Free-Range Humans: Permaculture Farming as a Biosemiosic Model for Political Organization

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Abstract Modern agricultural approaches attempt to substitute biological self-reinforcing networks, which naturally sustain healthy food economies, with technology that seeks to control nature — not work with it. Artificial solutions (caging, pesticides, genetic engineering) tend to address symptoms of problems that the artificial approach has itself created. The great error of modern agriculture is the assumption that Nature is not intelligent. In fact, we can learn much from natural smart technologies that far out-perform recently invented artificial "smart" technologies. These lessons can also be applied to other political and economic systems, allowing self-organization to foster creativity and intelligence in the populace at large.

Keywords Semiotic scaffolding · Henry George · Permaculture · Biosemiotics and politics · Monetary theory · Heterarchies

Introduction

When co-editor of this volume, Jonathan Hope, invited me to think about food from a biosemiotic perspective and to take part in a panel on the topic for the 2018 Biosemiotics gathering in Berkeley, I hesitated. I'm a farmer so I have a deep and complex relationship with the food I eat. In addition to vegetables and fruits, I raise chickens and sheep for food. There's no sugar-coating it; I am red in tooth and claw. I have eaten many a *coq au vin* and mutton curry whom I had known by name. I often wonder if I am more or less ethical than the coyotes I fence out of my pasture.

What is my primary role, predator or provider? I am no ordinary omnivore insofar as I have greater semiotic capacity than my fellows. I can reflect on my actions.

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To be sure, deciding upon an ethical way of treating and living with our Earthmates is not easy. To consider eating meat as a *moral* issue smacks of religiosity, supposing that there is a static or divine sense of right and wrong, good and bad. *Ethics*, in contrast, is associated with secular government, business, or medicine where the definitions of right and wrong, good and bad are arrived at through convention, agreement and use. The former is idealistic; the latter is pragmatic in C.S. Peirce's sense. I see myself, at worst, as just another predator in the ecosystem. I would not advocate veganism or vegetarianism for the coyotes, foxes, coy-wolves, bobcats, bears, hawks, snakes, or other carnivores and omnivores that live around my farm in the Harlem Valley of New York state. Each play a role in maintaining the ecosystem. From my participation within this system, my ethical maxims emerge, for example: don't eat more than you need to; don't waste lives.

As a biosemiotician I am not so interested in ethics as I am in another, related issue. In this chapter, I argue that what makes a course of action or system of organization *intelligent* is the degree to which *semiotic freedom* is fostered. All natural complex systems which support life are intelligent in this sense. Permaculture farming methods, which I use, more or less, tend to mimic a natural complex ecosystem. Industrial farming practices aren't intelligent insofar as they use a strictly top-down control approach. My research interests have long focused on identifying and describing the behaviors of mindless distributed systems that allow intelligent behavior to emerge from the network of interactions. Even so, mind emerges from mindless neurons. I argue that intelligence can only emerge from a distributed system in which the interacting individuals enjoy freedoms that are enabled by constraints. The extent to which the individuals—be they cells, organs, or organisms—making up a system have the ability to *interpret* and even *mis*interpret the world around them—and not just react mechanistically—determines whether or not the system as a whole can behave intelligently, that is, intentionally, adaptively and creatively. (The precise biosemiosic definition of "interpret" will be explored in detail throughout this chapter.) Ethical and intelligent farming practices are those that allow the individuals in the domesticated ecosystem to fend for themselves a bit and require the farmer to provide material enclosures and other enabling constraints that help the animals help themselves and, in doing so, help others. Industrial farming treats animals like cogs in a machine. The consequences of their behaviors are kept at a minimum. Mainly the will of the animals is replaced by the power of fossil-fuel machines that do the work that early farmers would have relied on other animals—and plants—to do. Using permaculture farming as an illustration of an intelligent system, I will pull out abstractions and general definitions in order to use them to judge how and under what circumstance a society, economy or government can be considered an intelligent system.

This is not to say that biosemiotics-inspired governance could create a utopia or that there is no injustice or suffering in nature or on a permaculture farm. As Death so infamously remarked once, "*Et in Arcadia Ego*." All ecosystems digest semiotic beings.

KING CLAUDIUS: Now, Hamlet, where's Polonius?
HAMLET: At supper.
KING CLAUDIUS: At supper where?
HAMLET: Not where he eats, but where he is eaten. A certain convocation of politic worms are e'en at him. Your worm is your only emperor for diet. We fat all creatures else to fat us, and we fat ourselves for maggots. Your fat king and your lean beggar is but variable service—two dishes but to one table. That's the end. W. Shakespeare (*Hamlet* 4.3.19–28)

Hamlet notes the human being's (rather inglorious) position within a material recycling process. The amazing "piece of work" that is Man is not just an eater of food but is eaten, and the Great Chain of Being joins itself into a loop. (If I—eater of vegetables, roosters and rams—were at my death to be recycled in my own compost pile, that would be poetic justice.) Hamlet's remark alludes to Martin Luther's condemnation at the "*Diet* of Worms," (a 1521 *meeting* in the city of Worms), a phrase in which Germans may recognize no humor, but which cannot fail to make English speakers giggle. The lines suggest that the person on which the Polonius character was based was part of the Reformation, an attempt to reduce the hierarchical control of church over the individual, giving people more freedom and responsibilities. We may suppose Shakespeare thought of the maggots that will recycle the body of Polonius the Reformer because of the pun, a willful *mis*interpretation. In this quote we find the main themes of this chapter: puns, power, control, cyclical reciprocity, freedom, and freewill, all of which I will explore through a theory of sign action.

An Intelligent System Is Held Together with Semiotic Scaffolding

Libraries and genes and governments and digestive systems are all, indeed, the products and producers of semiotic scaffolding. D. Favareau (2015: 243).

Networks of interactions exist in natural ecosystems; one organism depends on the by-products of another, which depends on others, until all life, watery brine and mineral crust are interconnected in a massively complex adaptive system displaying what Bruce Clarke (2019), the 2018–2019 U.S. Library of Congress Astrobiology Chair, calls a kind of "planetary cognition." The relationships between and among organisms and their environments can be described as *semiotic* because they are formed when the individuals respond to signals, which they subjectively recognize, in ways that aid in their survival or ability to adapt. After eons of such intentional actions, everything hinges on everything else. And because the relationships are interpretive, not set in stone, they are robust and can continue, even when some expected relationships fail. Interactions often help create and maintain material structures: shelters, pathways, and physical divides. Think of the consequences of a beaver dam or a migratory route of geese. Jesper Hoffmeyer (2008b) calls these inherited innovations—habits, tools, instincts, structures, and culture—that both help create and are created by each other, *semiotic scaffolding.*

