2 Agnotology in Action: A Dialogue

Peter Galison and Robert Proctor

1. Ignorance as a Topic of Investigation

Peter Galison: Robert, you and I have been talking about agnotology—the structure of impressed ignorance—for a long time now, or certainly since the time we were graduate students. Over the years, you have been focused quite rightly on the vast industrial apparatus that produces nonknowledge, especially in the spheres of the environment and health. I've been engaged with government secrecy—the excision of knowledge imposed on society, especially in matters of national security. Both of us see the intersection of politics and knowledge, or should I say nonknowledge, as an essential area of inquiry. Let's begin with your side: Could you say a little bit about how you got interested in what we don't know?

Robert Proctor: I remember going to Harvard as a graduate student and being surprised at the apathy of my professors toward what ordinary people know. I had come from the Midwest and Texas, where many of my relatives had been creationists and racists, and I was interested in knowing how this came to be. How could people be so ignorant? So I was asking all my Harvard professors whether they believed in God and questions like that—and they seemed to feel this was rather strange. So I started wondering, Why this scholarly disinterest? Why were scholars so uninterested in what ordinary people know? I realized there was a kind of a vanguardism among historians of science: you study the "best" knowledge not the worst, what is known and how that came to be, what "we" know and not "they." And you ignore what is unknown. So there was this unreflective, implicit presumption of the unknown being either trivial or inconsequential.

I was also teaching Biology and Social Issues (Bio 106) with Richard Lewontin and Ruth Hubbard and others from that Marxist/feminist/Jewish crew, exploring the politics of health and food, impact of military priorities on science, sexism and racism in certain lines of inquiry, and how all this shaped exclusions of one sort or another—certain kinds of people, certain kinds of topics. Key here was this sense of the radical contingency of what gets studied and what doesn't, who does science and who gets science done to them, who benefits, who suffers. I was struck by how much attention had been given to American eugenics, and how little to the "big eugenics" of Nazi Germany, so I spent several years excavating Nazi science, led by the Jewish proverb that "nonsense is nonsense, but the history of nonsense is scholarship!" I started to realize that the history of science as a discipline was overlooking some of the most important questions—as in how ignorance is created and why. So that was part of how I got involved.

RP: How did you get interested in what we don't know, Peter?

PG: Coming of age in physics (and the history of physics) during the height of the Cold War meant that secrecy was always just past the blackboard. Many of my teachers had worked on the Manhattan Project or radar; many in the 1970s were still working or had worked on postwar, classified research. It was early on very salient to me that there would be no writing of the history of modern physics without taking into account physics behind as well as outside the fence. There was another event too—one of those small things that stayed with me for many years. In 1977, I was struck by a newspaper report about a Polish censor who had defected to Sweden with his "Black Book of Censorship" that explained just what was to be censored. It was, in one compact place, a summary of what knowledge should *not* be released: disasters and toxicities, production shortfalls, and much more. These manuals struck me as essential to understand the antiepistemology of knowledge. Here were the rules of not knowing. Such volumes have remained essential to my work across many domains from then to now.

2. The Ignorance Produced by Industrial Science

PG: How did you get interested in industrial science, and in particular tobacco, and the issues surrounding it?

RP: I'd been exploring since my undergrad days the social and political causes of cancer; I'd worked to get a ban on smoking in my sophomore dorm at Indiana University (in 1973), after I realized that about a third of all cancers are caused by cigarettes. Other cancers were caused by what we eat or breathe, the radiation we're exposed to, etc.—topics generally ignored in Richard Nixon's War on Cancer, which focused on cures rather than causes and ignored cigarettes. I realized pretty early on that there were powerful industrial interests trying to shape what we know and don't know about these topics, and incorporated these into our Bio 106 topics at Harvard. I discovered there were about fifteen hundred trade associations whose business was just to protect a particular substance against claims it was causing harm. So there was the Asbestos Information Association defending asbestos, the Global Climate Coalition denying global warming, the Methyl Butyl Ether Task Force defending (guess what)—I'm talking about the late 1980s now—plus of course the Tobacco Institute defending tobacco. Most of these trade associations were denying there was "sufficient evidence" to convict a particular compound of causing harm. And this was a relatively unstudied social aspect of science, although Harvard did have a radical medical student newsletter cautioning that "Harvard may be hazardous to your health!"—in 1973, thanks to payoffs from the Tobacco Institute (*Present Illness*, October 1973). What I found remarkable about these trade associations was how they were using (or creating) science to create ignorance—partly by funding what I like to call "distraction science" or "red herring research." Science was effectively being supported as part of an effort to disguise harms.

Recall that agnotology is both the study of ignorance and the studied social production of ignorance—just as English is both a language and the disciplined study of that language. What's brilliant about the industrial production of ignorance is that when it was developed in the tobacco context in the early 1950s (following earlier efforts to defend lead and sugar, inter alia), they could actually claim to be acting in the name of science when they called for "more research." The call for more research was an

effective legal-savvy form of denial, expressed in a manner that effectively captured the allegiance of universities (and the high rhetorical ground of open-mindedness) while retaining plausible deniability in court ("we never said cigarettes are safe!"). Science could also be supported in such a way as to distract from the evidence that was accumulating that cigarettes were in fact causing cancer.

PG: One of the most striking features of governmental secrecy is its extent. For fiscal year 2014, for example, the government itself estimated that the cost of secrecy runs, for the government as a whole, about $15 billion (*Report to the President* 2014). That is bigger than the fiscal year 2016 budget for the Department of Labor ($13.2 billion) or the Environmental Protection Agency ($8.6 billion) (Federal News Network Staff 2015). The effort involves tens of millions of pages of classified material that must be sorted, classified, and guarded. Recognizing that the scope of this effort is important—scale matters, and tracking the structure and effects of this system is part of what I've tried to address not only in my written work but also in my film (with Robb Moss), *Secrecy* (2008). Of course, even these staggering numbers don't include the full range of outsourced materials, much less the secrecy that has its origin and maintenance in the private sphere. Which leads me to ask, How big is the production of distraction or decoy science in the industrial realm? Can you give a sense of the amounts of money involved, or the number of people, or any measure of how widespread it is?

