LANDSCAPE IN THE INTERACTION ORDER

by

Zachary Caple

A project submitted
in partial fulfillment of the requirements
for the degree of
Master of Science
Natural Resources and Environment
at the University of Michigan
2010

Faculty advisors:
Professor Thylias Moss
Assistant Professor Dean Bavington

ABSTRACT

Landscape in the Interaction Order explores the concept of landscape as a product of heterogeneous human practices and the life activities of other organisms. I argue that conventionalized understandings of landscape as visually integrated scenes obfuscate the labor and myriad material and semiotic practices that produce "landscapes." As an alternative, I advocate that landscapes should be perceived as emergent outcomes of vast sets of practices and interactional happenings. By attending to these practices and interactions we are confronted with philosophical questions about the nature of social engagement, the operations of working bodies in political ecologies, and our responsibilities to develop livable worlds. In so doing, landscapes escape the fixity and background status of scenery and emerge as developmentally consequential relational structures that are of the utmost matter of concern.

Through this political and ontological reconfiguration of the landscape concept, I challenge notions of intentionality, the meaning of human engineering, and categories of nature and culture. This work prompts consideration of the importance of responsive collaboration (however asymmetrical) inside worlds of cultural and species differences that are necessarily flush with an infinity of non-living forces.

LANDSCAPE IN THE INTERACTION ORDER

ZACHARY CAPLE

Table of Contents

Foreword

In the summer of 2008, I spent six weeks apprenticing with Professor of Landscape James Hitchmough at the University of Sheffield to learn how to create aesthetically appealing meadows for vacant land in Michigan's shrinking cities. Though England has a rich tradition of naturalistic plantings, this genre of garden design is experiencing something of a renaissance as landscape architects and urban designers increasingly see the need for affordable, low-maintenance, critter-friendly urban greenspace. On the cover of this thesis, you see me assisting Professor Hitchmough with the mowing of one of his experimental meadows in a large urban park in Sheffield. The mower is not a conventional mower; it is an alpine hay cutter we rented and were trying out. Though this particular hay cutter's blades were rather dull, we found it could be a useful tool for creating the annual end of season disturbance these plantings require. What was perhaps most exciting that day was to see proof that Hitchmough's plantings provided the habitat value he avowed: snakes, rabbits, mice, and insects fled the meadow as we tore it down. In the face of the many kinds of ecologically destructive landscape practices proliferating around the globe, James Hitchmough is developing landscape typologies and practices that might make real differences for multispecies living in Britain and abroad. Today, two years later, I am just as interested in Professor Hitchmough's novel ecologies and the scientific and design research that supports them. I look back at my time in England, however, with a different set of eyes - eyes that have been shaped by the writing of this thesis and through my increasing awareness of the importance of ethnography. While there is no getting around the fact that my research and learning with Professor Hitchmough was utterly ethnographic in nature, I - at the time - was not aware of the possibilities of ethnographic writing nor that my experiences in Sheffield could exist as fodder, as data, for the speculative theoretical work my thesis amounts to. Though that summer I learned an immense amount about the art and science of naturalistic planting, I missed out on an opportunity to engage big questions of landscape change and re-design in a situated and particular context. Had I known about the possibilities of ethnographic writing upon my return to Michigan I would have produced a thesis that engaged much of the same content, but would have had the added advantage of worldly detail that would have given my thesis and thinking that much more texture and grounding. Hindsight, as they say, is 20/20.

Though my experiences in Sheffield do not explicitly form the content of my thesis, they have informed my writing in many ways. The first chapter of my thesis "Landscape Ontology and the Praxiographic Turn" examines landscape as the product of human practices. As I wrote this piece, I continually referenced my time in England in my thinking. Immersed, as I was, in the "behind the scenes" practices of landscape I wrote against a concept of landscape as a visual integrated scene in favor of a concept of landscape as alive and always in-the-making, structured and structuring, and variously inhabited and perceived. In order to ground my emerging understanding of landscape as a phenomenon of embodied human activity, I implicitly wrote against academic critiques of landscape as a visual technology and as a culturally inscribed text. Had I directly attended to my ethnography of Professor Hitchmough and his naturalistic plantings I would have not only found evidence for "the praxiographic turn," but I would have been

forced to contend with the fact that Professor Hitchmough develops his plantings to resonate with conventionalized visual grammars of landscapes. Though I argue that the aesthetic-semiotics of landscape are critical to a performance of power, by attending to details of Professor Hitchmough's research on the visual perception and social acceptance of his plantings, I would have been in a better position to attend not only to the dominant visual grammars of landscape that circulate among Britain's cosmopolitan park-goers, I would have been in a better position to understand how these visual grammars inform and constrain the landscape imaginaries operationalized in the making of naturalistic plantings. Indeed the plot we mowed that day was part of a study to assess local people's aesthetic valuations of the naturalistic plantings. Establishing the social acceptance (or mere tolerance) of the plantings is an essential step not only for determining what plantings will count as recognizable and appealing alternatives to conventional plantings and lawn, but is essential to establishing these plantings as typologies in their own right. In a sense, research in horticulture and environmental psychology come together to establish these plantings *as real and viable features of landscape.* By focusing on the particulars of Professor Hitchmough's work I would have been positioned to explore the ways sensorial experiences of landscapes figure into the economy and social life of built environments.

Had I been clued into the methods of ethnography during my trip to Sheffield, I would have worked to record other kinds of information. I would have, for example, set up my video camera to document my interactions with Professor Hitchmough as we struggled to learn how to use the alpine mower for the first time. By attending to the details of human action and communication I would have been able to observe the many interactions through which Professor Hitchmough and I coordinated our bodies and tools in a shifting division of labor. Questions of human interaction, semiosis, and ecological agency form the subject of "The Interaction Order is Ecological." In this chapter, I examine landscapes as an emergent outcome of semiotic and material interactions habitualized in human action. I argue that by attending to the semiotic and material particulars of humans navigating an environment they make meaningful through talk, action, and perceptual engagement. At the philosphical core of this chapter and others is the question of how technologies of meaning are mobilized in the making of our material surround. Just how did Professor Hitchmough and I signal to each other over the roar of the mower so that our work could properly unfold? With what bodily technologies of meaning did we transform the ecological structure of our surround? How did perception-saturated, embodied human semiosis enable the disturbance that displaced the snakes, rabbits, mice, and insects?

These kinds of questions radically challenge the textures and scales with which we conventionally think about landscapes. Moreover they ask us to confront serious philosophical problems of meaning and materiality and the relationship between organisms and their worlds. In "Walking as a Total Fact of Human Organisms" I attempt to destabilize organism/environment and meaning/matter dualities by confronting the ways in which cultural forms are maintained and reproduced through our ecologically situated bodies. I argue that meaning has a biological and ecological life and that to attend to "inscribed" cultural habits, we must attend to thick problems of ontogeny and

social life. These considerations are essential to understanding not only the ways something like a visual grammar of landscape can be reliably patterned (with variation) across a population, but is also essential to understanding the ways in which two adult human beings can coordinate their bodies to perform a complex task like mowing an experimental planting. Indeed to understand how landscape typologies and practices become durable requires that we understand interactions between humans in various stages of development operating in a material world (rendered meaningful through human use and perception) that operates as inheritance. Like walking, practiced landscape-making activities inhere in ontogenetically structured, culturally saturated capacities of the human body.

Though landscapes may be intellectually engaged as infinitely refinable processes that reveal the indissolubility of meaning and matter, they must also be conceived at more global scales. Indeed, landscapes are not conventionally conceived as the emergent product of fine-grain interactions for a reason: they take up space, they project out of the earth, and they do the work of containing human life. Landscapes are the stage and scenery of heterogeneous living and dying. Indeed the renaissance of naturalistic plantings in the UK has everything to do with global crises of biodiversity and livability. James Hitchmough's landscapes are compelling not only because they sustain a thick interactional matrix of plants, animals, insects, and human practices but because they suggest compelling strategies for re-vegetating large and damaged parts of the earth's urban surface. That blasted urban landscapes could support attractive meadow spaces that mitigate against depreciating property values while operating as habitat is a win-win for both human and non-human residents. In my paper, "Toward a Political Ecology of Central Florida" I explore questions of landscape production that cut across geographies and extend deep in time in order to demonstrate the many articulations between ecology and political economy. In this paper I work to understand the ways landscape is entangled in colonial and capitalist modes of production and the transformations in human and nonhuman worlds that result. Landscapes in the interaction order are always landscape steeped in history, saturated in politics, and alive to global connections. Landscapes are big and consequential. I conclude this paper searching for ways to conceive alternative modernities that can support multispecies living.

It is my hope that my reader will work - as I have - to see the many ways landscapes come together through articulations of human practices and the life activities of other organisms. While it has not been my intent to shortchange the nonhuman in my analysis - I do regret that nonhumans do not feature more prominently. I think of the beautiful specimens of plants that Professor Hitchmough has assembled from the world's flora to produce his plantings – the kniphofia, agapanthus, and purple coneflower: what stories do they tell? How do they operate as collaborators in the making of landscape?

It is my hope that my more creative essays "On Top of Slug Mountain" and "Forest of Failed Connection" reflect my sustained meditations of landscape as product of the life activities of plants, animals, and other nonhumans. "On Top of Slug Mountain" emerged from the prodding of Joan Nassauer to consider the possibility that intentionality marks a fundamental difference between human and non-human construction. I am grateful for

her suggestion, which in many ways pushed me to think critically and develop the ontology of human practices and landscape-making found in these pages. Though I ultimately cannot accept the thesis that intentionality marks a typological difference between humans and nonhumans, I cannot escape the preponderance of evidence that there is something real and different about *Homo sapiens'* capacity to transform environments. Perhaps this why "On Top of Slug Mountain" operates at once as satire and serious philosophical reflection – that seeks intellectual resolution at the same time that is founded on problematic (and parodied) ontological assumptions.

In *Landscape in the Interaction Order*, I have worked hard to develop a field of thinking that (or perhaps, more accurately, worked *to develop into* an organismic field whose thinking) might have applications for querying many kinds of landscape. Though I began this foreword with an apology for my ethnographic shortcomings, it is my strong belief that my future ethnographic work will build on the philosophical scaffolding developed in these pages. Lacking ethnographic contextualization forced me to swim (and – at times - founder!) in abstract waters, but I was never without worlds of landscape that anchored and, at times, set me free.

My deep thanks to Thylias Moss, Dean Bavington, and Joan Nassauer for their guidance and many hours of thoughtful conversation.

Landscape Ontology and the Praxiographic Turn

"Landscapes, plans, even material ordnance, are fecund masses of jumbled identity."
– Brian Cantwell Smith

This chapter is concerned with landscapes and the human practices in which they are entangled - the ways in which earthly surfaces get touched, remade, and folded in intentional human activity. It is also concerned with those features of landscape - the objects, surfaces, spaces, and organisms - that exist *between* practices, that have not yet been touched or appropriated, that possess some (temporary?) independence from the tentacles of our unending construction. But, of course, to make a delineation between objects of human practice and objects independent of human practice is not a neat affair: ecologies and landscapes are full of leaks and ties, cascades and indirect interactions, accidental touching and disturbance that fails to respect analytic distinctions. Landscapes are messy - which is undoubtedly one reason why we Americans seek to render them orderly and legible, why we elect over and over again to put up fences, create deserts of lawn, and deploy all manner of domineering technologies.

Of course, landscape practices are as much about taming people and their messy politics as they are about managing the non-human. Chandra Mukerji in her book Territorial Ambitions and the Gardens of Versailles tells the parallel stories of 17th century French imperial landscapes and the formal gardens of Versailles. Mukerji is interested in the ways in which gardens and the larger landscape are reconstructed and reendowed with symbolic significance to leverage empire. She emphasizes exchanges between military engineering culture and garden practices: "French formal gardens were constructed with complex grading like fortresses to embed their surface geometries into the earth. Their elaborate terracing gave the gardens an important and imposing hierarchical structure that was much more feudal than Cartesian" (Mukerji p. 39). Military engineering practices enacted in the symbolic topography of the formal garden established a theater of power and grandeur and an emblem of French identity and taste. Gardens were sites that ritualized and performed power so much so that they "seemed to ratify lawlike order, making it seem natural because it worked so beautifully on plants and animals." The formal garden borrowed technologies from military engineering but not merely for aesthetic and symbolic ends, the garden was simultaneously a "laboratory for the techniques of land control used to construct the territorial state. The very elements that went into building the garden were the ones necessary for the rebuilding the landscape to make it a politically marked and fortified territory that both enhanced and defined state power" (Mukerji p. 304).

Mukerji is able to show how ideologies and ontologies of power are dialectically enmeshed in the material and symbolic practices of landscapes writ large and small. Power is intimately enfolded in place and is mediated and assisted by a whole host of human and non-human actors.

In the pages that follow I will locate questions of landscape in a variety of texts – some of

which have little or nothing to say about landscape, but are engaged for their metaphysical content. I continue with a discussion of Bruno Latour's Politics of Nature and Valerie L. Kuletz's The Tainted Desert. With these two texts I examine questions of ontological framing and the politics that result. I argue that we cannot separate politics from metaphysics. What we take the landscape to be - how we frame it - informs how we re-fashion it and ascribe it function.

I engage with Latour first because he offers vocabulary that will be immediately useful. In the Politics of Nature, Latour systematically dismantles monoliths of Western culture - Nature, Science, Politics, and Morality - in order to bring about *political ecology* and the metaphysics of the *collective*. Nature and Society, he says, can no longer represent domains of reality. We are left, he argues, in a better position politically and metaphysically by attending to heterogeneous collectives – "associations of beings that take complicated forms – rules, apparatuses, consumers, institutions, mores, calves, cows, pigs, broods" (Latour, p. 21). The collective reincorporates entities from the annulled categories of Nature and Society and entities whose former metaphysical statuses made them incommensurable i.e. the categories of the natural sciences (genes, molecules, skeletons, etc.) and the categories of perception and representation (ideas, colors, diagrams, emotions, etc.). In this new metaphysics, science becomes a process of taking things into account (composing the objects that can speak within the collective) and politics becomes "*the entire set of tasks* that allow the progressive composition of a common world" (Latour, p. 53).

Latour discards whole metaphysical systems and the vocabularies that served them and in their stead introduces whole new suites of concepts that lack historical baggage and are thus capable of doing new metaphysical work. And I am sympathetic with Latour's program; yet, it is difficult to talk about unless you are inducted into the program and in command of the vocabulary; that is, unless you are fully reformed. All politics (even the problematic politics of today) requires that we communicate in terms that are available. Latour's message cannot be introduced to new communities without also introducing a suite of new concepts and vigorous re-education. Even if translation is available (which it is), Latour does not show us how to do this and he does not make translation a mandatory step in his program. He fails, like the Bush administration, to show us how to transition out of current political predicaments (though to Latour's credit, he has not got us in sticky political predicaments). The collective, as beautiful and necessary as the concept is, is too enveloped in a network of hieroglyphs that point to a worldview difficult to appropriate. Landscape, however, is a useful translational term. By re-politicizing landscape at the same time that we seek to install it with new metaphysical responsibilities, we have the opportunity to engage, confront, and greet the messy political problems of life-worlds and collectives. To re-politicize landscape is to activate conversations about landscape's composition and the typologies that human practices bring into being.

Let us practice this translational activity by examining the ways Kuletz composes Nevada's desert landscape with radioactivity, ecological theories, and Native American spiritualities. Kuletz begins by identifying a pronounced division between Euroamerican/scientific conceptions of the landscape and the conceptions of Southern

Paiute. The cultural and metaphysical discrepancies between these groups are magnified in political debates about the use of Yucca Mountain as a storage site for nuclear waste. Particularly important to Kultetz's political argument is that scientific conceptions of the landscape depend on cybernetic models of ecosystems that reduce the ecology and landscape to a circuit-like system of signs and calculable entities. "Mastering the signs (through calculation) translates to mastery of the environment." Westerners and ecologist impose a "functionalist order" onto the landscape. "Its associated terminology – power, energy, productivity, efficiency, and work – have likewise been naturalized within an ecological context, making possible the discourse on ecological economics and a managerial ethos in which control of these factors becomes the primary mission of environmental managers in the late industrialist capitalist society" (Kuletz p. 251). For the scientist, radioactivity from atomic bomb testing in the desert landscape – though it signals cause for alarm for human health – is transformed into an assay that allows scientist to trace the energy and material flows throughout desert food webs. Radioactivity doubles as pernicious element within the landscape and as a tool to make interactions between ecological entities visible. Yet, despite this need to render the ecological landscape visible, the scientists ignore native peoples, their claims to the landscape (turned laboratory), and their spiritually infused relationship to place. Metaphysical exclusion mirrors political exclusion. Scientists – according to Kuletz - in their effort to render the landscape intelligible excludes humans, ideas, and other actors into the world they gather – indeed it must be this way to enact their managerial programs. "By identifying Yucca Mountain as a wasteland we legitimate activities that turn it into a wasteland. When we fill it with high-level nuclear waste, our actions suggest a belief that the earth is inert (because we need it to be) despite our knowledge of its dynamism" (Kuletz p.287). In Latour's terms, the managerial scientists of Yucca Mountain patrol and police the collective for anything (data about water movement, ethical arguments, the claims of native peoples) that could subvert the political and material activity of creating a wasteland. Enemies of this collective activity are refused metaphysical validity (but not without friction!) and the practices aligned with this well-bounded and policed ontology are set in motion. And the landscape takes on new form.