Many non-human animals can be said to have their own culture which is passed on to succeeding generations and becomes part of the immaterial and material

structure of an ecosystem. On my farm, generations of crows have dined at the compost pile near the barn; the territorial crows, in turn, protect my chickens from hawks, who are pushed to the perimeter near the vegetable garden where they seemed to have switched mainly to a rabbit and vole diet. These rodents migrate to the farm from the surrounding swamp and woods to try to enjoy the richer table of my garden but, in doing so, they lose the security of the cover of their natural habitat, which makes them easier prey for the raptors. A pair of red-tail hawks raise their young in my teenage son's lately unused treehouse perched high on one-treed hill, and while my garden functions as bait for the hawk prey, the garden is practically rodent-free, saving bushels of food from damage. Meanwhile in the pasture, the free-range chickens, unmolested by the hawks, follow sheep around because they scare up insects as they graze. Sheep are skittish and jump at the sight of a slinking animal and the chickens are warned by their movement. Foxes, who prefer an easy meal of wild berries, snakes, mice and squirrels, only seldom invade the farm, taking on one of our valiant roosters while the hens fly to the trees. The chickens sound the ground predator alarm (a squawking ruckus that I've learned to distinguish from the very similar daily "I just laid an egg" announcement and also from the "sky predator" alarm, which is answered by the crows, not me). Our dog is rallied or I come out yelling and waving my arms to chase the fox off the rooster.

A good rooster is essential; he breaks up hen fights and when he finds a juicy grub, he calls out with a specific "juicy food" signal and gives it to a hen who is always "eating for two." I lose a good rooster every year, but I can afford to keep extras because forage abounds, mainly from the seeding grasses, the feral raspberry bushes along the boundary and five mulberry trees dotting the pasture, whose ancestors were probably cultivated by first homesteaders in the 1750s precisely for this purpose. There's so much wild forage, in fact, that a blind hen in our flock, pecking randomly and feeling around, has managed to thrive—her continued survival shows that natural selection has been neutralized by resource abundance and her network of protectors. This hen, Sydney, invented a completely original call to communicate with humans. When she wanders off and gets lost (which happens often) we sing out, "Sydney?" and she replies with her signature four-part musical phrase, and we play marco-polo until we are reunited. When invasive Japanese beetles were turning our grapevine leaves into lace, Sydney discovered that if she struck the trellis with enough force, the tasty beetles got knocked loose and rained down. The other chickens have since learned her trick.

Everywhere I look on my little five-acre farm, there are relationships across time and space and species which, though built upon instinct, are largely adapted through learned experience and have evolved into our distinct farm culture. This culture is intelligent insofar as it is self-reinforcing and increases the overall productive capacity of the farm as a whole. My stories illustrate that animals are capable of tool use, planning, cooperation, and altruism. They are creative and smart because I give them room to be responsible for their own survival. I just provide a minimal amount of protection and social security, a safe barn to sleep in and food in the winter. Each hen pays me back for my trouble with one protein-packed egg every single day and the sheep provide wool, take care of the landscaping and help make the soil rich for

the vegetables. There is more than enough food for my family of three to eat fresh produce all summer and preserved foods throughout the winter. The permaculture way allows me to spend about as much time farming as a retired suburbanite spends taking care of ornamental gardens and house pets. I let the ecosystem work with me as much as possible because together we're smarter than I am alone.

All natural ecosystems integrate and constrain individuals such that they retain autonomy, and we can even go so far as to say it is the constraints themselves that engender autonomy (see Cobley 2016). When you hear the term "systemization" you may think of a loss of freedom of the system's subjected parts. In popular culture, farm animals, office workers, factory workers, soldiers, or students are sometimes figured as cogs in a great machine, meat for the grinder, or bricks in the wall. But, of course, a human is a social animal and can't exist for long without society, and with society comes constraints. Healthy human social organization needs governing laws—algorithms that are meant to eliminate personal biases and treat everyone equally. But these laws should not crush individuals under the weight of bureaucracy. Laws should help citizens help themselves.

Unfortunately, it seems no matter what kind of social-political structure we adopt—democracy, communism, socialism, free-market capitalism, anarchy—power tends to concentrate over time and to monopolize the wealth that is created by the semiotic scaffolding, that is, by the community interactions, the networks, the shared conventions, the public infrastructure, sovereign currency, laws and other enabling constraints. To name a half-dozen examples of how community wealth is pilfered: (1) much of the value of a plot of land in a city is not inherent in the land itself, nor anything that the landowner has done to it, but in its proximity to a community of people and public infrastructure; (2) the value of a social media site is found mainly in the content provided by the user community; (3) the value of a platform like Uber is found mostly in the labor and capital investments of the drivers, not in the platform software owned by the corporation; (4) much of the value of a business that requires a specific type of licensing may inhere in the limited access to the license not the business activity itself; (5) the ability of a business to capture a market through merger and acquisition may depend more on access to cheap loans than to the superiority of the business, and (6) an invention may be more a product of an evolving knowledge base than of the insight of those who hold the patent. In each of these cases a small group of people have gained control over what should be public infrastructure or a marketplace, in which the free exchange of ideas, goods and services should be enabled for all, without inequitable benefit to the providers of one specific kind of service. All have right to the fruits of their labor and capital risk, and all have right of access to a fair share of natural resources and semiotic scaffolding.

A widespread distribution of power is what ferments intelligence. While the algorithms on a permaculture farm—the habits that the individuals have collectively developed—are always adapting and canalizing with positive and negative feedback and selection, similarly the algorithms of a democratic state are constantly being revised with each new law or legal precedent. *But* not everyone is involved in the legislative process and there is a perfectly natural tendency for those rewriting the

laws to write them in their favor. If there is not sufficient input from diverse groups of people who have mutually beneficial relationships, the state will inevitably become less and less intelligent and less self-sustaining over time. We might do to develop permaculture governance.

Intelligent Agency Emerges from the Constraints (Lawful Use of Signs) That Enable Freedom (Misinterpreting Signs)

Some theoretical background is needed to make my argument about how intelligence emerges clear. Semiosis is co-extensive with life. According to the biosemiotic perspective, sign-use emerged long before chickens and even before other organisms with simple brainstems. As Hoffmeyer notes, sign-use emerged with the very first single-cell primitive life forms that were able to respond to and/or transform differences in the environment (e.g. a glucose gradient or degrees of light and dark) in ways that indirectly contributed to self-preservation (2008a: 31–38). These simple life forms would be powered by multiple interrelated autocatalytic chemical reactions, through which stuff could be metabolized or broken down and reconstructed into cytoplasm in a series of somewhat flexible steps. We may say these goalward steps *stand for* the goal. *Signs,* in essence, *are a means to an end*, an end that will autocatalytically recreate the conditions that will enable semiosis to continue. Within the cell, a tiny ecosystem unto itself, the cycle goes on, producing sign-reading intelligence even though there is no brain involved.

