

## Elegant Science Narratives and Unintended Influences: An Agenda for the Science of Science Communication

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*Scientists must share their work with the public in order to promote science-based public discourse and policies. These acts of science communication are often evaluated in terms of their ability to inform (i.e., introduce accurate and accessible information) and engage (i.e., capture interest and maintain attention). We focus on a third basis by which science communication might be judged, influence. Science communicators exert influence when they shape public opinions in ways that affect their judgments and decisions, alter social and political discourse and debate, and guide social policy. We describe how the influence of any given science communication should be evaluated independent of its ability to inform or engage. We give particular attention in our analysis to the often unintended influences that well-meaning science communicators can have. We begin by considering ways that communications from climate scientists might reduce support for climate regulation and communications from health scientists might undermine public health. We then develop two “case studies,” drawn from social psychology. These show how popular media descriptions of the science of racial bias and disadvantage might in some cases exacerbate racial discrimination and reduce concern for the disadvantaged. We close with an agenda for a more vigorous science of science communication; one that engages in two complementary pursuits. Critical studies identify the dominant and consequential effects that popular science communicators are having on public perceptions. Strategic studies advance and empirically*

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*test communication strategies that scientists can pursue to reduce—rather than exacerbate—social problems.*

Scientists who communicate effectively with the public can promote broader support for the sciences, encourage greater funding of research, increase the influence of science on public policy, and inspire tomorrow's scholars to join the scientific ranks. For these and many other reasons, one could argue that it is in the interest of all scientists that they and their colleagues engage in "outreach" to promote broader science literacy and knowledge. The formal term for this type of outreach is *science communication*, defined as the communication of science-related information by scientists to the general public or to smaller subgroups of nonexperts. Science communication contrasts with *scientific communication*, which is defined as the communication of science-related information by scientists to other experts or scientists (Burns, O'Connor & Stocklmayer, 2003). There are two distinct ways in which a scientist's shift from scientific to science communication is typically judged.

First is the extent to which the science communication *informs*. Scientists inform nonscientists when they promote veridical knowledge and understanding of scientific logic, methods, and theories, and when they educate members of the public about the true nature of scientific findings. This is no easy task. By virtue of their advanced training and absorption in the technical aspects of their work, research scientists often find themselves unable to judge what information nonexperts know versus do not know, and what claims they can versus cannot comprehend (Fischhoff, 1999)—a problem often referred to as the "curse of knowledge" (Camerer, Loewenstein, & Weber, 1989; Heath & Heath, 2007). Further complicating matters, scientists are trained to communicate through the use of specialized and technical terms, so that they can more efficiently communicate complex concepts to one another. This linguistic practice can add precision in communications between scientists, but it can come off as the use of "jargon," as unintelligible, or as simply pretentious by the audiences they might wish to inform.

Such risks point to the second dimension on which science communications might be judged—the extent to which they *engage*. Scientists engage their audiences when they capture their attention and maintain their interests (ideally for sufficiently long periods of time that they are also able to inform their audiences). In its strongest expressions, engagement crosses the line into entertainment, such that audiences seek out science reporting for their personal enjoyment and enrichment. This second task can also be challenging to the scientists. To capture the interests of general audiences, researchers must often look past their personal reasons for being excited about their chosen topics to instead locate the "hooks" they can employ to excite less involved and less informed audiences.

In *A Scientist's Guide to Talking with the Media*, Hayes and Grossman (2006) advise researchers to look for "short and punchy" ways of communicating (p. 145).

One rhetorical strategy often promoted is for science communicators to fold their science descriptions into a larger narrative arc, adding elements of storytelling to what might otherwise be viewed as a dry presentation of fact (Dahlstrom, 2014; Downs, 2014; Kaplan & Dahlstrom, 2017; Krzywinski & Cairo, 2013; Olson, 2015). Communication scholars have given considerable attention to the potential tension that can arise between the desire to engage and the obligation to inform (e.g., Katz, 2017; Yaros, 2006). Professional science organizations have also waded into such debates, providing guidelines to help scientists know when their attempts to engage cross the line into misinformation or the “hyping” of results (see Weingart, 2017).

