Now Is the Time: How to Increase the Value of Social Science

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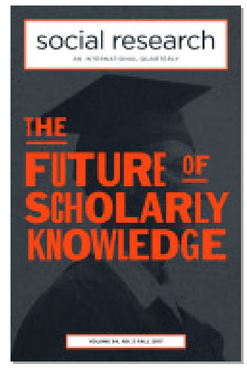

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INTRODUCTION

Social scientists conduct research, teach, and provide various kinds of services to the public and private sectors. Many are excited about their work. They want others to know about it and use it. They want these things for many reasons, including informing policy, making money, and job satisfaction. Readers of this paper are likely familiar with social scientists' motivations. What do we know about the motivations of the people who pay for the research, teaching, and public service that social scientists do? What motivates social science's actual and potential supporters?

Many people support social science because it has the potential to improve quality of life. Today, social scientific insights help many people better align their actions with their goals. It increases the effectiveness with which critical public services are delivered (Prewitt and Hauser 2013). It informs strategies in the domains of health, environment, business, elections, diplomacy, defense, and more.

Around the world, individuals and organizations use social science to improve quality of life for diverse and important constituencies. Consider, for example, behavioral economics. Its influence has improved health and life outcomes for thousands of desperately ill people (National Academy of Sciences 2016) and the number of people who participate in retirement savings plans. Other disciplines have similar stories. These science-fueled behavior changes affect how millions of people live their lives. Given its growing range and influence, one would think that social science's future as a generator of significant social value is very bright. But dark clouds loom.

Evolving communication technologies are altering how people perceive and value information. For example, more people than ever use the Internet to distribute information of all kinds. This avalanche of content has changed the kinds of information for which individuals, businesses, and governments are willing to pay. Technology has transformed the marketplace for information.

If social science wants to remain relevant in the face of these transformations, it must respond to increased competition and changing expectations in the information marketplace. It must do so by providing increasingly valuable services to potential users. The good news is that *social science has significant untapped potential to improve human life*. The challenging news is that achieving this potential will require changes to how many social scientists think about and do their work.

If individual social scientists want more people to know about their work, and if they want more opportunities to inform policy, make money, or have satisfying jobs in an increasingly competitive marketplace, the social scientific community must

- increase competence at communicating scientific information;
- increase commitments to transparency practices that allow consumers of social science to better understand what our claims do—and do not—mean; and
- commit to greater stakeholder engagement.

Failure to respond in these ways will limit social science's ability to benefit others, limit future opportunities for individual scholars, and limit the number of people who support social scientific research. This last point is a pressing concern. Prominent politicians have pointed to marketplace changes when questioning whether the National Science Foundation should support social scientific research at previous levels (Cantor and Smith 2013). Members of the public ask similar questions. Social science can answer these questions more effectively by providing greater value to more constituencies. Increasing our commitment to communication, transparency, and engagement is a means to this end. The time to act is now.

The article continues as follows. I first describe changes in the marketplace for scientific information. I then explain how these changes affect the types of research that sponsors want to fund. Next, I outline a three-step strategy for increasing social science's value and support. A final section concludes the argument.

CHANGES IN THE MARKETPLACE

A "marketplace" is a venue where people exchange goods and services. Some marketplace participants sell goods and services. Others acquire and consume them.

Scientific claims are exchanged in a marketplace. In this marketplace, scientists sell information and meaning. Scientists sell *information* in the form of data, evidence, and related materials. Scientists sell *meaning* when they categorize, analyze, and interpret these materials. Their products come to market in the form of books, articles, classroom materials, videos, archives, consulting activities, and more.

In exchange for these products, individuals and institutions provide resources that scientists value. These resources include financial support (such as grants and salaries), physical infrastructure (such as office and lab space), and intellectual infrastructure (such as opportunities to interact with other scholars and "academic freedom").

Evolving communication technologies have transformed scientific marketplaces by massively expanding the number of people who place information into widely accessible electronic distribution networks. This expansion includes many people who make claims about social science topics.

These transformations spawn new challenges. One is increased competition. To see this effect, contrast how people can learn about science today with what previous generations could do. In previous generations, people could access very little information at the limited number of homes, libraries, or universities to which it was economically feasible to travel. Many people did not have the time or resources to travel far. So, most of the time, people were limited to small amounts of science content within easy reach.

Today, information and analysis on millions of topics are available on handheld devices. These availabilities have changed expectations about information marketplaces. The amount of "free" information, for example, has led many people to expect that they should pay little or nothing for most of the content that they want. It is through this lens that many people view social science.

