

F/ACTUAL KNOWING

PUTTING FACTS AND VALUES IN PLACE

HOLMES ROLSTON III

Knowing needs to be *actualized*, an *act* of ours, yet also a discovery of what is *actually*, *factually* there. In place ourselves, we manage some awareness of other places. Agents in our knowing, we co-respond, and this emplaces us. But we humans have powers of dis-placement too, of taking up, whether empathetically or objectively., the situations of others, other humans, sometimes others than humans. How do our *facts* depend on our *acts*? Do we humans always put in place, or sometimes find put, placed there before us, what we variously value on Earth?

To put this provocatively: We need to "green" our beliefs; but every educated person knows that nothing out there is really "green." "Seeing green" is an interaction experience. Perhaps this perceptual experience is a model for the whole: all of our human concepts and percepts color up the world. This is true alike of facts and of values, discoveries and evaluations. Such knowing might be well enough placed, but it is always and only "placed." Our *geographical position* controls our *epistemic composition*. Epistemology is inevitably anthropocentric; we are always located in the center of our knowing.

But what if the "green" we see is mostly chlorophyll? Photosynthesis is not something we can see at all. In place on Earth, we humans breathe oxygen and would die in minutes without it; we depend on photosynthesis at the foundation of our food chains. We know our own respiratory

and trophic interactions with the plants, and this not simply at the native range experiences of breathing and eating. We have figured out the oxygen/carbon-dioxide/water cycles taking place at molecular levels.

Now it seems, however, that we are discovering ourselves placed where the facts are bigger than our acts, including our respiratory (and perceptual) interactions; these extend systemically and are hardly anthropocentric. Epistemologically, we have more to evaluate. "Greening" our belief, environmentally grounding it, will require knowing and appropriately respecting these vital life processes—of which we are a part, but which also are "in place" and "take place" apart from us.

1. EMBODIED, KNOWLEDGEABLE PERSONS

Whatever knowledge we gain has to "come through" at our native range. That seems uncontroversial, but what are the implications? Knowledge is relative to our location, our embodiment, our size, our terrestrial habitat. This situation constricts, it may be claimed, what can "come through." Mark Johnson concludes: "Our consciousness and rationality are tied to our bodily orientations and interactions in and with our environment. Our embodiment is essential to who we are, to what meaning is, and to our ability to draw rational inferences and to be creative." He urges us to "put the body back into the mind," that is, epistemologically, to become aware of how the body is there, willy-nilly (1987, xxxviii, xxxvi). Joining with George Lakoff, he claims: "Reason, even in its most abstract form, makes use of, rather than transcends, our animal nature" (Lakoff and Johnson 1999, 4).

Katherine Hayles continues: "To be incorporated within a different body would be to live in a different world." She features "interactivity" and explains:

Interactivity foregrounds rather than obscures the importance of embodiment. In the interaction model, the body does more than provide a biological support system for the mind. Interaction is possible only because we are embodied, and the precise conditions of our embodiment have everything to do with the nature of those interactions. The range and nature of sensory stimuli available to us, the contexts that affect how those sensory stimuli achieve meaning, the habituated movements and postures that we learn through culture and that are encoded for gender, ethnicity, and class—all affect how learning takes place and how the world comes into being for us. (1995, 56)

All this seems true, if one means that with reincarnation our native range experiences would be different. Wolves have keen noses and with them they experience, if you like, a different world. But the survival value of wolf noses, a situated knowledge for them, is equally true for humans, wolves, and elk, because all three live in the same world. That feature of "how the world comes into being for us" seems prior to our embodiment with our less keen noses, and also something that we have been able to figure out anyway. Our skills have discovered another skill that, though we do not share it, we can admire.

Trees, we might say, are organisms incorporated in different bodies, without noses; they live in a world of photosynthesis, as do neither humans nor wolves. Trees "come into being in the world" differently from humans. We do not "experience" photosynthesis, nor do trees. But photosynthesis is equally true for wolves, humans, and trees. Further, an account of what is going on there has come into our experience. If we had six legs and wings, or had we been born octopuses, the survival value of tree photosynthesis and of wolf noses would not change, though in those situations we would be unable to give an analytical account of either. All these are embodied forms of being, and the model we want is more pluralist. Earth is a valuable marvel of biodiversity, with richly various forms of embodied life. Perhaps we can find others well situated to defend what they value, and ourselves situated well enough to appreciate this otherness. Will this be on account of, or despite, our particular form of embodiment, human personality? Maybe both. We could be cognitively competent to study how the world is, yet the world will remain how it ontologically is, despite the successes or failures of our epistemology.

That we are embodied persons is not an unwelcome fact. "Green," for example, is no experience we wish to give up or get past. Coloradoans celebrate the "green and gold" on their landscapes: the spring greens against the dark green conifers, or the aspen gold against those conifers in the fall. There are many pleasures of the proprioceptive and kinesthetic senses—sight, hearing, smell, touch, warmth, somatic awareness. Environmental aesthetics stretches all our senses: the curve of the purple mountains rising toward the azure sky, the wind howling in the blue spruce, the fragrant, pungent odor of the needles, sharp to the touch. We go with the flow-experience of the brisk hike. Wait, stop! Listen, loons are calling!

But then again, neither do we want to be so embodied that we are unable to appreciate what is outside ourselves, others in their bodies, as we are already doing when we stop to listen to the loons. Philosophers have perennially found themselves in an epistemic prison. There is no human knowing that is not looking out from where we are, using our senses and our brains, from an anthropocentric perspective. That may be postmodern knowledge; it was already premodern. Remember the tale of the blind men and the elephant from India. Loon calls, wolves sniffing elk, spruce trees, their photosynthesis—these are known only with our filters on, the percepts and concepts of our peculiar environment.

All knowledge is relative; there is no "mirror of nature" (Rorty 1979). Richard Rorty deplores "the impossible attempt to step outside our skins—the traditions, linguistic and other, within which we do our thinking and self-criticism—and compare ourselves with something absolute." He urges philosophers to suppress the "urge to escape from the finitude of one's time and place" (1982, xix). Agreed, we do not want to escape the finitude of time and place either. But we do wish, rather, to establish the reality of times and places, our own and that of others on Earth, and then to evaluate life in its historical, earthy finitude.

We want to see better into our time and place; but to do that we do need to see outside ourselves, not to the "infinite," but at least to the global, to the finite myriads of other creatures with whom we share this time and place. We perhaps cannot compare our percepts and concepts with something "absolute" (that disparaging word of the anti-realists), but we can cross-check them with a world on the other side of our skins, which we move through, forming cognitions inside ourselves co-responding with this world encountered outside. We can't get out of our skins; but, inside our skins, we do bump into objects in the world in ways that give us convincing evidence of their "objectivity"—a concept to which we return below.

We are not so much prisoners encased in our skins as persons incarnate on Earth. We have no "infinite" "mirror," reflecting perfectly every process and ontological level, quarks to quasars, with ecosystems at mid-range. Perhaps we have no "mirrors" at all; that is a bad metaphor, used to caricature an epistemology. We encounter some things, and avoid others, because we have "windows"—eyes, ears, noses—and brains and hands, with which to construct theories and instruments that may enlarge

these windows. Maybe we can also become critics of our appearances and how veridical they are.

We do not need a "view from nowhere," but we do need a "view from now here." Everybody has a "body," everybody has a "standpoint," a "viewpoint." Hopefully, sometimes, we might get well positioned to see out? What and how far? Can we critique our own seeing? And knowing? *Homo sapiens*—we have named ourselves; can we get ourselves wised-up about what and how we know?

2. EMBODIED PERSONS IN PLACES

We are embodied persons in environments of two kinds, nature and culture. Life, a skin-in affair, is equally a skin-out event. Human life is a mind-in, and mind-out event too. Recent critiques in epistemology have, broadly, two components: (1) An ideological component. Our knowledge is a function of the ideas we make up, a social construction produced interactively in the human communities within which we live. (2) A physiological component. Our knowledge is a somatic construction produced interactively on the landscapes on which we reside. Both concepts and percepts have classically entered into epistemic analysis, only today the challenge is that we do not escape our emplacement in either culture or nature as much as enlightened people once believed.

Ecology is the logic of one's home; ecologists know that no organism can step outside its skin. But the central idea of ecology is that skins are semi-permeable membranes. No organism can live without constant exchanges and transactions across skin. So we do need an ecological epistemology. Humans, though, are at home in social communities. "Man is by nature a political animal," said Aristotle (*Politics* 1,2, 1253). The human *genus* may be animal, but the human *differentia* or essence is to build a *polis*, a town. The human habitat is village, town, city; human life is political, social, or, cultural.