Landscapes and Ontological Frames

To frame a landscape is to designate a unit in time, space, cognition, and perception; it is a metaphysical activity as much as one of everyday observation. It is an activity that necessarily entails attending to compositional features and their relationships. To identify features of landscapes (e.g. *organisms, ecological succession, transportation technologies, radioactivity, humans with strollers, soil, meadows, and formal gardens)* is to import and apply networked suites of meanings, associations, typological inferences, and metaphysical assumptions that give landscapes and their composite structures particular identities.

Landscapes, of course, do not come into being through a single act of framing but many – all the more reason to speak of dynamic ontological frameworks. Furthermore the perceptual/cognitive/ontological framing that does occur takes place in moving bodies – inside flesh and blood organisms that have particular needs that the landscape supplies or can be reconfigured to supply. The dynamic framing of the environment is intimately

related to what it provides. Landscapes are scattered with ecological affordances that perceptual systems of all species have evolved to be attuned. Organisms see the landscape for what it offers them – barriers, food, shelter, passage, etc.

J.J. Gibson in his work The Ecological Approach of Visual Perception asserts that perception is organized to reveal affordances in the environment related to the organism's changing pragmatic activities. Behavior cannot be explained as the secondary effects of raw sense data organized by conceptual schemes. Cognition, perception, and ontology cannot be partitioned from "the intentional movement of the whole being (indissoluble body and mind) in its environment" (Ingold 2000 p.166). Perception and knowledge cannot be distinguished from action.

Humans, however, have evolved/developed the capacity to construct alternative framings of the environment that have little to do with immediate ecological affordances; intellectual, philosophical, and aesthetic framings of the world, for instance, do not have the ecological urgency of frames that reveal predators or potential food sites. How can we account for the apparently ecologically liberated, disembodied frame of mind? The answer to this question lies in our talents in constructing niche. Embodied perceptual action enables transformations of the environment and reformulations of affordances. Our lucky species has evolved capacious minds, but minds that are intimately connected to bodily practices that engineer niche and the selection pressures that surround us. That we have created impressive conceptual and philosophical frameworks is not a testament to our ability to liberate ourselves from an ecological environment, but to transform it through a radical expansion of shared, embodied semiotic possibility. Mukerji:

> "Language provides one very powerful system for making thought social and constituting collective meanings, but it is not the only one. Meanings are also developed with the construction of monuments, clothing, or another other item of material culture. The crafting of the built environment is itself the locus of a kind of conversation. People look at the material results of their productive activities, and learn to see things in common" (Mukerji p. 326).

Meaning is not the currency of disembodied mental realms. Instead, meanings are embodied, situated, lived (and thus political), materially informed, and networked across all manner of message carrying technologies. Meanings are real players in real ecologies that are enfolded and unfolded within the landscape. Philosophy cannot be seen as separate from the armchair in which it is generated. There is no travel between human worlds that are distinctly material or distinctly of ideas: meaning and material are bizarrely infused. Speech acts perform semiotic and social functions yet have biophysical consequences. When I speak I not only add meaning to ongoing conversation, I change the carbon dioxide levels in the immediate atmosphere, my body changes the temperature of the room, my words change electromagnetic patterns in my brain and the brain of my addressee. We cannot trace all the physical consequence of a single speech act nor, for that matter, all the semantic change that could result. In the landscape, the relationship between semiotic content and its biophysical effects are even more challenging to

disentangle. Mukerji's text helps us appreciate this fact. Human practices continually reshape the semantic and biophysical, yet to trace human practices is not enough; we must also follow the consequences of our practices as they radiate out into other worlds.

Yet we must begin with practice. This is the lesson of Annemarie Mol's The Body Multiple. In this text, Mol traces atherosclerosis – an arterial disease of the leg – and its associated medical practices in a Danish hospital. She argues the disease entity and the bodies in which they are embedded multiply as they are coordinated and enacted across various human practices. "[O]ntologies are brought into being, sustained, or allowed to wither away in common, day-to-day, sociomaterial practices" (Mol p. 6). Mol cheerleads praxiography and directs a stake-in-the-heart move toward traditional epistemology that seeks single, totalizing representations of things in themselves. "Knowledge is not understood as a matter of reference, but one of manipulation" (Mol p. 5). Mol also launches an attack on what she calls the ontological pyramid around which scientists defined their disciplinary structure. At the bottom of this pyramid are small things (molecules, quarks and such) and at the top are larger, more complex entities (organisms, clouds, etc.). Mol argues that the ontology that supports this pyramid cannot accommodate the praxiographic turn – nor can praxiography accommodate the pyramid. Mol writes:

> "[T]he difference needing further elaboration is between versions of objects and the (science-related) practices in which they are enacted. If a disease like atherosclerosis is more than one, it becomes relevant to ask which one "it " is made to be. Which one of its various versions is enacted at any specific site or in any particular situation? Is it an X-ray picture and the atherosclerosis that encroaches the arterial lumen; or is it a patient history and the atherosclerosis that gives pain-on-walking?" (Mol p. 159).

Mol is right to locate atherosclerosis inside the practices in which it is enacted, yet is also necessary – at times – for atherosclerosis to be *of the legs. To be a thing (almost) unto itself.* To do otherwise would close down the possibility of practice - atherosclerosis at the physiological level would become a black box. I say this with out wishing to revive the specter of epistemology, but to demonstrate that *things unto themselves* are merely *frame effects*. Zoom out from the atherosclerosis in the leg and you are back to practice, zoom out even further and we are located in the strange landscape of a medical campus. It seems in Mol's universe we have only one of two options 1) bracket philosophy and everyday attention around practices or 2) revert to a world in which practices are relegated to background for *things in themselves* to take center stage. This is a false choice. Our frames are too polymorphic, can be layered on and adjusted across too many configurations and surfaces of existence, can be infused with too many possibilities for organizing and making sense of reality. To only trace entangled objects and practices, we risk losing sight of that which is not entangled, that is adjacent or merely co-occurring, that is indirectly affected, and that could one day offer resistance or be casually obliterated. To look outside of practice is part of what is required in gathering candidates for collectives.

Conclusion

Human landscape practices (landscape architecture, gardening, landscaping, landscape planning, etc.) cannot be abstracted away from the object of landscape. The French formal gardener is intimately enmeshed in the garden from which he – for aesthetic reasons – is asked to disappear. Practices of all kinds are forced into hiding. If we follow Mol's move and bring practice into the foreground, follow Latour's move and bring it into the collective, then perhaps we will have an opportunity to have intensely public political conversations about what practice and landscape can become, about what it would take for them *to become good*. As human infrastructure encroaches into the ecological, life-sustaining entanglements within ecologies get fewer and fewer. Our ontologies, practices, and material lives must be continually reworked until we can find a way for this to be otherwise.

On Top of Slug Mountain

It is time more than ever to examine the particles of Intention, to examine the arbiters of will working in conjunction to form a semblance of *can do* and *let's proceed*; particles that are central to this ad hoc and utterly inadequate theory of mind (all will have to be revised) that supposes Consciousness and Intention so as to better distinguish human from non-human acts of creativity: a theory of the beaver dam awaits!

To mean is to be human and to be human is to believe in particles. If we are to dissolve everything into its atoms, we must dissolve Intention into its elements, reduce it to its fractions of sign and electricity - dismember it from its accomplices of arms, legs, and nerves only to reassemble them - Frankensteinlike - so as to appreciate how the particles of Intention are simultaneously a net.

To suppose consciousness and intention is to accept them as legitimate composites: as sub- and superstructures built in a world of variable mathematical dynamics. (The math is very complicated, but will inevitably greet the mathematics of slug.) To be handled as particles of reality, intention and its associates - representation, consciousness, innate structures for learning and perception, etc. - must be handled as facts of realities that meet, touch, and interact. These realities are differentially produced, maintained, modified, split up, and re-aggregated, repaired (as with gluons) - not to mention differentially experienced, interacted with, and rendered meaningful. Intentions are (particulate facts) of realties on the move, realities of a still more complicated molecular-mathematical structure. The interactive architectures that mediate intentions and realities are explored in this text, but first I must deliver on my promissory note to produce a(n) (ad hoc) theory of the particulate structure of Intentionality.

The Particulate Structure of the Forest of Neurology

The particles of intention, like everything, are hierarchically composed. Intention's particles are wrought of lower order neural-electrical swarms whose particles' precipitates are nets (of nets of nets) undergoing geometrical transformations linked across mental and physical divides across which dissipate hard distinctions between biologicality and the molecular structure of signs. The particle is both a node and link within the net (of nets of nets) of energy and matter and simultaneously a fraction of a sign whose meaning is (but not a complete or total *is*) the tissue of nets and a subsection of the swarming pattern thereof. The sign is electricity and electricity representation. Consciousness and intention are focused in the structured and differentially energized neural-cognitive matrix whose outer limits are the interior surfaces of the skull. The skull bounds the mental like a firebreak curbing a consciousness that if otherwise unconfined would spread dendritically into atmosphere in auras of its branching. Instead the neural-cognitive matrix is forced into billion-fold foldings of its arborescence resulting in neural tangles and knots – concentrated loci of brain stuff in which one finds the reactions and interactions that results in the agitates around which form the kernels of intentionality and intentional behavior. Praise for the skull. Branches of swarming branches are wrapped into, folded onto, and molded by their own presence and generate - in the complex

alchemy of touch - the kernels of representations, intentions, and emotions that ride the brain's waves.

To summarize, the briars of brain waves are generated in the electrical-representational storms out of which Intention precipitates. The brainwaves obtain their generative interactional densities because the skull compresses neurological action into knotty tangles out of which intentions crystallize. From these crystalline centers, Intention branches into a meshwork slurped into the orbit of the conscious mega-particle called ego while simultaneously bifurcating into braids that tangle with the bodies locomotive instruments. In so doing, the tooled or untooled extremities of the ego become servants of Intention's swarming arms.

The Mind as Evolved Echo-Chamber

To produce an image of the brain or its particles (an act of intention itself requiring its own particles) generates a nebulous particle of the brain in the brain ad infinitum. The human brain is infinitely nestable circuitry of particles. The image-brain inside the brain is lashed together umbilically - nurturing and potentiating a reservoir of intention-particles in particlespace. That is, as the brain holographically supports its own image-molecule - conceiving of self within the self, brain within its brain - it multiplies its neurological reserves as if entering an echo chamber. Through this self-reflection, there is a certain swelling of mindspace and associated physiological development. Ontogeny recapitulates phylogeny. And man - having been selected for the capacity "to know thyself", to enter over and over again the Temple of Delphi as a way to open windows into (imagined) futures circumventable by way of the gathering of Intention(s) into (collective) action - has transcended beastly status. The worm does not imagine its own wormliness and is therefore restricted to the (evolutionary) paths of a two-dimensional creature. Man - unlike the worm or slug - is the beneficiary of *divine mutation* of his genetic structure that produced the proteins that built the first particle of mind that conceived of mind. Over the course of evolutionary time and the individual's life cycle this particles of mind conceiving mind have generated storms of electrical-representational activity that - in collisions - produce wavy nets of particles and subparticles of thoughtmeaningemotion that enlarge the range of reflexively managed capacities of the human megamolecule.

In these storms of self-reflexive action, Intentions crystallize and are made actionable (secreted), absorbed, stored in a queue for contingent future action. Memory stabilizes the particles – they can degrade! – and orders them inside the nebulous matrix of the brain-body macromolecule until the moment in which they become meaningfully actionable whereupon the particles dehisce and become electro-mechanical nets that co-opt the sinew in which they then become ambiguously braided – arms, legs, and the head on its swivel get recruited in the tangle, become the neurological braid: become part of the materially enacted sign fractions that were consolidated in the particle core. [This is a refreshing piece of FALSE INFORMATION.]

When the intention particle codes for a piece of speech the particle unfurls and unleashes electro-mechanical nets of language that travel through the air like a football or frisbee

turned floppy disc (that restructures a slice of a soundscape) that reach their intended recipients (the ear a perfect mitt) (as well as the mitts of ratified and unratified eavesdroppers) then goes into the ear as wavy mesh of sound that wraps around the organs (octopus-like) of the inner ear that is an evolved branch of the neural-cognitive forest. It is in the flesh of this connection that sound is converted into code whereupon it is promptly decoded which unleashes a storm of neurological activities in the hearer who begins - in the vast architecture of materialsemiotic consequence - to precipitate nets that set off storms that generate particulate intentions that further the chemistry of appropriate response. This is the beginning of a theory of conversation or, more precisely, *the embodied dialogics of the interactional chemistry of intentions.*

Having firmly established the particulate-net structure of intentionality as an emergent outcome of electro-representational storms within the skull, it behooves me to move to still larger questions of the evolved significance of intentionality. Much as plants have evolved various forms of photosynthetic apparatus to harness energy from the sun and thus maintain a foothold with the competitive circus that is life on earth, so have human beings evolved intentionality within a repertoire of thoughtmeaningemotional capacities. Intentionality is man's photosynthetic apparatus that allows him rather than capture light for life, impose designs on life as way of capturing energy for his sustenance and survival. In what remains I will attempt to account for the evolved significance of intentionality.

Monumentality and the Holocaust of Salt

Dear reader: I provide a reminder that this essay is forged out of a flawed and ad hoc theory of mind; ontological irony and play rule the page. Moreover, the condition of all thought (and writing) is structured in contingency and subject to entropy and therefore operating with some amount of randomness however much it may be conditioned by already constituted frameworks of meaning; thought may take general, recognizable forms, but it is always produced on the fly in circumstances that are novel but for which the habitus is differentially conditioned. And so, this thought – like all thought and the theories that inhere - must be taken with a grain of salt or, better yet, several: cubic crystals of sodium chloride that if spilled (in the literalization of the idiom) must be tossed over the shoulder – that is, if superstition is given access to the architecture of the moment. Salt that if thrown will end up on the floor or on whatever furniture (to evoke both the conventional sense of furniture and the Gibsonian sense) in which salt's path terminates. Salt traveling distances proportional to the energy with which it was tossed (provided there are no barriers to the ballistics): salt grains tumbling stochastically from their predictable arcs into low energy monuments.

A certain pelting of salt that emerges out of an undeniably complex interaction of: arm, will (and its nebulous particles), and superstition: components that it can also be said to have interacted to make the monument and what the monument monumentalizes. In the tossing of salt, arm and the arm's habits, the will, and the salt are coordinated and conjoined in a dynamical configuration in which the subject (tosser) joins with the object (salt) in the unfolding reach of the Intention's particles that summarize the toss and its meaning in idea prior, during, and after the event - particles undergoing transformation as

the event unfolds. In the reach and toss of the arm, the arm-hand-shoulder complex articulates with salt and in so doing temporarily grafts *subject into object and object into subject* in an ephemeral cyborg of salt. (Intentionality transforms the components of the event structure in the same way that electricity passing through a wire changes an electromagnetic field.) The field of objects and subjects is temporarily re-organized in the field of intentionality so as to engineer luck in a world (read fitness landscape) partially structured in flux and contingent happenings. In the tossing of salt, luck/fitness may or may not change, but the (micro)texture of existence surely does as tossed salt slides into the conveyor belt of present moments. The landscape of the floor and the landscape of pastpresentfutures are forever altered.

Now begin to image the microcosmic landscape in which a cube of salt becomes a pyramid of human achievement: an achievement, however, that was a byproduct of an act intended to construct luck. Some will say that the construction of the salt monument was unintentional and is therefore disqualified from obtaining the status of monument. Some will say that, but it is important to note that their saying that it is non-monument has the effect of making it a non-monument. In any case, as a narrator of the event (operating from some position in scenespace) *I am in a position to declare the salt a monument.* The salt, after all, cannot declare itself to be a monument, nor can the tosser for whom the act of tossing salt was saturated in the ritualized meanings of luck (not monument) production.

