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Life, Labor, and Value. Recreating Affective Food Ecologies Through Interspecies Cooperation

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Abstract.
As our most complex and intimate relationship with wider environments, food and agriculture provide important opportunities for exploring affective ecologies. Here I re-visit some of the ways that Modern constructs of humans as radically different from environments and of value as a function of exchange work to produce agricultural systems that are ever less affective and more problematic. In an effort to construct value in a way more applicable to the whole of our biosphere, and not only to humans, I take up an explicitly non-Modern Heraclitean perspective which conceives of all life as essentially relational. I then extend Marx's anthropocentric work to argue that all life labors to organize stocks and flows in environments which it finds useful and thus valuable. As co-adaptation illustrates, often produces value by finding usefulness in the by-products of other lives. Thus, we may understand ecological relationships as guided by the creation of abundance rather than the imposition of scarcity. From the Marxist tradition I then enlist the concepts of cooperation, which produces value synergistically, and exploitation which destroys the ability to create value, to suggest a basis for the evaluation of socio-natural trajectories, for creating more and less affective food ecologies.

Keywords: co-adaptation, mutualism, exploitation, naturalist intelligence, non-human agency

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Introduction

When deciding whether to buy produce at a farmers' market, consumers often balance two competing interests. The food is more expensive than conventionally grown produce, but it also seems better, for our health, or our environment, or for the nice people working at the market. Probably without knowing it, those who face this tension embody two dominant senses of value (Graeber 2001). A social/ethical sense of value addresses what is right, what is appropriate, what we ought to do in our interactions as individuals and as groups (Baldwin 2013). An economic sense of value focuses upon what we are willing to give to get the thing we desire is measured in dollars and operationalized in price driven markets. This sense also dominates global economies and neo-liberal governance.

On a global scale, this monetized sense of value has produced a food market which fails consumers, fails environments, and fails farmers and their communities. In the US, about 16 million people are malnourished. Another 33 million suffer from food insecurity (USDA 2014) in part because they cannot access the market, they do not have what economists call "effective demand", they do not have enough money. Worldwide, about 800 million people are under-nourished (FAO 2015b), the number of people living with insecure access to food, without enough cash to "enter the market" is far higher. It is important to note that malnourishment is not necessarily undernourishment. Over the past 40 years, agri-business firms have developed ever cheaper and more available products that threaten the health of the consumer. In 1911, beginning with the original Crisco, rich in trans fats – now due to be banned in the US – and progressing to ever more ready-to-eat foods made attractive with fats, salt, and sugar and more recently corn syrup, corporate prepared food is catalyzing epidemics in diabetes. Globally, adult type II diabetes rate is projected to increase from 2.8% (171 million cases) in 2000 to 4.4% (366 million cases) in 2030 (Shaw, Sicree, and Zimmet 2010). Adult obesity rates (BMI ≥30 kg/height in m^2) doubled from 5% of men and 8% of women in 1980 to 11% and 15% respectively in 2014 (WHO 2015; also Guthman 2011).

Modern agriculture is taking a toll on our environment as well. Driven by a moral sense of what was right and good, following World War II the United Nations along with the Ford and Rockefeller foundations, and several universities worked together to meet the needs of a rapidly expanding human population. The resultant green revolution operated through several technologies that have since degraded our biosphere. On the heels of war driven research into petroleum based chemicals, the green revolution promoted chemical fertilizers and a growing retinue of petroleum based "cides" (insecti, herbi, fungi). As Rachel Carson dramatically brought to light in *Silent Spring* (1962), these toxins degrade the health of plants and animals, including humans and especially field workers (Guthman 2004). As importantly here, these toxins have also widely degraded the soil communities that, through their life activity, make the nutrients in dead plant matter and animal waste available to plants. As a result, Modern farmers are dependent upon petroleum based fertilizers, much of which flows off fields, into streams, and causes algal over-growth and resultant hypoxic dead zones near estuaries, some of the most biotically productive and diverse areas of our biosphere. Combined with energy intensive large irrigation works, the unintended legacies of Modern farming are soil erosion, salinization, and the intentional sterilization of once vibrant fields (Brown 2012).

The green revolution and its agri-business successor have also failed farmers. First, agricultural development experts have promoted mechanization, powered by fossil fuels. As a result, fewer people are needed, i.e. can be employed in farming. New seeds have also worked to disempower farmers. Green revolution research into wheat and then corn

at CIMMYT in Mexico and at the International Rice Research Institute in the Philippines, and at public universities in other states produced high-yielding varieties of wheat and then rice and corn and then for other staple crops. Experts then taught farmers how to use these new seeds in coordination with petroleum based fertilizers to raise yields. Farmers were taught to plant extensive areas with a single strain, a technique which invited pest infestations requiring ever more pesticide application. These seeds replaced land races developed by farmers through hundreds and thousands of years of selecting and re-planting the seeds. Prior to the green revolution, farming communities had developed hundreds of varieties of corn and of potato and thousands of land races of rice, each adapted to specific growing conditions or culinary uses. These variations were generally available to any who could make use of them.