We protect ourselves quite literally inside our "skin" somatically; but if we try to use that metaphorically in epistemological analysis, insisting that "we can't get out of our skins," there is an immediate challenge. In society we do have *language*, with which we express our ideas, and these do get out of our skins. They get from mind to mouth and out, from mind to pen, print, and paper. So ideas cross from one mind to another; skins are quite semi-permeable membranes for ideas.

Language, we should first say, "comes naturally" to us; we have genetic coding, brains, and mouths adapted for speech—the bodily side of language. Humans everywhere have language; the child picks up speech during normal development with marvelous rapidity. The child-mind is innately prepared for such learning. But language, we must go on to say, is culturally transmitted. Indeed, such socialized language is what makes cumulative transmissible cultures possible. Human language is elevated remarkably above anything known in nonhuman nature. The capacities for vocabulary development, teaching, symbolization, abstraction, literary expression, writing, reading, imagination, argument are quite advanced. The results do not come naturally as an inheritance from the other primates, whatever may otherwise be our genetic or somatic similarity with them.

Language seems somehow to transform the other bodily capacities, such as seeing, hearing, smelling, tasting, which are shared with animals, and to introduce novel capacities in humans, evidenced in descriptions of photosynthesis, or debates about environmental justice. We develop mathematical and computer languages. Culminating millennia of cultural development, we have even built spaceships and flown off the planet to take an overview of Earth. Such linguistic capacities may offer a clue why this *Homo* is so *sapiens*.

Epistemology is about gaining, using, transferring information. In nature these processes are somatic: genetic at molecular, genotypic levels, which are expressed in phenotypes, with perceptual facilities. "Information" "coded" in genes is, if you insist, a fashion of speaking; it starts in analogy from human life, but we also have a quite detailed, reasonably objective analysis of how this takes place; this epistemic model is at the core of both contemporary genetics and ecology. Organisms "know how" to survive in their niches.

Further, some organisms have sufficient cognitive capacities for acquiring information during their lifetimes. These latter acquisitions in knowledge, however, do not alter genotypes. In culture, these epistemic processes become ideational; and, though minds remain in bodies, ideas travel in novel forms. Information in wild nature travels intergenerationally largely on genes; information in culture travels neurally as a new generation is educated into transmissible cultures. The determinants of animal and plant behavior are never anthropological, political, economic,

technological, scientific, philosophical, ethical, or religious. That puts us in a special situation, especially enabled epistemically.

We have bodies, we have been told for a quarter of a century, that are 99% the same as chimpanzees in DNA coding and resulting proteins and anatomy (King and Wilson 1975). That figure has recently been revised a little, to 95% (Britten 2002). Still, if knowing is such a bodily affair, we might compare our bodily knowing with theirs, with chimpanzee epistemology, so to speak. Chimpanzees have "cultural traditions," if one means that variant acquired behaviors are imitated in different chimpanzee troops. Birds in their flocks do this as well. But there is no clear evidence that chimpanzees attribute mental states to others. The editors of a volume on *Chimpanzee Cultures* concede that chimpanzees may be "restricted to private conceptual worlds" (Wrangham et al. 1994, 2).

Organisms with zero-order intentionality have no beliefs or desires at all. Higher animals clearly intend to change the behavior of other animals, first-order intentionality. Second-order intentionality involves intent to change the mind, as distinguished from the behavior (though perhaps the behavior as well) of another animal, that is, to teach by passing ideas from mind to mind. Third-order intentionality involves knowledge that another, a teacher, is intending to change one's mind. Primates do not seem to realize that there are minds present to teach in others, although they often imitate each other's behavior.

Asking "how monkeys see the world," Dorothy L. Cheney and Robert M. Seyfarth conclude that, in such higher-order senses of communication, "signaler and recipient take into account each others' states of mind. By this criterion, it is highly doubtful that *any* animal signals could ever be described as truly communicative" (1990, 142-143). They continue:

It is far from clear whether any nonhuman primates ever communicate with the intent to inform in the sense that they recognize that they have information that others do not possess. . . . There is as yet little evidence of any higher-order intentionality among nonhuman species. ... Teaching would seem to demand some ability to attribute states of mind to others. ... Even in the most well documented cases, however, active instruction by adults seems to be absent. ... The social environment in most primate species is probably too simple to require higher-order intentionality. (1990, 209, 223, 252)

What is missing is precisely what makes a human cumulative transmissible culture possible, ideas passing from mind to mind, parent to child, teacher to pupil, in large part through the medium of language. What the 99% or 95% overlooks is that humans have three times the cerebral cortex of chimpanzees, so from that perspective the 3% (to split the difference) genetically leaves us 300% better endowed cognitively. Patterns of gene expression in humans and chimps are quite a bit different in the brain (Paabo 2003). These codings in the brain, configuring and reconfiguring the synaptic connections as new perceptual skills and cognitive information is acquired, are regularly called "maps" by the cognitive scientists, which suggests not only functional usefulness but also correlation and correspondence with the outside world. "In most cases, the maps correspond obviously to features of the outside world" (Bear, Connors, Paradiso 2002, 277).

Humans still have genes, of course; but humans live under what Robert Boyd and Peter J. Richerson call "a dual inheritance system" (1985). That underscores knowledge as a social construction, rather than a somatic construction. Our 95-99% genetic and somatic identity with the chimpanzees is misleading, if we try to draw epistemic conclusions. Humans have a 300% gain, and this makes possible the cumulative transmission of what this increased cerebral power gains in each generation, an escalating gain compounding the 300% over the millennia of culture.

One could fear that these social environments superposed on our natural embodiments make our epistemic problems still worse, adding another layer of filter and distortion. But things might be the other way around, that our concepts arrange for new percepts. Our percepts come by nature, more or less. Our concepts come by nurture, more or less. One sees green by natural endowments. One has to be educated about photosynthesis. The two become entwined, of course. But maybe cumulative transmissible cultures, at least some of them, do an end run around our genetically transmitted perceptual abilities. We figure out what is in, with, and under the green—photosynthesis.

All our acting, knowing, valuing is done with our human faculties. If there are wolves who act, know, and value, they will do it from their wolfish perspective. If there are spruce trees that act on their photosynthetic know-how and value solar energy, they will do it from their sprucely perspective—if there is such a thing. If there are Martians who

act, know, and value, they will do it from their Martian perspective. Wherever there are agents who do such things, they must use their own capacities. But this is no conclusion of the matter; this is only a starting point. The inquiry continues: With those owned capacities, how far can we humans know what is outside ourselves? Can we identify other identities, such as wolves, with their own integrity? Can humans say what Martians must know about wolves, if they get wolves right? Or photosynthesis, if they get spruce right? Can humans insist that Martians too, if they get wolves right and are moral agents, ought to respect wolves and not cause their extinction? Or do our humanly gained facts, acts, and values apply only to those who are similarly placed?

Environmental ethics is lived on a geographical landscape. This ethics must be inhabited; it takes narrative form and needs personal backing (Rolston 1988, Chapter 9; 1998). In this knowledge and caring we need "participation," or "belonging," or "community," or "location" "situation," "residence," or "presence," "encounter," "embodiment," or "solidarity." We cannot escape relationship, ambience, surroundings, interaction, nor do we wish to. So why not accept that in such encounter, nature always wears a "human face"? By doing that I could avoid my "quaint ontological commitments" (Harlow 1992, 29). Why worry further about otherness out there? Environmental ethics is about being native to a place, so why not think of it as choosing our human story? "Environmental ethics is inescapably human-centered" (Harlow 1992, 29).

But what if there is more story to consider, solidarity with others in a larger biotic community, about whom we must gain truth enough to know something of their shared places before we can rightly choose ours? Perhaps we need to know what we are in the center of? Perhaps we need to escape our eccentric human self-centeredness and see outside our sector.