People compare social science to content from other sources, including news organizations, interest group websites, and ideological blogs. When comparing content, some people may notice that scientists are often terrible communicators; or that nonscientists appear to respond to urgent questions more quickly than scientists do; or that scientists are part of colleges and universities that—when viewed from many perspectives—appear to cost a lot of money. So, some people look at scientists and ask "why do we need *you* if we can get the information that we want more accessibly, quickly, and less expensively from other sources?"

Adding to this problem is the fact that some people want social science to influence a wider range of decisions than it currently does. There are numerous calls for decisionmakers to use social science to "improve" decisions on topics such as health, policy, and finance. To be sure, social science can help people align decisions with core values or material aspirations. But decisions that benefit one person can harm others. Thus, people sometimes differ on *how decisions should be made*. Consider, for example, people whose livelihoods depend on actions that social science can reveal as inefficient. If science can cause them to lose their jobs, they are likely to be less enthusiastic about science than are the efficiency's beneficiaries (Nisbet 2017).

A related challenge is that social science is sometimes implicated in claims about how people should think about important social phenomena (e.g., climate change). Some of these claims have prompted questions about whether professors use "the mantle of science" to disguise self-interest—or to impose unwelcome moral perspectives (Pielke 2007). Adding fuel to this fire are strong asymmetries in the ideological leanings of some social scientific disciplines (see, for example, Duarte et al. 2015). As a result, some people look at scientists and ask, "why should we believe you if you are really just pushing ideology?"

The two questions "why do we need *you* if we can get the information that we want more accessibly, quickly, and less expensively from other sources?" and "why should we believe *you* if you are really just pushing ideology?" have merit. Within these questions lie inconvenient truths about scientific practice today.

Whether we like to admit it or not, many of us are part of an academic advancement ecosystem. Those of us who accept office space, lab space, salaries, benefits, grants, contracts, prestige, and other valuable assets from major colleges, universities, and related organizations are part of this ecosystem. The ecosystem employs millions of people. It promulgates norms and institutions that influence scientific output, produce valuable scientific insights, and also can be seen as serving the desires of vested interests who seek large amounts of money while seeking to minimize accountability to those who are asked to pay (e.g., taxpayers and legislators).

In sum, evolving communication technologies have transformed the marketplace for information and meaning, producing new and legitimate questions about social science's credibility and public value. If individual social scientists want more people to know about their work, and if they want more opportunities to inform policy, make money, or have satisfying jobs in an increasingly competitive marketplace, the social scientific community must find persuasive answers.

THE POLITICAL ECONOMY OF FEDERAL RESEARCH FUNDING

What factors lead a society to want to support scientific research in increasingly competitive contexts? This is an important question, but many members of the academic advancement ecosystem have only a vague sense of how funding decisions are made. Some treat funding as an entitlement. They become offended or indignant when others propose funding cuts or ask penetrating questions about why social science deserves support. In my experience, this is not a persuasive approach to sustaining a supportive coalition.

In this section, I adopt the perspective of individuals who, and institutions that, decide whether and how to support social science. To articulate this perspective in a useful way, I need to define four terms: basic research, applied research, public goods, and private goods.

Basic Research and Applied Research

Right now, distinctions between basic and applied research are often in the eye of the beholder. Distinctions arise from the fact that scholars pursue inquiries from different perspectives and different levels of analysis. Work that seems "applied" from one perspective can produce insights that others view as "basic," and vice versa. For example, lots of microeconomics scholarship uses mathematics. Some of this work is regarded as "basic" within the microeconomics canon. That same research, when viewed from multiple mathematical canons, is "applied." For what follows, I need to use the terms basic and applied in a more specific way.

In *applied research*, the objective is to evaluate hypotheses about a conceptual framework's implications for particular circumstances. The stakes for quality of life can be very high, but the studies operate within a framework that constrains the kinds of conclusions that are possible to reach. For example, I have learned a lot from social-psychological work on attitudes. This work operates from widely understood conceptual frameworks. Its main questions of interest are whether previously established elements of a framework apply to a new circumstance.

In *basic research*, there is a larger distance between the existing framework's content and a particular circumstance. There is greater ignorance and greater uncertainty about what the research implies. Depending on the size and nature of the distance between the framework and the space of possible implications, initial results may offer only a small amount of progress toward a research objective. For example, basic research on how largely subconscious emotional responses affect information processing may be of use to improving how doctors convey critical health information to patients, but the path from this research to the desired outcomes may involve steps that are difficult to anticipate initially.

I propose these definitions because prospective funders often face financial or political pressures to produce concrete results quickly. Government funders feel these pressures at election times. Private funders feel this pressure from nonprofit boards or philanthropic sponsors. In both cases, "sponsors" want "results." Such pressures make applied research look more attractive.

