PALLADIUM
GOVERNANCE FUTURISM

WOLF TIVY AND MATT ELLISON • SEPTEMBER 14, 2022 • **ARTICLES**

"Life Goes On" With Stewart Brand

Christopher Michel/Stewart Brand in 2020

Stewart Brand was born in 1938. In 1964, he was hanging out with Ken Kesey's "Merry Pranksters" at the center of the LSD counterculture described in Tom Wolfe's *Electric Kool-Aid Acid Test*. In 1966 he realized a satellite image of the Earth could be a powerful symbol for holistic environmental thinking, and launched a campaign to

get such a photo released by NASA. In 1968, he succeeded, and the first satellite photo of the whole Earth, taken by the geostationary satellite ATS-3, appeared on the cover of Stewart's famous counterculture zine *The Whole Earth Catalog*. Later that year, he was the cameraman for Douglas Englebart's demonstration "Mother of All Demos," which laid the foundations of interactive graphical computing.

As a lifelong visionary and an adventurer with a unique mix of scientific education, Army officer experience, and classy pedigree, Brand participated in many of the key scenes and events of late twentieth-century American culture.

More recently, he is known for cofounding the Long Now Foundation, which has built a clock inside a mountain designed to run for 10,000 years to promote long-term thinking, and the Revive & Restore project, which is applying genetic technology to wildlife conservation, ideally including the resurrection of the woolly mammoth.

Stewart often warns that "we are as gods and have to get good at it." Humanity has become a planetary force with an emerging planetary consciousness. What kind of civilizations emerge from taking that seriously? We called him up at his library north of San Francisco to discuss the future of man's dealings with nature:

Wolf: We've recently been discussing where society ends and nature begins. How should we relate to ecosystem services and the ecosystem balance as parts of our industrial and social order?

Stewart: The only two magazines that I get anymore—I've got rid of everything else—are *Palladium* and *Noema*, Berggruen's thing. Noema had this campaign—they interviewed Jerry Brown and me about it a while back—where they said, look, we've been thinking globally for a while now. And there's some things for which it's been great, when the global economy makes all the cities grow and we get out of poverty. But there's also the planet, and the term "planetary economy" has no meaning. The dynamics of the planet are of a different order. And I think what you're talking about here is getting those two whole-system bodies of thought to engage each other rigorously.

We used to talk about EGG: Emerging Global Governance. And the

realization that, you know, it's not done with black helicopters. It's done with all the economists talking to each other and having a global economy to sort of share a frame of reference, and a body of economic thought to share thoughts about. Now that they're using models instead of equations, they're getting a little more predictive for a change.

That happened because of the Santa Fe Institute, where I served on the board for 14 years. The Institute was founded by bored nuclear physicists at Los Alamos. It's often the case that biology moves forward when physicists get bored and decide that they can take their rigorous thinking and deploy it against biology. Sometimes that works. Mostly it doesn't. But it worked to the extent that they were recognizing complex adaptive systems as being of a different order than those that had been studied before. So they reinvented cybernetics with computers. With the computers, they could do modeling.

They got a bunch of economists and physicists together—basically their friends—and asked the question in a series of sit-down meetings in Santa Fe: "Is there anything we can talk about together? What we need to do first is become familiar with each other's discipline enough to be able to talk at all." So they flipped a coin to see who goes first—economists or physicists—and the economists went first. They had a Nobel Prize-winning guy (Ken Arrow) and some others in the group. They were really good economists. They got up and went to the board and started writing out the equations that were their current understanding of how you think economically. The physicists kind of glanced at one another. Finally, one of them raised their hand and asked, "What are you doing?" And the economists replied, "We're writing the equations; we learned that from you!" And the physicist said, "We haven't used equations in years." And the economists said, "What do you use? You're still doing physics, right?" And the physicists answered, "Well, we use models, don't you?"