3. SUBJECTS PLACED AMONG OBJECTS

We human subjects think we know a world of objects out there. Mark Johnson summarizes this view, which he finds quite mistaken:

The world consists of objects that have properties and stand in various relationships independent of human understanding. The world is as it is, no matter what any person happens to believe about it, and there is

one correct "God's-Eye-View" about what the world is really like. In other words, there is a rational structure to reality, independent of the beliefs of any particular people, and correct reason mirrors this rational structure. (1987, x)

In fact, claims Hilary Putnam, we humans can have only a limited objectivity, realism with a human face:

Our conceptions of coherence and acceptability are . . . deeply interwoven with our psychology. They depend on our biology and our culture; they are by no means 'value free'. But they are our conceptions, and they are conceptions of something real. They define a kind of objectivity, *objectivity for us*, even if it is not the metaphysical objectivity of the God's Eye view. Objectivity and rationality humanly speaking are what we have; they are better than nothing. (1981, 55)

Putnam continues, "There is a real world *but* we can only describe it in terms of our own conceptual schemes" (1978, 32). Every act of knowing *ipso facto* gets "conceptually contaminated" (1981, 54). This contamination is so drastic that: "'Objects' do not exist independently of conceptual schemes. *We* cut up the world into objects when we introduce one or another scheme of description." (1981, 52, emphasis in original, with "objects" in quotes in the first but not the second sentence.) "There is a commonsense way of clearing up the puzzle about how many objects there are in the room, and that is to say, 'It depends on what you mean by object'" (1988, 113).

Such incarnate, contaminated epistemologists are anxious to make the point that we can speak of a thing only as we frame it up by our perceptions and conceptions, which exercise immense control over what we can know. But they are over-anxious and suppress how we manage to see quite well through these window frames. What if these epistemologists leave the room and go on a field trip? Putnam concedes that this must be "pragmatic realism" (1988, 114): "The very inputs upon which our knowledge is based are conceptually contaminated; but contaminated inputs are better than none. If contaminated inputs are all we have, still all we have has proved to be quite a bit" (1981, 54). We do have to walk around the trees; we cope in the world rather successfully.

But, back in a philosophical mood: Will we see any "trees," as we walk around them? Well, continues Putnam, it depends on what you mean by "tree." "Even when we see such a 'reality' as a tree, the possibil-

ity of that perception is dependent on a whole conceptual scheme in place" (1988, 113). Are you going to count the shrubby willows? "Trees" as a class of being exists after we have constructed a class into which to put trees.

But it does not follow that these trees, both the big spruce, which nobody disputes, and the shrubby willows, which we do decide to count, *after* these experiences of classifying them, were not there in the forest *before* our experiences, objects which we have come to know about. Philosophers can make this point with scare quotes. "Trees" as a class that English-speakers have constructed does have to be learned about, and decisions have to be made about how big shrubs need to be to count as trees. That class "trees," as a result of its connotation, denotes items in the forest and field, living trees out there in the world. "Trees" are a named category of experience; other sorts of beings, such as snakes or the trees themselves, might well have no such made-up category, the snakes because of the ground level native range embodiment at which they crawl, the trees because they lack mind enough to form such conceptions. But trees (without scare quotes) are not a named category of experience; they are items found in the world, objectively there. We can and do label them so because of their objective similarities, which is the basis of our placing them into the various species into which botanists classify them.

One March day I was lucky in Yellowstone National Park. I had a "three canid day": spotting wolves, coyotes, and red fox. An epistemologist could, by stretching the point, say that my good day depended mostly on how I chose to make up objects in my world. Wolves (*Canis lupus*) and coyotes (*Canis latrans*) are in the genus *Canis*; the fox was *Vulpes vulpes*; all three are in family *Canidae*. Checking my life list of canids, am I to include the wild dogs, *Lycaon pictus*, twice seen on lucky days in Africa? They are not in *Canis* either, with only four toes instead of five, yet in *Canidae*. That is Putnam's point: "We must observe that 'of the same kind' makes no sense apart from a categorical system which says what properties do and what properties do not count as similarities" (1981, 52-53).

But the pleasure I took in such spotting was primarily in locating wild lives, individuals in species lines, out there in the world. True, I view wolves from my located self, using eyes, coloring them grey, and I understand them in terms of my conceptual scheme—as predators after prey, stalking downwind, magnificent evolutionary achievements, *Canis*

lupus—not as "big, bad wolves." But how many wolf-objects did I see of the Druid pack? It seems quite implausible to say: "That depends on what you mean by 'wolf' and what you choose to count as similarities."

I watched four wolves attack and fail to kill one elk; they then went over a low hill and killed another, just out of sight, and ate the carcass all morning. We figured the kill out from ravens perched in the aspens above and wolves coming and going with bloody noses. Did not the wolves eat the elk, after locating this herd while on the hunt by using their keen noses, killing one with various skills of sight and sound, muscle and locomotion? The energy the wolves captured was earlier captured by elk grazing on forbs, captured earlier still by photosynthesizing, and this regardless of whether I happen to know about trophic pyramids or not. Embodied knowledge is present here, in both wolves and human observers, fitting into an embracing ecology. Further, the most knowledgeable observers will need to exceed their particular embodiments for a fuller account. We have figured out that much. Even in the much-disparaged "God's-eye view," disembodied and eye-less though God might be, God would have to reach a comparable account, affirming the reality of this Yellowstone time and place.

We do not think that wolves, coyotes, and foxes come into being when we humans arrive and cut up the world into such objects, much less when the scientific systematists arrive and make their decisions about genus, species, and family. Nobody believes that these animals, or their species lines, come out of our minds. Wolves in the Druid Pack being "of the same kind" makes sense because, apart from any human categorical system, wolves—members of the species we designate *Canis lupus*—reproduce themselves over again and again, their genetically encoded information determining what properties count as the similarities needed to make another wolf.

These wolf-acts are wolf-facts. Humans, in their categorical systems, get wolves right when they describe such objective processes and their products. Humans also get wolves right when they group them among the vertebrates and the heterotrophs. Humans cannot cut up the world any way they please; they have "to carve nature at the joints" (recalling Plato, *Phaedrus*, 265e).

"We cut up the world into objects?" Our human-acts make up the wolf-objects? Is there then only some undifferentiated flux before we cut?

No, Putnam backs off a bit, we should not describe the view of the anthropic realist as one "in which the mind *makes up* the world. . . . If one must use metaphorical language, then let the metaphor be this: the mind and the world jointly make up the mind and the world" (1981, xi). The metaphor is not that of a "cookie cutter" stamping out wolves from an undifferentiated dough; rather we have to make ourselves a "lassoo" [*sic*] before we can catch anything, and what we catch depends on the ropes we throw out (1988, 113; 1981, 53).

Yes, but lassos do catch objects, as cookie cutters do not. Should we lasso a wolf, any person from any culture, or other wolves in their different bodies, or Martians, even a disembodied God, could see that. We catch the wolf with percept and concept; but we do not jointly make up the wolf by lassoing it. Why not say, more precisely, that we can choose various sets in which to collect things—but that some of these sets are registering natural forms. Our construction of some sets is constrained by what has been constructed by nature. There are, sometimes, judgments of our choice about which labels to use for these different natural kinds of things (different canids) that we find. Sort our labels as we may, however, the question is not, fundamentally, our categories of choice, but whether we confront, at the native range level, a natural kind in *Canis lupus*, one that all humans and God too must recognize because this kind is found ready-made by natural processes.

What is getting contaminated conceptually is *epistemological* making up the world with *ontological* making up the world, the order of knowing with the order of being. True, we humans make up our categories as we know the world; that is epistemology, found as much in science as anywhere else. But it is also true that the world made up these natural kinds once upon a time; that is ontology, and science convinces us of this too. These are two very different makings-up; and it only confuses them to telescope them into a joint metaphor.

The Earth-world was quite made up with objects in it long before we humans arrived with our minds. The Earth is not a pliable recipient of whatever forms and properties we impose upon it. We make artifacts, but not the wild-facts. Mind-free, spontaneous nature speciated, filled up the world with five million species, through a turnover of perhaps five billion species. There is genesis and creativity long before we arrive with our distinctive human genius.

Indeed, the other way around. The Earth-world made up our minds over several billion years of evolutionary history, as it also made up our hands and our feet. We, with our embodied minds, are among the Earth-produced objects. True, our minds are unfinished, and we make up our metaphors in this construction, but joint make-up is another half truth, which becomes false in the whole. Our mind, with our words, is made to reach for objects as much as our hands, with our fingers. What the realist wishes to claim is that human-made epistemology can, and often does, track world-made wolves inhabiting the Yellowstone ecosystem. Our actual knowing is factual knowing.

Ontologically, we should begin with an account of being and becoming in the world out there, and, at or near the end of this account, move inside to the mind "in here" and how it knows what is out there. Epistemologically, we do have to start within and move out, with *constructed* percepts and constructs. We may find sometimes that objects and processes in the world are conceptually *clarified* as much as conceptually *contaminated* by our linguistic conceptions. Our percepts and concepts *constitute* our knowledge; and, equally, our knowing (to use still another c-word) is *constrained* by objects and events out there.