RP: Well, in tobacco alone, between 1954 and the 1990s, $450 million were funneled through just the Council for Tobacco Research (CTR), only one of several arms of the cigarette conspiracy. Most of that went to distraction or decoy research, mainly into basic virology, genetics, biochemistry, immunology, etc.—any kind of agent that was not nicotinic. Over seven thousand papers were published with support from the CTR, the principal arm of the cigarette conspiracy. CTR-funded scholars went on to win at least ten Nobel Prizes—so we're talking about some pretty solid research, albeit "harmless" from the industry's point of view. The problem is not really visible from looking at any one published paper; from a micro level, the conspiracy, the intent, is invisible. The pernicious intent is really only visible when you look at the research funded in the aggregate—and fortunately we have the industry's own secret documents, which talk about the

CTR as a "front," a "shield," and "a successful defensive operation." Again, the intent was to distract from cigarettes as a cause of harm, especially by focusing on proximate rather than ultimate causes. CTR research can be considered a kind of data chaff, jamming the scientific airwaves with noise. The CTR also funded a good deal of basic research, along with research looking at harms from things like carpet fumes, radon, occupational exposures, genetic predispositions—all of which are respectable topics, but which in aggregate create an impression that something other than tobacco is causing harm. And that's why you can't see the bias in any one publication. You have to look at macro bias rather than micro bias, because it turns out that if you actually control for industry funding—when looking at, say, the hazards of secondhand smoke—you get a very different result than if you just take the aggregate of all research that's published.

PG: I remember one example you once told me about, where it was discovered that miners in coal country got lung cancer or black lung disease or other diseases of the lung in large numbers if they smoked and were miners. The response was not to improve mining conditions, it was instead to ban smokers from some of the mining tasks. I might not have that story quite right, but could you say what happened, and how it fits into this idea of distraction or chaff science?

RP: Cancer hazards are often multiplicative, synergistic—which makes sense if the disease is caused by the accumulation of mutations. So if you are exposed to asbestos, you increase your risk of lung cancer by, say, fivefold, and if you smoke you increase it by fivefold. But if you smoke and are exposed to asbestos, you increase your risk by fiftyfold; there's a nonlinear, disproportionate augmentation. What's interesting about that is how different industries strategize to blame something other than themselves. Asbestos will blame tobacco, and tobacco will blame asbestos, but what's important is that each of those groups can create and then rely on particular types of science as weapons to be deployed in court. And a lot of these strategies do arise out of litigation—one of the three pillars of the cigarette conspiracy (the others being legislation and public opinion). Expertise is important in court, and cigarette makers have been able to create what they call a "stable" of expert witnesses to defend themselves and their products. And the role of science in this? As Imperial Tobacco once said, "Research must go on and on." Support for science is used as a way to prevent certain

kinds of questions from ever becoming "closed." In the tobacco case this was called the "open controversy": the idea was that by continuing to support science, they could use this very fact ("we need more research") to claim that harms had not been definitively proven.

It is important to appreciate the scale and scope of this campaign. CTR research alone resulted in over seven thousand peer-reviewed publications. The collaboration with the American Medial Association produced hundreds of others—and I mentioned the ten Nobel Prizes. At least twenty-six Nobel laureates have taken money from the cigarette conspiracy. R. J. Reynolds funded almost all of Stanley Prusiner's research into prions, for which he was awarded the Nobel Prize in 1997. Again good research, but part of the cigarette makers' interest in funding "small virus" research to distract from cigarette causation. Cigarette makers helped found the field of behavioral genetics; they funded leading scholars, like Hans Selye and Ancel Keys, publishing on the role of stress or cholesterol in causing heart disease. When people today think of heart disease as caused by stress or cholesterol, that is in no small part because cigarette makers encouraged this kind of research. Keywords here are corruption and monopoly (they tried to monopolize certain kinds of expertise), but also alternative causation and open controversy.

PG: You mean that the opposition in a sense would have to take a position of illiberalism? They would have to say, "We are against further research"?

RP: That's right.

PG: And that's a bad rhetorical spot to be in; by making doubt into a product, the industry has hidden perfectly well-established science. Demonstrated health risks became uncertain topics for research; inquiry became the opposite of understanding. Here is a particularly damaging form of knowledge manipulation and an important result of focusing on how ignorance is produced—agnotology at work.

RP: That's right. Tobacco and other industries were able to use their support for science as a central pillar of their conspiracy, which was that we don't really know whether cigarettes cause cancer. They were able to use the openness of the question and their support for research as a defense of their legal stance and propaganda position. So it's a brilliant example of using the liberal rhetorics of science to defend what's essentially a criminal

enterprise: a conspiracy to hide the hazards of smoking. It's really quite brilliant because it captured the authority of science and allegiance of scientists, made the tobacco industry seem open-minded, and made public health advocates seem like close-minded fanatics.

PG: And scientists who wanted to take the industry's money would then be able to say to themselves and their peers that they were involved in open-ended research, that as long as they were doing research they weren't guaranteed to produce what the tobacco industry hoped they would. They were simply adding to a general, broad and open-ended debate.

RP: That's right. I think of it as something like an army of idiot miners, paid to look for gold where the funders know there's no gold to be found. And then you (the paymaster) say, "Oh look, there's no gold." Cigarette makers loved funding research topics that posed no threat to their business. So most of the research funded by the industry had nothing to do with tobacco, and certainly nothing to do with that product causing harm (with a few exceptions, which I call "leakage"—since the conspiracy was not perfect).

PG: It's significant too that these techniques of ignorance production have multiplied over many different domains. Naomi Oreskes and Erik Conway's (2011) *Merchants of Doubt* shows how these same techniques, and indeed same public relations firms, even many of the same prominent scientists, went on to argue that climate change was "doubtful" and in need of more research. Once again, an "openness" toward scientific research could, in the event, serve short-term industrial gain, block regulatory and political action, and scramble public debate, even when the science was clear.