For salt to become monument requires two intersecting performances of salt: 1) the tosser of salt must expend energy-meaning to reverse the karma of spilt salt and 2) I, as narrator (operating in a different region of meaningspace), must expend the necessary energy-meaning to transform salt into monument. The meaning of salt, therefore, is produced and inhabited in a patchwork landscape of practices in which energy-meanings are deployed. Depending on your position in meaningspace, the salt is either monument or material for luck-production. In the case of salt as means for luck production, salt's meaning becomes "used up" once it hits the floor and becomes mere materiality. The salt exits the field of meaning produced in the ritual, but it does not exit all fields of meaning. As the salt becomes mere salt, it enters *the field of meaning of mere materiality* - a frame of meaning surrounds the crystals of salt that establishes it as mere, as chemical, as brute matter. As salt exits the field of superstition, it enters the field of meaning of things-in-themselvesness. Yet the frame around the object that invests it as mere materiality is nonetheless a semiotic cage. *The salt still has social life and as such has the potential to be monumentalized.* Phenomena do have their alone times (like a small child sent to "time out") albeit it is alone time that is always situated with some social life - most minimally the social life of the floor.

A question remains: does my declaration of salt's monumentality (from my position in narratorspace) sufficiently establish salt as monument? Must I necessarily specify what the monument commemorates in order for a monument to come into being and persist as monument in the conveyor belt of present moments? For the meanings of monumentality to sustain monumentality, how must meaning be structured in the differentially active and highly degradable substance-field of the social worlds of human megamolecules?

The monumentality of an object flickers in and out as "monuments" are drawn in and out of the meanings of monumentality structured in the semiosphere. For an object to become a monument it has to be drawn into the semiotics of monumentality which have everything to do with the linguistic performances that make structures monumental, the grammars of landscape in which structures (read furniture) are positioned and oriented relative to other urban structures, and the maintenance of the social practices that allow monuments to be read as monuments. Monuments are less about public meanings than they are the semiotic structure of social life.

There is no doubt that there can be monuments of one: as a maker of speech acts I have the option to privately monumentalize tossed salt. These private significations are built over an organism's lifespan and are quite common though without cartographer. I also have the opportunity to publicly declare salt as monument though I recognize I work against the grain of the semiotics of monumentality at the very least because of the miniature status of the objects I wish to imbue with commemoration. To monumentalize miniature objects it to violate a grammar of landscape. Yet a logic sustained in the meaningspace of this text gives justification to my monument-making. That said, my monument-making may be interpreted, by some skeptics, as a kind of lunatic performance. Salt - for the skeptic - may fail to acquire the status of monumentality (the grammar of monumentality not fully satisfied), but the skeptic's meaning of salt is is necessarily transformed by what he see to be my failed performance of monument-making. In other words, the frames that sustain the meaning of salt takes on complicated valence operating in the meaning produced in his skepticism, salt as matter of crystalline identity, and my failed-performance which might make for him something like a quasi-monument of salt.

Slug Life

Let us, for the moment, suppose that luck can be constructed through the throwing of salt over the shoulder (leaving universes of floor populated with monuments that are never experienced as such). By 'possibly constructed' I mean that the tossing of salt increases the statistical possibility of the Good reaching and rewarding the tosser of salt. (We recognize that the superstition of tossing salt over the left shoulder exists to neutralize bad luck generated in the spilling of salt, but let us suppose that this is achieved through the following mechanism). First posit that the Good is a cosmic force that permeates space and operates in the ecological order: it can travel across its Platonic remove, permeate the porous boundary of the cave, and enact health, well-being, attractiveness, fortune, etc. on the tosser of salt who does not, in that tossing, construct monuments of salt to honor the Go(o)d despite all that the Good the tosser wants the tossing of salt to deliver. In any case, monuments of salt may require too little labor (and suffering!) to iconize the grandness of the Go(o)d.

Now let us reject the possibility of luck and in doing so return to the language of fitness. The throwing of salt does not increase the fitness of the tosser (despite his or her desire to have it do so), but it does change the (micro)ecological surround. The act of throwing salt does make a modification in an environment in which the thrower and other organisms

are immersed. If the floor is a sheet of ice, the salt decreases the coefficient of slickness (the momunents merging with ice forming monumental slush), which changes the landscape of footing, changing the statistical landscape of broken hips. The salt thrown for luck in a landscape of ice has reconstructed the fitness landscape of the tosser and for all those for whom decreased friction constitutes a positive affordance. The throwing of salt changes the heterogeneity of surface and increases the range of what can be experienced. But with this increase in heterogeneity and loss of slickness can we assert that there is an absolute improvement in local safety? Does this change in microenvironment incontrovertibly constitute a positive amendment for all those populating this environment?

Let us consider two possibilities: you are on foot wearing footwear with moderately normal rubber sole. A more tractable island within a sea of ice can offer a moment of greater assured footing. Contrariwise, if one is moving across a sea of ice without any expectation of tractable islands, then one will condition one's movement for a landscape of ice. Encountering friction with the expectation of frictionlessness may trip up the coordination of the body leading to bruised bodies. Empirical tests are required. Unsuspecting victims should be looked at. Suppose there is a decrease in the number of falls when a traveler perceives the islands of tractability prior to encountering them and that the number of falls increases when a traveler does not perceive the islands. A theory of risk is entangled in a theory of perception.

Suppose now that there are slugs inhabiting the icy landscape. Slugs + salt = slug deterioration → slug mush restructuring the surface's furniture. Salt changes slug population dynamics and movement within the landscape of ice, slush(y corpses), and salt. Let us suppose that salt is scattered across a population of slugs in an icy landscape with scarce resources. Salt entering the equation equals certain death for some percentage of slugs, which changes the structure of good and bad luck within the system of survival. Some % of Slugs x'd out = greater resources for slugs surviving the holocaust of salt. Salt = death for some = negative affordance, but positive affordance for others (with the competition of resources lifted) - though we haven't taken slug mourning into account, the spirals of slug suicide that could result. The narrated monuments of Go(o)d carving out a need for the monuments of Death.

Let's continue the anthropomorphization of slugs (as if a cyrstal of salt as meteorite could slam into slug genetics leading to mutations that produce proteins of mind) as we imagine slugs laboring to produce a monument of salt to honor, index, and iconize an essence of salt. But, still, here, grant this other possibility: that the slugs build not a monument, but an actual God (now longer Go(o)d) - a God that has the power to strike at any moment to enact his wrath of crystals. But to engage with the materiality of monuments of salt, the slugs must risk direct contact with that which would transform them from slug to sludge (salt affords that kind of transformation) - and so the slugs must risk death to forge an idol of the Deathmaker. Having been blasted with the quality of mind, the slugs invent a prophylactic to handle the matter of God which is wrapped tight in the morality of cubic secret. Given their unbelievable access to God, it is only right and fitting that the building of monuments should require so much hazards - so much risk to physical identity.

In the architecture of so much loss, the social life of slug sorrow is rehearsed as theories of God's plans crystallize in the air of speech. It continues to snow in a landscape dive-bombed with crystals.

Slugs maneuver the world.

The salt's face holds a mirror - christening in that detection - an image:
a halo of doubt.

The Interaction Order[1] is Ecological

"Every speech act and, more generally, every action, is a conjuncture, and encounter between independent causal series." – Pierre Bourdieu

"Any complete account of speech and language requires an account of how the mind/brain relates the organism to reality" – John Searle

Linguists and social theorists that identify social structure as an emergent feature of face-to-face interaction often give passing attention to the ways various materialities pervade the interaction and give it shape. When problems of materiality are addressed, they are often handled in discussions of context that make neat partitions between text and context, language and materiality (Goodwin 2000, Irvine 1989). While it may at times be useful to adopt binaries of this kind to focus attention on the discursive dimension of the interaction, these approaches ultimately prove inadequate for exploring the ways in which embodied interdiscursivity is enfolded in material practices and only moderately productive for examining the ways in which the material surround (that is continuous with participants' bodies) is implicated in semiotic interaction. Approaches that point solely to the way material dimensions of context are drawn into discourse through deixis (the use of terms like *here, there, you,* and *me* whose meanings are dependent on the context of the utterance) often miss out on the fact those same features - if they are of the right scale and proximity - may be physically approached, handled, and modified as they are talked about. That is, as we talk about *this* we may be also tactually engaging *this*.

Deixis serves as critical hinge between discourse and material practices as it enables participants to mutually orient themselves to features of context with which they can go on to physically and/or psychically interact. Deixis is creative in both a discursive and material sense (Hanks 1992). As features of context are deictically drawn into perception and talk, participation frameworks are reconfigured; perceptual/cognitive/semiotic fields are redefined; discourse trajectories and content are reshaped *all at the same time* as participants use their bodies, adjust their hexis and orientations in space, and alter their immediate physical surround. The changing material context that is registered by participants may become meaningful irrespective of whether or not the context is indexed in speech: material context becomes meaningful in as much as it figures into situated activity. But upon being indexed in realtime interaction, the material context enters into the traffic of the indexical order whereupon it can take on a more complex presence in the unfolding social space (Hanks 1992, Silverstein 2003). In speech, perception and action, the material context is critical to the interaction order.

[1] The "interaction order" is a concept developed by sociologist Erving Goffman to denote the ways recognizable forms of social engagement and behavior emerge in face-to-face interaction. In this piece I not only work to understand the linguistic and bodily semiotics of situated social activity, but also to establish an understanding of how semiosis implicates and transforms the materialities that pervade local action space. This, as I see it, is critical to understanding the production of landscape.

In the course of this paper I hope to problematize material and semiotic divisions and to demonstrate that human interactions are best conceptualized as indissoluble bundles of embodied semiotic and material practices of diverse kinds and not as events that operate on distinct material and semiotic planes. It will be useful to speak of discursive-material practices while keeping terms like *material, semiotic, discursive,* and *physical* on hand as useful – albeit problematic – categories. I also hope to demonstrate by entangling a sociology of technology in the sociology of language one is in a better position to attend to the ecological dimensions of human interaction. Language and technology are used to navigate a world of changing affordances that are outside human control. They are, of course, also used to construct affordances into the world that have differential ecological, social, and functional effects for humans and non-humans alike.

Perceiving and talking about affordances makes them actionable

Perceptual enregisterment of material context is a semiotic event that precedes deixis. For an object to become meaningful in talk and action, it must first be recognized by one or more participants in perception. This act of recognition is semiotic: the object within the perceiver's perceptual field is structured by a network of presuppositions that yield - among other things - notions of the object's identity and its affordances (i.e. its positive or negative ecological values relative to the perceiver). Which is not to suggest that meaning precedes perception structuring it from the inside out, but that perception is itself a semiotic activity. This is the position of environmental psychologist J.J. Gibson who developed, what he called, an ecological approach to visual perception. Gibson rejected the notion that visual perception results from a re-organization of visual stimuli by cognitive schemes, but instead proposed that perception is structured within organisms such that they can become aware of affordances in their environment. In "ecological physics" values and meanings inhere in objects relative to the organisms that live in and remake their environments. "An affordance is neither an objective property nor a subjective property; or it is both if you like. An affordance cuts across the dichotomy of subject-object and helps us to understand its inadequacies. It is equally a fact of the environment and a fact of behaviour" (Gibson 1979).

Edward Reed argues that sociality emerges through the recognition and communication of shared affordances. He writes "Interaction occurs when two or more agents realize affordances in a *mutual* way, so that each presents acceptable affordances to the other (predator hides from prey, and vice versa; potential mates look attractive to each other; etc.), but in socialized interaction the agents' relations are further constrained by the perceived need to present proper affordances to the other" (Reed 1988). Reed has, unfortunately, reduced sociality to custom that overlays an ecological order, but he is correct in establishing it as the embodied perceptual activity of organisms constructively engaging their environment. An ecological approach to perception (and by extension communication and sociality) is essentially pragmatic. Perceptual activity and the perceptual field of participants attuned to information that has some bearing on the practical activities in which human beings are immersed. The object in perception indexes its own affordances and evokes denotative-connotative architectures forged over the perceivers' life spans (relevant and sometimes irrelevant to) the situated activity. The perception of an object varies from individual to individual, but for certain activities and

discourses to occur (and certain indexical entailments to emerge) the participants' semiotically structured perception of the activity and context must overlap (to some degree) or the overlap must be created over the course of the interaction. Moreover, participants must be oriented in space such that their perceptual fields appropriately coincide. Relevant disjunctures between participants presuppositions and perceptions are often repaired (meta)pragmatically as when a parent supplies a set of meanings and understandings for a child to index as they learn about (and live with) a new feature of their world or when an individual uses pointing gestures to redirect the attention of a companion.

Material features of context enter the indexical order through deixis as they become relevant within the changing pragmatic activity of the participants. Which is not to say that features in a perceptual field are always pragmatically or ecologically structured, but to become figural demands the sustained attention of the perceiver which will only occur if the feature is relevant to the ecological, social, practical, or intellectual concerns of the perceiver. The extent to which an object becomes figural either in perception, speech, or cognition marks the extent to which it is an immediate affordance. Once a feature becomes relevant with reference to a situated pragmatic activity (i.e. becomes an affordance), it becomes more likely that the feature will be drawn into dialog (or monologue) *and* the tactual space of the perceiver whereupon it becomes actionable (Hanks 1992).

Goodwin (2000) examines ways a hopscotch grid is visually structured in the semiotic field relevant to two girls' skirmish regarding a particular play. The grid is indexed within the speech and the pointing of the participants. As it becomes visually available (as a consequence of the pointing) the grid is incorporated into the larger semiotic fold of words, gestures, and the changing orientations and gazes of the participants. The grid as it enters both participants field of vision "is now in play as a relevant semiotic field implicated in the organization of the actions of the moment in ways that it wasn't a moment earlier." Goodwin asserts that a theoretically rich treatment of discourse and the action in which it is enfolded requires attention not only to changing language structures, but to the diverse semiotic resources deployed by participants at a given time – resources that include the participants own bodies (movement, gazes, gesticulations, etc.) and the material surround.

It is important to acknowledge that the hopscotch grid structures the event by offering an institutionalized set of uses and terms for participation (that may or may not be respected). The hopscotch grid, to use the language of environmental psychologists, *affords* a literal and institutional frame for playing hopscotch that remains active and referable even if the game goes awry. This is to say the game does not have to be played correctly to have a meaningful presence in interaction. The hopscotch grid is a material-semiotic technology whose designed affordance is indexically refracted in the unfolding local action space in as much as the participants engaging with the grid share the (codified) meanings and rules of use associated with its structure and give them creed in the moment of engagement. In as much as the grid affords a framework for interaction, it also affords a set of structures for making social meaning: winners and loser, cheaters and

honest players, and feelings of adeptness and ineptitude are made in the interaction. The game also affords the possibility of physical injury through a misstep or an altercation that gets out of hand. When participants engage in a game of hopscotch they are opening themselves up to the vast social and physical possibilities the game affords.

Silverstein writes: "Micro-sociological contexts are in a sense composed of a dynamic structure-in-play of [macro-sociological] categorial distinctions. And indeed, interactional happenings are social-actional 'events' of (to a degree determinately) interpretable cultural meanings only to the degree they 'instantiate' – indexically invoke – such macro-sociological partitions of social space, in terms of which cultural values can thus be said to be indexically 'articulated'" (Silverstein 2003). The material dimensions of micro-structural interactions that are semiotically operative in perception, action, and discourse obtain their meanings through, what Silverstein calls, *n-th order indexical projections* (i.e. the indexing of meanings accumulated in past speech in present speech that create the rich textures and various valences of talk). The participation frameworks that coincide with urban spaces (the kinds of talk and action that can occur in grocery stores, parks, hallways, etc), the perceived affordances of technologies (and non-technologies), and the rules of use associated with an object are manifest in higher order indexical projections. Realtime interactions with non-humans (re)produce both essentialized meanings and interaction-specific meanings that emerge through use. These meanings overlay and intersect. A vacuum cleaner (an assemblage of plastic) indexes "vacuum cleaner-ness" and procedures of its use at the same time that these meanings interact with an individual's associations about vacuum cleaners and the meanings that are produced at the moment of sweeping the floor. The machine's iconic value (the ability to recognize it as a vacuum cleaner and not an assemblage of plastic) is continuous with a user's notion of use which form its "already constituted framework of semiotic value" (Silverstein 2003). These pre-existing meanings are essential to the execution of the task and are thus implicate in the embodied knowledge associated with its use. The meanings that emerge over the course of the task, for example experiences of frustration or satisfaction, are often projected into the task of sweeping and back onto the object itself. Also important to consider are the ways in which the material object figures into higher order indexical projections and become emblems of macro-categories (Silverstein 2003). The assemblage of plastic can become an icon of the vacuum cleaner itself but can also evoke stereotypes of working class cleaning ladies. The assemblage of plastic is in no way semiotically neutral.