Though yields have risen, this modernization has changed the fundamental role of farmers. Through long experience working with crops and valued non-crop plants and animals, non-Modern farmers develop what Gardner calls *naturalist intelligence*, an ability to interact with food producing plants and animals in deeply knowing, caring, and sustainable ways (2006). Barbiero (2014) asserts that combined with a caring for the life in around their fields, these farmers produce *affective ecologies* – food producing socio-natural communities which, as I argue below, call forth a very different concept of value.

In a move to capture a greater share of the monetized value of agricultural production, agri-business has worked to further devalue naturalist intelligence. First by patenting the seeds that farmers must now purchase each year, Monsanto, Dow, Syngenta, and a few other transnational agri-business firms have essentially enclosed the market value of the plants that farmers grow (Acquaye and Traxler 2005). Ever more food producers now work as contract farmers. In such relationships people (not really farmers any more) are told what to grow and how to grow it, which products they must purchase from their contractors and how to apply it. As this political economy now spreads into sub-Saharan Africa, it has come to dominate meat production in the US. Increasingly the people who raise animals and now with privately held patents on seeds, people who grow crops, own neither the animals nor plants that they raise nor the value that those nonhuman beings create through their life processes.

Our food ecologies, once characterized by human families and communities engaged in profoundly knowledgeable and caring interactions with lively and productive forests, fields, streams, and seas (Altieri and Nicholls 2007; Ingold 2000) have been undone by market rationalism, supported by neo-liberal governance. Under that regime, agri-business has produced a global food/agricultural market which maximizes the market value of certain transnational firms. It has done so by enclosing revenue opportunities and externalizing costs. As a result our biosphere is degraded, rural communities are undone, and though more food is produced our health is often diminished. In short, the gesture of Modern agri-business is to undo affective communities characterized by deep caring for and extensive knowledge of local foodscapes. A liberalist concept of value underlies and rationalizes all of this.

My project here is to develop an alternative sense of value, one which empowers us to prioritize *naturalist intelligences* and a *caring for our biosphere* (Wilson 1984), *the pillars of affective ecology* (Barbiero 2014). As the readings in this special issue well demonstrate, we might pursue a variety of corrections in efforts to move us toward move vibrant relational ontologies, more caring ecologies (Bennett 2010). Each of these is further empowered by a more biospherically appropriate sense of value.

As a critical project, I first rehearse Western constructions of value across the second millennium, first as the product of Medieval bodies in intimate interaction with

agricultural fields and then as Modern monetized worth realized through market exchange. Having indicated the failings of market valuation above I then develop an alternative conceptualization of value which supports sustainable and lively human-environment interrelations. In re-conceiving a biospheric sense of value I take an explicitly non-Modern stance (Foucault 1970, Reiss 1982). Rather than drawing distinctions between humans and the rest of our biosphere, I suggest ways of understanding how we are alike through the lens of a biospheric and vibrant relational ontology. Towards that end I enlist work on alternative ontologies in the Heraclitean tradition which argue that we, that living beings generally, organize our selves and flows of useful matters in the spaces around us with the intention of extending ourselves in space and time. That we use and produce energy to build coherence around our selves as centers of caring.

I then draw upon Marx's ontological work to suggest that value, conceived as usefulness to life, arises from labor, from practical life activity. I extend that thesis and show that through co-adaptation the unintentional byproducts of life provide stocks and flows of value generally overlooked by economist and ecologists. Finally, I draw upon the development of exploitation and cooperation in the Marxist tradition to suggest a basis for the evaluation of alternative trajectories, for creating more and less affective ecologies.

Value in the western tradition

Value understood as monetized worth realized through market exchange has dominated Western discourse throughout the Modern period, However, that sense has not always been hegemonic. In the early Medieval period hermeneutic science saw value in adherence to God's plan. Poverty was seen as holy (Gurevich 1985, 8), and who had and handled money were analogized to over-stuffed intestines which "give rise to countless and incurable illnesses, and through their vices, can bring about the ruin of the body as a whole" (Policraticus quoted in LeGoff 1989, 17-18). Yet church leaders also recognized the social stability that coin represented and so defined value functionally, for what it could do, rather than as resident in coins/objects themselves (ibid, 215).

For the great majority of Medieval Europeans who made their living directly from the land, value was entwined with concepts of self that differed from Modern imaginings. People understood themselves to be among the things of the world, patterned after the divine order, and divine in one's bodily resemblance to that order. People understood themselves "caught up" in God's plan, and agency rested in a God who moved all things as He wished (Gurevich 1985, 32). Lacking individuality and agency, people imagined themselves as indistinguishable from their communities, and as intimately open to their worlds. Bahktin wrote that the leading themes of these bodies were "fertility, growth, and a brimming-over abundance. Manifestations of this life refer not to the isolated biological individual, not to the private, egotistical "economic man," but to the collective ancestral body of all the people" (1984, 19).

Bahktin explains that the body was understood as "in the act of becoming. It is never finished, never completed; it is continually built, created, and creates another body. Moreover, the body swallows the world and is itself swallowed by the world" (1984, 317). The Medieval body was understood to be:

incomplete and constantly intertwined with the earth which gives it birth and swallows it up again. The eternally renewed generic body was cosmic, universal, immortal ... The leveling of all barriers between the body and the world, the fluidity of transition between them — these are the traits of the Medieval popular culture, and, accordingly, of the popular imagination (Gurevich 1985, 53-54).