And what finally happened with the Santa Fe Institute is the economists said, "Okay, prove it. Model us some economics." They came up with a concept which they called Bounded Rationality, which is what humans actually operate on. Most of economics up to that point had been based on "what would the rational person do?" and on a theory of games consisting of rational players, and so on. Then, they began to model large quantities of these creatures that had imperfect knowledge, or were doing the best they could with it. This was called agent-based modeling. And each of these

players operated either on a different theory of the world, which we all do, or on different information that they had access to. How did they behave under those circumstances? The answer is that it's a complex adaptive system. And there's all of what goes on with chaos theory, like strange attractors and all of that—profound unpredictability in most cases. This then gave them the beginnings of a swing in economics actually, which flipped from witchcraft to become more predictive because they started to behave like weather forecasters.

This is Philip Tetlock's contribution to intellectual thought: forcing people to make falsifiable predictions and state their degree of confidence in each prediction about what is going to happen and by when. You get the superforecasters who learned to do that and then learned from studying, basically, the video of the game. "How did that guy get by me on the basketball court? He did this other thing I've never seen before. Well, I've seen it now. Now it won't happen again." And so game two is different from game one. And that's, ideally, what you can begin to do.

That's why my wife, Ryan Phelan, who runs Revive & Restore, came up with the concept of "Intended Consequences," which she immediately turned into a workshop and then into a paper. When we're doing any kind of genetic work with wildlife that would lead to some kind of intervention on the ground, people would say, "You can't do that because ecology is very complicated, and unpredictable. And you know, there will be unintended consequences, and you'll be really sorry."

So, it turns out nobody's ever done the research to find out if that's what actually happened with conservation interventions. All they knew about was things like cane toads in Australia, which was not done by conservation scientists. At the time, the scientists said, "Don't do it! You will be really sorry!" And the agriculturists went ahead and did it anyway. And likewise, there were species introduced in Hawaii. Basically anytime you introduce anything larger than a bug to an island, it's going to have deleterious consequences. That's not so true on continents, by the way.

Anyway, some of our scientists did the research. There's been about a thousand cases of intervention in the United States by wildlife conservationists where a species is introduced or reintroduced. And the "golden boy" story is the wolves of Yellowstone Park, or the beavers in Scotland, and so on. They've been gone for 400 years. They came back and

immediately did good for everybody. So the question for these thousand interventions is, first, do they cause any harm? Because at the time, people often ran out of money fighting for the permission to try something that they knew damn well was going to work. Some things were surprising, but they didn't matter. They were neutral. And sometimes the species didn't take. So you'd say, well, it was a failure. But it's not! It's just that nothing bad happened, but no good thing happened either. But then, if they had the money, they would go back with the lessons learned from the first reintroduction and do it better the next time. And then even better the time after that. And by then, the animals are starting to learn how to behave in the environment, too. So they've got their own story going again. And that's a success.

Nobody pays any attention when these interventions tail off into a success. It's failures that are news. But we discovered that when it's professional biologists doing the work, they don't cause problems. There was one introduction in the southeastern United States which apparently led to the extinction of a local fish in the stream. It was just a local fish. And so the harm was local, and minimal. And only that one case!

Matt: I wonder if there's some over-sensitivity in the biology world because there's historical experience with pathogens. Today we could say, look at the dangers of gain-of-function research. But maybe those should be considered a totally different category.

I think it does. It's mainly in medicine. Really only in the last century has it become worth your time to go to a doctor. From 1920 on, it started to become a slightly better bet to go to the doctor. Now, it's a much better bet. And that has happened with an organism which we do not understand completely at all. We understand a whole lot. We can draw a map that is the size of the wall behind me of just the metabolic pathways, not only in humans but in any large animal. And so, are you going to have unintended consequences when you meddle in that? Yeah. But then you develop double-blind, phase-three research and whatnot to head off the possible harm. And by the time you finally deploy something, you have a lot of confidence it's not going to cause any harm and it looks like it might cause some good.

We are in the process of figuring out how to do that at a planetary scale. That's what geoengineering is largely about. The best researchers, like

David Keith at Harvard, are completely doing incrementalist research—way smaller than a volcano. I mean, the main information we have about solar geoengineering, so-called reflective stuff in the stratosphere, comes from the Mount Pinatubo eruption, and others which are way bigger than anything that humans would do. But we want to be able to do it for a while, and actually stop the temperature rise and even bring it down a bit. That way, we buy time to do all the other stuff so that climate is not an issue anymore. That will take one to two hundred years.

