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A response to John Jacobi's "The Revolutionary Importance of Science"
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Note all the colonial elements present in this supposedly revolutionary view: the conquest of a territory once again presented as empty and therefore waiting for our improvements, the suspicious proposition of masters without slaves, the pillaging of natural resources, ascendancy as a superior race, and of course nature as nothing more than a limitation. The view shares much in common with current day cyborgs of the transhumanist movement who have no pretensions of being anti-capitalist as they promise to "free us, as a species, from the confines of biology."[https://edition.cnn.com/style/article/designing-bodies-future/index.html]

It is the abandonment of this nature-hating, body-despising imperative which is at the very center of Science as a mythological system and institutional complex that would truly be revolutionary.

spiritualities would be allowed to thrive again, and revolutionaries everywhere would shout at the top of their lungs, making it a common faith, "the earth does not belong to us, we belong to the earth."

This means thoroughly destroying the anthropocentric, technophilic fallacy that sits at the heart of Science and that is also shared by many Western anti-capitalist movements. Kropotkin and Marx both saw Nature as a limitation to overcome, and they correctly understood Science as the weapon to defeat it. None of their predictions regarding abundance produced by technology have come true.

If there ever were an anti-capitalist revolution that still clung to the values of Science, those beliefs would resuscitate authority as surely as the State did in the failed anti-capitalist revolutions of the 20th century.

Consider this quote from "a Situationist journal in 1969. [It] directly addresses the seizure of science from capitalism and the state by the people, and its recuperation for their own utopian goals.

> Humanity will enter into space to make the universe the playground of the last revolt: that which will go against the limitations imposed by nature. Once the walls have been smashed that now separate people from science, the conquest of space will no longer be an economic or military 'promotional' gimmick, but the blossoming of human freedoms and fulfillments, attained by a race of gods. We will not enter into space as employees of an astronautic administration or as 'volunteers' of a state project, but as masters without slaves reviewing their domains: the entire universe pillaged for the workers' councils. "

[Quoted in Stevphen Shukaitis, "Space is the (non)place: Martians, Marxists, and the outer space of the radical imagination" Sociological Review 57 Suppl (2009).]

The same old dogmatism

A response to John Jacobi's "The Revolutionary Importance of Science"

Sometime after I published "Science," which is a critique of an institutional complex fundamental to Western civilization, its worldview, its practices and its mythology, John Jacobi published a refutation on The Wildernist.

Though his article contains a number of interesting points, it also demonstrates the same underlying racism, dogmatism, and ignorance as to its own argumentative structures that I was trying to critique in the first place.

Defining Science

As is mentioned at the very beginning of "Science", that text is not a stand-alone article but the continuation of a previous work. In fact, both are part of a series of texts that endeavor to construct a mythological narrative of power and institutionality from an anarchist sensibility. The article was meant to sketch some criticisms principally at the mythical level, tracing certain conventions of Western thought and showing relations between supposedly neutral scientific practices and the operation of various power structures in our society.

Jacobi seems to evince a belief that all things can be measured with the same yardstick. As far as discourse goes, I gather that the only valid format he recognizes is that of objective assertions. This was, ironically, one of my principal criticisms of "Science," and one he never responds to: that it is impossible to only talk about things on the level of facts, and what's more that objective or empirical affirmations are not the only valid kind of knowledge or communication, because there is no learning without cultural framing, nor communication without mythical context. Mythography is not intended to convince, refute, prove, or disprove; rather, it gives us a

story—that we take or leave—within which we integrate our experiences, observations, beliefs, hypotheses, and knowledges. It is a part of every epistemological, pedagogical, or intellectual project. And from an anarchist or even an intellectual standpoint, the most dangerous myth for freedom of thought is the one that claims not to be a myth. In today's world, this is principally the mythology of the scientific institutional complex.

Since mythography, unsurprisingly, does not sit well with Jacobi, I will respond in the present text on the level of factual and textual critique.

Throughout, Jacobi commits what might seem like a trifling misquotation, saying I am critiquing "science" rather than "Science." It is a well known literary convention to capitalize a commonplace noun when we wish to refer to a specific phenomenon, especially where it concerns a centralized or official manifestation of said commonplace. In fact, I am referring to a power structure with its attendant mythologies when I critique Science. Multiple times I also specify, "Western science," again making it clear that I am talking about a specific historical phenomenon. However, it serves Jacobi's argument to pretend that I am lashing out against any possible use of the word "science."

> "Gorrion's article suffers from a lack of a working definition of science and so predictably falls into this trap. One can, however, discern at least three targets in his piece. The first is scientific thought: the epistemology of science, the notion of objectivity, etc. The second target is the technocratic organization of modern communities of scientists. And the third is the notion of scientific progress."

In light of the above quote, I can thank him for providing an effectively concise summary of my arguments and demonstrating why my admittedly broad definition of Science works. Ideas, how

surements and proving that CO2 is increasing and the planet is heating up. But just as they are not at the forefront of the struggle, they are also not an indispensable element at the level of knowledge. Anyone who pays attention to their bioregion and is more than 20 years old has been a witness to climate change. We don't need fancy equipment to see and feel the change. Science as an institutional complex convinces people to disconnect from their own experiences and trust in apparatuses over which they have no control. This kind of disconnection is part and parcel of the alienated, exploited relationship we have with the Earth that allows us to damage it so.

Recently, I was watching a video of a Flat-earther trying to prove his theory. The most compelling thing he said out of all the harebrained bits of evidence went along the lines of, "We're just supposed to believe the world is round because they tell us it is?" How tragic, to find the scientific spirit, in the best possible sense of the word, so poorly equipped. Everyone who goes to public school gets a few basic years of scientific education, and somehow, in those years, the average student doesn't receive the observational tools they would need to prove for themselves that the Earth is round.

I have no doubt that most scientists would heartily prefer that scientific education in elementary and high schools be vastly improved. Yet hardly any of them move a finger to accomplish this. How many people with a PhD, much less a PhD in a "hard" science, go back to teach in a public school? Probably something close to 0%. Overwhelmingly, they follow the money. How can one not give them their share of the blame for ensuring that scientific knowledge is enclosed, specialized, monopolized by a tiny group of people and therefore made an instrument of hierarchical power, rather than generalized, communalized, shared, and therefore made an instrument of the common people?

In my vision an anti-authoritarian revolution, empirical tools and methods would be put at everyone's disposal, but rationalist spirituality would be thoroughly subverted, indigenous, ecocentric

of color were scientifically inferior, animals didn't have feelings, and the world was a collection of dead elements that existed for our benefit.

In conclusion, Jacobi is akin to a liberal when it comes to Science. He is either unable or he refuses to appreciate a systemic critique. Any link between Science and capitalism is simply a question of corruption that needs to be cured with more and better science. This is a naïve, baseless view. Jacobi is completely unable of describing what science would look like—how even new scientists would be trained—without the countless institutional and cultural connections with multiple interlinked systems of domination and exploitation. Perhaps the divisionist prejudice that sits at the heart of Science is playing one final trick on him: he thinks that society is a collection of elements, and revolution is just a question of picking and choosing which institutions we like and which we don't, rather than a drawn out convulsion in which everything is fundamentally transformed. How are we supposed to make fundamental transformations without fundamental critiques? We aren't. Which is exactly why every institution of power rejects fundamental critiques and demands either conservative loyalty or the kind of liberal critiques like Jacobi's that lead at best to piecemeal reform.

The only positive scraps Jacobi offers regarding Science have to do with climate change. We have to believe in scientists because those who don't believe in them are the climate denialists. Another dishonest, totally disrespectful strawman. Today, most people trust scientists regarding climate change, and that is part of the problem. Because they have also been trusting the solutions validated by scientific institutions, which as already discussed are false solutions. Today, trust in scientists regarding climate change means first and foremost passivity: people leave the experts in charge, and trust that they'll come up with some technological solution that doesn't require everyone to change how they live and relate to the planet.

For the umpteenth time, I am not against empirical knowledge, and I think it is good that there are networks of people taking mea-

we think, how we attain and pass on knowledge, do not occur in a vacuum. I suppose it is decidedly unmystical of me to assert that such things require people, they require communities of minds. This brings us to "the technocratic organization of modern communities of scientists." When you have such organizations that determine how scientists are trained, what regulations they have to follow, what their internal structures for resolving disputes are, and what their funding and employment opportunities are, as well as interfacing with other institutions of power, you have, beyond any doubt, a formal network of communities capable of producing its own epistemology and its own mythical self-history (the notion of progress, the third target Jacobi identifies). These three targets not only converge to provide an effective working definition of "Science," in fact it would be naïve to criticize one of them without at least recognizing the interrelated existence of the other two.

Yes, Jacobi, institutional communities have their own epistemologies and their own mythical histories. No big surprises there.

As communities, they also have dissident members, and any of their members are capable of achieving a critical view of the whole, even if this view is disincentivized. Criticizing science as a whole, as defined above, is not "throwing the baby out with the bathwater" any more than criticizing the police as an institutional complex is unwarranted because many cops themselves are also critical of police brutality. If I had intended my original article to be a more complete and factually detailed article, I would have certainly gone into the tensions between the social sciences and the "hard," "pure," or "natural" sciences. Without a doubt, many thinkers from the first camp have greatly influenced my own critiques and do not themselves cleave to objectivity as a knowledge framework, rationalism as a mythology, nor the belief that empirical and quantitative processes are the only ways to achieve valid knowledge. Nonetheless, their status as real scientists is constantly put in doubt, and one reflection of the scientific mythology is the fact that ideologi-

cal hegemony is clearly on the side of the "natural" scientists, even though, for one, they are professionally incapable of understanding the meaning, the framing, the cultural conditioning, and the application of the knowledge they produce, and secondly, their use of the qualifiers "hard," "pure," and (the one they uncritically inherited from Christianity) "natural" reveals how fully and unconsciously they—taken as a whole, and with the inevitable exceptions—buy into their own mythology.

I predicted defensive responses like Jacobi's in the epilogue of my original article.

> "We predict that many believers in Science, especially the academically initiated, will reject this critique as uselessly broad, if they do not dismiss it outright. This is worth analyzing. First of all, someone in a position of power, someone with an accredited brain, a priest with a position in the hierarchy, need not respond to a non-professional writer, a layperson, unless the critique begins to be so widely distributed it constitutes a threat. [Jacobi himself admits that he was going to ignore the article until he saw that many of his friends were reading it…]
>
> Secondly, and more substantially, we have noticed a certain pattern. The academically trained will always insist that the scientific community is highly self-critical, yet at the same time they always (as far as we have seen) reject criticisms that come from outside of academia as "overgeneralized" or unfounded. We would argue that this is a structurally systematic response. An institution with hegemonic aspirations, or one that has already achieved dominance, must never allow itself to be fit into a globalizing theory" [formulated by its opponents.]

ence and it is horrifying. (Sounds familiar, right? Hey Jacobi, ever worked for the Democrats on a "Get Out the Vote" campaign?)

