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Science B

By William Eaton

Let us begin gently, with, before theory, anecdote. After playing his violin for a range of non-human creatures, Michel-Paul-Guy de Chabanon, an eighteenth-century musician and philosopher, concluded that spiders are pleased by slow, harmonious melodies and will slide down from their webs in order to listen. Small fish, he believed, will surface with the same intent.[1] Like many people, I, too, observe, and talk to, non-human entities, plants and rocks included. This has given me the sense, for instance, that while cats are pleased to have doors opened for them and to have their heads scratched, they hardly admire servile beings. And I have noted how, if we approach deer calmly, often they will stop, raise their heads, look at us, and listen attentively to the sounds, musical or not, that we choose to make or make involuntarily, perhaps without realizing what we are doing or communicating.[2] It has occurred to me that this is an underrated aspect of the great appeal of deer: deer may be the only animals that share a little of our fascination with human beings.

One evening I asked a large doe what she was thinking, remarking on her ability to turn one ear at a time and so forth. She—without the least sign of boredom or disapproval, and with a suggestion of contentment—kept regarding me through her dark, protruding eyes. I fantasized that she was thinking that she wouldn't mind having a conversation, but

[1] De Chabanon, *Observations sur la musique, et principalement sur la métaphysique de l'art* (Paris : Pissot, Père & Fils, 1779), 20–21.

[2] See the joke, a dog speaking: "If only I could tell you how much I can smell you."

William Eaton is the Executive Editor of Zeteo*; his explorations appear almost weekly at montaigbaktinian.com.*

she wasn't quite sure what to say.[3] Or perhaps she was testing one of her hypotheses, gathering information for a report. Next I wondered if I was not being misled by my human insistence that life have a purpose. Perhaps for deer and, say, spiders—and perhaps, too, for very young children, looking out wide-eyed from their strollers and padded carriers—curiosity is simply an activity. It need not lead to any product, conclusion, outcome document.[4]

As regards deer, of course to some extent they watch us very carefully, ready to bound away at the least sign of possibly menacing motion. But why not just bound away the moment we come round the bend? I am sure there is at least one modern scientist who can explain how this deer behavior—the standing watching—helps deer survive or once helped them survive. The primary purpose of this essay is to posit and explore a few things we might learn from what I am calling Science B—a science in which, for example, deer *might* also find something else in simultaneously watching and being watched. In Science B this could not be called pleasure, because that is part of human life in human language. There is some kind of a parallel experience that both can never connect and cannot be appreciated without presuming observed observers and presuming more of a connection between them than there may in fact be.

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[3] This is the inverse of Wittgenstein's "If a lion could talk we could not understand him." *Philosophische Untersuchungen / Philosophical Investigations*, translated by G.E.M. Anscombe, third edition (Blackwell, 2001), 190e.

[4] In an August 15, 2013 blog post, "**More on Heidegger on unknowing via Thoreau**," *Mists on the Rivers,* the philosopher (and *Zeteo* author) Edward Mooney wrote:

> Is there a way to be "open to the world," to be "curious" in a way that sets knowledge-acquisition aside? Or is there at least a way to be that honors a knowledge we could call intimate, close to the heart, to the heart-beat of others, to the heart beat of the world . . . ? What should we call a state of "relaxation and wonder," where information- or explanation-seeking curiosity seems to fall away and one dwells in the moment, a moment, say, of unknowing intimacy? . . . [T]he need-to-know is silent, not because one has a satisfying answer. One can wonder silently at the smile of a child, and seek nothing, be curious about nothing at all. So wonder need not be the launch to knowledge (as Aristotle held). . . . Thoreau has a memorable—and perplexing—line in "Walking." He says, roughly, I don't seek Knowledge, but Sympathy with Intelligence.

There are connections here with my essay "**Wild Life, Wild Mind**," which appeared in *The Chronicle of Higher Education* in August 2013.

Another name for Science B could be "shared science" (and as opposed to "hard science"?)[5] As a shared science, Science B rejects (or some may say overlooks) the distinction between studier (scientist) and thing or person studied. I study you as you study me, and vice-versa. As with romantic love (and momentarily setting aside its shadow, unrequited love), there can be no Science B without a mutual something, a mutual responsiveness—in human terms this would be a shared interest in better getting to know one another.[6] Science A, we might say, is an acquisitive science; Science B an erotic one.