That we associate technologies with rules of use and macro-sociological categories is evidence of their semiotic status. Materialities of all kinds - urbanisms, architecture, mundane technologies, clothing and accessories, and the body itself - are indexically structured material signs that specify affordance, behaviors and participation frameworks, social values and meanings. The participation frameworks evoked by materialities and technologies (and reproduced through use) are bound to be varied while often rigidly adhered and policed. Despite the rigidity with which they are adhered, people continuously break frames and create new ones as anyone observing adventurous skateboarders reinventing urban plazas can attest. Materialities and their meanings are

continuously being shuttled into and out of discursive-material practices and are transformed in the process.

Having established semiosis as a (necessarily material) means to coordinate affordances and the management of situated activity, it is also worth mentioning that a great deal of talk and action is devoted to labor structured to enlarge semiotic capabilities. Students of landscape architecture go to school to learn to render (certain kinds of) ideas in the visual and presentational paradigms of the field. Over the course of their studies they are talking, moving, drawing, and shuttling and back and forth to the arts supply store. Over the course of many design exercises and conversations with peers and professors they develop a set of semiotic skills (and obtain a degree) that enable them to go out into the world and enact that specialized set of discursive-material practices they've learned. "Signification, the social creation of meanings through the use of formal signs, is then a practical material activity; it is indeed, literally, a means of production" (Williams 1977). The labor we expend constructing technologies (both in and outside the body) that expand the repertoire of representational practices is considerable. At the material level, it requires technologies for making inscriptions, bodies to do the work, media of all sort, and infrastructure for transporting documents in time and space. Meaning generation is in an intensely material undertaking.

While I have identified several ways the material context becomes semiotic in situated activity, it is worthwhile to recognize that not all materiality that saturates the activity is semiotic. Indeed the physiological and neuroanatomical processes out of which speech emerges is composed of biological materials that are non-semiotic in character and which largely operate below the threshold of awareness. Non-semiotic materialities pervade the surround and structure the interaction "from behind the scenes." Awareness of the role the materiality is playing in the situated activity (or anywhere else) changes its semiotic status, but does not necessarily entail its actionablity. Irrespective of an object's semiotic status, it is operating and interacting in a field of material causes (that themselves maybe informed by one or more process semiotic happenings). This is invariably true for stars and planets that have been rendered semiotic in astronomy and astrology but whose dynamics are unaltered by their status as signs. This is not true for shrubs or flowers that are landscaped to perform a certain aesthetic and satisfy ideas of neighborliness. In the case of gardens, material causes are less neatly isolable from semiotic causation. Semiotic causation is less easily rendered isolable from material causes because the sign is always materially constituted and is structured by organisms. Yet it may be said that the semiotic event has more causal vectors than a material event because it is operating both semiotically and materially. When technical problems emerge in a theater production, the material causes become semiotic as they are sorted out in talk and action by technicians.

Material Underpinnings of Speech Events

Bauman and Briggs (1990) criticize anthropological and linguistic approaches to performance and poetic acts that reify artistic uses of language and neatly bracket them from other forms of discourse and social life. They insist that performances acquire their social meaning in complex social milieus and not merely from "context-free propositional content" of self-contained performances. They argue that understanding the

social function of texts and performances requires analysts to examine the ways in which participants index relevant features of the performance in diverse semiotic interactions. Bauman and Briggs write: "A given performance is tied to a number of speech events that precede and succeed it (past performances, readings of texts, negotiations, rehearsals, gossip, reports, critiques, challenges, subsequent performances, and the like). An adequate analysis of a single performance thus requires sensitive ethnographic study of how its forms and meaning index a broad range of discourse types, some of which are not framed as performance." Bauman and Briggs appropriately situate performance inside a messier sociology and discursive space and emphasis the importance of indexicals in reshaping available meanings and the social forms in which they are realized. Yet Bauman and Briggs seem to forget that in addition to past performances, readings of texts, negotiations, etc. there are a host of material practices that must be undertaken (and that depend on still other kinds of speech) to construct a performance space, render it operational, and contribute in non-trivial ways to the semiotic and aesthetic display. In Western theater these are practices that produce props and scenery, take audience members to their seats, ensure that lighting effects are executed in proper sequence, and costumes are constructed to create the right semiotic effect and to fit the performers' bodies so they can move in accordance with the demands of the performance. A robust ontology of performance must take these practices and their implicate materiality seriously.

The work of gaffers, for instance, requires complex coordinated maneuvers that cannot be straightforwardly categorized as discursive, technical, or of the body. Bodies are always in play as lights are turned on and off, directed, and filtered; tacit and explicit knowledges are continuously in play, negotiated, and rehearsed among relevant parties; and technologies of both mundane and sophisticated kinds permeate the activity allowing the gaffers to illuminate the stage, but also to hold up their pants and modulate body temperature. There are no human activities that are not technologically contingent, of the body, and structured in socialized cognition (Hutchins 1995), which is to say material and discursive practices are never enacted singularly, but are formed in indissoluble chains of happening the cut across human bodies, diverse discourse types, and non-human presences.

It is perhaps not altogether strange that sociologists of language like Bauman and Briggs and Erving Goffman do not plunge into the material dimensions of human semiosis: language is sufficiently complex to warrant life long attention. However, it seems a little odd that sociologists of language repairing the legacy of structural linguistics explode the very possibilities of language as a disembodied, internally consistent symbolic system, but fail to fully situate it as a system of lived, material worlds. While for many analytical approaches it may continue to be appropriate – methodologically speaking - to silence the material dimensions of the interactional order, it is time, I think, for materialities to be taken out of the analyst's backstage and situated alongside the diversity of discursive and semiotic practices that they pervade and with which they variously merge.

This move to establish the discursive, material, and biological as enmeshed features of earthly existence is consistent with Bruno Latour's project in the Politics of Nature. In

this work, Latour seeks to repair the intellectual and disciplinary divisions the have emerged around reified categories of Nature and Society and develops the notion of the *collective* as an ameliorative. Collectives are "associations of beings that take complicated forms – rules, apparatuses, consumers, institutions, mores, calves, cows, pigs, broods" (Latour 2004). The collective reincorporates entities from the annulled categories of Nature and Society and entities whose former metaphysical statuses made them incommensurable i.e. the categories of the natural sciences (genes, molecules, skeletons, etc.) and the categories of perception and representation (ideas, colors, diagrams, emotions, etc.). In this scheme language, materiality, bodies, and ecologies are scrambled together making it impossible to attend to any one "plane" of existence and forcing conversations (that are themselves embedded and established within collectives) to attend to the heterogeneity forged in interaction between heterogeneous actors.

Sociology of Technology and the Interactional Order

Trevor Pinch (unpublished) explores the invisible sociology of technology in Erving Goffman's work. Pinch sees real sociological gains that come from examining the functions of technology and the material in the interactional order. Pinch: "As for many sociologists the materiality and technology involved [in human interaction] are seen as inconsequential for the sort of analysis of the social being pursued. Goffman notes in passing that: 'as is often the case with situated activity systems, mechanical operations and administrative purpose provide the basis of the unit'. But Goffman does not push on why these mechanical operations are so important" (Pinch unpublished). Pinch, however, takes up the sociology of technology where Goffman leaves off and examines the functional role of technologies featured in two of Goffman's analyses: a merry-go-round Goffman uses to examine "role distance" and the doors that separate "front stage" from "back stage" in a hotel in the Shetland Islands.

In the case of the merry-go-round, Goffman is interested in the ways in which children of different ages differentially inhabit the role of merry-go-round rider. Very young children are timid and often fearful, moderately older sincerely enjoy the ride and "embrace the role," still older children inhabit the ride with irony and use the opportunity to show off and demonstrate their distance from the role. The oldest children, Goffman notes, "test limits and [their] antics may bring negative sanction from the adult in charge of the machine" (quoted from Pinch unpublished). Pinch works to demonstrate that the merry-go-round as a technology structures the situated activity of the children, the parents attending to the spectacle, and the authorities managing it. "That the machine-generated ride is repetitive and routine allows for this performance of role distance to occur at all. If these were real horses we would not expect eight-year olds to, say, let go of the reins and change horses. Mechanical horses are much more stable and predictable and hence permit the larking around behavior observed by Goffman." The merry-go-round enables certain kinds of displays from the children on the ride and from parents oohing and ahhing from the sidelines. The ride enables a range of performances that roughly coincides with age of the riders and certain expectations of communication between the family members. The interactions, performances, and experiences the technology affords are also structured in an economic transaction; part of the function of the technology, Pinch comments, is to extract money from its patrons. Once the ride concludes the family continues on with

their recreation as they, at the same time, are absorbing and processing the experience and any personal or interpersonal changes the ride induced (parents dealing with crying children, etc.). Pinch's point, however, is that the technology of the merry-go-round structures an interaction that makes possible an analysis of role distance to begin with and that the function of the technology is largely lost on Goffman.

Pinch goes on to examine Goffman's analysis of "front stage" and "back stage" dynamics in a hotel restaurant in the Shetland Islands. Goffman's analysis, Pinch observes, depends on a spatial partition affected through the technology of the door. Front stage, hotel workers are expected to behave in accordance with "norms of politeness and presentation of food" in accordance with a participation framework that structures a relationship between workers and patrons. Back stage, discourse is more relaxed and uncouth, spitting occurs openly, and food is handled and prepared in ways the patrons would find appalling. The physical partition between front stage and back stage marks two different social universes and as workers move back and forth, behavior and language changes markedly. The door, Pinch writes, "screens the activity that is taking place back stage from the patrons up front." The door becomes a site of political negotiation. Workers want it open so that they can carry trays back and forth more easily; managers want it closed as to not afford a window into the churlish happenings back stage.

"The interactional order in these examples," Pinch writes, "is embedded within, mediated by, and staged by material circumstances including mundane technologies such as doors, walls, and windows." The materiality structures the social domain in mundane physical ways and marks diverse social worlds that have to be negotiated by the workers. The participation frameworks these worlds entail for the workers are prescribed by the physical and semiotic content of the hotel architecture. The materialities index a range of conducts that are admissible and inadmissible in each space at the same time that they structure the movement of (kinds) of people and zone admissible and inadmissible behaviors. For Pinch, these are important considerations of a sociology of technology, although he adds that is also important to examine those moments in which the technological decisions are socially negotiated, "say the contestation between waiters and managers over what specific sort of door technology is most appropriate." Moments of technological choice are important for Pinch because they reveal the unseen political and social dimensions of technologies that go on to shape social space.

Pinch's framework, however, does not explore the ways in which technology is rendered semiotic through indexical projection. While he is interested in the interactions in which technological decisions are made, he does not appear to be interested in these moments because *people are talking about technology*. For Pinch the material and technological milieu is important because it shapes the social space in which events unfold – he is less interested in how these events are semiotically-mediated. Technologies physically mediate and restrict the kinds of happenings that occur between humans, but it is important to recognize that they do so only because they are indexically projected into the macro-structural order (where they obtain emergent codes of use, participation frameworks, values, social identities, role distance) through perceptually structured interactions in which the technologies obtains signs-of-use (Silverstein 2003).

The Anatomy of a Dinner Party

A recent invitation to a dinner party and a re-reading of Silverstein's writing on *oinoglossia* provoked me to do a little armchair sociology. Below I have sketched out a way to think about the discursive-material practices at play in the local action space of a dinner party. While this research lacks empirical grounding, I hope my reader still finds value in the exercise.

The social space of a dinner party is created in situated action that is structured by pragmatic and metapragmatic discourse that emerges indexically over the course of the evening, but is invariably structured by memories of prior interactions between participants, the participant's shared and unshared cultural knowledge of dinner parties and the conventionalized behaviors which they engender, the interactional texts laid down by guests and hosts as they prepare for the event, etc. The (indexical) structure of talk in which the social meanings of the event and identities of participants have and will be forged are invariably contingent on the past and present material dimensions of the event that are both within and outside the control of the hosts. Invariably the guests bring their own materialities to the event in the form of adorned bodies, dishes to pass, bottles of wine to present that are intentionally crafted to perform the guests' identities, personalities, and ritualized understandings of the participation frameworks appropriate to the event. The hosts differs from the guest in their enlarged responsibility to the social space: furniture, lighting, food, drink, table setting, music all have to be coordinated to concoct the right social effects. The materialities that I have described for both guests and hosts are the product of decisions that emerge through socially-mediated, higher order indexical inferences in which macro-social meanings attributable to the material artifacts are constructed. These meanings are very much in play over the course of the evening (both prior to, during, and after the event) although their designed semiotic functions are realized in the course of the event itself where they are both perceived (and rendered meaningful in perception) and talked about and thus subject to indexical projections in the complex back-and-forth of present guests (and sometimes ghosts as when a place setting is set for a recently deceased member of the group).

In the dinner party (or any situated activity system) there are two senses of social space in play: one referring to the literal spatial context that is structured materially with walls, floors, tables, silverware, food, and dynamic human bodies; and another sense evoking an indexically and ideologically structured n-dimensional hypervolume whose coordinates mark the many macro-social categories and meanings tacitly and explicitly in play over the course of the social event. These two senses of space both belong to the interactional order - the first, however, is crudely material and spatial and the second is constructed through higher order indexicals. These two senses of social space hinge together through indexical structure of the materialities whose affordances:

1) are perceived;
2) index the tastes, personalities, values, identities, and any other macro-social traits of their owners (another indexical relationship);

3) are technological. The “good silver” affords the cutting, securing, and delivery of food to the mouth. It enhances the function of the hands at the same time that exhibits the wealth and pedigree of the hosts. The silverware is literal and symbolic capital;
4) are ecological. People are fed;
5) are physiological. Muscles are exercised;
6) work in functional combination to the allow the event as it scripted conceived to unfold;
7) work in symbolic combination with the other symbolic materialities that together form the stereotypical components of the event structure;
8) if successfully handled, afford social mobility (Cf. 3).

Participants at the dinner party need to know how to talk with respect to the conventions of the moment and coordinate their bodies with respect to each other and extant material props so that felicity (in multiple senses) can be achieved. This requires tacit and explicit knowledge produced on the fly and acquired in prior interactions (of similar and dissimilar kinds). Moreover guests and hosts need to enact these discursive, bodily, and technical skills relatively simultaneously and in the right sequence – the panoply of materialities, technologies, words, actions, gestures, and procedures that are put into roughly stereotypical configuration. Linguistic and material cues must be coordinated so that actions unfold properly. “It is time for dessert!” must coincide with the removal of dirty dishes and the presentation of Baked Alaska otherwise the utterance could prove meaningless. “Context is not simply a set of features presupposed or invoked by a strip of talk, but is itself a dynamic, temporally unfolding process accomplished through the ongoing rearrangement of structures in talk, participants' bodies, relevant artifacts, spaces, and the features of the material surround that are the focus of participant's scrutiny. Crucial to this process is the way in which the detailed structure of talk, as articulated through sequential organization, provides for the continuous updating and rearrangements of contexts for the production and interpretation of action.” (Goodwin 2000)

As interactional texts are laid down (according to the many overlaid participation frameworks in play), chairs are moved, bodies repositioned, coifs carefully adjusted. The semiotic happenings co-occur with changes in bodily hexis and material alterations of the surround. Together the multiple causal chains of happening that cut through bodies, discourse, and materialities form a complex milieu shaped by the indexical meanings in play, but not so intensely that the event is merely rehearsal of scripts and schemes. The social action is inevitably contingent and recursively inflected through the habitus, emergent discursively-structured meanings, and the multiple affordances of the materially surround. And, hopefully, a good time is had by all ☺

Conclusion

I have made the strong argument that material features of situated activity are intensely semiotic. The degree to which materialities are rendered semiotic is dependent on the dialectical particularities of the interaction-in-context which is structured both ecologically and through *n+1* indexical projections. Deictics are discursive-grammatical

structures that allows features of the environment to be referenced as affordances that may be rendered actionable. Deixis, however, is preceded by perception in which it becomes semiotic. Deixis also allows features of the context/environment/participants to figure into higher order indexical entailments. Higher order meanings generated in interaction are richly textured, complex, and of an abstract kind that may not have any bearing on immediate ecological affordances: intellectual discourses do not exist to reveal predators or potential food sites. How can we account for the apparently ecologically liberated, disembodied semiotic possibility?

Meanings are, of course, are not the currency of disembodied mental realms. Instead, they are multifunctional, embodied, situated, lived (and thus political), materially informed, and realized across all manner of semiotic technologies. That we have created sophisticated conceptual and philosophical frameworks is not a testament to our ability to liberate ourselves from an ecological environment, but to transform it through a radical reconstruction of niche through diverse discursive-material practices. Seen in this light, Goffman's interaction order is ecological.