RP: It's really quite brilliant: if you don't like the science that's out there, create some of your own. And then claim "we need more research." And then label your opposition as a bunch of close-minded fanatics. Later this became more subtle, with the industry claiming that knowledge of cigarettes causing cancer was "common knowledge," and had been so for hundreds of years. This was part of the industry's "assumption of risk" defense: you were fully informed of the nature of the hazard, information on the hazard was "available," you have only yourself to blame for whatever harms you may have suffered. The common knowledge defense is now deployed in every tobacco trial. So first they falsify science, now they falsify history.

As for science, though, the deceit was not what we normally think about in terms of research misconduct—falsification or fabrication of data, for example. The bias was further upstream than we imagine, and the fact is that once funded, the industry generally did not influence the science funded.

PG: You mean if they accepted money for research from the Tobacco Institute or CTR?

RP: Right. The CTR would say, "Publish whatever you want." But the bias was built in to the selection of problems in the first place. And that's a general principle that historians and philosophers need to pay more attention to: problem selection and funding shape what kind of science gets done. One of the more general points about agnotology is that there are infinitely many things you might know, and that whatever in fact becomes known is only a tiny sliver of what might be known—infinitesimal really. What this means is that when you're shining a light on something, almost everything else remains in the dark. And sometimes that darkness is deliberately kept dark; the darkness itself may be created, maintained, exaggerated, inflated, and reinforced, sometimes even by the very power of the light itself (think flashy fish lures or Donald Trump). I think there's an assumption in a lot of thinking about science that there is some finite quantum of knowledge humans might acquire. Maybe we'll never get it all, but at least we're moving forward, vanquishing the darkness. But darkness has many friends, and often deep pockets as well. And darkness can easily grow as fast as (or faster than) the light. So it's much more a constructive or organic metaphor that we need.

PG: Of course, the tobacco industry employed other strategies of ignorance production as well. One technique that was often used was to mention things out of proportion. For example, 90 percent of lung cancer is caused by smoking. But it's true that people sometimes will know somebody who got lung cancer but who didn't smoke. If you obscure the fact that 90 percent of lung cancer comes from smoking by mentioning twelve other possible ways to get lung cancer—or even having in that 10 percent some that are completely of unknown origin—then you've actually created ignorance.

RP: Yes. I like to ask my World History of Science students, "Are you convinced that smoking is the leading cause of lung cancer?" only about two-thirds will say yes. If you ask, "Do you think smoking causes cancer?" a

much higher proportion will answer in the affirmative. And if you ask, "Have you heard that smoking causes cancer?" an even higher proportion will say yes. So much depends on how the question is asked, and this has often been exploited by the tobacco industry in court because it'll say, "Look, in the 1950s, 90 percent of Americans had heard that smoking causes lung cancer." But they'd also heard that aliens were being held in Area 51. There is a big difference between awareness and belief.

PG: Certainly if you are aware of a debate, you could say, "Are you aware that there's an argument for increasing taxation? Are you aware there's an argument for decreasing taxation?" People would with high probability recognize both of those.

RP: Right. The industry is able to use this proximity of ideas in deception. Merely by pointing to someone who smoked and lived a long time—George Burns lived to be a hundred—the industry creates the impression that smoking doesn't always causes cancer, which of course is true. But you also have to remember that if you ask ordinary people, ordinary smokers, "Do you think smoke will kill you?" the most common answer will be, "Well, if God wants me to die, I will die." We tend to forget that most people are still monotheists and think their fate lies in God's hands. That has agnotological implications.

PG: The everyday epistemology is really strange to me, given that we don't actually have experience with absolute causality in our daily lives. Wearing a seat belt while driving does not make you invincible against any possible car crash, it just makes you more likely to survive or to survive with lesser injuries than had you not worn it. But when we're talking about a public, disputed, economically powerful area and whether something causes something else, as a society we often go back to saying, "If there is an exception, then the thing isn't true." That's strange, right? Because we know someone who lived to be a hundred and smoked, we think smoking really shouldn't cause cancer, even though most of the causal things we have any experience with are probabilistic. And in science, our most basic account of the world, quantum mechanics, tells us that when one elementary particle hits another, the outcome can be predicted only probabilistically. So whether we are deciding about whether to wear a bicycle helmet or how deep-inelastic electron scattering will proceed, we use, formally or informally, a notion of probabilistic causation. It's really stunning that the industry can get away

with saying that causes inevitably either lead to a particular outcome … or else they are not causes at all. Strange reasoning, and stranger still that it worked (somewhat).

RP: Yeah, it's called sophistry! But it seems to work. One of the brilliant things cigarette makers were able to do was to say that unless every person who smokes gets cancer, and unless every cancer is in someone who smoked, then smoking doesn't cause cancer! By that same logic you'd say that drunk driving can't cause traffic accidents, because some people who have accidents weren't drinking and not everyone who drinks has an accident. So cigarette makers created an impossibly high bar for inferring causality. And for decades they were successful using this argument—by essentially redefining causality. They actually funded a lot of scholars, people like Alvan Feinstein at Yale, an early CTR special projects operative and one of the founders of evidence-based medicine, to create such a high bar for evidentiary proof that nothing could jump over it! So there's a long litany of actual harms he was able to deny because they didn't meet his criteria for causality. The industry was able to manipulate these philosophical ideas to its benefit because of how much money it's got.

3. Ignorance as a By-product of the Media and Publishing

PG: Back in 2004, Oreskes published an article in *Science*, "Beyond the Ivory Tower: The Scientific Consensus on Climate Change," which examined the nearly one thousand abstracts of papers in refereed scientific journals that explicitly referenced "climate change." She wanted to know whether, as the media often implied (in their crude parody of objectivity), there was a roughly even split between those who argued for human-made climate change and those who argued against. What she found was that 75 percent of these articles implicitly or explicitly agreed with human-originated climate change, and that *none* took the position that this was not so. The so-called scientific debate had effectively been created in the public sphere by what you call chaff science—all these news reports, even the nightly news version of objectivity, which is 50 percent of X and 50 percent of anti-X. If you think that way and consider that debate "makes good television," as the news announcer Ted Koppel used to say, then it's easy to mistakenly think that there are 50 percent of scientists on one side and 50 percent of

scientists on the other side of the climate debate. Once there is a debate, it can be made to seem like it's a coin toss. Experts disagree, so this line of implied reasoning goes, and what's a reasonable person to do but to stay agnostic?

