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“I’m not going to eat in my kitchen, under my roof. I’m going to go into nature.”

IGNACIO: Yes, it’s a very manicured nature because that’s the way we like it, especially in the West, but also the Chinese were super manicured, and the Islamic gardens and Babylon. It is the condition of so-called “civilization” that puts you in a little box that is square, like the picnic blanket, the fear ...

AMY: If we were to land in one of the increments of ten in

the movie, which one would we be sitting in right now?

IGNACIO: For me it’s like a magic carpet that doesn’t stay still, it moves and flies and floats about. Rather than talking about a specific power of ten or even about the “powers of ten,” I feel more comfortable in this moment speaking more generally. I see it as a complementary process. Philosophically and culturally I like to see the detail but also the big picture, the glimpse of the whole. Maybe this is due to my ecological background.

AMY: What do you think it is about us humans that we want to classify and think about things in increments, and within frames?

IGNACIO: I feel that it is an attempt to create *cosmos* (order) out of chaos, as the Greeks used to say. From the undifferentiated *apeiron*, “boundless,” we want to draw limits: *peirar*, *peirata*: “perimeter(s), edge(s), enclosure(s).” We need to circumscribe a place because the “outside” is too frightening. It needs to be bounded, understood, and overpowered.

MICHAEL: I’m thinking about the need to predict the weather for getting food – in farming, or to predict where the animals are going to be if you are a hunter-gatherer. A prediction of the future could be the beginning of counting ... I need to count because I need to predict so that I can put food on my plate.

IGNACIO: Yes, indeed, it is survival. This is what the shamanic moment is. The shaman is the person who usually combines the poet, the priest, the scientist, the philosopher, the king, or the artist, but also the person who is able to traverse through different worlds. S/he is the one who can cross the “powers of ten.” From the beginning we always have perceived what surrounds us. It is because we are upright that we can look up and down, way down and dig in, the *axis mundi* – the axis of the world, whence the idea of heaven, earth, and underworld. It’s layered.

MICHAEL: Did all cultures have such a notion? I’m thinking of the ones I am familiar with, “the devil is down there and the good is up there.”

IGNACIO: That split mostly comes from Zoroastrianism through Ahura Mazda (Ohrmazd), the good god, and Ahriman, the subordinate evil one, a dualistic



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view that is very influential later on in the West, like Manichaeism, a major gnostic religion from Babylonia. Many societies before and after had the concept of the Underworld, not of Hell, the Christian Hell. The Underworld was in some ways the invisible or the hidden, the misty magic. What is under us is not always negative. In fact, this is where the roots of all life are, like the roots in the plants of this greenhouse.

**AMY:** I'm sitting here looking at all the plants we're surrounded by, Japanese hibiscus, another bush from Hong Kong, tropical plants from Costa Rica, from Panama. We are sitting in a representation of a certain plant universe inside of a university. I like to imagine the ideal university as one that addresses the whole universe.

**IGNACIO:** Indeed, that's where the name comes from: *Uni-Versum*, unity, *unus*, one, circumambulating towards unity, wholeness, the universal. That's why I was intrigued when you invited me to this picnic in relation to this movie. I thought about the universe. It's also what I love about this particular July 2010 *Scientific American* (FIG. 2).

This concept of the Lucretian *clinamen*, the chance "swerve" of atoms, and his *unvorsum*, a whole

turning around, leads me to this idea of a universe that is "leaking," or constantly changing, swerving energy, and it reminds me of Kurt Gödel's incompleteness theorems. In the beginning of the twentieth century, they thought they had reached the math *culmen*, the culmination of mathematical completeness. Arithmetical logic in *Principia Mathematica* seemed to be perfect, internally consistent. But Gödel in 1931 demonstrated, first, that "all consistent axiomatic formulations of number theory include undecidable propositions," and, second, that "such a system cannot demonstrate its own consistency." The seeming logical consistency collapses when Gödel comes along and says, "Oh, by the way, there is a little leak here," for this implies there is no such thing as a completely closed system or system of identities or system of axioms. In other words, we are confronted with a non-deterministic, non-linear universe of probability, a "swerve cloud" without certain truth. On a related angle, Jacques Derrida's *Truth in Painting*, discussing Kant's aesthetic concept and examples of the *parergon* or frames, reminds us how one cannot fully separate the work, or *ergon*, from what is *beyond* the work, the frame, or *parergon*. If you view a "power of ten" as an internally consistent inside, you will need to get out of it to try to perceive

something that you cannot see from within, and, so you always have to be in motion, leaking, swerving, crossing the cloud.