> For one thing, even if this approach has some real problems, the alternatives are even worse. Mysticism, religion, and various forms of obscurantism have been the primary tools of the powerful seeking to justify their power. Science—logic, reason, empirical evidence—has been the tool that has cut off the legs of those beasts. Science is what allows us to demystify power relations and the world around us so that we can properly respond. Otherwise, we are left making decisions that do not, for example, acknowledge evolutionary processes, economic trends, sociological tendencies, and human nature. This is as absurd as making decisions without acknowledging the laws of gravity. Worse, we are left not believing in the laws of gravity because a monarch or tradition or "divine revelation" has told us so.

Well, no, actually, you're a couple hundred years late with this claim. Today Science is the primary tool by which the powerful justify their power, and while scientists do love cutting legs off beasts, it would be a better metaphor to claim that Science has built the powerful a freaking jetpack to zip around in. Also, did anyone notice how he threw "human nature" in there? Another favorite trope of the status quo and a part of Enlightenment mythology that many scientists have clung to.

Just as he can't appreciate a global critique of the institutional complex he feels compelled to defend, he cannot offer a vision about what is liberating about science, beyond calling up some 19th century bogeyman regarding the oppression of mysticism, much the same bogeyman his forebears used to justify the slaughter of witches and the genocide of indigenous societies in order to usher in the reign of their own rationalism, in which women and people

*All animals depend for their survival on healthy bacteria populations in their digestive tract.

Tell these two facts to any nine-year-old, and they would probably see that glyphosate presents a danger to animals as well.

Lo and behold, the scientists in their shiny white labcoats have come to save us. In September 2018, 48 years after scientists identified glyphosate as an effective herbicide and 44 years after it hit the market, scientists at the University of Austin reported that when honeybees visit fields that have been sprayed with Roundup, they suffer die-offs of their intestinal flora that make them significantly more vulnerable to a number of contagious diseases, creating the conditions for the simultaneous deaths of most members of a hive. [https://www.sciencedaily.com/releases/2018/09/180924174506.htm]

It took them 48 years to look into a problem that any pre-adolescent with only the most basic information on biology would identify as a potential danger in five minutes. Yet another example of the mind-blowing stupidity of scientists when they're not getting paid to think about something. A danger to the world and a boon to capitalism and states: general stupidity, applied brilliance, coupled with immense power. They'll solve the problems placed in front of them, avoid any overarching structural critiques, and delegitimize any affirmations or perspectives from outside the system.

Revolutionary Science?

Jacobi titles his critique "the revolutionary importance of science," but throughout his text he offers very little to clarify what these revolutionary qualities are. He comes the closest in the following paragraph, and it's telling that he actually says nothing positive about Science, he just falls back on an old strawman scare tactic, assuring readers that there is only one alternative to Sci-

Objectives

The above serves to justify the target of my critique. Scientific epistemology and technocratic organizations, studies in peer-reviewed journals and pop science; these are not "radically different" phenomena constituting a target of critique so "broad" as to be "meaningless", as Jacobi claims. They are all structurally related. If Jacobi wishes to continue denying the validity of my definition, which was already mapped out in the first essay, he would have to explain how a community with a technocratic organization does not have its own epistemology, or how it is that smoothing is not an integral part of the knowledge production of scientific communities, or how it is that such a massive amount of funding and the systematic production of jobs does not shape the entire scientific community to be an industrial complex fully integrated into the capitalist economy. Needless to say, he is incapable of making any such arguments, because all of these are naïve positions. On the other hand, fine-tuning the definition is clearly possible, and I'm open to suggestions.

Before continuing to other arguments, I think I should dispute one blatant mischaracterization that Jacobi makes (would he appreciate the irony if I labeled it as "hysterical," or is he not as versed in the history of scientific thought as he claims?). No doubt trying to excite the passions of his readers, Jacobi writes that my article arrives at the "wildly audacious conclusion that we should dispose of science wholesale." Every institution produces its police, and here Jacobi resorts to rhetoric that we anarchists have long been familiar with. *Don't listen to these wild, savage types: they want to destroy everything!* On the contrary, even Jacobi is able to recognize that at various points in my text, I validate the empirical method and the work of various scientists. In other words, he either wasn't paying attention to his own arguments or was consciously lying in order to delegitimize my positions, the majority of which he ignores.

To clarify: I think empirical knowledge and as such the empirical method are both very useful. However, the empirical method is limited, and empirical knowledge is by no means the only form of knowledge. For this reason and others, objectivity as a framework for understanding knowledge (knowledge is either true or false, knowledge can be unbiased, there is an absolute frame of reference for the universe, perception can be illusory or it can be disciplined, quantified, and mechanized in order to validate objective truths, subjectivity is an obstacle to objective knowledge, and the organization or history of knowledge does not necessarily affect its content) is not only a cultural artifact that reproduces a specific value system connected to specific social hierarchies, it also flattens and falsifies the world we live in.

The primary objective of my original article is to develop a systemic critique of a technocratic institutional complex that is inseparable from power and oppression in our society. Within this critique there is certainly room to champion a subversive folk science alongside non-empirical practices of resistance and learning. Perhaps the only thing that I seek to "dispose of wholesale" is the idea that scientists and scientific institutions are neutral, that they are not a fundamental part of how power and oppression exist in our society, and that they are not currently integral to power and oppression. Rather than address this argument, Jacobi goes on tangents.

Of Velvet Gloves and Firing Squads

We've spoken of definitions, of objectives, now let's speak about manners. I am certainly not the ideal writer to call Jacobi to task for his arrogant and insulting tone, though I would say there is a very real difference between the tone born of superiority, used by the defender of what is already hegemonic, and the tone born of

save the planet? Constantly we are told to trust in the priests, and to think of anyone who loves the earth as backward "mystics". Jacobi is shameless enough to equate those who fault Science for its role in the devastation with climate denialists who refute the scientific consensus.

As one final example of ecocide in which scientific institutions undeniably played an irreplaceable role, we have the so-called Green Revolution, the forcible industrialization, mechanization, and chemicalization of agriculture throughout the Global South. The scientific practices that underpin monocrop agriculture, machine-planting and harvesting, factory-based meat production and processing, global transportation, and chemical fertilizers and pesticides entail a fatal ignorance of biological processes, ecosystems, and ecological limits and they have destroyed the world's soil, created dead zones throughout the ocean, poisoned our environment, and condemned billions to a precarious dependence on the market and millions to outright starvation. These practices, developed, promoted, and defended by scientists and scientific institutions, are directly involved in the forcible suppression of numerous ecocentric, sustainable, traditional practices of sustenance, while they themselves constitute the most inefficient form of food production in world history. I am referring to inefficiency, stupidity, and abusiveness on multiple levels, but those who are mentally inhibited by rationalism and have trouble appreciating things that are not numbers-based need only the readily available calculations of fuel calories spent versus food calories produced.

As just the latest in a cascading series of disasters produced by the idiocy of scientific agriculture, we have the first empirically demonstrated factor related to the catastrophic die-offs of bee populations worldwide. Glyphosate, Monsanto's *Roundup*, supposedly doesn't affect animals, except when agricultural workers are exposed to large quantities, in which case they tend to die quickly. But officially:

*Glyphosate only affects plants and bacteria.

Where are the scientists who release reports stating that the Paris Agreement is not enough according to accepted climate models?

Where are the scientists who object to the new geological term, "anthropocene," pointing out that it is capitalism and not all humanity that has caused the problem, and that there have been many carbon neutral, non-ecocidal societies we might learn from?

Where are the scientists who openly refer to the energy companies as mass murderers?

Where are the scientists getting arrested for direct actions against the industrial decimation of the planet, for pipeline blockades, for assassinating the executives of the companies most responsible for pollution?

Where are the scientists speaking up in support of Greenscare and Standing Rock prisoners?

Nowhere to be found. Because all the scientists who find it economically convenient to deal with questions of climate change and ecocide are sitting obediently right next to those who are most responsible for the problem, meekly submitting reports to the media, giving their support to ineffective government treaties and green capitalist pseudo-solutions even though empirically speaking these cannot possibly stop the ecocide.

The common factor of every false solution, every framing of the ongoing destruction of the planet, is that the scientific, technological, industrial system of capitalism afforded the ultimate consideration and made an absolute priority. Any social response to climate change, habitat loss, and mass extinctions must first posit the untouchability, the immortal preservation, of this system. Only then can it begin to address the question of ameliorating ecological harm. Scientists are fully complicit in the framing that has us first save capitalism, and then see if it's also possible to save the planet.

How are we supposed to believe that an institutional complex that systematically produces people who hate the planet, who hate other life forms, who think of themselves superior, are going to

anger, used by those who are marginalized and delegitimized by the institutions of power and their discourses.

More useful to my argument would be a brief look at who deserves the velvet glove treatment, and who gets the discursive firing squad. There are very few producers of discourse who are polite and considerate with everyone. Nearly every social conversation sets certain boundaries of civility that implicitly signal who is a legitimate interlocutor and who is a thoughtless savage to be silenced or excluded. I have no problem admitting which way I fire my shots. I try to be respectful towards those who put themselves on the line, who theorize as just another action within a struggle against authority, even if I strongly disagree with them (and I admit, I'm not always successful). On the other hand, I don't really care if I insult careerists, those who are paid to think, and those who have some influential employment with an institution of power. Honestly, I have trouble viewing them as people. I'm not saying it's justifiable, I'm just trying to make the rules I operate by explicit, to acknowledge and explain my own double standards.

The unwritten rules in normalized discourse, rules which Jacobi evidently follows, are nearly the opposite. Professionals merit respect and attention, whereas others, especially angry others, can be insulted or dismissed. This "self-regulating conspiracy" among professionals makes sense: within a vast complex of interrelated institutions, you never know who might control purse strings or future employment opportunities that interest you (those who find this explanation insulting might consider that it uses the exact same cynicism with which game theorists explain customs and organization among the savage tribes). But because these are the institutions that produce the dominant discourses and practices in our society, their norms become everyone's norms. I don't assume Jacobi is a professional with any possibility of financial gain for his writings, nonetheless he has learned well that David Hume (involved in the slave trade) deserves respect and consideration, whereas some anarchist publishing on the internet can be scornfully disregarded.

The effects of this value hierarchy, imposed across society, should not be underestimated.