RP: Right. It's sometimes called the balance routine. Journalists usually have short deadlines, they don't really know the technical details, and they think it makes a better story if you give two sides to an issue. And it's one of the reasons, as you used to like to say, that [Dwight David] Eisenhower wanted a one-handed adviser because there aren't always two sides to every question! In the tobacco case, what would happen is there would be a story and then at the end of the story there would be the tobacco institute's refutation. And like the tail of a kite, such denials would be attached to every announcement of new evidence of a hazard to make for more exciting reading. We actually have some great industry documents on this, instructing writers and editors of cigarette propaganda on how to headline their stories: according to Hill+Knowlton, the public relations arm of the conspiracy, headlines in the Tobacco Institute's *Tobacco and Health Reports*, sent to every doctor in the country, were supposed to "strongly call out the point—Controversy! Contradiction! Other Factors! Unknowns!" Journalists are now starting to appreciate the danger of such an approach, realizing that not every "controversy" has two equally valid sides, and "balance" can actually misrepresent the truth.

PG: Another place where this kind of fabricated scientific debate gets deployed is around the creationism and intelligent design issues, where the creationists and intelligent design advocates would say, "Just teach the debate. That's all we're saying." And then again, somebody who said, "No, actually you should just teach evolution as best we understand it," would again be forced into that illiberal position of seemingly being against inquiry. Agnotology makes this process of ignorance production into an object of inquiry.

One of the most famous sites for these debates over teaching uncertainty—making secure scientific knowledge insecure—occurred in the small town of Dover, Pennsylvania. Schools there had wanted to teach "intelligent design" as a viable, non-Darwinian account of how the biological world came to be as it is today. The 2005 case (*Kitzmiller v. Dover Area School District*) challenged a policy that required teachers to discuss intelligent design

as an alternative theory to evolution, claiming that intelligent design was a not-very-covert form of creationism that had been rejected by the courts as religious doctrine. Plaintiffs showed that the required textbook, *Of Pandas and People*, (written before but revised and published after *Edwards v. Aguillard* had barred the teaching of "creation science" in public schools in 1987), simply replaced the words "creation," "creationism," and similar terms with the phrase "intelligent design," without changing any of the actual content. Plaintiffs argued that *Pandas* was in effect a creationist textbook (with a search-and-replace toggle), and whose requirement violated the First Amendment's Establishment Clause, which prohibits the "establishment of religion" by the government. Judge John E. Jones III sided with the plaintiffs, equating intelligent design with "creation science," which "'is simply not science' because it depends on 'supernatural intervention.'"[1] The courts were pretty clear: you can't hide religious doctrine in a proxy bit of cooked-up science.

RP: Right. It's a little bit like when my ten-year-old son would ask, "What if I say my religion is two plus two equals five? Does that mean I won't be counted wrong in math class?" The strategies there have changed interestingly over time, because for many years after the Scopes trial, it was rare to find evolution being taught in US schools. But then they had that successful campaign to introduce balance laws, or what they called "equal time": if you teach Charles Darwin, you have to give equal time to what they call creation science and, more recently, intelligent design. This is one of the problems of a type of radical constructivism, the kind of symmetry of different epistemic systems that some philosophers of science like to uphold, balancing forage against garbage. It's almost like a justification of this balance routine in the media and shows the impoverishment of that point of view. Now we're seeing it powerfully with things like global warming denialism, and things that are really of life and death consequence.

As for creationism, I think that's generally a more honest form of agnotology; creationists seem to actually believe the world is six thousand years old and the Bible is the literal word of God. The irony is that intelligent design really poses an interesting, nonobvious problem: How do we know when something is the product of an intelligence? That is a key question posed all the time in archaeology and the search for extraterrestrial intelligence: How

1 *Kitzmiller v. Dover Area School District*, 400 F. Supp. 2d 707 (M.D. Pa. 2005).

do we know that an artefact is human made and not a geofact? And how do we know that a pattern of signals from outer space is the result of an alien intelligence? Those are fascinating, nontrivial questions. But intelligent design à la refurbished "creation science" ignores these genuine questions in favor of a pseudoscientific argument from ignorance—basically, "I can't imagine how natural selection could have produced this micromotor in a flagellum, so it must have been made by an intelligence, really an unmoved mover whose name I won't mention." That is just intellectual sloth, cryptocreationism, as even republic magistrates have realized (in the notorious *Dover* case in Pennsylvania).

PG: True, one can distinguish between sincere and insincere advocates of this form of doubt production. But I'm perhaps a tad less persuaded that the *Kitzmiller v. Dover* case has a solid bit of sincere objection. After all, one of the great blows to the prointelligent design case was when that side insisted that its views were utterly independent of creationism—which the courts had struck down as an offshoot of established religion. You may recall that the philosopher of science Barbara Forrest showed the court that the antievolution side had, in fact, taken a creationist manuscript and simply swapped out "creationists," replacing it by "intelligent design proponents." In the end, we may need to focus more on the structure of the argument ("there is always doubt, there is always more research to do, we cannot act when there is doubt") than whether those advocating are, in the inner recesses of their souls, convinced or cynical.

For years, the Texas school system has had disproportionate influence over textbook development because it buys textbooks as a block. So what gets incorporated into the Texas curriculum has dictated what a lot of high school textbooks look like all over the country. As tough as that may have been in the twentieth century, because there were really big battles over what would be said about evolution, we are now entering a time, I think, where we're going to have modular online units of learning and teachers will essentially compose their own textbooks. I think the future of the hardbound, expensive textbook that's been approved by the Texas Board of Education may well come to an end. We may have more openware that people will assemble in different ways. Of course, teachers always had the option of not teaching a chapter on evolution if there was one, but once it becomes modularized in this way it's going to be possible to eliminate all

sorts of things that teachers or school boards or counties or states don't like. And in a way I think that battle hasn't been fully realized yet, but in the future we're going to have free shared modules that people will assemble. How that chapter of our educational history will unfold still remains to be seen.