The root idea in the word "objective" is that one is "thrown against" something out there in the world, whether "objects" such as wolves and elk or processes such as natural selection and food pyramids." Our knowledge is shaped and reshaped by them. One inescapable conclusion is that many of these objects and events are there before and after, as well as while we are thrown against them. Although it is possible to doubt this in moments of philosophical speculation, no one in any culture really lives doubting the existence of an external world. The question continues: We humans are knowing subjects placed among dynamic objects. What grounds have we for our beliefs?

4. EPISTEMIC SUPPORT: GROUNDS AND FOUNDATIONS

We need support for our beliefs, else we cannot separate the true from the false ones, or, if you prefer, the better from the worse. By some accounts, our propositions (beliefs) are justified by a reliable chain of inference that bottoms out (is founded on) indubitable basic facts, truths. Mediate justified beliefs require epistemic support for their validity in immediately justified beliefs. Systems of knowledge, in content or

method, require first principles, There will be some set of self-evident supporting beliefs, the ultimate terminating points for chains of justification. Our more complex beliefs can be warranted by appealing to some basic items of knowledge that are self-evident or beyond doubt. There are *ultimate* terminating points of justification.

This account is labeled "foundationalism," usually a pejorative name. I do not recall ever having chosen the word to describe my position, but am nevertheless accused of being one (Norton 1992, 218), guilty of "disastrous epistemological commitments" (Norton 1995, 329). Any foundationalist account faces two questions: (1) What are these bottom foundations: Sense data? Clear and distinct ideas? Self-evident facts of the matter. First order empirical experiences? (2) What sorts of inference are reliable, built on these reliable foundations? Induction? Deduction?

The objection here cannot be that some beliefs are founded on other beliefs; no one denies that. Nor is the problem that some beliefs are more settled than others; no one denies that. The objection is that in our chains of beliefs, inference built on inference, we never "hit bottom." Rather, according to W. V. Quine, the better epistemology is that of a "web of belief" (Quine and Ullian 1978). Our beliefs go round and round, beliefs latched onto other beliefs, each belief held up by its ties to other beliefs, the webwork nowhere bottoming out in belief-facts that are unsupported by the network, but which rather support all the beliefs piled up on top of these foundational beliefs. There are, indeed, myriads of connections, but these are not long, one directional chains of inference. All the strands mutually reinforce each other, perceptual strands made possible by our bodies, and conceptual strands made possible by our cultures.

Our beliefs have "founders," our forebears who originated them and sorted out the knowledge into which we get ourselves educated. These foundations lie in our social, conceptual, linguistic heritage, Quine claims: "The totality of our so-called knowledge or beliefs ... is a man-made fabric which impinges on experience only along the edges. ... In point of epistemological footing, the physical objects . . . enter our conception only as cultural posits" (1980,42,44).

That seems plausible, as far as it goes, and provided that it doesn't go too far. "Man only deceives himself when he regards his own linguistic constructs as embodying some trans-anthropological truth. . . . Man, like the spider, spins out of himself the world which he inhabits" (Soskice

1985, 80, summarizing and criticizing Jacques Derrida). But that forgets that these physical objects appearing as cultural posits will still require grounding. Make your network as big as you please and knot the strands together tightly. This is all to no avail, unless and until the net is somewhere hooked up, attached—if not on ground bottom, then to tie points: a tree limb, a rock. Quine knows that there is still the where-is-the-contact-with-the-world problem—as much with nets as with foundations. My world picture "hangs together," but it also "hangs onto" fundamental experiences, constraint points where my beliefs hit reality. "Creatures inveterately wrong in their inductions have a pathetic ... tendency to die before reproducing their kind" (Quine 1969,126). There is plenty of testing for realism in the web of belief.

Mountain climbers need to be roped together but the climbers need, even more, anchor points where their ropes touch the ground. The natural contact is as important as the social contact. Both sets of contacts will shift around as the climbers progress. There are no "absolute foundations" here, but neither can our epistemically cognitive bodies do without grounded support. Placing a web, we bump into objects hard enough that these encounters revise any local claims, and, with enough of these we may shift the whole net. Suitably grounded, nets can be arranged to catch, but they do not invent what they "lasso." We fabricate nets, but the catch is discovery, not fabrication.

We humans, embodied, are involved in the gathering of evidence the quality and implications of which we must judge. If we live, we must live some "where," as we must live some "how." We will do all our thinking from this "where" and "how." That gives our knowledge, if you like, "a human face." But if we are clever we can gather evidence in our own life-supporting epoch and region about times and places in which we could not live or have evolved. Mind can exceed its locality, as we do when we study chemoautotrophs and chemoheterotrophs living in the hot water at the openings of deep sea vents and which need no light for energy but oxidize inorganic substances such as hydrogen sulfide or ammonia. We then research whether these were the primitive forms of life in an oxygen-free atmosphere on Earth. Well, yes, critics may reply, but all such knowledge is still Earthbound. Then notice that while the biologists were discovering the deep sea life, the astronomers were discovering black holes in space.

We can gather evidence about life forms not our own, other kinds of

"how" even in this "where" of our own location. If the spiders or the chemoheterotrophs start gathering evidence and framing worldviews about themselves, or us, or the solar system, or black holes, or life in the anaerobic evolutionary period, then we will wish to talk to them about whether their views are arachno-centric or chemotropho-centric, biased by their "where" and their "how." Meanwhile we are looking from here, from where we are, but with enormous cognitive power, nowhere better demonstrated than in the natural sciences.

The natural sciences do open up a world that is objectively there; they contact, catch, describe it more and less accurately—evolutionary history with its dinosaurs and primates, ecology with its genetics and trophic pyramids. This network hits up against a hardworld of experience, and some points on the network (points constructed by theory and tested in experience) are so much tied into empirical observation (theory-laden though this is), that their "foundation" (their warrant) is equally theory and world encounter. The support for the belief lies as much in a sense of world contact as does it lie in linkage to other beliefs. There is not simply webbing, idea to idea, word to word, concept to concept, but there is feedback and feed forward, idea to world, word to world, concept to percept to objects and processes out there. We do not just test coherence. We test connect-up, correlation, coordination—yes, correspondence. Ultimate foundations? True in all possible worlds? Maybe not. But in this world some things have been "found" out, though they are not self-evident.

These facts include valuing found located out there. A wolf values elk; elk flee because they value their own lives. Such values are found when we see nature through a culturally established framework, and we can set up arguments for such values. These arguments do hit the ground ("bottom out") in experience. Our "acts" encounter "facts." These are "my" arguments; with others who share them they are "our" arguments; but they are "grounded" in contact with values out there. When found, these intrinsic values are terminating points of justification.

Reaching them, value needs no further justification or contributory reference, though there are always such webworks of reference present, if one wishes to look. So I do not say that I find "ultimate" or "absolute" foundations. But I do encounter "local" centers of value, that constrain, or ought to constrain, our behavior, should we jeopardize such value. Values are "grounded" on what is "found." Other persons, failing such

"acts," miss the "facts." That makes me an epistemic empiricist. From the premise that we humans are embodied we do not always have to draw the conclusion that our knowledge is parochial.

Do I have a fallibilist commitment to a corrigible point of view? Yes, I join fallibilists scattered all across intellectual history. We "see through a glass darkly" (1 Corinthians 13.12); truth in the Reformation heritage is *semper reformanda*, always reforming. But some things that I believe (that Earth is round, that thorns have adaptive value) are so "settled"—a reliable, foundation-like word—that I would be much surprised to find them corrected in my web of beliefs. They are not in principle beyond doubt, but they are in practice never seriously doubted. I have this much of a "God's eye view"; God also finds, or ought to find, that trees photosynthesize and that water and nitrogen are of value to them here on Earth.

I am always using certain standards of my community inquiry, but also I bump up against constraints that can lead me to reject what my community has concluded. In fact, that is a summary of my career: My teachers all told me that nature was intrinsically valueless; that is what I was educated to believe. But my encounters with nature led me to reject that webwork of belief. The facts of the matter (organisms webworked into biotic communities) caused me to reject the conclusions of my social community. Consensus—at least the consensus of my rearing and colleagues—was not the touchstone of truth.

I reached the conviction that plants, objectively and without subjective experience, are valuing organisms. My botanical inquiries, made possible by textbook, microscope, and field experience, led me to plant encounters where the plants in place out there refused their place in my inherited web-system of beliefs (that plants were valueless machines). It was not some other belief in the web that revised this one. This belief "touched ground" wrong. "Grounds with roots" is a better botanical metaphor than "foundations with stones." My beliefs are a webwork, netted together, yes. But my beliefs located me in a webworked world, where flora and fauna, humans included, are netted together. I was, if you like, relating to those plants through interpreted experience, incarnate in flesh as I did so. I did carry them home, dissect them, and look them up in the manuals. But there were encounters across my membranes that revised my interpretive framework. The plants critiqued my theory.

