The Cartography of the Space Between

I've come out here to the woods to learn to track. I have some interest in the footprints of the deer—especially now that they've started jumping the garden fence and eating all the sweet potatoes—but my real interest is in tracking humans.

I am following the meandering steps of mothers and hunters, doctors, and physicists—the other trackers who ventured before me into this territory between human and nature—this place that is not a place where I find footsteps from before I was born, still fresh in the mud, the water trickling into them from the edges.

I sit out here on a rustic open balcony, nestled among the trees, flipping through books, and smoking. This morning I am hot upon the trail of one Stephen Buhner, a teacher and writer whose tracks I have stumbled upon before. I believe he lives in New Mexico, but not so long ago he was in this land that I am mapping—probably still is. These tracks are fresh. Like the others I have followed here, I feel certain that his steps are circling around the margins of this place. It seems that no one can really approach the center, that maybe we can only find our way by spiraling slowly inward.

I've been called to map this place—the land between human and nature—so I've come out here into the woods to track, and study, and to draw a map that points the way that so many other people have gone, even if they never got where they were going.

I'd like to draw this map because I can see very well that this is what we badly need. We've reached a place where the map we have—the map of the land of Man—won't serve us any longer. It seems obvious that we must "get back to nature" so to speak, but we cut ourselves off from nature so long ago that we don't know how to get back. At least not without a map. I've been wandering this road back to nature all my life it seems, and so have quite a few others. The road is actually quite well travelled in spite of what it seems.

Today I'm following Buhner who is writing of plants, and he does it very well.[1] His articulate and emotive voice spins the threads of their story (the plants) and our story together. He spins the threads that guide our steps through the labyrinth like Ariadne's string. But then the path is muddied by other travelers. So many have passed this way before, each on their own path with their own marks. I follow them all.

I lose Buhner among the footsteps of an anthropologist, Gregory Bateson, and another teacher whose steps I've seen before—Martín Prechtel. I pause here, and wonder which of these men to

pursue from here. I have a sense of where each one goes, inevitably leading to another intersection with another traveler, their paths always winding in and out of the margins of this place.

I have a map of this place that I made myself, but most of my life has been guided by the map of the land of Man—the same rigid and static map that you probably know as well, and that we're still handing out in schools. These textbook maps of the land of Man portray a Cartesian machine where man stands above the tic-tock world of clockwork. It's subtle. I found this map hidden in the text box figures of my elementary school readers, those books with the ragged binding picked at by restless fingers of children sitting in schoolroom desks.

But my schoolroom map was also in the orderly rows of the desks themselves and in the grid of the linoleum. The map was in the overhead projectors with the witty slideshow Mrs. Diamond prepared for us about how to *solve for x and y*. You have to have one equation for every variable. It's easy.

I got very good at getting around the world with that map, but I had this other map too, of the land between. I'm never sure exactly where this one came from. Just like how my map of the machine-world came from a childhood with refrigerators, cars, school buildings, and the Fourth of July—but could never be attributed to any one of these alone—my other map came from a childhood with relative freedom, a little trickle of a creek now disappeared under ticky-tacky houses, and enough books to give me glasses by eleven.

It's this second map that I'd like to draw for you.

As I track the others through the land between, I find that Prechtel's writing intersects with Buhner's in the pursuit of our ancestry among the plants. Both tell the story of how humans share both a mythical and a genetic lineage with the vegetable community—how we are the offspring of plants. Both of them, of course, are following others, and I think they too have seen the dancing footsteps of the old ones—those by whose marks I can see that they travel without a map at all. Prechtel and Buhner are resurrecting the stories of our indigenous forbearers—who carried the traditions and stories of their own ancestors from the beginning of this thing we call story. These stories become some of our best guides when we leave the well-traveled edges to find the beginnings of a path toward the center.