RP: Yes, I hope you are right! That ties into the much-discussed dangers of the "echo chamber" of the internet, where personalized search (really, personally return) has led us into "filter bubbles" allowing seemingly endless confirmation bias. It is now of course easier to find whatever you want on the internet, reinforcing old forms of cultural tribalism. The spread of massive digital misinformation has become ever cheaper and easier. But again, one difference between creationism and the whole business of industrial doubtmongering is that creationists actually seem to believe what they say (with some brazen exceptions, as in the *Dover* textbook word swap). Even in the history of propaganda, however, there has always been this distributed mixture of imagined truths and outright lies. So intent is important, especially with regard to distinguishing different degrees of honesty and dishonesty (and self-deception). In the creationism case, you have strongly held convictions that seem to be genuine; in the tobacco case, there's clearly a type of duplicity—but there must also be a kind of denial in the psychological sense. As when causality is redefined so that cigarettes actually don't cause cancer!

In the climate case, there's seems to be a mixture of honesty and dishonesty, because it's sort of like the point Oreskes and Conway were making earlier about surrogacy: climate denial is often really just a disguised defense of untrammeled capitalism or God's benevolent plan for the planet. Oftentimes the force of an idea is different from its literal expression, and the true point or intent of an expression remains unexpressed (or dog whistled). Creationism is a great example because in the Scopes trial in the 1920s, the question of whether humans evolved from apes was really a surrogate for whether racial mixing is tolerable or intolerable. So "humans evolving from apes" in the 1920s was de facto understood as black men having sex with white women. If you look at the Klan literature from the 1920s, it's really associating evolution with miscegenation, whereas creationism nowadays is much more about the dangers of homosexuality and abortion—and Darwin is blamed for the Holocaust! In the climate case, climate deniers see

environmentalists as watermelons: green on the outside, red on the inside. Basically socialists with a big government agenda. So it's an interesting way in which a lot of strongly held views are really surrogates for some other thing that's really at stake: creationism is about race and then feminism and homosexuality; climate denial targets environmentalists and challenges to some religious order.

4. The Ignorance Produced by Governments

PG: Government secrecy is another place where we, as a culture, are more and more accepting of big sectors of our world being blacked-out spaces.

RP: And more and more people do not even know that they're blacked-out spaces, they're so blacked out. A lot of people really don't have any idea about how many secrets there are, or how strongly they are actually organized by our government. There's an entire apparatus designed to create secrets that few of us know anything about.

PG: Yes! Understanding the mechanism, how things actually come in and out of secrecy, is a hugely important practical means toward making our world more understandable. I've been interested in laying out these procedures, in how they are established, enforced, and changed. What kind of thing can be a secret, and how that has changed over time? Probably the most important fact about the history of secrecy is that it is punctuated. Secrecy doesn't just slowly increase over time, it gets amplified in times of conflict and war, and never fully relaxes to its preconflict form—more like a ratchet than a spring. And the three big moments, I would say, over these last hundred years of secrecy have been World War I, World War II, and the terror wars. Let me expand on this a bit.

Governmental secrecy came into something recognizably similar to the system under which we live now starting with the Espionage Act of 1917. Under this act, sharing information that influenced the outcome of a military operation—whether giving advantage to an enemy or to the detriment of the United States—spreading dissent, or interfering with recruitment and enlistment practices were punishable by fines, imprisonment, or death. Under this act, the picture of a secret was one of propositions or individual objects—for example, the exact diagrammatic layout of the Springfield Armory or the statement that "General John J. Pershing will

arrive in Boulogne, France on June 13, 1917." And that understanding of what kind of thing a secret could be had different ways of being manifested. It could be exhibited by a photograph or a drawing or a letter, but secrets at this time were basically what in ordinary speech we would call facts. This fact or that fact would be dangerous if other people knew it. In a kind of addendum to the original Espionage Act, there was a powerful and highly problematic addition known as the Sedition Act, under which you could be prosecuted if, for example, you interfered with the process of recruitment. And that was a much more draconian standard because it allowed prosecution if you said—for instance, as a farmer in Montana did—that the fields of France will be fertilized with the blood and bones of our young men. Just that utterance, by its demoralizing power, could be seen as interfering with recruitment. So spoken or written opinions could be considered to be violations of the Sedition Act. Even President Woodrow Wilson was uneasy with some of that language and eventually it was rescinded, whereas the bulk of the Espionage Act continued, and has been added to, modified, and updated in various ways to cope with new technologies.

In World War II, a new kind of secrecy arose: the classification of whole domains of research. At one point, just after the war, all knowledge about elements on the periodic table from uranium on up were secret; the whole domain of the physics of fission fell into the black zone. At this point domains of knowledge became classified—a far step past the mere utterances of the Great War.

Finally, in what we might call the terror wars—from the Patriot Act of 2001 forward—the reach of secrecy extends far beyond Cold War secrecy. As the notion of a target expanded, infrastructure (gas mains, water conduits, electric switching stations, and electronic and data centers) could be classified—in ways that had been excluded even as the Soviet Union and NATO faced off across the divide. Secrecy extended even beyond the extension of classified facilities to include infrastructure. Indeed, purely *symbolic* sites could be brought under the veil. It became possible to classify aspects of national monuments. To cope with this augmented sense of vulnerability in which just about all we could see around us was potentially swept into secrecy, whole new kinds of restricted (but unclassified) knowledge came into existence. There are hundreds of new kinds of bounds on what can be known—unclassified but restricted. Published documents (such as

maps of floodplains beyond dams) could be withdrawn from libraries. This was a new and nearly boundless extension of a government-imposed curtain of ignorance—one that extended far beyond a nuclear weapons design secret or the silence surrounding a military operation.

RP: What do you think are the oldest secrets? Are there things that remain secret today that were originally classified over a hundred years ago?

PG: In 2011, the CIA declassified a clutch of documents that up to that point had been hidden since World War I. Several had to do with French, German, and US invisible inks, one instructed how to write with them (use a quill pen), and another, a most discreet way of opening letters surreptitiously (but don't breathe the chemical solvent).[2] Why that took so long to be released from the secret stash, I can't say.

RP: Those were still actively classified up to 2011?

PG: Yup.

RP: Could you say something about how more recently secrets are actually maintained? Because it's not just a matter of failing to reveal them, there's actually a cost to maintaining them; they're created, they're sustained, there's an army of censors responsible for administering them.