At the same time, many important scientific discoveries have come from basic research. History is replete with stories of discoveries that took many years to reach actionable, transformative conclusions. Behavioral economics' effects on kidney transplants, for example, were themselves products of basic research on matching algorithms conducted in the 1960s and 1970s (National Academy of Sciences 2016). Hence, the question for prospective funders of basic research is not just whether to give money but also whether they can accept the elevated levels of patience and uncertainty that basic research can require.

Public Goods and Private Goods

Why do governments (or other actors) fund scientific research at all? To answer this question, it is useful to review how research generates what economists call *public goods* and *private goods*.

A *public good* is a product or service whose benefits are *not excludable*. A streetlight is a public good when the fact that it lights my way does not prevent it from lighting yours as well. Science's public goods include nonexcludable knowledge that can improve quality of life. In other words, the fact that one person uses public-good science to improve his or her decisions does not exclude others from using the same science to improve their decisions.

A *private good* delivers excludable benefits. An apple is a private good in the sense that when one person consumes it, others can no longer eat that apple. Science's private goods include jobs, salaries, and benefits, certain opportunities to conduct research, specific teaching and public service experiences (for those who derive positive net benefits from such activities), and other personalized benefits that accrue from doing scientific work.

I will now use the terms *public good* and *private good* as markers for who can own and use a scientific finding. The key difference between *public-good science* and *private-good science* is the accrual and distribution of what economists call *rents*—that is, benefits of conducting science. The nonexcludability of public-good science means that certain rents accruing from it can be distributed broadly.

For an example of how public-good science produces broadly distributed rents, suppose that one research group produces a finding that 100 companies use to improve quality of life. In this case, the people that the companies serve benefit from the finding. Because the finding is nonexcludable, society gains an additional benefit by paying for the discovery only once (rather than 100 separate times)—and then letting lots of people use it.

Private-good science can produce more exclusive rents. Rents can become exclusive when corporations use scientific information to establish strategic and financial advantages over competitors. When corporations narrowly channel large rents to a small group of people (i.e., executives, owners), these rent collectors have incentives to hide information from rivals. Thus, profit motives limit broad distribution of certain types of scientific findings.

With such comparisons in mind, some people support public-good science because they want science to produce broadly distributed rents. However, public goods can be difficult to obtain. When public-goods production requires significant expenditures of time, money, or scientific infrastructure, incentives to "free ride" emerge. If, for example, private sector actors can get public-goods providers to pay for research that will improve their profits, they benefit from letting others pay the cost. When many private sector actors have the same incentive, public-good science is undersupplied.

The nonexcludability of public goods often reduces individual incentives to produce it. Recognition of this fact motivates governments and others to fund scientific work under the expectation that resulting discoveries will be made widely available.

At the same time, private sector incentives appear necessary for converting some public-good discoveries into more usable forms. Apple's work on technology and design generated substantial public value by converting elements of public-good science into widely beloved products. To achieve these goals, Apple used public-good science as the basis for many of its own "private" studies that were not shared with others. The fact that millions of people buy and are happy with Apple products (even after paying a premium for these goods) is a credible sign that Apple's work creates significant social value. Private-good science that comes from public-good science can produce important benefits.

In sum, basic and applied research can create public goods and private goods. While the benefits of public-good science can be broadly distributed, they are also likely to be undersupplied by private sector actors due to the incentive for free riding. For that reason, public sector actors, private sector actors, and broad social constituencies can benefit from public sector funding of public-good science. With this realization in hand, the question becomes: will the public sector choose this path?

The Role of Government Funding

Decisions about whether and how to fund public good science are made in different types of organizations. Some of these organizations, such as legislatures, are in the public sector. Others, such as philanthropies, are in the private sector. In any of these organizations, general, nonspecific arguments about the value of public-good science are not typically sufficient for funding. Many prospective funders must also navigate the rules and norms of their organizations.

In legislatures, for example, a decision to fund public-good science requires the political support of a sufficiently large legislative coalition. Obtaining such support depends on the ability of legislators and scientists to coproduce explanations for why basic-applied research bundles provide substantial value to the nation. Why bundles? Bundles allow funders to balance desires for short-term results with the recognition that basic research often takes more time to produce potentially massive payoffs.

In competitive funding environments, decisionmakers who seek to defend research funding are often asked to document the endeavors' benefits to society. For legislators, these questions often come at key moments, such as legislative hearings or in the heat of electoral campaigns. To defend public-good science funding, these and other prospective funders need to persuade pivotal stakeholders that the activity generates significant and distinctive net benefits to key constituents. When decisionmakers are under pressure to produce these benefits quickly, applied research is in greater demand. In such circumstances, even people who believe that basic research is essential gain incentives to advocate for basic applied research bundles.

In many cases, prospective funders must do more than articulate benefits because there is often competition for available funds. If competitors can argue that other programs, or reduced taxes, will create greater social value than science funding, those who want support must be willing and able to make arguments about the benefits of science funding relative to alternatives.