When you begin to systematize the whole question of what *is* and what *is not* and so on, the Greeks are in some ways a very interesting case study for the West, because they take systematization in two directions. First, they ask themselves what is the *stuff* of everything, what is the world made out of? This was the province of the *physicoi* and *physiologi* or pre-Socratic physicians and physicists. The other question they ask is *who* are we? This is the realm of the *philosophoi* or early Socratic philosophers, though both cross over. They begin to say that you have to put things within context, and to get away from *poiesis*, because as Plato used to say, that was for women and children, and the poets and artists. There was in some ways a fear of ambiguity, and he wanted things clear and stable.

**MICHAEL:** Reflecting on the social aspects of the picnic and this meal we are having, I am thinking about how scientists publish papers as a way to share with the community. What other ways are there that you share in your field?

**IGNACIO:** I think we need all to share. This is the cooperative and

communicative nature of humanity. That is why I take such a strong issue with a “survival of the fittest” ideology and its constant social Darwinist propaganda. It is solely about *me*. Beatle George Harrison’s poignant “I-Me-Mine” lyrics expressed it very well years ago: “All through the day I me mine ... I-I me mine ... All I can hear, I me mine ... flowing more freely than wine ... All through your life, I me mine.”

MICHAEL: There’s Myspace and iPhones and iPods.

IGNACIO: Yes, and you have this paradox of being super wired but also alienated, separated, estranged. On the other hand, it was the Russian Vladimir I. Vernadsky who in 1926 formalized the concept of the “biosphere” that in many ways challenges this individualism and is very influential in ecology and political ecology later on.

AMY: So what do you think about the distribution of the *Powers of Ten* as an act of sharing, albeit with a certain message. Why do you think a company like IBM would make this movie?

IGNACIO: This is the moment in which IBM was developing a computer that was more accessible and the information age was beginning to take off. We

had computers in some form or another since World War II and even before, but they were completely inaccessible to the general public, except for business, so, it is not a coincidence that IBM is called the International Business Machine Corporation. That to me speaks a lot about the hidden, the invisible. I don’t want to just get into “IBM or corporations are the devil,” but at the same time, there is a Faustian bargain, like, where is my *Faust* (looking for a book on the blanket). You can only go so far. *Faust in Copenhagen*, the subtitle is *A Struggle for the Soul of Physics*, it’s about a moment of the Niels Bohr-inspired “Copenhagen Group” of quantum scientists, and the Faustian choices they had to make during the Nazi and Cold War eras. Ironically, given his later wartime activities in Germany, it is Heisenberg toward the finale of the book who intones, “Insofar as we have won half the world, what have you done?” It’s our quandary still today. Beside him were some of the greatest twentieth-century physicists: Bohr, Ehrenfest, Meitner, Pauli, Dirac, Delbrück, in turn coming on this shoulder of giants, Max Planck, Madame Curie, Einstein, etc. They discovered the Yin and Yang “swerve” of light being both wave and particle, a quantum sharing cloud, literally, full of enormous positive and negative

implications. I am sure some of the natural scientists you will picnic with later on will reflect on these matters beautifully. This is only an introduction as to how the world begins to dissolve within our very hands.

The ancient Greek search for the building blocks that would explain everything else was a quest for abstraction, order, and classification but also connections. Today we take it for granted, but at that moment when knowledge was basically undifferentiated and unbounded, to have this probing, this more systematic way, was remarkable. Anaximander, an early pre-Socratic *physicist* (610-546 BC), actually talks in his only extant fragment about this unbounded or limitless principle in his search for universal origins, which he conceptualizes as the *apeiron*, as I mentioned earlier. His knowledge of geometry and geography leads him to construct the first known map of the inhabited earth, *oikoumene*, though Babylonians and much earlier native cultures had drawn maps before, they were more local in scope. The importance of his conceptualizing physical limits, proportionality, and scales is fundamental. It leads him to his truncated cylindrical map of the cosmos. It is also related to what the Romans later called *Scala Naturae*, the Stair



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or Ladder of Nature, linear and hierarchical like the “great chain of being,” a forerunner of the *Powers of Ten*.