PG: Every level of secrecy has its own formula for protection and corresponding degrees of punishment for those who expose them. For example, top secret documents must sit in an approved form of container, with at least one of the following:

(A) Continuous protection by cleared guard or duty personnel;
(B) Inspection of the security container every two hours by cleared guard or duty personnel;
(C) An Intrusion Detection System (IDS) with the personnel responding to the alarm arriving within 15 minutes of the alarm annunciation … or
(D) Security-In-Depth conditions, provided the GSA-approved container is equipped with a lock meeting Federal Specification FF-L-2740.[3]

2 See Freedom of Information Act Electronic Reading Room, CIA, accessed May 30, 2016, https://www.cia.gov/library/readingroom/search/site/secret%20writing.

3 32 CFR Part 2004, Safeguarding Classified National Security Information; Final Rule, sec. 2004.6, Storage, accessed May 30, 2016, http://www.fas.org/sgp/isoo/safeguard.html.

Such precautions cost money—as does the process of maintaining those who create, sort, and apply the rules.

People sometimes don't realize how pyramidal this structure is. At the top is the president, the first classifier among all classifiers. The president then vests the authority to classify in the heads of different cabinet-level agencies—the secretary of defense, the secretary of energy, and so on. Each of these heads of agencies then deputizes a group of people, the smallest number of whom can actually classify as "top secret" certain things. These are the "original classifiers," the people deputized by the heads of the cabinet-level agencies to create new secrets, to say that something is a secret that wasn't a secret before. Over the years, there has been an effort across the executive branch to adhere to Executive Order 12356, Section 1.2 (d) (1): "Delegations of original classification authority shall be limited to the minimum required to administer this order." The US Information Security Oversight Office (2017) has monitored and reported on the number of classifiers at every level, and by the 2000s, the number of "authorities" able to classify new secrets at the top secret level was down to just shy of two thousand.

Below the secret creators is a much larger group of people called derivative classifiers. And they simply say, "Does the document in front of me, which I have to classify, contain information that the original classifiers have said is secret, top secret, or confidential." Often, they will even do that paragraph by paragraph: this paragraph is unclassified, this paragraph is top secret, and this paragraph is secret. Then the document as a whole gets the classification of the highest level that's assigned to its contents. Using those rules of classification set by the original classifiers there were, however, in 2017, some 9.6 million top secret "derivative" classification actions and 36 million such derivative actions at the level of secret (Information Security Oversight Office. 2017). And then there are the 5.1 million Americans who, in 2014, had security clearance (Fung 2014). For quick reference, that's more than five times the number of medical doctors—and means that about one out of every fifty adults in the United States has a clearance.

RP: Is "top secret" the highest level of formal secrecy classification?

PG: Yes, but then there can be special programs that have a need to access what is top secret. There was a big battle over this back at the height of the Cold War; every general and every colonel wanted to be head of such

a special program, because having the authority to "read people into your program," as the expression goes, was considered to be a mark of authority, importance, and status. This proliferation caused no end of problems, and over the years the number of people with the authority to create new secrets was reduced, even though the total number of classified pages grew wildly.

RP: Are there some things that are secret to everyone except a tiny number of people?

PG: Yes. Even if you have a special program, even if you have a top clearance authorization in the navy, that doesn't say that you can go over to a nuclear submarine yard and read all its top secret documents.

RP: Because you don't have a need to know.

PG: Yes, you don't have a need to know.

RP: And when did that idea of a "need to know" arise? World War I?

PG: It became important in World War II. It may have existed in some antecedent form in World War I, but in World War II, in the big, multibillion-dollar weapons projects—the atomic bomb and radar—this is when the massive, bureaucratic structures of secrecy first took hold. It was only then that began an effort to limit the damage that could be done by one person with top secret clearance. In the war, the Manhattan Project leaders tried to restrict what people on the bomb project could say to each other; that was the start of large-scale compartmentalization. Scientists on the bomb hated it; Edward Teller, for example, railed against this kind of walling off of some secret holders from others.

RP: Is it true that there were certain words that were classified?

PG: Yes.

RP: I've heard that the word "radiation" was not used in the first two hundred reports after the Hiroshima bomb, and that the word "plutonium" was not supposed to be published.

PG: The radar laboratory was called the Radiation Laboratory (Rad Lab), and the Manhattan Project atomic bomb laboratory avoided the term "radiation" in its title. In fact, the A-bomb scientists tried spreading rumors about what they were doing at Los Alamos that had nothing to do with the atomic bomb; they tried to get false information out there.

RP: Isn't the name "health physics" a kind of disguise for the medical effects of radiation?

PG: Some of the dangerous effects of radiation were known from early on as people began dealing with X-rays back at the end of the nineteenth century. In World War II, there were a myriad of names that used to disguise work on the atomic bomb and its constituent parts—and yes, the effects of nuclear weapons components and use on bodies. The bomb itself became the gadget, plutonium-239 was replaced by "49," with the "4" standing for element 94 (plutonium) and the "9" for the fissionable isotope of atomic weight 239. Some participants have identified the origin of the name "health physics" as a similar sleight of expression—a way of avoiding saying or writing "radiation."

RP: Would there be clearance-related activities in the Environmental Protection Agency EPA or the Occupational Safety and Health Administration, or is this all military related, and therefore military and atomic?

PG: It's definitely not just military. As I said, in recent times we've gone from this sort of propositional secrecy of World War I to the scientific domain classification of World War II, where things that had to with chain reaction physics were classified, where the separation of isotopes was classified—isotopes that could be used for making nuclear weapons. You didn't classify things like power plants, dams, electric transmission cables, or telephone switching stations, but with the Patriot Act in the aftermath of the 9/11 attacks there has been a huge expansion beyond even certain areas, like the World War II classification of chain reaction physics, to include infrastructure that had been expressly forbidden to be classified during the Cold War. So you have a growing domain of what potentially can be classified, and it now includes a kind of parallel system, which I think of as a parasecrecy of controlled but unclassified information, which itself has a hundred or two hundred different subareas—for official eyes only, for official use only; there are lots of these. So something could actually be kept from you or kept from the public that isn't classified—like how often the guards change at Mount Rushmore, or what the capacity of some wires is that come out of a switching station, or something of the sort. So there has been a huge expansion in the remit of what can be kept in the dark.