In Prechtel's story, which he adapts from the much older Tzutujil Mayan stories, what we now call humans are actually the descendants of a much older human race and the plants which they domesticated so long ago. So now we are half plant and half human. If it is our nature to be human, we are not fully human now that we've separated ourselves, a separation which these Tzutujil stories trace back to the beginnings of agriculture.[2] By contrast, in Buhner's version,

plants and humans alike are sort of an emergent phenomenon of the microbiological action of the soil. Kinship with plants permeates all of Buhner's writing, and both of these stories assume an intimate relationship between humans and plants, our ability to communicate with plants, and that our place is among the plants and not above them. These are stories of an animate world that is not machine.

All in all, what I am seeing is that the stories of how we came to be can be told in many different ways by many different people, but there are some ways that go together very well. The stories of the Tzutujil mesh quite well with the stories that Buhner shares (and which he received at least in part from Lynn Margulis who helped develop the Gaia Hypothesis). And that's why these paths become so muddied and hard to follow. There's not just one way to say these things, nor one person saying them. It's all being put together in different words by different people building on the tracks of those who came before them.

In part, we find that these maps can't really be drawn in words or even in lines, arcs, and angles. The mechanical map of the world-as-machine can be drawn well enough, and so I can remember when I started learning about that map, but when did I start drawing this other map of the land between? Where did it come from?

I know it's in the spaces between the memories where both of these maps became a part of me, but I can isolate certain definitive moments as belonging to one map or the other. I can feel the book under my hands as I sit in the swivel chair in the lecture hall and the old man tells me about organic chemistry and how every molecule of every compound is defined only by the precise structure of the atoms—carbon, nitrogen, and hydrogen all neatly arranged into hexagons and chains. He is insistent and confident in his map of the underlying structure of my body and yours. It's all very convincing. We're all nodding our heads (perhaps in agreement, perhaps in boredom, but is this not itself a tacit acceptance?) Where do you think this plastic chair came from? It is those who wield these very secrets who have molded and fashioned the world before you!

The memories associated with my second map are more subjective. I can remember the feel of sand-in-a-slippery-muck, dark black in my hands under slitted light of the woods behind my childhood home, and the knowledge—even then—that it was all going to go away. These memories remain in the unresolved whispers of grasses or in the trickle of the creek. I have only ever received one stern lecture from the forest—and this much later in life—so my second map is not so punctuated by the iconic moments of indoctrination; never so formally presented as the chalkboards of my youth wrapped from end to end with insistent and apparently indisputable equations. The territory described by my second map is different from the machine world. It is not static or objective, and so I can't really paint it for you exactly. The second map describes a subjective world of balanced but constantly shifting interconnections.

It's hard to describe this subjective world of the land between, because my description must take place within the confines of the Cartesian map that we mostly share. This shared map is the very system that we use to communicate, because our languages compose a very large portion of this map. Without it, we can't have much conversation at all. The language of mathematics, by virtue of being shared all over the world, has become so powerful exactly because it links so many into a global cooperative system that shares one common language. But it is not the only language. What of the forgotten languages of plants and animals? What of the languages spoken by the roots of trees to the microbes of the soil? What of the language of dreams and images explored by shamanic visionaries such as Gloria Anzaldúa or Terrence McKenna? These are languages from nature or from the land between human and nature. But I'm afraid we do not share them.

You can read these words because we share the map of the English language, and since English is part of the Cartesian mechanical map, this machine worldview is the basis for our communication. (It's probably just as accurate to say that the Cartesian map is part of English, which acknowledges the depth of this epistemology being much older than Descartes, but I'll avoid that digression because what I'm really trying to share is my second, and more subjective map.) But, in order to tell you about my second map, I'm limited to other maps that we *do* share, such as English. And circles and lines.

We can still talk about the land between, even in English. In fact, I've obviously found many pieces of this subjective map in books (in English and in Spanish). I can even see this map in the language of mathematics and physics—although it's apparent that the bulk of our scientists and mathematicians prefer the stance of a frightened ostrich over that of a rigorous student of nature. Nonetheless, I think most of my second map has come to me in other ways—in the whispers of grasses and the anaerobic smell of muck. How do I know what I know? The trees told me. I have heard the stories of Anansi, the spider, walking early in the morning through the sun-slanted trees, her webs spun across the trail breaking strand after strand upon my face. This is how she whispers what she knows to me.