Racism and Colonialism

A brief aside: is Hume's complicity in genocide and enslavement reason to dismiss his ideas? No. But is it a coincidence that Hume and most of the other great men of Science were racists, elitists, and exploiters whom their underclass contemporaries would have been perfectly justified in murdering? Also, no. A third question, then, which I'll leave unanswered: if we reject ethical relativism and identify at every moment with the struggle for freedom and well-being, is it wrong for us to declare the great men of Science our enemies, giving fair consideration to but also contextualizing their ideas?

The debates that Hume intervened in are beyond a doubt interesting, but they reflect their participants' social position as nobles, enslavers, mass murderers, and rapists. And they were not the only ones having interesting debates. Social rebels, poor women, kidnapped Africans, disenfranchised peasants, religious heretics, and armed natives were also having debates, though they were much less likely to be committed to paper. In part, that's because they faced the reality of repression and often had to operate in secret, because dominant society denied them the resources necessary to publish and keep good records, and also because dominant society went out of its way to eliminate their oral histories, their memories, their very identities. The preservation of one set of debates and the invisibility of the other is neither a coincidence nor a natural result of neutral factors, but another reflection of the war waged by rulers and their scientists against everyone else. It's true, some historians who consider themselves social scientists have started to recognize and recover these other conversations, but I don't think that anyone can deny, with evidence, that the conversations of

well, maybe it's time to recognize that Western notions of other life forms are basically without merit, whereas many indigenous knowledge systems that treat all other life forms—not just animals—as our brothers and sisters, as intelligent beings with personhood, are more accurate. Wouldn't that be embarrassing for all the scientists standing atop centuries of presumed superiority?

But you know what? Fuck them. The sheer damage wrought by the application of their paradigm on the natural world has been devastating enough to prove that it's wrong.

The planet

Who dares to say that Western science has not been involved in the destruction of the planet? Who is shameless and dishonest enough to deny that scientific advancement is inseparable from industrial advancement, and together these two forces are destroying the place that gives us life, killing hundreds of millions of people, billions of other life forms, brutalizing the earth, and causing thousands upon thousands of extinctions every year?

Most scientists make their living working in some way for this ecocidal system. If they can get funding to study salmon populations, they'll study salmon populations. If the funding is in fracking and horizontal drilling, that's what they'll do instead. It's no mystery where most of the research dollars are, and how the majority of scientists are busy making the system stronger, more devastating. The small minority whose funding opportunities allow them to be more idealistic are also a part of the problem. They continue to support the institutional mythology regarding solutions to the problem of ecocide.

Where are the scientists who make it clear that alternative energies have no chance of reducing emissions within a capitalist energy market?

Van der Lummel makes an easy target. Not only does he have a funny Dutch name (and anyone who doesn't think this actually makes a difference is naïve), but in the book he published after the study, he wanders into a number of New Agey explanations for how consciousness might actually work given the inadequacy of the biocentric or neural/mechanical model. And yes, he makes recourse to quantum physics. But this is only after he uses decidedly scientific methods to statistically refute all the other mainstream explanations for consciousness events among people who are medically dead or in full comas. In any case, his New Agey hypotheses are independent of and therefore do not discredit his peer-reviewed research on consciousness after death. This research doesn't tell us what is actually going on with people who lose blood flow to their brains but keep on thinking, feeling, and receiving sensory information, but it most certainly puts another crack in the mechanistic theory of the brain as producer of consciousness. And what's more, his research results have been independently reproduced at NYU [http://www.independent.co.uk/news/science/mind-works-after-death-consciousness-sam-parnia-nyu-langone-a8007101.html].
(While studies of executed rats suggest their might be a sudden spike in brain activity after medical death, when even all brain stem reflexes have stopped, therefore possibly resuscitating mechanistic theories, this doesn't explain long-lasting consciousness among coma patients. There's also the troublesome fact, backed up by the NYU study, that not only can people consistently hear when they're being pronounced dead, they also often have access to falsifiable visual information about the emergency room and personnel, whether or not their eyes are closed or able to focus and respond to light.)

When you consider that plants can hear, smell, and see, as well as experience fear [http://www.bbc.com/earth/story/20170109-plants-can-see-hear-and-smell-and-respond], and that slime mold, which has no nervous system whatsoever, is capable of learning,

the great men of Science took place on top of and against those other conversations, and that the history of knowledge presented by the dominant strains of social science as well as nearly all the "pure" scientists directly and aggressively silence the "wretched of the earth".

(Another brief aside: Jacobi is apt to cite the rules of logic, not understanding, it seems, that such rules are a Western cultural artifact (more later on the value of contradictions). One could easily say that now, by pointing out Hume's complicity in the slave trade, I am engaging in the logical fallacy of an *ad hominem,* even though I have stated that Hume's conduct does not invalidate his ideas. But ideas are historically rooted, and they are never impersonal. The separation of ideas and actions, what's more, is fundamental to the subtle oppressions of Western democracy. Anarchists, on the other hand, coincide with many non-Western cultures in favoring the idea of coherence, that in reality it counts for a lot if someone is able to put their own ideas in practice, and what the results of that practice are. Furthermore, I don't think it's a coincidence that the foremost proponents of the view that we should evaluate ideas without also considering those who promote them enriched themselves off of genocide, slavery, and the destruction of the planet. Is it unfair, at this juncture, to declare: *Ecce homo*?)

To return to my principal line of argument, I was describing the antagonism between the official and the unofficial histories of ideas. It is true that those who demand that we take sides are carrying an ideological stick capable of beating down free debate. But it is also true that there is no such thing as neutrality, and that in a conflict between those with more and less power, such as is the case with colonialism or patriarchy, claims to neutrality amount to support for the powerful.

Having made that caveat, allow me to suggest that in considering how colonialism, slavery, and genocide since the Enlightenment have always made use of science and scientists, when considering the possibility of inherent racism in the scientific institutional com-

plex, we cannot be neutral, though we can map out third and fourth positions.

Jacobi, however, dismisses criticisms of scientific racism. Despite the lengthy criticisms I made of racism in the original article, with multiple examples, Jacobi only deigns to respond with a single sentence, without referring to a single example, after affirming, "we shouldn't take Gorrion seriously." To wit: "For one thing, he says that there is "implicit racism" in the "empiricist mythology," even though he stated earlier that he does not reject empiricism, only science." Does he not understand that the terms A: "empiricism" and B: "empiricist mythology" are not equal? Evidently not. If someone says that B is implicitly racist, and they approve of A, therefore they don't have a problem with racism, they are supposing that A and B are equal. Well, empiricism is a method, the empiricist mythology is an entire worldview. Jacobi clearly has a very weak grasp of the very language he uses to communicate his supposed truths. It also becomes clear that he does not give any importance to the criticisms of racism, given that he uses another cheap bait-and-switch to weasel his way out of the argument.

Nor is it surprising that addressing racism is not a priority for Jacobi, given that he makes a couple racist quips of his own. They are, however, well masked: I presume Jacobi is college-educated, and what does a college degree serve for if not to hide racism in more subtle language? So, we need to dedicate a little space to unpacking his comments.

In section V of his response, he jokes: *"According to Gorrion, Buddhists invented quantum mechanics "well over a thousand years" before modern science. I just wonder where they got the lasers for the double-slit experiment"* (referring to the experiment that demonstrated that photons act as both waves and particles and that their position, until it can be definitively measured, exists as a probability wave rather than having an exact location).

What's most obvious is that Jacobi is once again distorting my argument. I never said Buddhists invented quantum mechanics.

defending it and viciously attacking anyone who points to its cracks, as does Jacobi and so many like him.

One of Jacobi's tactics is to use a total *non sequitur* on quantum physics and mock all the spiritualists who use what we might generously call a poetic understanding of quantum physics to support dissident ideas about consciousness. Jacobi expresses his suspicion that I hold the same views, but he is unable to make any textual reference, because, well, I actually don't hold those views. (Has anyone else noticed how little importance Jacobi gives to evidence while championing empiricism?) I would say, however, that those quacks are being more honest thinkers than the stuffy traditionalists who continue defending a paradigm that holds no water. At least they are looking for new answers in a realm where it should be obvious that new answers are needed.

To name one area of study that is breaking the paradigm, we have the research into consciousness after death, focusing on evidence of consciousness among people who experience medical death, and who show no brain activity, and are then resuscitated. The groundbreaking study in this field was conducted by Dutch cardiologist Pim van der Lommel, who interviewed hundreds of patients over twenty-five years, recording their experiences while they were in full cardiac arrest or total comas with no brain activity. Van der Lommel observed a great deal of similarity in patients who reported "near death experiences" including having access to falsifiable sensory experiences at times when there was no blood flow to their brains, as well as a strong quantifiable difference in psychosocial experiences in the years after their resuscitation, comparing those who had had a near death experience with those who had experienced medical death without such an experience. His study was published in the peer-reviewed medical journal, *The Lancet*, and predictably, many scientists subsequently mocked him, dismissed him as a quack, and tried to drag his name through the mud. Curiously, they did not publish their refutations in peer-reviewed journals, which some might qualify as rather unscientific of them.

When I participated in a listening project regarding health care, it was astounding how many people, especially women, had had atrocious experiences with the medical establishment, which in many cases were not only humiliating but also dangerous for their health, with many doctors systematically and ignorantly insisting that they knew their patients' bodies and problems better after a cursory examination than the patients themselves.

The question of the placebo, and the broader issue of the demonstrable power of the mind in healing, points to a major crack in the current scientific paradigm. I would agree with Jacobi, referring to Kuhn and others, that a single piece of evidence doesn't justify discarding a theory. However, the evidence has been amassing for a long time now that the current scientific paradigm explaining the mind, consciousness, and the relationship of mind and body through genes and neural structures is simply inadequate, if not completely wrong. Additionally, we now have a large body of historical research showing how the scientific paradigm governing the mind-body relation was never evidence-based, but from the very beginning was a philosophical imposition stemming from the prejudices and mythical frameworks of Enlightenment era thinkers looking for an absolute theory of knowledge. These thinkers, who also gave us the idea that empirical knowledge is the only valid form of knowledge, based their arguments not on experimentation but on armchair speculation.

I would disagree with Jacobi that one theory should not be discarded until we have a better one to take its place, which I would ascribe more to an insecurity with humility and uncertainty, since such attitudes undermine the institutional separation between experts and laypeople. But if anyone who holds this preference nonetheless wants to overcome the conservative nature of paradigms, and insists that science has a revolutionary importance, then they would do well to be more forthcoming in acknowledging a theory that is clearly insufficient, underlining a viewpoint that is ready for an update rather than obstinately

What I said was: *"well over a thousand years earlier, Daoists and Buddhists were already promoting a worldview that clashed with Cartesian geometry but was largely compatible with the discoveries of quantum physics."* Embedded in my sentence is the fact that the discoveries of quantum physics are posterior to the development of the Buddhist or Taoist worldviews. The relevant argument is that they had developed a worldview in which quantum- or relativity-inspired ideas regarding the nature of energy or the shape and age of the universe could have made a lot of sense, and would not have clashed with as many fundamental dogmas. In rationalist, dualist Western society a hundred years ago, the idea that matter and energy are interchangeable, that space-time is curved, or that a particle does not exist in any one place but within a probability wave would have sounded like absolute nonsense, and even today it strikes (Western) people as a contradiction that is difficult to grasp.