(FIG. 3) Illustration of the Great Chain of Being from *Retorica Christiana*, by Didacus Valdes, 1579.

MICHAEL: Now it seems to make sense in my head that the relationship between science and either big business or the government is limited to the kind of knowledge they want and why “we won’t support you because you ...” Somehow the connections in the past don’t seem so instrumentalized, it seems like some

of the discoveries they made then were less specific and directed than how it happens now.

IGNACIO: There is no doubt that today’s science has become the instrumental appropriation of knowledge, desire, and affect through technology to serve capital accumulation, which I’ll explain in a moment. But, first, let me bring some further thoughts on Anaximander by philosophers Karl Jaspers and Robert Hahn. Jaspers’s writing in the 1950s documents that he was a citizen of Miletus, the largest of the Ionian commercial centers, and as such a gathering point of knowledge emanating

from the Mediterranean regions and the Near East. Empirical knowledge and technical skills were reflected in navigation, commerce, colonial undertakings, temple architecture and such enterprises as a tunnel. Anaximander was said to have directed the founding of a colony on the Black Sea and so on. Thus, the idea that philosophical exploration begins as a kind of “la-la land quest” is inaccurate. On the contrary, it is very much rooted in the concrete. Hahn’s *Anaximander and the Architects* connects the contributions of the Egyptian and Greek architectural technologists to the origins of Greek philosophy. It’s a fascinating book because what professor Hahn proposes is that somehow by Anaximander observing what the architects were doing (besides his observations and participation in commerce, transport, food, agriculture, sharing, and the polis), he envisions his model of the cosmos as a truncated cylinder. In fact, Jaspers already notes that Anaximander’s “earth has the shape of a cylinder, a kind of truncated column, its thickness equal to one-third the diameter of its surface,” and that we live on the surface with the earth suspended in the center of the universe “because there is nothing to cause it to move.” Looking at the models of Egyptian and

Greek module-columns, you see here (pointing to Hahn’s book) it’s almost like the shape of the universe that he ...

(FIG. 4) Anaximander’s Cylindrical Earth, from *Popular Science Monthly*, March 1877.

MICHAEL: Right, like the columns that hold up the roof of a building, therefore it must be the shape of the universe.

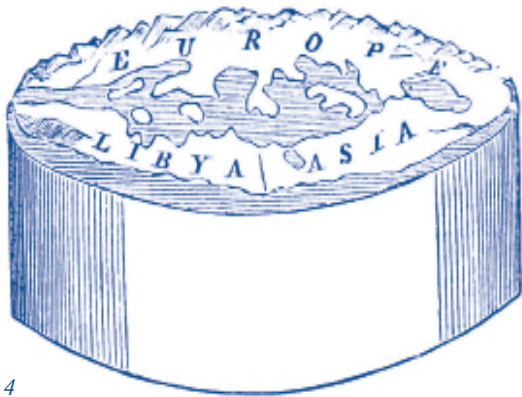
IGNACIO: Yes, partly, since some of this would accord more accurately to a Homeric view of the cosmos, where the vault of heavens is seen as a roof or dome. But Anaximander’s paradigm shift, in Hahn’s view, is his ability to imagine elements where the earth was at the center and the stars appear closer than the moon and the sun. Anyway it has this moving circularity, which as Hahn points out, in this 3-D mapping, was a design technique that involved aerial views, model-making, a theory of proportions, and the cylindrical edges and central fittings of the columns.

AMY: It also looks like an eyeball.

IGNACIO: Indeed, indeed.

MICHAEL: We’re in the center.