### A Focus on Science-Communication Influence

Here, we draw attention to a third way that science communications might be evaluated, as well as the distinct challenges this concern introduces to the science communicator: *influence*. Science communicators exert influence when they shape the opinions and perceptions of general audiences or other nonexperts in ways that have consequential effects on their personal judgments, decisions and life outcomes, or when the communication shapes public perceptions in ways that alter social discourse, practices, and policies. Although the influence that science communication might have on any given group will depend in large part on the communicator’s success at informing and engaging members, we treat influence as a distinct dimension, one that can be evaluated on its own terms.

Research on health communication illustrates the utility of distinguishing the informational (or educational) value of a message from its influence. Scholars in this domain often find that attempts to educate the public about the potential negative health consequences of a risky behavior are not sufficient to exert influence. More is frequently needed to communicate health science in ways that will affect public health decisions and outcomes (e.g., Grier & Bryant, 2004; Rice & Atkin, 2012; Rimer & Kreuter, 2006; Whitehead, 2004). As just one example, messages that teach teens about the dangers of sexual risk taking can raise their knowledge levels, even while failing to affect their sexual decision making (Fisher, Fisher, & Shuper, 2009).

In science communication, as opposed to health communication, the distinction between information and influence has been given less emphasis. This is perhaps because a dominant model guiding evaluations of the effectiveness of science communications, particularly their potential impact on social policy, is the *information-deficit model* (Bauer, Allum, & Miller, 2007; Dickson, 2005). The key assumption in this approach is that public resistance to science, including opposition to science-based recommendations and science-informed social policies, arises from lack of knowledge and understanding of scientific principles and

findings. This model draws a sharp line between scientists, who possess a high degree of science knowledge, and members of the general public, who have more limited understandings. The implication is that science communicators who wish to promote science-informed public policies (i.e., to exert influence) should focus their attention on educating the public—raising their understandings of scientific methods and results, such that the latest empirical research will inform public discourse and social policy.

The deficit approach helps draw attention to gaps in public knowledge that stand in the way of more informed social policy, but it is often limited as a comprehensive influence strategy. Although it is certainly true that knowledge of science is necessary for any given individual or group to make a science-informed decision, it does not follow that knowledge of science, in and of itself, will be sufficient to lead any given individual or group of individuals to make science-based decisions. To the contrary, humans can be quite adept at separating their knowledge from their decisions. Consider as an example the medical doctor who knows and accepts the current science on how best to maintain heart health but who, as a result of his diet, exercise habits, and alcohol consumption, finds himself at elevated risk of heart attack.

Similar disconnects can be found in the ways that science knowledge often fails to predict public attitudes and actions. Research on climate science suggests, for instance, that higher levels of scientific literacy and science comprehension are not highly predictive of increased support for “green” climate policies. In general, political beliefs and social ideology are of greater value than veridical science knowledge, when predicting concern for climate change or environmental behaviors (Hamilton, 2011; Kahan et al., 2012). This suggests that to promote public policies that are informed by climate science, climate science communicators must do more than simply inform the public of current research. They should also find ways to confront the beliefs and ideologies that in some instances promote resistance to science-based recommendations (and see Nisbet, 2005; Nisbet & Goidel, 2007 for parallels in the biological sciences). Put another way, concerned climate scientists should also seek to influence and not simply inform the public.

### *Just the Facts*

We suspect that many scientists might resist any suggestion that they should focus greater attention on how to exert influence. If scientists pursue science communication with this purpose—if they try to do more than simply engage and inform the public and instead work actively to shape attitudes and opinions in ways that affect social and political discourse, debate and policy—they risk jeopardizing the special status scientists can hold in society. A core value of science is the neutrality of its methods and the objectivity of results, and so

many scientists will feel most comfortable acting as dispassionate, apolitical, and disinvested communicators of facts.

