the testing of sculptures with a group of amateur balloonists. However, neither work nears completion without the other. In the case of the MIT scientist and the Balloon enthusiast, the project's activities translate back and forth. What is theorized in the lab is put to task in the field, forming a structural methodology that juxtaposes the amateur and the professional to form a unifying whole.

This question might also be extended to Saraceno himself, in particular his own amateur position within the field of science. As Garber points out, the professional amateur "is someone

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[132] Marjorie Garber, *Academic Instincts* (Princeton: Princeton University Press, 2001): 4.
[133] Ibid., 17.
[134] Ibid., 5.

who glories in the amateur status. Often the professional amateur is *not* a professor, at least not one with a conventional academic training. If he or she *is* one, the odds are that some pains will be taken to disavow the fact."[135] What is important to Garber when discussing the celebration of amateurism is its suggestion of authenticity: the public intellectual is celebrated for being an impassioned outsider to the realm of experts, their unconventional training "a sign of realness,"[136] or, "an 'authenticity effect'"[137] Similarly, Saraceno employs his outsider position within the institutions of science to his advantage. He brings together individuals from various professional and amateur backgrounds to create a participatory framework that gains traction in part for its open-source spirit and collective energy. Indeed, Saraceno's *Aerocene* activities are meant to be as accessible through various outputs as viably possible.

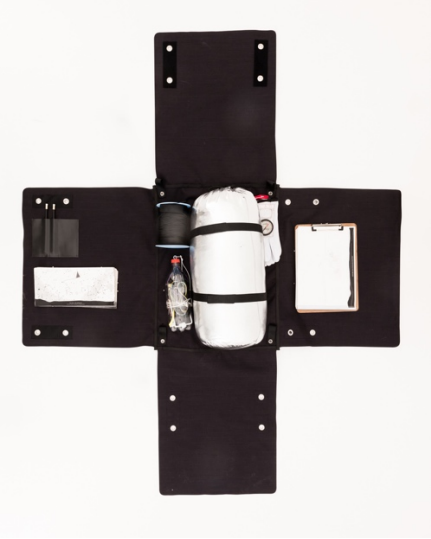

Figure 11: Tomás Saraceno*, Aerocene Backpack*, 2016-

The *Aerocene backpack* (2016-) (fig. 11)*,* for instance, is loaned out through the Aerocene Foundation—which structures the project's various activities—at a scattering of

[135] Ibid., 20.
[136] Ibid., 21.
[137] Ibid.

locations around the world. Individuals are invited to borrow a small backpack that contains all supplies required for a flight test, and report back to the foundation with their findings and experiences. Do-it-yourself instructions to assemble the required materials yourself are also readily accessible and strengthens the project's ties to grassroots initiatives and open-access forms.[138] Here, while the project is structured around the work of experts employed professionally in the field of science, there is an interplay between the amateur and the expert that situates the work in partially in the public realm.

Aerocene thus de-stabilizes disciplinary siphoning through the multidisciplinary structure at the project's root. The project is equally sustained by an exploration into unsustainable living patterns and new, speculative forms that seek to liberate society from these ailments. As I have said previously, there is nevertheless an important dissonance that we can locate between Saraceno's collaborative model and Fuller's 'comprehensive' designer. To think with Fuller reveals the presumption that any person is able to think in a fully comprehensive way. Fuller's utopic vision has been critiqued for championing the role of "exceptional individuals stepping up to the task of envisioning social problems holistically,"[139] linking his pedagogy to "a midcentury cultural lexicon emphasizing scientificity in a spirit of American technological optimism and exceptionalism."[140] *Aerocene*'s capacity for dynamic and collaborative thinking, or bringing in as many vantage points as possible, rescues the framework of Fuller's pedagogy from the confines of individualism. Rather than work towards the belief that an ideal working method can

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[138] For an overview of countercultural experiments in art, which speaks to many of the principles I have described (in particular a DIY ethos cultivated by artists working from grassroots positions) see: Elissa Auther and Adam Lerner, "The Counterculture Experiment: Consciousness and Encounters at the End of Art," in *West of Center: Art and the Counterculture Experiment in America, 1965-1977*, eds. Elissa Auther and Adam Lerner (Minneapolis: University of Minnesota Press, 2011): xvii-xxxvi.
[139] Diaz, *The Experimenters,* 144.
[140] Ibid., 147.

be achieved by "exceptional individuals," Saraceno welcomes as many perspectives as possible. It might instead be said that comprehensive design is not produced by a single, rational subject, but is instead *a process that emerges* through the collaborative space within which *Aerocene* has germinated. *Aerocene* thus embodies many of Fuller's principles of comprehensive design—from an embrace of diverse viewpoints to poetic ideals of global cooperation—from a fragmented position rather than that of a single surveying subject, suggesting a shift from the individual to interdisciplinary collaboratives.

This leads me to a related point, Saraceno's engagement with a more-than-human framework in *Aerocene*. There are two primary sites in which Saraceno's work breaches Anthropocentric methods that challenge the designer's role within larger ecosystems. In his practice, Saraceno has often worked with various species of spiders[141], studying their web-building practices as well as working with them to produce hybrid webs[142] that are used to explore their structural properties. Saraceno's work with spiders extends beyond the species itself. For instance, his study of webs takes into account a relation to wind and atmospheric pressure, which is itself tied to solar energy. These connections bind natural phenomena at various scales. The elemental and the biological co-exist in conditions of environmental connectedness.

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[141] Sasha Engelmann, "Social Spiders and Hybrid Webs at Studio Tomás Saraceno, *Cultural Geographies 24,* no. 1 (2017): 161-169. The spider room at Tomás Saraceno's studio contains more than three hundred spiders of varying species. Hanna Baranowska, who works at the studio, is responsible for their care. Amongst the various species of spiders that Saraceno works with are the *Nephila, Latrodectus mactans* (black widow)*, Tegenaria, Cyrtophora* and *Steatoda*. *Stegodyphus dumicola,* another species that Saraceno has worked with, is a particularly large spider that travels many kilometers by ballooning its silk.

[142] Hybrid webs are produced by pairing different species of spiders together in the same habitat. This results in the formation of webs that are the result of a collaborative effort between the spiders and are studied by Saraceno and his team for their structural and aesthetic properties.

Sasha Engelmann has penned captivating descriptions of Saraceno's work with spiders, describing the study of three-dimensional web formations and the "degree of care and reciprocity that occurs between spiders and studio assistants […], expressed through the degree of acute and careful observation that is necessary for such multispecies collaboration to succeed."[143] Engelmann, here, is describing Studio Tomás Saraceno's multi-sensory study of arachnid web-building and environment sensing practices. With relation to the *Aerocene* project, Saraceno has described the ways in which the study of spiders has influenced the development of *Aerocene*. This relation (as noted above) is tied to the spider's form of air travel, in which the spider 'balloons' from strands of silk and floats across streams of atmospheric pressure.[144] In other projects, such as the tensile installations I have described previously, the geometries of the spider's web are experimented with for their structural properties. For instance, in *Galaxies Forming along Filaments, like Droplets along the Strands of a Spider's Web* (2009), the installation's geometry is a complex and interconnected system that utilizes geometric patterning and the productive force of tension. Here, careful observation of the spider has produced a mode of working through structural experimentation and implicates both human and non-human actors within larger atmospheric relations. These connections that criss-cross throughout *Aerocene* and the studio's broader practice bind each of Saraceno's various pursuits to unified ideas of connectedness, of learning from agents beyond the human species. An impression of interrelatedness is embraced through a multispecies framework that emerges from the Studio's various projects and includes an important structural focus, not simply on collaborative modes of

[143] Engelmann, "Social Spiders and Hybrid Webs at Studio Tomás Saraceno," 164.
[144] Sabine Schaschl and Tomás Saraceno, "Everything Starts as a Cloud of Cosmic Dust: A Conversation between Sabine Schaschl and the Artist," in *Tomás Saraceno: Aerosolar Journeys*, edited by Sabine Schaschl (Köln: Verlag der Buchhandlung Walther König, 2017): 101.

working from various disciplinary vantage points, but of increasingly addressing multispecies frameworks of working in doing so.

Saraceno has suggested that in *Aerocene* "a cloudscape of interconnected spheres of practices are created that include open, participatory platforms of knowledge production and distribution as well as models, data, and sensitivity to the more-than-human."[145] Like Fuller's global network of researchers—a structure that facilitates knowledge production and sharing—Saraceno's model for *Aerocene* integrates the same pedagogical emphasis into its core goals.[146] I have argued that *Aerocene*'s collaborative approach shifts the role of Fuller's comprehensive designer from the visionary thinking of a single individual to a constellation of agents and forces capable of contributing to collective knowledge production. Keeping this in mind, let us now look to the emphasis present in both on the universal—a suggestion that in comprehensive and engaged experimentation global patterns can be identified.

Fuller's search for the "universal principles of form" [147] assumed that these could be found by carefully abstracting the empirical world to uncover universal geometries.[148] Fuller was particularly concerned with geometric patterns found in nature—forms he understood as

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[145] Ibid.

[146] Both Fuller and Saraceno place an importance on the role of pedagogy in their work. Fuller's passionate teaching—including five-hour lectures—as well as his extensive publications suggest the priority of education in his practice. Saraceno shares a similar emphasis on teaching—both through workshops and through the open-source nature of the project. Saraceno's studio also maintains publishing activities that describe *Aerocene* activities at length in a number of volumes, contributing to the process of knowledge-sharing that the project revolves around. As I suggest, affinities to Fuller's pedagogical model do not rest on Fuller's own practice, which saw the celebration of techno-capitalism as a means of controlling the planet for human needs, but instead lie in his larger project which looked to design as it is capable of changing our deep-set practices, beliefs, and relations through the role of experimental forms.

[147] Diaz, *The Experimenters*, 110.

[148] Diaz notes elsewhere on this topic that Fuller's emphasis on experimentation and form emerges from the Bauhaus earlier in the decade through a shared engagement with tests of total systems, as well as the study of both the structure and appearance of form. She also suggests that Fuller's philosophy of efficiency (notably resources and labour) engages with many of the same questions asked by Bauhaus practitioners. See pages 126-127 in *The Experimenters* for this discussion.

grounded in ideas of synergetics.[149] He saw these as products of evolution that were the most efficient to utilize in his designs and spoke of the importance for the comprehensive designer to identify these: "Nature wrote all the roles of structuring; man does not invent chemical structuring rules, he only discovers the rules."[150] Fuller's thinking thus looks to what we might be able to learn from the world around us, all the while sharpening our skillsets for translating these phenomena into efficient designs.

Aerocene similarly orients itself towards universal principles of form found in nature, though with less emphasis on the technological mastering of the world through geometric structures and networks. Instead, Saraceno's ideas of universal connectedness are evoked through the relational properties of the web. Not simply the web itself, which is based in Saraceno's research on tensile networks, but its relationship to the elemental forces of the air. These connections serve ideas of environmental connectedness, an ecological framework that binds the atmosphere to the life and relations engulfed within its midst.

Saraceno facilitates an ecology of thinking and making practices embedded within larger patterns of environmental sensing. His attunement to the matter of air, as well as the geometries of three-dimensional webs, become ingrained at the structural level in his projects. Saraceno has suggested that he is interested not only in the structural properties of a web's construction, but for the its responsiveness with regards to both the spider's physicality and the environment in which it is situated.[151] He expands this idea to account for a modelling of social and ecological relations, and suggests that "the goal of these research projects, and what I'm trying to say in my

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[149] Bryan Barcena, "R Buckminster Fuller: Great Circle Sphere Model," in *Leap Before You Look: Black Mountain College 1933-1957,* ed. Helen Molesworth (New Haven: Yale University Press, 2015): 224.
[150] Buckminster Fuller, *Ideas and Integrities* (Toronto: Collier-Macmillan, 1969): 75-76.
[151] Tomás Saraceno, "Actions," in *Experience: Culture, Cognition, and the Common Sense,* eds. Caroline A. Jones et. al. (Cambridge: The MIT Press, 2016): 184.

installations, is that perhaps there's a way we can become a little more aware of each other."[152] The web is thus transformed into a figure for networked social relations, gesturing to an ecological awareness towards multispecies connections. Investigations such as *Aerocene* are thus about more than simply functional design. Forms are instead taken up as material, technological, social, and ethical.

Having worked with Saraceno on an exhibition, curator Carlo Rizzo has the following to say about the project's structure: "Aerocene is the idea. It changes the way we live, move, and relate to the natural world. It celebrates the wisdom of other species and injects a healthy dose of humility in our own species. It connects. Here it brought together composers, geographers, climate scientists, aeronautical engineers, biologists, designers and more. It offered inspiration to school children and PhD students alike. It created new bridges by offering a common language."[153] And so Saraceno's investigations into the web, the atmosphere, and the cosmos exceed *Aerocene's* technical goals of developing transport mechanisms that do not run on fossil fuels. To shift our emphasis from Fuller's geometric model—one that emphasizes a mode of thinking rooted in ideas of human efficiency and control—to Saraceno's atmospheric model situates *Aerocene* within a broader set of thinking and making practices. *Aerocene* re-articulates Fuller's comprehensive design model through an interdisciplinary, experimental framework rooted in a distinctly identifiable ecological ethos. What this framework provokes is a way of thinking through various connections within and beyond species and national boundaries.

Environments of Domination, or, Dissolving Relations of Capital

[152] Ibid., 182.
[153] Carlo Rizzo, "Floating above Exhibition Road: A Prelude," in *Aerocene*, eds. Studio Tomás Saraceno, et. al. (Berlin: Studio Tomás Saraceno, 2017): 17.

In order to unpack *Aerocene*'s relation to ideas of environmental connectedness, it is useful to consider how the project's model rejects dominant modes of relating to the planet embedded within the logics of capitalism. Jason Moore's work on capitalism as a world ecology diagnoses its role in the domination of humans, non-human animals, and the Earth's ecosystems through pursuits for financial gain. Moore's argument rests on a description of capitalism not simply as a world-economy but as a *world-ecology* that is both a product of—all while producing—social relations in the web of life.[154] Capitalism, as Moore outlines in his work, has been historically built on the dual exploitation of both natural resources as well as human and non-human animals. Relying on under- and unpaid work—a term which includes the labor of environmental systems such as fossil fuels and plant and animal life—capitalism is productive of a web of relations whereby the world is quantified and monetized in pursuit of the accumulation of wealth and resources.[155] As Moore suggests: "The history of Capitalism is a relation of capital, power, and nature as an organic whole. It is world-ecological. […] It is a multispecies affair. Capitalism is neither a purely economic nor social system, but 'a historically situated complex of metabolisms and assemblages.'"[156]

As Moore suggests, capitalism has unsustainably exhausted the planet's material resources with a model premised on the exploitation of both human and non-humans alike. Attempts to address our current conditions of social and environmental devastation *must*, according to Moore, account for the underlying world-ecology of capitalism. We have not, that is, arrived at our current state of affairs from biospheric consequences that have affected social relations as a result. This way of thinking occludes the larger relations of dominance that

[154] Moore, "The Rise of Cheap Nature," 79.
[155] Ibid., 85.
[156] Ibid., 81.

underlie a capitalist world-ecology, relations that have caused irreparable harms to life on our planet.