The idea of comparing science to other activities is anathema to many academics. Some members of the academic advancement ecosystem say "*they* should fund science at much higher levels." This is an interesting suggestion, but how much higher should the funding be?

The amount of resources available for any government or private funder is far smaller than the full set of activities to which the resources could be allocated. For example, science can study numerous topics in an infinite number of ways. So, "everything" can't be funded because "everything" is infinite, while time and available funding are finite. Hence, tradeoffs of real options against other real options must be made.

Comparing science's benefits to "doing nothing" is another approach that some members of the academic advancement ecosystem use to try to stack the deck in favor of their desired activities. While such arguments may carry the day in sympathetic environments, they are less effective when savvy competition is present. For example, if a science advocate asks "what would happen if we didn't conduct this study?" the most correct answer from a competitor or prospective funder is that "we would not have your findings but would have the benefits of the alternate activities on which those funds were spent." So, current and prospective social science funders have incentives to fund scientific activities that produce valuable material benefits in comparison to other activities that the same funds could support.

Other pressures can induce decisionmakers to vary the amount of science funding from time to time. Funding-related uncertainty is problematic for several reasons. For example, if researchers and institutions cannot rely on continuous funding, they may fear investing time and effort in projects that will be terminated before the research can produce valuable public and private goods. To engage in many types of basic research, researchers and institutions need to operate under the assumption of continuous long-term funding commitments.

Long-term commitments, however, produce their own challenges. These challenges extend beyond the difficulties often associated with explaining basic research's benefits to constituents. Long-term commitments can create incentive problems within the academic advancement ecosystem. They can lead institutions to offer a variety of excuses for the absence of short-term deliverables. In some cases, the nature of a basic research project mitigates against short-term deliverables—so excuses are valid. In other cases, people who argue for continued funding appear motivated more by a desire to preserve their income and less by a desire to find ever more effective ways to produce valuable public goods. Since the path of progress in basic research can be nonlinear (i.e., success can follow different kinds of failure), it can be difficult for prospective funders to identify which basic research endeavors merit continued support.

For all the reasons stated above, maintaining and increasing support for basic and applied research will require scientists and science institutions to demonstrate the distinctive value of basic-applied science bundles in comparison to plausible alternatives. For funders who face time pressure, such as elections or impatient governing boards, sustaining a broad supportive coalition will require the bundle to produce short-term deliverables that have high value for key stakeholders. These deliverables, along with iconic reminders of the benefits of basic research projects, can help organizations build broader and more stable support for socially valuable public-good research. The reminders are especially important when increasing competition in information and meaning marketplaces are considered.

This way of describing science's benefits also allows prospective funders to claim kinds of credit that are essential for sustaining funding decisions. Legislators, for example, value opportunities to tie themselves to popular outcomes that give them leverage when bargaining with other government actors. Many decisionmakers earn such leverage when funding decisions produce iconic examples of greater effectiveness in the achievement of high-value social goals.

A STRATEGY FOR INCREASING THE PUBLIC VALUE OF SOCIAL SCIENCE

An effective case for continued public support of scientific activity depends on researchers' and science organizations' ability to answer the questions "does the activity provide benefits that are more valuable than the resources that are allocated to it?" and "does the activity provide benefits that are more valuable *than the other activities to which those resources could be allocated?*" Answering these questions depends on science having attributes that allow it to create distinctive social value.

Science creates value only if people can use its products to create new knowledge. (Not all information produces knowledge. Knowledge is created only if people integrate information into their prior beliefs in particular ways). Moreover, knowledge has value only if it can help people achieve beneficial outcomes in subsequent decisions. Information and meaning that do not influence knowledge or affect decisions create no value for its intended recipients.

In a competitive marketplace, individual researchers and science organizations can sustain or increase demand for their work only if they can demonstrate that this work produces benefits that are large with respect to its costs and in comparison to its competition. Therefore, if individual social scientists want more opportunities to pursue discovery, inform policy, make money, or have satisfying jobs, the social scientific community must:

- increase competence at *communicating scientific information*;
- increase commitments to *transparency practices* that allow consumers of social science to better understand what our claims do—and do not—mean; and
- commit to *greater stakeholder engagement*.

I now discuss the rationale for each of these steps and then explain why all three are necessary.

Communication

By science communication, I mean the use of language, metaphors, analogies, and examples to convey the content of scientific information to people other than the researchers who conducted the study. A challenge for science communicators is to choose language that leads others to have accurate beliefs about scientific content (Kahan 2010; Lupia 2013; Druckman and Suhay 2015).