The problem in such an analysis, as we see it, is that science communicators do not get to shut off the social and political ramifications of their findings, simply because their results were generated from a disinterested vantage point, via neutral scientific methods. Researchers studying topics with political and/or partisan significance risk becoming political and/or partisan agents, each and every time they set out to (impartially, dispassionately) communicate their (objective, unbiased) science to the public. What we are suggesting is that the neutrality of the science in no way provides assurance of the neutrality of the science communication. Researchers who conduct research in controversial areas—climate science, stem-cell research, racial bias—cannot simply “opt out” of the controversies that shape how others will interpret and react to their findings. The question to ask from this perspective is not whether a science communicator does or does not intend to exert influence, but rather whether a science communicator’s influence is as it was intended.

### *Unintended Influence*

In the analysis that follows, we set aside the notion of objective and neutral science communicators to draw attention to the ways that they might exert influences, independent of the objectivity and neutrality of their science and method. We attribute “intentions” to science communicators, even when their personal hope is to introduce unvarnished empirical facts to the public. We impose these interpretations on other scientists by adopting one simple working assumption: *We posit that scientists wish to make the world a better place.* We believe that scientists who study social problems do so because, uniformly, they want to see these problems diminished and not exacerbated. We thus believe it reasonable to label the influence of a researcher’s science communication as *unintended* whenever its result is to make worse the very problem the scientist is studying.

Central to our focus on unintended influence is the view that well-meaning scientists can communicate their research to general and nonexpert audiences in ways that engage their audiences as intended (i.e., grabbing and sustaining their attention), that inform their audiences as intended (i.e., raising their knowledge of scientific methods and results), but that also influence their audiences in ways unintended. Consider as an illustrative example the potential ways a general audience might react to science reporting that introduces recent advances in geoengineering (the deliberate manipulation of the atmosphere to counteract the effects of global warming). It is entirely possible that such reporting will lead to outcomes that most climate scientists would want, such as increased public support for geoengineering and greater understanding of human threats to world climate. But unintended effects can also occur and so these should be considered.

It may be that by increasing knowledge of and interest in geoengineering, science communicators for this discipline *increase* public consumption of fossil fuels. This could happen if the general public comes to believe that innovative geoscientists will someday figure out how to save our planet, no matter what choices humans make now. If that is the case, public reasoning may go, there is no harm in running the air conditioning while away or driving a gas guzzling car for daily commutes. Unfortunately, recent research suggests that such a possibilities might be more than hypothetical. In a recent analysis of over 1,500 news articles, Anshelm and Hansson (2014) found that in journalistic representations of geoengineering, common storylines emphasized the inadequacy of interventions that are premised on changing human behaviors (through political and regulatory reforms). Geoengineers are presented in these storylines as the answer to this problem, because they offer “pure technology” solutions that can address climate problems brought on by human activity. We do not yet know what impact such journalistic representations of geoengineering are having on public opinions and behavior, but it seems plausible that they work against efforts to promote greener consumption habits, making this a hypothesis worthy of future study.

One might argue that in this particular example, we are positing unintended influence because a false narrative has been advanced by science reporters, not because an accurate narrative has been advanced by the scientists themselves. Anshelm and Hansson (2014) is a reminder that journalists, bloggers, and other media agents at times will “hype” science in ways that actual scientists would reject. One might then argue that their study is merely a cautionary tale, reminding scientists to be vigilant in their interactions with media and to do what they can to ensure that any “storytelling” that results is grounded in fact. Although we agree that scientists should be cautious in their media interactions, we stress that unintended effects can arise even when scientists take full charge of their own science communications. Here again, research on health communication is informative.