At each level of organization, semiotic scaffolding appears through the interpretation of signs. Marcella Faria (2018) has described how single biological cells in a body can alter chemical signals and receptors as conditions change, and disperse signals into the surrounding fluid medium to create virtual networks with other cells through synapses, empty spaces, very much like neurons do. These virtual communication assemblies exhibit coordinated wave behavior and can act as a single entity. Faria argues that this smart behavior between and among simple cells is an example of the necessary adhesion mechanisms that made multicellularity possible. These fluid and adaptable semiotic relationships tie different cells together, and change and evolve over time.

Why are such enabling constraints necessary for intelligent behavior to emerge? When any group of independently acting individuals are kept in close proximity, their behaviors may tend to regularize; the result is what looks like intentionally coordinated behavior (see Alexander 2011: 41–46; Alexander and Grimes 2017: 346–349). Imagine a starling murmuration in which there appear to be different centers of organization emerging and dissipating as the flock seems to act as a single intentional entity. Such behavior visually illustrates the effects of semiotic scaffolding; the organization does not come from top-down control but from flexible individual interactions. Complex system scientists have attempted to decipher the algorithms of bird flocking, but the computer simulation models of murmurations

that have been produced are too symmetrical (see Reynolds 1987). While the self-organization of lifeless material, like bits or crystals, tends to be somewhat symmetrical, organismic self-organization tends to be more amorphous. This is due, I argue, to the fact that when organisms interact with each other, they tend to *interpret* the signs of their fellows. A semiotic habit is flexible, whereas an inanimate algorithm is not.

What is interpretation? Are not organismic interactions based ultimately on chemistry and physics? Isn't each starling and every chicken like Sydney just driven to react to physical matter in ways that are predetermined by the laws of physics and chemistry? Is there a black box where some magic happens and the individual escapes the bounds of determinism and performs a creative act that is truly self-generated?

Marcello Barbieri (2003) has introduced a concept for understanding the nuts and bolts that go into the formation of semiotic scaffolding, the virtual networks that tie things and individuals together, producing what he calls "biological codes." He explains that codes develop when two material entities from two separate worlds are joined by *adaptors*. Imagine, for example, a cell, its receptor, and a protein molecule; or a truck, a hitch, and a trailer; or wasp DNA, a bacterium/virus, and butterfly DNA.[1] If adaptors can come in all different kinds of shapes and/or can hook up with other adaptors, one thing could potentially make an unlimited number of *arbitrary* connections with any other thing through adaptors. It's the arbitrariness of the pairing, stresses Barbieri, that makes the relationship an encrypted *code*. If some adaptors are selected over others because they happen to join two things that are better together, evolution can occur and a new biologic code can lead to a new semiotic habit, that is, a new self-reinforcing effect.

Barbieri further notes that whatever is used to interface with something else may be considered a *tool*, an artifact of biological processes. Tools are part of the emergent semiotic scaffolding created by interactions within constraints. Food is translated into useful stuff for our bodies by means of Barbieri's third-party adaptors. A whole series of chemical transformations involving adaptors is often necessary to get food into a form we can finally work with. The chemicals that aid in digestion are tools that a body has evolved. The effects of the arbitrary relations are not predetermined by chemistry or physics because the relationship is arbitrary. This is why we may say that the emergence of these processes is truly creative.

Although Barbieri might not agree with me, I further argue that when two intelligent systems (*e.g.* two cells) transduce through an adaptor (e.g. a signaling molecule), the adaptor functions as a sign, to both parties, of the benefit of the connection. To put it another way, the adaptor is a means to an end. It doesn't matter that the two systems are not consciously pursuing that particular goal. It only matters that the beneficial effect occurs and is self-reinforcing. In the course of negotiating with an environment, a cell or organism faces the blooming buzzing confusion with its

[1] Genetic material from one species can be transferred to another through bacteria and/or viruses acting as vectors

evolved receptor tools, and sometimes a familiar match is made, and sometimes, although rarely, a match is made with a deceptively familiar coupler. This might lead to nothing; this might lead to something negative, but it might also connect the organism to a *new* benefit that the organism didn't even know it was looking for. In this way, a new theory or useful habit is discovered by making a logical leap through the wormhole of analogy. In Peircean terms this is called this the logic of *abduction*.

Cells have evolved receptors that match with specific kinds of proteins; organs have evolved specific procedures for processing a variety of biochemicals that, in turn, transduce other chemicals; animals have instincts that get triggered by appropriate cues; humans have schema that they compare to the world. All organisms have evolved semiotic infrastructure and semiotic conventions that they use to make sense out of the world. What they have not evolved an interactive tool for, they cannot use, they cannot perceive, they cannot process. Therefore, we must ask, how do they ever learn anything new? To be able to learn *new* things is true intelligence.

To understand how living systems learn new things, we first need to describe how they know the things they've already learned. The signaling molecule, receptor, relay molecules and cellular response shown in Fig. 1 make up the semiotic scaffolding, shaped by natural selection, which channels the semiotic habit that results in an effect that is self-sustaining for the body. Semiotic infrastructure allows mediated contact with the world; organisms know things through their tools, and, more

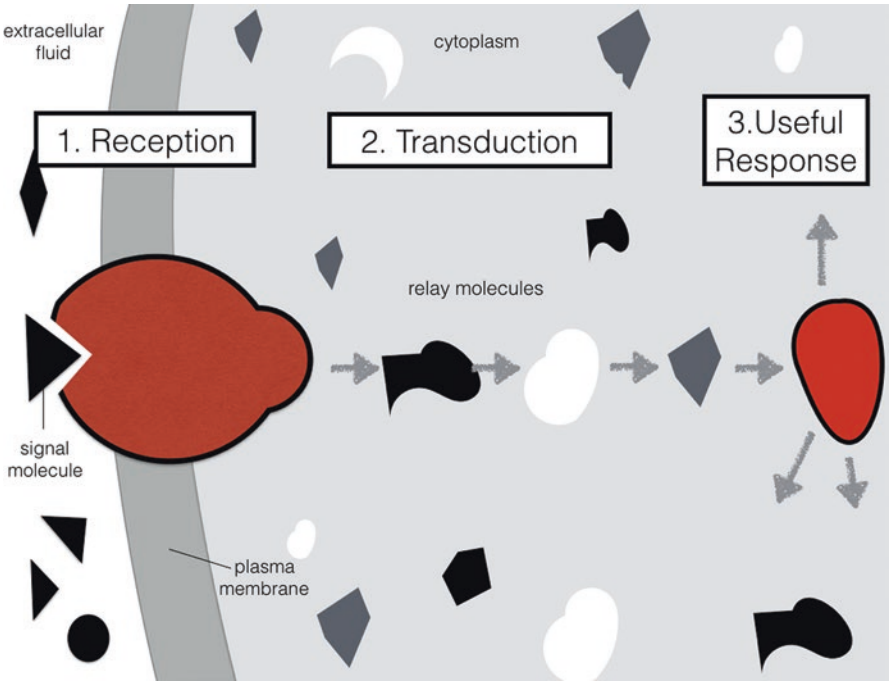

Fig. 1 Sign-Reading using Evolved Infrastructure: Semiosis

specifically, through the reinforcing effects that are produced when they interact with the world through their tools. A semiotic habit is a series of mediated steps, a series of sign-interpretations and code-transductions, one thing leading to another, then another until finally an effect is produced that helps recreate the conditions that allow that kind of semiotic habit to recur. An autocatalytic chemical reaction is a nice physical picture of such a process. There may be a number of steps on the way to the final reinforcing effect. Each link between two transductions may be seen to involve one of Barbieri's third-party adaptors. In biological systems the number of steps is often quite large and complicated. As with many purposeful actions, it matters less what actual steps are taken, as long as the objective is satisfied. There may be a number of means to any end. Likewise with a semiotic habit, the steps may be somewhat arbitrary.