Walking as a Total Fact of Human Organisms

In his essay *From Complementarity to Obviation: On Dissolving the Boundaries between Social and Biological Anthropology, Archaeology, and Psychology* Tim Ingold argues that analytic segregation of cultural and biological phenomena inhibits richer understanding of human life and allows research to continue along intensely problematic assumptions. Ingold asserts that human growth and development cannot be disentangled from the production of human meaning and cultural selves: "If those specific ways of acting, perceiving, and knowing that we have been accustomed to call cultural are incorporated, in the course of ontogenetic development, in the neurology, musculature, and anatomy of the human organism, they are equally facts of biology. Cultural differences, in short, *are*, biological." Ingold evokes the indissolubility of biology and culture under the rubric of the obviation approach to anthropology which he contrasts with the complementary approach (both terms of his invention) that refers to those styles of analysis that treat human biology and sociality as separate - albeit superimposable - domains. Ingold asserts that Mauss's treatment of the body in *Techniques of the Body* is paradigmatic of the complementary approach. For Mauss, "the body is innately predisposed to walk, it is also educated by received social traditions, transmitted orally or by other means" (Ingold 2001, p. 257). Ingold's obviation approach strips genetic determinism and disembodied cultural transmission of ontological and analytical significance. Under the obviation approach, walking and other practices and life activities emerge in development that cannot neatly be separated from an "unfolding field of relationships" external to the human organism. Infants learn to walk in environments "that includes walking caregivers, a range of supporting objects, and a certain terrain"(Ingold 2001, p. 257).

In crafting the obviation approach, Ingold criticizes theories of embodiment, like that of Csordas, that treat the body as an "inchoate mass of biological potential" upon which durable cultural inscriptions are made. Ingold reminds us that the "body is the human organism and that embodiment is one and the same as the development of the organism in its environment" and he goes on to say that "given the choice of which term to retain [*body* or *organism*], I would opt for the latter, since it better conveys the sense of organized process, of movement, connectivity, and relationality, that I take to be fundamental to life" (Ingold 2001, p. 259). While Ingold productively challenges the hidden nature/culture duality of the embodiment perspective and demonstrates that ontogenetic development is indissolubly part of the architecture of culture, there is a significant omission in Ingold's framework that must be taken seriously if we are to render extant classifications of human science obsolete. In his attempt to bring the physical and cultural halves of anthropology together, Ingold fails to point out the philosophical stubbornness of the meaning-out-of-matter problem: that is, how semiotic structures emerge and inhere in biological systems and tissues. How neurobiological processes (over the course of development in an ongoing and already structured ecological and cultural milieu) generate semiotic experience is a major obstacle for boundary-cutting research. This major problem is linked to questions of consciousness, perception, learning, language, and human evolution, but it stems from the still broader question of how living systems become meaningful systems. Following Ingold, it would

be correct to frame this philosophical puzzle in terms of situated ontogenetic processes, yet assembling an answer to the riddles of consciousness, biological materiality, and culture may take lifetimes - if it is at all a possibility of human thought. Yet despite the many problems this philosophical quagmire poses for all research on meaning and bodies, it is often glossed over with theoretically vacant metaphors. Metaphors of *inscription* and *internalization* dominate discourses that attempt to establish relationships between cultural forms and the body/organism. Ingold problematizes these metaphors only to replace them with metaphors of *enfoldment* and *incorporation* (Ingold 2001, p. 258). Yet even for Ingold, the mechanisms of meaning and their neurophysiological underpinnings (another metaphor) are neatly concealed. Of course things could be worse: in many strands of developmental sciences complex cultural meanings are often left out the picture altogether or reduced to cognitive schemes that obfuscate as much as metaphors of inscription do.

While answers to this intractable problem in many ways must remain black boxed (and to this extent total obviation of disciplinary categories that fall along the meaning/biology divide must be stalled as we yet cannot move interchangeably from statements about meaning to statements about matter), research need not be stymied: models that link semiosis and physiological functioning already exist (Kleinman 1997, p. 326). Moreover, there is no single solution to the problems of biology and semiosis - only through piecewise and diverse approaches can this enormous and unwieldy question be made manageable. In the remainder of this paper I engage with one subquestion of this necessarily multi-generational research project. I examine the cultural and physiological dimensions of walking as necessarily coupled dynamical activities that structure and reshape the habitus of the human organism. By examining questions of walking and looking closely at Kathryn Geurts's treatment of *lugulugu* walking in an Anlo-Ewe community, I entertain ways in which the body and bodily techniques are rendered as perduring semiotic structures in complex social activity. Critical to such an endeavor is to examine how behaviors, actions, and body parts index and become indexed with cultural meaning and moral content in realtime events. The challenge, however, is to account for the ways in which biological activity is coupled with semiotic activity. I propose that cultural meaning and neurobiological processes hinge together and are preserved as habitualized structuring structures by dynamic coupling of multiple sets of attractors ("preferred" states of systems) distributed across the neurobiology of the human organism, but also preserved inter-organismically through institutions[2] and the material environment. In so doing I do not mean to posit two separate forms of memory - one on the inside of the organism, one on the outside - but to demonstrate that humans are always adapting themselves to environments and modes of being that are structured by

[2] "This durably installed generative principle of regulated improvisations is a practical sense which reactivates the sense objectified in institutions. Produced by the work of inculcation and appropriation that is needed in order for objective structures, the products of collective history, to be reproduced in the form of the durable, adjusted dispositions that are the condition of their functioning, the *habitus*, which is constituted in the course of an individual history, imposing its particular logic on incorporation, and through which agents partake of the history objectified in institutions, is what makes it possible to inhabit institutions, to appropriate them practically, and so keep them in activity, continuously pulling them from the state of dead letters, reviving the sense deposited in them, but at the same time imposing the revisions and transformations that reactivation entails" (Bourdieu 1977, p. 57).

past adaptations of diverse kinds. Strictly endogenous or exogenous forms of order do not exist; instead biological memory emerges out of complex and adaptive attunements of organisms-in-their-environment and fleshy memory of constructed organisms.

Let us return to Ingold's critique of Mauss's theory of walking. Ingold writies " Walking is certainly biological, in that it is part of the modus operandi of the human organism, but it is social - not because it is expressive of values that somehow reside in an extrasomatic domain of collective representations, but because the walkers' movements, his or her steps, gait and pace, are continuously responsive to the movements of others in the immediate environment. It is in this kind of mutual responsiveness or 'resonance', not in the subjection of behavior to categorical rules, that the essence of sociality resides." While Ingold is correct in saying that the there is no "extrasomatic domain of collective representations," he is incorrect to suggest that walking is not expressive of social values: "mutual responsiveness" is conditioned on mutual perception and semiotic interactions that are invariably informed by concretized social identities. What the participants are doing and perceiving in each other and about themselves affects the participants' interpretation of the event structure - which may or may not include walking. And even though there is no "extrasomatic domain of collective representations" their are more-or-less shared codes "incorporated" and "read" in organisms that - as Bourdieu says - are mastered and make possible social "grouping that spring from the spontaneous orchestration of dispositions" (Bourdieu 1977, p. 59). Ingold's emphasis on "mutual responsiveness and 'resonance'", however, is compatible with an interactionist framework in which well-established frameworks of meanings are continually refreshed, reproduced, and practiced in realtime interorganismic encounters (Silverstein 2003, p. 197). The question that Ingold approaches, but does not fully acknowledge is how the body operates as a system of signs and how this capacity emerges along with other developmental capacities that are indirectly, mutedly, or perhaps wholly separate from the meaning making/interpreting capacities of the organism. Walking *is* expressive of human meaning and values and to ignore the ways in which the body constructs, inhabits, and interprets meanings simultaneously as it develops physiological capacities is a significant lacuna in Ingold's critique. Bourdieu writes:

> "When the properties and movements of the body are socially qualified, the most fundamental social choices are naturalized and the body, with its properties and its movements, is constituted as analogical operator establishing all kinds of practical equivalences among the different divisions of the social world - divisions between the sexes, between the age groups and between the social classes - or, more precisely, among the meanings of positions in the spaces defined by these divisions. In particular, there is every reason to think that the social determinations attached to a determinate position in the social space tend, through the relationship to one's own body, to shape the dispositions constituting social identity (ways of walking, speaking, etc.) and probably also the social dispositions themselves" (Bourdieu 1977, p. 71).

An activity such as walking necessarily develops in milieus in which bodies and bodily

movements have meaning; unsurprisingly, bodily hexis emerges and indexes social forms that bear some relationship to the social logic that permeates/ed an individual's developmental field. It is insufficient to suggest - as Bourdieu does - that bodies incorporate meaning structures out of pragmatic or functional obligation to a sexed, classed, and socially marked division of labor alone. These forms develop as the human organism works to satisfy biological imperatives such as locomotion, eating, and sleeping. The development of the *habitus* must be situated within a heterogeneous landscape of practical problems that require the simultaneous coordination of physiological and social selves. In other words, we must interrogate questions of the *habitus* at the same time that we ask how the organism - without a conductor - orchestrates controlled movement, neuromusculoskeletal coordination, and other biological processes to negotiate and construct a diverse range of affordances. To attend to the development of cultural formations as they surround and implicate the body *at the same time that we attend to the human organism's ontogeny* is to begin to understand how history becomes nature. Yet difficulties of the meaning-out-of-matter problem rear their head: how is semiosis retained and structured as the organism develops and carries out the practical activities of its life? "[D]epositories of deferred thoughts can be triggered off at a distance in space and time by the simple effect of re-placing the body in an overall posture which recalls the associated thoughts and feelings, in one of the inductive states of the body which, as actors know, give rise to states of mind" (Bourdieu 1977, p. 69). How are thoughts deposited in the organism, triggered off, and associated with postures? Perhaps a look at the biology of walking may offer alternatives (or a new set of metaphors?) to the body as a *reactive container*.

From *Habitus* to Attractors

Let us consider how two distinct theoretical frameworks across the biological and cultural divide confront questions of stability of human organisms, their practices, and dynamics in time. In this section I compare Bourdieu's concept of the *habitus* and dynamic system theorist's concept of an attractor. It is not my intention to reconcile these two concepts in the imperative of bipartisanship; rather it is to bring these two concepts into conversation to destabilize culturalists' metaphors and to point to the intellectual difficulties questions of biological memory present (i.e. morphological, cognitive-cultural, behavioral, and neurobilogical stability). Bourdieu's sociology and dynamical systems approaches to development share overlapping ontological commitments despite their divergent emphases on biological and cultural processes. Both approaches reject the possibility of hegemonic sources of order operating on either mental or molecular domains. As such these frameworks are anti-preformationist and anti-essentialist. Both frameworks also privilege notions of causality that distribute agency across actor's bodies and milieus (self-organization). Because the body is always in dialectical tension with a heterogeneous environment, both frameworks give theoretical weight to questions of context and the pragmatic lives of situated organisms. Finally, both approaches seek to account for the adaptive significance of behavioral stability and flexibility. Bourdieu's *habitus* is both "generative" and "durably installed" and in the dynamic systems approach "systematic pattern[s] of experience" are structured in a multivariate "phase space" that is stabilized through practice or destabilized as new practical/developmental demands emerge for the organism. Both the *habitus* and the sets of attractors that define the

tendencies of the human systems compress the immense possibility space of organismic configurations or units of behavior (degrees of freedom) of a necessarily "high dimensional" organismic system (Smith and Thelen 1993, p. 163).

How is a dynamic systems perspective applied to the phenomena of walking?
Keslo et al. describe walking as limit cycle oscillator. A limit cycle oscillator is a type of attractor defined by its periodicity. Figure a and b are phase plane portraits for the thigh and shank attractors in an adult walker (figure from Clark et al. 1993, p. 76). The angle of displacements for both the thigh and shank were measured over a specific period of steps. The phase profiles of thigh and shank are not averages from a number of different step measurements, but instead define a stable dynamical trajectory which the system returns if displaced by a momentary stumble or a bifurcation in behavior, e.g. a transition from skipping to walking. Compared with infants, this limit cycle oscillator shows much less variability (and therefore stability) than an infant just learning to walk. Moreover, the infant phase profile does not demonstrate mastery of the heel-toe-operation made graphic in the subtle bumps at the bottom of the curve in figures a and b. The phase portrait describes the geometry of the attractor/habitualized movement. As a modeling system it allows one to make formal statements about the overall style of movement as well as component movements.

A critical feature of dynamical systems perspective is that attractors can become coupled. The thigh and shank phase profiles represent oscillations in a coupled system. Walking is synergistic and is achieved through intralimb coordination (Clark et al. 1993, p. 79). The various oscillation involved in walking are entrained in much the same way that postures can recall "associated thoughts and feelings." These resonant links within neurobiological and biomechancial systems (and undoubtedly outside them as well) are perhaps one key to understanding how stable cultural meanings and practices inhere in the body through its system dynamics. As attractors become coupled and as practices become more entrenched in the life activity of the organism, the more habitual the practice becomes.

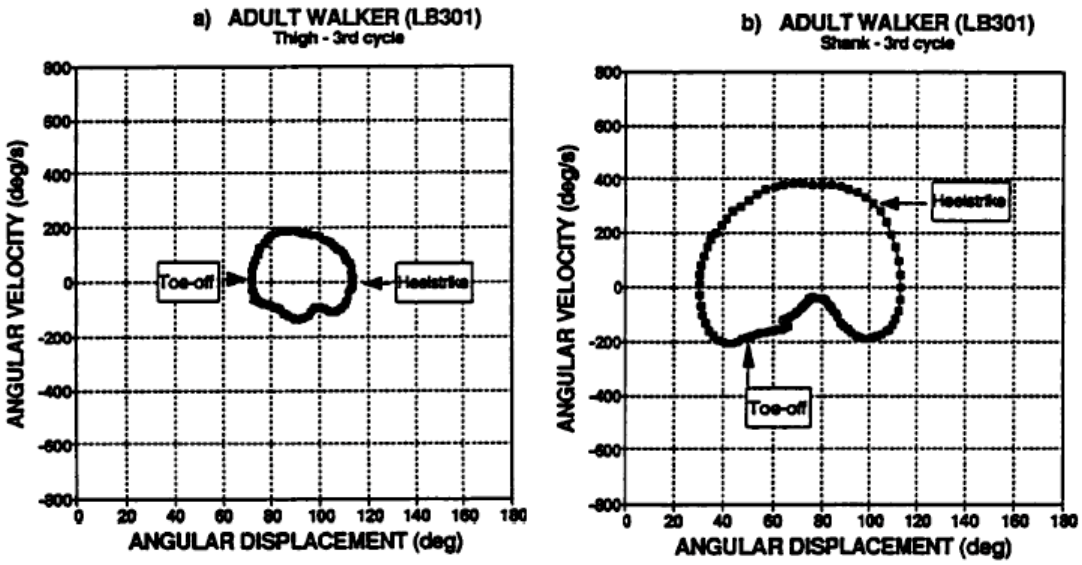

Figure
a) The phase portrait of the thigh motion during walking from toe-off to toe-off in an adult. *b*) The phase portrait of the shank's action for the same walking cycle.

Like the *habitus*, attractors are developmentally conservative. However, unlike Bourdieu's *habitus*, attractors are structured by way of a number of parameters that if adjusted can reshape state space and lead to shifts in behaviors and novel developmental patterns. *Habitus*, of course, is not like a single attractor, but multiple attractors that come and into and out of being as the pragmatic demands emerge in conditions that resemble those in which the *habitus* developed. And while Bourdieu makes room for flexibility in his theory, he tends to emphasize the determinative character of the *habitus*. For developmentalists, change and stability deserve analytical parity:

> " A central question for developmentalists is how behavior can show both stability and flexibility, especially the flexibility to move into new solutions - the essence of developmental change. When behavior is seen as controlled by "schemas" or programs in the brain as fixed symbols or representations, it is a major theoretical challenge to find mechanisms by which the old schemas dissolve to be replaced by new forms. If, however, behavior is seen as quasistable, dynamically 'visiting' a preferred configuration, but not rigidly captured by that configuration, the origins of new cooperative relations among the components are apparent" (Smith and Thelen 1993, p. 2).

Both dynamic systems theorists and Bourdieu pay special attention to early development when the organism is "softly assembled." In the final section of this paper, I revisit Geurt's analysis of *lugulugu* walking as an element of children's horseplay. I argue that though the skill of walking is fully developed in the playing children, they continue to explore socially saturated developmental space in their play. Their play marks a realtime event in which the *habitus* remains open to new forms - though already intensely

socialized - and the ambulatory attractor is intentionally destabilized in the name of a game. Critical to this story of the *habitus* and dynamic exploration of state space is their mother's reaction to the children's play.