Epistemology is the study of how we know things, and the other traveler who I find at this intersection—here where Buhner and Prechtel have woven together the stories of plants and humans into one story of our history together—is Dr. Bateson, who I mentioned before, and whose approach comes from the road of epistemology. His approach is not so meandering as Buhner's (or perhaps my own), and he applies rigorous logic and rationality to the observation that *knowing* is something that we share with redwood trees and starfish as much as we do with other humans.

For Bateson, the art of knowing is the quintessential element of life and is bound up in the story and context of any organism. In this respect, a human's knowing how to build a skyscraper is not

so different from a redwood's knowing how to build a tree. That is, we are all taking information from our environment and our past story and building up on that to direct our next actions—humans and plants alike. Our ability to connect to this kind of knowing—as something that we share with starfish and redwood trees—is mostly destroyed by our educational system. Bateson made this observation sometime just before I was born, referring of course to the educational system that I was then brought up in.[3]

And here we intersect with the trail of biologist E.O. Wilson—who seems to show up about as often as anyone in this place beyond place—and who offers us the word *biophilia* to refer to the innate bond and love between humans and nature.[4] I find some consensus—which is to say many others who have followed this well-worn track of Wilson's—that biophilia stems in part from the recognition of the self in nature—a breaking down of the division between human and nature. Biophilia, being instinctively developed by children in their interactions with the natural world, seems to have been surgically removed from our youth somewhere along the way. Rather like a psychic circumcision. Both Buhner and Bateson have followed the roots of this division to the doors of our schools.

Because I am writing this in English, for us to understand the real meaning of the word *biophilia,* we have to break apart man and nature (in order to enter a territory where English exists) and then put them back together again into the concept referred to by the word 'biophilia'. This abstract idea of an inherent unity between human and nature—an attempt to weld together these two ideas after we have broken them apart—is, of course, totally different from shoving your arm into the muck and squeezing the grit out between your hands. Nevertheless, this is exactly what Wilson's writing does; he conveys humanity's unvarying fascination and connection with nature through a strictly reductionist approach by turning the Cartesian lens of exploration back in upon the human mind and human nature. The effect, for me, is mildly disorienting. It is a strange loop that vaguely captures the essence of our unity with nature not by animating the natural world so much as by revealing the paradox that results from treating our own subjective experience as machine. It's a very strange approach, but people seem to like it, and I can't claim to have a better idea.

As we see, in my attempt to portray my map of the world between, I am crippled by having to do so on the terms of the map created by the English language, or mathematics, or any other map that we might happen to share. Unless you want to come play in the creek with me.

Nevertheless, since I do love creeks, and I love my daughter, and because I love interesting puzzles however hopeless they may be, I keep trying to draw this second map. I've done it with equations,[5] and I've sketched it out in words in various ways. It seems impossible sometimes.

Our shared mechanical map has become so powerful that its momentum seems unstoppable. In fact, ironically but perhaps inevitably, it has developed a sort of life of its own.

For over one hundred years now we've been collectively aware—as an industrialized society—that our stories about the world-as-machine didn't quite match up. Of course this awareness is mostly limited by the fact that most of us don't even realize that we're using a map. Most of us filter all of our experience through this Cartesian worldview, presuming that everything we experience is objective (for so we've been told) when, in fact, it's not. For me anyway, it required substantial effort, several epiphanies, travel to other countries, and some very challenging personal experiences to ever realize that the objective reality painted by science and embodied in my language, identity, and ethics simply did not exist. I'm left appalled that we are knowingly and intentionally lying to our children about how the world is made, and have been doing so for about a hundred years. Simply appalled.