My favorite way to illustrate this is to compare a biological process to a Rube Goldberg machine—a long, overly complicated procedure for carrying out a simple task, that involves a number of physical processes (one thing hitting another, knocking over something, triggering something else…). Each step in a Rube Goldberg machine is there—it exists in the way it does—because it represents, to the designer, the ultimate effect that he is after. Each step is a sign of the goal. The individual steps in a Rube Goldberg machine are somewhat arbitrary. Apples used to knock things over can replace oranges. A high heel shoe use to flick a switch can replace a hammer. Because this is so, biological Rube Goldberg machines can generalize (Wittgenstein's idea of family resemblances is relevant here). They can substitute some of their sign-tools for others that are similar enough that they work for their purposes.

But generalizing is not discovering anything new. It's a process of reducing differences to sameness.

Now let's think about how a living system learns something new. In Fig. 2, a foreign and different molecule, which happens to be similarly shaped to the signaling molecule, enters the extracellular fluid. Although the receptor has been evolved by natural selection to only respond to the first signaling molecule—the correct one—due to the similarity in shape, the receptor can mistakenly respond to this look-a-like molecule. If this misinterpreted response activates a different set of relay molecules or triggers a different cellular response that happens to be self-sustaining for the body in a new way, then this new look-a-like can become a new signal and form a new semiotic habit. It is such *mis*interpretation of chance look-a-like signs (icons)—biological puns, in a way, like Hamlet's pun—that allows living organisms to perform actions that are not predictable by means of traditional methods. The laws of physics and chemistry conform to statistical probabilities. The relative similarity of one thing to another is a quality, not a quantity, and it is difficult to measure or categorize precisely. As I've argue elsewhere (Alexander 2013), these fortuitous qualities of signs are the "effective factors," noted by complex systems scientists, that make the evolution of self-organizing systems inherently unpredictable.

An *interpretation* in a biological system may depend on different semiotic habits being triggered by the same sign, depending on context, or an interpretation may depend on different signs all triggering only one semiotic habit. There are a number

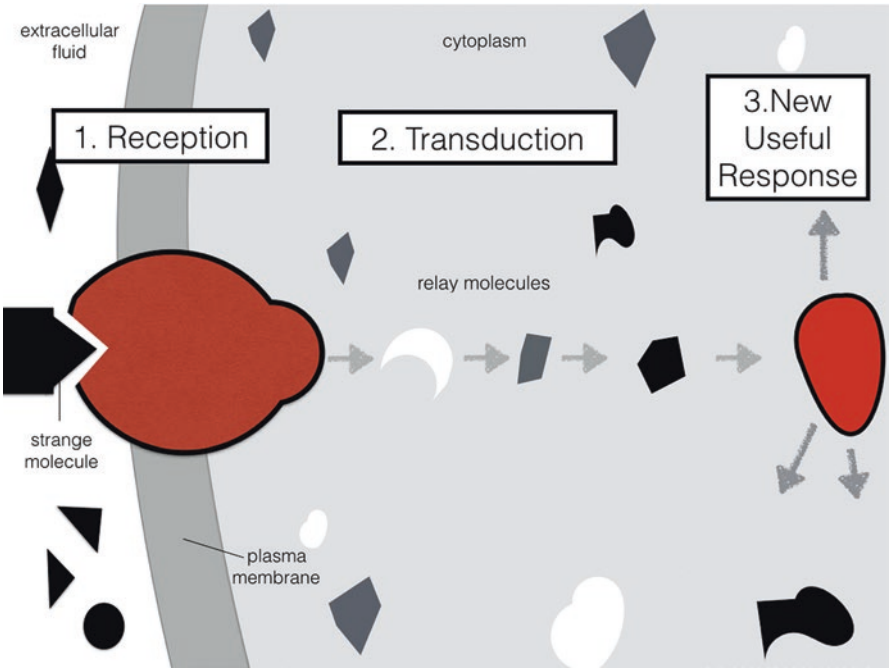

Fig. 2 Sign-Misreading using Evolved Infrastructure: Poesis

of many-to-one and one-to-many signaling pathways in the body that are differentially triggered depending upon what the signs mean (how they function) in different contexts.

A *mis*interpretation is different. It occurs when a new sign enters and repurposes existing semiotic scaffolding (as in Fig. 2). If the misinterpretation is lucky for the organism, it becomes a new habit and the misinterpretation (a poetic act) is subsumed and becomes an interpretation (a semiotic act) once habituated or fixed by selection. As Percy Shelley, in *A Defence of Poetry* (1840), declares, "Poets are the unacknowledged legislators of the World." *Mis*interpretation is a process whereby something entirely novel comes into being. This is one of the reasons why organisms are so different from machines, even artificially "intelligent" machines.

A machine that enacts procedures in a strictly defined way with no hope of learning from its mistakes, or, more to the point, no hope of innovating *through* its mistakes, is not intelligent. Recall how blind Sydney, searching for grapes, bumped into the trellis and knocked beetles down. Had she done this previously and knocked grapes down? Did she pluck up her first beetle expecting a grape? Was she just groping her way blindly or was she seeking with her other organs of perception? Most likely she was looking for food using tools that had worked for her before, but the new result was a great innovation. Biological systems do not just allow mistakes to happen so that the animal can learn not to do that again—that's how AI learns (see Alexander 2019)—living systems take advantage of mistakes. No non-cyborg

machine is designed to learn the way that Sydney did. A machine designer would decompose, define and categorize each step toward the goal, assign percentages and values, and create a machine that would reject the beetle as not a grape.

The only way an organism has to respond to something foreign and new is to mistake it for something it does know, assimilate it into itself and allow it to change itself. Because Sydney is expected to fend for herself a bit, she was out there trying and she discovered a new way to get easy food; and when the other chickens adopted her method, a plague of insects was prevented from destroying the grape harvest. In an intelligent system, the self-interested actions of every individual tend to mutually benefit the others—it's not that they are especially generous or communists or anything like that; it's not that the universe is divinely benign; it's just that ecosystems tend to evolve this way because those that are helped as a side-effect of another's actions tend to thrive.