Medieval farmers understood time and their embodied being as cyclical rather than teleological. They understood that through

their labor, valued food emerged from the earth, passed through them, and through their efforts returned to the earth to emerge again.

People maintained the fertility of fields in several ways: through crop rotation, marling (Glacken 1976, 345), and through manuring, either through passive grazing on fallow fields or through the active collection and spreading of human and stock animal excrement. Indeed, human excrement became an especially potent fetish; conceived "as both a joyous and sobering matter, at the same time debasing and tender; it combined the grave and birth in their lightest, most comic, least terrifying form" (Bahktin 1984, 175-6). Excrement, and food, mediated between living bodies and regenerative earth. Through daily life, people experienced the links between their embodied product (excrement and labor), and the continuous product of land and seed. Excrement formed a link between animal life and plant life as certainly as eating linked plants' lives to those of animals (humans included). In his practical observations of daily life, Naturalist monk, Albertus Magnus (*c*. 1200-1280) understood value created through agriculture to be a reflection of the Divine. Glacken writes that he "in the need to know nature for religious and practical ends" Albertus understood the relationship between God, Man, and his environment as an unbroken "chain from theology to manuring" (1976, 351)—a very non-Modern conceptualization of value.

Prior to the resurrection of trade and urban living, through their own labor communities generally produced what they used, and used what they produced (Lefebvre 1991a, 263). As trade facilitated by money began to intermediate between production and consumption, the connection between labor and value became experientially abstracted, quantified through payment in wages rather than in things useful in and of themselves, and purchased through coin rather than something of immediate worth. Abstraction entered life through trade in money and through Modern laws and mathematics which homogenized relationships among people (Foucault 1970; Reiss 1982). As impersonal markets worked to dissolve previously personalistic relations (Ruggie 1993, 155), merchants working in an atmosphere of calculation further abstracted inter-personal relationships through flows of money and a new double accounting system (Crosby 1990, 27).

Even the basis of the value of precious things changed. By Medieval hermeneutic reckoning, jewels and coins made of precious metal were valuable for their likeness to the Godly and glittering stars of the heavens (Gurevich 1984, 217). This basis of value shifted and by the sixteenth century economists argued that coinage made of precious metals was prized for its ability to *represent* value which could be gotten with it through purchases (Foucault 1970, 169).

Thus, as burghers began to quantify time, individuate themselves, and compete in urban market economies, new concepts self as agent and of scarcity and finitude of time and life became dominant. As Foucault put it, by the nineteenth century:

what made economics possible, and necessary, then, is a perpetual and fundamental situation of scarcity… it designates in labor, and in the very hardship of labor, the only means of overcoming insufficiency of nature and of triumphing for an instant over death. … homo oeconomicus … is the human being who spends, wears out, and wastes his life in evading the imminence of death (1970, 256-257).

Scarcity among certain classes, and its management and elimination became a primary concern of Modern economics, particularly amongst liberalists.

Concerned to understand value as a function of trade and markets, Adam Smith's work proved canonical. In 1776, he argued that scarcity is not always endemic; however, exchange or market value can be realized by *creating* scarcity. Smith observed that "things we desire and are held commonly and in abundance, such as air, have no value. However, if a "*product in demand can be appropriated and enjoyed by a number of*

persons to the exclusion of others," it takes on value which can be realized through exchanges in markets (1828, 4: 82, italics in original). Thus constructing monopolies of access to the products of nature, i.e. commoditizing matters once commonly available, is understood to be a means of creating value where none was before. Yet clearly that condition may not lead to a greater abundance of the valued thing, and prohibits access to those unable to purchase the desired matter.

The environmental consequences of value so conceived are writ large across our biosphere. Through enclosure movements in Europe (rationalize by Locke 1988, 2: 19-34) and the dispossessions of lands in colonial and post-colonial spaces, elites have worked to create monopolies over access to land and land-products.[i] More recently, globalizing agri-businesses have created scarcity through their control of seeds and associated chemicals, and through wholesaler collusion to drive down farmers' profit margins. In response farmers must work ever more acreage and where possible are driven to clear more land. Small farmers, who still produce as much as one-half of the world's food (Maass Wolfenson 2013), are being driven out of business or forced into mechanistic contract farming.

As Weber (2013) explains, this Modern construct of scarcity as an organizing principle also pervades ecology, a second Modern science central to this essay. Darwin's thesis that scarcity, as the normal condition drives evolution clearly reflects Malthus's essay (1966 [1798]) predicting that famines would result from rapid population growth. Today the imprint of scarcity is seen clearly in energy focused ecologies which fixate upon trophic chains (1,000 kg of plants => 100 kg of herbivore => 10 kg of primary predator> = 1 kg of top predator). These imagine life as wasteful, but at the same time driven to efficiency by endemic scarcity. Following Darwin's scarcity thesis, evolutionary biology has organized itself around an assumption of poverty as a natural and virtuous driver of adaptation. Yet as Weber (2013) points out, Darwin never observed speciation occurring as the result of scarcity.