In the parable of the blind men and the elephant, a first blind man approaches a seemingly novel, fascinating otherness and, feeling a well-ribbed side, concludes that the thing must be similar to a wall. A second blind man, feeling a tusk, would have the otherness be a spear, and so forth. As I was working on this essay, someone, recalling the parable, asked if my Science B was meant to teach a similar lesson. That is, as Werner Heisenberg

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[5] It was only when I was almost done with this essay that I realized the origins, in my subconscious or in an inner ear, of this name "Science B": memories of reading Langston Hughes's great poem "**Theme for English B**." Herewith the opening set up and lines from the conclusion (italics are Hughes's):

> The instructor said,
>
> > *Go home and write*
> > *a page tonight.*
> > *And let that page come out of you—*
> > *Then, it will be true.*
>
> I wonder if it's that simple? . . .
>
> [W]ill my page be colored that I write?
> Being me, it will not be white.
> But it will be
> a part of you, instructor.
> You are white—
> yet a part of me, as I am a part of you. . . .
> Sometimes perhaps you don't want to be a part of me.
> Nor do I often want to be a part of you.
> But we are, that's true!
> As I learn from you,
> I guess you learn from me—
> although you're older—and white—
> and somewhat more free.
>
> This is my page for English B.

[6] We are back to my fantasy about a particular deer perhaps wishing to have a conversation, but not being quite sure what to say. It would take a whole 'nother (and more Wittgensteinian) essay to explore this point, but we can say here that Science B, like love, presumes that two or more othernesses can find a common language. For the purposes of this essay, however, we will keep falling back on human terms, such as "interest" or "curiosity."

famously put it, "We have to remember that what we observe is not nature in itself, but nature exposed to our method of questioning."[7]

Although my answer was no, the question was nonetheless helpful, clarifying. Notwithstanding the parable's Indian origins, it fits within Science A (modern science, Western science). The elephant is passive— motionless, in fact. It is just a hard to get to know object. In Science B, however, there are no objects that are not themselves scientists; no blind men who are not also elephants. It could be said that in the twentieth century both physicists and anthropologists travelled some distance toward Science B by noting that their scientific activities had an effect on—even deformed in various ways—the objects, people, cultures they were ostensibly seeking to know better (or, say, exploit better). Physicists came to talk of the "observer effect." A classic example: When you check the air pressure in an automobile tire you let some air out (e.g., into the gauge), and thereby change the amount of pressure being measured. In studies of subatomic particles, the changes produced by the attempts at observation are considered sufficiently significant that aspects of the observer (complete with all of her or his technology) must be studied in parallel with the particles or interactions that are the ostensible objects of the experiment. I trust, however, that readers are noticing how far such sophisticated approaches remain from Science B. Anthropologists may presume that their subjects have *some* interest in anthropologists or in them in particular, but this interest must often fall way short of the anthropologists' own interest in the subjects. The gap is yet greater for physicists who, we might say, cannot imagine a lepton (for example) having the least interest in them.[8]

Touching on one of the principal interests of the present essay, I will here suggest that the isolation of the Science A scientists (social scientists included) is not decreased but heightened by this inward turning, this wondering how "I" might be affecting this other I am trying to get to know. Now a similarity between certain kinds of science and unrequited love

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[7] Heisenberg, *Physics and Philosophy* (George Allen and Unwin, 1959), chapter 3 ("**The Copenhagen Interpretation of Quantum Theory**"). See also David Hume, "**Of the Standard of Taste**" (1757): "[A] thousand different sentiments, excited by the same object, are all right: Because no sentiment represents what is really in the object. It only marks a certain conformity or relation between the object and the organs or faculties of the mind".

