

What do politicians believe about science and innovation policy?

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I like that this session is titled, “What’s the Talk on Mount Sinai?” but for a reason I’m pretty sure the conference organizers didn’t have in mind. In the Biblical telling of the Mount Sinai story, the Ten Commandments are given in an atmosphere of confusion, fear and sensory overload. The people receive some sort of overall cultural message and a sense of divine power, but it’s not in any way through a clear, specific, intellectual experience; rather, they are overwhelmed -- they see sound, for example.

I think this is not a bad metaphor for the way the public, including politicians, receives its notions of science. Specific words may be spoken, but the culture (to use a deliberately vague term) or the scientific establishment, perched on high, transmits a general sense of the power and mystique and rules of science that is apprehended in a general way by an awed (yet sometimes resentful) lay public.

Implicit in this metaphor is the idea that politicians are more similar to the lay public in their notions of science than they are different, and that they respond to those notions at least as much as they shape them. I think both those claims are true.

By “politicians” – to use the term assigned for this talk – I mean elected officials, particularly the many who are not themselves trained as scientists. I will be talking primarily about Members of Congress because they play a key role in science policy, they are representative of the “politician” category as a whole, and because they operate in the milieu with which I am personally most familiar.

I am going to be making broad, sometimes speculative claims and raising general concerns and questions in an effort to prompt discussion of a central, but, I suspect, little asked question in the science of science and innovation policy: What do politicians think they know about science and innovation policy, and why do they think they know it? I noticed, for instance, that there is nothing on this topic in the otherwise broad volume, *The Science of Science Policy: A Handbook* (2011), to which I and several other speakers here today contributed.

But before I turn to the question of what politicians know, I want to pose a follow-up question: Why should we care? Why is an inquiry about the nature and origins of politicians' ideas of any consequence? For at least three reasons, I think. The first pertains to science policy itself. A sense of politicians' thinking processes could enable students of science policy to be better able to predict what policies are likely to be promulgated and adopted. A better understanding might also enable the development of better tools and strategies to alter science policy. At the very least, a better understanding could make the development of science policy seem less baffling.

The second has to do with political science more broadly. I should say that my academic background is in history, and I have at best a superficial sense of the political science literature. But one branch of political science tries to understand Congressional action, positing interest group politics, political donations, representational needs, election strategies and ideology as among the competing factors. But I think these aspects of politics may be less relevant, or may play out differently in science policy than in other areas, and probing those differences could broaden the understanding of the political system as a whole. It could also, at least indirectly, alter cynical public assumptions about what drives policy.

And finally, more study could better situate science policy in the overall Congressional policy debate rather than treating it like its own little cordoned-off world. Changes in science policy (and in the thinking behind it) may have more to do with changing attitudes toward policy or politics broadly than about anything directly related to science. But that's rarely the story that's told. For example, it's apparently a much prettier tale to ascribe the growth of science education funding to Sputnik than to the Great Society – maybe because the latter sounds too “political.” But that doesn't make the story any more or less true.

So let's take a look at some of the reigning notions in science policy. I'll conclude by examining some of the “commandments” enumerated in the conference agenda, but first let's talk about some assumptions that appear to be widely held by politicians. I've chosen these assumptions because they play a central, significant role in policymaking and because they are more surprising than they might appear at first glance.

The first is that peer review is the “gold standard” for selecting which grant proposals the government should fund. You can see the strength of this belief in peer review in the current debate over the “Scientific Research in the National Interest Act,” in which even the right-wing Republicans who are skewering National Science Foundation (NSF) grants have gone out of their way to argue that they are not tampering with the peer review system.

I would argue that there are several reasons for this fealty. The first is just the public stature of scientists. If scientists are thought to be smart and dedicated, and science is objective and an engine of progress, why not delegate proposal selection to scientists? This inclination to defer to scientists is reinforced constantly by scientists themselves. Scientists laud the virtues of peer review publicly, while at least implicitly contrasting the system with “politics” – and even

politicians routinely derogate “politics” in their public speeches. Scientist rarely, if ever, speak publicly about the shortcomings or vagaries of peer review or about its politics. They may occasionally lament that the system can be too conservative, but then that’s often blamed on low funding.