In a self-organizing ecosystem where true intelligence emerges from the interactions of all agents in their environments, there is no ultimate top-down control, no unitary mind that makes all the decisions and comes up with all the plans. Instead actions flow to the lowest energy state and tend to find an intersection where good things will happen—for one or the other of the members. An intelligent environment is—to use Peirce's analogy in "Design and Chance," (1992: 220)—like a casino where the odds have been skewed so that it is easier for players to win. As Favareau (2015) explains, sign readings reinforce each other

> *providing directionality* towards and away from other sign relations in the network, through the dynamic emergence and canalization of semiotic *pathway biases and constraints.* [This] … enables new scaffoldings and new pathways within and between scaffoldings to arise, increasing semiosic capacity exponentially (emphasis in original 239).

Bisoemiosic Permaculture Negotiates Between Heterarchies and Hierarchies, Diversity and Specialization, Niche-Building and Global Intercourse

Gen X bore witness as the pyramid structure of a feudal hierarchy somehow or other impressed its shape again on society, even though that type of political organization had long been banished by Enlightenment era framers of the democratic state. New "private-public partnerships" have help create a powerful ruling class that exerts control over the populace whose actions in voting booths, in the courts, and at the check-out counters are increasingly rendered ineffectual. The dominance today of online platforms has exacerbated the problem of centralization. It started with food, naturally. Small farmers were the first to lose their autonomy. In 1910 there were some eight and a half million farms in the United States. Today there are a little more than two million, although the number of acres farmed has not changed much. The sharpest drop occurred between 1950 and 1970 when machines replaced human labor and farms began to specialize in monocrops (see Ganzel 2007).

I can't imagine how a reasonably low-cost machine could harvest what I grow in my vegetable garden. A green bean, pea, jalapeño, chard, collard, asparagus, zucchini, yellow squash, or okra plant replenishes its yield every week or so. It would be inefficient to uproot the plants and put them into a mechanical sorter to separate fruit from leaves. Carrot and beet seeds planted on the same day do not germinate or grow at the same rate, and I harvest carrots and beets every week beginning in June and the last are not ready until November. I stagger cabbage plantings, and after I cut firm heads in late July, the younger heads can begin to grow into the empty spaces. I do succession planting in some of the beds; winter spinach grows where the spring pea plants were. Because we grow about thirty different kinds of vegetables and fruits that are ready at different times, we harvest non-stop from the first appearance of early spring's nettle and asparagus to last of early winter's arugula and kale finally succumbs to a prolonged hard freeze. If I were to specialize in a single crop, I would need migrant labor for a few weeks or a month to bring in the bulk of the harvest, and my role would be more like that of a landowning Lady than a farmer. Indeed the hoarding of land that we see with industrialized farming has many features in common with feudalism.

In the 1990s the decentralized Internet promised hope and change and escape from the resurgence of concentrated power, the neo-feudalism of the corporate-state. The Internet promised to dissolve economic borders. Massively interconnected horizontal communication would replace hierarchies. Middlemen would fall away, leaving producers to connect directly to consumers. Trade would be free and fair. Agency would be distributed along the many googles of nodes in the network. But fast forward thirty or so years and we find the Internet, and the neoliberal globalism that rode into town with it on a white-washed horse, has instead intensified the centralization of power with a billionaire class presiding over a heavily mortgaged populace whose assets are, for the most part, under water.

Was It the Tool Itself or the Way We Used It?

Initially, the Internet started to foster the self-organization of different self-sustaining niches, from which and into which, envoys and messengers from other niches regularly traveled. If not for the certain manipulation of certain algorithms this situation might have evolved cyber intelligence as in any science-fiction novel, but it didn't. Those groups deemed too-outside the norm earned the derogatory label "filter bubble" and are now quarantined by search algorithms in Internet back alleys where they don't get checked and they can't evolve. All Internet users are now invited to enter the World Wide Web through a door marked Google, after which they are herded into one of just a few technological-industrial complexes, YouTube, Amazon, Wikipedia, Springer, Apple, Facebook and Twitter, where serfdom, censorship and the invasion of privacy are not illegal. The Internet no longer has enough enclosures or enabling constraints created by different groups, independent niches partially isolated from global effects. The control of the Internet was effectively seized by

one small group people—with low-interest central bank loans and majority control of the finite resources, land, minerals, energy—and another small group of people in control of the communication, laws, and public infrastructure. Together the ventriloquist and their dummies homogenized the heck out of cyberspace by broadcasting mind-numbing infotainment.

As these two groups of concentrated power come to more or less perfectly overlap, intelligent society disintegrates, and eventually you and I, like beef and dairy cattle, may be shown to our stalls where the troughs have been filled with fossil-fuel grown corn, which our bodies, not unlike those of ruminants, have not evolved to digest very well. Today there are few independent or isolated groups of scholars, artists, musicians, artisans, experts, professionals, or farmers. This kills the kind of local reciprocity, mutually beneficial relationships—such as I have on my farm—which lead to enabling constraints and semiotic freedom. Without enclosures and enabling constraints, the innovative effects of local interpretations tend to dissipate. Web-like power-distributing semiotic scaffolding doesn't form, and instead all the power gets siphoned up.

With a traditional hierarchical structure (Fig. 3), it is more or less transparent who is wielding the power. A decentralized network (Fig. 4) may appear to distribute the power, but it can become dominated by a few people who have control of money, technology or laws and then a decentralized network can easily develop a hierarchical structure that is hidden from participants (Fig. 5).

A garden requires a fence to keep rodents out. Flocks of sheep and chickens need to be fenced in to keep them from wandering off and to keep predators out. But a permaculture farm's borders are still somewhat porous, like the membrane of any living cell. The domesticated animals share the rewards and responsibilities of maintaining the farm ecosystem with the wild ecosystem creatures that surround it. Relative isolation (not total isolation, a closed system will die) is how diversity is created and maintained. Signals can't travel across systems that have different constraints. The signals we invented on my farm might be meaningless to animals on the farm down the road. Maintaining separate niches or groups keeps the world from becoming too homogeneous. If members of a group depart from the regular constraints (usually by reinterpreting them), they will either make the group more diverse, adaptable and robust, or break off and form a separate group with a different dynamic. Separate interacting niches both keep one another alive (by supplying by-products and wastes) and constrain each others' growth (by consuming the