Bodily-Social Exploration in *Lugulugu* Walking

In Culture and the Senses, Kathryn Geurts examines how a particular style of walking indexes a morally-charged social meaning in an Anlo-Ewe community in Ghana. *Lugulugu* refers to a kind of "bodily motions such as swaying, tarrying, dawdling, or moving as if drunk" but that is also used to describe people who are "aimless" and "irresponsible" (Geurts 2002 , p75). Geurts recounts an episode of a mother scolding her two children for walking *lugulugu*: "I watched [the children] darting from one side of the compound to the other, swaying perilously on the outer foot, feigning to nearly fall down, and evidently mocking their mother for her charge that they were moving *lugulugu* on their way to the well" (Geurts 2002, p. 75). Geurts argues that *lugulugu* as a bodily motion and character state are linked in a cultural logic wherein bodily practices lead to existential transformation. "The logic expressed [by the concerned mother] was that if you move in a *lugulugu* fashion you experience sensations of *lugulugu*-ness and begin thinking in a *lugulugu* way and become a *lugulugu* person, which is then evident to others from the way your *lugulugu* character is embodied in your *lugulugu* walk" (Geurts 2002, p. 76). Geurts glosses over the fact that in the moment of their horseplay, the mother was attempting to intercept a form of development by stigmatizing the style of walking with her scolding. The physiological and social activity the children were exploring became couple with the mother's disapproval which may, for the boys, have been part of the fun. For the mother, however, this scolding was not only an opportunity to disrupt a certain form of play/development, but a moment to perform her maternal responsibility and to correct her children and prevent them from implicating her through their actions: the children's play and her scolding were public events after all. In this case, the mother was attempting to structure both her children's behaviors/development and – potentially - public conceptions of her family and in so doing she constrained the boys' exploration of bodily state space (compressing the degrees of freedom) while reproducing culture values against *lugulugu* walking.

The mother's scolding also interacted with set of links and associations between the boys' *lugulugu* motor activity and the incorporated meanings and values that they brought to the event. While it is impossible to specify what *lugulugu* meant for the boys, lugulugu meaning was necessarily triggered, performed, and entrained in the motions that were part of the play. To this extent it is impossible to anticipate how this event became developmentally significant. But if the mother's scolding was successful the children would have practiced/played *lugulugu* walking less and less and *lugulugu* walking would be structured out of the *habitus*. This is not to say that the children would grow up to avoid alcoholism or any other trait associated with the *lugulugu* personality type - only that the set of psychic and physiologically patterns of *lugulugu* walking would not be reinforced through additional practice. However, even if *lugulugu* walking was not practiced after the scolding the concept of *lugulugu* continued to develop and inform their *habitus* - at least in the rejection of *lugulugu* walking in favor of other forms.

"Infants [differentially tune natural elastic properties] by *exploring* the range of possible parameters provided by their elastic potentials through their self-generated movement, and *selecting* ranges which fit the task at hand" (Smith and Thelen 1993, p.6). For the Anlo boys (not infants) the task at hand was a form of play that allowed an opportunity to explore the "elastic potentials" of their physical bodies (in locomotor state space), but also explore and "try on" a set of cultural meanings about *lugulugu* character. While the infant's exploration of state space is more of a movement out of behavioral structurelessness, the boys' had already learned to walk and so their bodily exploration of *lugulugu* was less an exploration that would lead to a developmental phase shift (from crawling to walking), but a form of exploration that allowed their bodies to engage a complex range of motion types - a kind of agility and gymnastic training inside an exploration of social degeneracy.

In the same way that negative social forms are disciplined out the body, Geurts demonstrates the ways in which positive cultural values are structured into the situated body. The body develops in a milieu of social and culturally specific values, practices, and forms of touching. Geurts demonstrate the ways in which the discourse surrounding birthing practices, the physical handling of infants, the public performances of children's cleanliness, and walking are all events where bodies and bodily meanings develop simultaneously to form the Anlo-Ewe person. In the end, however, the body remains a mysterious container for cultural meaning in Geurts's analysis.

Conclusion

Each step we take, each movement - integrated in a flow of practical activity - is an opportunity to become, to rehearse, and to improvise within a range of adapted possibility. The *habitus* is in continual dialectical engagement with a social and ecological field - an engagement from moment to moment never to be repeated, yet that is always constrained by history. Each movement and configuration of the organism possesses a familiarity at the same time that the organism assimilates strangeness - potentially working itself out of the "feeling of the game" or perhaps by finding itself in an alien world. But even when human organisms find themselves in an alien world they consistently have terrain - a system of support that affords walking, running, or crawling. And as they move through an alien landscape - negotiating its textures, affordances, and meanings - they might discover that they use their bodies in new ways so much so that they might become sensitive to changing realties beneath the skin.

Whoever we take ourselves to be, we are structured out of a maze of possibilities forged in a subterranean universe of nerves, bones, cells, ligaments, and organs that are inevitably organizing themselves on a variety of scales so that our social and ecological selves can stay in productive relationship with the going-ons outside our bodies. Whatever the confluences that hold the body and its meanings together - by attractors or *habitus* - the human organism is stabilized and made flexible without vitalistic glue, divine hand, or miraculous molecules. We have only begun to scratch the surface.

Toward a Political Ecology of Central Florida

In the last few weeks I have developed an urge to dive into the history of swimming pools - not those that litter the Florida landscape, per se, but those built into large shipping vessels that set sail from Brazil or Florida with vast quantities of fresh orange juice or concentrate in their refrigerated cargo holds. I like to imagine myself as an ethnographer on one of these vessels - dutifully learning about the ship, the divisions of labor that keep it running, and the ways orange juice is loaded onto and off the ship. In the heat of the afternoon - after all my hard work – I would lay out with my copy of *Cognition in the Wild* and take a swim. The wheels of ethnographic thought, however, would continue to turn as I made my laps. Along with the orange juice sloshing in its maritime container, I would ponder the water I was swimming in: from what aquifer was it pumped, by whom and for how much, and with what technologies? How might this swimming pool help me understand hydrology in the anthropocene?

Other questions would quickly follow: How did the swimming pool merge with the technologies of citrus transportation? Was the vacation cruise industry the first to equip ships with pools? Does a swimming pool help recruit and retain laborers? Has the swimming pool become an obligatory amenity within the lifescapes of late capitalist modernities? What does the presence of the pool say about the capital accumulated by multinational corporations in the citrus business?

I want to think about the swimming pools and the contemporary systems of orange juice delivery at the same time that I think about mid-18th century British ships (sans pools) sailing out of Northeastern Florida along the eastern seaboard carrying a substance we would no longer recognize as orange juice. I want to think about these two ships together as a way to leverage an understanding of how the 8 billion dollar Florida citrus industry (its landscapes, crop plants, technologies, workers, and consumers) has evolved since the time the Spanish washed ashore.

During the 20-year period of British rule, Florida "orange juice" was made from the juice of the locally abundant sour orange, *Citrus sinensis*. The sour orange reached the New World by way of the Spanish who traveled with its seeds in order to establish, what John McPhee called, scurvy prevention stations. The sour orange naturalized in Florida's woodlands after its introduction by the Spanish and was quickly taken up by native peoples.[3] During Florida's early colonial period, the sour orange was one of the only forms of citrus in Florida. The Spanish, prior to British succession, did not cultivate citrus on a large-scale or, for that matter, have much success in developing plantations. Wars with native peoples and colonial rivals and Florida's difficult-to-cultivate landscape threw major wrenches in the Spanish colonial machine (not that it would have cultivated citrus on a mass scale anyhow – its southern colonies produced citrus in abundance). The

[3] It is these kinds of introductions that produce – what Jill Casid calls - "hybrid landscapes." Understanding the ways citrus, Spaniards, razorbacks, and the raft of other Old World species were grafted in the New World is critical to appreciating the ways the colonial landscape machines latched into and transformed New World naturecultures.

English's plantation systems were comparatively successful – the timber and naval stores industry, indigo and the work of slaves paved the way for citrus in Northeastern Florida. It was the English who first successfully capitalized on Florida's natural resources and established a citrus industry in Florida. The English concocted a beverage with the juice from both wild and planted oranges that they spiced, diluted, and preserved with spirits. Casks of this orange juice made their way up the Atlantic to the markets of New York (Miller, 1997).

In both contemporary and colonial citrus production, understanding the mobility, labor, and material conversions of citrus is essential to understanding the ways the literal fruit of biological production gets transformed into capital. While the recipes, preservation measures, and shipping technologies have all changed, citrus remains a commodity that links (sub)tropical landscapes and Northern markets. Understanding the transformations in the citrus industry is also key to understanding the ways Florida's land and waterscapes have changed. Wetland drainage, large scale deforestation, the introduction of new plants and animals, plantation agriculture, destruction and displacement of native peoples, slavery, the Civil War, homesteading projects, cycles of economic booms and busts, and sustained campaigns to render Florida a destination for northerners have all been entangled in the making of citrus and modern Florida.

In what follows I intertwine stories of Florida citrus and its pollution of the state's fourth largest lake; at the heart of these stories are questions of economic production, ecological decline, and the reconfiguration of human and non-human worlds and bodies. I discuss the ways the Florida landscape was rendered into a machine for the production of fruit and juice and the ways this machine inadvertently transformed the ecology of Lake Apopka. Following Escobar, I will argue that the capitalist mode of production – assisted by the apparatuses of the state – undermines the condition of production transforming lives and lifeworlds often for the worse. I argue that capitalist and colonial expansion may be productively and literally conceived as a form of, what biologists call, *niche construction* or *ecosystem engineering*. Niche construction refers to the range of ways organisms engineer their ecological worlds through their always-relational life activities. Niche construction helps us grasp the ways an organism's constructive/destructive presence informs their and others' ecological/developmental trajectories. Niche construction not only changes the ecologies of organisms but it changes the conditions of natural selection for present and future generations of multiple species. By examining capitalism through the lens of niche construction I hope to better understand the changing naturalcultural articulations across Florida's landscapes.

Regrettably, this paper does not directly address larger structures of political economy, the impact of citrus on laborers and lake dwellers, nor the global topographies of affect and desire that shape the architectures and practices of citrus worlds.

Lake Apopka and the Florida Frontier

Lake Apopka - like so many water bodies and landscapes in the anthropocene - has undergone troubling transformations as a consequence of human use. Tangled in the waste streams of 20th century agribusiness, Lake Apopka's waters have become a

chemical soup – a waterscape teetering at the brink of double death - that has changed ecological structure, reduced biodiversity, and induced serious developmental abnormalities in many of the lake's animals. After decades of phosphorus loading from citrus processing plants and runoff from citrus groves, Lake Apopka underwent what ecologists called a catastrophic ecological shift from a clear water state that supported bass and aquatic macrophytes to a turbid state dominated by algae and gizzard shad. The ecological switch occurred in September of 1947 when a Category 4 hurricane uprooted the aquatic vegetation that stabilized the mucky sediments. With the vegetation gone, the sediments entered the water column making available large quantities of phosphorous for uptake by algae. Reinforced by a number of feedback mechanisms, the aquatic vegetation could not recover: a new ecological state had been achieved.

Exceptionally high levels of pesticides that flowed off farm fields compounded the lake's troubles. In 1980 a storm event flooded the waste storage ponds of the former Tower Chemical Company - a manufacturer of DDT, DDD, and other chemicals for the local citrus industry – sending large quantities of agricultural poisons into Lake Apopka's waters. Soon thereafter, wildlife biologists began to detect decreased recruitment in juvenile alligators. Through the pioneering work of the Guillette lab at the University of Florida, it was established that the toxins from the Tower Chemical Company spill were disrupting the endocrine systems of the lake's alligators and turtles.

The changes in ecological conditions effectively ended sports fishing industry and hobby fishing by local people. This is not a lake to swim in.

In the 1990s the St. Johns River Water Management District (SJRWMD) embarked on an expensive two-pronged restoration effort to return Lake Apopka to a clear water state. The SJRWMD performs gizzard shad harvests to remove phosphorous from the system and to reduce the negative churning effects the species produces as it forages. The SJRWMD also purchased adjacent farms and converted them into wetlands into which Lake Apopka's water would be pumped and filtered. While the restoration efforts have made modest improvements in water clarity, they have not pushed the lake back into its prior state.

The abrupt change in Lake Apopka's ecology and economy emerged at time of rapid expansion of Florida's tourist industry. In the 1940s and 50s, the population of Florida was edging into exponential growth, the green revolution was in full swing, and citriculture was rapidly expanding to meet the demands of markets hungry for orange juice concentrate. While much of the native pine forests had been clear cut in the late 19th century for timber and navel stores industry, the area surrounding Lake Apopka was rapidly planted with citrus. 1900 -1980 mark the golden age of Florida citrus. A devastating series of freezes in the 1893 wiped out the majority of citrus production in Northern Florida pushing the industry further South. Big freezes in the 1980s, like the 1893 freezes, destroyed thousands of acres of citrus; growers found themselves in the position of having to choose between replanting their groves or selling their land to developers. In the 1980s and 1990s the counties of central Florida were some of the fastest growing in the country. Citrus land around Lake Apopka was increasingly

purchased for exurban development. The agricultural landscape around Lake Apopka, like the lake before it, was undergoing major and irrevocable changes.

The Lake Apopka region first became populated by Westerners during the Florida's Territorial period in the early 19th century. The earliest settlers of the Lake Apopka were incentivized to settle the area with the Armed Occupation Act of 1840 that offered homesteaders 160 acres in exchange for cultivating the land and defending their property against Seminoles. Attacks by Seminoles were a major obstacle to Western expansion and had persisted beyond the Seminole Wars (Wolf 1982). While the Armed Occupation act did not realize the state's goals of increasing population in Florida's interior – it did establish new agricultural communities that would become more populous with the construction of railroad networks out of Jacksonville. These railways became important not only for populating the hinterland and creating conduits for tourists, but they also enabled more clear cutting. These railways also enabled the citrus growers to access and cultivate the sandy soils ideal for citrus production. With the routes between producers and markets in place and expanding, citrus began to boom in the early 20th century so much so that it was often described and imagined as a Cinderella crop capable of making small fortunes without intensive labor. Though the citrus industry, today, is largely unsubsidized, its expansion can be traced to enormous research investments of the USDA and land grant universities and a history of land use policies that have made available cheap land for transportation development and development projects of all sorts.

Citrus Diversity

In her poem "Hispaniola" Amy Clampitt writes of a "rumor/ brought to Alexander/ of, in India, a reed/ that brought forth honey/ sans the help of bees/ began it/ a topography of monoculture." Clampitt goes on to pithily indict sugarcane, its spread across the tropical regions of the new world, and the "world-class indignity" its production necessitated. Anna Tsing – building on the work of Sidney Mintz – contrasts the labor conditions in sugarcane fields with the pleasures of the sugarcane consumption in Meratus swiddens. For Tsing, the colonial sugarcane monocultures are problematic not only because of the indignity and violence of the sugar enterprise, but because plantation sugar is predicated on the clearing of diverse forests that were once the source of various human and non-human livelihoods. Tsing is also disturbed by the lack of diversity in the crop itself. "In Meratus swiddens, cane is one of perhaps a hundred species and varieties. Variety is an admired aesthetic as well as a safeguard against disease or failure in any one crop; others will survive." Tsing consciously and justifiably develops a critique of sugarcane plantations that resonates with contemporary biodiversity discourses. While deeply troubled by the landscapes of modern extraction – what she has called "blasted landscapes" - Tsing also works to see glimmers of biological potential and livelihood in naturecultures worked over by human capital. In her work on matsutake worlds, Tsing investigates the forms of life, global commodity chains, and kinds of naturalcultural diversity that surround the matsutake mushroom in its disturbed forest habitats in the northern hemisphere. That Tsing has both learned to love varieties of swidden sugarcane in the lush matrix of Indonesia's forests and the matsutake mushroom that populates blasted landscapes of the North speaks to the capacities of human beings to enter (affectionate) interspecies relationships inside various modes of worlding – some more

destructive or sustainable than others.

What Tsing's work (and personal correspondence with Donna Haraway) helps me see is that we can learn to love and value the diversities produced in colonial-cum-capitalist modes of worlding at the same time that we are deeply troubled by the transformations of global capital. This is an important lesson as we examine the diversities of citrus produced in the plantations, orchards, labs, and experiment stations of the New World. What does it mean to savor Rio Red grapefruit bred for frost hardiness by x-ray irradiation in the labs of the US Department of Energy? More generally, what kind of relationship should we cultivate with the grapefruit that spontaneously hybridized in a slave plantation in Jamaica? (The grapefruit is a cross between mandarine and pummelo.) Diversities of citrus grew out of imperial conquest and the experiments of 20th century technoscience. This should cause us indigestion.