A new belief, revised into the former web of beliefs, resulted. The worldview into which I was educated preconditioned my encounter—at first, but later my encounters constrained and reconstituted my worldview. The reason for the change was not incoherence within my belief system. The change was constrained by plant encounters, forcing revised beliefs—although, if I looked around, there were indeed some of my beliefs (about survival value of thorns) that could be hooked into and support my new beliefs. And there were always a few maverick thinkers that gave me comfort.

So I have reached some "core beliefs" less revisable than others. A reason is that these beliefs seem more constrained by the world, or by back-inference from encounters in it. Here my web of beliefs more reliably (dare I say it) corresponds—co-responds—to reality.

5. CO-RESPONDING ON EARTH

No, my sophisticated critics will immediately object. If epistemologists learned any thing at all in the last century, they learned to reject correspondence. The early Ludwig Wittgenstein took a correspondence view: "If a fact is to be a picture, it must have something in common with what it depicts" (1922, 1961, Proposition 2.16). Later, Wittgenstein got smarter. "The meaning of a word is its use in the language" (1958, sec. 43). The main feature of language is that we humans are always trying to do something with it; and so the coping comes first, and copying is the wrong way to think of it. Cognition is always "know how" and never "know that." Any idea that we can check up on our descriptions according to an extra-linguistic how-things-really-are is an illusion, for there is no "behind" to language, no "out there" that we can consult non-linguistically. We are always inside our language, like we are always inside our skins, managing our way—or poised on our webs, on the catch, if you prefer that metaphor.

More lately still, Richard Rorty warns that we must not think that "Reason" offers "a transcultural human ability to correspond to reality"; the best that reason can do is ask "about what self-image society should have of itself" (1991, 28). The big mistake is "to think that the point of language is to represent a hidden reality which lies outside us" (1989, 19). Formerly, naively, we used to ask whether the words in our language about nature have extensions to which their intensions successfully refer.

Now we ask, more pragmatically, how well our words help us function; for that is why and how language evolved, a survival skill for a social primate incarnate in flesh, making a way through the world, seeing "green," avoiding "wolves," and hunting "elk." "Representation, as opposed to increasingly complex adaptive behavior, is hard to integrate into an evolutionary story" (Rorty 1998, 20). Science, philosophy, or whatever the endeavor: the effort is to manage a way of dealing with our environment. We humans are quite sophisticated about this, using computers and mathematics, debating environmental policy and ethics, but in principle we and the animals are doing the same thing, "Adaptive management" is our version of "adapted fit."

Does not all this coping require some copying? Begin with those animals. Is a wolf's view of an elk, scouting the herd, then the chase, ending in a kill, complex adaptive behavior that is hard to reconcile with representation? *Prima fade*, the presumption is the other way round. Unless the wolf pack can accurately locate the herd, pick out the aging, slightly lame elk, and track it in the chase, there is no kill, and no survival. The wolves, of course, see the world through their niche; they see (and smell) food. But they equally have to see objectively the lame elk they select. Nothing about this epistemology needs to be "absolute," or "ultimate," or even "foundational." But their knowing does have to be accurate, factual, or their acting will fail. Perceptions do have to re-present the elk, to present the elk on location.

Are we humans less capable? Our noses are, but not our minds. If the "corresponding" of mind with world is too troublesome, begin with another metaphor: Language is "co-ordinated" with reality, like Cartesian co-ordinates overlaid on the world in order that we can map it. The locating co-ordinates are our invention; what we locate with them was in place before we took up our search. Biologists construct cladograms, branched diagrams of relationships between taxa of organisms, based on morphological and molecular characters, and use these to infer phylogenetic trees. These, biologists claim, diagram the evolutionary history across which these descendent taxa (usually species) developed from branching ancestral lines.

This often results in various possible trees, called "inferred trees," and biologists attempt to resolve which one is what they call "the true tree" (Grauer and Li 2000, 173). Molecular data often resolve what were hith-

erto ambiguities in the morphological trees, bringing them, they claim, closer to the true tree. Surely that involves the claim that some one of their considered trees (often these trees are "constructed" using computer programs) is in fact the real one, that is, the one that represents, re-presents now to biologists, the routes of inheritance that in fact took place long ago out there in the world. "In a species tree, a bifurcation *represents* the time of speciation" (Grauer and Li 175, emphasis added). Of course a phylogenetic tree does not "look like" these plants and animals diagrammed, nothing is in any literal sense "pictured." But, when biologists are successful, truth is "depicted" because there is verisimilitude between the diagram (with its supporting texts) and the world.

The biological journals that specialize in systematics are full of articles analyzing how to get artifacts and other inadequacies (such as what they call "long branch attraction," or the confusing of synapomorphies and homologies, etc.) out of the cladograms produced by the computers and get the result that is true to evolutionary history. Simon Conway Morris, a paleontologist, remarks: "Constructing phylogenies is central to the evolutionary enterprise, yet rival schemes are often contradictory. Can we really recover the true history of life?" (Conway Morris 2000,1). The test of a successful phylogeny, or cladogram, is whether it is co-ordinated with what has taken place out there in the world. The cladogram is a sort of map. Maps sketch; they are useful, but only when they correspond with the terrain.

Such co-ordination can certainly seem like description, I am looking at a *Potentilla*. The fact stated in the flora manual that *Potentilla* has five sepals does have "something in common with what it depicts" (Wittgenstein), those five green flaps of tissue beneath the flower there under the microscope. The "sepals" are not my construction simply because I must conceive of them in language. I read the botanical text, mostly words and a few sketches; and, reading the text, I read the plants. The text says: "sepals with stellate pubescence on underside." I had not looked; but now I lay down text, put my eyes back to the binocular scope, take a dissecting needle, turn over a sepal, and, sure enough, there are the stellate hairs. The text enables me to read the world because my forebears in botany consulted the world.

Yes, I am "seeing it" as "a sepal," as "stellate pubescence" on the "underside." But these concepts, into which I have been educated, fashion

my perception and equally they facilitate it. There is, if you like, a "language game" (Wittgenstein) about what counts as a "sepal." How many sepals are there? It "depends on what you mean by 'sepal'." See that sepal-like-object-cum-cultural-posit out there, it is described as a "sepal"—at least the bigger lobes are. In *Potentilla*, are you going to count those smaller "bracts" between the larger five "sepals"? In fact, what plants do we put in *Potentilla*? Mostly they have five sepals and five bracts, but then there is tormentil, *Potentilla erecta*, with only four. Is not a conceptual scheme framing up what the botanist sees?

Yes, but what the botanist sees is equally constraining the descriptions of species and genera. Botanists "place" *erecta* in *Potentilla* because of other family resemblances in flower and seed structure—and we are talking about "resemblances," things "placed" out there in the world that look alike, similar morphologies, and they do so because of their evolutionary histories. There are judgment calls about how much they are alike, but that there are discovered resemblances in fact is beyond doubt. Say if you like that the systematists are helping us cope—better floras give us better control over the landscapes we inhabit—but they succeed by better corresponding, co-responding, co-ordinating with what is there. Yes, the botanists have their world view at stake, and their success valorizes Western science. But equally the scientific categories work because, cumulatively from the sustained critical inquiry of systematists, they better co-ordinate with the objective world.

Language is not just for encountering and conversing with each other; language is for encountering and getting along on Earth, in the world we inhabit. That makes perceptive pragmatists into realists. Karen Barad concludes, with emphasis: "*Realism is not about representations of an independent reality, but about the real consequences, interventions, creative possibilities, and responsibilities of intra-acting within the world*" (1996, 188, her italics). Knowing is always "in between," never "independent." Barad asks rhetorically: "Why would we be interested in such a thing as an 'independent reality' anyway? We don't live in such a world" (1996, 185).

Ask the zoologists. Wolves? Yes, indeed there are consequences, creative possibilities, and responsibilities of interacting with them. But in order to evaluate what these responsibilities are we need to know something about the wolf independent reality, what they are in themselves,

their own possibilities as created beings. On the basis of what is presented (re-presented) to us about their own form of life, zoologists-become-ethicists might resolve, as far as possible, to restore wolves to Yellowstone and then to let them be, minimizing our interactions with them.