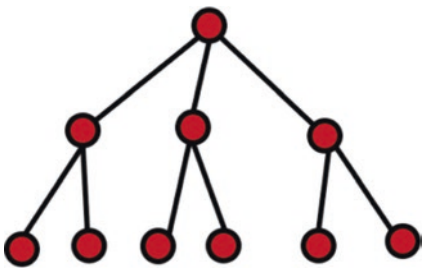

Fig. 3 Top-down hierarchy

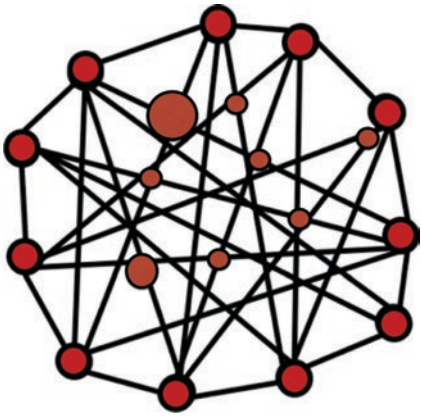

Fig. 4 Distributed network

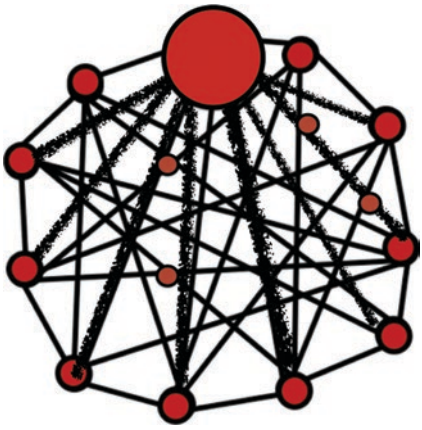

Fig. 5 Distributed network with hidden hierarchy

excess, thinning the herd). Wendy Wheeler (2019) stresses how important a biosemiotic perspective is in valuing political diversity:

> While a convergence of interests and aims is necessary for the cohesion of social organisations, the political implications of the danger of collective error in too much agreement, and absence of dialogic exploration, should also be obvious. The reproduction of the same, and the failure to countenance disagreement, or multifarious difference, is clearly perilous because deathly. This fact is seen vividly in totalitarian societies which produce death symbolically and actually on vast scales (p. 195).

The separate sustainable ecosystems, groups of people and other animals, that create their own rules of engagement for each other by their interactions are called heterarchies that resemble a dynamical interplay between Figs. 4 and 5. These heterarchies do not themselves form hierarchical pyramids where those at the top benefit off those on the bottom. Instead they form clouds of reciprocal interaction that evolve centers of shifting organization and change like murmurations.

A permaculture farm tries to be as self-sustaining as possible, nearly a closed-loop system, while also interacting in permacultural ways with the surrounding

culture and economy. On our farm, we mainly grow food just for ourselves and give a few gifts to neighbors at our karma farm stand when we have more than we can use. But we also run a cottage industry selling wool. We chose Navajo-Churro sheep, the oldest breed in the United States, a hardy, efficient eater, almost a wild-type, which are known to have good strong textile wool as well as sweet meat, even as the animals mature. We have about six sheep at the beginning of winter; then the flock expands to twelve to sixteen, which is about right for our five acres during grass-growing seasons, and then the flock contracts again in the fall as young males are slaughtered or sold to wealthy home owners to replace their motorized landscapers (this is a trend in our community that we helped start), and extra ewes are sold to breeders who want this valuable heirloom variety.

Small farms struggle with the slaughtering process. Knowing how to dispatch a lamb as quickly and as painlessly as possible and divide up the carcass correctly is a valuable skill. In the old days, an itinerant butcher might come to a small farm with a mobile unit. But that practice is now illegal (thanks to Big Ag-friendly regulations), which forces all animals to be shipped under terrifying conditions to industrial slaughter houses where they are killed without regard for their feelings. We address the dilemma by bartering with newly immigrated Muslim neighbors who are experienced in humane slaughter, which happens to be the method prescribed by their religion for preparing for holy feast days. This interaction with a group unlike ourselves helps us both.

Most varieties of sheep are either specifically bred for wool or for meat, but not both. Commercial meat farms throw out the wool after the ewes are shorn each spring. We take the garbage wool from neighboring farms and process it for use as building insulation (my husband is an "ecological" builder). Since our primary resource is waste to whomever is providing it, we are imitating economical Nature. She has also designed wool, a smart technology, to be a natural humidity regulator and well as a superior insulator, even when damp, and the springy design of the individual fibers makes the insulation expand in the walls over time to fill every empty space instead of shrinking and sinking like fiberglass, recycled blue jean cotton or cellulose insulation.

After shearing, the dirty "skirt" or edge of the fleece is cut off and thrown in the compost and it helps build soil that retains moisture. Then the fleeces are stretched out on racks left out in the rain and the sun and occasionally turned for few weeks before washing. Then they are "picked" apart by a hand-powered machine (which looks like a cross between a rocking baby cradle and a bed of nails) by my son and myself while we do his homeschool curriculum, listening to books or watching documentaries. (I use permaculture methods for homeschooling too, teaching my son how to teach himself.) I'm rigging up a system with a windmill so that we can harness wind energy to run the machine. This will allow us to can vegetables while we do school work instead. The point that I'm making here, providing so much Melvillean detail, is not to teach you how to manage a wool business, should you ever need to, but to illustrate how semiotic scaffolding creates an efficient self-sustaining cottage industry that is interdependent on the wastes and by-products of other self-sustaining entities.

Why We Can't Have Nice Things: Parasites and Monopolizers of Finite Resources and Semiotic Scaffolding

The invention of symbolic barter, paper or electronic currency, enables specialization and trade. This remarkably useful tool is part of human semiotic scaffolding and can create super-ecosystems that interact with all the others without taking away their local autonomy, if it's used right. Belief in currency operates quite literally on a, if not a free-lunch principle, at least on a stone soup principle. As long as people believe in the value of symbolic money and act on this belief, it functions as a means of exchange and triggers the creation of wealth. In a permaculture society, currency would function differently than it does in an industrialized society.

Let's imagine long ago a pioneer community got together and decided to create fiat money to pay some of their members to build good roads from their village to neighboring villages and to construct a public market square with stalls and a good roof, for everyone to use to sell their goods. The road workers and carpenters were paid this fiat money for their services, and later they were able to exchange this money with other villagers for goods and services. This money started to cycle throughout the entire village, creating jobs out of people's needs and creating greater overall wealth. Some villagers bought tools or had barns constructed and became more productive farmers. Soon everybody had more produce to bring to market. Soon more people moved into the village to fulfill different specialized needs, an apothecary, a seamstress, or a blacksmith. Neighboring villages mimicked the first. The different villages began to specialize in local beers or textiles or preserves and traded with each other. Next the first community decided to create more fiat currency to build a school, dig a town well and make public privies. The modern equivalent of the public square/market place is the Internet; using fiat currency, the state could directly fund the development of public platform sites, search engines and bulletin boards, and then allow them to be democratically regulated by the people who use them.

As the somewhat eccentric economist Bill Still (Still and Carmark 1996) and the less eccentric but still quite radical economists Stephen Zarlenga (2002) of the American Monetary Institute and Ellen Brown (2012) of the Public Banking Institute have argued, a government need not borrow or tax to have money to spend. Creating money out of thin air and turning it into public infrastructure instantly creates wealth for everyone and backs the currency with material assets. Small fees can be charged for use of the infrastructure to control inflation, which will be slight unless fiat money is created and dispensed in exchange for nothing, as with a Universal Basic Income, or is created to destroy infrastructure, as in war. Taxing of the top percent of wealth would only be necessary to control inflation, not to generate revenue. This is how the semiotic scaffolding of currency functions in an ideal permaculture farming village.