Florida citrus, like sugarcane, proliferates in the peninsula's blasted landscapes. Citrus groves owned by or catering to multinationals like Tropicana, Minute Maid, and PepsiCo are effectively monocultures managed like – so many other staples of the contemporary food industry – with pesticides, inorganic fertilizers, and low wage labor. But unlike sugarcane, citrus's colonial-cum-capitalist caretakers have cultivated hundreds of varieties in the last several hundred years. At the same time that plantation agriculture, contemporary agribusiness, the state, and state-sponsored technoscience have managed to produce forms of agriculture hostile to multiple forms of life (both in field and outside), it has also produced diversities of citrus that have similar aesthetic appeal as Meratus sugarcane. Marketable cultivars like the golden nugget, tangelo, and Ojai cuties make it a pleasure for me to stroll the produce section of my local grocery store. Citrus is wonderfully diverse. The number of genus, species, varieties, hybrids, cultivars, and scion-rootstock combinations is staggering. This diversity deserves explanation. I can only offer, however, some speculation:

It would be a mistake to strictly partition the kinds of selection operating on citrus as either natural or artificial. Though US citrus experiment stations are new to the game of life, they do not represent a radically different form of frugivore interest in fleshy plant rewards. Evolutionary ecologists argue that plant-animal mutualisms tend to build into diversity-spawning networks. The "coevolution of free-living mutualists favors networks that expand to encompass an ever-widening range of specialization in the interacting species" (Thompson 2005). The diversity of citrus, then, probably evolved as frugivores converged and speciated to take advantage of the fruits' traits. As citrus drew more frugivores (evolving to take advantage of the reward) into its network, it too began to diversify. As citrus became a more and more successful group, it expanded into a variously connected geographic mosaic in which citrus-in-its-coveolutionary-networks could diversify. Because of ideal growing conditions and complicated ecological conditions of the tropics and subtropics, the diversification of citrus was probably very rapid. The diversity of citrus and its reproductive plasticity (a hallmark of the genus) has everything to do with its subtropical coevolution with frugivores and pollinators. That colonist, scientists, agribusinessmen and women have been drawn into this mutualism is neither surprising nor does it mark a break in the coevoltuion of citrus and frugivore

desiring machines.

These reciprocal inductions between citrus, frugivores, pollinators and the nested and overlapping matrices of environments are the raw materials *of becoming with* (to borrow more terms from Donna Haraway 2008). These reciprocal inductions, however, do not automatically become death machines as soon they tango with capitalist modes of production. As I hope to show the capitalist mode of production affirms and creates many forms of life - like the citrus varieties - that we might want to put in our carrier bags for building alternative multispecies modernities.

To better understand articulations between biology and political ecology, I turn to a quote from Gilbert and Epel in their chapter on niche construction. They write, "The 'circuitry diagrams' of organ formation within the embryo become united with the 'circuitry' diagrams within the ecosystem" (Gilbert and Epel 2009). Ontogeny and ecology form cats-cradling linkages of construction and adaptation. Situating capital and capitalisms in Gilbert and Epel's "circuitry diagrams" helps me understand how wealth and prestige are generated not from Nature, but from situated organisms with particular traits variously enrolled into capital-generating collaborations and subjugations.

Capital flows through and is generated within tangles, circuits, and traffic of materials, energy, and meaning. It is the capitalist job to engineer these tangles, circuits, and traffic to generate excess *something* too often at the expense of human and non-human others. The gizzard shad's death and removal from the lake's circuitry changes the biological and ecological routes of phosphorus. The use-meanings of clear water are the intended *something* the lake managers are engineering. The goal of the lake's restoration is not to return it to a pre-capitalist Eden, but *to recuperate a form of productivity* that fosters certain kinds of human and non-human flourishing. Like eating, the gizzard shad's death enables other kinds of life.

To tell the story of citrus diversity and its relationship to capital requires that we understand a complicated variety of human niche-construction activities routed through multispecies worlds. Industrial citriculture has succeeded in turning oranges into capital by transforming the landscape into an ecological *tabla rasa* to reduce predation and competition from other plants and insects. Agriculture eliminates ecological noise and rewires the routes of water, nutrients, and pollinators to ensure good yields. These kinds of practices, however, can undermine the conditions of production. The attempt to erase plants and insect with pesticides in industrial contexts can create evolutionary arms races that create nastier pesticide-resistant bugs. Elsewhere, scientists and agricultural technocrats working out state-sponsored labs and agricultural experiment stations labor to re-engineer the conditions of citrus selection to induce new and useful traits into crops.

The scion-rootstock combinations become interesting because growers are able to select (in both evolutionary and decision-making sense) belowground parts to fit (again in multiple senses) nearly non-optional conditions of soil and climate while they can select different aboveground parts to accommodate consumer preferences and the needs of industrial production. The diversity and modularity of citrus has allowed it to spread to

different climates and soil types with different consequences for how that fruit travels to reaches its markets. It is indeed these collaborations across scion and rootstocks that changes the range of productivity and ecological aptitude of the citrus.

Multiple kinds of knowledge, technical capacity, state-funding, market devices, and let us not forget about plants, farmers, and consumers must be wired together for the agribusiness machine to start yielding returns. Getting inside and learning about the "circuitry diagrams" of contemporary modes of production - as much as it maybe psychologically defeating - is also essential for mobilizing new political ontologies, fighting for the construction of environmentally just worlds and salvaging what is left of ongoingness.

Re-Imagining Agroecological Production

In *Territories of Difference*, Arturo Escobar asserts that capital tends to undermine the ecological and social conditions of production as it moves toward ever greater expansion. Non-commodity elements of colonial-cum-capitalist machines - e.g. labor, land, local knowledge, and water - are variously spoiled, exploited, exterminated, and subjugated in order to configure naturecultures to yield capital. For ecological Marxists like Escobar, the tensions and contradictions between production and sustainability are serious intellectual and practical matters of concern. Escobar implores his reader "to arrive at a representation of the economy as a diverse landscape of forms and possibilities" and to reconceive logics of production as part of the project of imagining and building alternative modernities.

In the cases Escobar cites, state and corporate actors are aligned in neoliberal projects to transform nature into capital while social movements emerge to respond and fight against the destruction of production conditions and local people's livelihoods. The state - in Escobar's field site and philosophical program - is an aider-and-abetter of profiteering multinationals. "[The capitalization of nature and human life] is meditated by the state, which regulates the production conditions and makes them available to capital in the form, for example of subsides, technical assistance, and control of labor on behalf of the capitalist sector" (Escobar 2008) While acknowledging the capacity of the state to deliver on neoliberal agendas, other scholars have discussed the roles states can play to develop sustainability. "Governments are simultaneously a foundational force underlying environmental destruction and the principal agent of sustainability reforms" (Buttel 1998).

Escobar asserts, "whether state policies pertaining to the conditions of supply and regulation of environment, labor power, infrastructure, and space will enable the reproduction of capital as a whole has yet to be proven; since 2000 the instrument of choice has been force and new legal apparatuses." Escobar adds the following cautionary: "[the use of] force… could further undermine the conditions of production" (Escobar 2008).

I draw special attention to the state because of its contradictory role in the reengineering of naturecultures. On the one hand it engineers the expansion of the citrus industry and by

extension the lake's trouble. On the other, it seeks to repair the damage it does. That different branches of the state engineer naturecultures at cross-purposes creates for schizophrenia of the landscape or what I have elsewhere called landscapes of the anthropocene. Any alternative future that envisions a clear water state in Lake Apopka in the not-too-distant future will have to rely on the interventions of the St. John's River Water Management District. While social movements are necessary to the development of alternative modernities they - at least in the case of Lake Apopka - must articulate with the state to receive funds, knowledge, and technology to rewire naturalcultural pathways for multispecies living. I say this not wishing to heroize managerialism or technoscience, but to acknowledge that progressive, state-sponsored, science-based initiatives are necessary - in some instances - to repair the excesses of capital. Keeping the state, technoscience, and capital (in the economist's sense) in our bag of tricks as we work to recuperate and salvage multispecies living may bind us into a Faustian pact. (Workers fighting for alternative futures will necessarily have to engage the state because it will not readily disappearing from circuit diagrams - especially without a fight!) Collaborations with the state may also prove to have unexpected libratory, life affirming, diversity making potentials (he speculates…). At the very least, transitioning into alternative natureculutres means engaging the frictions and awkward collaborations like those emerging between citrus men and women and environmentalists.

I conclude this paper by briefly addressing two future imaginaries of citrus growers that I have learned about from listening to the Florida Citrus Industry Oral Histories conducted by Bill Mansfield. Listening to the stories of citrus men (yes all men) variously positioned within the industry, I have learned that globalization, land use, and ecological concerns are all challenging and changing the ways growers conduct their operations and organize their groves. Growing collaborations and conversations between environmentalists – inconceivable 15 years ago – are shaping the imaginaries of groves as sites for habitat, stormwater management and retention, and greenspace (not as recreation space - as agricultural land in, say, the UK is used, but as part of what people like to live next to and drive through). These visions, however, are complicated by growers' concerns that Brazilian domination of the market and land use pressure from exurban development will mean that groves will have to produce the same quantity of fruit in half the land area. These concerns stimulate a vision of tightly packed groves on precise grids roved by hi-tech robot pickers. Productivity - in the essentialized economic sense - continues to inform the imaginations and practices of growers in large part because grower livelihood is still predicated on inhabiting the logics of state-sponsored capitalism. But perhaps not forever.

The Forest of Failed Connection

1. Elemental Equations

Underneath all this ambience of lights, clouds, and action I can feel the effects of numbers underneath my feet; numbers that work together to provide what J.J. Gibson calls *a surface of support*. The numbers are invisible, but they are out there somewhere on *an ontological ground floor* making things up, making things walkable, building a narrative of matter that concludes in *terrain* of which I and my bipedal kin are beneficiaries. The numbers work from the center of the earth out to this thin skin of concrete that affords standing, walking, skipping, stopping (on a dime). The equations of the ground connect with the equations of my meaningful movement and comportment, street trees and streetlights, architectural foundations, the making of sidewalks, not to mention the slow drift of continents. The reliability of geologic math results in the assuredness of my gait. I walk in trust and in ignorance of the dynamics of the perduring structures of terrestrial surface. I walk in a math that affords posture, dignity, uprightness just as it supports the possibilities of open manholes, tree roots that buckle sidewalks, and hazards of ice. The math of the sidewalk does not indulge the physics of utopian fantasies; instead the mathematics of sidewalks supports the mathematics of hard knocks, strip malls, and networks of literal and figurative paths that cannot and will not take everyone to opportunity.

Inside of all this ambiance, the ground – in all its gravity saturated process - shuffles in and out of various states of upholding and compaction. Fissures, porosities, rills and gullies pervade the topographical coherence – yet the world of our walking is not littered with quick-to-swallow pits. Give praise. Yet if we follow the earth's reliable surface to its edge we encounter the ocean's havoc choreographed in infinite equations of waves. At the mathematical interface between land and water we get ocean shore, littorals, bluffs, beaches, estuaries: hybrid zones. Across these interfaces are transactions: little bits of mathematical stuff escape their equations' domains to travel and traffic in another domain's computations. Driftwood becomes that variable grown in geometry's arboreal flourishings, but that takes flight in the polishing action of waves to end up as output in sand that has taken altogether similar beatings.

Within all this ambience of boardwalks and beachscapes, structures get structured and structure other structures. Beachgoers improvise choreographies rehearsed in the theaters of our bodies - the collected habits of which link and sync into rhythms and functions of cells and cities. Sandwiched between the many maths that crisscross scale and enterprise, our bodies are drawn into the many shores of touch in which there is always touching back. And in the waves of interaction, there is a passing back and forth of in*form*ation: transactions that leave residues of consequence that join the collaboration of bodies in the making. There are wakes of information that flow across boundaries, re-creating bounded and unbounded bodies (of action). Action is transacted and transducted across the plurality/infinity that is the interactive surface.

Inside of all this ambience of numbers, there is the multiplicity of light's doings. Light steps in (from its various sources, travels, and transmutations) and illuminates our dwellings. We see fruit trees, lawn chairs, and grassy lawns – the various furniture of our landscape to which we are beckoned as frugivores, loungers, and cartwheelers. Light illuminates a layout by way of the ricocheting of particle-waves throughout the surround. The eye intercepts the ricocheting light that affords an patterning of external presences that affords our navigation of those presences. Equations of light join the equations of eyes inside the equations of head (on its swivel), on top of the equations of the body that navigates and constructs the landscape of its ongoingness by way of its foldable, mobile geometry. Simultaneously as light ricochets off an assemblage of surfaces into perception, a portion of it is absorbed and grafted into the surface as heat. Light latches into the surface of leaves in the enterprise of sugar. Green light escapes into retinas. Light starts the engine of the enterprise of the tree turning water and carbon dioxide (hijacked from atmosphere) into a field of chemicals that take on the familiar morphologies of oak and pine. The traffic of light, water, and carbon dioxide metabolize into tall pillars cut for the making of ships, fences, plantations, teepees, TP, barns, rocking chairs, and shacks. The evolved technologies of woody plants afford the technologies of becoming human (Tsing unpublished). The technologies of becoming human continue to figure in the landscape of interacting mathematics in which the branching chains of difference-making have no end. The equations of toilet paper link with the equations of sewers.

---

2. Matrix of Happenings

To be fed equations of equations for (the sake of) equations from an outside into an inside: the entering of figures through senses that specify features of existence that reel in specificity, that are embroiled in their own sticky existence (with literal and figurative burrs). This is part of the fact of being a being – the perceptual inputs from diverse sources reverberating through organs of skin, ear, tongue, eyes, and nose. Out there, in the physical layout of things called landscape are additions and subtractions of patterned and interacting materialities abiding, but also inventing: bringing their rules to the ruled happening, changing their differential force, changing the network in which force travels. We must learn to watch for the subtle interactions between neighborhoods of substance, the events of touching and touching back: nightgown and legs (and leg hair) erupting the variable of static electricity; the collisions of birds and airplanes in flight: features of avian integumentary system (not to mention the guts of the bird) entering into the mathematics of engine: the feathery massacre in engines, the massacre of engines in feathers: consequence spilling always from the idiosyncrasies of event. Miraculous emergency landing in the Potomac: event residues. Events that reside – in some way or another – outside the influence of the representing eye and therefore the semiotically informed touch.

These are some considerations for the most complicated math – a math not nearly mathematized: but a math nonetheless: unruly computation of firing synapses in the body generating the structures that makes perception semiotic, that makes events ecologically

meaningful, that renders all manner of interactions between humans and non-humans possible. These equations may or may not be trusted let alone apprehended: they belong to a faulty math that converges on dilapidating structures (bridges collapsing under the weight of neglect), on the embodied eye in light's ambient arrays, of vegetation organizing carbon to make its functional structure (vines proliferating at the woodland edge where shade breaks down), of dung beetles creating (un)wholesome orbs of defecated goodness(?).

These are complicated/convoluted equations that describe, but are also part of interacting architectures: as descriptors these equations work through words and thus interact with structures of grammar that constrain the ontological space in which the meanings are registered and produced. As interactants, they enter into the indexical order in which meaning and social forms are made. The equations belong to nesting and adjacent ecologies: the roofs of mouths underneath the roofs over our heads, the creation and healing of abrasions, rates and paths of water in the anthropocene, the rising and staling of bread (the many equations of yeast!), the equations of bread entering, resturcturing, and exiting the bread-eater, the various machines from which wheat was turned into flour, of water escaping the reach of roots to reach wetlands that may or may not support the ecology of salamanders. Equations meet and in each meeting transform (some) of the rules of future interactions. But equations do not always meet and interact: the matrix in which equations interact are often filled with zeros. Non-interaction forms the matrix of interaction. The plasma of interaction is filled with equations whose outputs, coefficients, and variables are zero or effectively zero relative to forces whose conditional dominance is not in question. Always there are equations of dust exacting microforces on the ecology of elephants. The matrix of all interactions is contained in a shifting sea of zeros.

---

3. Drawing Drawing into Landscape

A drawing of a landscape makes a mark in the landscape - the topography of paper embedded, as it is, in the complex origami of the conversion of forest. The inscriptions, brushstrokes, and traces of the landscape renderer creates landscape inside of notebooks inside of landscapes: refigures a part of the total order as she depicts a part of the total order. The mark, the change, the difference that is the drawing - that results in the re-presentation - exists in a notebook that fits into a bag slung over the shoulder of someone leaving the scene(ry) and an array of impressions, footprints, and traces in her wake. Organisms re-engineer surfaces and create landscape intentionally or not. There are traces, restructurings - intentional or not - that go on to interact with a world left behind: pieces of consequence evolving in the traffic of landscape's happenings.