We might wish to prevent the extinction of *Canus lupus* at our hands, while also recalling that dire wolves, *Canus dirus*, went extinct millennia back, uncertain whether this happened naturally, perhaps as a result of changing Pleistocene climates, or by human hand, aboriginal hunters migrating into the New World. Realism about dire wolves hardly seems only about the consequences, creative possibilities, and responsibilities of our interacting with them. Rather, we live in a world in which dire wolves once upon a time did—as grey wolves today do—have their long-standing independent reality. It is just that creativity, its processes and projects, that we wish appropriately to re-present to ourselves, and in environmental ethics to respect and save it.

After all, the less we really know about nature, the less we can or ought save nature for what it is in itself, intrinsically. We will find it difficult to know how we ought to behave toward others, if we do not know what their goods or interests are, before we get there and after we leave. Indeed, if we know that little, it may be hard properly to value nature even instrumentally when we are interacting with nonhuman others. Pragmatic adaptive management requires accurate assessments of what is going on. We cannot correctly value what we do not to some degree correctly know. How can we care for others if we cannot see outside our skins enough to know both that they exist in their different modes of being and that they have their own fields of significance? We will do this, of course, from within our skins and languages; and these things will come to have significance *for us*. Still, the environment, the biotic community, cannot be reduced to *our* field of significance, any more than can the cultural community be reduced to *my* field of significance.

Maybe all those nonhuman creatures out there are just coping and incapable of representation. Maybe most humans are like this too, their seeming truth claims nothing more, really, than quite complex linguistic behavior arguing this or that ideology, pushing to get more of the speaker's genes into the next generation, proving their adapted fit. But if that is what evolutionary biologists are trying to do, subtly with their complex persuasive, seemingly argumentative behaviors, that and nothing

more, this would supply ample reason to distrust the theory. Their arguments would become self-serving and discredit their theory.

Evolutionary theory, superficially, may seem to demand that our knowledge be local coping and nothing much more. But think further, "Evolutionary theory" is counterevidence to evolutionary theory. The bizarre fact that this one species, *Homo sapiens*, can discover, critique, evaluate this transcending overview of 3.5 billion years of life history on Earth is not at all easy to reconcile with complex adaptive behavior selected to increase one's share of genes in the pool, next generation. If anything at all in science seems a description of events in nature independently of human genetic coding or phenotypic coping, it is these claims that biologists make about what went on on Earth long before we humans arrived. Quite contrary to Rorty, the evolutionary story is incredible unless it is descriptive of natural history, and the warrant for that cannot be complex adaptive fit, more genes for these biologists in the next generation.

Surely a more plausible account is that our inputs are "constructed" and the main reason that some are better than others is that some co-respond, re-presenting to us more accurately the number of wolves and which one of the elk they are stalking. Incarnate epistemic actors need to know such facts. And this has been greatly elaborated by the linguistic webs we spin, catching facts outside our native range, discovering also that the energy the wolves capture in the elk was earlier captured in photosynthesis at the molecular level, and that these ecologies have a long, dynamic evolutionary history.

6. HUMAN GENIUS: TRANSCENDING LOCATION

We never experience a dis-embodied and un-placed mind. But we do gain views that look out from our bodies and places and see what is out-of-my-body and out-of-my-place. We enjoy a native incarnation and a native residence. Had we been microbes or octopuses, our native ranges of perception and conception would be different. But we humans also enjoy a surprising transcendence of localized body and place. We are always situated somewhere, but it does not follow that all our knowledge is situational. Our epistemic compositions enable us to enlarge our geographical positions; we discover more of nature's compositions. Oddly, what was once and still is a part in a whole, *Homo sapiens* now also

understands and oversees the whole and its parts, reshapes parts and the whole, jeopardizes the whole and its parts. The behavior of this part, owing to critical cultural innovations and decisions, is no longer predictable or controlled by the whole.

Microscopes and telescopes come immediately to mind, making visible the microbes and galaxies, of which humans were long unaware with their native-range eyesight. But much further; we can learn about photosynthesis, an Earth-bound event out of our native range, and discover that it is fundamental for life on Earth, and this Earth-fact is true for all observers, earthlings or not. A forest cannot be understood simply by looking long and hard at it, with one's body in an appropriate place, even aided by microscopes and telescopes. To understand a forest, one needs concepts, such as carbon bonding, oxidation, oxygen balance, photosynthesis, and knowledge of glucose, cellulose, or nutrients such as nitrogen and phosphorous. Science takes away the colors, if you insist; apart from beholders, there is no autumn splendor or spring green. But science gives us the trees solidly there, photosynthesizing without us, energetically vital to the system of life of which we are also a part.

Alone among the species on Earth, all of them embodied, *Homo sapiens* is cognitively remarkable. With our instrumented intelligences and constructed theories, we now know of phenomena at structural levels from quarks to quasars. We measure distances from picometers to the extent of the visible universe in light years, across 40 orders of magnitude. We measure the strengths of the four major binding forces in nature (gravity, electromagnetism, the strong and weak nuclear forces), again across 40 orders of magnitude. We measure time at ranges across 34 orders of magnitude, from attoseconds to the billions-of-years age of the universe. Nature gave me my mind-sponsoring brain; nature gave me my hands. Nature did not give me radiotelescopes with which to "see" pulsars, or relativity theory with which to compute time dilation. These come from human genius, but nature supplies the marvelous processes analyzed by radiotelemetry and relativity theory.

These extremes are beyond our embodied experience. No one experiences a light year or a picosecond. But they are not beyond our comprehension entirely, else we could not use such concepts so effectively in science. The instrumentation is a construction (microscopes and mathematics), a "social construct," if you must. But precisely this construction

enables us dramatically to extend our native ranges of perception. The construction dis-embodies us. It distances us from our embodiment. No one has an everyday "picture" of a quark or a pulsar. So if you want to lampoon the perfect "mirror" image at these extremes of range, this is easy to do. But we have good theory why nothing can be "seen" at such ranges in ordinary senses of "see," which requires light in the wavelength range of 400-700 nanometers, with quarks and pulsars far outside that range. We can ask whether a molecule is too small to be colored, or whether an electron, in its superposition states, is so radically different as to have no position, no "place" in the native range sense, but only a probabilistic location.

Yes, replies the embodied epistemologist, but body is more present than we realize in such mind. Take the concept of "balance," for instance, pivotal in organismic biology, in reactions in chemistry, or in equations in physics. "Balancing is an *activity we learn with our bodies* and not by grasping a set of rules or concepts," insists Mark Johnson. Learned in our own body states, balancing our weight on either side, we extrapolate and metaphorically extend it to other equilibria in biology, and on to balancing red-ox reactions, then to logic (whether one argument outweighs another), to ethics (whether on balance the judgment was just), and even to balancing mathematical equations. "Equality is a matter of balance . . . We *balance* the equation by performing the same operations on each side of the 'equals' sign" (1987, 74-87).

But probing the origins of metaphors—"balance" in our walking upright—is not all that illuminating when we wonder what is the mixture of equilibrium and chaos, order and disorder in ecosystems. Every effort to deepen understanding, science included, originates somewhere in the available reservoir of human experience. So we will often attempt understanding by analogy. Metaphor makes initial contact, and then we critique the imagery, with counter-imagery, with more precision in analysis, with measurement, further imagination. Science involves a long history of breaking up commonsense understandings with more sophisticated ones. We greatly extrapolate and radically transform any such originating metaphor. When we say that ecosystems provide life "support," that "support" presumably employs a word once learned in ordinary life, but we do not learn much about this support from our habit of walking upright. We subject it to analytical criticism.

We may conclude that equilibrium theory (with its balance) and non-equilibrium (dis-balanced) theory represent two ends of a spectrum with real ecosystems somewhere in between. Whether one sees one or the other can depend on the level and scale of analysis. If density or community structure as a whole is studied, equilibria may appear never to be reached. However, at population levels, species diversity, or community compositions, ecosystems can show more predictable patterns, and even approach steady states on restricted ranges (Koetsier et al, 1990). In well-studied areas, we get much the same species count over a century, similarly with what eats what, or what the community composition is. Numbers vary, densities shift with good seasons and bad, wetter, drier, colder, hotter; community composition changes after a fire. But the fluctuating processes are much the same over hundreds of years.

R. V. O'Neill summarizes: those who see stability and those who see change are looking at two sides of one coin: "In fact, both impressions are correct, depending on the purpose and time-space scale of our observations" (1986, 3). "The dynamic nature of ecosystems," concludes Claudia Pahl-Wostl, is "chaos and order entwined" (1995). Such scientific study no longer seems all that limited by our being embodied with a need to walk upright. The constraints on our epistemology are not our flesh and blood experiences but rather are how far we can co-ordinate our ideas with the degrees of contingency and order in ecosystems out there. The stability we do discover is external to any inside our bodies, or to any we discover somatically by walking upright.