So anyway, I came to all that because of complex adaptive systems. You have to adopt the understanding that they are, in some senses, intractable to define in a way where you know for sure that it is going to do what you had intended. You never have complete enough knowledge to know that until you experiment in a number of small and illuminating ways. But once you do that, you can actually manage these very complex adaptive systems. And that's what humans are taking on in this century, I think.

Wolf: So then, our big picture is this idea of complex adaptive systems in the context of the relationship between industrial civilization and our natural environment. A lot of people see human civilization and nature as opposed. Do you think we can find a more symbiotic relationship? That seems to be a theme in your work. What do you think that looks like?

I think it's actually useful to keep the distinction between human activities and nature. I think that both nature and human activities in this century are in the process of learning to blend in with each other. But I think the distinction is actually helpful for doing that. What we do with intention, what we do with abstraction, what we do with language, and so-called culture involves a lot of Darwinian sorting. But it's not Darwinian evolution in the sense that ideas have to individually reproduce in some fashion in order to carry on. We have broadcast capabilities that nature does not, for example.

What I know as a conservationist and from working with conservation biologists is that the rate of evolution has generally gone up since humans started having large impacts on all the kinds of environments that various creatures, plants, and microbiota live in. There's this very good book, *Inheritors of the Earth* by Chris Thomas, that documents this increased rate of evolution. More and more, people are seeing wildlife in town: raccoons,

foxes, coyotes in California. Everybody that shares a biome spends a lot of their time evolving in relation to one other.

And that's coevolution, which is a profound concept. One of the most cited papers in all of biology is by Peter Raven and Paul Ehrlich, who was an advisor of mine at Stanford. He said it was a great paper to write with Peter because they didn't have to do anything. They just had a couple of cups of coffee together, then reported on what they were finding in their research.

Coevolution is a profound concept that, I think, scales. It scales up from microorganisms to the planetary scale. Some of it is expressed in the Gaia hypothesis. Jim Lovelock and Lynn Margulis came up with that long ago and I got to print an early version of it. Actually, the Gaia hypothesis itself opened up a whole new avenue of nature and humanity, in a sense, taking each other seriously, and gave us the scale and scope to think about human activities having a planetary-scale impact. Gaia is different after humanity shows up and takes dominion. And presumably, Gaia never had a model of herself; the planetary self-regulating system got there by evolution, got there without self-consciousness, and got there without a model. But humans generate models all the time, we can't help it. And the Gaia concept was a wonderfully inclusive model of engaging nature at planetary scale.

Wolf: One way that humans and nature then fit together, in a way that's going to change both, is that we're now in this position of modeling these planetary effects and the planetary ecosystem. And so we have to learn how to garden that ecosystem. And we have to learn how it affects us and how to integrate those things well.

A lot of this is kind of like medicine. And gardening in some respects, because of the "do no harm" injunction. In a way, the part humans are sorting out is moving beyond conquering nature. Danny Hillis made this point a while ago when we were starting the Long Now Foundation, that humanity's story, up until pretty recently, has basically been humans learning to conquer nature, to master nature, to whip it to our aims. And that story is complete enough that we can move into the next mode, which is basically conquering ourselves in relation to nature and realizing that, while we can do everything, we should not do everything—we should only do some things and stop doing some things that cause undue harm.

And that's part of why the idea and practice of de-extinction appealed to me, because it's kind of a new level of thinking through undoing harm. We're not going to bring back dinosaurs, but we can bring back the thylacine, the Tasmanian tiger. That one is well along right now. And it would be nice to have an apex predator back in Tasmania and in the parts of Australia that used to have thylacines. It's not as crucial as something like a woolly mammoth, where we really need to get the mammoth steppe fully back, to help stabilize the climate over the long term.

Wolf: What distinguishes a reality-based framing on a problem like this as opposed to other ways of thinking about it? This is a concept you've used previously. Why is it important?