Of course there are plenty of others who have made this observation. They've drawn maps of their own, and we can track them in their spiraling course around the edges of the land between. If we follow the paths of other educators who share these observations with Buhner and Bateson, we find the prints of Thomas Berry, Gregory Cajete, Wub-e-ke-niew, Robin Wall Kimmerer. They've all been here along this road that connects education with our map of the world-as-machine. It's an old problem. This part of the territory is well-mapped already.

Make no mistake, there are some places off to the sides of the well-beaten paths where the vines are tangled enough to give one pause. I have ventured into one or two of these places, generally to find myself in some other better travelled area soon enough, although sometimes the connections and the shortcuts we find in these places are surprising. A bit further along Bateson's path, I have passed into a strange area where his trail merges for a short while with another and then diverges again. This other trail belongs to the expansive logic of mathematician and computer scientist Douglas Hofstadter. In this place they have both discovered the possibility of reconstructing information that hides in an inaccessible spectrum—beyond our senses. Bateson approaches this idea through what he refers to as *moiré phenomenon*. This is the combination of two rhythmic patterns to create a third, which is the intersection between the two. (There is obviously a secret tunnel here into Gloria Anzaldua's *Borderlands*.) Bateson gives an example of moiré phenomenon:[6]

> "It is possible to combine two sounds of very high [inaudible] frequency in order to produce beats of frequency low enough to be heard by the human ear. Sonar devices that operate on this principle are now available for the blind. A beam of high-frequency sound is emitted, and the echoes that this beam generates are received back into an "ear" in which a lower but still

> inaudible frequency is being generated. The resulting [audible] beats are then passed on to the human ear."

So we see that we may combine information at different frequencies in order to "lift" information from a spectrum that is not available to our senses and present it in a form that *is* available to our senses after all. (In this case, information from inaudible frequencies of sound is being lifted into the audible range.) Hofstadter—whose sprawling path can be traced from the unraveling of mathematics, through information, complexity, and Zen—approaches this concept in a bit of fanciful speculation on the possibilities of acoustico-retrieval, which would mathematically reconstruct, for instance, the original acoustic performance of a Bach fugue from the chaotic motions of the air molecules today—effectively lifting this information out of a spectrum where it is no longer available and making it available again.[7] And this is when I see that I have been in this part of the forest before.

Once, while following the trail of Malidoma Somé—who teaches about the role of ritual in the Dagara communities of West Africa—I caught a glimpse of this place while I considered the possibility of moiré phenomenon (although I lacked this term) resulting from the combination of rhythmic drumming and dancing that is invariably part of indigenous ritual all over the world with the slower frequencies of Earth's seasons and the generational return to the same rituals and ceremonies. It seemed apparent to me that some resonant phenomenon between the frequencies achievable through ritualistic drumming and dancing within the context of periodic seasonal and generational ceremonies must have the effect of conveying information for and about the community to the participants in the ritual.[8] I presume that there are others who have passed through this shortcut between ritual and the patterned information of moiré and similar phenomena, but I find no trace of them, and this path appears more tangled than travelled.

While a few connections like this remain to be charted, we have sufficient information to create the emerging map of the land between. How is it that, in spite of the general availability of this map, and in spite of "objective" science and mathematics' utter failure to create a system that isn't grotesquely self-contradictory, that we continue to follow our broken Cartesian map of the world-as-machine? Have you explored this land and followed any of these trails? Do you know where they lead? These are well-worn roads. Do I find your footprints here?

I know it doesn't matter anymore. The story of the world-as-machine has eaten its own tail, and so it will roll onward into what can only be oblivion, but isn't it intriguing? I can't help but spiral around and around on the edges of all of this, picking away at the Gordian knot we've all made. Do you find it as fascinating as I do that this whole story about the objectivity of science and mathematics is total bullshit at the bottom? And yet it all carries on, holding itself up on nothing.

Or, perhaps it does matter after all. For although the story cannot be stopped, our own story may yet take whatever shape we wish, and from the fragments of my broken Cartesian story I am fashioning a new mosaic. I can hear the plants now. I am learning languages that I was told do not exist. It takes time. The unravelling matters because it gives us permission to look past our objective paradigm into the land between—that erstwhile forbidden place that was always calling in languages we would not hear. Listen.