Now let's look at how these subsequent discoveries and theories have unfolded. For hundreds of years, the Western intellectual elite have instructed their subject populations—which through force of arms came to encompass the entire world—with certain beliefs, many of which promote materialist, Cartesian, and/or neo-Platonic ideas about the world (for the record, I know that to the proponents of those ideas, they are not synonymous and in some ways they are mutually contradictory, but from an outside perspective, especially one critical of fundamental dogmas in Western civilization, there is far more similarity than difference between them; there is, for example, a wider range of opinion in the worldviews of an anarcho-primitivist and an anarcho-syndicalist, but in general they don't reject being lumped into the same basket, as long as the pertinent critiques are being leveled at beliefs they both hold in common).

Authoritarian, institutional, and genocidal forces instructed us all—sometimes through subtle value hierarchies and other times through compulsory education—that humans are the superior

species (and that Western man is the most human of all humans), that the world exists for our consumption, that everything is either matter or energy, that nature functions mechanically, and so on. As pertains to Cartesian and Newtonian ideas, we are indoctrinated in the meta-epistemological framework of objectivity with its idea of an absolute reference, and its prejudice towards analyzing discrete objects within a neutral space (although clearly Newton opened the way for an understanding of fields through his concept of gravity, as every theory opens the space for possible refutations, expansions, or evolutions). There is also the Platonic/Catholic/Cartesian opposition between matter and mind, which is still present at the rationalist extreme in which spirit is abolished and all that is left is one half of the pair, dead matter, rather than a synthesis of the two as exists in many other worldviews.

For hundreds of years, we have been taught these things, and in the process, and with complicity by scientists and scientific institutions, other cultures have been belittled, ridiculed, and exterminated. Some of these cultures have believed that all life is interconnected, that there is no knowledge without a knower, that one person's truth is different from another's, that the space between two objects is a living field rather than a neutral, static non-entity, or that things are better understood through their relations than as separate entities. Some have believed that the universe is better characterized by principles of continuous transformation and interrelation rather than by the machine-metaphors favored by Western scientists (who, as I mentioned earlier, often do not realize that they are using metaphors).

Then, at a certain juncture, scientists in a few fields began to say that, in fact, there is no absolute reference point for the universe, that measurement and observation affect what is measured and observed, that velocity and position depend on perspective, that something can be both a wave and a particle, that something can potentially be in two places at once, that two separate particles can be "entangled" or connected in non-local space such that one ex-

when people experience a permanent resolution and not a temporary abatement of their condition.

The placebo effect is especially embarrassing to the scientific establishment if we consider that its margin of effectiveness is greater than the margin of effectiveness of many commercial medications. In other words, if the no-treatment baseline is zero, and the placebo effect in a drug trial runs at 30% (of patients who report the decrease of symptoms after receiving the placebo), many drugs only rate an effectiveness of 40-45% (in other words, only ten to fifteen points on top of the thirty points of the placebo). This is especially significant when we consider that the placebo effect is so strong among people who have received absolutely no training to use their mind to heal their body, and when the "care" they receive when getting the placebo is the minimal, cold contact of a doctor looking them over and a nurse handing them a pill and a plastic cup of water. What if respectful, positive, experience-based forms of traditional healing were recovered, people were encouraged and trained to take part in their own healing, and the professionals were caring, sympathetic, and attentive individuals who favored hands-on methods instead of arrogant, cold, hostile experts in lab suits? Coupled with lifestyle- and cause-based rather than symptom- and disease-based healing, people's health would improve drastically.

But the medical establishment has no interest in breaking with its authoritarian, torture-complicit, colonial, racist, and patriarchal history. They are interested in minimizing doctor-patient interactions and preserving the patient as a passive and ignorant recipient of treatment. (I can assure you that it is an accurate generalization that still today, doctors who work in the prison system are torturers, and we also have to add the medical workers in mental hospitals, in animal testing laboratories, all those who work in hospitals near the border and are complicit with the deportation machine…) And these dynamics long precede the financial incentives of big pharma.

ted results that were unexpected or undesirable. So yeah, priests of science, keep talking about control. The underclasses you assume to be ignorant are just laughing and waiting for our day.

There's another important point easily lost within all this discussion of the need to distinguish effective treatments from the placebo effect, which is the concept of the placebo itself. Within dominant scientific practices, the placebo effect is practically a code word for a meaningless error, a "nuisance variable" according to one dissenting view [https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2582657/]. It means the therapeutic effect that patients report when taking a fake treatment. Researchers rate their experimental treatments against non-treatment and against a placebo to find out its *real* effect. The insinuation is that the placebo effect is not real, which is a rather arbitrary, subjective distinction given that it has real results. To be more precise, the placebo effect represents the power of the mind to heal the body, how the feeling of being cared for, of receiving attention, and expecting to get better actually heals people. This is a concept that Science is unprepared to deal with, especially considering that the mind, according to the dominant paradigm, doesn't exist. It's supposed to just be the illusion produced by chemical and therefore wholly material processes in the brain. If the mind is an illusion, it cannot possibly act as a force, a factor, or a cause of anything, much less a healing of the body.

An advocate of this view might dodge the bullet by saying that receiving a placebo triggers endorphins or whatever other chemical that provide temporary relief. This is a sloppy argument typical of one who hasn't studied language or logical structures. If the placebo is chemically incapable of triggering such a chemical reaction on its own, then it is only the expectation the patient feels on receiving the placebo that could trigger the chemicals that supposedly relieves their suffering. Consciousness here still acts as an operational factor. And this explanation still leaves out cases

hibits simultaneous changes in response to a change experienced by the other particle; they began to appreciate fields, systems, and relationships, and questioned the discrete bodies that were the subject of analysis in earlier ages.

It is true that this shift represents a great intellectual courage and versatility, which is something that a few scientists have, but that does not characterize scientific paradigms as a whole in their "normal" periods (see the discussion of Kuhn, below). It is also true that through scientific flattening, these developments are primarily presented as technical matters with limited philosophical bearing, that do not change the fundamental features of society's mentality. They are intentionally presented to the public as things that only people with advanced degrees can understand. They reach us only as equations or the occasional anecdote about photons and black holes.

($E=mc^2$ is a great example: rather than giving us a mythical phrase about the nature of the world like those frequently used to convey Darwin to the masses, e.g. "survival of the fittest," we are given a ready-made metaphor for the mystically inscrutable intelligence of scientists, an ergot of technical genius beyond the comprehension of the masses: *behold—the equation!* This is highly significant given that $E=mc^2$ as a phrase would have been delivered to us as "matter is energy," "the universe is made of energy," or "anything in the universe can be transformed into anything else," statements that reaffirm Buddhist, hippy, or even alchemist worldviews. Of course, no respectable scientist would vulgarize Einstein thusly, though they had no problems vulgarizing Darwin into a capitalist worldview or Newton into a mechanistic one.)

In contrast, every law and principle of classical physics and the neo-Platonic worldview that preceded the paradigm shift is inscribed in countless metaphors, language conventions, discursive customs, and myths, mass-produced even today.

In other words, the technical adjustments that allow Science to *be right with God*, so to speak, that allow Science to correct ear-

lier errors and improve its productive capacity, vastly increasing the power of the State in the process, are produced in a way that they have no hope of correcting the impact that earlier scientific theories had and continue to have on our society's worldview.

The machine-metaphor and other fundamental dogmas are preserved.

Let us for a moment imagine that a stateless Daoist or heretical Buddhist society of runaways from the Han slaver state, existing in the mountains of Southeast Asia, had advanced technically and was able to develop ever better scientific instruments. At a certain point, they also could have developed complex forms of geometry and physics, eventually explaining the very phenomena that Newton did so convincingly. However—and this is what many "hard" scientists or rationalists like Jacobi have such a hard time understanding—though the hypothetical Daoists used the exact same equations as Newton, the packaging, the application, and the institutional interfaces would have been completely different. And those differences would have affected how the society understood and thus interacted with the world it lived in, the applications of the technologies produced with the new knowledge, and also the course of future discovery. The First Law of Thermodynamics, we can imagine, would have been conceptualized and phrased in a different way, one that might not have proved a conceptual obstacle to the eventual evolution of the theories of relativity and quantum mechanics (which probably wouldn't have been named "mechanics"). And those theories, when they arose, would probably not have seemed so bizarre, but rather a confirmation of the things that people already suspected about the universe.

I understand that many physicists don't want to have any social responsibilities, they just want to study subatomic particles and black holes. It's an admirable curiosity, but it's also hopelessly naïve. To them, maybe their most important achievement is General Relativity or Maxwell's equations, but to many other people, it's nuclear weapons. Can you begin to understand how these are

understanding this as a limitation of the method of study, yet another piece of evidence that empirical knowledge is not the only valid kind of knowledge, the bulk of scientists interpret this as a failing of acupuncture. Pretty clearly, they feel threatened by a form of healing that threatens their knowledge paradigm on multiple fronts. This can be read as yet another front in Science's war on healers, a war that in earlier centuries was carried out with torture and mass murder against primarily women practitioners of traditional forms of healing, and that today is waged with derision, marginalization, and occasionally the criminalization of alternative therapies. (I can already hear Jacobi preparing his counterargument, ignoring all my critiques to claim I am defending quack doctors who prey on desperate people and make a bundle giving out Vitamin C tablets to people with advanced stages of cancer.)

This is another example of the mechanization of practices, in which any knowledge or practices that don't fit through the social machine are forcibly discarded. It's also worth noting that many of those who have worked in so-called controlled experiments know that they are a joke, or at the very least, not as controlled as the scientific establishment pretends. I worked in the role of guinea pig, and I and my fellow test subjects regularly worked the system, lying to get accepted to the study, reporting symptoms of conditions we already had to get free medical care, not reporting symptoms if we knew it would allow us to continue in the study for longer and make more money. The researchers treated us like ignorant machines, passive and knowledgeless subjects, when in reality we were generally smarter than they were, getting the system to work for us when we were meant to suffer happily in pretty extreme precarity (enough precarity that we'd be willing to work by taking experimental drugs, without which the entire medical industry would fail). The truth of the matter is we had our own interests, our own strategies, completely illegible to those who thought they were in control. We also saw how often researchers fudged or omit-

(Note that this article falsely claims that the Parapsychological Association, easy to dismiss as quacks, were "expelled" from the American Association for the Advancement of Science; in fact that never happened, and they are still affiliated. So much for a scrupulous commitment to fact.)