Despite Fuller's broader project of harmonization with natural systems, his diagnoses of the world's problems rest on unquestioned beliefs in the value of capitalism to achieve his goals. As such, Eva Diaz has suggested that "Fuller provided few insights as to how the *structure* of society could be transformed,"[157] and that "never is it explored that capitalism might *produce* class and other inequalities as an effect of its rampant technological development."[158] Similarly, Wong Yunn Chii traces Fuller's housing projects with corporate models, suggesting that "believing the corporation's ethical imperative to be its selflessness, *Lightful Houses* offered a preview of his projection of an eventual world with the corporation as world commonwealth."[159] Fuller spoke equally highly of consumerism, believing the free marketplace to be a democratic sign of individual will. These views lead Fuller to "naturalize obsolescence in the emerging culture of mass-consumption by merging the last resistant cultural object—the house—into the consumer landscape." If we consider this statement in relation to Moore's discussion, the underlying relations of capitalism are not disturbed by Fuller's comprehensive systems. Our reliance on fossil fuels is seen as inefficient, yes, but the core relations at play—chiefly human domination over the planet and its various resources for human consumption—is left unquestioned.

This set of relations can be further explored with an atmospheric example—air conditioning. Eva Horn has stated the following about this technology:

> Air conditioning—the possibility of 'fixing' the air's temperature and humidity at one's own comfort level—is one of the oldest dreams of mankind. It means creating a world without heat or cold, rain or snow, without suffocating humidity or dusty winds. Climate

[157] Diaz, *The Experimenters,* 144.
[158] Ibid.
[159] Wong, "Fuller's Corporate Soul," 46.

> control allows for a life without weather, without meteorological contingencies and surprises, extreme weather events, seasonal changes, or locally challenging climate conditions. Air conditioning creates what has long been lauded as a 'temperate climate,' a climate adjusted to the comfort zone of the human body—a comfort zone that, today, seems to get narrower and narrower.[160]

The presence of air conditioning lays bare the engineering of the planet into microclimates optimized for human comfort. Air is not only something controlled through technology but is also something that has become increasingly volatile. But yet the air is something shared by all, a climate that "surrounds and penetrates us, not just our bodies but our minds, souls, and societies."[161] Fuller's comprehensive design, through its goals of a quantifiable and technologized planet, extends the process of air conditioning to the earth's ecosystems as a whole. In the spirit of such technological optimism, air (and the planet at large) are able to be shaped and exploited for human aims within this framework.

Aerocene, on the other hand, takes cues from Fuller's idealized and under-realized environmental vision and effectively shifts structural relations between humans, non-human animals, and their environments. If Fuller's model was one that in practice emphasized the machination of the planet and the top-down management of resources, Saraceno strives for a weightless impact by attempting to utilize global energy patterns with as little disruption as possible. I have thus far suggested that there are structural affinities between Saraceno's collaborative and ecology-driven pursuits in *Aerocene* and Fuller's model for a comprehensive design strategy. Inasmuch as the two share commonalities in their search for expansive models of ecological forms, as well as the championing of multiple perspectives and transformative political goals, a wedge is placed between the two practices with regards to the domination of

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[160] Eva Horn, "Air Conditioning: Taming the Climate as a Dream of Civilization," in *Climates: Architecture and the Planetary Imaginary,* eds. James Graham et. al. (Zürich: Lars Müller, 2016): 234.
[161] Ibid., 235.

nature. *Aerocene* does not seek the domination of nature. The project does not attempt to create a network that uses up energy, but instead *works with it* in conditions of symbiosis. The *Aerocene* sculptures do not disturb the air that they inhabit. Instead they rise gently with the heat of the sun until they reach a point of equilibrium at which they surf through air channels—catching a ride in a complex web of activity. Ground-level activity is not exempt from these dynamic alliances and connections. Like the entangled interactions of the sculptures with air currents and solar energy, *Aerocene* participants are attuned to more-than-human entanglement by collectively attempting to float the sculptures, working from a collaborative and interdisciplinary model that not only rejects specialization and institutional hierarchies, but further expands the range of knowledges embedded in the project's scope. These propel the project beyond anthropocentric models of human exceptionalism and domination over the planet. These include the spider's web-forming and sensing practices, which are invoked to explore how a sensitivity to the atmosphere can create efficient forms of travel that "utilize the medium of air, without using it up."[162] As Eva Horn describes:

> Here is where I see Saraceno's departure from a merely scientific approach to the air. Much like the old forms of knowledge, he thinks about air as a *social medium*, and about ethical and political attitude toward that medium. What can we do with things, with environments, with atmospheres—and maybe also with human beings—without, in one way or another, consuming them, burning them up in our industrial, economic, social, or even emotional metabolisms? Saraceno's attitude seems to be one of preservation, a grasp on things that is essentially non-consumptive, non-appropriative but rather passive, resourceful, intelligently frugal, and sharing."[163]

What Horn emphasizes here is exactly the connectedness I have been describing at the root of *Aerocene*. Social relations are reconfigured through the project's structure, one in which multiple forms of collaboration are able to shift the work produced beyond dominant forms of knowledge

[162] Eva Horn, "Aesthetics of the Air: Tomás Saraceno's *Aerocene*," in *Aerocene: Tomás Saraceno*, eds. Studio Tomás Saraceno (Milan: Skira, 2017): 28.
[163] Ibid.

production by integrating science and technology into a larger nexus of practices—such as the fine arts, the humanities[164], and local histories of craft and material culture. In these ways, the pedagogical form employed by Saraceno resists the degradation and appropriation of natural resources and various forms of human and non-human labour described by Moore. To return to the epigraph which began this paper, the "relations that made the coal plant,"[165] relations of domination, exploitation, and scientific rationality, are re-configured by *Aerocene* through ethical forms of collaboration beyond a belief in human exceptionalism and species boundaries. I will now examine the role of pedagogical form more closely in order to identify the ecological goals of this mode of practice.

Towards Ecological Forms

I have explored thus far the relationship between *Aerocene* and Buckminster Fuller's working methods and outlined an emphasis on pedagogy that locates collaboration and interdisciplinarity at its core. With *Aerocene*, Saraceno's work in particular rejects social and ecological relations of dominance and exploitation and instead propositionally models a framework for ecological relations that *work with* rather than *exploit* nature and other species. Aerocene's capacity to approach the problem of transport begins by first shifting our frameworks for working and thinking. This suggestion places a particular emphasis on *Aerocene*'s capability to shift dominant relations by devising particular forms to structure the project, distinguishing

[164] Studio Tomás Saraceno maintains publishing activities through various platforms, and also houses multiple writers in residence from disciplines such as geography, philosophy, and art history. The goal of these publications is to develop a critical corpus of writing on the studio's activities and providing added perspectives on the pedagogical and philosophical implications of the project. Writing about *Aerocene* is therefore embedded within the project itself as one of the many forms of knowledge production sustained in *Aerocene*'s structure of activities.
[165] Moore, "The Rise of Cheap Nature," 94.

Fuller and Saraceno's work as I have described above. By engaging closely with the study of ecological networks, Saraceno works to integrate human-driven technologies within larger environmental entanglements. This invitation is also extended to viewers and participants, who, through flight attempts, are prompted by the work's structure to attune to the materiality of the air. Akin to the Josef Albers's emphasis on artistic experimentation, I argue that Saraceno's practice works from a similarly-iterative model that seeks to expand the perceptual capacities of viewers by creating conditions that invite an openness to environmental entanglement.

In discussing Buckminster Fuller, Mark Wigley has argued that "Fuller, who surrounded himself with statistics, models, and five-hour lectures, was first and foremost an artist, an image maker. Despite his professed disinterest in the look of his projects, each is an artistic manifesto. All the layers of science are carefully organized to produce an aesthetic effect. Science is deployed as an art form. Not just any art. The art of housing. More precisely, the art of ecology."[166] Similarly, what Saraceno offers us is not a sense of openness to just anything, but instead an attunement to *particular* nodes that connect us with our environments. Saraceno's scientific initiatives, like Zittel's engagement with industrial design, do not propose straightforward solutions. Instead, what they offer is an invitation to participate in embodied practices of experimentation in order to stimulate our social and ecological imaginaries.

[166] Mark Wigley, "Planetary Homeboy," *ANY: Architecture New York* 17 (1997): 16.

Figure 12: Tomás Saraceno, *Becoming Aerosolar, Free Flight,* 2015

Life-Support Systems

Let us return to Fuller's and Sadao's *Cloud Nine* (1960), which opened this chapter and has yet to be looked at more carefully. *Cloud Nine* stands in stark contrast to the sense of atmospheric attunement and environmental interconnectedness proposed by *Aerocene* (fig. 12). Fuller and Sadao's structures rise above the earth and dwell in the atmosphere. And yet, their forms are completely enclosed, walled off and thus isolated from the air in which they are floating. To dwell in such a space is a project that requires an understanding of interiority as isolatable and autonomous, what Peter Sloterdijk refers to as a "life-support system"[167] for the maintenance of the human body. As Sloterdijk outlines, "classical philosophy of technology begins with the suggestive hypothesis that technological 'devices' are essentially extensions of

[167] Peter Sloterdijk, "Deep Observation: Toward a Philosophy of the Space Station," in *What Happened in the 20th Century?*, trans. Christopher Turner (Cambridge: Polity, 2016): 108.

organs, allowing users of such devices to broaden the range of their senses and extremities."[168] Technology, to Sloterdijk participates in the process of sphere-making (or, world-building) that drives the creation of life-support systems. This can be summed up as follows: "humans not only require a cultural sphere, as it is to be expected for members of the symbolic species, but *also need to be connected to a natural sphere that permanently assures their vital functions*"[169] [emphasis mine]. This process relies on 'insulation' as a means of protection and recalls to mind Eva Horn's work on air conditioning described earlier. Sloterdijk explores the concept of insulation with the example of space stations, a description that applies to Fuller's and Sadao's spheres: "in the construction of space stations, we are confronted with ontological implants and transplants—that is, with the implantation of a word where there was previously nothing and with the transplantation of a suitable living environment for human beings into an external world-container."[170] *Cloud Nine* distills Fuller's technology-driven ideals of human progress into complete artificial environments. The globes that form Sadao's and Fuller's proposal are marked by a desire to be closed off from the atmosphere. They transplant an environment that is habitable for humans into a free-floating container. They are life-support systems for inhabiting the sky that rely on enclosures to separate human inhabitants from the atmosphere. And yet the sky, unlike a space station floating in outer space, is not at all absent of life.

Cloud Nine thus seeks to house vital functions for human dwelling at the expense of environmental integration. Its design assumes the isolation of the human species in artificial environments, with its ironic title further gesturing to an ideal environment for human habitation. *Aerocene* escapes the autonomy of such a life-support system and integrates participants into the

[168] Ibid., 106.
[169] Ibid., 107.
[170] Ibid.

material conditions of the atmosphere. In this way, while *Aerocene*'s on-the-ground work is crucial to the project's structure and development, the project is inevitably one that draws our attention upwards and into the sky. The life-support system—a place that replicates life where there is none—is replaced with a view of humans as integrated into larger environments, rather than separated out. Individuals using the *Aerocene* sculptures need not implicate technology as a means of closing themselves off from the material properties of the world. Instead, they are asked to dwell in the material complexities of the world, rather than stand separate from it with the help of technologies that privilege human comfort.

This fact returns us to questions of artistic form, in particular, the sense of environmental connection that distinguishes Saraceno's *Aerocene* from Fuller's comprehensive design systems. Although Fuller's diagnoses missed the mark in his own projects—only further propagating destructive relations on the planet—he may have simply found the wrong forms to represent the phenomena he saw. Saraceno may not have found the right ones either, but the desire to find a perfect form proves less important than the processes of working and thinking through Aerocene's core questions that drive the project and its varied iterations. What is highlighted at this chapter's end is the profound reverberations that can result from attending closely to the perception of ecological systems, and by providing a structure through which this experimentation can occur. Such a practice slows our perception, as I described through the work of Viktor Shklovsky in chapter one, asking us to spend time engaging closely with our senses in order to strengthen our understanding of environmental entanglement. In Wigley's description, Fuller's vision of ecology is exactly that, his own. Conversely, Saraceno's vision of ecology is dependent on distributing a share of the agency to everyone (human, non-human, and more-than-human) involved. *Aerocene* allows every participant to hold a stake in the project, to become a

perceptual student engaged with the development of the work. Phenomena, such as the spider's web and streams of atmospheric pressure, are closely studied in order to find appropriate forms that are produced ecologically rather than through relations of dominance. Importantly, close observation of the world precedes the design of Saraceno's technologies, shifting Fuller's method that sought the mastery of nature towards a mode of practice that embraces uncertainty and flux as it responds to the complexities of the world in which it is situated.

While thinking with the atmosphere implies a global scale, *Aerocene* does not lose sight of smaller-scale, situated relations on the ground. The project's capacity to attune participants to the enveloping atmosphere draws out a profound sense of interconnectedness. It is through this consideration that the macro-scale utopias of global networks, as well as the scales of the earth as a whole, are explored alongside the micro-scale practices of spiders and human animals. By oscillating between the large and the small, the terrestrial and the atmospheric, *Aerocene* transmits interconnectedness into technology and knowledge production. As I have traced in this chapter, Fuller's design pedagogy—full of his technological polemic and utopian worldview—relates in important ways to this task. If one result of the naming of the Anthropocene has been critical work that challenges the universality of the term, then *Aerocene,* in many ways, takes on the global without placing humans in the center. To consider the air as a point of commonality between human and more-than-human life semantically shifts objects of study. Taking cues from Fuller's model, Saraceno re-inscribes ideas of global networks to re-inforce sociality and perceptual exploration over modes of technological control.