[8] I am pleased that this essay is being published in an issue of *Zeteo* that includes two other approaches to questions relating to the interaction of researchers and their study subjects. See: Sue Ellen Christian and Ann Miles, "**Consent and Money**: *A dialogue on the ethical dilemmas in the reporting and writing of The Immortal Life of Henrietta Lacks*," and James Hughes, "**History, Method, and Representation**: *Photo-Elicitation and Lewis Hine's Photographs of Child Labor in Chester County, South Carolina*."

appears. The scientist wondering about his or her effect on the other is not unlike the lover wondering how he might change himself or his (or her) behavior in order to get the object of his affections to allow herself to be better known.[9]

To get to Science B you have to take just one more step, known to some lovers but alien to Science A. This step involves making room, emotionally above all, for the other to be interested in and to get to know you, and thus, as well, for you to try to better know yourself. To borrow a few lines from a very short Emily Dickinson poem, "Distance—is not the Realm of Fox" (i.e. it is not quantifiable, not some number of miles of external terrain); "Distance is / Until thyself, Beloved" (i.e. it is either between two beings or between a being and itself, and it is only spanned by love, by a loving relationship).[10] From here we can say, again, that a B-scientific relationship involves mutual interest, to include a mutual interest in how we are responding to one another.

By setting aside Euclid's parallel postulate mathematicians have been able to imagine different geometries.[11] Similarly, by setting aside the parallel tracks on which modern scientists and their study subjects and objects run, it becomes possible to imagine not only Science B, but indeed any number of alternatives. Some of these sciences are not potential or imaginary but have been largely forgotten or misunderstood as a result of the many military,

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[9] I trust it is recognized that these gender markers are arbitrary. He's can love he's, and she's he's and she's, and so forth.

[10] The complete poem:

> Distance—is not the Realm of Fox
> Nor by Relay of Bird
> Abated—Distance is
> Until thyself, Beloved

[11] Euclidean geometry begins with five assumptions, let's call them (slipping away from mathematical terminology). The fifth of these is, roughly speaking, that if you have a line and a point not on that line, there is only one line going through that point that is parallel to the line. This seems so intuitively obvious that for centuries the assumption was either unquestioned, or mathematicians thought it should be possible to prove this rather than to have to accept it as an assumption. Attempts to prove the assumption, however, eventually led to the discovery that geometry was perfectly consistent *without* the "parallel postulate." Indeed, by the nineteenth century people had begun to wonder: could there be more than one parallel line (e.g., in some kind of warped space)? Or could there, under some other set of circumstances, be none, no parallel lines? And if so, what kind of mathematics (or what kind of world) would you have? At first people thought that there were only a few alternatives, then it became apparent that there was an infinite number of possibilities.

I note that my interest here is not in the mathematics, but in what it suggests: that if one is willing to shift one's assumptions, entirely new theories and worlds open up. And what the history of mathematics has shown is that what at first seems "merely" a thought experiment or an extraordinary flight of imagination, often, if not always, turns out to have quite practical applications. (*Note*: My thanks to City University of New York Professor Joseph Dauben, for his expert assistance with this note.)

commercial and academic uses of Science A. Among the possible or imaginary sciences, I note an idea (Science L?) mooted by the philosopher Kelly Dean Jolley in a recent blog post in which he distinguished between

> investigations that are, as it were, self-willed, where the investigator stands above, over and against, what is investigated, and one where the investigator is "object-willed," moved to consideration of what she stands enmeshed in, alongside, and which calls out to her for consideration. We might say that in the first case, the investigation proceeds in light produced by the investigator, in the second, in light produced by the "object" investigated.[12]

Once one gets started with such labeling and inventing of sciences, the hangar door opens (and may become difficult to close). For example, a child I know well, and greatly admire, has one, not uncommon, children's habit which dismays me. He plucks leaves from bushes and trees as he walks by them. To me this is an example of Science Z, which seeks to deny the possibility of otherness and thus of knowledge or learning—all be this, in this child's case, a quite casual, absent-minded denying, as he is walking to school.

We might imagine a continuum between research that, on the one end, sought to learn only about ourselves or for ourselves, and, on the other hand, research that sought to learn only about others and otherness. Scientists practicing this latter Science O might try to imagine, for example, what it would be like to be a worker, queen, drone, nurse or undertaker bee, and this only from the bee's perspective, and while also wondering about such things as whether "perspective" were a concept one could apply to a bee. For another, and as a corollary, this other science, like Science B, would assume that the "other" had equal moral standing—an equal right to autonomy and to be left alone, to privacy, to not loving—as we do.