Since many scientific phenomena are higher-dimensional phenomena than the language that we use to convey information to others, science communicators are forced to engage in an act of *compression*. Compression entails decisions about what attributes of a scientific phenomenon to emphasize, the order in which attributes are presented, and the language used to describe each attribute. The question for science communicators is not *whether* to compress, because they have no choice in the matter. The question is how to do so effectively.

Complicating matters is uncertainty's role in science. The scientific method, while well suited to evaluate a well-formulated conjecture's consistency with carefully collected evidence and rigorous, reproducible logic, is not well suited to eliminate uncertainty from explanations. Thus, compression entails choices about whether and how to describe uncertainty associated with a scientific finding.

The effectiveness of any compression strategy depends in part on the communicator's objectives and in part on the target audience's abilities and motivation. Sometimes a target audience has low capacity. In many such cases, likely outcomes include:

- being completely ignored;
- the audience paying attention and drawing a false understanding of *all* aspects of the phenomena; and
- the audience paying attention, drawing a true understanding of certain elements of the phenomenon, and not drawing a false understanding of other elements.

A communicator who prefers the third outcome is challenged to find examples, metaphors, and analogies that lead the target audience to reconcile their postcommunication beliefs with true attributes of the scientific phenomena. An implication is that audience characteristics affect which compression strategies will be most effective. Effective communication requires understanding an audience's motivation and capabilities.

Attention is an important bottleneck in such attempts. Many science communicators overestimate their target audience's attentive capacity (Lupia 2013, 2016). When capacity is limited, effective communication entails finding a nonempty intersection between the scientific phenomenon in question and content whose relevance (from the prospective learner's perspective) is sufficient to draw and sustain the required attention. If such an intersection can be found, science communicators are more likely to have an audience that uses scientific information to inform their decisions. For example, instead of giving an abstract theoretical presentation of a phenomenon, such as how the design of a retirement system affects employee life outcomes over time, audiences may be more receptive to iconic examples of how different choices affect the likelihood of particular types of outcomes.

If this type of advice seems reasonable, it is also unusual in the context of how researchers are trained. Many scholars have professional incentives to present their research at academic conferences and to publish in journals within their disciplines or disciplinary subfields. If scholars are taught to communicate, the emphasis is on these venues. Many scholars, for example, regard the "ideal conference discussant" or the "ideal journal reviewer" as someone who shares their research interests and methodological commitments. Hence, scholars write for these "ideal" types—using jargon and examples that are specific to these groups. They never learn how to effectively communicate with broader audiences.

To increase the value of social scientific work, we need more people who can convey relevant information to more audiences that can use the information to inform their own decisions. In other words, we need skilled compressors. In my discipline, political science, the *Washington Post*'s Monkey Cage and the *New York Times*'s Upshot are vehicles for conveying social science content more broadly. Both outlets feature leading academics as regular columnists. Other entities, including the National Academies of Science, Engineering, and Medicine (2016), are engaged in comprehensive attempts to improve science communication.

Individual scholars who want their work to influence larger numbers of decisions can increase their capacity by learning more about target audiences' core concerns and aspirations. These phenomena drive attention and fuel kinds of information processing that make the formation of new memories (i.e., learning) more likely (Lupia 2016). To help target audiences form more accurate memories of scientific phenomena, communicators must be diligent in using sound information and accessible examples, metaphors, and analogies that, when integrated with prospective learners' prior knowledge, biases, and penchants for motivated reasoning, produce more accurate inferences about the subject matter, including relevant aspects of research design and associated uncertainty, where possible. These and other efforts are necessary to produce accessible and accurate understandings of scientific phenomena—the kinds of outcomes that are better suited to improve quality of life in more circumstances for more people—and the kinds of outcomes that can help more people realize the value of social science.

Transparency

Researchers work hard to have their studies seen as legitimate and credible. In the ideal version of science, we evaluate the extent to which proposed knowledge claims are consistent with carefully collected and curated observations and the observations' rigorous and replicable logical implications. This work can help us distinguish empirical regularities from mistaken beliefs, self-serving boasts, and wishful thinking. When science is working as it should, it can help individuals, communities, businesses, and nations make decisions that can improve our quality of life.

Science is not working as it should. Ideally, science gives people who practice it a greater capacity for honesty in explaining how they know what they claim to know. Instead, the academic advancement ecosystem produces incentives that mitigate against important types of honesty. Young scholars, who are often seeking to survive in competitive research environments, are under pressure to behave in accordance with these incentives. These learned behaviors often continue, becoming part of established practices in subfields and disciplines.

One implication of these honesty-mitigating incentives is that scholars in many fields tend to circulate only certain types of results. This phenomenon is known as *the file-drawer problem*—a situation where null results are hidden from view. Others learn statistical techniques that can turn unflashy results into flashy ones. This phenomenon is known as *p-hacking* or *significance fishing*—a situation where people design statistical models to make a certain type of finding more likely to appear. Because of these incentives and practices, even leading scientific journals can present misleading portraits of what scientists actually discover (Franco, Malhotra, and Simonovits 2014).