A guy named Rapoport said something that I quoted in the beginning of one of the books I did: "Knowledge will never replace respect in human dealings with nature." You can know a lot, and generally the more you know, the better, but you're never going to know it all. And so it's about a certain amount of modesty. If you can't manage humility, modesty will do. In the face of complex systems, it's actually a prudent and usually necessary approach if you're doing anything that is going to stay useful. You can make big changes, but then they take on lives of their own. Some of the ways they go may not be what you wish would have happened. The models are always evolving. They're evolving in terms of your ability to sense things, like getting knowledge of oceans at depth, for example. They evolve in relation to notions that people have of how to put ideas together in a way that's effective in the world.

Science is about organized skepticism to determine what you keep having to come back to, because it's the part that won't change in relation to your opinions. And we're sort of missing that in the public discourse right now: the idea that you can make up the world that you think the way you think is convenient, and then act on that. And that's as important as what scientists turn up. It's good that people got postmodernism and all that other stuff. Science is embedded in scientists who are human and fallible. But science takes account of that, in a way that strictly postmodern thinking doesn't really allow for. There's been this fashion these past years, maybe decades, to think of everything in terms of power relationships —gender, colonialism, and "late capitalism," whatever that is, when those terms are not actually appropriate. It's a simplistic filtering of experience and knowledge that you always want to bear in mind, but not fall

completely into, where you can't see anything else.

Wolf: You've mentioned that ecosystems and human society are complex adaptive systems. Can you say more about how we should approach those kinds of systems in theory and practice?

Back in the 1990s, climate scientists were getting worked up about what was happening with the Keeling Curve, that we were going to have way too much CO2 and methane, and that the atmosphere was going to heat up badly. And so they said, quite rightly, that we've got to mitigate the greenhouse gas getting into the atmosphere, which means we've got to mitigate the use of fossil fuels for energy. And then a guy named Jesse Ausubel, at Rockefeller University in New York, came up with a paper saying, absolutely, we need to do all that. And we're probably not going to be able to do all of it as fast as we need to, just because there's so much friction in the system. And so we need to think about adapting to temperature rises that are going to happen anyway. This was treated as a moral hazard violation [that adaptation would reduce the incentive to do the "right" thing, which is to mitigate fossil fuel use]. Efforts were made to destroy Jesse's reputation. And so, adaptation was a taboo line of research and discussion for a decade or two. Now, could you have known at the time that this was actually a stupid thing to do?

Wolf: It seems pretty straightforward that you don't want to shut down some line of questioning just because it might slightly take the pressure off some other important thing. There's also a big dosing of bad faith in those things. There's people who get attached to the idea of reducing fossil fuel usage, and bring in other unrelated motivations. It may be that for them, it's not about global warming, it's actually that they don't like industrial society. And then anyone who's providing solutions to the original problem becomes an enemy.

This is true of various kinds of intellectuals, including me, I'm sure. And this happened with my old teacher, Paul Ehrlich. He is a brilliant population biologist. He's not a brilliant human population biologist, however, and so he actually became part of the problem by imagining that the authority with which he could speak about butterfly populations and co-evolution situations could be directly applied to human populations. And with his sense of humor, which is great, he became very persuasive on the Johnny Carson Show, and so on. And people who actually studied

human demographics had a completely different view that was basically suppressed by Paul and my fellow environmentalists of that time—including me, by the way.

Wolf: This was the Population Bomb theory that human overpopulation was going to consume all the resources and cause a collapse?

Yeah, the Population Bomb theory probably appealed to us for a number of reasons. One of them is that it had this kind of algorithmic clarity. We weren't looking at real data the way human demographers were at that time. And those demographers were seeing this thing in response to what they saw in the world, not in response to theory, which got named the "demographic transition." It turned out that with the prospect of prosperity when women moved from the village to the city, they immediately stopped having seven children and had two instead. And then they would get them educated. So they're trading seven ignorant children for two educated children. This is a good deal, and clear thinking by the women. And that is one of the mechanisms by which the demographic transition actually happens. But we still have people screaming about overpopulation.

Matt: There is this Weberian distinction between science and politics as vocations, that these are two fundamentally different domains that require very different types of thinking. They select for different types of individuals. If you look at the history of the twentieth century, did the fact that Oppenheimer was pivotal in the creation of the bomb give him some special privilege? Should the atomic scientists themselves have a special privilege to talk about the use of nuclear weapons, or is that actually out of their domain of expertise? This question of the relationship between sciences, and between science and politics, seems to be at the center of so many of our controversies.