Some might say that in such a case we would have no science at all. The present essay is best thought of as a thought experiment and as perhaps a prelude to future ones. It leads us down one path to certain views of modern science and, down another, to wondering what might be learned or what feelings recognized by practitioners of alternative sciences? Toward the end of this essay I will explore this latter question in the context of Science B and with the help of several great texts. (And this is certainly one of the pleasures of essay writing as Montaigne has introduced us to it: this sharing of previous writers' and

[12] Jolley, "**More on Abiding in Hope**," *Quantum Est In Rebus Inane* (August 15, 2013), was responding to Mooney's post, quoted in an earlier footnote of the present paper.

thinkers' attempts at understanding and articulation.) I would also stress, however, that there are many other ways of viewing science besides through the lens of Science B, L, O, Z, . . . Science, for example, may be thought of as imaginative, as involved most fundamentally in developing and exploring analogies. Alternatively it may be thought of as a seeking of greater protection—from hunger, disease, attack. Myself, I have been quite taken by and have previously written about Lévi-Strauss's idea that our primitive or seemingly sophisticated ("Science A") pursuits of knowledge are motivated by a common psychological need: to impose some order on the chaos of our perceptions, of the world outside our sciences. From this perspective our relationship with the other is striking, but secondary. In a sense, from this perspective science is a kind of carpentry and architecture: a constructing of boxes and of systems of boxes. What things or experiences may or may not be put in which boxes is secondary.

The work that pushed me to finally start trying to get my cloudy ideas about Science B down on paper was *The Spirit of the Hive,* written by Robert E. Page, Jr., an apiologist long interested in population genetics and the mechanisms of social behavior.[13] I was fascinated by this careful distillation of decades of research, but I found it hard to read *The Spirit of the Hive* as being about bees rather than about humans, and I could not help feeling that the author and his many fellow researchers had the same problem. For one, like many other kinds of research, research on bees has a strong economic motive: how to develop bees that produce more honey for less money. For another, it was hard not to learn, rightly or wrongly, about human beings and human society by applying the researchers' observations about bees to us.[14] For example, the author's central conclusion is that, although bee colonies have no central administration, managers, or leaders, tasks are successfully parceled out, performed, and coordinated simply as a result of the individual

[13] Allow me here to thank my editors, Alexia Raynal and Caterina Gironda, who pushed me to make ideas, still cloudy after several drafts, more tangible and clear, and who have contributed to this text their own reflections regarding Science B.

[14] Equally, as a reader of an earlier draft of this text pointed out, everything we can possibly learn about bees is shackled to our own definitions of behavior. There is a sense in which we first impose ourselves, our tools, terms and norms on the other, and/or project ourselves psychologically into the other, and then we try to see what we find there. This is a variation on physicists' observer effect (discussed in the body of this piece), a variation that lovers, too, may get to know. With such an approach the other cannot be known as an independent, autonomous being. One is getting to know either a reduction or inflation of the other, or some mixture of the two.

bees responding "to stimuli they encounter; [and] when they respond, they change the amount of stimulus at that location and thereby affect the local behavior of their nestmates." I could not help thinking about large bureaucracies in which I have worked and about the relations among the workers, myself included. To what extent have our behaviors also been regulated in such a way?[15]

Secondly, I had a feeling I almost always have when reading about research involving animals. I would like to put this as gently as possible. There is something quite particular and odd about modern scientists' lack of concern for the integrity, feelings and moral standing of the animals (humans included) that they study. Similar observations might be made about studies of plants, bacteria, genes, astral bodies and so forth, but they come most readily to mind when one reads sentences such as the following (which are hardly atypical of Science A texts):

> Males [male bees] were randomly selected to provide sperm for instrumental insemination of high-strain queens. Before we ground them up to take their DNA, we ejaculated them and collected their sperm.

If we take a broad view of the idea that "to be is to be in dialogue"— if we accept that being involves on a most fundamental level relationships—then a science that engages in reducing the objects of its study to dust might be said to be a science of non-being.[16] (And one might write similarly of sciences that are involved, inter alia, in making others more exploitable.)