Aerocene moves away from practices of domination and institutional authority defined under the world-ecology of capitalism. By emphasizing a process of attunement through which participants are physically moved by the atmosphere, *Aerocene* relies on a pedagogical ideal that

embraces each participant's own capacity to perceive the complexity of the world in which they are situated.[171] Tracing the critical efficacy of Saraceno's work in conditions of social and ecological devastation does not, however, point simply to the benefits of an ethic of interconnected between species and environments. Looking closely at the forms employed by Saraceno reveals a commitment to his role as pedagogue in facilitating this. Not quite as a scientist, but always as an artist, a *professional amateur* who teaches us to learn, Saraceno invites us to situate ourselves in the world differently. By employing a framework for collective engagement with atmospheric attunement, *Aerocene* situates the body within a matrix of elemental energy, suggesting a way of thinking about the atmosphere that opts out of control in favor of an ecological disposition. Forms of art-making, such as Saraceno's, that prioritize openness and experimentation do this; they make the lift-off seem all the more possible.

[171] German conceptual artist Joseph Beuys's theory of social sculpture relates to this ecological orientation. Beuys coined the term in the 1970s within his discussions on the 'expanded concept of art,' which also included his own teaching. In her description of social sculpture as a mode of practice Shelley Sacks (a student of Beuys's) outlines how Beuys's pedagogy sought to facilitate 'new organs of perception,' based in strategies of attunement, with the goals of cultivating an ecological society with an ethic of interconnectedness at the core of its practices. For Sacks's discussion of social sculpture see: Shelley Sacks, "Social Sculpture and New Organs for Perception: New practices and new pedagogy for a humane and ecologically viable future," in *Beuysian Legacies in Ireland and Beyond: Art, Culture and Politics,* eds. Christa-Maria Lerm Hayes and Victoria Walters (Münster: Lit Verlag, 2011): 80-97.

CHAPTER 3.

ACTS OF ENTROPY:

BEATRIZ DA COSTA'S *PIGEONBLOG* AND *DYING FOR THE OTHER*

> "There is no longer an outside to the world of design. Design has become the world."[172]
> -Beatriz Colomina and Mark Wigley
>
> "Assuming that those who created these problems
> are not those who can solve them
> outsiders might find it appropriate
> to gather and do this work"[173]
> -Helen Mayer Harrison and Newton Harrison

Entropy is defined as the gradual decline of a system into disorder, that is, as a process that is increasingly random, disorganized, and unpredictable. For example, a roaring fire slowly fizzling out, or an iceberg melting faster and faster. Entropy is all around us. It is a natural process that our own bodies undergo. The concept of entropy gestures to ideas of instability, of a certain mutability that underpins natural systems. Wherever entropy is present nothing can be fixed. Order; control; systematize; these actions seek to mitigate such disorder and link the two quotations that open this chapter. Design theorists Beatriz Colomina and Mark Wigley diagnose our current planetary conditions as ones of human design, of natural processes being controlled and manipulated. The Harrisons—ecological artists who will be discussed in this chapter—understand the current 'design' of the world as a problem and seek those in opposition to its practices to do the work of mending. Both quotations point to a desire for problem identification and remediation. There is also a gesture to the outsider, a figure who works against the grain of institutionalized practice in a productive tension. While the desire for order is an act that might

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[172] Beatriz Colomina and Mark Wigley, *Bis Insan Miyiz? / Are we Human?: Design of the Species: 2 Seconds 2 Days 2 Years 200 Years 200,000 Years* (Istanbul: Istanbul Foundation for Culture and Art, 2016): 544.
[173] Helen Mayer Harrison and Newton Harrison, *The Time of the Force Majeure: After 45 Years Counterculture is on the Horizon*, eds. Petra Kruse and Kai Reschke (Munich: Prestel, 2016): 431.

seem to reject entropy, in this chapter I will consider the relation between the two in the practice of Beatriz da Costa (1974-2012).[174] Da Costa's work combines the organization of design with the process of entropy. It inserts itself in the world in active ways while denying itself full control of the outcome.

Da Costa is a multidisciplinary artist who works at the intersection of art, biology, and technoscience, with a strong interest in developing works that engage a variety of human and more-than-human participants. In this chapter I will focus on two of her works. The first, *PigeonBlog* (2006-2008), is a project that was developed in Southern California that reveals many of da Costa's guiding interests developed in various nodes throughout her oeuvre. These include an attention to non-human animals and agents in our environments, as well as a praxis that stresses public engagement and open-source exploration with regards to daily life. Stemming from Marjorie Garber's discussion of academic specialization in the previous chapter, I will tease out the ways in which da Costa's *PigeonBlog* asserts a critical distance from academic conventions for knowledge production common in institutional contexts. To do so I will draw on da Costa's work on tactical biopolitics, a term that engages artists, scholars, and individuals outside of the domain of science. After I have outlined the resistant relationship of da Costa's work to institutionally-sanctioned modes of knowledge production I will turn to a late work by da Costa, a three-channel video installation entitled *Dying for the Other* (2011), in which the artist examines multispecies corporeality within the field of medical research.

Beginning with *PigeonBlog* and transitioning to *Dying for the Other*, my discussion of da Costa's practice will engage issues of design outlined in the previous two chapters. To look

[174] Da Costa was a student of Donna Haraway's and was in the process of working on her PhD when she passed away in 2012. This is an important point of intersection that binds the two figures, whose work on multispecies relationality and technoscience emerges within this relationship.

comparatively at da Costa's two works means looking closely at how I approach design in the work of Andrea Zittel and Tomás Saraceno. With the former, the design experiment is taken up as a speculative exercise in form-making that invites reflection on our daily living practices within capitalism. The design of prototypes that facilitate an openness to ecological integration, as explored in the work of Tomás Saraceno, will also be a starting point as I consider similar invitations by da Costa in her work. Looking lastly at the work of Helen Mayer and Newton Harrison, I argue that da Costa—like the Harrisons previously—works to investigate sites of human entanglement in a reflexive and situated manner.

Figure 13: Beatriz da Costa, *PigeonBlog*, 2006-2008

PigeonBlog: **Multispecies Amateurism**

A handful of people step out of a small truck (fig. 13). They are in a parking lot amidst the sound of traffic whirring by. In other outings, they have driven to parks and roadways sited in urban areas—phenomena that have become ubiquitous in many cities across the globe. We are in the southern region of California on a sunny afternoon. Everyone walks around the truck and begins to arrange a cluster of birdcages on the back of the truck bed. First, everyone pauses to

take account of the work to be done. Then comes the quick work of outfitting a small group of pigeons with their supplies for the afternoon. Small harnesses are wrapped around the birds in order to hold a GPS and air quality monitor. The pigeons appear to remain comfortable throughout the process. The moments in which the devices are placed on the pigeons are scenes of attention and care as everyone attends to visual signals from the birds, making sure that the process of dressing creates as little discomfort as possible. Once this delicate choreography is complete, and the birds have been safely outfitted with their sensing devices, they are sent off in flight. After a short amount of time, they return and gently descend in altitude before they reach the ground. The harnesses are removed, as carefully as they were put on, and the birds return to their cages. Everything is packed up quite quickly, and once the group is back in the truck, they drive away without leaving a trace.

Figure 14: Beatriz da Costa, *PigeonBlog*, 2006-2008

As all this is happening, anyone with an internet connection can go to a designated website and track the progress of the birds' flight (fig. 14). Displayed on the screen is not only the location of each pigeon dotted out on a map of the region, but a lively reportage of data.

Blinking on the screen—and constantly changing based on the trajectory of each bird's flight—information regarding air quality levels is accessible. The overall effect is that of a networked, multispecies environmental report in which human, bird, and technology integrate to provide evolving and situated data on the air quality index in southern California.

The descriptions above describe two facets of *PigeonBlog*, a collaborative artwork conceived by Beatriz da Costa in 2006 with the assistance of Cina Hazegh and Kevin Ponto.[175] The former revolves around da Costa's outings into southern California's urban landscapes. The artist works in close collaboration with a local pigeon fancier and relies on their learned flight expertise in order to facilitate scientific experiments in the urban air shed. Small black harnesses, similar in size to an adult human fist, are carefully placed onto the bodies of carrier pigeons, specially designed according to their physiology.[176] These devices, which contain a GPS tracking device and air quality monitor, do not seem to bother the birds. In fact, their design has been carefully tested and manipulated with the bird's comfort in mind.[177] After these devices have

[175] Hazegh and Ponto assisted da Costa with the project's digital interface, as well as in the development of the tracking software worn by the pigeons.

[176] There is a long history of carrier (homing) pigeons. Bred for their ability to travel long distances and navigate their way back home, pigeons were used in mail service, as well as for military intelligence operations. Cameras were attached to pigeons during the First World War, a practice that da Costa draws on in *PigeonBlog*. For an ethnographic account of pigeon-human relations, see: Colin Jerolmack, *The Global Pigeon* (Chicago: The University of Chicago Press, 2013). For an article of historical importance on the use of pigeons in warfare, see: Lieut. J. A. C. Nicol, "The Homing Ability of the Carrier Pigeon: Its Value in Warfare," *The Auk* 62, no. 2 (1945): 286-298. For a more recent discussion of pigeons used in warfare see: Hendrik Snyders, "'More Than Just Human Heroes': The Role of the Pigeon in the First World War," *Scientia Militaria: South African Journal of Military Studies* 43, no. 2 (2015): 133-150.

[177] The pigeons were under the care of a local pigeon fancier, who attended to their food, water, shelter, and general comfort. While the comfort of the birds was kept in mind throughout the project, this is an instance that recalls the imbalances in multispecies collaboration that I point to in the introduction. Although no clear consent could be provided by the birds, da Costa and her collaborators attended responsively to cues from the birds in order to assure their well-being. This approach echoes María Puig de la Bellacasa's work on care as a temporal and often-improvisational commitment, which I discuss on pages 116, 119.

been installed the birds are sent off on a journey through the urban air space. Half-an-hour to forty minutes later they return from flight, the day's work complete.

If this first encounter with the project reveals the structure that the work follows, the second way to view *PigeonBlog* gives a better sense of the project's goals. At any moment in the project's lifetime members of the public can visit the project's website in order to access the data collected. While geographically separated from da Costa and her team, there is nevertheless a fluidity between the work being done in the field—by both human and non-human participants—and the information networked and translated across an infinite number of screens. In this way, *PigeonBlog* blurs the physical and virtual, scientific expertise and the hobbyist's spirit, and works via various mediums to draw attention to not only the air in our cities but to the other species with whom we share our urban space. This is not to say that pigeons aren't already a common presence in large urban centers. It is rather the pigeon's connotation that shifts, from an urban 'pest' to a 'researcher,' which in turn raises important questions on multispecies relations encountered in urban life.

While we can understand Saraceno's work as the co-mingling of expert and amateur actors—in the sense that *Aerocene* is affiliated with various research institutions worldwide—da Costa's project engages more closely with amateurism. Da Costa herself has discussed the role of public amateurism in cultivating grassroots engagements with science and technology. She argues that the artist who wants to engage with science *outside* of institutional contexts is often placed in a bind, as "direct access to the locations where science is being conducted is often a necessity for those who wish to become active players in the shaping of socioscientific

discourses and their (mis)appropriation by cultural, political, and economic forces."[178] To da Costa, the question of positioning her practice within debates surrounding the disciplinary conventions of the sciences is an important consideration that drives the form of her projects. In addition to the question of scientific knowledge production, da Costa has questioned the influence of political and financial interests in the structuring of the university, whose status as an incorruptible space of higher knowledge remains largely unexamined.[179] It is from within the context of neoliberal capitalism—particularly its manifestations within the academy—that Da Costa asks: "how can the artist function as an activist intellectual situated between the academy and the "general public" in an age in which global capital and political interests have obtained an ever-increasing grip on the educational and public environments where technical, scientific, and artistic knowledge production occur?"[180]

This question raises an important point of difference between works such as *PigeonBlog* and Saraceno's *Aerocene.* Saraceno's project finds strength in working with various scientific 'experts' who collaborate with Saraceno's studio on *Aerocene*'s research activities. While this supplies the project with the advantages of being linked to institutional research—in particular the authority and legitimacy gained through this collaboration—there is a conscious decision to work between both expert and non-expert participants. In a sense, the tensions between expert

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[178] Beatriz da Costa, "Reaching the Limit: When Art Becomes Science," in *Tactical Biopolitics: Art, Activism, and Technoscience*, eds. Beatriz da Costa and Kavita Philip (Cambridge: The MIT Press, 2008): 365-366.

[179] Neoliberalism is a term that emerged during the 1970s to describe economic theory in which an entrepreneurial framework—including private property rights, free trade, and free markets—satisfies individual well-being. Marxist economic geographer David Harvey suggest that neoliberalism has become a hegemonic force within global capitalism, which includes activities in and around the university. By engaging with questions of institutional practice, da Costa is attentive to the role of financial interests in structuring research activities and scholarship and asserts this critical position from within this context. See: David Harvey, *A Brief History of Neoliberalism* (Oxford: Oxford University Press, 2005).

[180] Da Costa, "Reaching the Limit," 366.

and non-expert voices in the project embody the tensions of the disciplinary and non-disciplinary outlined by Garber, in which the amateur and the professional work are bound to one another and yet remain distinct. Professional scientists are given an authority in *Aerocene* that might sometimes overshadow amateur participants.

Da Costa, on the other hand, works from a position that asserts an important distance from institutionalized practice. Her work in *PigeonBlog* seeks an engagement outside of the discipline of science and the university itself. Amateur pigeon enthusiasts—in the sense of their training lacking the institutional authority of the scientist—and da Costa alike work outside of disciplines that would typically be tasked with studying air pollution. While the recording devices are created from parts designed by specialists, they are hacked by da Costa and her collaborators for uses beyond their initial design. Rather than focus on amateurism as a voice that is lacking in authority, what is instead achieved by *PigeonBlog* is a direct result of the participants' distance from institutionalized norms for scientific practice. This position has been taken up by artist Simon Penny, who writes of 'rigorous interdisciplinary pedagogy' as requiring the formation of practitioners who do not fit neatly into established academic disciplines. Penny posits that deep interdisciplinary thinking is often at odds with "the relative stasis of institutionalized disciplines which have an investment in maintaining their identity."[181]

With *PigeonBlog,* da Costa works critically with relation to scientific norms for measuring air pollution. According to da Costa: "besides the actual numbers, it was the way in which air pollution measurements are currently conducted that the project hoped to address."[182]

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[181] Simon Penny, "Rigorous Interdisciplinary Pedagogy: Five Years of ACE," *Convergence: The International Journal of Research into New Media Technologies* 15, no. 1 (2006): 32. Penny's article was written while he and da Costa were developing the Arts Computation Engineering (ACE) interdisciplinary master's program at the University of California, Irvine, which ran from 2003-2011.
[182] Da Costa, "Reaching the Limit," 379.