RP: Do you think there are secret laws of nature?

PG: Well technically you are not supposed to classify a law of nature, but this becomes a rather subtle issue. In addition to the kind of examples we spoke about earlier—like classifying aspects of nuclear physics in the 1940s—there are even branches of mathematics that have come under pressure to classify. For years, mathematicians have argued about what their obligations are and aren't to cooperate with the National Security Agency and the British equivalent, the Government Communication Headquarters. As it turns out, there are deep issues of number theory and algebra that cross with fundamental demands of cryptography. The form of the tension has changed—from work relevant to decryption to questions that bear on backdoor access to encrypted commercial data. The questions run deep. Without a lot of the mathematical work, we wouldn't have any internet security at all; there would be no internet commerce and no privacy. Much of our banking and financial system would grind to a halt if you couldn't secure a deposit or effect a transaction without risk of identity theft or other fraud. All that stuff is encrypted with things that had been classified not many years earlier. The idea that "the purity of mathematics protects the field from classification" has gone the way of the carrier pigeon.

5. Virtuous Ignorance

RP: Well, this bridges to another topic—what I like to call virtuous ignorance. In other words, a lot of the things that could be known, you don't want to be known. You don't want it known how to take an AIDS or bird flu virus and make it airborne, you don't want it known how to make a neutron bomb in your basement, you don't want it widely publicized how explosives can be made, or what the most vulnerable parts of a city's water supply or an airplane are, or innovative ways to smuggle something. So there's a lot of ignorance that is actually good, right? I like to think about the whole notion of a right to privacy as a form of virtuous ignorance. We all have things we don't want other people to know about ourselves; we all can name examples of dangerous technology that are better not distributed. So how should we think about that?

PG: I think there's an enormous temptation for people who are shocked by the huge expansion of secrecy and the parasecrecy regime of controlled but unclassified information to worry that if too much is hidden, we are not

going to be in a position to make democratically reasoned decisions. But from that shock to the idea that the procedures for making binary nerve gas should be published—that is a jump, and to me a non sequitur that could get us killed.

RP: So do you think that secrecy is inherently authoritarian at the level of the state?

PG: Secrecy always concentrates power because if you don't know, then you can't participate. As I see it, the question is not whether there should be any secrecy but rather how do we keep it from overwhelming us, how do we keep so much power from flowing to the center that democracy becomes unworkable? The most important decision our society makes is whether to go to war. In my view an overheated and overly powerful secrecy system left us, the people, along with Congress and the courts, in no position to assess the real evidence (of which there was none) that Saddam Hussein's Iraq had or was building nuclear weapons. This was a catastrophic failure—one built on a rotten foundation of callouts to secret knowledge.

RP: But still, secrecy can be a good thing or a bad thing, right? I mean, secrets about yourself allow you to maintain control over yourself and prevent others from doing you harm, no?

PG: Well sure. Without privacy we cannot have the trust and intimacy that make our lives worth living. And yet I think we have to be careful about identifying privacy and secrecy. At root there is a fundamental asymmetry: protecting the individual from the overzealous prying eyes of the state is a matter of defending the less powerful against the more powerful. So we are often tempted to make an identification that might be expressed:

Individual: privacy; state: secrecy

Indeed, more generally in my view, we have moved, in our laws and common discourse, far too quickly toward the identification of the person, the corporation, and the state. They are not equivalent, no matter what the Supreme Court decided about First Amendment corporate rights in *Citizens United*. Even now the Supreme Court does not allow a corporation (or for that matter the state) to plead the Fifth Amendment to avoid self-incrimination. And we should not think that the state deserves the same degree of protection that we aim for in making sacrosanct privacy of an individual, a family, or a couple.

RP: Yes, *Citizens United* has to be one of the worst Supreme Court decisions of all time; it basically enshrined and formalized a new political principal—one dollar, one vote—and gave "dark money" new and unprecedented powers.

PG: I want to distinguish individual privacy from corporate or state secrecy. On one side, we want to protect an individual's most intimate beliefs and relationships from prying eyes. Does that obligate us to defend a kind of privacy for the state (state secrecy)? Or conversely, if we are for transparency for governmental—that is, national security—secrecy, are we obliged to advocate a similar transparency for our personal lives? I think this often made analogy is false: the state is *not* a person writ large. Nor, for that matter, do I buy the specious reasoning that corporations are people too, with rights of expression or other such privileges. The corrosive creep, recently accelerated in the United States, of corporate personhood (or for that matter, a way of speaking and thinking that implies a state personhood) toward natural personhood strikes me as highly dangerous.

That said, like you, I think it would be a much worse world if it was easy to find out how to make weapons of mass destruction, or how to use the internet to collapse the national grid or a hydroelectric dam. So if we're opposed to the overreach of secrecy, should we take the position that we're against all secrecy? There's a kind of satisfying absolutism about saying, "Just let everything get out there." I think that we are, in all our political engagements, always going to be using judgment. There may be some things that we think are better not disclosed but whose disclosure we don't want to criminalize, and some things we think are better not disclosed whose disclosure should be criminalized. Surely we want to protect the name of somebody who is investigating a plot to steal from or reveal a nuclear or chemical weapons program in order to give us realistic estimates of the danger. That seems to me what our intelligence agencies should be doing. But there are other places where the arguments are dicier. The *New York Times* and *Washington Post* began publishing the secret history of the Vietnam War (the Pentagon Papers)—knowing perfectly well that they could be prosecuted. The Nixon administration indeed tried to exercise prior restraint and block publication. In the end, the courts sided with the paper (blocking the injunction). There is no doubt that we have had revelations in the United States and elsewhere that violated the law, sometimes for the worse, and sometimes (as in the Pentagon Papers) for the good.

RP: Of course, the law is not always good—but neither, then, is radical transparency, which can in fact be weaponized.

PG: That's right.