To see how these practices can impede science's ability to improve quality of life, consider an example. A new medicine is put on the market. A doctor seeks to learn about which type of patients the medicine will help or hurt. The doctor reads the published academic literature and sees that all peer-reviewed publications show the medicine having a positive and statistically significant effect on patients. In fact, she sees a scientific consensus on this point. So, she treats patients based on the belief that the medicine always works. Studies with different findings (e.g., null results) were not submitted for publication or were not published. These studies reveal cases where the medicine is ineffective or worse. Patients suffer unnecessarily.

In other words, the incentives described above can lead to incomplete documentation of what scientists *actually observed*. If publication biases cause only certain observations to be published, and if researchers try to increase their publication odds by engaging in p-hacking and placing null results in file drawers, then the papers that scholars send to journals would offer misleading pictures of the work that researchers actually did. As the difference between what researchers observe and what they publish grows, common interpretations of scientific consensus (as credibility markers) weaken. Practitioners who interpret consensus as reflective of the totality of scientific knowledge on the topic (as the doctor and patients in the example above) suffer the consequences (see, e.g., Nosek and Errington 2016). When publication biases, p-hacking, and file-drawer problems operate at a large scale, what appears to be a scientific consensus is in fact a skewed image of what science has actually discovered. Consensus becomes an illusion.

This is tragic. Science can have so many positive effects on life, but its capacity to have these effects depends on the extent to which scientists are honest with one another and with the public. This means sharing data when doing so doesn't endanger human subjects. It means using the leverage of funding agencies, research institutions, and journal editors to generate incentives for scholars to offer all the details of a research design that allow findings to be more accurately interpreted (see, e.g., Lupia and Elman 2014). It means altering professional incentives in ways that induce more of us to share all our discoveries, even the ones that aren't so flashy.

If we do this, more people would have more opportunities to understand what scientific claims do and do not mean; people who believe that scholars use "the mantle of science" to disguise self-interest—or to impose unwelcome moral perspectives—would know more about the conditions under which a finding was produced. With greater transparency, people can, if they wish to, make more knowledgeable judgments about whether our findings apply to them. By being more honest with ourselves and with each other, we can provide new ways to facilitate more accurate interpretations and, hence, provide more valuable insights to more people.

STAKEHOLDERS

We don't listen very well.

This is a common stereotype of academics. It is the root of "ivory tower" stereotypes. We are aloof. We only speak with each other. And we don't get out much.

There is truth in all of this.

Of course, there are also powerful defenses of the academic ecosystem. Universities and research centers offer the time and space to work through complex conceptualizations, competing conjectures, and contrasting counterfactuals. These venues facilitate the destruction and regeneration of conceptual frameworks, sequences that can improve knowledge. Yet academics should also recognize that the time, space, and other resources directed to scientific venues are not an entitlement. These resources come with commitments.

To justify public and private support of science, science must be responsive to stakeholders' needs. Engagement is important because social science can study many topics in an infinite number of ways. Society, however, can only support a small fraction of all possible scientific endeavors. Moreover, many social entities will want to support fewer or different kinds of inquiry as transformed marketplaces make potential substitutes for some kinds of research more freely available.

It is particularly important for people who want to increase support for science to understand stakeholders' values. I define values as do Shalom Schwartz and Wolfgang Bilsky. They define values as: "(a) concepts or beliefs, (b) about desirable end states or behaviors, (c) that transcend specific situations, (d) guide selection or evaluation of behavior and events, and (e) are ordered by relative importance" (1987, 551). Values affect the types of information to which prospective learners are willing to pay attention.

The demand for, and reception of, scientific information will depend on the distribution of values within a decision context. I present the range of possible circumstances as four mutually exclusive and collectively exhaustive cases. The four cases differ in whether decisionmakers share relevant values and whether they perceive greater knowledge of science as helping them achieve shared aspirations.

1. Everyone shares relevant values. Scientific knowledge is commonly perceived as a means to achieve shared aspirations. By providing task-relevant information ef-

fectively, science can help groups achieve highly valued competences in these circumstances.