Smith's argument that matters as useful as air would have no value suggests a certain poverty of thought, and certainly does not describe life, human or otherwise, beyond markets. And so I suggest an explicitly non-Modern reconceptualization of value and of self which addresses what life does, and so allows consideration of our biosphere as imbued with vibrant agency. I seek a concept of value that encompasses the processes through which life finds and produces both value, and its antithesis for which we do not have a word – matters and processes that degrade value. Above all, this discussion views life through a lens of vibrant relational ontology (Bennett 2010), a position which begins with the non-Modern understanding that all beings exist through interactions with the bodies, products, and projects of other beings whose first and shared motive is to live.

Finding biospheric common ground

Modernity is marked by binary categorizations founded in difference, rather than inter-relation (Foucault 1970, Reiss 1982, Fracchia 1999). Such categories arise when different matters are compared along single axes of difference: e.g. sentient ⇔ insentient. Longhurst (1997, 490) explains that categories so constructed form mutually exclusive and mutually exhaustive poles. And because axes of comparison carry an implied normative quality, as either 'good' or 'bad,' our orderings are ethically hierarchical and so "describe systems of domination" (Grosz 1989, xvi).

Western categorizations of humans and nature thus construct humans as Godlike and Others the rest of life as lacking in such virtues (sentience, language, intent, value production or appreciation). As I develop in the discussion of (un)intentionality and value

below, this categorization scheme supports logics which find appropriateness in dumping waste such as greenhouse gases, pesticides, and waste into our global commons, so long as there is no monetized cost incurred. I join many others in suggesting ways to think differently about ourselves, to undo this human-environment binary. Towards that end I begin with the very non-Modern questions, how are humans *like* all other life, and how is life essentially different from non-living matter?

In seeking commonalities between human and nonhuman beings, in identifying what *life* does to continue itself, it is useful to contrast the most basic reaction separating living beings from non-living things. That difference is made clear in the absorption of solar energy by living plants and nonliving matters. Photons, the energetic waves in sunlight, change atoms that absorb them. Absent photosynthesis, atoms absorb and hold that energy for only one ten millionth of a second before re-radiating the energy at a lower frequency (Ho 1993). The energy is transformed but, in accordance with entropy, is released in a lower and "less useful" form (usefulness is poorly described here). In abiotic processes actions are impelled by what we understand as physical and chemical properties such as gravity, thermodynamics, and quantum mechanics (McDaniel 1983). Photosynthetic plants do something very different. Ho writes that "life has learned to catch the electron in the excited state, uncouple it from its [electron] partner and let it drop back to the ground state … utilizing its excess energy for life processes" (ibid, 56). Indeed, Lefebvre asserts that life normally produces surpluses of energy:

The living organism may be defined as an apparatus which … captures energies active in its vicinity. … It also, as a 'normal' thing, retains and stocks a surplus of available energy over and above what it needs …. This superfluity of energy is what distinguishes life from survival (1991, 176).

All healthy life obtains energy from its environments and processes that into stores for later use. Non-living matters do not do this. Their energetic interactivity is described by entropy. Living beings gather energy and then direct the expenditure of those energies to fuel its efforts to extend itself in time and in space.

Intention

Such self-directedness is a central point here. Humanists have long held that intentionality constitutes a central axis differentiating human from nonhuman life. This human exceptionalism is difficult to escape. Even among posthumanists who argue that human subjectivity is essentially a self-world hybridization (Badmington, 2000), non-representationalist conceptions of intent tend to still place human awareness at the center of networks/hybrids/*collectifs*. This persistent anthropocentrism is evident in Latour's (2004) representative example of nonhuman agency recounts how snail darters, a small fish native to the Little Tennessee River stopped a major dam project in 1973. However, as Latour explains, it was the new consciousness of the threatened species among anti-dam activists who then sued and stopped the dam project (see also Lorimer 2006 and Braun 2008a, 673). The snail darters in fact *did nothing* to stop the dam but exist. However, *collectifs* may be very intentional without the central participation of humans.

One cannot use human language to ask a plant about whether efforts on its own behalf are intentional; however, directedness may be understood as the performance of intention. Even bacteria employ tens of receptors to identify matters they can use and then work to move to and stay near favored food molecules (Mortensen 1987, 127). Working from an ontologically relational feminist perspective, Massey (2005) points out that all living beings author their own trajectories and negotiate the trajectories of others. All life works to sustain and continue itself through directed efforts. In the same vein Plumwood observes that in so doing life performs intention:

To a more sensitive and less human centered view, the plant world includes fully intentional others whose strivings, interactions, and differences in life strategy are intricate, amazing and mysterious. … To all living creatures we may clearly ascribe a teleology or overall life-goal…. Trees appear as self-directed beings with an overall 'good' or interest and a capacity for choice in response to their conditions of life (1993, 134-135).

The intention of life is to live. That intent is manifested in living entities' efforts to produce themselves and their space. In those efforts life is directed and intentful (see Sterelny 2001). Keystone species, such as beaver clearly co-direct projects and with nonhuman others in ways that can significantly alter landscapes.