On that particular subject, we saw the whole idea of nuclear winter. Friends of mine, like Carl Sagan, bought into it, and the JASONs [scientific groups that advised the U.S. government] looked at it. Freeman Dyson was part of the JASONs at that time, and they could not make sense of the numbers. And over a few years, some scientists did put in some time to try and understand it. They came up with, at most, a "nuclear autumn." And that's part of why Freeman then was dubious about climate change, because he had been through that thing with the nuclear winter

exaggeration. And he feared that there was exaggeration going on with the climate. And there is, by the way, a lot of exaggeration in relation to climate. That is not to say it isn't going on in the biggest way. But the main event gets put in apocalyptic terms, and I think that's completely misplaced.

And then that shifts over into another discussion: is apocalyptic thinking good for anything whatsoever, other than excitement? My girlfriend in the 70s was Stephanie Mills, the woman who got up in front of the Mills College and was valedictorian or whatever she was, and said she was not going to have children, because the world is overpopulated. And it would be irresponsible of her to think about having children. To her credit, she never did. But it was actually a goofy thing that my generation got up to. It was based on nothing, it turned out.

Matt: You're saying, it wasn't just a pose or a theory to believe in overpopulation, people really changed how they lived.

Yes. And they are now! There are people figuring "I'm not going to have children because it's going to be a hot world, and all these other bad things are going to happen." And therefore, don't reproduce. Part of it is, I think, a scale error. Maybe it's even a pacing error of some kind.

David MacKay, who was Chief Scientific Advisor to the British government, wrote a great book on global warming. One of the things he addressed is people who are imagining that their personal behavior is going to save the world, like people who will unplug their phone charger when it's not actually charging their phone. As if that was anything other than performative virtue signaling. He said, "Let's look at the actual energy involved here. And then I'll compare that to one bathtub that this person takes and the heating that was involved with getting the waters to the right temperature they like." And how many mega-years of not having your phone charger plugged in does it take to match one bathtub? And so just keeping the scale of things in mind helps a lot.

So there's over-personalizing stuff. "Live the change you want" is, in some respects, a really valid idea. But not in all respects, I think. It reminds me a little bit of landfills back in the day. In the 1970s, we got all worked up about landfills. And then this guy did a book that looked into what actually goes into the landfill. Is it those terrible burger-enclosing plastic things that

you get along with your burger at a fast food joint?

Or is it building materials? Turns out, it's mainly building materials in the landfills. It's buildings and all the spare parts, all the spare leftover boards you can't use after all, and all this kind of stuff. I'm becoming somewhat of a fan of landfills. I think it's a great way to sequester carbon.

Matt: Does this mean you're anti-recycling, Stewart?

Well, a lot of recycling is kind of like the newspaper drives during the wars, that I actually remember. In World War II, we had to go out and collect everybody's newspapers, and they were bundled up and sent off to the government for some purpose that we never understood. And it turned out there was no purpose and actually, it was just something to mobilize citizens so they'd be part of the cause.

Wolf: It reminds me of this story in rural Canada during World War II: they had people guarding a bridge just in the middle of nowhere in the prairies, as if the Germans or whoever were going to show up.

Can you imagine how much fun that is? Actually spotting airplanes, and learning all the various airplane silhouettes and whatnot. There were aspects of World War II that were great fun, if you weren't in combat.

Matt: All that gets to this important question about the scale at which we intervene to solve these problems. I think there's a tendency, especially in the mass media age, to make everything about the individual: if only I were to sacrifice going on an airplane, and so would everyone else, then we would solve the problem. In fact, more often the scale has to be at the level of the state or of collective action.

I think with the climate, it's useful to ask what the things are that actually function at the scale that you want for the result that you need—in this case, a planetary scale. And thinking through that reversed my opinion about nations, in the sense that nation-states still pretty much control their tax systems. To the extent that you want to use the tax apparatus to make coal and gasoline expensive and clean forms of energy cheap with a carbon tax, the UN can't do that. Nonprofits can't do that, businesses can't do that. Only governments can pass laws and enforce them. And likewise with geoengineering, with sulfur dioxide in the stratosphere you don't have to

go to planetary scales to start finding out to what extent it can work. You do it in tiny, tiny amounts. It actually changes things in the direction that you want, without causing regional problems like stopping the monsoon— that would starve India, or cook India.