Chaos too, some will object, must be first learned in ordinary life and extrapolated as metaphor to ecosystems. Maybe so. But we are quite remote from our native ranges when trying to decide whether the chaos is deterministic—similar to those sorts which can be mathematically generated—or indeterministic, as a result of amplified quantum indeterminacies. We get loose enough from our positions and places to consider other time-space scales and other kinds of balance: species diversity versus density dependent regulation. There is no direct connection between our bodily "balance" and stable, dynamic, or unstable ecosystem community composition. We are quite capable of asking whether even a parallelism is relevant or far-fetched.

One uses concepts of balance to understand co-valent bonding, ionic bonding, Van der Waals bonds, subshells, quantum energy levels, none of

which are at all similar to corporate bodily experience. To the contrary, these are domains where intuition and everyday experience do not easily serve. Whatever we do figure out about them has to be translated into native range experience. Might it then be that "balance" is contaminating our understanding more than clarifying it? Or that it is only a metaphor, projected onto nature?

The basic energy-use processes in ecosystems take place inside cells and involve glycolysis feeding into the Krebs cycle, releasing energy once stored in photosynthesis. The diagrams of these transformations in biology textbooks are typically drawn in color and with curved arrows going round and about, single dashes for single bonds, double dashes for double bonds. If one does the chemical equations for the dozen or so steps, they must be carefully balanced. These drawings are cartoons, if one wishes to call them that. These molecules are too small to be colored, and an electronic bond does not look like a dash. We realize our everyday bodily experiences are being transcended.

Still, these diagrams sketch transformations that are taking place in nature. These diagrams, and the texts that accompany them, do not claim to be absolute, but they do claim to be veridical. That trees photosynthesize is true for all observers because it is true independently of observers—as true in and for the trees as it is in and for observers of the trees. Martians too, whether they walk upright or not, will have to figure out the conservation of charge, energy, and mass, and balance their equations in photosynthesis and glycolysis. These essentially involve conservation laws, discovered through powerful and penetrating insight into nature, all of which is a long way from the bodily balance upright primates need.

Some native range perceptions are metaphorically transferred and prove useful when understanding phenomena at other ranges. But it is just as true that science teaches us how native range perceptions can be deceptive: Trees are not really green, all by themselves. We have learned that the sun is not setting, that species are not fixed natural kinds. Earth is a diverse place: myriads of species, rocks, minerals, rivers, oceans, and mountains—but everything is made up of ninety-two elements, each made of a few simple if bizarre "particle-events," "wavicles": protons, electrons, neutrons.

Physicists have discovered that the mass of the proton is almost the

same as the mass of the neutron; the electron is eighteen hundred times lighter, but with a charge that exactly balances that of the proton; they calculate how these figures could not vary much and have atoms still remain stable (Smolin 1997, 39-40). No routine bodily experiences trigger such discoveries—certainly not that of walking upright. Nor does everyday experience—taste, touch, smell, sound, sight—suggest time dilation in subatomic interactions, or Heisenberg's uncertainty principle in the location and momentum of electrons and protons. Electrons, protons, neutrons are composed of quarks in turn, said, almost comically, to have their "flavors": "up, down, sideways, and charmed," and, more seriously, are thought to be too small to have location.

George Lakoff claims that all "thought is *embodied*, that is, the structures used to put together our conceptual systems grow out of bodily experience and make sense in terms of it; moreover, the core of our conceptual systems is directly grounded in perception, body movement, and experience of a physical and social character" (Lakoff 1987, xiv). But one commits the genetic fallacy to claim that, because once upon a time knowledge originated locally in bodily experiences and was elaborated through metaphors, now and always knowledge remains all and only of that kind. Evolve we once did, and embodied we remain, but there are genuine epistemic novelties. Earthlings can learn the Pythagorean theorem in ancient Greece or at Colorado State University; it is the same in both places because it is not a body-bound, a place-bound, nor even an Earth-bound truth. Nor does the need to balance the square of the hypotenuse with the sum of the squares of the two sides arise from our walking upright. Although the brain with its mind evolved and exists in this world, the mind can imagine and reason in alternative worlds, as mathematicians do with their non-Euclidean geometries.

Our bodies with their percepts, our minds with their concepts do not make our own location disappear, nor do we wish it could. Location gets expanded, re-located, builds up overviews of the whole. That does transcend startpoint location enabling us to reach standpoint location greater than ourselves. No animal, humans included, knows everything going on at all levels, quarks to cosmos ("the God's eye view"). Some animals, sometimes humans, know nothing really of what is going on at any level; they have only functional behaviors, genetically coded or behaviorally acquired, that work, more or less, for survival. They have, if you like, lim-

ited know-how and no know-that. But some animals do cognize what is going on at some levels, typically with the animals a functional picture of their native range niche (the wolf sees the elk). Humans begin here, but can enjoy an epistemic genius, transcending their own sector and take an overview (Earth seen from space, hydrologic cycles), or take in particulars outside their embodiment (sonar in bats, low-frequency elephant communication). We are always agents in our knowing; yes, but our agency can increase our powers for becoming spectators.

Continuing now, especially in the life sciences, just this transcending overview equally brings us ethical responsibility. At this range of vision, there are no detached, disinterested spectators; to the contrary, at such scope our agency returns, supercharged with existential responsibility. We can not only discover, for example, fact of the matter about order and disorder in biotic communities; we can worry about disorder we are introducing, and go on to ask what mix of order and disorder may be desired for ourselves or valuable for ecosystem integrity. The more inclusive overview of what is going on has orienting, engaging truth value. Such science demands conscience.

7. FACTS AND VALUES IN PLACE—ETHICS EN-ACTED

Environmental ethics seeks answers to the question, "What shall we do with regard to nature?" This always puts us in place on the scene. An ethic is called for if and only if we are there interacting. No people, no ethics. But the answer often depends on what was going on before we arrived and on what is going on outside of our human domain. Humans find themselves uniquely emplaced on a unique planet—in their world cognitively, critically, and ethically as no other species is. Our bodily incarnation embeds us in this biospheric community; we are Earthlings. Our mental genius enables us to rise to transcending overview. Can and ought we to move from facts to values, from values in fact to ethics enacted?

This exclusive, epistemic rational power has led, unfortunately, to an exclusive, axiological mistake. The prevailing Enlightenment conclusion, thought to be endorsed by science, is that the surprisingly rational species is the sole locus of value. One might have thought that discovering ourselves to have evolved with so many other species would make ethics more inclusive. Nevertheless, impressed with the power of mind over matter, the Cartesian legacy continues that nature is value-free.

In an age of naturalism, philosophers seem as yet unable to naturalize values. They are naturalizing ethics and metaphysics. They have connected human ethical behavior to Darwinian reciprocity, kin selection, genetic fitness, and so on. In epistemology, philosophers notice how our human perceptions have an evolutionary history. Our cognitive capacities are pragmatic ways of functioning in the world. They interpret ideologies and metaphysical views as means of coping, worldviews that enable humans in their societies to cohere and to outcompete other societies. Philosophers (as we have heard) insist that we remain embodied and realize how our mind has its roots in matter.

But philosophers are slow to naturalize axiology. If they do, they try to demonstrate the biological roots of human values. Joining the evolutionary psychologists, they show that our values root in our biological needs—for food, shelter, security, resources, self-defense, offspring, stability and status in our societies. Beyond that, philosophers are reluctant to naturalize values in any deeper sense. They cannot disconnect nature from humans so that anything else in nature can have any intrinsic value on its own. Nature comes to have value only when humans take it up into their experience. Humans en-act value.

That is disconcerting. There is something philosophically naive, and even hazardous in a time of ecological crisis, about living in a reference frame where one species takes itself as central and values every thing else in nature relative to its potential to produce value for itself. One might think that embodied human valuers, with such smart minds, would be quick to see that other embodied beings, nonhumans, have their values too. Intrinsic values skin-in would enable us to locate values out there, outside our skins and inside other skins. Value, first self-experienced in our own kind and communities, could metaphorically extend to others and their kinds, immediately to other psychological selves and further to other somatic selves, in their species lines and ecosystemic communities.