Behavioral scientists continue to provide new evidence that nonhuman beings are intentful. Even bacteria move decidedly towards food (Mortensen, 1987, 127). That beaver and other species choose optimal sites for their dwellings (Naiman et al. 1988), and that animals such as Satin Bowerbirds incorporate colorful themes, such as plastic bottle tops all of the same color (Milius 2000) in their flamboyant nests provides evidence that such behavior is not solely instinctual. That plants, animals, and even communities generally prefer (choose) behaviors that lead to their enrichment and persistence rather than to their impoverishment and death further demonstrates intent. This intentful preference begins to suggest a sense of biotic valuing.

Autopoeiesis

Grobstein asserted that life is uniquely "characterized by replication, metabolic turnover, and exquisite regulation of energy flow constitutes a spreading center of order in a less ordered universe" (1964, 1). Unlike non-living matters, living beings are self-organizing, they are "materially embodied processes that bring forth themselves" (Weber 2013, 30). Thinking about life in terms of process rather than object, evolutionary biologist Ho suggests that living beings may be understood as fields of coherent activity (1993, 178). She asserts that in their metabolism living beings:

[C]an mobilize the whole spectrum of energies for work …[Life activity] has not so much to do with free energy…, but with the way energy is trapped, stored and mobilized within the living system. Energy is trapped directly at the electronic level. It is stored not only as electronic bond energies, but also in the structure of the system; in gradients, fields and flow patterns…. All this in turn enables organisms to mobilize their energies coherently (ibid, 71).

Understood as consistency, connection, or contiguity arising from some common principle or relationship, *coherence* allows us to think in terms of caring selves who organize spatial flows in dialectic with active and inactive others. It allows one to imagine unbounded selves, centered in concern for their own life; all constituted by flows which circulate through environments and bodies. Coherence works to undo self/world dichotomies without annihilating the individual. Coherence allows one to address what life does, rather than what humans do and what nonhumans do not do.

The dialectic aspect of coherence also serves to challenge mechanistic metaphors for living beings. Genetic determinists still entranced by the life-as-mechanism metaphor attribute such activity to DNA structures; however, that inherited information only guides or constrains spatial form and behavior. This is well demonstrated by an experiment conducted by a group of scientists from Stanford University in the 1930s in which clonal starts were cut from a single plant and replanted in various California climates (Lewontin 2001). Though genetically identical, the plants grew in ways that reflected their new surroundings, each with distinct forms. Indeed, since 2006 the peer reviewed journal *Plant Signaling and Behavior* has offered good evidence of plants' ability to interact, to learn, to remember, and to adapt their somatic form to be appropriate with their environment (see also Trewavas 2014).

Socio-spatial being

As organisms adapt their bodies to environments, they also work to adapt environments to their needs. In accord with Greek philosopher Heraclitus, Serres (1982) characterizes living bodies through *diarrhesis*, as forms through which environments flow. Moderns, fixated upon Leibnitzian atomism, understand living bodies as clearly bounded objects. However, our bodies may also be understood as processes (Martin 1998). Dossey observes that

When we view our physical boundaries with pinpoint accuracy, they are so fuzzy as to be nonexistent. With each bodily movement, we trail such a haze of chemicals, vapors, and gases behind us that we resemble out of focus images. … Not only are we constantly blending physically into the world and our environment, we are blending into each other. … Many of the elements that comprise our bodies were not born on Earth but were recycled through lifetimes of several stars before becoming localized on our planet. Thus, not only are our roots in each other, they are also in the stars. We are literally star stuff (1990, 79).

Thus, living bodies are reasonably consistent in form, but dynamic in substance. Even the molecules that make up our bones stay with us only for about ten years.

As we organize our bodies, as living beings we also work to organize the flows of matters which we value and add value to. In so doing we produce certain spaces. I do not mean to say that life produces space itself, but that it produces particularities of space, it affects space. Through our life activities we transform what is there into something it was not before. As Lefebvre observes, "The release of energy always gives rise to an effect, to damage, to a change in reality. It modifies space or generates a new space" (1991a, 176). Serres (1982) explains that life is not only constituted by coherent flows, life works to create and organize those flows, a process he calls *syrrhesis*, or flowing together. From an evolutionary perspective Grobstein observed that for all life "Among the mechanisms that have proved successful are those that that extend *into the environment* the homeostatic consistency of the organism (1964, 111).

Agency

From a posthumanist perspective, a more-than-human sense of agency suggests that coherence is an essentially inter-relational process (Braun, 2004a). Hinchliffe (2007) and Braun (2008a) explain that in the Western tradition agency has been located in particularly qualified and very specific human bodies (Callon and Law 1995). Network and hybridity theorists (e.g. Whatmore 2002; Latour 1993; Haraway, 1992) argue that agency is manifested through relations with and between humans and nonhumans. Hinchliffe enlists Law's (2004) conceptualization of *agencement* to argue that agency arises through "a suite of stories, practices, technologies, animals and people … an active combination of technologies, ways of proceeding, their arrangements and their ongoing, unfolding nature" (2007, page 38). Agency in this sense is still/always in the act of unfolding, becoming, emerging.