But unilateral geoengineering has been treated as the great crime that might come out of taking geoengineering seriously. Somebody might just go off and do it without asking everyone else's permission. And this is where you get into a really interesting mode of this century, having to think through global permission for planetary actions. Do you need to get total unanimity of everyone on Earth saying, "Okay, let's do it"? Do you need to get unanimity of all the nations? Of most of the nations? Measuring how? These kinds of things will be worked through in this century.

Wolf: To continue the question of scale of action, this also gets to sort of what time-scale we are acting on. It's like your idea of pace layering: you want to act and learn at the appropriate pace in relation to the phenomenon, or else you risk reacting too fast or slow.

When I was studying organic chemistry for my biology degree, it felt like special cases all the way down. But that's not actually true. Physicists like Geoffrey West at the Santa Fe Institute came along and said, well, there is a scaling effect. It is clearly the case that—they call it Kleiber's law—that large animals have slower heartbeats and live a long time, and tiny animals have very rapid heartbeats and live a short time. It turns out that mice and elephants both have the same number of heartbeats in a lifetime. And the difference has to do with scale. Mice are small, but the network effects of being a mouse are quite different from the network effects of being an elephant.

Geoffrey West's book *Scale* went on to look for Kleiber's law in human institutions like cities. Cities, in particular, have a reverse relationship: the bigger they get, the faster they go, instead of slower. And this frightened him! At least, more than it frightened me. He believed that clearly the great thing about cities is, yeah, they create these extra problems, but because they're faster at everything they can come up with solutions to the problems that they cause faster than they caused them. And therefore, they get bigger and more advantageous, and pretty soon you've got a whole urban global civilization. And then he just sort of hit some kind of interior wall, thinking "this can't go on!"

He thought that infinite acceleration is not something that humans can live with, that it's going to just slow down and break. So he was worried about a collapse that may come about from these cities getting bigger and bigger, faster and faster, until something breaks in a big way. I'm not persuaded by that. And maybe it's because by training, I'm a biologist and he's a physicist. I just see so many ameliorating Gaia-like mechanisms that biology has to manage big change.

I mean, the planet's shift from anaerobic to aerobic life as the primary life form was a huge and seemingly catastrophic change. Certainly, if you're an anaerobic microbe, you didn't like it. But the great oxygenation worked out actually pretty well—so we oxygenating organisms say. You might think the anaerobic guys that have to hide down in the soil are saying, "Yeah well, fuck you! We're down here hating you to this very moment!" But none of that happens. I'm pretty sure they don't even know.

Wolf: You've been around for many decades working on all of these problems, meeting all the key people in the field and seeing how things have changed over time. What do you think are the most important lessons from these last decades that we need to be carrying forward?

I'm trying to figure out if apocalyptic thinking is actually destructive, or just a waste of time. How much longer will the term "existential threat" be something that we are constantly hearing in the high intellectual public discourse? It's gotten so generalized, you can say it about anything now. "Is Trump an existential threat?"

Martin Rees, the former Astronomer Royal, is a friend in England. I was trying to think of the real existential threats. I thought, well, there are comets that are pretty rogue and are pretty big. We can head off asteroids pretty well now, but comets are probably not in that category. So I wrote Martin and asked him, should I be worried about a comet hurtling in and blasting into Earth? And he said that the odds of that are so close to zero that you might as well consider them to be zero.

This is a guy who came up with a bet with Steven Pinker about how there's going to be a million people dying from bio-error or bioterror. And we thought that Steven won in 2020. But there's still the question of COVID-19, which has killed more than a million people worldwide— was that a case of bio-error, getting out of the Wuhan lab? That's still not decided yet. So

those guys are relitigating the bet.

But anyway, Martin Rees is the one who was saying he expected a million people to die from a bioterror or bioerror. He's not a biologist, but if it did escape from the Wuhan lab, he was right. Was that an existential threat to humanity? Not even close.