IGNACIO: It is the scoping, the eye of time, they were and we are



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looking deeper into time, as I told you that for this conversation my musing would be “An Aesthetics and Biopolitics of Space-Time Consciousness.” Sounds pretentious, perhaps, but it points to the question of aesthetics returning to *aisthesis*, the greatness of sensuousness, touching, feeling. It’s not so much the purely abstracted aesthetic theory that appears later on, largely disembodied, for I want to go back to that element of being connected. When you look at the universe you are inevitably connecting to a space-time consciousness. Why, because what we are looking at here through light is really the past, sensing in a sort of Proustian

search of lost time, a “remembrance of things past,” of some 14 billion years of this universe. The light distance is always really a time-distance, a time-space. That’s why I say consciousness, because it took a cosmic evolutionary eon for energy-matter to become conscious and have the cognitive, mathematical, emotional, biological, cultural, and socio-economic and political maps to be aware that in fact when we raise our eyes to the sky or look down deep inside the electron microscope we are stardust and elemental physics and poetics. It is quite an irony and very beautiful that in our quest to find the ultimate building blocks of matter and

the universe, they dissolve before our very eyes and we are left with the wondrous alchemies of light and shadows and the oceanic feeling of the quantum void, super-strings, the *apeiron* of *sunyata*, the Buddhist void.

AMY: Something else interesting about this movie is the voiceover by Philip Morrison, the physicist who wrote for *Scientific American* and who also worked on the Manhattan Project as well as the search for extra-terrestrial life that led to the SETI project. I wonder if we were to make this movie now, who would be the voice of a project that would try to look at the edges of our current understanding?

IGNACIO: Well, you know it’s a very tricky question because it depends where we are aiming at. The question is really, is there a spokesperson for the universe? Because that would be “God,” you know?

AMY: Where were you in 1968?

IGNACIO: The years around that period were very important for me, because I was studying at Missouri State University and the University of Florida, doing my undergraduate and postgraduate work in economics, environmental studies, and sociology and development. Later

in Colombia, where I am from, I went to work for the Colombian Science Foundation, around this time at an ecological meeting in Mexico organized by UNESCO’s Man and the Biosphere Program, I embraced the environmental cause, which led me to the Environmental Agency of Colombia, where I later became its deputy director and acting director. During this period, I was invited by the United Nations Environment Program to be Latin American coordinator of environmental education in Madrid, Spain, traveling all over, organizing international seminars and research gatherings, and advising governments and institutions on matters involving environmental policy, education, and sustainable development.

AMY: What were the questions of that period?

IGNACIO: There was the sense that we had spilled the beans somehow and were coming too fast out of the planet’s frame, after all these were the sixties and seventies: Vietnam, the oil shock, Watergate, mutual assured destruction, etc. We were beginning to have a clearer awareness of the human impact on everything, socially and environmentally speaking, because of the increased powers of technology and capitalist consumerism. There

was a tremendous drive, if you were talking about IBM there was always “knowledge,” but also how much money could I make with that? What later became the “knowledge economy,” the “information economy,” but is really the enclosure and appropriation of knowledge and affect for money. There’s always that tension about the bottom line of profit maximization, so you have that push. And it was not only Western capitalism – also the so-called communism, or more accurately state-capitalism, of the Soviet Union was horrendous in environmental issues as well. This is an overall theme of modernity – the idea that we can control, instrumentalize, industrialize and, now, massively network. But with that we began to poison souls, oceans, and land. There’s a beautiful book that everyone should read again and again, Rachel Carson’s *Silent Spring* from 1962. She was a scientist and a woman! The chemical industry absolutely hated her because she was doing “funny science,” smeared her as a spinster, etc. And they paid scientific hacks to “demonstrate” that she was wrong.

MICHAEL: “Demonstrating” in science, and its relation to “truth,” is such a curious thing to us. One of our fascinations as artists is with the tools that scientists make to measure and

to demonstrate. In your field of social sciences, how have the tools for research changed?