So let me see if I got this straight. The Chinese are pre-modern and non-scientific, not just two thousand years ago but still today, whereas Democritus is worthy of consideration. Atoms and the void don't exist, not as Democritus envisioned him, but he gets credit. On the other hand, people do have energy coursing through them, every body has an electrical field, yet we're told that acupuncture is pre-scientific, even when the majority of empirical studies demonstrate otherwise… If the same standard were applied to the Chinese as to the Greeks, wouldn't they have been given credit for discovering electrical fields? Is there another criterion here I'm missing that explains this double standard, besides blatant cultural supremacism?

Placebos and consciousness

As mentioned earlier, it is very difficult to effectively evaluate acupuncture with the kind of double-blind studies that empiricists prefer. This is because acupuncture, just like other forms of body therapy, require a good deal of skill. They are not comprised of tasks that can be mechanized, just as giving a patient a pill or radiation therapy. A double-blind study means that a method can be rated against a placebo in a way that neither the patient nor the healthcare practitioner know which is the real treatment and which is the placebo. An acupuncturist, however, knows when they are properly performing acupuncture on a patient. Amazingly, in much of the scientific literature, this counts as a mark against acupuncture. In other words, "controlled" studies are incapable of properly evaluating acupuncture, and rather than

not separate realities? How even though the so-called Laws of Nature would hypothetically exist independently of human societies and the things that our power structures are doing to us and to the planet, in practice they are not independent at all?

In sum, the precious equations might have remained intact, but the fates of millions of people and other species would have been completely different. Can we really countenance a belief system in which that is irrelevant, in which the applications of a theory are not understood to be part of the theory, in which the consequences of our actions are constantly made invisible?

We have been dancing around the topic of colonialism for some time, unpacking what is wrong with Jacobi's flippancy and his textual distortions. Now let's get to the grain. What he is doing is ridiculing the notion that non-Europeans might have had a better—and healthier—cultural understanding of the universe, and the only arbitrary evidence he gives—arbitrary because it was a total non sequitur to my argument—is that they had not developed the technologies deployed by those ingenious Europeans.

No doubt he is rolling his eyes at this characterization, but the fact of the matter is that the only references he makes to non-European cultures in what is supposedly a response to an article that makes a great many accusations of racism is to ridicule and belittle the knowledge base of non-Europeans.

This is a basic tenet of colonialism: until they learn how to be like us, they are illegitimate.

His other main reference to non-European knowledge systems, regarding acupuncture, shows that this attitude constitutes a pattern. Jacobi claims there are no studies showing the effectiveness of acupuncture, and he cites three articles to that effect. One of these articles, "Do certain countries produce only positive results?" is borderline racist: it highlights how studies in countries like Japan and China produce more favorable test results for acupuncture than studies in Western countries. Rather than presenting this in a comparative way, it posits the West as the norm and

characterizes the other countries as "abnormal". In conclusion, the article recommends skepticism towards data coming from those countries. The implication is that Japanese and Chinese scientists aren't real scientists, because they are beholden to their mystical traditions and haven't broken free like Western scientists. A more Orientalist view would be harder to find.

On examination, it turns out that the Asian countries cited range from showing 99% to 89% effectiveness in acupuncture trials. Granted, 99% (for China) seems worrisomely high, but how about Japan's 89%? The white *control* country this article cites, a Western nation of rational white men and proper scientists, is the UK. But in the UK, 75% of studies show that acupuncture is effective, and the difference between 89% and 75% is large, but so is the difference between 89% and 99%. It hardly seems large enough to lump a bunch of Asian countries together and suggest that all their scientists are too mystical and Asian to be trusted. But then, when has Science ever needed a justification for racism? Historically, it has been the principal manufacturer of justifications for racism.

Also, incidentally, together with Jacobi's tolerance of racism, we also find his tolerance for hypocrisy and sloppy research. He clamors: "I must demand to see these "scientific studies" that support acupuncture as a valid form of treatment". Well, my dear Jacobi, you need go no further than the article you referenced in your own text, which states that 75% of the acupuncture studies from the comfortingly white UK (since evidently you won't trust the titular studies from Asian countries) show that it is an effective treatment. Oops!

Nonetheless, I will readily admit that I had an inaccurate view of how widespread the studies were that give credence to acupuncture, and Jacobi's article forced me to investigate further. Jacobi, it turns out, represents the majority position (in white-dominant countries), but not, however, the scientific consensus. The UK's National Health Service recommends acupuncture for a few conditions like chronic headaches, malaises that standard

Never mind that media used these studies in nationalist, racist, and dishonest ways, and the researchers would have to have been idiots not to predict that result; never mind that their construction of honesty was embarrassingly simplistic and moralistic, hence, subjective; never mind that the amount of money given out was worth a lot more in the countries that were reported as "dishonest" and that most of the people in the wealthier, "honest" countries didn't have a need a couple bucks. These studies responded to a need that was not empirical, but political and racial.

Some more mundane examples of scientific mythology concern inaccurate concepts that Western scientists uncritically inherited from ancient Greek philosophy. To wit, elements and atoms don't actually exist. More specifically, the substances we call "elements" have turned out not to be so elementary, and "atoms," the fundamental blocks of matter theorized by the Greeks, fundamental in the sense that they could not be cut or divided, which is the very meaning of the word "atom," likewise do not exist. They weren't discovered, they were sought out, projected onto the available evidence.

Nonetheless, we are left with the pernicious myth that the Greek grandfathers of Western civilization, the putative ancestors and originators of our most cherished institutions and beliefs, were soooooooooooooooooooo smart. A belief in their smartness, an identification with them in the construction of this subtle "we" that shows up so much in Western discourse, is a key plank of white supremacy shared by both the Left and the Right. I have one example that I found, ironically enough, in a sophomoric article mocking hippies for making poetic, philosophical and not terribly rigorous use of the discoveries of quantum physics [http://www.nytimes.com/2006/03/14/science/far-out-man-but-is-it-quantum-physics.html]. After explaining to readers that quantum physics doesn't mean that your thoughts can alter reality, the author concludes: "In other words, reality is out of our control. It's all atoms and the void, as Democritus said so long ago".

make the necessary modifications when the dominant paradigm is already in tatters.

Then there was the amaaaaaazing study about honesty from the University of East Anglia, which compared the responses of subjects from different countries to a situation in which they flipped coin a number of times, and got a small money reward if it came up heads; the trick was that researchers didn't see the coin and relied on the test subject to report the result of the toss. In other words, they could lie and get more money, and researchers could tell who was lying more frequently based on statistical probability. The conclusion of the study, and one of the most frequently used headlines, was: "The British are the most honest," as opposed to "The British are the least clever," "The British are the most blindly obedient to arbitrary authority," or "The British are the least likely to take advantage of resources that could be used to enrich their communities." Incidentally, the study was carried out in… you guessed it! Great Britain! As far as honesty goes, well, the study didn't actually put Britain at the top of the list, it only came first in one of the two tests. And people from only fifteen countries were tested. A similar study that compared "honesty" rates to corruption indexes only tested people from 23 countries, but that didn't stop the Telegraph from reporting, "Britain has most honest citizens in the world." Speaking of honesty, though, that second study actually gave the top spot not to the UK, but to Lithuania. The paper reported that "British students were found to be the most honest, along with those from Sweden, Germany, Lithuania and Italy. At the other end of the scale were those from Tanzania, Morocco, China and Vietnam." This racially tinged list is made more so by the fact that European country Poland was left off the worst five as reported in the study. [https://www.uea.ac.uk/about/-/study-finds-honesty-varies-significantly-between-countries] [https://www.telegraph.co.uk/news/science/science-news/12189003/Britain-has-most-honest-citizens-in-the-world…-because-politicians-are-less-corrupt.html]

Western medicine has a poor track record in treating, beyond the effectiveness of, ahem, aspirin. (Recent studies suggest that the rationalist geometry of cityscapes actually increases oxygen levels in our brains and can lead to headaches).

The most thorough review of scientific studies that I could find concludes that the evidence is mixed regarding the effectiveness of acupuncture [https://nccih.nih.gov/health/acupuncture/introduction#hed3]. The evidence is that it is effective for short-term relief of lower back pain when combined with other therapies; it is effective for treating osteoarthritis but there is contradictory data as to whether it is more effective than simulated acupuncture; it is effective for treating migraines and tension-based headaches.

The primary conclusion of the review is that it is difficult to evaluate acupuncture using double-blind studies and other rigorously empirical methods. This is a significant point I will return to later.

For now, I want to focus on the fact that Jacobi and many other proponents of Western science—the strong majority, according to my unscientific internet survey—overstate their case, misrepresent the scientific record, and cover up the positive evidence for the weak or mild therapeutic effectiveness of acupuncture. Jacobi, the articles he cites, and many other articles in peer-reviewed journals or on ideological, pro-Science websites, are totally dismissive of acupuncture, even though the bulk of studies demonstrate that it has at least some effectiveness.

It is no coincidence that acupuncture—a non-Western technique—receives such vicious treatment from the proponents of Science, whereas far more doubtful techniques, like chemotherapy or early AIDS medication, are treated as imperfect but legitimate. Jacobi is polite, as are his references: they only express the positive side of the racist double standard. Other examples are less circumspect. According to the website, *sciencebasedmedicine.org*, "Acupuncture is a pre-scientific assumption."

> Proponents often cite acupuncture's ancient heritage as a virtue, but it is more of a vice. Acupuncture was developed in a pre-scientific culture, before anything significant was understood about biology, the normal functioning of the human body or disease pathology. The healing practices of the time were part of what is called philosophy-based medicine, to be distinguished from modern science-based medicine. Philosophy-based systems began with a set of ideas about health and illness and based their treatments on those ideas. The underlying assumptions and the practices derived from them were never subjected to controlled observation or anything that can reasonably be called a scientific process."

There's a whole lot wrong with this paragraph, steeped as it is in the coded assumption that a culture is ignorant until it is colonized by the West. It also demonstrates a total ignorance of the history and the current cultural limitations of Western medicine. Western medicine operates within surgery- and drug-based constraints because it evolved directly from a surgery- and drug-based practice that at the time, 500-1000 years ago, was one of the worst healthcare practices in the entire world, rightly ridiculed by Arabic contemporaries, for example. But the idea that ancient heritage is a vice does not hold up across cultures. On the whole, ancient cultures embody a great deal of accumulated experience and observation. Chinese, Ayurvedic, and traditional European medicine, for example, were founded by generations of observation and experimentation, and the writers for *sciencebasedmedicine.org* are speaking from a racially tinged ignorance when they claim otherwise. No, it wasn't "controlled" experimentation, but controlled experimentation is also a flawed system that frequently produces faulty data and willfully ignores the connection between a person's health and their environment.

still a monopoly on who can grant legitimacy to knowledge systems. And the ones handing out validations are the same ones responsible for dispossessing successive generations from their lands and their traditional practices, for helping to wipe out millions of acres of healthy forests, and for causing the extinction of countless species. Who atones for all that? What kind of structural changes will we see in response? None.