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[15] For example, in human relations in general it is certainly the case, and it is a fascinating aspect of social behavior, that through our speech, silences, posture, and positioning we regulate what can and cannot be said to us—e.g., whether the person running on the next treadmill over can or cannot say anything to "me," or even go so far as to ask if I might want to get a coffee sometime. Similarly, during a meeting it is possible to feel viscerally that there is no room to make certain statements or kinds of statements, notwithstanding however true or useful these statements may seem to be. We call crazy—worthless bees, in a sense—people who have inordinate difficulty reading and responding appropriately to such signals. And while many of us may at times be frustrated by the repetitiveness or narrowness of our meetings, conversations and relationships, it is rare we even give our own controlling behaviors much thought. They are for the most part as unconscious as are (in our imaginations or our science) the bees' decisions to perform one task or another for the hive.

[16] Quotation is from Dmitri Nikulin, *On Dialogue* (Lexington Books, 2006), 253. While Nikulin's focus is the dialogue of humans with humans, taking the broader view I am proposing here Nikulin's observations can inform our view of science, not only as regards the bees, but certainly also as regards the deer and cats of the first segment of the present essay. See, for example, from page 142 of *On Dialogue*: "[D]ialogue's main intention is not that of . . . establishing oneself or one's own ego—as if one's subjectivity were only achieved once it has been imposed upon the other—but rather it is to provide the chance for opening up a conversational clearing". Of course this broader view seems harder to apply when the subjects of scientific inquiry are inanimate and perhaps microscopic or smaller. In such cases, it seems to me, what is tested is not only this idea of dialogue but also our powers of imagination. This brings us back to mathematics, which has grown in large part as the

Among other things, reading about the bee experiment, I found myself reminded of the habit of children, or of some children, to torment animals by throwing rocks at them or by pulling the legs off insects and studying their reactions. Again, this behavior seems intimately linked to a desire to learn something about ourselves (here, both as tormentors and as the objects of torment, be this from other human beings or other forces). The cat who cowers, runs away or dies tells stone throwers a little something about cats and a lot more about relationships. Ideally some of the curious, rock-throwing children later become better acquainted with the loneliness, the isolation, of sadism, and have other "corrective emotional experiences."[17]

I trust it is being appreciated that Science B is or quickly becomes a way of exploring certain emotions, in particular: loneliness (or feelings of isolation) and what drives us to seek knowledge. In the present essay I will approach this subject from only one angle: the isolation of the subject, whereby the drive for knowledge becomes an attempt to grapple with this isolation. From this perspective Science A is a way of defeating feelings, either by denying the fact or necessity of the isolation, or, say, by reaching new places, discovering new things, new relationships. Science B, by contrast, is more static; it involves recognizing the isolation and the feelings, be they of sadness or terror (or self-satisfaction?), to which our isolation gives rise.

I have come to this view of Science B in part through reflections on specific texts and experiences, which I will now briefly mention. It is worth noting a paradox: appreciating isolation involves making a connection—for example with texts and experiences and certainly also with one's isolation. It would be nice to think that we could be or feel less isolated were we to practice a science that encouraged us to recognize our isolation—e.g.,

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imaginative reach of mathematicians has grown, for example to make room for such possibilities as the zero, irrational numbers and non-Euclidean geometries.

[17] See Franz Alexander and Thomas M. French, et al., *Psychoanalytic Therapy: Principles and Application* (Ronald Press), 1946. From chapter 4 ("The principle of the corrective emotional experience"): "The patient, in order to be helped, must undergo a corrective emotional experience suitable to repair the traumatic influence of previous experiences." In the present context we might ask if the trauma came from the stone throwing or, say, vivisection, or if some other, earlier or underlying trauma inspired such behaviors? From chapter 17 ("Conclusions and outlook"):

> [T]he main therapeutic result of our work is the conclusion that, in order to be relieved of his neurotic ways of feeling and acting, the patient must undergo new emotional experiences suited to undo the morbid effects of the emotional experiences of his earlier life.

our inability to converse with deer, let alone plants, rocks and base pairs, or extraterrestrial beings. By contrast (or perhaps not), Science A in fighting isolation would seem to reify it.

Now to the specific texts and experiences.