The collapse of the story of the world-as-machine brings us to another part of the land between human and nature. This is a special place along the trail, at least for me, where the objective paradigm folded in upon itself—where the snake ate its own tail and left nothing holding the story up except for the story itself. This is where it all came apart.

The Daniel Boones of this part of the territory were here a century ago, blazing the new trails that would allow the settlers to pour in, gaping at the new wonders they had found. Einstein was here, and Heisenberg, and Gödel. Sometimes, my tracking borders upon archaeology and I can see how this area was settled after it was opened, how others began to penetrate the deeper edges—always looking for the center. Frijtof Capra was one of these, tying together the roads that others had made and clearing out the paths between mysticism and physics; health and complexity.[9] Then, later there were the other explorers—the mathematicians, physicists, economists, and anthropologists that tried to break down more barriers between disciplines—finally realizing that this was a land that we could not understand by reducing the parts. There are little towns in the valleys here now, like the Santa Fe Institute devoted to the science of complexity—the study (or is it an art?) of reconnecting all of these pieces now that we have taken them apart.[10] All of this before I was born.

I am riveted by the spectacle of what we've done, spellbound by the possibilities of what we'll do next now that we know our folly. Isn't it compelling to watch our own preposterous behavior as we continue to give this Cartesian story so much power—not in the world but over ourselves? Does it make you feel any better if you aren't much good at math to know that math is fucking bullshit anyway, that we've known this for a hundred years because the mathematicians figured that out all on their own, but no one probably told you because they were really hoping you'd make widgets for them. Same with science and all the rest of it. Right down at the bottom, in the cellar, under the foundation of all of it, there's nothing there.

At this point it would be easy for the reader—especially if one is of a liberal bent—to write me off as one of those deplorables who rejects science in favor of some fundamentalist ideology. Science, supposedly a bastion of support for the liberal environmentalist agenda (which mostly consists of maintaining the "sustainability" of human dominance over the rest of the world (referred to as "resources")), can't be bullshit, for if it were we would not have computers upon which to type

denunciations of science, and certainly without science we would have no hope of addressing the multiplicity of crises which we generally wrap up into a neat little package labeled 'climate change'. I would like to point out that what I am denouncing is *Cartesian science*, which differs from subjective sciences most markedly in its handling of complex systems and in the participation of the observer—which is to say, the real world and not so much the making of the toys upon which we type things. Cartesian science is certainly hopeless in any effort to even describe climate change, much less address it if such a thing can be done at all.

I consider myself to be something of a scientist in that I have spent decades studying various fields of science independently, as a requirement of my profession, and in a university setting (quite successfully in all cases for what it's worth), and it's apparent to me that Cartesian science and the whole worldview that it underpins are losing home games. (Although if we follow this metaphor, the tournament is clearly rigged such that it doesn't matter.) So, while a reader looking to maintain his or her Cartesian map of the world may reject my arguments against science as the ramblings of a an ideologue, it is nonetheless quite easy to undermine the Cartesian approach *on its own terms*. It is precisely this lack of rigor in the presentation of the sciences in our schools, institutions, and culture at large that I am denouncing here. It's hardly rigorous science to claim objectivity at this point in our story, and it hasn't been for a hundred years. Stop it.

In advance of the March for Science on Earth Day 2017, more than twelve hundred indigenous scientists expressed this view that we must acknowledge and consider other approaches to science in their *Indigenous Science Statement for the March for Science*:[11]

> "Let us acknowledge that there are multiple ways of knowing that play an essential role in advancing knowledge for the health of all life. Science, as concept and process, is translatable into over 500 different Indigenous languages in the U.S. and thousands world-wide. Western science is a powerful approach, but it is not the only one."