If the scientists and institutions involved were sincerely owning up to their errors, they would resign their positions, throw themselves at the feet of the Karuk, and seek to learn from a demonstrably superior knowledge system. They would also do everything in their power to get indigenous peoples their land back so they could re-institute their traditional practices. Of course we didn't see any of that. All we see are condescending displays of recognition coming from those who have no legitimacy beyond naked force. And progressives like Jacobi will sometimes go so far as to condescend that in his view, "primitive" peoples were truly scientific, else who could they have discovered so many useful things? But the demonstrably superior knowledge systems of the Karuk and many other indigenous peoples are not at all "scientific," nor do they need that label to attain legitimacy. They tend to be experiential, spiritual, communal, and ecocentric, not institutional, empiricist, objectivist, anthropocentric, and capitalist.

Another example: scientists are skewed towards monogamy [https://www.independent.co.uk/life-style/love-sex/monogamy-flawed-concept-science-sex-one-person-relationships-university-michigan-a7645271.html]. Researchers who study relationships and family structures tend to favor monogamous structures in a way that affects their research results, even as they naturalize certain relationship forms. Again, we see scientists represent more conservative interests in society that back up dominant forms. Time and time again, it has been social struggles that have advanced knowledge, especially where gender, race, and the environment are concerned. Scientists typically come in later to

falsehood are not the same thing. What's most dangerous in the long run is not the falsehood, but the mythology, because Science's baseline mythology is patriarchal, colonialist, white supremacist, elitist, authoritarian, anthropocentric, and ecocidal. It's unhealthy. It's damaging. If something can be proven false, in the long run, scientists will reject it. It might take them a hundred years, they might be the last ones to clue in, but eventually, they will discard a demonstrably falsifiable belief, all the while congratulating themselves on how intelligent they are and never giving credit to the people who figured it out long before them. But the way that they promote false beliefs and the way they correct such beliefs still reinforce their base mythology.

Here's an example: when settlers arrived in the western part of North America, supported and encouraged not only by the government but also by the geographic societies of the day, they slaughtered, enslaved, or evicted the original inhabitants. As soon as the stolen territories were fully integrated into the United States, there came to be large holdings of public lands and with them, the scientific management of those lands. A part of that, from the beginning, was fire suppression. This wasn't "pop science" or "pseudo-science," on the contrary it reflected the efforts and the consensus of the finest scientists of the day. It took these overwhelmingly white scientists working at the behest of colonialism more than a hundred years to figure out that they were totally full of shit, that the observant, respectful, spiritual, non-scientific native inhabitants had worked out a much better system of forestry. Finally, in the second decade of the 21st century, when climate change is causing forest fires to reach new magnitudes, the Forest Service and related scientific and public agencies have started allowing native peoples like the Karuk to play a small role in shaping forestry practices. Today's scientists pat themselves on the back for recognizing that the Karuk had it right, but the dominant power relations do not change in any way. Karuk and other indigenous methods are only validated once scientific studies grant them legitimacy. There is

In medieval Europe, there was also a very thuggish practice of medicine based on the humors, bleeding, and liberal use of the scalpel. This was the practice of medicine that evolved into the supposedly superior Western medicine of today. The "modern" preference for a negative, symptomatic view of health and the emphasis on surgery and drugs is a cultural-historical artifact from those thuggish times. Science-based medicine, in the West, *is* philosophy-based medicine. The pretensions to superiority evinced by proponents of Western medicine would be hilarious if they didn't have so much power. It's worth noting that its original proponents and the institutions they created were directly responsible for the bloody repression of folk medicine through witch hunts, criminalization, demonization, and later the urbane ridicule of the scientists of the Enlightenment. We have little remaining evidence as to the healing practices of the lower and rural classes of European society, but we know that first it was the Church and then the scientists who identified these primarily women healers as a threat. There is also a good bit of evidence to suggest that they had effective practices for abortion and contraception. And one of the most successful drugs that Western medicine falsely claims credit for—aspirin—is a testament to their wisdom. Aspirin is the industrial version of willow bark, a common remedy among the medieval healers who were repressed by the surgeons, the priests, and the scientists. It is not a coincidence that aspirin works; rather, it is evidence of the accumulated experience and observation passed on by the downtrodden.

Neither is it a coincidence that pharmaceutical companies are stealing, patenting, and industrializing the herbal remedies of indigenous societies across the world, nor that the society those companies come from continues to propagate the idea that "pre-scientific" societies are ignorant about the world they live in. All of these facts are functions of the racist colonialism that Science is an integral part of.

Much has been written about the use of science to support racism, genocide, colonialism, and other atrocities. Today's

scientists might refer to the most embarrassing episodes (like racial skull measurements) as "pseudo-science," but this is pure revisionism. The culprits were recognized scientists in their day, and besides, scientific racism went well beyond phrenology and Social Darwinism to include nearly every surveyor, geographer, anthropologist, and doctor for decades if not centuries.

An acquaintance of mine who is a progressive biologist has been ranting about the "unfair" treatment being given to yet another biologist who has been protested and no-platformed while making the rounds claiming a genetic basis for the supposed intellectual superiority of white people. It's not a 19th century idea: there is still a great deal of money going to support scientists making the same tired arguments, ideologically pre-determined. The acquaintance, who voted for Obama and is certain he isn't racist, claims the man should be given a fair hearing since he went and carried out a study. Just out of curiosity, where are all the scientists getting invited to universities and receiving lucrative book deals who claim that black people are superior?

Most relevant to this article is the question: to what extent has this racism continued or been atoned for? Roxanne Dunbar-Ortiz provides a clue [*An Indigenous Peoples' History of the United States*]. Scientific archives, museums, laboratories, and universities across North America are filled with corpses and artifacts stolen from Native burial grounds. The conquerors' scientists systematically refuse to give them back. This is one strong example of continuing complicity with genocide.

Are there others? Insofar as colonialism continues today, as neocolonialism, through the exploitation of occupied territories and contamination of the land, air, and water primarily of people of color, maybe the problem is that scientific complicity with thinly veiled racism and colonialism is so common as to be ubiquitous. There isn't a single mine, oil well, or commercial timber plantation in the world that doesn't have scientists working on it in some capacity, either on site or away in some laboratory making calcu-

as possessors of wisdom that humans could gain through respectful observation. The scientists who promoted the contrary view were also promoting the view that all living things were machines to be modified and exploited as needed, and they were also basing their new empirical model on cruel, unfeeling practices of vivisection, torturous and generally fatal experimentation on live animals (often including humans from the lower classes and from other races).

True to patriarchal form, scientists were also the ones to make the claim that female orgasms didn't exist, that women weren't intelligent, that women who sought clitorial stimulation rather than penetration were pathological, and so forth. In the 16th century, two Italian scientists, Renaldo Columbus and Fallopius, fought over which of them had discovered the clitoris, as detailed in Elizabeth Hall's, *I Have Devoted My Life to the Clitoris*.

It was scientists who claimed and continue to claim, despite ever more evidence to the contrary, that IQ is inherited, and thus any social inequalities are justified. These and similar claims of biological determinism are often related to the assertion, explicit in the 19th and 20th centuries, nowadays increasingly implicit, that people of color are inferior.

These are not just chance byproducts of imperfect paradigms. There is no coincidence in who is targeted by these "unscientific" fallacies that were promoted by the scientific establishment itself. They always went against those who have been oppressed by the very social hierarchies that scientists serve. And in every case, they were blatantly absurd beliefs, far more ridiculous than the idea that after we die our invisible spirits go to live in the sky with some dude with a beard, because that assertion at least is non-falsifiable. Scientists were believing, and trying to force everyone else to believe, things that any observant twelve-year-old could see were false. Time and again throughout history, scientists have been at the vanguard of the mouth-breathers.

In the examples I've given, scientific mythology and falsehood coincided, though as I've pointed out before, mythology and

In fact, scientific philosophy is a direct descendant of Christianity. Early scientists inherited their penchant for encylopaedism that was so vital to their work of the 17th-19th centuries, and still present as a bedrock structure today, directly from the Christian monks, whose dogma also had them believe that knowledge was bounded, finite.

The French Revolution gave rise to the most definitive break between Church and Science, a contrast to the model of respectable continuity practiced in the UK. But even in their exuberance the French rationalists betrayed an attachment to the exact same forms and apparatuses as the Church. In fact, they systematically seized churches and rebaptized them "Churches of Rationality" or "Churches of Science," while they spoke of empiricism as the new religion.

Covering up this connection is something like an institutional origin story. And the thing is, it shouldn't be that embarrassing. All ideas have histories. All knowledge systems are culturally inflected. It is only embarrassing to Science because of its absolutist and religious pretensions, and above all its projection of a monopoly on all knowledge.

Falsehood and Myth

When I was growing up, we were still taught in school that animals didn't have feelings, they weren't intelligent, they were just unthinking machines of instinct. At the time, there were already decades of scientific studies disputing this view, but as usual, anything that challenges the myth of human superiority takes a much longer time to filter down to the masses. This erroneous idea about non-human animals was created in the first place by scientists out of whole cloth. Non-human animals in pre-Enlightenment Europe and even moreso in stateless societies across the globe had personhood. They were often respected, seen as thinking and feeling, even

lations, directing explorations, improving techniques, engineering more profitable tree species. And then there's the biologists who expropriate indigenous medicinal plants for the benefit of the pharmaceutical companies, and the anthropologists who aid military occupations in Afghanistan and Iraq or state-building missions in Somalia. All of these millions of scientists have decided that they prefer getting paid to engaging in a critical examination of their lives and the effects of their actions. Yet to Jacobi, somehow, all of this is incidental to the pure nature of Science, not even worthy of a response.

Leave the critiquing to the experts

I would argue that anyone with a brain and a heart would not trust in an internal affairs bureau to effectively rein in the murderous power of the police, much less to do what really needs to be done: abolish them. It is no surprise, however, that just as institutions always seek to appropriate the power that regulates and disciplines them, institutional complexes and society-wide religions do not recognize the critiques of external authorities.

It is therefore no surprise that Jacobi asks us to leave the problems of science to scientists themselves, even though—as I argued at length in the original essay—those problems are primarily suffered by everyone else: lower class people, women, trans people, people of color, people in countries victimized by the weapons industry, the targets of policing technologies, anyone who eats industrial food or has to be subjected to medical procedures to fix a health problem, all non-human species, the entire planet… But no, let's trust the people who get paid to make all the technologies that are fucking us over, the doctors who drug us, the sociologists who study us.