In particular, da Costa is critical of current practices in which testing stations are fixed in place in "quiet, low-traffic areas, not near any known pollution hotspots,"[183] a phenomenon geared towards obtaining "representative values of the urban air shed as opposed to data 'tainted' by local sources in the immediate surroundings."[184] Da Costa's pigeon collaborators, on the other hand, are able to collect data as they fly through the sky, providing a lively set of results that cannot be obtained easily through established channels. In da Costa's words "not only were they collecting the actual information while 'moving' around, but they were also flying at about three hundred feet, an area that has proven difficult to assess through other means. Most flying targets [currently in use] are themselves sources of pollution. Airplanes in particular have this problem, and obviously cannot fly at such low altitude."[185]

What we are faced with then is an instance in which amateurism works in da Costa's favor.[186] The findings, which were useful to the scientific community, drew media attention that cited da Costa as a 'researcher' at the University of California, Irvine. Da Costa discuses that her work was "put under a scrutiny and questioning similar to what scientists have to go through after publishing their work, and the association of the 'political technoscientific artist' with a 'specific' intellectual seemed to have gone one step too far."[187] These events call to mind Garber's analysis of the 'public intellectual:' a figure who is celebrated for her outsider perspective that is brought to conventional disciplines.

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[183] Ibid.
[184] Ibid.
[185] Ibid.
[186] It was pointed out to me by Joan Greer that the pigeons in this work—like the spiders in Saraceno's studies—are 'specialists' in the development of the project. By remaining open to learning from other species, both da Costa and Saraceno give up complete control of the project (if we think of this term authoritatively). They do so in order to work relationally with non-human species, who bring their own specialized knowledge to the methods used in each artist's work.
[187] Da Costa, "Reaching the Limit," 379.

That being said, da Costa herself cites the public intellectual in her description of the project going "one step too far," a statement that problematizes the role of the public amateur with relation to the institution. In da Costa's case, the artist took care not to conflate her work as an artist with that of science. While *PigeonBlog* produces scientific data that can be of use in institutional research, da Costa has purposefully developed the project in tension with institutional practices within the domain of science. This serves to keep *PigeonBlog's* research within the realm of public activities. In an evaluation of the project's successes and failures, da Costa asks: "Did the project lose its political potential by becoming too closely associated with the university and myself being an actor within it?"[188] On the possibility of the project's future, da Costa considers how the *PigeonBlog* data might be used with existing air pollution models "in order to justify the project's scientific validity to criticism."[189] This approach would require shifts at the project's structural level, and da Costa speaks with worry of how an approach that linked the project with the university might "create the same trap of eventually developing expertise while becoming less accessible to a nonexpert public."[190]

Tactical Biopolitics

In order to examine da Costa's decision to challenge institutional practices, it is important to situate her thinking within debates on the scientific management of bodies, and developments

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[188] Ibid. Here, da Costa refers to criticism of *PigeonBlog* by the People for the Ethical Treatment of Animals (PETA), who spoke harshly of the project's use of animal subjects. While da Costa counters that there was no animal abuse in the project, and that the work was not attempting to enact animal rights work as part of its aims, she contends that the criticism from PETA raises interesting questions relevant to the project. In particular, da Costa points out how PETA's critiques were based on the fact that *PigeonBlog* was not a valid, scientific study. In response, da Costa asks whether this type of work would be seen as appropriate if framed under the boundaries of science. See: da Costa, "Reaching the Limit," 380-381.
[189] Ibid.
[190] Ibid., 382.

in art that stress the artist's involvement with scientific initiatives. *Tactical Biopolitics* is a term used by da Costa and cultural historian Kavita Philip that describes various investigations into these issues. The term takes its name from *Tactical Media*, practices of cultural resistance that blossomed in post-Cold War Europe with the advent of inexpensive media channels such as the internet.[191] This do-it-yourself framework is entangled with philosopher Michel Foucault's theory of biopolitics in order to formulate a term that grapples with modes of resistant media that engage with the scientific management of our lives.[192] As da Costa and Philip state:

> "While tactical biopolitics does not see itself as the successor of Tactical Media, it does share some of its convictions regarding the importance of interdisciplinary knowledge-making in the context of resistant practice. […] In addition to re-calling technology practitioners, artists, activists, and theorists, we now call for the inclusion of and cooperation of the scientific community."[193]

While there are echoes of Fuller's research network here, as well as the invitation of interdisciplinary thinking, what is key is the way in which these practices are framed as resistant to artistic and intellectual activities within the context of the neoliberal university and society at large. As da Costa and Philip make clear, "such an intellectual/political/artistic/technoscientific community is a potentially resistant formation in the heart of postmodern transnational technospheres."[194]

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[191] Beatriz da Costa and Kavita Philip, "Introduction," in *Tactical Biopolitics: Art, Activism, and Technoscience*, eds. Beatriz da Costa and Kavita Philip (Cambridge: The MIT Press, 2008): xvii.
[192] Foucault describes bio-power as concurrent with the development of capitalism. The term describes the process by which the state, as an instrument of power, absorbs bodies into relations of production and thus control. For Foucault's discussion of bio-power see: Michel Foucault, *The History of Sexuality: Volume 1: An Introduction*, trans. Robert Hurley (New York: Vintage Books/Random House, 1990): 141-144).
[193] Da Costa and Philip, "Introduction," xviii.
[194] Da Costa and Philip, "Introduction," xviii.

Artist and art historian Lindsay Kelley's writing on the public amateur further expands on the concept of *tactical biopolitics* by looking at the work of Critical Art Ensemble (CAE).[195] Established in 1987, CAE is a collective composed of tactical media practitioners—Steve Barnes, Dorian Burr, Steve Kurtz, Hope Kurtz, and Beverly Schlee—whose work engages with the interrelation of art, technology, and political activism. The collective works with software, video, publications, and exhibitions as a means of engaging politically through grassroots initiatives, and has collaborated with da Costa on three projects between 2001 and 2004.[196] Noting CAE's emphasis on the productive role of the amateur, Kelley notes that "by modelling amateur scientific investigation, CAE promotes a return to accessible experimentation not dominated by corporate interests."[197] The process thus assembles a do-it-yourself framework that exists outside of institutional channels for scientific study, prioritizing "the impact that street-level interventions can have on larger industrial systems."[198] Here, what is stressed in Kelley's writing is the critical stance taken by CAE against the role of corporate interests in scientific experimentation. In positioning their work in opposition to institutional forces, CAE asserts the importance of situating scientific experimentation in the public realm. On this topic, da Costa has suggested that "the conduct of 'objective' and 'pure' research, independent from the political 'outside,' are impossible positions to uphold at a time in which industrial, military, and political interests are directly tied to funding provided by the respective institutions."[199] To site work

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[195] Lindsay Kelley was also a student of Donna Haraway's in the History of Consciousness Department at the University of California, Santa Cruz.
[196] CAE and da Costa worked together on *GenTerra* (2001-2003), *Molecular Invasion* (with Claire Pentecost, 2002-2004), and *Free Range Grain* (with Shyh-Shiun Shyu, 2003-2004). For a timeline of CAE's formation and early works, see: Critical Art Ensemble, "Critical Art Ensemble Timeline," *TDR* 44, no. 4 (2000): 132-135.
[197] Lindsay Kelley, *Bioart Kitchen: Art, Feminism and Technoscience.* (London: I.B. Tauris & Co., 2016): 99.
[198] Ibid.
[199] Da Costa, "Reaching the Limit," 366.

outside of the institutional context is key here. The artist in this scenario is able to take on a role of dissenter rather than collaborator, looking to the subject of scientific study as a site of intervention that is able to be critiqued, and potentially disrupted through the artist's work.

Beyond the role of amateurism, tactical biopolitics is a term that draws into its grasp issues that pertain to the category of the human. Philosopher Eugene Thacker has engaged with the term in order to outline the relationship of the human to the concept of the commons—a term that refers to a collective sense of belonging within our political imaginaries that upholds the right to flourish.[200] In particular, Thacker is concerned with the problematic of asserting a shared and collective space in material worlds in which not all life is accorded this status. As Thacker suggests:

> In its traditional sense, the commons is a concept that responds to the problem of 'the government of the living,' of how best to articulate the relations between the elemental (rock, soil, rivers, lakes), plant and animal life (crops, herds), and human productive labor. It is thus a concept that folds into itself territory and earth, the crop and the plant, the herd and the animal. As a form of governing, the commons involves the circulation of life-forms centered around human living labor."[201]

The commons, according to Thacker, is thus a term that implies a collective atmosphere, one that places humans at the center of relations at the expense of non-human life.

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[200] The notion of the commons is a contested idea. Scholars who work on issues of decolonization, for example, have been critical of the term for its assumption of universality. Ash Amin and Philip Howell trace the "systematic encroachment on life, resources, and spaces once held in common" by forces of capitalism and colonialism ("Thinking the Commons," in *Releasing the Commons: Rethinking the Futures of the Commons,* eds. Ash Amin and Philip Howell (Abingdon: Routledge: 2016): 1-17). With relation to ecology, jan jagodzinski outlines a Eurocentric and representational inflection of the commons when thinking of a unified world-population that shares the Earth's resources. That being said, critics of the term do not reject it wholeheartedly but seek to re-consider its potential value. As jagodzinski states: "Commoning, as a collaborative sharing of resources that are neither publically (via collectives of the state) nor privately owned *must* be accessible to all (like air, water, gifts from the soil), [… and] has the potential to deterritorialize neoliberal planetary urbanization." (jan jagodzinski, "Introduction: Interrogating the Anthropocene," in *Interrogating the Anthropocene: Ecology, Aesthetics, Pedagogy, and the Future in Question*, ed. jan jagodzinski (Cham: Palgrave Macmillan, 2018): 42.)

[201] Eugene Thacker, "Uncommon Life," in *Tactical Biopolitics: Art, Activism, and Technoscience*, eds. Beatriz da Costa and Kavita Philip (Cambridge: The MIT Press, 2010): 309.

In outlining a history of bio art artist Claire Pentecost takes up this notion of a human commons as a site of critique.[202] According to Pentecost, "Under neoliberalism, the governance of the vitality and fertility of whole populations is arrogated by market forces."[203] In sum, "via this ideology, anything humans value becomes legally articulated as something to be owned by one party literally at the expense of another: not only real estate, material produces, and technological inventions, but also the basics of life, health and safety: knowledge, creativity, nutrition, sanitation, medicine, water."[204] Pentecost is concerned not with the institution of science full stop, but with its relation to neoliberal capitalism, given the extent to which "science in the service of neoliberalism alienates the non-specialist whose life is profoundly affected by its commercial application."[205] What is needed in the face of this is a "refiguration of science, still vested with its traditional claims to truth and service to the public good, while shaped to narrow market agendas, that requires a new enfranchisement by a broader scope of society."[206] To activate this question, Pentecost finds value in artistic practices that engage with the sciences and the arts through their entanglements in neoliberal governance. This positions the artist as a figure that can disrupt dominant scientific modes of practice—such as through da Costa's work with *PigeonBlog*.

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[202] Bio art is a term used to describe art that engages with the production, management, and manipulation of biological life. Importantly, artists who work with bio art methods often do so while considering the ethical and political implications of manipulating life in such a manner. Bio design is a closely-related term that describes design work that engages with biotechnology, in ways that attempt to mimic processes found in nature. For a discussion of bio art see: Eduardo Kac, "Introduction: Art that Looks You in the Eye: Hybrids, Clones, Mutants, Synthetics, and Transgenics," in *Signs of Life: Bio Art and Beyond,* ed. Eduardo Kac (Cambridge: The MIT Press, 2007): 1-27. For an overview of bio design see: William Meyers, *Bio Design: Nature, Science, Creativity* (London: Thames & Hudson, 2018).
[203] Claire Pentecost, "Outfitting the Laboratory of the Symbolic: Toward a Critical Inventory of Bioart," in *Tactical Biopolitics: Art, Activism, and Technoscience*, eds. Beatriz da Costa and Kavita Philip (Cambridge: The MIT Press, 2010): 111.
[204] Ibid.
[205] Ibid., 112.
[206] Ibid.

Up to this point in the thesis I have argued for methods of artistic practice that focus on situated and experimental acts in order to stimulate our perceptual imaginaries. With Andrea Zittel's *A-Z Wagon Station Encampment,* I looked to her iterative design process in order to trace the effects of form as tactile tools for shaping our perception. By inviting visitors to engage with the work by taking up residence, Zittel pushes for a material and durational process of sense-making that raises questions regarding domestic excess within capitalism. Turning to Tomás Saraceno's *Aerocene* project, I continued my discussion of perception as an experimental process, reading *Aerocene'*s collaborative and interdisciplinary structure for its ecological disposition. I argued that *Aerocene* welcomes sensory experimentation from participants in order to attune themselves to multispecies connections within ecological networks. I have thus far focused on *PigeonBlog* with this thinking in mind, looking closely to da Costa's interdisciplinary and design-based working methods. I read a desire in the work to curtail institutional affiliation in favor of an open-ended and non-specialist framework for engaging with scientific questions, one that invites reflection on multispecies networks often overlooked in urban space. In their own ways, each artist engages experimentally with the socio-political systems that bind their work to the everyday, seeking strategies that engage viewers at the level of perception. I will now turn to *Dying for the Other* (fig. 15), a work that frames the body as a multispecies site of life and death, in order to situate death within the fluxes of natural systems in a similarly situated and perceptual manner.

A Note on Form

Dying for the Other was made by da Costa while she was living in New York undergoing treatment for stage IV metastatic breast cancer.[207] The project visually entangles processes of life and death in a study of illness, tracking da Costa's own cancer treatment alongside mice used for laboratory cancer research. Mundane in its subject matter, the work blurs the laboratory and the home, as well as da Costa's body and that of non-human animals and microbes, in order to offer a poetic meditation on acts of cultural and biological resistance.