Graeber (2001) goes so far as to argue that value itself rests in relationships, in process. I disagree and suggest that this reproduces a Modern either/or trap. In response to such polar thinking Lefebvre observed that while "Around the living organism, both those energies which it captures and those which threaten it are *mobile*: they are 'currents' or 'flows.' By contrast, in order to capture available energies the organism must have at its disposal apparatuses which are *stable*" (1991, 176). Just as we are both ontologically stable and dynamic, matters that are useful to us are both object and process, often simultaneously. The seed of a corn plant bred to grow well in volcanic soils at elevation with full sun is a thing, co-produced by people before me in concert with the plants and the specific environments they've adapted to over many generations. It is a thing, it is also a process, and it is also the configuration of many relationships.

This inessential and extra-categorical nature of value is captured in Callon and Law's

argument that "by themselves, things don't act. Indeed, that there are no things 'by themselves.' That instead, there are relations, relations which (sometimes) make things" (1995, page 497). They suggest that agency is performed by *collectifs*, emergent effects "created by the interaction of the heterogeneous parts that make it up" (ibid). Thus, agency rests in the affective relationship itself, rather than in specific actors. But value may rest in relations, *or* in the things they make.

The next question then is how do we understand life to do this, to access matters it needs and create matters of greater worth? How does life create value? Marx's ontological theorization of labor and value provide insights.

Value as usefulness created through labor

Throughout Modern history, certain economists have attended to the role of labor in creating value. In the eighteenth century the French physiocratic school argued that the value produced by labor was equal to the cost of labor, and that surplus value arose not from labor but from the productivity of nature (Foucault 1970, 193), what we call ecosystem services today. Along similar lines Smith argued that in manufacturing labor was simply paid for the value it added, and that profit arose from market conditions and scarcity (1828, 2: 93). Alternatively, in the early nineteenth century Ricardo argued that the value of a commodity was in fact the result of and measured by the labor contained in a commodity.

As Marx laid out his relational and materialist ontology, he argued a rather different relationship between labor and value. In the opening pages of *Capital* (1976, 126) Marx, citing Locke (ibid fn 4), asserts that value lies in usefulness and writes that: "The natural worth of anything consists in its fitness to supply the necessities or serve the conveniences of human life." In this sense, value lies in usefulness. In the thrall of Modern human-exceptionalist constructs, Marx insists that value and usefulness are co-produced by uniquely human sensibilities. Here I dismiss that historical affect and suggest that this is true for all life.

Marx worked to construct people as essentially material and relational beings. He reasoned that we were fundamentally engaged in dialectic relations with other people and with our environments. In his *German Ideology* he observed that we produce value by mixing matters "from nature" with our "practical human activity" (1972b, 74; also 1967, 177). This fundamental process provides a fruitful basis for reconceiving value. It suggests that one might understand value as a functional rather than an essential category; a category based upon what things do, rather than what they are. Functionally, value lies in things, relationships, processes, environmental qualities in which life finds usefulness as it pursues its various projects and trajectories.

Consistent with the idea of syrrhesis, Marx also argued that through mixing matters of the world with our labor we also invest labor and so value into nature/space. In so doing we alter, we enrich, we invest value in biospheric spaces (1972b 145-160). He explained:

Animals and plants which we are accustomed to consider as products of nature, may be, in their present form, not only products of, say, last year's labour, but the result of the gradual transformation continued through many generations under human control, and through the agency of human labour (Marx 1976, 287-288; and earlier in 1972a, 116).

Thus, value may be produced in excess of the producers' need. And in a self-actualizing socio-ecology the results of other's labors are available to us in biospheric spaces. Thus, we, and life more generally can be understood to act both autonomously and interdependently (Weber (2013). Organisms are autonomous in their self-caring, and they are dependent upon the products, the valued matters made by others. In breeding a plant better adapted

to wet soils, for example, we create value not only for ourselves, but for others who might also benefit. As a result, the matters we work upon are themselves often the products of the labors of other beings.

(Un)Intentionality and value

Thus, through labor, i.e. practical life-activity, organisms alter biospheric spaces and effect relationships. The intended result is to create value for the organism and/or for others that it cares for or about. But life also finds value and harm in the unintended byproducts and waste that laboring organisms also produce. A market focus directs attention away from these externalities. Yet as I detail in the introduction, those effects can cause very real harm.

Williams addresses the resultant myopia with regards to the by-products of human industrial activity. He explains that because we have imagined ourselves separate from 'nature,' that is where we project our "unacknowledged activities and consequences" (1980, 81). This would not be such a problem, Williams asserts, if we were not in fact so profoundly inter-related with nature, with "the environment". He writes that:

we find it very difficult to recognize all the products of our own activities. We recognize some of the products, and call all of the others by-products; but the slagheap is as real a product as the coal, just as the river stinking with sewage and detergent is as much our product as the reservoir. … Furthermore, we ourselves are in a sense products: the pollution of industrial society is to be found not only in the water and in the air but in the slums, the traffic jams, and not these only as physical objects but as ourselves in them and in relation to them (ibid, 83).

Though unintended, byproducts are no less effective.