(a) In his once bestselling, nineteenth-century novel about Tahiti (*Le mariage de Loti*), Pierre Loti not only waxes Romantic about life far from Western Civilization, he also talks about the "strange sadness that weighs on the Pacific islands"—the wind off the sea, the waves pounding the shore, the thick shadows, the sad, guttural sounds of the native language.[18] For Loti, the sadness of Tahiti is both oppressive and the source of much of the charm of life on the island. I would suggest that this is because such sadness feels right; it speaks to something fundamental in human experience. *Cf.* the last lines of Wallace Stevens's "Less and Less Human, O Savage Spirit," i.e.:

> It is the human that is the alien,
> The human that has no cousin in the moon.
>
> It is the human that demands his speech
> From beasts or from the incommunicable mass.
>
> If there must be a god in the house, let him be one
> That will not hear us when we speak: a coolness,
>
> A vermillioned nothingness, any stick of the mass
> Of which we are too distantly a part.

(b) When my son was younger we used to play in swimming pools the game of tag called "Marco Polo." Let me explain to the uninitiated that this involves the "it" person, in the middle, eyes closed, shouting "Marco," and everyone else answering these shouts with "Polo." By hearing from where these replies are coming, and repeating the process again and again, the "it" person is to find his way to one of the others and tag him or her (assuming they haven't all climbed out of the water or the universe and are not now looking down laughing from some higher ground).

I have wondered how the game came to be called "Marco Polo" rather than say, "Stanley and Livingstone" or "Helen Keller," "Jonah in the Whale," etc. Presumably the pleasure of the simple rhyme was key, and yet an impression of the adventurous Italian trader is communicated, as if he had been wandering blind across the steppes, in pursuit of someone, anyone who would respond, whom he might touch, do business with. This feeling

[18] Allow me to thank another *Zeteo* author, Richard M. Berrong, for bringing me to this novel via his article "**Oil Paintings of Word Paintings of Nature's Paintings: Gauguin's Early Tahitian Canvases and Pierre Loti's Le Mariage de Loti (The Marriage of Loti)**," which appeared in *Zeteo*'s Spring 2013 issue.

deepens with the possibility broached by Frances Wood, head of the Chinese Department at the British Library: that Marco Polo never went to China.[19] He represents the imagining of relationships desired and dreamt of, but that never occurred.[20]

(c) Le silence éternel de ces espaces infinis m'effraie" is one of Pascal's most famous notes. The eternal silence of these infinite spaces terrifies me. In reading in the history and philosophy of science, I have often seen the phrase used to refer to the cosmos. In this regard we may appreciate how hard we have been working these past several decades to combat the silence of outer space. Foremost in this combat is a rejection of the idea of there being silence, or at least not in outer space. With our telescopes and satellites we seek to pick up signals and to send back some of our own to the intelligent beings we hope/fear are out there somewhere. (And might we think of dark matter as substance that refuses to communicate or that has very limited communication capabilities?)

In another note Pascal writes about how, "when considering the speechlessness of the universe and how man, unknowing, has been left all alone," he becomes frightened. He has tried to find some marks of God's presence that might have been left behind. From this perspective, the longing in Pascal's observation about the silence of infinite space may be better heard. As if, more prosaically, he had written, "I am getting the impression that I am all alone, and that all of us, individually and collectively, are all alone, and this is terrifying."

A few notes by way of a conclusion. First I note that over the past 50 years or so a loose grouping of philosophers, psychologists and others, many of them influenced by Hegel's writing on the master-slave dialectic, have written about how we get to know ourselves—or further, realize ourselves—with help from "the other," or only with help from the other. For example, in recent decades Hegel's parable and analysis, presented in *The Phenomenology of Spirit*, has been used in discussions of sadomasochism, and it can be quickly seen how a masochist and a sadist (like a slave and a master) depend on one another in order

[19] Wood, *Did Marco Polo Go To China?* (Westview Press, 1998). Note that Polo's thirteenth century travelogue (commonly known in English as *The Travels of Marco Polo*) was written down by one Rustichello da Pisa, from stories ostensibly told to him by Polo while they imprisoned together in Genoa, Italy. The book was written in what has come to be known as Old French and it first went by the titles *Livre des merveilles du monde* (Book of the Marvels of the World) and *Le divisament dou monde* (The Description of the World).