Dying for the Other stands apart from *PigeonBlog* in its finished state, marking a stark division of formal choices. *PigeonBlog* relies on a steady network of participants to energize the project (participation not only through work on pigeon flights and the design of the hardware, but through viewing and sharing information on the project's online platform), whereas *Dying for the Other* has less to do with hands-on participation from individuals. Unlike *PigeonBlog* it is not concerned with the design of a device or process with a practical function. *Dying for the Other* presents no similar invitation for engagement, nor does it propose a propositional solution to a discreet set of urban issues. Instead, the work demands a contemplative state from the viewer who is confronted with juxtaposed images of da Costa's own body and those of lab mice, a process by which her body, like that of the mouse, is framed as a research subject. And yet the work holds as much of a stake in ideas of design and experimentation as does da Costa's more tactile work such as *PigeonBlog*. Instead of reading *Dying for the Other* as separate from da Costa's infrastructural efforts, I propose to weave *Dying for the Other* into a discussion of design that raises questions about the field's larger role in structuring the worlds we live in. To consider design in this way—beyond the design of *things in the world*—asks us to consider how design is

[207] Da Costa was diagnosed with breast cancer in 2009 while she was living in California. She was in New York in 2010 when she discovered that the cancer had spread to her brain, and stayed in the city for treatment.

embedded into our conceptual structuring of the world itself—and by extension our own understanding of ourselves within it. As Boris Groys contends: "the ultimate problem of design concerns not how I design the world outside, but how I design myself—or, rather, how I deal with the way in which the world designs me."[208] At stake in Groys statement is not simply the ways in which we live in layers and layers of design that shape our domestic and urban spaces, for instance, as there is also call to examine the ontological effects of this condition . To do the work of design in da Costa's practice has as much to do with the design of the self as it does the manipulation of already-designed systems, which, through the artist's intervention, shift our understanding of our place within them.[209]

I argue that *Dying for the Other* frames an interplay between control and entropy that penetrates the medical field as well as da Costa's own body. I first consider the artist's own illness alongside acts of non-human entanglement and microbial resistance and argue that, beyond the links made between da Costa and the lab mice, the work also frames da Costa's body as an emerging and more-than-human site. In a sense, the microbes that penetrate da Costa's body have effects that can be managed but never controlled, a form of entropy that human ingenuity alone cannot contain. I then consider the work as an act of resistance with relation to design. In particular, I consider perception once more as it is linked to the work of form, shifting from a politics of form to a politics of design foregrounded in the environmental work of Helen Mayer and Newton Harrison. Here, I argue for a reading of *Dying for the Other* as a design-based intervention, one that documents a particular node of human activity. Like the Harrisons,

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[208] Groys, "Self-Design and Aesthetic Responsibility," 3.

[209] The notion of self-design echoes Michel Foucault's concept for an aesthetics of existence. Concerned with addressing how we relate to, and transform, ourselves in an ongoing way, Foucault argues that by developing 'techniques of the self,' living becomes an ethico-aesthetic practice. For an outline of this concept through the example of diet, see: Chloë Taylor, "Foucault and the Ethics of Eating," *Foucault Studies*, no. 9 (2010): 71-88.

who saw entropy as a crucial process to be taken up in their work, da Costa works from a position that asserts both control and decay: of trying to grasp what is always uncontrollable.

Figure 15: Beatriz da Costa, *Dying for the Other* [stills], 2011

Dying for the Other: Poetics of Entanglement

Three video channels illuminate, and the center image gives us our first glimpse of da Costa's body marching forward intently. The camera rests on the artist's face which holds a blank expression as she walks alongside a second figure. Suddenly, the two screens on either side of da Costa's body light up, remaining grey for a moment before images of fleshy, pink mice appear on either side. Da Costa's own still motions suddenly seem quite animated in contrast to the images of the mice, who themselves appear stiff in the latex-clad hands that grasp them firmly. The mice do not appear to react as needles are pressed into their abdomens, injecting their bodies with an unknown substance—albeit one that we can assume to be for medical research. My mind flashes back to the opening title cards—the words 'Dying for the Other' having hovered on screen at the film's start. Only here, as I view da Costa's and the mice's own bodies presented side by side, it is unclear who is the subject who is dying, and who is the other defined in this relationship. In the first minutes of *Dying for the Other* the bodies of da Costa and the mice are equalized: everyone holds a blank expression and appears quite still. As I watch da Costa's companion guide her along her walk, this image is visually blurred with the other animal subjects on screen who are manipulated and guided into place by human hands.

The mice disappear from the screen temporarily, and we are once again confronted with da Costa's sole body on view. She continues to creep forwards with the same focus and stillness as before, only this time her image is triplicated. Her moving body is flanked with an identical shot of da Costa's moving gaze as she repetitively scans a piece of paper grasped in her hand which she swings horizontally back and forth across of plane of vision. The act of walking in the center of the screen is soon replaced with another angle of this vision exercise. Only now the directions of her head motions are in tension. Though the three screens share the same tempo and

depict the same action, the subtle shift at the center of the composition creates a set of motions that approach the mechanical. Through repetition and varied angles, the three video screens connect in the installation as though repetitive gears of a larger unit. Da Costa's body performs a varied set of exercises that are rhythmically aligned and, through repetition, create a structure that is employed throughout the work's duration. As the work moves through time there are multiple instances of such exercises bound through repetitive motions. Da Costa's body moves throughout the three channels. Sometimes the artist is depicted moving her hands back and forth placing the tip of her finger on a partner's outstretched hands and back to her own nose. Back and forth, faster and faster, her hand's speed increasing while the motion remains stable. Other sections of the video depict da Costa, hands crossed and placed on opposite shoulders in a partial embrace, standing on one leg and repeating the motion when she loses her balance. The artist stretches on her apartment floor. She counts backwards from high numbers in groups of seven. She spells words prompted to her backwards. All of these activities are linked to her walk which introduces us to the work. Throughout, there is a stillness and repetitiveness that creates a marked impact when seen altogether.

At the center of *Dying for the Other* are scenes of consumption. Couched by the rhythms of da Costa's body as she moves through various exercises, human bodies consume and manipulate pharmaceutical drugs, research chemicals, and dark, leafy greens. In one instance, exterior shots situate us in a medical laboratory. All three channels then flash images of gloved hands and petri dishes in front of our eyes. I watch as fluids are mixed and measured into syringes. Then, in a moment I find particularly difficult to watch, the swollen body of a mouse is held up. It appears completely engorged, still to the point of lifeless, as a lab member pierces its body with a needle in order to inject it with the unknown mixture. While watching at this point, I

look away to the channel on the left and focus on an image of four plastic beakers. Some contain a light pink liquid, and the containers are rimmed in blue. It takes me a minute to notice that the center image has moved on from scenes of injection to a close-up shot of da Costa's hands sorting pharmaceutical drugs into a pill container. The colors of each lid are the exact blues and pinks as the beakers and I cannot help but visually connect the two in my mind. What is being consumed by both the mice and da Costa emerges from a context of blues and pinks, simple hues that draw together the laboratory and domestic spaces, as well as da Costa's and the mice's bodies.

Once again, the laboratory and the home become visually synonymous as the video progresses. We are now in da Costa's kitchen looking at a large bunch of kale and some beets on a chopping block.[210] Juxtaposed to the left is a view of a small scale. Placed on top, a small mouse. If it were not for the mouse, the scale might appear to be a kitchen tool. Once again, there is a visual connection impressed upon us as this section of the video goes on. One by one, mice are laid out on the scale, their weights called out one by one. As this goes on, da Costa is seen chopping up kale, as well as pills, and my attention turns to the various agents that the artist is consuming. Both da Costa and the mice, in this sense, continually consume in the work.

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[210] A related project by da Costa, entitled *Anti-cancer Survival Kit* (2013), was completed after her death by her assistant Crys Moore (with Beatriz's partner Robert Nideffer, Pamela Jane Mendoza, Johnny Lu, Frank Peter, Jamie Schulte, and Donald Daedalus). It contains a book, scientific articles and reference guides, as well as educational games, seeds for planting DIY anti-cancer gardens, and soothing items such as teas and chocolate. The kit was designed by da Costa with an interest in cancer prevention models, rather than those that strive for early detection. Intended as a tool for public-education, the project seeks an understanding of cancer as both scientific *and* social. For a discussion of the project by Moore, see: Crys Moore, "Art in the After," *Art21,* June 12, 2013, https://magazine.art21.org/2013/06/12/art-in-the-after/#.XUZIsC0ZPOQ.

Perhaps harder to watch than the mice being injected are images of the animals being pinned in place by small dowels.[211] Their bodies are compressed and manipulated next to images of da Costa, in control of her own movements as she practices yoga on her apartment floor. Back to the mice: they are now pinned down in place and are having weights placed on top of them as a lab technician explains that the extra depth is required in order for radiation to work successfully. In another shot, the mice are no longer being prodded but instead pierced with metal pins that attach them to solid boards. Their bodies are cut open with a small blade, and I watch as portions of their stomachs are removed, presumably for analysis. While da Costa herself is never seen in the lab, the prodding and manipulating of the mice's bodies is directly linked through the use of multiple channels to those of her own body being contorted and manipulated by various physical exercises. The slicing endured by the mice is mirrored by da Costa's hands cutting into pills, and slicing and preparing organic vegetables that nourish her body. Such visual connections structure *Dying for the Other*. Images are overlaid in such a manner that they muddle together da Costa's human body as intricately linked to that of the mouse under conditions of medical analysis and treatment. Human and mouse become enmeshed in a network that includes all sorts of microbes and chemicals.

In her 2017 article "The Political Life of Cancer: Beatriz da Costa's Dying for the Other and Anti-cancer Survival Kit," Lindsay Kelley captivatingly traces multispecies power structures as they criss-cross between da Costa's own body and those of the lab mice. Kelley's analysis of the work begins with a discussion of *Invisible Earthlings* (2008-2009), an earlier work by da Costa whose activities "illuminate symbiont relationships by making microbes visible as

[211] There are ethical implications here that are not glossed over by da Costa, and that relate to my discussion of Alexis Shotwell's concept of purity politics on page 122.

relational companions and social actors."[212] Da Costa's work is unpacked in this context for the presence of multispecies interaction at the microscopic level and "builds affective and physical alliances cooperatively through surface encounters that promote the extension of affective ties to very tiny companions."[213] This interest in tiny companions begins in work such as *Invisible Earthlings* and directly nourishes da Costa's later engagement with cancer. In particular, Kelley is concerned with questions surrounding the relationship of microbes to cancer. Given the status of the microbe as a common cause of human cancers, investigations into microbes are bound to cancer-prevention efforts. *Dying for the Other*, as Kelley contends, links da Costa's illness to relations that shatter her body's autonomy. The following statement details Kelley's experience of viewing the work: "When I look away, I knowingly break uneasy connections between da Costa's body, the bodies of the mice, the food, assisted living and dying as lively processes. Even familiar scenes of preparing greens and vegetables in the kitchen become difficult to watch when held between the bodies of vulnerable pink mice flayed and pinned to foil boards."[214] What Kelley makes clear with this statement is the visual trick played by the installation's three channels. In superimposing da Costa's activities with the routines present in the lab environment *Dying for the Other* blurs each of these activities in its format and impresses a sense of connectedness between da Costa, the mice, food, and various microbes. Quotidian scenes, such as cooking in the kitchen, are thus de-familiarized through their links to the laboratory in order to highlight a reciprocity between the laboratory and the home in da Costa's daily life.

Situated Knowledges and Multispecies Muddles

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[212] Lindsay Kelley, "The Political Life of Cancer: Beatriz da Costa's *Dying for the Other* and *Anti-cancer Survival Kit*," *Environmental Humanities 9*, no. 2 (2017): 236.
[213] Ibid.
[214] Ibid., 238.

To return to the goals of tactical biopolitics, it is necessary at this point to look at *PigeonBlog* alongside *Dying for the Other* for the two projects' relationship to situated knowledges. Situated knowledges is a term employed by Donna Haraway in a discussion of scientific authority. In particular, Haraway is concerned with the myth of scientific objectivity as "a way of being nowhere while claiming to be everywhere,"[215] which leads to the blind faith that scientific studies are objective and universal truths. In opposition to this framing of knowledge, Haraway calls for the "practice of objectivity that privileges contestation, deconstruction, passionate construction, webbed connections, and hope for transformation of systems of knowledge and ways of seeing."[216] In their own ways each project deals with knowledge production in a highly relational and situated manner. In each, da Costa positions herself within webs of complex activity and participates in activated and responsive research within these sites. Akin to tactical biopolitics' emphasis on engaging politically with specific nodes of scientific praxis, da Costa's presence as a researcher is always tied to the material conditions of her working site.

Figure 16: Photographer Unknown, Pigeon with German miniature camera, during the First World War, 1914

[215] Haraway, "Situated Knowledges," 584.
[216] Ibid., 585.

In the case of *PigeonBlog*, part of working in a situated manner includes an attention paid to multispecies entanglement that does not seek to dissolve the positions of the actors involved. Da Costa's work with birds retains relations of difference and suggests the sometimes-unequal collaborations that arise within multispecies work. In particular, da Costa acknowledges the history of pigeon-human collaboration—such as the use of pigeons equipped with cameras during the First World War (fig. 16), used to take aerial photographs for intelligence gathering. This history, which binds the body of the animal to the goals of militarized governance, is far from neutral. The first of these cameras was invented by amateur photography enthusiast Julius G. Neubronner.[217] Neubronner's camera was used widely for recreational purposes, but its eventual use in military operations suggests the ethical and political implications that reverberate from technological development. Donna Haraway has suggested that "da Costa set out not to become an air pollution scientist, but to spark collaboration in something quite different: multispecies art in action for mundane worlds in need of—and capable of—recuperation across consequential difference."[218] Here, Haraway asks us to pay attention to the histories that we inherit, but also to recognize that we are not all implicated within these histories equally. While in the case of pigeons we face histories of militarization, Haraway posits that "we are all responsible to and for shaping conditions for multispecies flourishing *in the face of terrible histories*, *and sometimes joyful histories too,* but we are not all response-able in the same way. The differences matter—in ecologies, economies, species, lives."[219] *PigeonBlog* is not a project that presupposes innocence with regard to these histories. It engages with a specific site of

[217] Joan Fontcuberta, "Dronifying Birds, Birdifying Drones," in *The Pigeon Photographer*, ed. Nicoló Degiorgis and Audrey Solomon (Bolzano-Bozen: RORHOF, 2018): 1-30.
[218] Haraway, *Staying with the Trouble*, 21.
[219] Ibid., 29.

scientific inquiry in order to probe the potential of working in more ethical collaborations within sites of multispecies relationality.

Dying for the Other is situated differently with regard to multispecies relations. Although engaging with multispecies relationality through visual layering, *Dying for the Other* is structured around da Costa's own illness. I would like to consider da Costa's cancer alongside Eugene Thacker's discussion of microbial resistance. Thacker suggests that "biological life itself, microbial life, is understood to be essentially emergent."[220] And, while the medical industry attempts to grasp the complexities of the body at the scales of the microscopic, there is an unknowability that can never be fully understood. Biological resistance is described as "frustratingly unhuman."[221] Thacker expands:

> In the same way that microbes exist in cycles of resistance to drugs, so do the drugs exist in cycles of obsolescence. In a sense, antimicrobial resistance is the schizoid dream of the biotech industry, a cycle of microbial capital that is constantly renewing itself both as threat and as the necessity of response or intervention. The problem of antimicrobial resistance is by definition indeterminate—or, rather, it is determined by the fluxes and flows of the biocapital and the pharmaceutical industry (itself tied to the dominant medical paradigm of drug therapy as a form of medical healing).[222]

Dying for the Other does not simply imply an interconnectedness within the laboratory setting. The work is situated within the emergent properties of da Costa's own illness. Although not dealt with explicitly in the work, the microbes that circulate through her body—and between her own body and those with whom she comes in contact with—are a force that can be temporarily managed but never controlled. Dying is thus embedded into various nodes in the installation as an always relational and multispecies affair. I will now turn to the work of Helen Mayer and

[220] Thacker, "Uncommon Life," 313.
[221] Ibid.
[222] Ibid., 315.