2. People have diverse values but perceive mutual benefit from certain types of collective action. For science to affect this decision context, it must offer information that is relevant to group members' overlapping concerns while also transcending individual differences. Otherwise, controversies about the value of science (e.g., concerns about the "politicization" of science) will result. Learning how to recognize commonalities and differences in values can affect communicative effectiveness in these circumstances.
3. People have diverse values and do not initially perceive that they can benefit from certain types of collective action. If science is to play a role in these situations, group members must have a way to learn that they have previously unperceived common interests. Consider, for example, a study that shows rival groups that working together can help them achieve a goal that they both value. If that happens, the situation takes on characteristics of case 2.
4. People share all relevant values, and scientific knowledge is a perceived threat to shared aspirations—or, people have diverse aspirations and science cannot persuade members of previously unrecognized common interests. In these circumstances, there will be no demand for science from the group as a whole. Subgroups may desire information about science to achieve their objectives, but others need not see the pursuits as legitimate or useful.

If decisionmakers see scientific information as helping them to advance their shared goals, they will embrace science (case 1). They will see it as essential to progress. Indeed, decisionmakers in these circumstances are likely to question the intelligence or motives of anyone who makes contrary arguments. By contrast, if decisionmakers with a values consensus see science as threatening to their values and as not necessary for them to achieve their aspirations, this situation is fertile ground for rejecting science (case 4).

When value diversity leads people to prefer sufficiently different outcomes, it becomes harder for them to draw a shared conclusion about the value of science (cases 2 and 3). For example, when an action makes one subset of a group better off at the expense of another, getting the net losers to accept the action as legitimate requires an explanation of why this tradeoff is preferable to other tradeoffs that could be made. This situation is fertile ground for science to be viewed as "politicized."

So, while social scientists often tell themselves, and one another, that our work is "useful" or "valuable" to certain types of stakeholders, we rarely check in with our imagined end users. More than a few stakeholders are not getting what they want or need from us. We can serve others better if we understand more about what they need.

Individuals and institutions can engage with stakeholders (governments, nonprofits, citizens, students, foundations) at multiple moments during a research process. Such engagement is about more than asking for money. The reason to engage is not to seek advice on scientific practice; it is to seek counsel about what kinds of work make valuable insights more likely. Such engagement can change public perceptions of our work and increase the efficiency with which we serve others.

Why It Matters

Researchers and institutions that want private and public sector actors to support science must be able to demonstrate that scientific knowledge confers value that other forms of knowledge do not. To demonstrate such value in an increasingly competitive marketplace for information and meaning, it is necessary to have better communication, transparency, and engagement. Taking only one or two of these three steps is not sufficient. This is true for several reasons:

- Greater transparency and stakeholder engagement without better communication can produce potentially valuable work that is presented ineffectively.
- Better communication and stakeholder engagement without sufficient transparency can produce incentives to oversell research implications. Without sufficient transparency, subsequent communication can reduce, rather than increase, others' understanding of the relevant knowledge base.
- Better communication and increased transparency without sufficient engagement can cause even well-intentioned scientists to ignore critical stakeholder needs.

The communicative competition that technology enables is not strictly numerical. Evolving communication technologies permit mass distribution of many different types of claims. To demonstrate science's distinctive value, it must be shown to create value that is different than other ways of knowing. What is science's competition in the domain of "knowing"?

There are four ways of "knowing" something. That is, there are four collectively exhaustive but not mutually exclusive bases for defending a knowledge claim's truth-value.

1. *Appeals to metaphysics*. A person asks others to believe in a knowledge claim's veracity because of the claim's relationship to phenomena that are beyond most people's ability to perceive directly. If some people (e.g., priests) can plausibly claim to have greater access to this metaphysical knowledge base than others, then they will also be seen as having special abilities to determine the truth-value of relevant knowledge claims. A common manifestation of this way of knowing is the use of theology in religion. This way of knowing remains widely accepted as a source of moral and ethical credibility. Ap-

peals to metaphysics remain influential throughout the world.

2. *Appeals to personal experience: Testimony.* A person conveys an experience or set of experiences that they have had. They describe their perceptions of these experiences. They describe their feelings about these experiences. They testify to the validity of their descriptions. They use their special access to this knowledge base to clarify whether other propositions are consistent with their lived experience. This way of knowing is a primary basis of many attempts to educate others. It remains influential throughout the world.
3. *"The space between God and man": Culture.* This is the set of perceptions and propositions about shared experience that can give meaning to the present and future. This way of knowing manifests as appeals to art, tradition, or history as sources of knowledge. Experts in these areas use special access to relevant knowledge bases to make claims about meaning in our individual and collective lives. This way of knowing remains influential throughout the world.

Then there is a fourth way of knowing, which I will first describe through an analogy. Suppose I have a device that I can hold in my hand. It has a red circular button on one end. A series of mechanical parts and electronic wires attach the red button to a light bulb at the device's other end. I press the red button. The light turns green. Then, another person, indeed any other person, asks, "what happens if I press it?" With the fourth type of knowledge I am describing, specifically science conducted in accordance with best practices, I would reply, "The same thing happens. The light turns green no matter who presses the button."