Fiat currency can accelerate the formation of more semiotic scaffolding. It's like pumping energy into a system. Assuming that a community collectively owns its finite natural resources like forest and stone (that is, they aren't hoarded by some

Lord), the only thing needed to start building public infrastructure for everybody is the guarantee that those few doing the construction work get paid. One of the reasons why we probably don't have so many community barn raising-like projects in modern society is that not everyone in the community who stands to benefit from the infrastructure works as hard on the project as everyone else. Permaculture farming operates on the premise that those doing the work, be they chickens, sheep, crows, hawks, or farmers, are more or less immediately rewarded for their efforts. Today a state treasury could act like the permaculture village council and simply create the money needed to build the public infrastructure that would allow people to begin fending for themselves better. Similar monetary reforms were introduced to the U.S.112th Congress by Representative Kucinich as part of the National Emergency Employment Defense (NEED) Act, HR 2990. The bill, unfortunately, did not attract a large number of sponsors.

American economist Henry George makes a distinction in *Progress and Poverty* (1879) regarding the means of production that his contemporary Karl Marx did not; George was more permaculturally minded. He recognized the difference between owning and controlling the material tools that an individual might build or buy and owning and controlling finite natural resources—that are given/created by Nature (land, water, minerals, forests)—and semiotic scaffolding—that is created by community interactions. George argued the individual might own a tool—like the machinery in a textile factory—and benefit off the *added* productive value the tool creates for those using it. For example, weavers might chose to work in a textile factory using the machinery if they can produce more rugs there and make more money. But George, drawing upon the trend of discussion in his day, further argued that an individual should not own and control more of the *finite* natural resources than he/she can personally work. To do so is to hoard resources and prevent others from using them. In addition, an individual does not have a right to unfairly benefit off the value created by the interactions of a community. To illustrate both forms of unjust ownership, let's imagine the successful textile factory owner takes his profit and buys up land in an industrial area but doesn't build another factory and doesn't use the land for anything else, not even farming; he keeps it out of use and creates land scarcity in the town. In this way, he can make more money speculating on land than he can running a textile factory. The added value of land that is in the middle of an industrial zone is created by the existence of other industry and transportation infrastructure in the area, which the owner of that land did not himself create. In *Progress and Poverty*, George argues that land monopoly is the cause of poverty even as technological progress provides the means for everyone to be more productive. George suggests taxing finite resources such as land *only*, not labor or interest income, would allow the individual to keep the fruits of labor and the capital investor to keep the added productive value of the tools provided. To go against this is to go against a force of nature, according to George, which we see in the constant battle between laborers who use tools and capital investors who provide tools. Instead of speculating on land or on stocks to make money, the profitable textile factory owner could lend his extra money out to some else to build a business. In this way he would be adding to the productive capacity of his community. George's

single land tax remedy is designed to prevent hoarding and make land available to more people. George's remedy assumes that the natural resources and community infrastructure belong to everyone equally, present and future.

George recognized the negative effects of taxing the income from productive labor and productive investment at a high rate and taxing the income from hoarding resources, speculating on land or stocks, and monopolizing community infrastructure at a low rate. In a permaculture system, a productive worker like Sydney or a productive capital investor like a wool-picker provider would not be taxed at all. The highest tax would be on those who, for example, own second and third vacation homes in the center of my hamlet valley as an investment, and who keep their two or three acres of manicured lawn out of productive use, driving up the price of land and housing in the hamlet, and even preventing local wildlife from using the land. (They are venerable job creators, however, for the guys that mow their lawns every week.)

The "taxes" that the members of a permaculture farm pay are just their wastes, their by-products, their Malthusian excesses, and the side-effects of their efforts to survive. I'm not forgetting that animals also pay the ultimate price of lost years when they are preyed upon. In the wild, many fowl, for example, only live about three to four years which keeps the wild population stable. Nature is more profligate than permaculture farmers are. We maintain the fowl population size on our farm by eating our chickens' eggs and extending the lifespans of individual chickens. (One of our hens celebrated her eighth birthday this summer.) We maintain the size of our herd by selling the ewes and eating the rams. The sheep we keep grow into old age. We don't reduce our herd to a number below that which the farm can sustain. That would throw the whole operation out of balance.

In a permaculture state, only taxing excess would be permitted; to tax those existing at the level of subsistence is parasitism. The fact that the state taxes the labor of people earning minimum, low, or even medium wage is grossly unethical. The fact that the state taxes the little bit of land people require for shelter or a garden is grossly unethical. As farm governor, my job is to provide the infrastructure that guarantees my community is kept free, productive, healthy and secure. As a governor, like a doctor, my first directive must be "do no harm."

Gas Burns the Semiosic and Poetic Ties

> *The principle behind modern agriculture is simple: Break down nature's own semiotic scaffoldings by the intelligent application of oil. It's oil all the way through: It takes oil to extract the metals and produce the tractors, it takes oil to drive the tractors, it takes enormous amounts of oil to produce the fertilizer and spread it on the fields. It takes oil to harvest the big fields and eventually to dry the harvested product.* J. Hoffmeyer (2018).

I am not a trained expert in permaculture farming; I simply adopted methods that are easy. On our farm, we always multi-task and every solution ought to fix two or three problems without creating any new ones. The most essential rule of permaculture

farming is try not to work too hard. Meanwhile, my retired neighbor, spends several hours every weekend early spring through late fall mowing his single-species three-acre lawn, giving it a precision Scottish plaid pattern. He fertilizes it, spreads weed-killer. In the 1800s, his house was built close to the curb on a narrow plot designed to accommodate a backyard kitchen garden, hens and a maybe a family goat or cow. In our hamlet, wizened elders still remember when more than a few houses on any block had a dairy cow, even the merchant and professional worker families who did not consider themselves "farmers." Their gardens and animals functioned as their economic safety net. Refrigerated long-distance shipping ended the need for kitchen gardens, and gas-powered lawn equipment changed the habits of the successive residents of my neighbor's house. I doubt that much time or effort has been saved in this exchange. My neighbor spends a lot of time on his lawn. Perhaps he doesn't like the Turing pattern that my sheep graze out or the many varieties of grass, clover, trefoil, creeping Charlie, and dandelion, which he considers weeds, that thrive and bloom in our pasture and feed the bees. In the fall, he uses a gas-powered leaf blower to collect his leaves and then he burns them. My sheep stand under the sugar maples and eat the sweet leaves as they fall. I let the wind blow the rest up against the fence and into the low areas, then I rake them up and pile them in the potato and cabbage beds. I rarely have to weed these beds because I use so much mulch. Out of my raking, I get twice my volume in potato-filled sacks every year and ten gallons of sautéed cabbage or sauerkraut. The soil in the potato patch is so rich and loose—made up granule castings from earthworms that get as big as young garter snakes—that you can just slip your bare hand six inches under and pull a big golden Yukon or a handful of purple Peruvians. My neighbor doesn't get any food out of his efforts.