Newton Harrison in order to further outline an attentiveness to environmental situatedness and ecological perception.

Since the 1970s, the Harrisons have developed an artistic practice that works closely with natural systems. Although based in California, the duo has worked both nationally and internationally in collaboration with a variety of local and state actors.[223] Taking on a research-based process, the Harrisons are invited to a site, which then becomes their object of study. Here, they closely research, map, and seek out an understanding of the complexities of the ecosystems in which they work. Sometimes they propose solutions, other times they simply reflect on the site's history as one of human disturbance. Their work in the 1970s was primarily concerned with urban farming, and the Harrisons have since approached issues of watershed restoration, agriculture and forestry, and urban renewal, amongst others.

Figure 17: Helen Mayer Harrison and Newton Harrison, Making Earth, 1970

[223] The Harrisons were Professors at the University of California, San Diego. Upon retirement in 2004 they relocated to Santa Cruz, California.

Making Earth / Making Strawberry Jam

In *Making Earth* (1970) (fig. 17) Newton Harrison spends each one of his mornings invested in the process of working dirt. Images of his laboring body document various stages of this process. Harrison waters, turns, and hoes the dirt. He shovels endlessly, working away at a mound of matter with the goal of understanding a base element of our ecosystem. These quotidian and repetitive tasks give way to another of the artist's goals: that of the senses. We observe Harrison kneel in front of the earth, with image captions that suggest that he is feeling the earth, crumbling it in between his fingers to study texture; composition. Finally, Harrison brings his face closer in order to smell and taste the earth as it develops under his touch. Described by the artist as a private performance, *Making Earth* stems from a profound ecological awareness combined with its status as an immensely complex series of related processes and actors. Helen and Newton had decided to "only do work that benefitted the ecosystem in some way,"[224] and yet felt perplexed about how to best begin this work. Newton recalls: "Though I knew nothing about how ecosystems actually worked, I asked myself if there was a source, a place where I might begin, and a material I might begin with."[225] With the knowledge that topsoil was endangered globally, Newton began his performance. It is by carefully researching soil composition whilst simultaneously feeling out these conditions in the process of making that Newton assumes this work. He describes the process of spending time each morning with his supplies, of how the mixture combines over time—its properties shifting with each interaction, "becoming literally a living element, a medium for growth."[226] This description of the earth as a

[224] Harrison and Harrison, *The Time of the Force Majeure,* 18.
[225] Ibid.
[226] Ibid.

medium for growth becomes a driving metaphor in this action—and gestures to Donna Haraway's discussion of compost in both a literal and conceptual manner.

Feminist philosopher María Puig de la Bellacasa takes up Haraway's thinking in her work on soil,[227] arguing that human-soil relations in techno-capitalist worlds focus solely on a model that seeks a constant increase in yield production.[228] Contrasting this vision of capitalist productivity, Puig de la Bellacasa models an alternative scale for the care of soil health. As she states: "Caring for soil communities involves making a speculative effort toward the acknowledgement that the (human) carer also depends on soil's capacity to 'take care' of a number of processes that are vital to more than her existence. Thinking multispecies models such as food webs through care involves looking at the dependency of the (human) carer not so much from soil's produce or 'service' but from an inherent relationality."[229] Newton is attentive to the multispecies processes described by Puig de la Bellacasa. Day after day he attends to the health of the soil ecosystem by remaining attuned to its shifting properties under his care.

Concurrently, as Newton was caring for the soil, Helen Mayer began growing things in the topsoil that was being produced. Over a duration of time she attempted to grow a variety of plants native to the region of Southern California. Corn did not seem to work well, and Helen settled on strawberries, which were growing exceptionally well in the earth Newton was tending. Like Newton's process for working with earth, which relies heavily on close sensory and tactile observation, Helen's process of growing strawberries is achieved through trial and error in a

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[227] Puig de la Bellacasa was a research fellow at the Department of History of Consciousness and the Center for Cultural Studies, University of California, Santa Cruz.
[228] María Puig de la Bellacasa, *Matters of Care: Speculative Ethics in More Than Human Worlds* (Minneapolis: University of Minnesota Press, 2017): 186.
[229] Ibid., 192. Puig de la Bellacasa's description of the soil as 'service' provider references Jason Moore's work on the unpaid labor of natural systems within capitalism. For my discussion of Moore in chapter two see pages 76-77.

responsive manner. Helen later conceived the work *Making Strawberry Jam*, in which she makes one batch of strawberry jam per day for thirty days. The amount of sugar was reduced each day, until none was used by the end, as a means of "decontaminating"[230] her family's taste for sugar. *Making Earth* and *Making Strawberry Jam* form a cycle. In one, the natural properties of topsoil are researched and put to test, in order to attain a delicate ecological balance. From this, Helen's work proceeds to work further with the earth in order to grow plant life as a means for sustenance. The relationship between the two is symbiotic, with both Helen and Newton focusing on one reciprocal aspect of cultivating the means for human and multispecies survival. They do so by attending to survival of others—micro-organisms in the soil, as well as the many species that inhabit its ecosystem. Theirs is a careful study infused with flourishing life at every level of its development.

Looking; Learning; Making

The Harrisons, whose work emerged within the context of American counterculture and environmental activism in the 1970s, have sustained an artistic practice deeply rooted in examining the complexity of natural systems. In *Making Earth* and *Making Strawberry Jam*, the Harrisons are interested in the role of technology, particularly its theorization as an extension of the human body—a tool—that increases flourishing and survival capacities. This does not necessarily refer to technology as it has been applied by industry, for instance in high-tech machinery, but to understandings of technology as a process or skill that augments human capacities for survival.[231] The Harrisons engage with ecological flourishing as a technological

[230] Harrison and Harrison, *The Time of the Force Majeure,* 21.
[231] A similar invocation of the term technology is also utilized in the work of Peter Sloterdijk in chapter two. See pages 82-83.

act, as a set of technical practices that can be used to produce ideal conditions for life. They work with top soil, not only using garden tools, but with an embodied approach that has them touching, smelling, and occasionally tasting the earth. Each of their actions engage with one node of a larger ecosystem. Newton researches and produces soil, employing processes of mixing and tilling in order to do so. Helen also works with this soil in order to grow food, which is an action that requires a slightly different set of tools. By researching the process for producing topsoil, and experiments to uncover what flourishes best, they rely closely on observational skills, which are put to work in later works that map and describe natural sites using a variety of media such as maps, photographs, and text.

This focus on perception can be traced to the fact that Newton was himself a student of Josef Albers and considered himself a "colorist" throughout the production of the duo's environmental works.[232] For Albers, to be concerned with color implied a concern for perception, particularly for its situated and embodied effects with relation to form. This implication emerges consistently in the Harrisons' work, and stems from their careful observation and embrace of complexity. By studying and working *with* natural systems the pair explore the perception of natural systems as an ecological framework through which technology becomes an ecological force. This concern with perception is the basis from which the Harrisons' teach—by learning themselves—about the material particulars of ecological networks. Shortly after their first collaboration, they outlined clearly how they would continue on working:

> We would go to a place only by invitation, we would accept an invitation only if it included some means for networking into a larger community; we would agree only to go for a week or two at first, to think and research. To earn our way we would sing for our supper, so to speak, by speaking or performing. If an idea or consequence to us came

[232] Anne Whiston Spirn, "Helen and Newton Harrison: The Art of Inquiry, Manifestation, and Enactment," in *The Time of the Force Majeure: After 45 Years Counterculture is on the Horizon*, eds. Petra Kruse and Kai Reschke (Munich: Prestel, 2016): 434. By this point Albers was a professor at Yale, following the closure of Black Mountain College.

> forward, we would present it, and if funding and interest arose, we would enact and evolve whatever concept emerged.[233]

The above suggests that the Harrisons' work is one of looking closely, of spending time in particular sites in order for complexities to reveal themselves. Projects are proposed but not always completed. They are thus speculations derived from the Harrisons' own experience with the working site, ecologically-informed studies within sites of human disturbance.

The Harrisons' emphasis on spending time with an object of study echoes Puig de la Bellacasa's discussion of care time. She states: "The repetitive character of ongoing observation of soil cycles enables care. Care work becomes better when it is done *again*, creating the specificity of a relation through intensified involvement and knowledge. It requires attention and fine tuning to the temporal rhythms of an 'other' and to the specific relations that are being woven together.[234] In *Making Earth* and *Making Strawberry Jam* the artists perform tasks repeatedly and respond from sensual cues to fine-tune their actions, tools utilized to further the health of their objects of study. This fact echoes Zittel's iterative design process, as well as Saraceno's methods for atmospheric attunement, for the ways in which each artist takes the time to integrate into the complexities of their surroundings. This comparison equally extends to the uses of technology, which are understood as sets of practices that hold the ability to be ecologically integrated into larger multispecies sites.

Art historian Amanda Boetzkes has recently suggested that for the Harrisons "the project of fostering an ecological orientation involved acquiring specialized scientific knowledge of how ecosystems function, and developing technological strategies to create a symbiosis between the

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[233] Harrison and Harrison, *The Time of the Force Majeure*, 64.
[234] Puig de la Bellacasa, *Matters of Care*, 201.

natural world and human systems of food and energy production."[235] The Harrisons' work, which closely researches natural systems of food production and water cycles, for instance, posits an approach that re-investigates potential technologies that are able to work with, rather than exploit natural systems. Boetzkes makes clear that to the Harrisons, technology is not simply an additive agent, but is "the a priori condition of human society"[236] in which we shape the world around us. To consider technology in this way allows for basic life-sustaining activities—such as growing food and maintaining clean water sources—to be experimented with by the Harrisons. Such experimentation relies most importantly on close observation of systems, which has been discussed by Anne Whiston Spirn as integral to the duo's working process. Spirn describes their research methods, which include mapping, the use of metaphor, and storytelling in the process of researching a system of phenomena. As Spirn suggests, "the artists are not detached observers. They look for what a place has to tell them—to what stories it holds."[237] Importantly, to return to Boetzkes, this attunement does not fall back on idealized visions of nature. Instead, what is established is a "critical position as one that is intertwined with technology,"[238] that attempts to reveal, as well as resist and re-frame, systems that enhance or impede our collective flourishing.[239]

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[235] Amanda Boetzkes, "Techniques of Survival: The Harrisons and the Environmental Counterculture," in *West of Center: Art and the Counterculture Experiment in America, 1965-77*, eds. Elissa Auther and Adam Lerner (Minneapolis: University of Minnesota Press, 2011): 307. Boetzkes's discussion of technology draws on the thinking of philosopher Martin Heidegger, who writes of technology as not only a means to an end, but as a process of revealing tied to being in the world. See: Martin Heidegger, "The Question Concerning Technology," in *The Question Concerning Technology and Other Essays*, trans. William Lovitt (New York: Garland Publishing, 1977): 3-35.
[236] Boetzkes, "Techniques of Survival," 307.
[237] Spirn, "Helen and Newton Harrison: The Art of Inquiry, Manifestation, and Enactment," 435.
[238] Boetzkes, "Techniques of Survival," 319.
[239] Boetzkes's description of human technologies intertwined with nature echoes Donna Haraway's concept of naturecultures, a term that describes the inseparability of nature and culture to understandings of ecology. For Haraway's discussion of naturecultures, see: Donna Haraway, *The Companion Species Manifesto: Dogs, People, and Significant Otherness* (Chicago: Prickly Paradigm Press, 2003).

This emphasis on situated knowledges pushes for close observation of human and natural entanglements and links da Costa's work to that of the Harrisons. Attending to site in this way also brings to mind the work of Saraceno and Zittel, who engage closely with the specificities of their environments in order to model ecological propositions. By working from a strong base of detailed and intuitive observation, the Harrisons first attempt to understand the working site in as much complexity as they can, before devising careful systems that work *with* the site. Although da Costa does not create a hands-on interface in *Dying for the Other* as she does with *PigeonBlog*, there remains an emphasis on sustained observation of ecological systems. Both, importantly, work from a position that embraces multispecies relationality at its base. With *PigeonBlog* this is clear in the working method in which birds that share our urban airways are collaborated with rather than ignored. But in *Dying for the Other* tactical multispecies research is not developed. Instead, da Costa frames the space of her illness as a multispecies encounter at its core. Like the Harrisons, there is a strong process of observation present that enables these relations to be traced by da Costa. And, like the Harrisons—who's work both utilizes technology while retaining a criticality towards current practices of technological management—the use of technology is not limited or presented in a utopic manner. Instead, the interweaving of technology, nature, humans, and other animals retains conflicting interests and contradictions. *Dying for the Other* presents an image of the human body as reliant on multispecies muddles, of which the terms of this relationship are not without harm.

This condition echoes Donna Haraway's concept of significant otherness, a term for sketching relations that takes differences seriously. The development of significant otherness relies on emergent practices, described by Haraway as "vulnerable, on-the-ground work that cobbles together non-harmonious agencies and ways of living that are accountable both to their

disparate inherited histories and to their barely possible but absolutely necessary joint futures."[240] *Dying for the Other* engages with the systems that structure medical research and treatment from the lens of significant otherness. Da Costa traces the intertwinement of her own body, that of the lab mice, and the various microbes and chemicals that move between and link them together. Importantly, this task is structured around representation formed from da Costa's close observation. Pointedly non-harmonious, da Costa rejects simplification of the images displayed into moral frameworks of right or wrong, a practice described by feminist philosopher and sociologist Alexis Shotwell as "purity politics,"[241] choosing instead to elucidate one site in which the body extends beyond autonomy and relies on multispecies webs of life and death.[242]

Above all, thinking with da Costa's work alongside the Harrisons' reveals a commitment to environmental systems grounded in perception. Da Costa and the Harrisons—like Zittel and Saraceno—are figures that engage with a field, in the sense that they ground their work in the complexity of the systems in which they operate. Turning to *Spoils Pile Reclamation* (1977-1978), a later work by the Harrisons developed in Lewiston, New York, I will now develop their engagement with entropy. In doing so I will invoke issues outlined throughout this thesis by attending to the Harrisons' links to situatedness and ecological thinking as it is rooted in an integrative art and design framework.