Now consider the bodily motions of the renderer as she places her notebook into her bag - the many coordinated changes in physiology that unfold along the micro-folds of memory structured in neurologically active tissues of muscle. Think about all the intensely practiced changes of the body inside *the improvisations of the now* – think about how many of these movements occur below thresholds of awareness which is slippery to

begin with as is the act of wielding pastels – a slipperiness not of actual implements per se, but a slipperiness that emerges in the coordinations that lead to marks that can add up to *drawn resemblance* and can do the work representations are often made to do. Let us imagine our landscape renderer as a member of a landscape architecture firm steeped in the enterprise of translating landscape drawings into capital. The history of her bodily movements that result in the practical capacity to engineer a representation of the environment results in *economic value.* The landscape renderer (in all her practiced social and biological capacity) can turn her body - in coordination with an environment of pastels, landscapes to be drawn, and set of supportive people and practices - into capital which can be further transformed in a multiplicity of ways to construct new affordances into the world.

Let us now consider what happens when the drawing (as a phenomena within a topology of interactions *called landscape*) is mobilized to re-engineer the landscape it depicts. The drawing, its normative force, and the practices in which it is mobilized become part of the consequential system of the rendered landscape, *part of the landscape in its unstoppable becoming.* The drawing gets drawn into a system of tooled bodies in a division of labor that articulates with the structures of landscapes on and off the page. The specifications of the drawing inside of its larger discursive field of social and material practices gets mobilized in the restructuring of a landscape already undergoing change – alive, as it is, with human practices and the life activities of other organisms. *Landscape is intense collaboration* joined from multiple angles, by multiple collaborators with diverse and

consequential histories.

To do theoretical justice to landscape, the drawing of landscapes must be drawn (which is part of what I am attempting to render here) into an understanding of landscape as - W.J.T. Mitchell famously pronounced – a verb. A theory of landscape must indulge a recursive loop that takes the theoretical life of landscape seriously as matter of landscape production. Moreover, to properly theorize the semiotic life of landscapes in the making requires that the landscape theorist elaborate – to the best of her ability – the ways meaning – in all its forms and gestations – articulates with processes and materialities landscape are conventionally seen to be possessed of. A theory of semiosis in landscapes must become – in some way or another – a theory of chainsaws.

---

4. Traffic

The word for world is forest – Ursula Le Guin

What does a tree do in a forest? Of course the living and dead tissues are eaten by many animals and microorganisms, and the tree competes with other plants for light, water, and nutrients. But a tree does much more than provide food and directly compete for resources. The branch, bark, root, and living and dead leaf surfaces make shelter, resting locations, and living space. Small ponds full of organisms form where throughfall gets channelled into crotches, and the soil cavities that form as roots grow provide animals with places to live and cache food. The leaves and branches cast shade, reduce the impact of rain and wind, moderate temperature extremes, and increase humidity for organisms in the understory and the soil. Root growth aerates the soil, alters its texture, and affects the infiltration rate of water. Dead leaves fall to the forest floor altering raindrop impact, drainage, and heat and gas exchange in the soil habitat, and make barriers or protection for seeds, seedlings, animals, and microbes. The trunk, branches, and leaves can fall into forest streams creating debris dams and ponds for species to live in. The roots can bind around rocks, stabilizing the substrate and ameliorating hurricane impacts on other species. If the tree falls, the downed trunk, branches, and resulting tip-up soil pit and mound create habitats for numerous organisms. - Jones et al. 1997

I am trying to think about the multi-dimensionality of a tree – of all the things it does in the multiple forests of itself and the forests of other organisms. I am trying to consider the consequences of relationships (and the relationships that emerge out of consequences) join(t)ed in architectures unfolding (contingently) in a matrix of variegated materialities and event types that result in various forms of in*form*ation – *materialsemiotic differences that make materialsemitoic differences* (Oyama 1980). To aid my understanding of this ontogeny and ecology of in*form*ation I develop the concept of traffic that serves to denote conventional comings and goings, but is also used to evoke the many lines of transactions and transformations between actors within contact zones of forest. Traffic, then, has everything to do with the making, re-making, and undoing of bundles of phenomena (sometimes called bodies) in motion.

The traffic of the forest is made of multiple lines of action, multiple kinds of flow that pass in and out of multiple kinds of consequence taking place in some region of the forest we will call location. Traffic within the xylem and phloem of a tree's bole branches into the canopy that traffics in photosynthetic processes as well as branching belowground into roots capturing water and nutrients aided or unaided by the prosthetics of mycorrhizae. Trafficking phenomena necessarily loops through zones of material and energy capture. Leaf and root/mycorrhizal surfaces act as junctures in which various forms of traffic come together as assimilations. Traffic of light, carbon dioxide, water, and nutrients moving at different rates through heterogeneous matrices (path structures) of travel to come together in the tree. The tree is a highly patterned node of assimilated materials the ontogenetic traffic of which cannot be partitioned from the stream of energy/materials entering, variously residing in, then exiting the tree to forge new relationships and reactions in the forest of future happenings. The tree is a complex intersection with evolved capacities to direct traffic into and out of its structuring structures.

As with any kind of traffic there are junctures in which flows come together as collisions, as evolved comminglings, as mere touching or perceptual brushing past. Traffic comes together in predictable and unpredictable waves of interactional chemistry between agents of various types, sizes, genealogies (i.e. history of interaction), and relational and emergent semiotic valences. The traffic of organisms is mediated, often, by their respective perceptual apparatuses – the organs of sense are part of the megamolecular

structure of the organisms. Perception, and what follows from perception, is always, however, a matter of the situated chemistries of the organisms intermittently involved in perceiving each other. Predator-prey dynamics emerge in forest traffic in which perception asymmetrically mediates living and dying.

The waves of consequence of multispecies chemistries reverberate into branches of consequence sometimes called population dynamics and ecological cascades. But in the forest of interaction, we must not only attend to the traffic of organisms but the traffic of the non-living. To be an ethnographer of forest traffic means following reverberating branches of consequence into other branches of consequence. Given limitations of space, I will not elaborate the methods of forest ethnography; needless to say it is impossible to follow the reverberations of consequence along its infinite pathways. To suggest, however, that all consequences have infinite life is too lose sight of the fact that branches of reverberation branch into branchlets of reverberation, passing through the ecology of dust, ad infinitum until microconsequences stumble into silence. This represents the edge of the forest.

I make this last statement not wishing to intimate that consequences travel from boles into branchlets or that the macrocosmic causes stampede into microcosmic effects. Nor do I wish to seek a golden mean solution and suggest that there are both "top-down" and "bottom-up" causalities at work. The chemistries of the forest proceeds in streams of traffic in which there are an infinity of lanes branching in and out and moving through a cornucopia of happenings: lanes crisscross, run parallel (intermittently), veer, run amok, traverse scales and spacetimes, bulge, narrow, bend, fracture, dead end, change textures. Moreover, the highways of forest becoming host diverse vehicles moving and interacting at different rates with difference chemistries that obtain their powers and qualities through contingent relationships and articulations built from deep and shallow palimpsests of activity. Vehicular demographics are invariably determined by the accumulated difference-making of the vehicles comings and goings and interactional life. And as vehicles traffic they make differences: leaving marks and deposits and taking away impressions and new luggage. The paths and locations of traffic are made and remade through use. Traffic, in other words, is a form of location-making.

Indeed, just as organisms cannot be extracted from some form of environment, traffic cannot be disentangled from the locations in which traffic occurs. The forest is nothing less than a multitude of highways made in traffic, supporting traffic. Traffic and locations are dialectically enmeshed as ants and acacia trees are enmeshed (that lovely symbiopoesis), but also as ash trees and ash borers are enmeshed. The many lanes of ontogenetic traffic of trees work to build the location of a stand of trees. The stand, by way of the traffic of gametes and larger sexual apparatuses, enables more traffic (ontogenetic and otherwise) that may allow the stand to persist across life spans of multiple trees. The symbiosis between ant and acacia trees demonstrates how forms of co-living are sustained through coevolutions of the traffic of organisms. The stand of ant-acacia complexes are able to persist because the ontogenetic traffic of the tree has produced a set of affordances for the ant (domiciles in its thorns and extrafloral nectarines for their sweet tooths) while the ant has evolved patterns of behavior to intercept the

traffic of insect herbivores. The ants further protect their host trees-cum-partners-in-living by mowing the grass around the base of the tree to prevent fires from traveling into its branches. The evolved caretaking of the ants speaks to the power of lines of traffic to stabilize around advantageous patterns of intersecting traffic. The ants maintain the highways (of the tree) such that both the copatterning of the arboreal highway (as ontogenetic traffic articulating with still other forms of traffic) and its ant traffic can persist in time and space.

Elsewhere, the ontogenetic traffic that produces ash trees produces habitat for the emerald ash borer. Ash borers – gorged on cambium – leave labyrinthine marks on the wood made through their explorative chomping. The ash borers in their appetite-driven traffic effectively girdle the ash and fatally interrupting its ontogenetic traffic. The scaffolding of the dead trees persists as a feature of suburban forests where they go on to interact as a feature and location of traffic. Humans attending to the spread of ash borers and the disposal of dangerous snags they leave behind become another player in the multispecies hullabaloo. But the ash borer can travel beneath human radar and across manufactured barriers (forests of ash are cleared to create a barrier to the pest's movement) by hitchhiking in camper's firewood. An advertisement campaign against the hauling of firewood is developed through the traffic of conservationists. Oh the many dynamics of a forest!

The forest is a patchwork forged in heterogeneous dynamics of traffic of evolved,

ordered, contingent, and utterly accidental character. As streams of traffic merge into the making of location they simultaneously transform the vehicles and the conditions for future traffic and place-making. Earthly traffic tends to occur within ragged horizonalities that I wish to call "canopies." The ontogenetic traffic of tree meristems generates the verticality upon which horizontal planes of activity are hung. The axes of action matter. Learning to perceive traffic is learning to perceive lines of activity in the geometry of ongoingness. The forest, however, is a noisy place.

It is a noisy place full of accidental collisions the consequences of which spill into reverberations (along branching paths of further consequence). Yet the forest is full of non-accidental gatherings that take place in coordinated meeting places and times that stabilize interactions between organisms. The cellular and intercellular filigree of lichen's fungi and algae are wrought in long-patterned (but still improvising!) intimacies made in deep time in the forest of rock surface to form the thinnest of canopies. It is with this image of the canopies of lichen that I wish to conclude this essay that has worked, among other things, to establish semiosis as part of the forest of happenings. Forests are being spoken. Traveling through the networks of traffic we reach junctures where the equations of lichen articulate with the equations of ongoing interactional texts. Lichen in all its associations belong in some (distant and not-so-distant) relation to speaking mouths and therefore to the equations that surround mouths: the math of mouths form a field whose structures in*form* the structure of lichens – contingent intimacies in a jungle of long distance relationships.

Landscape Studies from Car Windows

From the rearview window, from the side mirrors

a head that swivels

perception exits the car

through prescription lenses

into the road (blinking) onto the roadside

where vegetation makes an unruly low-lying pattern(lessness)

amongst which is scattered

the detritus of
human presence

the view in motion

underneath underpass

the more or less horizontal structure of vision

confined to a path engineered into the earth

heavily funded initiative

legacy of policy

part of the total motion

from a car you are

making a theory of that which exists outside the car (theory that is personal, opinionated, drafty,

subject to swift changes in direction and topic, of variable importance to the species)

the examination of an outside at the expense of an inside

an inside extensive with a motor, steel frame, wiper blades

you look *out into*

expend calories making (credible?) inferences, normative assesments

the theorizing going on simultaneous with the automatic and almost-automatic operation of the car

you are looking out into, steering the gaze

into vegetative borders, sprayed annually to set back succession

to set back what could serve as a rudimentary clock

looking out into

that which will pass through the gaze

to be filtered in the sticky (but highly degradable) stuff of memory

so much that is unseen despite the panoptical suite of mirrors

that allows vision to curve behind and create the effect of eyes on the back of heads

an augmentation of vision that, like all vision, is far from perfect

though is sufficient for impromptu theorizing of man in space,

organism-environment systems, semioticmaterial happenings:

landscape studies from car windows

Works Cited

Bauman, Richard and Charles Briggs, 1990. Poetics and performance as critical perspectives on language and social life.

Bourdieu, Pierre. 1990. Structures, habitus, practice. In *The Logic of Practice*. Standford University Press: Standford

Bourdieu, Pierre, 1991. Language and Symbolic Power. Cambridge: Harvard University Press.

Buttel, Frederick. 1998 Some Observations on States, World Orders, and the Politics of Sustainability. In *Organization Environment*. 11: 261

Casid, Jill H. 2005. Sowing Empire: Landscape and Colonization. University of Minnesota Press: Minneapolis

Clampitt, Amy. 1997. The Collected Poems of Amy Clampitt. Knopf: London

Clark, Jane, Terri Truly, and Sally Phillips. 1993. On the Development of Walking as a Limit-Cycle System. *In A Dynamic Sytems Approach to Development: Applications* Eds. Linda B. Smith and Esther Thelen. MIT Press: Cambridge

Escobar, Arturo. 2008. Territories of Difference: Place, Movements, Life, Redes. Duke University Press: Durham and London.

Gibson, J.J., 1995. The ecological approach to visual perception. Boston: Houghton-Mifflin.

Goffman, Erving, 1983. The interaction order. American Sociological Review 48: 1-17.

Goodwin, Charles, 2000. Action and embodiment within situated human interaction. Journal of Pragmatics 32: 1480-1522.

Goodwin, Charles, in press. The semiotic body in its environment. Prepared for: Justine Coupland and Richard Gwyn, eds, Discourses of the Body.
Geurts, Kathryn. 2002. Culture and the Senses. University of California Press: Berkeley, Los Angelos, London.

Hanks, William, 1992. The indexical ground of deictic reference. In: Alessandro Duranti and Charles Goodwin, eds. Rethinking context. Cambridge: Cambridge University Press: 43-76.

Hutchins, Edwin, Cognition in the wild. Cambridge: MIT Press
Ingold, Tim. 2000. *The Perception of the Environment: Essays on Livelihood, Dwelling, and Skill*. New York, London: Routledge Press.

Ingold, Tim. 2001. From Complementarity to Obviation: On Dissolving the Boundaries between Social and Biological Anthropology, Archaeology, and Psychology. *In Cycles of Contingency Eds. Susan Oyama, Paul Griffiths, Russel Gray.* MIT Press: Cambridge

Irvine, Judith, 1989. When talk isn't cheap: language and political economy: American Ethnologist 16: 258-67.

Kuletz, Valerie L. *The Tainted Desert: Environmental and Social Ruin in the American West*. New York, London: Routledge Press.

Kleinman, Arthur. 1997. "Everything that Really Matters": Social Suffering, Subjectivity, and the Remaking of Human Experience in a Disordering World. The Harvard Theological Review, Vol. 69. No. 3. pp.315-335

Laszlo, Pierre. 2007. Citrus: A History. The University of Chicago Press: Chicago and London

Latour, Bruno. 2004. *The Politics of Nature: How to Bring the Sciences into Democracy.* Cambridge, Mass.: Harvard University Press.

McPhee, John. 1966. Citrus. Farrar, Straus, and Giroux: New York.

Miller, James. 1998. An Environmental History of Northeast Florida. The University Press of Florida: Gainesville

Mol, Annemarie. 2007. *The Body Multiple: Ontology in Medical Practice*. Durham and London: Duke University Press.

Mukerji, Chandra. 1997. *Territorial Ambitions and the Gardens of Versailles*. Cambridge: Cambridge University Press.

Pinch, Trevor, unpublished. The invisible technologies of Goffman's sociology: from the merry-go-round to the internet. Prepared for the 50th Annual SHOT Meeting, Lisbon.

Reed, Edward S., 1988. The affordance of the animate environment: social science from the ecological point of view. In: Tim Ingold, ed. What is an Animal? London: Unwin Hyman

Silverstein, Michael, 2003. Indexical order and the dialectics of sociolinguistic life. Language and Communication 23: 193-229.

Smith, Linda B. and Esther Thelen. 1993. From the Dynamics of Motor Skill to the Dynamics of Development. *In A Dynamic Sytems Approach to Development: Applications* Eds. Linda B. Smith and Esther Thelen. MIT Press: Cambridge

Thomspon, John. 2004. The Geographic Mosaic of Coevolution. The University of

Chicago Press: Chicago and London

Tsing, Anna. Unpublished manuscript: Blasted Landscapes and the Gentle Arts of Mushroom Picking.

Tsing, Anna. Unpublished manuscript: Globalization and Nonhumans: On Multispecies Storytelling.

Wolf, Eric. 1982. Europe and the People Without History. University of California Press: London