I can appreciate the difficult position that these scientists were placed in upon considering their participation in this march. On the one hand, the march was intended to demonstrate support for a rational approach to the global crisis in the context of an apparently irrational administration threatening to exacerbate the existing trend toward global instability. Certainly a worthy goal. On the other hand, the march was clearly a tacit perpetuation and reinforcement of the Cartesian world-as-machine paradigm that has created this crisis in the first place. What to do? Unfortunately, the complexity and nuance of this issue was almost certainly lost on nearly all of the participants in this march—who no doubt preferred to adopt the canned partisan dialogue they were handed—unless they happened to bump into one of the well-spoken indigenous scientists who penned this statement.

It is this type of nuance which we must come to appreciate if we are to venture into the land between.

So what can I offer to the cartography of the land between man and nature? How may I paint the pictures whispered to me by the grasses and the creeks? Sitting here among the branches, the creek slipping away below me, and the smoke of my fire wafting off up the ridge above, what can I offer you that you don't already know? It's all there on Google anyway.

It occurs to me that perhaps the thing that I can offer is an ever broader integration of the maps that others have already made. After all, this journey through the edge country is clearly the reassembling of all that we have been taking apart. The separation of this from that, the naming, the archaeology of the division—where did it all come apart? And, more importantly, how do we put it together again?

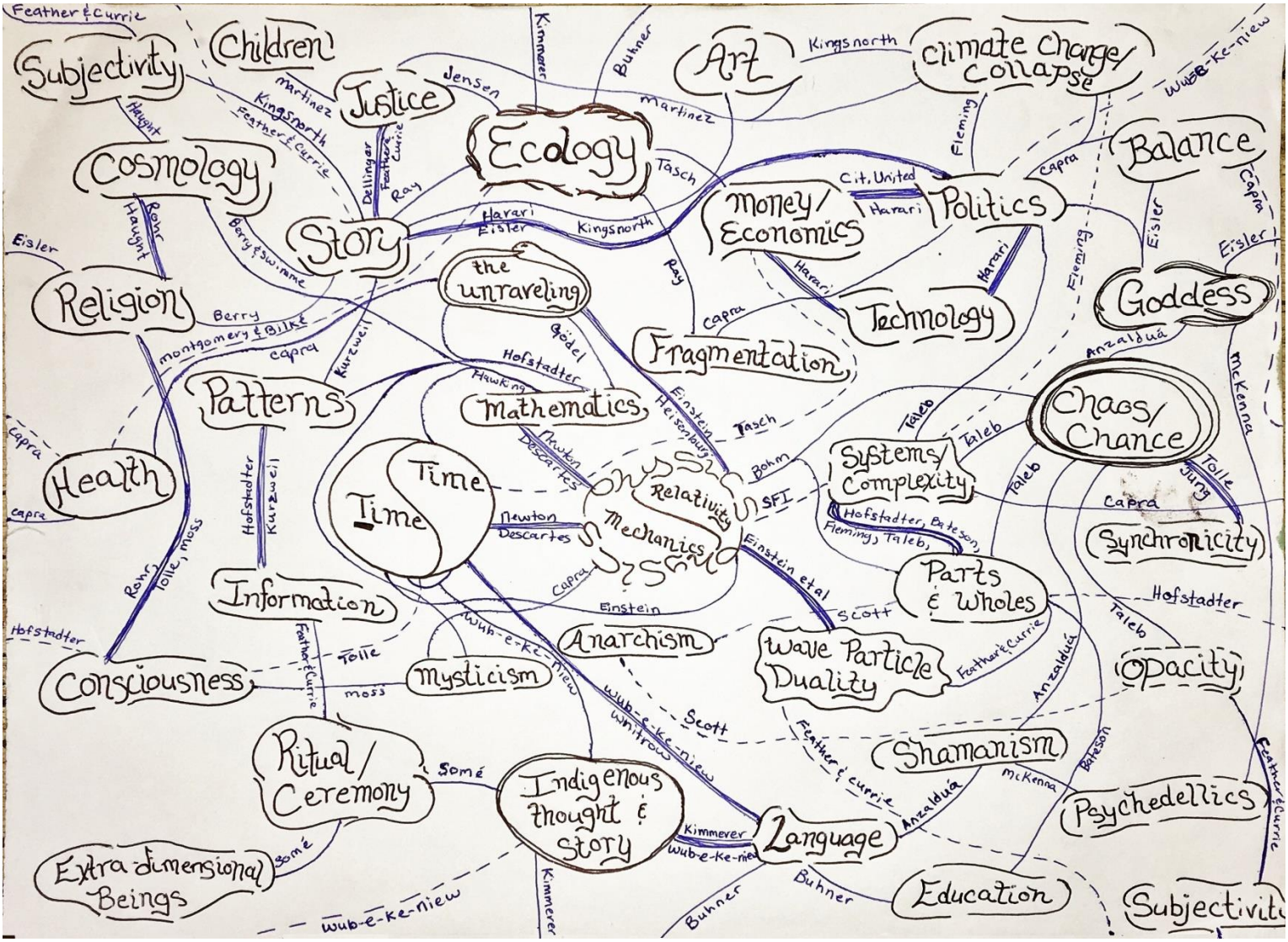
The broadest integration of human and nature is, of course, only to be lived. Redwoods and ragweed do not write books, and so my most important interpretation of what it is to live in between human and nature is the dirt under my nails and the wild mushrooms and field corn in my belly. But I do love books.