Byproducts may also be very useful. Amongst ecologists, those focused upon energy exchange may miss unintended yet valued spatial amenities, and those focused upon scarcity may miss the abundance the byproducts may create (Weber 2013). Examples abound. Native to Northern India, neem trees follow their own life trajectories and projects (Massey 2005; Plumwood 1993): their roots grow towards water, their branched grow toward full sun where their leaves produce nutrients through photosynthesis, the resulting carbohydrates are metabolized to produce biomass, and they produce an excess of seeds for their own reproduction. The trees also produce and invest chemicals in those seeds which interfere with molting, reproduction, and digestion among over 200 insects. Thus the trees inhibit populations of organisms that might harm or kill them. These are some of the 'intended' objects produced by the trees for their own use (ibid, 134-135).

The trees also produce potentially matters useful to others, but not to itself. Nearby plants and animals may also benefit from the trees' insect repressing matters. The trees also produce byproducts in the form of shade which cools nearby terrestrial and aquatic environments. Their branches provide living spaces and shelter for birds, insects, reptiles, small mammals, and other plants. The trees produce an excess of nuts which are edible to mammals, and spent leaves fall to earth and become food for soil communities. All of these values are enjoyed by others able to adapt to use them with little or no cost to the tree. This facilitation becomes mutualism when partner species produce matters valued by the trees. Animals defecate or die near the tree and so provide nearby soil communities with matters from which they make phosphorus and other nutrients available to the tree itself. Other co-inhabitants eat organisms that might diminish the trees' vitality. Still others help disperse the trees' seeds away from the parent assisting the trees' population continuance in time and space. Such cooperative mutualism increases as populations co-adapt to find usefulness in the byproducts of their neighbors.

Abundance

Though scarcity has long been a foundational concept in both liberal economics and evolutionary ecology, it seems that life may

be better described through abundance, through a surplus of value. Neem trees produce far more seeds than is required to reproduce themselves. Indeed, most plants and many aquatic and marine species produce thousands and even millions of seeds and eggs even though the populations of all non-threatened species are far larger than necessary for species continuance. Weber (2013) goes so far as to argue that life is normally inefficient, at once benefitting from abundance of value while also creating that abundance of matters, of bodies, of relationships, of species. Lefebvre observes that surplus production of value is the norm and that an economics based in scarcity "is biologically or 'biomorphically' inadequate. It is a low-level principle applied only to situations where a short supply of energy calls for restrictions on expenditure. It applies, in other words, only at the level of survival" (1991, 176).

Ecologically, scarcity is not the normal state. Rather it describes only spaces deficient in critically valuable matters such as water, sun, nutrients. Absent those constraints, given time life proliferates as it embodies value, invests value into environmental spaces, and organizes flows of value, all through labor conducted out of caring for self and others. Economically, scarcity is the normal state only where markets prevail. Though capital endeavors to colonize everyday relations (Lefebvre 1991), Gibson-Graham's *oeuvre* has focused upon the limits of capitalism and the depth and breadth of economies that operate out of caring: creating family, building community, mentoring, all the value-creating things we do to produce abundant and vibrant material/relational human life.

Models for less and more lively food production

Exploitation

In a Marxist sense, biospheric relations may be understood as more exploitative or more cooperative. Though Marx himself became focused upon exploitation as it affects human labor, Young (1990) provides a more widely useful formulation of the concept. She asserts that exploitation occurs when more value is taken than is returned. The one-sided appropriation of matters produced and valued by nonhuman beings from biospheric spaces has been a central gesture of capital. This is the root of primitive accumulation (Harvey 2003), wealth accumulation through the enclosure and dispossession of spaces laden with values that can be stripped and sold in markets. In many cases this exploitation has degraded or destroyed locally valued biospheric processes, now often referred to as ecosystem services (Costanza et al, 1998).

Perversely, in many cases where industrial byproducts have degraded or destroyed ecosystem services, capital often steps in to replace the lost flows of value. Thus capital circulation expands through the destruction of ecosystem services. The agro-industries that produced the chemicals that killed soil communities are the same that then produced and sold fertilizers. Modern agriculture is foundationally exploitative.

Cooperation

Marx argued that communities are self-actualized by doing the opposite (1972b). Rather than taking more value than given, successful societies produce surplus values and share them cooperatively, taking no more than is given, and often contributing more value than is consumed. What Marx held to be true for human communities is equally applicable to biospheric communities. Life is life, value is value, and labor is labor. Human integration with wider biospheric flows of value are nowhere more immediate than in agricultural production.

Human cultivation and caring for the value produced by nonhuman partners is hardly a recent innovation amongst agriculturalists (Rosset et al 2011). Many non-Modern cultures value the excess, byproducts, and waste produced by partners in agricultural ecologies. Such partnerships are evident in

the extensive dark soils in and Amazon basin produced by Neolithic farmers (Glaser et al 2000), among wet rice paddies in Southeast Asia which have been in continuous production for hundreds of years without off-farm inputs, by pre-Modern three field rotational farmers in northern Europe, by shifting cultivators who have exquisitely managed fertility and production in wet tropical environments.