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[240] Haraway, *The Companion Species Manifesto*, 4.

[241] Shotwell's concept of purity politics rejects the idea that we can ever access a time before pollution, without conflict, a position of ethical perfection, in short. In contrast, Shotwell proposes a politics of impurity whereby we embrace our impure ethical positions as a starting point for action. It is also worth noting that, although Donna Haraway was not on her thesis committee, Shotwell was a graduate student in the History of Consciousness Department at the University of California, Santa Cruz. See: Alexis Shotwell, *Against Purity: Living Ethically in Compromised Times* (Minneapolis: University of Minnesota Press, 2016).

Figure 18: Helen Mayer Harrison and Newton Harrison, *Spoils Pile Reclamation*, 1977-1978

Spoils Pile Reclamation

A painted sign stands in front of a mound of earth (fig. 18). There is no ornamentation on the sign, no imagery, only instructions: "All people with material to aid in the reclamation of the spoils pile should proceed as follows." There are two options: top soil and earth, and organic material. Subsequent information describes where to deposit each of these materials, with a final note that contributions are tax deductible. Beyond this sign is a large expanse of space, a reclamation site born from the land's particular history and environmental conditions. *Spoils Pile Reclamation* is a work that was created by the Harrisons after being invited to work in a natural site scarred by industrial activity in the region.[243]

The Harrisons describe in their writing visits to the site with their son Josh, and their intentions to create a reclamation piece that would restore the site and allow plant life to grow again. The surrounding towns had all recently had to rebuild their sewer systems, and "many truckloads of earth, some sub-soil, and some topsoil were to be carted to a landfill many kilometers away."[244] Through negotiations, the town committed this topsoil, as well as organic waste, to the project. Truck by truck, these materials were added to the site. The plan was for the transformation of the entire sixteen-hectare site into a meadow. Those in charge of Art Park stopped the work half-way through, halting the full-scale reclamation of the site. Now working in the completed half, the Harrisons directed bulldozers to mix, shape, and smooth the material.

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[243] Mierle Laderman Ukeles's ongoing project *'Fresh Kills Landfill to Landscape:' Conceptual Design & Planning Approach Competition & Master Plan Services"* (2001-), as well as Agnes Denes's work *Wheatfield—A Confrontation: Battery Park Landfill, Downtown Manhattan* (1982), relate to *Spoils Pile Reclamation*. Both projects work to remediate landfills in and around New York City, and draw attention to questions of ecological labour. See: Mierle Laderman Ukeles, "Leftovers / It's About Time for Fresh Kills," *Cabinet*, 2002, http://www.cabinetmagazine.org/issues/6/freshkills.php, and Agnes Denes, "Wheatfield—A Confrontation: Battery Park Landfill, Downtown Manhattan," *Agnes Denes,* n.d., http://www.agnesdenesstudio.com/works7.html.

[244] Harrison and Harrison, *The Time of the Force Majeure,* 78.

Boy Scouts and Girl Scouts helped gather seed from the surrounding meadows and grasslands in the region. These were scattered by the Harrisons, and slowly a meadow emerged.

Spoils Pile Reclamation gestures to ideas developed in *Making Earth* and *Making Strawberry Jam* on a larger scale. Here the process of attending to soil health remains integral, only the process is expanded significantly and reflects the shift in the Harrisons' working methods. The meadow in *Spoils Pile* results from an invitation by the organizers of Art Park. The Harrisons visited the site, observed the various ecological conditions of the region—in this case one where nutrient-rich topsoil was being dumped into landfills—and proposed a project. With *Spoils Pile* the Harrisons integrate themselves into a site and re-invigorate its ecologies through careful reclamation work. Like in *Making Earth* and *Making Strawberry Jam*, in which actions are structured around a set schedule and clear scope, in *Spoils Pile* the artists play with conventions of form in order to frame their work. For one, "the signage of the work was designed to operate within the proposal format of conceptual art, stretching the permission a bit by being so practical."[245] Similarly, the creation of the meadow itself is framed as a formal exercise in the artists' description of the work: "We found the idea amusing, to see if we could make a 16-hectare grassland/flower field/pasture of some kind, where all the other artists could make work on our work. *We would be the field, and they would be the figures within it, speaking in Bauhausian terms* [emphasis mine]."[246] By working carefully to frame their ecological works in a particular way, they curate an encounter all while retaining a sense of indeterminacy. In *Spoils Pile Reclamation* the 'field' that is acted upon is both metaphorical and literal. I will now look more carefully at what is modelled by this work, in particular a sense of ecological indeterminacy that manifests in the Harrisons' study of entropy.

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[245] Ibid., 81.
[246] Ibid., 79.

Experiments with Entropy

The Harrisons, like other land artists in the 1960s and 1970s such as Robert Smithson, were deeply concerned with entropy.[247] Entropy, as explained earlier, refers to the loss of energy of a system that causes gradual decline into disorder. The Harrisons have discussed entropy with relation to environmental systems, explaining that "when we say entropy is raised in a system, we mean the system has lost the energy to maintain itself in its former state."[248] In a recent book project that follows the Harrisons' work over their long career, they ponder this question of entropy and suggest that it is a through-line that links all of their work. Here, the Harrisons ask: "would it be enough for life to continue, by reducing local entropy system by system?"[249] While this focus on entropy seems applicable to human systems, for instance urban infrastructure that begins to decay and fall apart as soon as energy is not put into maintaining it, the Harrisons make clear that they are concerned with environments in a broader sense: "When we say 'for life to continue' we mean whole systems continuing. Lowering entropy within living systems turns out to require the elimination or transformation of all economic systems based on exploitation,[250] and their regeneration into systems of exchange."[251] Thinking with the Harrisons about entropy invites contemplation on the possibility of life in global ecosystems that have been exploited and degraded over the years. These sites can be usefully described as 'blasted landscapes,' a term

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[247] For a discussion of Smithson's work, particularly for the set of ecological propositions it offers, see: Amanda Boetzkes, "Spiral Jetty: Allegory and the Recovery of the Elemental," in *The Ethics of Earth Art* (Minneapolis: University of Minnesota Press, 2010): 65-100.
[248] Harrison and Harrison, *The Time of the Force Majeure,* 374.
[249] Ibid., 377.
[250] The Harrisons state elsewhere that nature and human industry differ with regard to entropy. Nature uses all waste available to it while industry does not, and industry also charges a profit for the energy created. This leads the duo to critique capitalist systems of exploitation and domination as culprits in the degradation of environmental systems.
[251] Harrison and Harrison, *The Time of the Force Majeure*, 374.

defined by Anna Tsing to mean "disturbance-based ecologies in which many species sometimes live together without either harmony or conquest."[252] The Harrisons call for action, while avoiding tropes of human dominance over the environment:

> So we at the Center conclude
> That counterforces are available
> That can in some measure mitigate a possible 6th mass extinction
> But unless created over the next 50 years or much less
> *Civil society in many places will experience perturbation, then collapse*
> *Keeping company with ecosystems*
> *Experiencing perturbation and then simplification* [emphasis mine].[253]

The concept of entropy is expanded by the Harrisons here to include socio-political systems alongside their larger project of environmental perception. While they research entropy closely and speak to its negative effects in ecosystems, entropy also points to the state of the world as a dynamic assemblage of systems that are constantly in flux. *Spoils Pile Reclamation* speaks to this through its project of reclamation. After careful research into the site's history, the duo worked to re-energize the site and produce a stable ecologic system able to regenerate over time. To spend time in a site, to research it carefully, results here in an approach to form that rejects environmental domination. Instead, environments are *worked with* in the Harrisons' proposals through their embrace of the fluxes of nature.

Dying for the Other engages in a similar way with conflicting processes of flourishing and decay, entropy and stability, only its context shifts us from environmental systems to the body as an emergent ecological site. Eugene Thacker's description of the microbial body—a living and dying body—suggests this state. *Dying for the Other* presents us with a study of the artist's body where her illness is enmeshed within larger natural processes. The artist's body is

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[252] Anna Lowenhaupt Tsing, *The Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins* (Princeton: Princeton University Press, 2015): 5.
[253] Harrison and Harrison, *The Time of the Force Majeure,* 379.

framed as a site of resistance, one that inches closer and closer to a state of disorder. The body is increasingly framed as a more-than-human amalgamation both of cells, bacteria, and other such agents. Just as the Harrisons employ the labouring body in their research on particular ecosystems, there is a shared desire by da Costa to investigate our messy entanglements in the material world. The Harrisons' perception-based and technologically-oriented working methods, which predate da Costa's and similarly draw attention to the fluxes of entropy present in natural systems, create the conditions of possibility for da Costa's reflection on multispecies webs of life and death.

Design Informing Perception

Up to this point I have spoken of da Costa's work as a multi-modal process that works from a position integrating humans within larger multispecies entanglements, noting an emphasis on the design of systems that emerges through da Costa's close observation and hands-on commitment to study. Like the Harrisons, who view the goals of design as an instrument for the shaping of ecological relations, da Costa's practice is one that strives for a deepened understanding of our place within the world. While the two projects take different forms, both sustain a close study of a particular ecological entanglement. *PigeonBlog*'s deployment of a multispecies and open-source scientific initiative develops a framework that takes seriously the multispecies webs of life which, although materially present everywhere, are often ignored. Doing this type of work requires an openness to experience as communication happens nonverbally between the artist and the birds. Attunement thus precedes the process of design, which itself raises important questions on our entanglements with other species, as well as the ways in which relations of dominance permeate our institutional structures and histories. *Dying*

for the Other takes seriously the knots that bind our bodies to a multitude of other subjects. In this sense the work acts as a document of the artist's careful research. Research that results in the mapping of an environment—in this case the laboratory, medical facilities, and the artist's own home—that links the human body to microbial and multispecies worlds. While not building from this to develop an alternative, speculative re-design—as da Costa develops through *PigeonBlog*—this portrait of the entangled body serves as an important engagement with the body as enmeshed into environments, shattering any illusions of its autonomy. With the former work we have the careful re-development of a set of relations based on the intervention of technology. The latter project marks an extended process of research into natural systems in order to reveal multispecies connections in their folds.

Both, in this sense, function to disturb naturalized systems of scientific management. While *PigeonBlog* does so through a designed intervention, both interrupt the design of scientific systems that are built in part on the exclusion of both individual and non-human animal agency. The Harrisons' study of environmental systems similarly interrogates sites of human disturbance. Rather than assert nature as an untouched space, their work frames natural systems as entangled with human actions. Opting for a politics of care towards natural systems, the duo keeps an eye to natural processes that they seek to integrate into propositions for ecological practice.

This line of thinking gestures to the work of Zittel and Saraceno as well. The Harrisons' situated and process-oriented methodology drives home the importance of site in developing an ecological awareness. Zittel, for instance, is attentive to the desert climate in which her works are situated, as well as to the ecological effects of human practices within capitalism. Like the geographic area delineated in *Spoils Pile Reclamation*, the *A-Z Wagon Station Encampment* becomes a site of laborious activity when inhabited and becomes a field for ecologically-oriented

experimentation. Saraceno looks less to a specific geographic site. Through an attunement to environmental complexity, he works to develop technologies that integrate within natural systems in relations of non-dominance. These are practices that—like the Harrisons' and da Costa's—employ a process-based framework that engages with the complexities of physical and discursive sites in order to raise complicated questions that situate humans within multispecies ecologies.

Importantly, none of the artist discussed provide easy answers to the systems they critique, and echo instead Josef Albers's process-based approach intended to attune individuals to their perceptual capacities—and thus the complexities of the world. This emphasis on complexity echoes Alexis Shotwell's discussion of purity, in which she states that "living well might feel impossible, and certainly living purely is impossible. The slate has never been clean, and we can't wipe off the surface to start fresh—there's no "fresh" to start."[254] In its place Shotwell champions a politics of impurity that finds useful the inclusion of "complicity and compromise as a starting point for action."[255] Working from a position of impurity does not deny our own complicity in living patterns that ignore multispecies engagement. But working from within also allows one a certain freedom for experimentation and confrontation with the logics of these systems, playfully—and seriously—interrupting their naturalization. Da Costa's design initiatives—her tracking, mapping, looking, sensing—like the work of Zittel, Saraceno, the Harrisons, and the Albers, seeks to expand our perceptions of the world and our place within it.

This place in the world is always entropic, always involves fluctuations in life and death. Here I am reminded of Roy Scranton's writing on practices of dying in the Anthropocene, in particular his claim that "we don't need to learn anything at all about dying; it's the one thing in

[254] Shotwell, *Against Purity,* 4.
[255] Ibid., 5.

life we can absolutely count on getting done."[256] Humor aside, Scranton's work raises pertinent questions about human mortality in the context of mass-extinction, questions relevant to da Costa's work. As Scranton argues, "learning to die demands daily cultivation of detachment and daily reminders of mortality. […] And since we can't ever really know how to do something until we do it, learning to die also means accepting the impossibility of achieving that knowledge as long as we live."[257] That is to say that learning to die requires a situated attunement to the present moment, a means of keeping mortality close to us in our daily lives, a practice that Scranton posits has worldly consequences: "the practice of learning to die is the practice of learning to let go: learning to die means learning to let go of the ego, the idea of the self, the future, certainty, attachment, the pursuit of pleasure, permanence, and stability."[258] Da Costa is perhaps not learning how to die herself, but instead looking to how she lives and dies amongst other species and agents. This denies efforts to contain the human body as an isolated figure. To look further, this staging of fleshy, multispecies, and microbial death stands starkly in the face of human ideas of progress and immortality. The anthropocentric makes way for a letting-go of the idea of a cohesive self, separated from the material properties of the world. The permanence of the human—or perhaps of current human practices dominated by an inflated sense of authority—is suspended and becomes emergent, unstable, and finite. The Harrisons' work rejects a position of human dominance through a letting-go of human control in natural ecosystems. Instead, the duo looks to natural processes that can function alongside their own actions in symbiotic ways. Like Saraceno's efforts to study, learn from, and *work with* naturally-occurring phenomena, the Harrisons work is emergent from the landscape in ways that cannot be fully predicted from the

[256] Roy Scranton, *Learning to Die in the Anthropocene: Reflections on the End of a Civilization* (San Francisco: City Lights Publishers, 2015): 36.
[257] Ibid., 37.
[258] Ibid.

outset. The suggestion of entropy in *Dying for the Other* posits difficult questions regarding life in conditions of ecological collapse. This condition extends from da Costa's own illness to larger natural cycles of life and death. While a certain level of indeterminacy structures *PigeonBlog* through the unforeseeable results that might arise in collaborative multispecies environments, *Dying for the Other* reflects more seriously on the inevitability of death in all life. Resisting ideas of permanence, da Costa presents a much less stable view of the body—one that is always in an active state of change that entrenches it within its environment.