Here I'll offer the beginning of this integrated map, which fits a few relevant books together like puzzle pieces. Books come in all shapes and sizes. Some are slim little things that just fit one piece to another perfectly. Others are knobbly weird things with holes in them everywhere so you can fit them up against almost anything. I'm imagining that I can build little models out of these books in order to convey some of the parts of my second map—the map of the space between.

Of course books are always made of other books, and that's why research is so important, and why so much nonfiction includes pages and pages of endnotes and references. It was in writing a couple of books that I figured out that everything I was writing has already been said one way or another by other people since well before I was born. That was a little frustrating and made me consider that this approach might not be as effective as I had hoped.

Then, I wondered if I might be able to somehow link all these books up into a system of thought that might convey this larger puzzle without having to actually write another book myself. (Not that I don't enjoy it, but really it's all been said anyway). So, linking all these books up into a graphic representation of the second map seemed an interesting exercise. Here is my Map of the Land Between, reconstructed from the footprints of others who have passed here before, and while I hate disclaimers I can only say that this is a map of a territory that shifts and flows, that

defies descriptions and namings, but it is a territory that can be travelled as evidenced by the wanderers I have myself encountered here:



View this map as a set of interconnected themes. The themes are in black and the connections in blue. Every connection is a book (or several books), and labelled with the author's name. The map is structured so that the edges of the page connect into a single point, so a path may exit from the east and enter on the west (as in a conventional globe) but also exit in the north and enter on the south. So for example we may follow the path of Wub-e-ke-niew's writing to connect time with language, then through indigenous thought and story, extending also into politics. The themes are chosen merely to provide structure for the connections. These connections are the most important that I have discovered in this particular region of the Land Between.

Every theme in this figure could be expanded into any number of other themes, and we can always find more ways to connect them. That's the nature of the land between, and that's why we can't really map it except by living the map. In the cartography of the land between, I'm inclined to adopt a holographic approach such as that suggested by physicist David Bohm, who points out that each piece of the world is also composed of pieces in a repeating system that does not appear to have a beginning or an end.[12] Each piece merely repeats the patterns of the pieces below and above it. Photons aggregate to make light. Cells aggregate to make organs. People aggregate to make cultures and economies. The complex interconnections of all of these elements on all of these levels produce all of nature. (On our map, this observation would amount to Bohm's connection of the theme of "physics" to the theme "parts and wholes". [not shown!]) Here, themes and books aggregate to make a map—a very incomplete one at that.

Happy reading.