Showing obeisance to peer review is also, consciously or not, a way for politicians to let themselves off the hook – it frees them from the task, and from the responsibility of making certain decisions, granting them a kind of immunity when things go wrong or become controversial.

Yet it was not always thus. Scientists’ dominion in grant-making used to be questioned more in Congress, I think. Legislators from states that did not win a lot of grants used to point fingers at the system. (I can still hear in my head the sneering way then-Sen. Ernest (Fritz) Hollings (D-SC) used to say the word “peers” – like a revolutionary questioning the existence of the House of Lords.) And the rightful role of scientists was, of course, a flashpoint in the debates around the founding of NSF, and more recently in disputes over the legitimacy of Congressional earmarks for research.

This apparent rallying around peer review is happening, paradoxically, even as some in Congress are less likely to defer to scientific consensus in policy debates. So what’s going on? I think it may say something about the *relative* stature of scientists in the mind of both the public and politicians. (I told you I was going to offer sweeping and speculative hypotheses.) As respect for other fields and other processes has declined (including, most notably, for politics), the idea of giving over decision-making to scientists can only seem more appealing, and

“interference” – the word is telling – more suspect. Politicians, who are good at instinctively sensing public attitudes, are responding to this.

And it matters. It is almost impossible right now to imagine Congress having a debate, never mind a thoughtful debate, about when peer review should be used or how. That’s true even as Congress half-knowingly builds agencies that function otherwise, like DARPA and ARPA-E. Science is left to police itself – at which it has a mixed record. It will be interesting to see if the concerns being raised about reproducibility scramble any of this. But for now, peer review is indeed treated like gold – locked away in a kind of mental Fort Knox, where it can be admired in the imagination but not tangibly explored.

Another critical idea in the minds of legislators is that good science offers useful facts and conclusions that border on the incontrovertible. The thinking on this one is more confused, with lots of contradictions to consider, but it holds sway nonetheless. And I think it’s especially interesting because of the mixed messages scientists themselves send about this belief.

Fundamentally, politicians value science because it is seen, at least in the abstract, as objective, factual and useful – it is knowledge you can bank on. Yes, there are chinks in this armored view of science that even politicians can see. Politicians argue all the time these days about which policy position has science on its side. But the way these fights are framed generally assumes that one side is relying on real science and the other on “junk science;” the framing isn’t about uncertainty or unknowability or differences among scientific subfields. With a little more awareness, bills now sometimes call for decision-making based on the “best available science,” which implies, anyway, that knowledge may change over time, even in fundamental ways, not just through growth by accretion. Also, in a tendentious way, one side or

the other may even cite historic paradigm shifts, but only to raise doubts about certainty others have in scientific conclusions they already hold are false. The idea of science as fact is basically left unassailed.

Scientists sometimes profess bafflement about where politicians ever got such a notion. Don't politicians understand, the scientists ask, that science is "process"? But it seems pretty clear that politicians got the idea of science as fact largely from scientists. Scientists may trumpet "science as process" to their students and may use it in the policy sphere to batter theories with which they disagree, but generally, before Congress, scientists testify about what is, not what may be. And even when scientists talk about process, they generally hold it out as a process to uncover an objective picture of the world, to learn the truth. It's a view Newton would recognize.

As with peer review, politicians and the public may be subscribing to this idea of science-as-fact more than ever because of the declining regard for other approaches to comprehending the world. In policy debates, the opposite of science is often portrayed to be politics, the opposite of facts. The choice presented is between science and Lysenkoism.

This idea of science as factual and progressive fuels the belief in a version of what the conference agenda calls Commandment 1. Politicians believe that spending more money on research, particularly basic research, will foster domestic economic growth.

It's easy to see how this view gets propagated. There has been a concerted effort to do so for decades, going back at least as far as Vannevar Bush's "Endless Frontier." Universities push it as a strategy to seek funding, and doing so reaches an apex in periods when "competitiveness" becomes the economic buzzword. Industry leaders bang the drum for it, in part, to offer

alternatives to solutions they might find less palatable, like limits on outsourcing, which were becoming a political focus around the time the National Academies' "Rising Above the Gathering Storm" was written. And scientists themselves are imbued with this idea, which connects their personal interests with national needs that justify federal funding. I'm not suggesting by the way, that the arguments being made are insincere or incorrect; I'm just pointing out that there is also a practical urgency to the arguments for those making them.