To wit:

> Gorrion might be surprised to learn that a good deal of scientists and philosophers of science strongly agree with many of his critiques of scientific thought. In fact, all the limitations he writes about have been pointed out with much more convincing argumentation by widely recognized philosophers of science.

I suppose Jacobi can be forgiven for not recognizing any of Thomas Kuhn's ideas behind my own—he was an influence, but I never cited him directly. However, I don't think he missed my explicit reference to Stephen Jay Gould (Jacobi also cites Gould), nor my references to self-regulating processes of critique within scientific communities themselves. In other words, Jacobi is aware that I already know about such critiques made by scientists and philosophers of science, but he just sees another cheap opportunity to be paternalistic, and he takes it.

Then he does something curious, though equally reminiscent of a fratboy intellect. He spends 750 words attempting to show off, quoting David Hume, Thomas Kuhn, and Karl Popper, evidently thinking he's just gone over the heads of his audience, or at least bored them long enough to carry out a skeezy, back-alley word fight bait-and-switch.

Jacobi's brief history demonstrates that, lo and behold, scientists themselves debate about the nature of knowledge. At no point did I claim the contrary; I explicitly mentioned these debates, though I did not give them what would have been their due space if my goal had been to write an article about the history of conflicts in scientific epistemology (another characteristic of institutional self-defense: the institutional players always have to be the protagonists. *Just put yourself in the shoes of that poor cop for a moment, and think of how scared he felt before he pulled the trigger!*).

His summarization of Hume makes me think that Jacobi simply didn't understand the sorts of discursive shaping that I am talking about. His poor use of language suggests that he is either a habitual

Many rationalists today do not know that dozens of the greatest scientific minds and philosophers of the Enlightenment tried to create objective languages that would not change in translation, that would have the exact same meaning to people from any country and any time period, and that could describe and categorize anything in the world in precise, indisputable, and unchanging terms. Every single attempt was a total failure, most of them humorously so, as documented by Arika Okrent in *In the Land of Invented Languages.*

An objective language is impossible. Meaning is necessarily subjective, a relationship that people collectively have with a concept only in reference to a historical and fluctuating pool of experiences and other concepts that never manifests as a precise consensus because every node in the network, every individual, has a different perspective of the whole and a different kind of access to a different mix of the resources in the common pool. One of the implications of this reality is that definitions are always posterior and extraneous to concepts, never more than a convenient fiction.

On a simpler level, objective language is impossible because such a large part of language is naming and categorization, which too is subjective.

Categorization is also an indispensable part of the sciences. Sincerity would have us recognize that the bulk of Science is a cultural exercise. And the word "cultural" stems from a synonym for "knowledge," because human groups are different precisely according to the different knowledges they pass down and enact. But the priests of empiricism are capable of recognizing only one kind of knowledge. And they are so insulated from their origins in massive technocratic structures that they regularly dismiss philosophy, having forgotten that the men who created the disciplines they follow were philosophers every one. Today, they are still fine-tuning this philosophy, they merely pretend it is the only valid knowledge form in existence.

tifically minded that *tomatoes are a fruit*. Tomatoes are not a goddamn fruit. The implication that they are fruits and not vegetables stems from an arrogant and preposterous attempt by biologists to appropriate the word "fruit" many centuries after this word came into the common parlance. They made an inaccurate definition, and rather than correcting themselves, they tried turning something everybody knew was a vegetable into a fruit. Hey jerkoffs: what's the scientific definition of vegetable? Oh wait, there is none. Because the whole world doesn't belong to you. "Fruit" and "vegetable" are culinary terms, you assholes, not botanical terms. When you say "fruit", you're misusing the word. You actually mean the ovary of angiosperm plants. Get it fucking straight.

In the interest of fairness, we the laity can give back to the scientists a term we have been misusing: *the learning curve*. For the record, now that I have everyone's attention, a "steep learning curve" means something is very easy to learn, or that it evinces a threshold of effort or time spent learning, before which it is difficult to learn and after which it is easy to learn, as in, until you study the subject for twenty hours you don't really get it, but after that you advance quickly. (Hint: the curve is plotted on a graph. The X access is achievement, the Y axis is time or effort.) Something that is difficult to learn would have a low learning curve. Get it right. To be fair, though, a true linguophile would never use a metaphor that made reference to something they didn't understand, nor would they use a complex term as a simple synonym for "difficult" just to make themselves seem more intelligent.

But let's get back on topic, shall we? Languages have a far greater expressive capacity than mathematics due exactly to the linguistic conventions that make them incapable of pinning down an objective network of meaning. Rightly so are they incapable, because "objective meaning" is an oxymoron. Meaning can never be objective.

manipulator or he simply has a stunted verbal intelligence masked by a large vocabulary.

So let's try to explain this one again: All worldviews are cultural artifacts related to the reproduction of power in society, either antagonistic to it, supportive of it, or some combination of the two. Given their relationship with the exercise of power, worldviews also constitute worldshapers, though in the original article I reserved that term for Science, since the scientific worldview directs the exercise of power in our world far more than any antagonistic worldview.

What does Hume have to say? Actually, nothing of relevance to the critiques I was making. Causing a big splash on the debates of the powerful white men of his day, Hume argued that knowledge must be based on sense-experience (dealing Plato a blow), but that sense-experience can be flawed. Hume isn't talking about the organization and deployment of knowledge. He's still dealing with knowledge at the level of whether it's true or false, and where it comes from. As such, Hume doesn't even come close. Of course, it's not up to Hume to respond to something that I wrote 250 years after he died. The fact that Jacobi wheels him out of the morgue, however, shows that he either doesn't understand or he's choosing not to.

Jacobi's references to Thomas Kuhn, on the contrary, are relevant to the present debate, though he presents Kuhn's observations in a way reminiscent of PR damage control. To recap, Kuhn revealed that scientific knowledge exists as a consensus within a paradigm, that the consensus remains stable over time, even as specific elements of the paradigm are disputed or disproved, and then in "revolutionary" moments the entire paradigm shifts and new interrelated theories are accepted. It's hard to give a more tame summary of a dynamic that has some pretty extreme implications. Nonetheless, Jacobi softens the blow even more by citing Imre Lakatos' work on "research programs", translating the prob-

lem into a more technical matter and justifying the pragmatism of holding on to a flawed theory until a better theory comes along.

(In justifying the conservatism of research programs and the way they allow ideologies to signal areas for further study, thus conditioning results, Jacobi claims that "infrastructural determinism" is the best predictor of many cultural shifts, such as the change from hunter-gatherer to agricultural societies; what's more, "one is justified in looking at a society and assuming, before getting any empirical evidence, that the infrastructure is the primary reason the society is the way it is." That's embarrassing for him because actually, such determinism is on the ropes. Lots of new research shows that the switch between agriculture and gathering is a political choice, that infrastructure generally relates to social choices; and there are even many cases in which a society has drastically changed its infrastructure without changing its superstructure. The deterministic framework oversimplifies, ignoring how porous the boundary is. It is favored because it is mechanistic and adheres to rationalist belief structures. But then, when you're ideologically motivated to go out and look for evidence, you'll probably be able to find evidence, no matter how accurate your theory is.)

In fact, Kuhn's revelations are a little more disturbing than that, and Kuhn, ever polite, doesn't hit hard against any of his colleagues and he doesn't talk about the many ways in which people's lives can be ruined by this little matter of paradigms. What Kuhn actually reveals is that scientific communities will systematically suppress contrary evidence, functioning in a conservative, dogmatic way, until reaching a tipping point at which time the entire paradigm must be discarded and a new conservative order must be developed. This is not a pragmatic necessity, nor is it the reflection of a culture that truly believes in questioning everything and fostering open debates. It is (though Kuhn does not go this far) the reflection of a religion of power that will run roughshod over dissenting scientists and people caught up on the wrong side theory, whether that's queer or trans people who are pathologized

ference, an ideological imposition. All biologists discovered was a biochemical mechanism in the interior of every living cell, without fully understanding the relation between that mechanism, biological traits, and lived experiences. What they did was rush ahead to conclusions that their ideology dictated; otherwise, we never would have heard the word "programming". How long did this ideology delay the recent discovery that lived experiences can actually change which genes get activated and passed on?

The history of ideas

Mathematical equations may be beyond cultural framing, but nothing else about science is. The meaning assigned to those equations, their applications in society, the technology they require, the technology they enable, what had to be sacrificed so that the technology mathematical advances rest on could be developed, what questions were asked, what questions weren't asked, and so on. Western science responds to a certain history and cultural heritage that informs everything it does.

Mathematical equations by themselves are next to meaningless. They have not operational value until they are converted into code that can act on machines, and all machines are culturally and socially inscribed. Any other use of mathematics requires its interface with language, which is the polar opposite of math. Language is by necessity subjective, ambiguous, contradictory, and constantly changing.

Many mathematicians say that math is also a language. This is only because they have never studied languages and have no idea what they're actually saying. Physicists and mathematicians have as much right to define language as linguists have to define wave functions or imaginary numbers.

And while we're on the topic of definitional overreach, I need to go on a random but important tangent: the contention by the scien-

Why is this important, and not just nit-picking? For one, it shows how low the bar is, and how scientists are complicit. Would they complain if a media outlet reported that a new study potentially validated vaccine skepticism? You bet your ass they would. But they don't complain when the misrepresentations reinforce dominant power relations and fundamental worldviews. The article provides yet another example of the ubiquitous ways in which scientists and the institutions necessary for spreading scientific information build a rationalist mythology. In this case, we have the mechanistic idea that genes function as on and off switches that determine human behaviors. The study itself contradicts this view, as does most research into genes. What we actually get is evidence that genes are one of multiple factors that influence human behavior. Yet when scientists communicate to the media they frequently use the bodies-as-machines metaphor and present it as objective fact.

The machine metaphor has implications across the social terrain, relating again and again to the war waged by capitalism and patriarchy against bodies, with the systematic support of scientific institutions. The deterministic (and false) vision of addiction has played a historically important role in colonialism. Alcohol, opium, and other drugs were and in some cases continue to be key weapons used by colonizers against colonized peoples. Neo-colonial states then blame addiction on their victims. Native Americans, for example, suffer alcoholism in disproportionate numbers not because of social factors, scientists argue, but because they have inferior genes. Admitting that all the evidence suggests that addiction is not deterministically caused by genes, but by a host of factors, many of them social, robs (neo)colonialism of one of its key weapons. It's hard to argue that scientists are not complicit in this process, given that the discourse at play is scientific in its entirety. But the apologists of Western science have no shame in claiming objectivity and neutrality with respect to systems of domination.