On paper, the fossil-fuel powered farm appears to produce more food with less human labor, and it probably does, but industrial agriculture tends to produce more processed carbohydrates (grains that are easily harvested at once), and less nutritionally dense foods like leafy and root vegetables, a tendency which more or less defeats the purpose of food. And many of the laborers are not readily visible, those who subsidize the fossil-fuel industry, the soldiers who fight in wars for oil, the miners digging for steel for the machines, the marketers and bankers involved in the procurement of expensive machinery, and the millions of other laborers involved in managing the politics of industry. *Into Their Labours,* John Berger's 1991 intergenerational historical novel, about a farming community in France, traces the displacement of traditional farmers into farm-industry-derived jobs. Most of the characters in Berger's novel wind up less well-off than their ancestors. The family member who earns the greatest financial reward in the end is a tiny old lady living high in the mountains who forages for herbs and mushrooms and then trades with local restaurants.

The problem with the kinds of networks that industrial farming creates is that they are not immediately reciprocal; interactions are spread out over a larger number of specialized workers. This greater complexity would be fine if it weren't for the fact that some profit and tax is extracted from each task of each worker and filtered up to a small group of people occupying privileged positions in the network.

Fig. 6 Captured network

The industrial network isn't so much a decentralized web as it is an octopus with tentacles in everything (Fig. 6).

Animals in cages aren't able to fend for themselves. People who aren't allowed to fend for themselves are not being enabled to give back to their communities. This doesn't just degrade the life of the individual but the whole system in which they exist. In 2013, Roy Walmsley reported that the United States had almost a quarter of the world's prison population, even though the U.S. had only about 5% of the world's population. The private prison industry absorbs the tax-revenue that could go to purchasing materials to build affordable housing and farms for poor communities, so that non-violent convicts could be sentenced to community service building that infrastructure to help eliminate poverty, which is the main fertilizer of crime. Every solution should fix at least two problems and not create any new ones. Even convicts should be free-range, fending for themselves while co-creating and co-sustaining their communities.

Conclusions

Permaculture could be the (albeit unattainable) ideal for agricultural, economic, political and social systems. What I've learned on my farm through the lens of biosemiotics has helped me come up with some general principles for healthy creative systems:

> Every self-organizing system begins with constraints, an enclosure, or limited communication network, a niche, a farm, a flock, institutions, language, conventions, constitutions, basic laws, semi-porous national or regional boundaries.

> Within these constraints, the individuals do not need a law governing every exchange or action, because this is to make them into automatons and prevents them from coming up with new and different solutions. The regularizing effect of the constraints, which they all have in common, may be sufficient to provide reliable, rule-governed behavior, that is somewhat predictable and yet open to novelty.

> Maintaining separate niches or groups with limited interaction fosters diversity. Too much global communication makes everything homogeneous.
>
> Government could use fiat money to create enabling constraints like supply lines and communication lines, education and health centers, *but not run them*. The professionals and people interacting within these constraints should have semiotic freedom to help create and maintain the institutional constraints.
>
> Individuals must pursue their own purposes, be somewhat responsible for their own survival, because in this way they are in a position to create their own good luck and contribute to the building of semiotic scaffolding.
>
> Ideally niche-to-niche interaction should be limited such that each benefits off each others' by-products, excess, or waste. Ideally all waste should be recycled (if it can't be recycled or composted, you probably shouldn't be using it) and taxes should be levied only on excess wealth, if at all.
>
> We could all stand to eat more vegetables and less meat.

The idea of permaculture governance seems to echo many a notion of reform that has been introduced again and again throughout human history. I began with a mention of Martin Luther (1483–1546), who questioned the authority of the Catholic Church and who advocated for the individual's right to interpret scripture. Above I mentioned as well Percy Shelley (1792–1822), Romantic poet (and a vegetarian)—whose father-in-law, William Godwin (1756–1836), was perhaps the first true direct democracy advocate, whose mother-in-law, Mary Wollstonecraft (1759–1797) was perhaps the first women's rights[2] advocate. Percy penned *The Necessity of Atheism* in 1811, urging the use of reason guided by feeling instead of depending upon authoritative morality. Shelly advocates for peaceful revolution and civil disobedience in *The Masque of Anarchy* (1832), in which he powerfully reminds us, "[We] are many—they are few." Shelley would later influence the great civil rights leaders and pacifists, Henry David Thoreau (1817–1862), Mahatma Gandhi (1869–1948) and Martin Luther King (1929–1968).

As I close here, Ralph Waldo Emerson (1803–1882) also comes to mind. Emerson thought the divine was not a Being but was *distributed* throughout nature, and he preached the self-reliance that became identified with New England mindset and which I echo here. Friedrich Nietzsche (1844–1900) inspired by Emerson[3] wrote *Beyond Good and Evil* (1887) and *On the Genealogy of Morality* (1887), showing how conceptions about morality actually emerge from the interactions of society. We may say that every attempt to get away from a hierarchically organized system is a biosemiotic move insofar as it recognizes intelligence as a distributed system in which the individual creates society and is created by it through semiotic

[2] Wollstonecraft argued that women, as the primary educators of children, should themselves be well-educated. She attempted to change the culture to improve the state of existence for women and, in consequence, for all people (see Wollstonecraft 1792).

[3] Nietzsche praises Emerson extensively in his journals and letters (see Stack 1993).

interactions. We can note that the sentiment, "Government of the People, by the People, for the People," attributed to Abraham Lincoln (1809–1865) echoes Immanuel Kant's (1724–1804) observations in *Critique of Judgement* (1790), that in an organism:

> every part not only exists by means of the other parts, but is thought as existing for the sake of the others and the whole—that is as an (organic) instrument….also its parts are all organs reciprocally producing one another…. Only a product of such a kind can be called a natural purpose, and this because it is an organized and self-organizing being. (p. 220)

One wonders why similar revolutionary impulses have to reinvent themselves every several generations. Perhaps it the clash between holistic/organicist thinking and scientific reductionism that has kept reforms from fulfilling their goals and creating self-organizing societies. If this is so, then we may lay the blame on Rene Descartes (1596–1650) who convinced the Western world that mind and matter, the spiritual and material, were subject to two incommensurable fields of inquiry (see Favareau 2010: 1–77), driving science toward mechanistic views, which has lent false legitimacy to mechanistic approaches to agriculture and to governance. Fortunately now, with the introduction of information concepts into biology, such as "signal" and "code," the separation between the two cultures may be bridged. Perhaps now the biosemiosic permaculture revolution can finally go forward.

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