Dark Mountain 12: Sanctum ed. by the Dark Mountain Project
The Chalice and the Blade by Riane Eisler
Food of the Gods by Terrence McKenna
Antifragile by Nassim Taleb
Braiding Sweetgrass by Robin Wall Kimmerer
Gathering Moss by Robin Wall Kimmerer
The Turning Point by Frijtof Capra
The Tao of Physics by Frijtof Capra
The Seed Underground by Janisse Ray
We Rise by Xiutezcatl Martinez
Confessions of a Recovering Environmentalist by Paul Kingsnorth
The Singularity is Near by Ray Kurzweil
Sapiens by Yuval Noah Harari
Homo Deus by Yuval Noah Harari
Native Science by Gregory Cajete
Borderlands by Gloria Anzaldua
We Have the Right to Exist by Wub-e-ke-niew
Quantum Healing by Deepak Chopra
The Hidden Half of Nature by David Montgomery and Anne Biklé
Slow Money by Woody Tasch
Relativity by Albert Einstein
Complexity by M Mitchell Waldrop
The Second Miracle by Richard Moss
A New Earth by Ekhart Tolle

The New Cosmic Story by John Haught
The Universe Story by Thomas Berry and Brian Swimme
A Brief History of Time by Stephen Hawking
Time in History by CJ Whitrow
A Lever and a Place to Stand by Richard Rohr
Causality and Chance in Modern Physics by David Bohm
Ritual by Malidoma Some
Of Water and the Spirit by Malidoma Some
Lean Logic by David Fleming
The Lost Language of Plants by Stephen Harrod Buhner
American Shaman by Bradford Keeney
Worldchanging 101 by David LaMotte
The Vagina Monologues by Eve Ensler
Quantum Justice by Paul Feather and Terra Currie
Mind and Nature by Gregory Bateson
Godel, Escher, Bach by Douglas Hofstadter
Two Cheers for Anarchy by James Scott

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[1] Buhner, Stephen Harrod. *The Lost Language of Plants: The Ecological Importance of Plant Medicines to Life on Earth.* White River Jnctn, VT: Chelsea Green. 2002
[2] Prechtel, Martín. *The Unlikely Peace at Cuchumaquic: The Parallel Lives of People as Plants: Keeping the Seeds Alive*. North Atlantic Books, 2012. Excerpted in *Dark Mountain 12: Sanctum.* The Dark Mountain Project, 2017.
[3] Bateson, Gregory. *Mind and Nature: A Necessary Unity*. New York: E.P.Dutton. 1979.
[4] Wilson, Edward O. *Biophilia*: *The Human Bond with Other Species*. Harvard Press, 1984.
[5] Feather, Paul. "A World Without Because." May 2018. The hyperlink in the text above is a mathematical derivation of a specific case of subjective causality with some interpretation. This essay: www.paulandterra.com/essays/wwb.pdf is a plain English explanation of subjective causality without the math.
[6] Bateson, Gregory. *Mind and Nature: A Necessary Unity*. New York: E.P.Dutton. 1979.
[7] Hofstadter, Douglas. *Godel, Escher, Bach: An Eternal Golden Braid*. New York: Vintage. 1979.
[8] Feather, Paul and Currie, Terra. *Quantum Justice: Theories and Theatrics for the Ecozoic Era.* Carrollton, GA: Full Life Farm Publications. 2017.
[9] Capra, Fritjof. *The Tao of Physics. An Exploration of the Parallels between Modern Physics and Eastern Mysticism.* Boston: Shambhala, 25th anniversary edition, 2000. Also, Capra, Frijtof. *The Turning Point: Science, Society and the Rising Culture.* New York: Bantam Books, 1982.
[10] For a wonderful history of the work being done at the Santa Fe Institute in the 80's, see Waldrop, Mitchell M. *Complexity: The Emerging Science at the Edge of Order and Chaos.* New York: Simon and Schuster. 1992.
[11] The full statement, now with over 1,800 signatories may be read here: http://www.esf.edu/indigenous-science-letter/Indigenous_Science_Declaration.pdf or at http://www.esf.edu/indigenous-science-letter/
[12] Bohm, David. *Causality and Chance in Modern Physics*. Philadelphia: University of Pennsylvania Press, 3rd ed, 1984