A century of education that genes constitute programming is no coincidence, nor was it ever a discovery. It was a religious in-

and medicated, institutionalized, or lobotomized, or Africans who are scientifically determined to be inferior.

A recent example that demonstrates what happens even to privileged, accredited scientists when they contradict the dominant paradigm: a number of archaeologists and paleontologists in San Diego investigated a site of mastodon bones that suggested that tool-using hominids may have been in North America 130,000 years ago, which would upend the dominant Clovis and Beringian hypotheses regarding hominid expansion into the Americas. They told how many scientists refused to work on theirs or similar sites because it would be "professional suicide," how they were advised by colleagues to "Keep it under wraps. No one will believe you." Two decades went by and their findings weren't published. Finally, when a new team of scientists did publish, they were viciously attacked by much of the rest of the scientific community. "It was like getting lined up and shot with machine guns," is how one archaeologist involved with the study described the reactions of his peers.

The reactions of the scientific community to van der Lummel's paradigm-threatening research on the experience of consciousness after medical death was even more insulting. I'll get into that area later on.

Examples like these show that Jacobi has given us a misleadingly watered-down summary of the dynamics Kuhn was talking about. But Kuhn's concept of the paradigm shift is only one small part of what I am talking about. To be as concise as possible, the main problem is twofold: the inextricable relationship between knowledge and power; and the continuity of certain practices of power and forms of knowledge within Western civilization, reproduced and intensified by the scientific institutional complex, that is currently destroying the world.

None of the scientists or philosophers of science that Jacobi trots out speak to this problem. I don't believe, as he suggests, that I am saying anything new. I could have cited a great many people, but in

the end it's a question of form: some of us believe that ideas don't have owners and that everyone should feel comfortable expressing themselves in their own words. (There is an intrinsic elitism of the citation artifact in scientific discourse, though without a doubt it is highly practical for research and investigation.)

Jacobi has proved that he is good at citing famous people. So why, then, does he cite people who aren't making the arguments I'm making? Why does he not cite anyone who talks about the violence, the destruction, the oppression that scientists and their institutions are complicit in?

This is where we get to the bait-and-switch. Jacobi, after proving how smart he is and how ignorant I am, delivers what he supposes is a *coup de grace*.

"[E]ven though each of the above-mentioned issues present profound problems to scientific reasoning, *every one of the thinkers who articulated the problems continued to espouse the scientific worldview*."

In other words, he deliberately misdirects the reader, assuring us that the problem is well under control because scientists are already policing themselves, by quoting a number of people who are not making the criticisms I am making, nor talking about the problems I am talking about. Why, then, quote these paragons of self-critique? Because they serve as a parable of reconciliation: they revealed problems but they never abandoned the Church, they never lost their faith. He assures the readers, falsely, that they made the same criticisms I do, but they had much better arguments, clearly they were more intelligent, and the ultimate symbol of their intelligence is their loyalty to the scientific worldview.

Jacobi has not yet addressed a single criticism of that worldview, only underlined tensions that exist within it. And he has shown that he is willing to use various forms of marginalization, insult, and misrepresentation in order to protect that worldview.

It turns out, the study says nothing of the sort. Rather, it links a gene originally introduced by a retrovirus to 34% of drug-users in Glasgow and 14% of drug-users in Greece (in both cases 2 or 3 times higher than the presence of that gene in the general population). In other words, the study suggests that a particular gene may be related to addiction in a small minority of cases. Contrary to how the media present the study, it does not offer any evidence that suggests that this gene is the original cause of addiction, nor that it is related to the overwhelming majority of addictions. It also does not tell us about people who have the gene but never develop any kind of addiction.

One thing that the study does suggest, that the media do not pick up on, is that social factors may play a huge role in encouraging addiction. After all, there is quite a large difference between the 34% rate in Glasgow and the 14% rate in Greece, as there is a great difference in wealth and access to social services between Scotland and Greece (the greater the poverty, the less this one gene explains cases of addiction). Of course, this study was not designed to study social causes of addiction, and as such it is incapable of providing concrete evidence of such causes, but the huge discrepancies in results at the very least suggest social causes as another factor. The fact that the media entirely ignore this line of inquiry gives us an idea of how likely scientists are to get funding to explore such possibilities, rather than looking for exclusively genetic explanations of drug use.

Even though CNN has shown a penchant for fact-checking since Trump got into office, and the article shows a Trumpian level of inaccuracy, their science editor was neither fired nor reprimanded for grossly misrepresenting the study. In fact, the article is par for the course as far as science reporting goes. Nor, as far as I can tell, did the researchers complain to CNN about their sloppy and misleading reporting. On the contrary, I would wager they were happy their article got picked up. Such things build careers.

so long as they do not support conspiracy theories that violate the scientific consensus.

*There is a great deal of funding for pop science. On an individual and an institutional level, scientists are complicit in accepting this funding and the consequences it has for knowledge production. Scientific studies on diet might take the cake. There is a great consumer demand, produced and facilitated by the media, for diet science. The vast majority of diet studies use small samples or have other design flaws that make them useless or severely limited for the production of empirical knowledge. Nonetheless, straight-to-market studies about what people should or should not eat constitute a major industry and a cash cow for individual scientists and scientific institutions. It's curious. Such institutions take part in punishing doctors who prescribe salt water as a cancer treatment, but they look the other way when it comes to the constant, large-scale production of "bad science" that also can have negative effects on people's health (including claims about whether coffee, red wine, avocados, and so forth increase or decrease cancer risks). The common factor that accompanies punitive action by the scientific community is not the accuracy of the empirical knowledge being spread or how much harm it might cause, but pure, mercenary economic interests. Diet science is a big business, and so are the officially validated cancer treatments.

Let's look at one example in which pop science and scientific smoothing coincide with the systemic complicity of scientists themselves. This is just a random article I came across the other day; one could find similar examples every week. Near the top of their page, a CNN headline ran: "Addiction could stem from ancient retrovirus, study suggests" The first sentence: "An ancient retrovirus that predates modern humans may explain why people suffer from addiction, scientists have said." [https://edition.cnn.com/2018/09/25/health/retrovirus-addiction-study-intl/index.html]

Scientific Smoothing

True to form, Jacobi misrepresents my criticism of how Newtonian physics are used to prop up a rationalist worldview. I never say that Newtonian physics is pop science; in fact, I say that it is dishonest of scientists to chalk systematic simplifications up to pop science. Nonetheless, Jacobi has no qualms twisting my words.

To clarify, we should distinguish between scientific smoothing and pop science. Both of these phenomena are structurally integral parts of Science, but they function differently. As I stated in the original article, scientists often respond to criticisms of mythical (worldview-promoting) usages of science that whatever is not a sound theory or a quantifiable, technical assertion can be blamed on "pop science" propagated either by journalists and authors or by scientists reaching beyond their field of expertise. However, the problem goes well beyond pop science. We can call the process "scientific smoothing".

Smoothing is a feature of any knowledge system too complex for any one person to know or communicate (i.e. any human culture), but scientific smoothing happens in a specific way, which Jacobi avoids. Because the body of scientific knowledge is way too vast for any one scientist to be familiar with even a tenth of one percent of it, the institutional complex as a whole relies on simplified digests (sometimes these summaries are produced by specialists, sometimes by non-specialists such as journalists and educators) to communicate scientific knowledge to laypersons and also to scientists who are specialists in other fields. This is a structural part of the body of scientific knowledge and of the technocratic organization of scientific communities. It is neither an error nor a marginal occurrence. For this reason, critiquing the worldviews that are propagated by smoothing is not a case of critiquing "various stereotypes about science" as Jacobi claims.

Demanding that we exclude considerations of scientific smoothing when we evaluate the transmission of scientific knowledge,

that we only pay attention to specialists publishing in peer-reviewed journals, is unrealistic, because smoothing is a structural part of the transmission of scientific knowledge. There is no communication across scientific institutions, nor communication between scientific and governmental or corporate institutions, without scientific smoothing. Pop science is the profit-motivated production of watered-down or lazily researched scientific claims for a consumer audience. It is instrumental for winning funding, building careers, and cementing the influence of scientific institutions, but it is not as integral to communication between institutions as smoothing.

Ironically, one of the articles he cites as evidence complains about how scientists who specialize in one branch can spread completely baseless ideas in areas they do not study. "Just because you're a world expert in one branch of science doesn't qualify you in any other discipline [...] this is a particularly bad habit among physicists." The problem is, they are only called on it if the ideas they are spreading go against central dogmas.

The myths or falsehoods (please note that I am not using these terms as synonyms) that are contained in every paradigm does not mean that every idea is equally valid or equally unverifiable (Jacobi has already tried strawmanning me as a relativist, without any textual evidence). But the way the scientific paradigm works does mean that the uncorroborated myths that support central dogmas, most of which are inherited from Christianity and neo-Platonism, will not be challenged, or at least not marginalized and ridiculed. On the other hand, ideas that break with those dogmas (and at least some of these will be the very ideas needed to radically alter the paradigm or found a new one, in other words, the truths of the future) will be ridiculed and their authors will be marginalized and dismissed as crackpots. What's more, given the continuity of power institutions, and given the specifics of the scientific smoothing process, the myths that carry over from one paradigm to the next change much less than the technical explanations and theories that are considered valid. In other words, the "broad picture" provided by smoothing contains a great deal of Cartesian and neo-Platonic myth, even though the technical experts in any given field do not uphold the specific manifestations of those myths in their area of expertise.

Somehow, Jacobi doesn't find a problem with this.

And as far as outright pop science is concerned, there are a few features that are worth underscoring.

*Pop science tends to be especially overt and proactive in inculcating Western mythology (for example, the common myth that evolution is a process that went from single-celled organisms to multi-cellular organisms to vertebrates to mammals to primates to humans: this is a mythical reframing of evolution that is repeated again and again, useful, even though it is factually incorrect, because it is progressive and anthropocentric).

*Scientists' knowledge outside their own field of specialization tends to also be rooted in pop science. This is a problem, given that scientists' opinions have more legitimacy, even when those opinions are not the product of an empirical study, due to the ideological role that science plays within the power hierarchies of our society. Scientists talking in their social circles, through social media, on television, or with journalists, are the principal legitimizers of pop science. Rarely in their interactions with society do they restrict their commentary to the results of their studies. On the contrary, like anyone else with privilege, they use positions of power to push their own interests and worldview. A dramatic example of this would be how scientists who are not specialists in virology or immunology have been instrumental in supporting HIV/AIDS denialism. Jacobi would point out that their conduct is unscientific. There is, however, a wealth of more mundane examples of scientists carrying out the same kind of manipulations to shape our understanding of what is natural in areas as diverse as family structure, sexuality, economics, politics, and so forth. Though they are advancing non-empirical positions, they are not called to task