An especially valuable attribute of science, this fourth way of knowing, is that it is available to anyone. It doesn't matter if you are a Christian, a Jew, a Muslim, or an atheist. It doesn't matter if you are rich or poor, young or old, tall or short. Your attachment to, or distance from, a set of cultural commitments is less relevant than for other types of knowledge claims. If the claim is communicated effectively and if the communicator commits to a truthful description of the device, then the truth-value of the claim need not depend on who made it. The light turns green for all.

Of course, questions may be asked about whether alterations to the machinery or to the context would affect the device's operation. If we change a lever, will the light turn green? If we reduce the temperature of the room, will the light turn green?

These are reasonable questions, particularly if there is social value in understanding whether the claim's relevance depends on the shape of the lever or on assumptions about room temperature. A core scientific commitment is to answer these questions honestly, where answers can include "yes, I can show you that the light turns green with a different lever" and "no, if the room is cold enough, the device breaks," and "I don't know because no one has conducted this study in the context that you describe and our existing theories do not address that particular case."

In sum, science is not the only way of knowing. In cases where substantial moral and ethical concerns are at play, science may not even be the most effective or most valuable way of knowing. But science's distinct value-creation opportunities come from producing knowledge claims that are not dependent on others' religious, cultural, or personal experiences. When such claims are competently conveyed (with accurate inference being the primary goal), are conducted in ways that narrow the gap between what researchers observe and what they report, and are responsive to stakeholder needs, then more science can produce more value for more people. If it does these things, then it can also produce more opportunities to pursue discovery, inform policy, make money, and create satisfying jobs in an increasingly competitive marketplace.

CONCLUSION

While every current scientific researcher, science educator, science advocate, science journalist, science funder, and science student was learning about science, conducting science, or working to promote science, the world changed. The changes altered how we communicate and made it easier to spread unprecedented amounts of information across the globe.

These changes have upended the marketplace for the two principal products that scientists sell—information and meaning. As a result, many people are raising important questions about social science's public value. Researchers and institutions that want more opportunities to continue their work need more persuasive answers.

Now is the time. Improved communication, transparency, and engagement offer a path toward such outcomes. By following that path, we can give people new reasons to support social science and, hence, give social scientists new opportunities to serve others more effectively.

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REFERENCES

Cantor, Eric and Lamar Smith. 2013. "Rethinking Science Funding." *USA Today*, September 30. http://usat.ly/JrdwZU.

Druckman, James N. and Elizabeth Suhay. 2015. "The Politics of Science: Political Values and the Production, Communication, and Reception of Scientific Knowledge." *The Annals of the American Academy of Political and Social Science* 658: 6–15.

Duarte, Jose L., Jarret T. Crawford, Charlotta Stern, Jonathan Haidt, Lee Jussim, and Philip E. Tetlock. 2015. "Political Diversity Will Improve Psychological Science." *Behavioral and Brain Sciences 38.* doi:10.1017/S0140525X14000430.

Franco, Annie, Neil Malhotra, and Gabor Simonovits. 2014. "Publication Bias in the Social Sciences: Unlocking the File Drawer." *Science* 345: 1502–5.

Kahan, Dan. 2010. "Fixing the Communications Failure." *Nature* 463: 296–7.

Lupia, Arthur. 2013. "Communicating Science in Politicized Environments." *Proceedings of the National Academy of Science* 110: 14048–54.

———. 2016. *Uninformed: Why People Know So Little about Politics and What We Can Do about It*. New York: Oxford University Press.

Lupia, Arthur and Colin Elman. 2014. "Openness in Political Science: Data Access and Research Transparency." *PS: Political Science and Politics* 47: 19–42.

National Academy of Sciences. 2016. "From Research to Reward." http://www.nasonline.org/publications/from-research-to-reward.

Nisbet, Matthew. 2017. "Ending the Crisis of Complacency in Science." *The American Scientist* 105 (1): 18. http://www.americanscientist.org/issues/pub/2017/1/ending-the-crisis-of-complacency-in-science.

Nosek, Brian A. and Timothy M. Errington. 2016. "Reproducibility in Cancer Biology: Making Sense of Replications." *eLife*. doi: 10.7554/eLife.23383.

Pielke, Roger A. Jr. 2007. *The Honest Broker: Making Sense of Science in Policy and Politics*. New York: Cambridge University Press.

Prewitt, Kenneth and Robert Hauser. 2013. "Applying the Social and Behavioral Sciences to Policy and Practice." *Issues in Science and Technology* 29 (3). http://issues.org/29-3/prewitt.

Schwartz, Shalom H. and Wolfgang Bilsky. 1987. "Toward a Universal Psychological Structure of Human Values." *Journal of Personality and Social Psychology* 53: 550–62.