I have outlined *PigeonBlog* and *Dying for the Other* with an eye to their engagement with design, natural systems, and ecological perception, noting how both works intervene in large-scale systems that have been naturalized over time. With *PigeonBlog,* this takes shape through da Costa's engagement with tactical biopolitics, a set of working methods that prioritize citizen engagement and more-than-human enmeshment. The resulting work binds human and bird in a process of monitoring and invites non-expert citizens to claim a stake in scientific practices that affect us all. In *Dying for the Other,* da Costa's investigation takes on a reflexive role as she presents images that make present multispecies entanglement. A comparison to the work of the Harrisons reveals a commitment by da Costa to cultivating ecological perception through situated research and design experiments. More than this, both share a desire to explore the larger fluxes of life and death that form our material worlds—a process that is enacted through situated entanglements with the more-than-human. Coupled, the two projects by da Costa operate from a shattered sense of bodily autonomy, vying instead for a mode of relating that engages in environmental connections. As such they are, like all the artists I have discussed—situated and impure practices of living outside of anthropocentrism, existing within expanded concepts of design that explore how we, as humans, have built the world around us and our place within it.

Importantly, da Costa's work asks necessary questions regarding mortality in an age of mass-extinction. Putting our own human histories—in particular histories emergent within relations of capitalism and colonialism—within the scales of natural systems is a sobering act. It is also a necessary one, when faced with dominant human ontologies that embrace the power of humans over the rest of the earth's ecologies. It is high time for us to situate ourselves in place, learn from our surroundings in order to "[keep] company with ecosystems,"[259] and design our worlds differently.

[259] Harrison and Harrison, *The Time of the Force Majeure*, 379.

CONCLUSION:

FINDING ONE'S BEARING

> "Inside, here, at the Bauhaus after some two years of its existence, was confusion, too, I thought, but certainly no hopelessness or aimlessness, rather exuberance with its own kind of confusion."[260]
> -Anni Albers

Describing her initial arrival at the Bauhaus in 1922, Anni Albers speaks of a sense of productive confusion that reverberated in the work being done. This is an experience that prioritizes an immersion in the current state of the world as one that is a "tangle of hopelessness, of undirected energy."[261] It is from this context that Albers speaks of a sense of confusion full of hope, with energy directed to fostering an experimental spirit through art and design. This will to experimentation, to immersing oneself in the world with an openness to experience, speaks of the possibility of "realizing sense and meaning in a world confused, […described as] the same experience of finding one's bearing."[262]

In this thesis I have explored a number of artists who find their bearings in the world through a spirit of experimentation that brackets art and design. Beginning with Andrea Zittel's sculptural works, I have situated her overarching concerns with form and perception within the pedagogical model developed at the Bauhaus. Turning to Josef Albers's pedagogy for its concern with experimental and iterative practice, I outlined Zittel's work within a model that stresses form's effects on perception—and the artist and designer's ability to challenge these capacities. Zittel's testing of living arrangements—by living in them herself and inviting others to do the same—invites an attention to acts of daily practice that are embodied in relation to the work. By

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[260] Anni Albers, "A Start," in *Anni Albers: Selected Writings on Design*, ed. Brenda Danilowitz (Hanover: University Press of New England, 2000): 1.
[261] Ibid.
[262] Ibid., 2.

situating her practice within her daily life, Zittel embraces the integration of art and design—and by extension art and life—in ways that disturb our naturalized domestic practices.

I then turned to work of Tomás Saraceno, placing it in dialogue with Buckminster Fuller. Fuller, who was hired by Josef Albers to teach at Black Mountain College, promoted a vision of the designer as an interdisciplinary individual able to tackle complex problems with almost network-like abilities. I investigated Saraceno's *Aerocene* sculptures first for their relationship to Fuller's concept of the comprehensive designer, noting a similarity in Saraceno's interdisciplinary methodology. While I revealed similarities on these grounds, Saraceno's commitment to ecological attunement stands him apart from Fuller's utopian view of the world—a view that did not question the role of capitalism and extraction economies towards achieving his goals of ecological flourishing. In work that draws on Fuller's theories of design, I argue for a reading of *Aerocene* as an art/design experiment that fosters a collaborative mode of perceptual sense-making in the context of anthropocentric practices, one in which an attunement to environmental enmeshment blossoms from an interdisciplinary and collaborative working model.

Beatriz da Costa's work then helped ground us within the unpredictable fluxes and multispecies relations that structure our lives. I first outlined da Costa's critical position with relation to institutional forms of knowledge production as taken up in *PigeonBlog*, in which she levels critiques that align with the development of tactical biopolitics as a site of citizen science engagement. From *PigeonBlog* I then turned to *Dying for the Other* and the work of Helen Mayer and Newton Harrison. I considered the emphasis in the Harrisons' work on situated knowledges, sensory research, and study of environmental complexity, in order to locate a similar spirit in da Costa's reflexive work. With this in mind, I then looked more closely at the

Harrisons' study of entropy, as well as their interest in design as a processual technology to achieve environmental goals. In doing so I aligned the Harrisons' concerns with entropy and da Costa's meditation on illness and death, arguing that *Dying for the Other* as a detailed study of da Costa's illness as an emergent biological site—one that integrates disorder and decay into its very existence. The work is thus framed as an exercise in perception, one in which da Costa locates her own life cycle within many others through her situated research.

Together, these three chapters locate the work of environmental perception as intimately bound to questions of artistic form, considering in particular the joint efforts of both art and design to accomplish this task. I point to three specific instances in which the work of art can playfully disrupt our accepted patterns of living and provide an experimental framework through which alternative ecological relations can be developed. This notion is intimately bound to questions of design—of the design of systems and relations that materialize to shape our world.

Design in this sense denies a focus on objects alone, and we can begin to consider how design at the most local scale is embedded within larger geopolitical landscapes. The dominant patterns of consumption that drive our domestic ontologies under capitalism in my discussion of Zittel are a larger, guiding system that is the product of a particular design. Similarly, social relations and hierarchies of knowledge are revealed as products of design—and are re-designed—in Saraceno's practice. In this same way, neither da Costa's nor the Harrisons' design efforts end with the material results of the project. There is, instead, a sense of design as a process of open-ended investigation. A process whereby not only systems and objects are produced—as in *PigeonBlog*—but the role of design in prescribing patterns for living and relating in our homes and cities is problematized, revealed, and re-mapped.

In this context, it is useful to consider architectural theorist Keller Easterling's thinking on the designed medium. Easterling's writing engages design at a global level through a focus on systems and processes that drive global capitalism. Medium design, as Easterling has argued, looks not to the formation of independent objects or isolated events, but instead to interfaces that operate at the global level through the workings of capitalism. Medium design is about implementing projects and ideas with an interest in their movement through the larger mediums in which they are embedded. This mode of thinking is bound up in the practices of Zittel, Saraceno, da Costa, and the Harrisons, inasmuch as they develop propositional models that are activated through time and place by various participants and publics. These models, importantly, operate to dislodge sets of anti-ecological relations that drive the workings of capitalism. Looking to design as a process of 'hacking' into these totalizing structures is at the core of Easterling's thinking. Importantly, such design is never fully graspable, and remains indeterminate. It is in this indeterminacy that Easterling sees a potential, for the ways in which speculative practice might grasp momentum when put out into the world:

> That indeterminacy is not marginal or weak—just agile enough to respond to the moment when it is outmaneuvered. […] These designs offer no correct answer or homeostatic balance, but if there are dispositions of violence embodied in space, are there also not dispositions that ease or neutralize tension and violence? The documents that architects present in the future might not be snapshots of perfect moments, but specifications for linkage and interdependency that remain in place to counterbalance and *imbalance* each other.[263]

The idea that design can extend beyond the design of things, that designers can consider the implications of their practice to larger social and political apparatuses provides a political stake to design—in particular for its destabilizing or propositional stance.

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[263] Keller Easterling, "No You're Not," in *Superhumanity: Design of the Self*, eds. Nick Axel et al. (Minneapolis: University of Minessota Press, 2018): 23.

In his work on capitalist realism, Mark Fisher diagnoses our contemporary condition in which: "the widespread sense [is] that not only is capitalism the only viable political and economic system, but also that it is impossible even to *imagine* a coherent alternative to it."[264] Capitalism, in Fisher's model, exists in a condition of stasis in which history unfolds and repeats itself with little structural change. To return to Jason Moore's analysis of capitalism as an all-encompassing global organization that drives our relations on the planet, the inescapability of this world ecology is what is emphasized Fisher. Attempts to critique capitalism are often re-absorbed by its mutable and ever-evolving structure, which relies on binary thinking, such as those of nature and culture described by Moore.

In this context design can play a role, in particular how it is bound up in artistic practice. As Easterling suggests, design can respond in the moment to briefly interrupt or re-direct the medium in which design operates. Importantly, these efforts can be improvisational, short-lived, indeterminate but always in pursuit of a desired outcome. Zittel, Saraceno, da Costa, and the Harrisons do this. Their work cuts into the folds of capitalist relations in order to challenge our naturalization within these systems. They thus consider the work of art as a tool for design—from designing perception as formulated in Bauhaus pedagogy, to the design of technologies and relations that disrupt us in our daily lives. The artists I have discussed utilize the tools and methods of design in order to proposition possibilities for working, thinking, and living that tense the hegemony of global capital. Once again quoting Fisher, "from a situation in which nothing can happen, suddenly anything is possible again."[265] Tony Fry's thinking on design as a mode of political engagement is also pertinent here when considering the works I have discussed. Fry's work aims to tease out what the work of design is able to achieve as a form of political

[264] Mark Fisher, *Capitalist Realism: Is There No Alternative?* (Ropley: Zero Books, 2009): 2.
[265] Ibid., 81.

engagement beyond current forms of democratic politics. This argument rests on a diagnosis of our current political systems as incapable of achieving any form of environmental or social sustainability. In addition to this, Fry traces the ways in which design has always engaged with—and contributed to the formation of—forms of political control and intervention. As Fry argues: "as the history of architecture and design confirms: cities, hospitals, prisons, offices, factories, homes, parks, public transport, utilities, infrastructure, public information and so on, all arrive with forms lodged in particular sets of ideological value that are predicated on how human beings should be viewed and treated. *In this way, design and the designed function politically*"[266] [emphasis mine]. With this in mind, Fry goes on to articulate a theory of design politics that stresses the manner in which design is always already embedded within social, political, and economic structures that govern our daily lives. We are both *designed* and *designing* as we act in the world. It is through enacting a design politics that we can think self-reflexively about our place within these systems and engage with the medium that Easterling describes. Importantly, a consideration of design in this way is always situated and entangled in the world, and this is exactly the positionality required by Fry and Easterling in order to interject strategically.

The goal of a design politics concerns the potential of design to break away from our current relations of unsustainability and to instead facilitate practice-based environments through which we can begin to shift from current relations to underexplored practices of living in ecological relations. Design is thus figured *as a process rather than as a product or service*. It is this act of design as an ongoing process—a way of relating to the world—that is modelled by Zittel, Saraceno, da Costa, and the Harrisons. As artistic strategies in defiance of relations of

[266] Fry, *Design as Politics*, 6.

unsustainability, these artists work with design not as a set of discreet acts, but as a methodology embedded at the core of their artistic practices.

While resisting a complete shift from the work of form that I have outlined to a politics of design, what I instead would like to emphasize is the intimate relationship between the two. In doing so I will begin with two anecdotes. In 2016 and 2018 I took two seminars on art and ecology with Natalie Loveless, who would go on to become my thesis supervisor. At the crux of these courses was the distinction between *art about ecology* versus *art produced ecologically.* These were questions that circulated in the classroom daily, and in conversations with Natalie both inside and outside of the classroom.[267] In these conversations I was struck by this shift in thinking with regards to artistic form. At the time I was focusing on theories of design politics, and located many affinities between design and art in this model—particularly for a shared emphasis on what these two sets of practices can accomplish in the world.

Half a year later I came across a passage by Josef Albers, whose words struck me:

> So I am looking forward
> To a new philosophy
> Addressed to all designers
> —in industry—in craft—in art
> and showing anew
> that esthetics are ethics,
> that ethics are source and measure
> of esthetics.[268]

[267] Natalie Loveless's mentorship has been foundational to the direction of this thesis. Concurrent with my own work, Loveless has been working on a related project that looks to de-materialized, performance, and daily-practice artwork. In *Sensing the Anthropocene: Aesthetic Attunement in an Age of Urgency*, Loveless argues for practices of aesthetic attunement that enable alternative ecological relations than those formed under petro-capitalism. While in my own work I consider the role of form within a design-based framework, the question of ecological form drives this project and my approach to working.

[268] Josef Albers quoted in Nicholas Fox Weber, "Designs for Living," in *Josef and Anni Albers: Designs for Living,* eds. Nicholas Fox Weber and Martin Filler (London: Merrell Publishers, 2004): *28*.

What struck me was not simply Albers's insistence on the role of art and design in shaping perception, but how the categories of craft, industry, and art are subsumed under the category of design. Nicholas Fox Weber, who includes this passage, went on to describe the importance of design in the Albers' daily life:

> Their concerns spread in every direction, from the design of stationery to the making of abstract art, from the placement of objects on the kitchen table to the layout of forms in a large visual composition. [...] Life itself was rugged, with inflation and politics, prejudice, war, internecine strife, greed, even evil, often ascendant. But in art, and design, in what we make and use and wear […] we can have some respite, some calm.[269]

A politics of artistic form in this regard is thus equally concerned with a politics of design. What struck me in these passages was the implication that to *do* the work of art is a practice that designs experience. This is a sentiment that is at the root of the works discussed here and forms a bridge in my thinking between the role of ecological form in art making and the implications of these methods for design politics. Zittel, Saraceno, and da Costa continue the trajectory of the work of the Albers, Fuller, and the Harrisons. Each produces acts of design that engage closely with form to shape our perception of the world. Here, perception is the goal of practice—which is achieved through situated and embodied research on particular environments. Design and art are thus embedded into larger ecologies of practice; they utilize form to shape our experiences, and, to paraphrase Albers, open our eyes to our place in the world.

Achieving this perceptual shift requires deep interdisciplinary work not bound to conventional modes of practice. It is thus not enough to tack design onto the workings of art, or art onto design, as if they function independently. Instead, it is the act of recognizing how the two are always already implicated with one another that ties their activities to practices of the everyday, a site from which the work of the two can illuminate, engage, disrupt, and flourish.

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[269] Weber, "Designs for Living," 26.

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