Somewhat curiously, however, the more obvious kind of naturalizing—showing that our values are framed by our evolutionary embodiment in the world—blinds us to the deeper kind of naturalizing—recognizing an evolutionary world in which values, some of which we share, are pervasively embodied in the nonhuman world. We are unable to discover value except in ourselves and our own kind. Our "enlightened" ("Enlightenment") axiology has blinded us to a world laden with values. Here the can't-get-out-of-our-skin epistemology can be as much

problem as answer. We are powerless to act verifying even facts, much less values outside human realms.

In the ultra-sophisticated circles of postmodern epistemology, if describing nature is an illusion, finding intrinsic values present in nature is still more illusion. Do not try, warns Eugene Hargrove, to develop a nonhumanist argument that "such values exist independently in nature ... The best way ... to deal with this concern is actively to defend these values as part of our cultural heritage, not to try to develop a metaphysical/epistemological theory of objective nonanthropocentric intrinsic values that constitutively trumps individual judgment and culturally evolved values" (1992, 186). Be an activist; defend the wolves in Yellowstone as part of your American heritage—the wild West. Do not think you are epistemologically competent to know the ontology or axiology of wolves.

The retreat into our cultural heritage is wise, it is insisted, because knowing nonanthropogenic intrinsic value requires humans to do what they cannot, get out of their skins, languages, minds, and to value nature independently of human perceptions and preferences. Hargrove continues: "The search for a nonanthropocentric intrinsic value seems to me to be comparable to a Kantian search for actual objects in the noumenal world. To succeed, the nonanthropocentrists apparently need to go beyond valuing based on the human perspective—which seems impossible" (1992, 192).

Is it so impossible? Will not actual objects in the *phenomenal* world serve to take us beyond the values we have culturally selected? Any values intrinsic to the wolves are humanly extra-somatic, though these are not dis-embodied values. They are in wolf bodies. We can judge them by comparison with our own somatic interests. Yes, comes the reply, but that is just the point. The shapes these phenomenal values take reflect our constituting framework. All these values come through with a human face; they have to be enjoyed by flesh-and-blood humans in their cultural places. So we are warned: Do not try to go beyond and mistakenly think that you know anything objective about either nature or values there.

Bernard Williams insists: "A concern for nonhuman animals is indeed a proper part of human life, but we can acquire it, cultivate it, and teach it only in terms of our understanding of ourselves" (1985, 118). Well, yes and no. The concern has to be ours, and our relation to animals will affect

our self understanding, especially with pets and domestic animals. But we also need to understand animals in their wild, noncultural settings. Environmental ethics is not ethics by extension, not just humane moralism toward our cousins in fur and feathers.

We treat humans and wild animals differently, for instance, non-interfering in the pain of wild animals in distress, letting nature take its course, letting the wolves eat the elk, which would be monstrously cruel should we let wolves eat humans this way. "Our ethical relations to each other must always be different from our relations to other animals" (Williams 1985, 118). But just such valuing requires extra-cultural objectivity, a window outside our self-understanding. They live in wild nature, we live in culture superimposed on nature. We do not want to see in the wolves a human face.

Nor is it just the beasts with whom we have such ties. We share vitality with the invertebrates, the protozoans, the plants. Plants are not only nonhuman; they are faceless, as are protozoans and many invertebrates. Surely it is a mistake to see them with a human face, although their organismic value is, as much as is ours, embodied value. But it is value embodied quite differently.

To fall back into conserving nature as, and only as, important in "our cultural heritage" is to slip into another of these anthropocentric illusions that have long plagued philosophy, the mind turned in on itself in a self-reflexive trap, unable to test either its facts or its values against an external world. The objectivity myth, so alleged, is replaced by a subjectivity myth. Nature may not be as given as the naive realists suppose; but, upon finding this out, we make an equally naive mistake to think that actual nature is not given at all.

Bryan Norton chooses, admirably, to place his memorable encounter with a little girl collecting sand dollars on a Florida beach as an introduction to his *Toward Unity Among Environmentalists* (1991), and the sand dollar is featured on the book jacket. I share Norton's hope that she can find better ways of valuing sand dollars than to toss them into chlorox to kill and bleach them, and then sell them for a nickel each to make ornaments. But when he tries to give a rationale, to imagine what might be said to such a utilitarian mentality, he finds himself stuttering, unable to escape his "environmentalists' dilemma" (1991, 3-12).

Norton insists, right through to the end of his book: "Moralists

among environmental ethicists have erred in looking for a value in living things that is *independent* of human valuing. They have therefore forgotten a most elementary point about valuing anything. Valuing always occurs from the viewpoint of a conscious valuer. ... Only the humans are valuing agents" (1991, 251). That nowhere leaves him well-placed to value sand dollars. Such value epistemology does, indeed, put him in a dilemma.

What he himself clearly feels "is this sense of respect for sand dollars as living creatures" (1991, 5), for value present there that ought not to be sacrificed for a nickel. Something "matters" to the sand dollars; that's what's the matter with killing them so trivially. But he cannot voice this reason, and this is not surprising since, epistemologically, he does not think that language serves well to represent anything objective at any range of observation (1992, 218), and therefore is unable, ontologically, to re-present, to present to us any values objectively present in lives out there. If Norton does not have any reliable truth about what those sand dollars are in themselves, either in terms of their biology or of values intrinsically present there, then there is not much argument possible with those who prefer dollars to sand dollars.

He says: They are alive and I interact with them with "character-building transformative value" (1987, 10-11). He gets an enlarged sense of his place in the world. She says: They are alive, but I interact to transform them into dried shells for ornaments my mother makes, and I value them for that. So it is just one person's interactive experience against another person's, and no one can appeal to a better appreciation of what is actually there. His interactive acts lead to one set of facts. Her interactive acts lead to another. Different spokes for different folks.

Those who can appeal only to their interactive experiences with nature, or to those that their cultures have preferred to choose, unconvinced that they or anybody else can go further, really do not have any convincing arguments with those who choose otherwise. They are destined to end, as Norton ended his conversation on the beach, "in ideological impasse," in a "dilemma in values." This dilemma with sand dollars, he muses, is a microcosm of the human relation to the whole biosphere (1991, 3-13). Norton hit reality when he encountered the sand dollars, and lamented the little girl making a resource of them; he has yet to face up to the epistemic crisis that contact with sand dollars entails.

The social construction that dresses up nature most unrealistically is that nature is all and only resource-for-us-humans, that there is no value there unless and until we conjure up value. That we enact and project all value, a metaphysics buttressed supposedly by an embodied epistemology confining us to our own experiences, that all value has a human face—that is surely Cartesian myth, a misleading webwork of belief if ever there was one. Natural science is superb evidence of our capacities to discover facts outside our own home range. What a pity that such creative genius, looking at the planet as a whole (as from space), can then shrink down to a "can't get out of my skin" argument, or to a "no values without a human valuer" account. What's inside my skin is itself quite good evidence for evolutionary achievements out there; my valuing and valuable mind is even better evidence for the surprising powers of evolutionary creativity.

More recently, Norton "values nature for the creativity of its processes." "It is possible to recognize a deeper source of value in nature, what might be called 'nature's creativity'" (2000, 1029, 1039), Amen! Now there is prospect of real progress! Here we reach the final of our c-words: *construction*, *contamination*, *clarification*, *constraint*, and now, *creativity*. To avoid further dilemma, however, first we will have to figure out how we know enough about these creative processes to evaluate them. Will we not need considerable realism, accurate if not objective? We can learn to respect the sand dollar as a product of this creative process, perhaps even to find value achieved and located there.

Once we ascertain creativity put there, as ontological process, we will need to return within if we are to take this creativity seriously. These processes created not only the sand dollar but also the mind and hand, supreme and superb evolutionary achievements. We have to take that human genius seriously in its creativity, "Celebrate nature's infinite creativity," urges Norton (2000, cf. 1043). Yes, and certainly we must see our brains as dynamic and creative objects, bodily as these are, and sponsoring our subjective minds, valuable, able-to-value. Humans are as infinitely creative as anything else yet achieved in evolutionary history, with our 10^{12} neurons, each capable of 10^3 interconnections, quite dynamic and with more brain circuits possible than there are atoms in the universe.

Hence I have no wish to oppose the idea that humans construct and critique their myriad concepts, enabling them to amplify, focus, correct,

and extend their percepts. Rather, I rejoice in this continuing creativity. There is active nature actively known by human genius. Moral agents are not found outside society; but it does not follow that morality, arising within society, cannot find value in the natural world, resulting from creativity there and in encounter with which duties arise. This finding of value is going to have to be intellectually credible before it can be morally imperative. The sole moral species thereby comes to care for Earth. These *facts* result from and further command our *acts*. Finding ourselves living in that kind of place is quite exciting. We might become *Homo sapiens*.

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