RP: Philip Morris, for example, was behind the passage of two data transparency laws in 1999–2000 that required that the data underlying any governmentally funded (nonclassified) research be open for public inspection. This, however, created an asymmetry in the degree of inspection or interrogation between what the tobacco industry is doing, which is entirely cloaked, versus what publicly funded research is doing. And it allows the industry to get its hands on the raw data of any governmentally funded research, and deconstruct it, challenge it, rework and generally mess with it. Cigarette makers had successfully taken over the Framingham study in the 1970s, for example, allowing them to excavate cigarette-friendly facts from the raw data—or even claim that certain things "could not be proved" from the data. So access to underlying data can be used for good as well as evil.

Of course in quite different contexts, there are times when in order to guarantee quality science, you actually need a certain type of privacy, a certain type of sequestration, confidentiality, or anonymity—which is another form of virtuous ignorance.

PG: In order for fruitful deliberation to take place?

RP: Yes, and for it to be done in an honest and, in a sense, open yet sequestered way. I mean think about something like peer review, where the anonymous nature of the reviewer is important for guaranteeing a kind of openness and honesty of evaluation.

PG: And that's true in our letters of recommendation too. I mean we both, and all our colleagues, have had the experience of writing letters that we know are available to everybody including the person we are writing about, in which case we know how to do that and the letters are anodyne.

RP: And this falls into the category of virtuous ignorance, where a certain type of sequestration of information can be empowering, can promote democracy, can promote honesty. It can promote freedom of inquiry in a sense without retribution. It's sort of the same kind of logic that's involved in something like a trial, where jurors are not supposed to have any knowledge of the facts of a case prior to sitting in judgment of it—with the

theory being that pretrial ignorance creates a kind of honesty and integrity and objectivity in the procedure. You and I have both worked a lot on the history of objectivity, and there's this myth we encounter about a certain distance being required for objectivity. But there are also ways in which distance—which is a kind of ignorance—can give us a helpful lens.

6. Final Thoughts

PG: I want to come back to join the two strands of our conversation about industrial and governmental agnotology. One of the great and greatly worrying trends over the last twenty years or so is that many things that used to be handled by government agencies have been privatized. Of course, it is by now a commonplace to note the precipitous rise in private prisons, contracted mercenaries, and private charter schools. Much of the electromagnetic radio and television spectrum is now in private hands. These are just a few of the formerly public spheres. But for this conversation, it is important to note too the analogous subcontracting of intelligence functions covering a vast range—the *private* culling and processing of data, the corporate mining and analysis scooping up biometric, locational, metadata, and financial and online behavior, and the government's interest. Some of this is propelled by the more general push toward the private sector, but some is motivated because there is much that the government is restricted by law from doing that can be done by private industry. The government can legally buy what it cannot itself gather. Privatization offers a form of backdoor passage around laws of disclosure and transparency.

If I was thinking ahead to where a study of secrecy will be in the coming years, I would say that late Cold War government secrecy, classically understood and regulated (for example, through the Freedom of Information Act, or FOIA) may well come to look like the halcyon days of openness. One can see this already in the nuclear domain—where the big contractors running the weapons and power domains already show themselves vastly *less* open than the Department of Energy ever was. How will this play out across the landscape of other agencies—as the Department of Defense, three-letter agencies (CIA, NSA, FBI, and DIA), and other branches of government hand over their functions to increasingly airtight global corporations? Corporate

state secrecy, walling off police, military, and intelligence domains, is driving a new and deeper black.

RP: At the end of the day I'm sort of a populist, in the sense of that term prior to its corruption to mean "nationalist." One of the things I'm interested in is the ignoring of what ordinary people think in their daily lives, and how this affects their bodies, their freedoms, and so on. I think this is one of the things that too often gets left out in epistemology. I mentioned that one reason I started trying to understand ignorance was to respond to the radical apathy so many scholars evidence toward what ordinary people think about the world. In other words, it's not just about industry fooling us, it's not just about governments allowing certain types of knowledge to be constrained by the military-industrial plus media-entertainment complex. It's also about understanding what nonelites think they know about the world, and what relationship scholars have to such knowledge. It gets back to the issue you raised about things like creationism. Why do we have a world in which there are large bodies of consensus about certain scientific facts, but millions of people seem to have no difficulty living their lives in relative oblivion? I think of something like the recent presidential election, where most of the Republican candidates in the primary confessed to not believing that humans evolved from apes. This is a staggering indictment of modern knowledge—and therefore education, and hence the accomplishments of scholars. And as historians and philosophers of science, we don't seem to be doing enough to understand its origins. So that's another thread—which you might call populist: How do we understand what ordinary people know and don't know, this radical discontinuity that exists between expert and popular knowledge? Many philosophers seem to be blissfully unconcerned with it, reflecting perhaps that vanguardism I mentioned, where attention is focused on smart new ideas, while dumb or commonplace ideas are ignored. That's one of the concerns I've had, and one reason I asked the linguist, Iain Boal, to coin the term agnotology.

PG: How we choose to regulate this corporate state secrecy could well determine the future of democracy. Imagine a world not too different from ours, where investigative print and digital media thin out beyond recognition, replaced by performative politics and anecdotal, narrative nonfiction journalism. With much of the state apparatus privatized, and therefore no

longer answerable either to sunshine laws and FOIA inquiries, we will need other kinds of mechanisms to understand our world. It is now fifty years since the signing, in July 1966, of FOIA. Perhaps now is not too soon to launch a serious discussion about the information we and the coming generations will need from the corporate state if we are to have the deliberative democracy we want.

RP: Go for it! I'm particularly worried about how humanity and the nonhuman world will fare, given the rising tide of threats from climate change. But I'm also excited to see so many young philosophers start to grapple with such fateful matters; Christophe Bonneuil and Jean-Baptiste Fressoz's *Shock of the Anthropocene* (2016) has an entire chapter on the agnotocene, recognizing the crucial role of engines of ignorance in our feeble response to the climate crisis. Years ago I abandoned philosophy from a sense that the field had become too inward looking and narrowly technical, with too much focus on wordplay and trivial puzzle solving. Reality can pack a punch, however, which is probably why we're seeing more and more philosophers recognize the vital—and sometimes fatal—force of ignorance. Especially with the growth of ever-faster technologies for spreading mis- and disinformation, we're seeing renewed interest in how we've landed ourselves in this golden age of ignorance. And how we might escape from it.

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