[20] Thinking about Shakespeare's sonnets and about Plato spending long hours inventing dialogues about friendship and love, and spending many years myself writing lengthy, imaginary dialogues and novels, stories and essays about relationships and love—all this and more have brought me well in touch with this idea of relationships desired and dreamt of, and with the sadness in the dreaming.

to be—however provisionally, and however happily or miserably, oppressing or oppressed—who they are. If the masochist is too successfully self-abasing or the sadist too successfully other-destroying or denying, both individuals, let's say, die; they cannot be themselves. In *The Bonds of Love: Psychoanalysis, Feminism, and the Problem of Domination*, Jessica Benjamin famously made a place for the dialectic within feminist theory, asserting that in a love relationship the two lovers can only begin to know themselves, to know the other, and, we can add, to know love through a recognition of the autonomy and the importance of the autonomy of the other. I quote:

> [W]omen must claim their subjectivity and so be able to survive destruction. They may thus offer men a new possibility of colliding with the outside and becoming alive in the presence of an equal other. . . . The vision of recognition between equal subjects gives rise to a new logic—the logic of paradox, of sustaining the tension between contradictory forces. Perhaps the most fateful paradox is the one posed by our simultaneous need for recognition and independence: that the other subject is outside our control and yet we need him. To embrace this paradox is the first step toward unraveling the bonds of love. This means not to undo our ties to others but rather to disentangle them; to make of them not shackles but circuits of recognition.[21]

Of course objections may be quickly raised that this is rather easier between two consenting, libidinous human adults than between a human and a colony of bees, let alone between us and, say, our genes, the proteins within them, or astral bodies. Again, this is where I would insist both on the role of the imagination in science (as in mathematics) and on Science B's role as a thought experiment. Perhaps in the present case what is being pointed to above all is a limitation of Science A. It is as possible/impossible to do science on another being that is little interested in you, the scientist, as it is to love someone (or some cat or wayward son) who does not love in return (and may also not care to be loved or even notice that he or she is loved). I take it also to be in this sense that a reader of an earlier draft of this essay commented that in the end Science B becomes a way of "making otherness the more fearful (it reveals our ultimate loneliness)."[22]

Secondly, I would also note that isolation is not just between "me" and external others. There are Science A astronomers who study electronic echoes of events that occurred eons ago in faraway galaxies, biologists who study the all-but invisible, and

[21] Benjamin, *The Bonds of Love: Psychoanalysis, Feminism, and the Problem of Domination* (Pantheon, 1988), 221.

[22] Alexia Raynal, private communication, October 2013.

physicists who study the infinitesimally small and short-lived. Science B, perhaps here in dialogue with Freudian psychology, also opens onto study of the vastness within—as if a scientist might wish to find and have difficulty finding the place from where her studies have begun. When an observer looks inward with some assiduousness—trying perhaps to understand his effects on the observed or to find what another might see in him—he might well find "there is no there there" (borrowing Gertrude Stein's phrase).

A leitmotif of the present essay has been that in Science B, as in mathematics and in Science A, our imaginations, and our ability to wrestle together, with language, to articulate our experiences, are the most valuable pieces of equipment we possess. From this perspective it seems only fitting to close this piece with excerpts from a great poem that speaks of or to Science B. The poem is "Touching Each Other's Surfaces" by Carol Jane Bangs:

> Skin meeting skin, we want to think
> we know each other scientifically;
> we want to believe
> it is objective knowledge
> gives this conviction of intimacy,
> makes us say it feels so right.
> That mole below your shoulder blade,
> the soft hair over my thighs—
> we examine our bodies with the precision
> known only to lovers or surgeons,
> all those whose profession is explication,
> who have to believe their own words.
> And yet, having memorized each turning,
> each place where bone strains or bends,
> each hollow, each hair, each failure of form,
> we still encounter that stubborn wall,
> that barrier which hides an infinite vastness
> the most sincere gesture can't find.
>
> Nor does emotion take us further
> than the shared heat of our bodies
> aware of themselves,
> the flattery of multiple desires. . . .
>
> Perhaps it is just this ignorance,
> this absence of certainty, lack of clear view,
> more than anything, brings us together,
> draws us into and through each other
> to the unknown inside us all,
> that gray space from which
> what we know of ourselves

emerges briefly, casts a transient
shadow across the earth
and learns to believe in itself just enough
to believe in some one else.

Welcome to Science B (an acquisitive science after all?).

* * *