IGNACIO: There is an important book that appears around the same time, as postmodernism gains ascendancy. It is Thomas Kuhn’s *The Structure of Scientific Revolutions* from 1962, postulating what he called paradigm shifts, wherein new knowledge, perceptions, and contexts change and shake things up, allowing new concepts and attitudes to emerge. When I began to study sociology, though theorized in all the social sciences, structural functionalism was very present. It was about consensus, stability, and order in the social system, and historicism was pretty much absent, never mind that Vico, Montaigne, Hegel, and Marx were talking about history much before, but that is a whole other story. Eventually this was a straightjacket, too simplistic. I remember doing a study back in 1969 when I reviewed all the major U.S. journals of sociology for that year. In 1968 the whole thing was exploding: Vietnam, a disaster, Martin Luther King and Senator Robert Kennedy assassinated, students at Columbia University and other parts of the U.S. widely demonstrating, students and workers in Paris in massive rallies, the Soviet Union invading Czechoslovakia. All this

happening and what do you read: a whole bunch of trivial articles full of regressions and statistics. There was one article I will never forget, it was called “Associated Patterns of Innovation,” (I said, “innovation, ok, something interesting”) “of Assorted English Football Coaches” (laughter) and so the topic was about the likelihood for English football coaches to adopt certain new playing techniques!

AMY: That sounds like the fifties.

IGNACIO: I think it was the tail end still lingering. Soon after, French post-structuralists begin to say, well, there is this thing called deconstruction, which is really reflective of the transition from Fordist industrial capitalism to a post-Fordist global free market economy. All the social science methodologies, disciplinary silos, and topics are impacted by these developments, both in the global North and the global South. New intellectual movements and key theorists emerge, and a more fluid relation between natural and social sciences and the humanities becomes possible. A notable example of this is economics, particularly neo-classical economics, which has been a staunch proponent of globalization and neoliberal free markets. We should not forget also that much de-structuring has always

occurred in true avant-garde art movements, as early as impressionism, with their break-down of light, and with pointillism and its dots of light, even before Max Planck talks about the *quanta*, or dots of light, if you will, in physics. The intuitions and the capacity of the artist are always there. This is quite apart of course from the widely speculative billionaire art market that mirrors current financial speculation.

AMY: A primary desire to restage these picnics was to linger here on the blanket at the human level. *Powers of Ten* moves so quickly into outer space and then back into the microscopic level that the people on the blanket become very trivialized. What is your take on that?

IGNACIO: This is on par with the transition to a massively networked post-Fordist economy where the people are trivialized, as you note. I brought this book by Melinda Cooper, *Life as Surplus: Biotechnology and Capitalism in the Neoliberal Era*, that warns of the Faustian bargain that recombinant DNA and genetic engineering technologies can be when they are at the service of maximum profit and the commercialization of life. It speaks to the power *over* life not the power *of* life, what Foucault views as biopower and biopolitics.

This commodity orientation further ignores the social and ethical consequences of biomedicine but can be applied to other areas as well, including your concern about the trivialization of people. While the hype is all about the individual, we are no longer really individual persons but consumers, the ultimate abstraction of commodity fetishism. It is the cynical double-speak of a society that is redefined as not being a society, as per the infamous 1987 phrase of British Prime Minister Lady Margaret Thatcher: "... there is no such thing as society. There are individual men and women, and there are families. And no government can do anything except through people, and people must look to themselves *first* ... There is no such thing as entitlement, unless someone has met first an obligation." No entitlement, except, of course, if you are a large monopoly bank that is "too big to fail." In the end, this is nothing but a new massive enclosure of the commons – "Capitalism for the poor and communism for the rich," as the saying goes.

On the other hand, Egyptian people are giving us a great example of real democracy. I was in conversation very recently with a former Egyptian student of mine, who had already told me over a year ago that things

were going to happen, because the whole thing was a pressure cooker and had to give way, and it did. It's a beautiful thing that it somehow replayed for an old sentimental romantic like I am, a kind of Ghandian or Christian Buddhist but also humanist sensibility, non-violent resistance and hope. You don't have to be religious if you don't want to; it's the idea that the world is for all of us to share and love. It is not simply for *me*.

MICHAEL: The world is for all us except when the greenhouse is closing for the night. I love that sometimes you have to be kicked off the blanket (*FIG. 5*).