Politicians are a receptive audience for these arguments linking basic research and national prosperity for many reasons. First and foremost, it fits with their sense about science being fact, and facts leading to progress. Planes don't fall from the sky; bridges stand; medication works. Second, politicians themselves need some solutions to economic problems that don't come with excess political baggage. And innovation through research provides just such a solution; there is virtually no one arguing the opposing case, not even in terms of opportunity costs. Why doesn't this embrace of basic research extend further down the research pipeline (to use that outdated yet still potent image)? The rest of R&D doesn't have that aura of a disinterested search for truth, and starts wandering into ideological minefields. Even conservatives, who can be notably suspicious of academia, seem to see academic scientists as residing in some different stratum from other mortals. So it's convenient that basic research can offer economic benefits.

Yes, this concept of basic research can get awfully complicated all these years after Bayh-Dole, with university labs rushing to patent and disputing the ownership of key discoveries. It would be interesting to know more about how politicians are integrating such things into their views of basic research. But the concept is simply too handy for them to be readily dismissed.

As an aside, it would be interesting to know more about where Congressmen and Senators develop or pick up the notion of “basic” science to begin with. Is it just that they come into Congress thinking of “science” as basic research, with their layman’s sense of truth-seeking nerds in lab coats? Do they pick it up from government documents and university flyers and Congressional debates? I doubt my old boss, Congressman Sherwood (Sherry) Boehlert (R-NY), had any sense of what basic research meant – or perhaps even that the term existed – before being thrust on to the Science Committee as a freshman Congressman. But it was not a difficult concept to grasp; it’s perhaps more like an inchoate notion given form by the language of debate. Certainly he felt totally comfortable with it by the time he was chairman, even though he was someone who supported the full range of R&D.

And scientists themselves certainly take recourse in the idea of basic research all the time. The research pipeline is also another concept that scientists tend to denigrate in theory but promote in practice, probably for all the reasons just discussed.

At any rate, the belief that basic research, at least in key fields, contributes inexorably to economic growth flows into the last politician assumption I want to discuss, which is related to the agenda’s Commandment 2. Politicians assume that spending more on basic research and having more scientists is always good. It may not always be possible, but it is always good. As Dan Sarewitz has shown, the governing factor determining the level of science funding tends to be the amount of overall federal spending, not anything directly related to science.

This dogma of growth is an obvious corollary to the beliefs I’ve already discussed, and also is one that is avidly perpetuated by the scientific community. If science is a noble pursuit of gifted researchers that produces knowledge and societal gains, how could you ever have too

much of it? Specific debates may bring out some complexities, but the paradigm really is not much more complicated than that. Want greater health advances? Stoke the budget of the National Institutes of Health like then-Sen. Arlen Specter (R, then D- PA) did during the debates over stimulus funding (ARRA). Want greater advances in engineering? Simply try to produce more engineers, after all, China has more. These kinds of views have proved fairly impervious to analytical assaults, especially when the assaults have no political phalanx backing them up.

My point here is not that any of these ideas is entirely wrong, or that the nation would be better off if politicians didn't hold them. That's open to debate and would depend on what alternatives took hold. Rather, my concern here is that no one seems to spend much time taking politicians' assumptions seriously even though those assumptions do shape science policy. And as I hinted at the beginning, ideas like the ones I've reviewed here may have an out-sized impact on science policy because they are rarely subject to debate and, no political needs come into play to counter them, which is not the case in most other policy areas. Science policy is simply not a top-tier political issue and scientists aren't top-tier political players.

So, I think science policy experts ought to be inventorying and exploring the ideas that drive science policy-makers. How do those ideas differ from public attitudes, if at all? How and when and why do they change? How is new information, especially contradictory information, assimilated? How are science policy assumptions affected by larger political shifts? What new approaches developed by science policy experts are destined to fail or get hopelessly distorted unless politicians' fundamental assumptions are altered?

These are questions that merit some work. Otherwise, we are left with the Sinai model – that politicians' attitudes toward science were just somehow handed down from on high,

shrouded in mystery, and will, for all we know, endure for the ages. Interestingly, that's not the way theologians, or historians, or ethicists treat the Ten Commandments themselves. Science policy should be at least as open to inquiry.