Amongst contemporary Western farmers, agro-ecology techniques mimic and extend these trans-species cooperative practices (Altieri 1995). Many agro-ecology efforts build upon four themes (Pretty 2008; Altieri and Nicholls 2012). Bio-control, also called integrated pest management has farmers enlist certain insect, plant, and vertebrate populations which control, but do not eliminate other problematic (pest) populations. Intercropping both provides a variety of habitat for insect, bird, and microorganism partners and decreases infestation risks by avoiding monocropping (a farmer in Matanzas, Cuba told me that biodiversity was his best pest control). Agro-forestry maintains soil moisture and habitat-rich forest structures while also producing food, richer soils, and providing resilience following storms (Holt-Giménez 2002).

Composting and vermiculture actively partner with micro-organisms and invertebrates to convert waste into fertile soil amendments. In a review of the efficacy of these techniques, Pretty et al (2013) find that among 40 different projects in 19 sub-Saharan countries, across 11.3 million hectares, and over the course of 3-10 years, small holders more than doubled their annual production. Over the past several decades geographers and anthropologists have further documented what is often called indigenous technical knowledge, naturalist intelligence that allows pre-Modern farmers to manage often very difficult conditions while farming in modes that are sustainable and actually cultivate biodiversity and resilience (Tsing 2005; Hecht and Cockburn 1989; Dove 1985).

In the US, the hearth of highly exploitative commercial agriculture, even conventional farmers are beginning to appreciate the benefits of allowing non-crop life in their fields. In 2014, about 35 percent of all crops were planted using conservation tillage techniques. These modes of planting seeds leave soil communities and some cover vegetation in place and so decrease erosion and increase soil nutrient content and moisture retention. While Natural Resources Conservation Service agronomist Ray Archuleta referred to this as a "massive paradigm shift" (in Goode, 2105), Texan farmer Terry McAlister more closely reflects findings of research into conventional farming adaptation to climate change in California (Jackson et al 2011 and 2009): "My goal is to improve my soil so I can grow a better crop so I can make more money … If I can help the environment in the process, fine, but that's not my goal" (ibid).

Paradigm shifts

Like most farmers in North America, Mr. McAlister remains enrapt in a Modern sense of value and self. He understands "his soil" and his land as something different from "the environment", something that he does not particularly care about. Like most Modern farmers he has become a knowledge receiver instead of a creator – he is told that if he does not turn his soil and otherwise destroy the communities that produce fertile soil, he will be able to spend less on chemical fertilizer and cut costs.

Does conservation tillage allow livelier and so more resilient agriculture? Clearly it does. But a shift to conservation tillage does not constitute the re-establishment of affective food ecologies. And the political economic structures that work to the benefit of agri-business remain in place. Under market logics, anytime yields increase, from conservation tillage in this case, farm-gate prices drop. Mr. McAlister and his peers will continue to face ever decreasing monetary returns per acre, and monocropped farms

will have to expand. To become more efficient (i.e. to cut expenses), farmers will continue to externalize costs. Farms unable to expand will perish, and often communities with them. Surviving communities will be harmed by some of the toxic externalities. Processed food manufacturers will continue to find new ways to market (i.e. to create desire for and access to) the increasing supplies of soy, corn, and palm oil in the form of tasty, faddish, obesity and diabetes engendering foods.

If we, farmers and consumers alike, were to think about value as I develop it here, we might expect a different result. When we think of value as what is useful to life and truly respect the lives of others, if we were to see ourselves as essentially vibrantly interdependent upon our biospheric partners, if we were to eschew harmful externalities because we get that "the environment" flows through us too, if we were to champion affective food ecologies, agriculture might look very different.

This isn't conjecture. Agricultural systems which work through alternative and often affective ecologies are not a fringe movement. Thousands of communities and millions of households now live in accord with this ethic. Some estimate that over one half of the global food supply is produced on small farms (Maass Wolfenson 2013). Many of these farmers have deep knowledge of and caring for their nonhuman and human communities. Programs sponsored by the UN Food and Agriculture Organization (FAO 2015a), government extension services, and numerous non-profits are helping farmers regain lost naturalist knowledge and re-vivify agro-ecological modes of food production, often using traditional cultivars. Through efforts like their *campesino-á-campesino* program in which farmers share their growing naturalist intelligence, La Via Campesina has become the largest civil society organization in the world (Rosset 2008; Desmarais 2012). And these affective ecologies continue to face challenges agri-business, from development programs, from government initiatives, and from corporate land grabs.

We *can* think differently. We can change our notion of value as the West did in its transition from Medieval to Modern frames. Understanding value as the product of lively labor whose surpluses infuse our shared spaces works to undo scarcity, to undo the logics supporting agri-business. It also suggests what one ought to do if interested in restoring biospheric vitality and resilience—work to decrease exploitation and increase cooperation manifested in biospheric liveliness.

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[i] In his *Second Treatise on Government* Locke argued that "God gave the World to Men in Common; but since he gave it to them for their benefit, … it cannot be supposed that he meant it should always remain common and uncultivated. He gave it to the use of the industrious and Rational, (and *Labour* was to be *his Title* to it;)" (1988 2.34).