Wolf: There's a lot of these sorts of risks that are very disruptive and cause a lot of trouble, but our ecology and our civilization are incredibly deep in their resilience. For example, the last time an asteroid big enough to matter hit Earth was 65 million years ago. That's a long time. Like Rees says, statistically it's not happening again any time soon. But even then, life goes on.

Even then, life goes on. Exactly. This is what I've sort of realized, you know, if we had a major nuclear exchange—life would go on. Differently, but mostly in recognizable ways. I did put this question up on Twitter the other day. I was thinking in the morning, pulled out the coffee—actually, I was reading *Palladium*—and I got thinking about civilization, thanks to you guys. And I put up this question: Individual civilizations come and go. Civilization continues. It has for five to ten thousand years. So when you think about a global civilization, does that mean that therefore it's deeply fragile? Or deeply robust? Which lesson do you draw?

Wolf: That's an interesting question. I don't know the answer.

Matt: Well, while we have a global civilization at a certain level of analysis, we also have the diffusion of certain kinds of technologies, of certain ways of thinking and doing politics and economics. There's still a lot of deep cultural distinction between, say, Japanese and Indians, or Africans and Americans and Europeans. So in a sense, that would make me optimistic about a sort of resiliency.

You have this modern, technological civilization that's diffused among many different deeper historical cultures. These existential risk questions don't really get resolved or mitigated by this phenomenon I'm describing. But what it might mean is that even if you had some major crisis in say, the Anglosphere or in India, it would not necessarily cascade or translate into a global catastrophe. When Rome collapsed, that culture was only one instantiation of their peak

technological development. Or is that not the case now?

I'm going to go out on a limb and say that I think that global civilization is robust, for some of the reasons we just discussed. There's a fair amount of variety, and it's one of the things that culture does. It's one of the things that nations do. And even Jared Diamond's book *Collapse* ends with him saying that all of these prior civilizations that collapsed didn't know about each other. But we know about all of them, right? And ourselves. That awareness means that we do not take longevity for granted, which these other civilizations did.

And so in that sense, the concept of existential risk is a good one to have out there. It's probably not one to obsess over. Yeah, things really can end, at any scale you want to think about. But at a giant scale there's a lot of micro-robustness built in. There's a lot of subsidiarity built in, of these various things operating regionally, at different rates, independently of each other. Or even contrasting enough between each other in terms of pace layers that the system can handle shocks.

Wolf: You know, it reminds me a little bit of the story of the Tower of Babel, where humanity comes together and builds this big central civilization to control everything. It's fragile and hubristic. But once you do that, all the ambition in the system is towards differentiation, and the system fragments back down to some stability. God has a plan for this, so to speak.

I guess every now and then people get experimental. They learn the hard way, but it works out.

That was one of the things going on over the PA system at Woodstock. "Don't eat the brown acid! Brown acid is bad acid!" That was all being managed by the Hog Farm, because they were running the overdose tent, the tripping tent. And you saw kids coming in really bad. And so you sort of ask them through there, what kind of acid did you take? Oh, the brown acid. Okay, no brown acid! That's the Ken Kesey approach to science. "If you don't boil rocks and drink the water, how do you know it won't make you drunk?" And I think that actually, societies at various times get into that mode of "screw it, let's do it!" And it's a good thing. You know, some hippies died, some went crazy and stayed crazy. But that boldness, that fearlessness made it an exciting time to be around. And because everything

was illegal, everything had to go by word of mouth. And we're talking about reality: what's the real world that you fall back on? Personal experience is the real world that you fall back on, to some extent. And if you have avenues to transmit that, talking with the hitchhiker you picked up because they were dressed like you are, information gets around.

And then that flew in the face of the going theories! "No hope without dope!" Well actually, there's such a thing as too much dope. I just saw that Kim Stanley Robinson, in the beginning of his wonderful book *The High Sierra*, is talking about how when he was dropping acid in the 1970s, he grew up in Newport Beach in Southern California. And then he went up into the mountains. And he says, "I got high and I never came down." And he's been in love with the High Sierras ever since. What does that say? That youthful folly has its functions for society.

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