Health communicators often present veridical research findings in the hopes of positively impacting public health. Despite the best of intentions, however, such efforts commonly “boomerang” and make matters worse (Cho & Salmon, 2007). Considerable research suggests, for instance, that when health communicators seek to promote public health by drawing attention to research linking risky actions (e.g., cigarette smoking, unprotected sex) to poor health (e.g., cancer, sexually transmitted disease), the appeal of such risk taking can actually *increase* in at-risk groups (e.g., Blanton, Gerrard, & McClive, 2013; Dillard & Shen, 2005; Fishbein, Hall-Jamieson, Zimmer, von Haften, & Nabi, 2002; Rogers & Mewborn, 1976; Wolburg, 2006). Similar effects have been found in climate science, where deliberate attempts to educate the public as a way of increasing support for climate regulation and climate science can move public opinion in the

opposite direction, lowering support for moves that might mitigate climate change (see Hart & Nisbet, 2011; Lewandowsky & Oberauer, 2016).

These examples illustrate that science communicators can be damned if they do and damned if they do not. If they take a relaxed approach to communicating with the public, they might lose control over the narrative of their own research and watch as science journalists and other media agents promote their findings in ways that are problematic. In contrast, if they work deliberately to package their research to produce desired results, they might inadvertently push their audiences in the opposite direction. Due to awareness of this dynamic, many scientists might wish to disengage from science communication altogether, focusing their attention instead on thoughtful, scientific exchanges with their peers. How much “outreach” a given scientist pursues with the public is, in our view, a personal choice. However, disciplines must find ways to communicate, if they are going to inform social and political discourse, debate and policy. We thus think it important for scientific disciplines to engage the public through science communications and, as a result, to grapple with the influence such efforts are having. In our view, scientific disciplines must work to find ways of communicating that not only engage and inform but that also exert positive influences on society.

### *Engaged Influence*

Many of the examples so far have focused on the unintended effect that can result from trying to *inform* the public. It is also important to consider the unintended effects that might arise from trying to *engage* the public. Health communication is again informative. Researchers in this field have often tried to get the attention of target audiences by scaring them—by presenting health risks in ways that will promote fear. This might work as a way of grabbing attention, but research suggests that such “fear appeals” will often backfire, whereas less scary (and potentially less engaging) ways of presenting health risk information might succeed (e.g., Leventhal, 1970).

We thus think it important to turn attention not just to the information of a science communication but also on the “hooks” that communicators use to engage their audiences in science and to ask what kinds of effects these might have. We noted before that one common approach involves reliance on storytelling or the introduction of a compelling science narrative as a strategy for increasing interest in science communications. Prior research and theory suggests that narratives can in fact make science communications more attention grabbing, personally relevant, and easier to process (e.g., Dahlstrom, 2010; Downs, 2014), thereby increasing the influence they exert on their audiences (Green, 2006; Green & Brock, 2000). Dahlstrom (2014) argues that for these reasons, the addition of storytelling narratives can make otherwise dry treatments of science “intrinsically persuasive” (p. 13614). This might be a slight overstatement, but from our focus on

unintended influence, we see a question that is worthy of empirical attention: “What are the consequences of this persuasion?” Does storytelling promote intended or unintended influence? It is our view that those interested in science-based social policies should be asking such questions. They should be looking at the ways science communicators seek to engage their audiences, and then asking “to what effect?” We turn next to two case studies that provide elaboration on this concern. Each shows how attempts to engage the public with compelling stories of elegant science can produce unintended effects.

### Two Case Studies: Implicit Bias and Wise Psychological Interventions

There in principle are no limits to the range of stories communicators might introduce to draw attention to science, but David Dobbs (2010), science reporter for the *New York Times*, *The Atlantic*, and *National Geographic*, suggests most science reporting breaks down to two broad storylines. He termed one class of stories as *nifty* and the other as *fishy*. Stories of the “nifty” variety engage audiences through a narrative of scientific discovery. Whether in the science section of the *New York Times* or on a stage giving a *TED talk*, science communicators who engage in this form of storytelling present scientists as insightful protagonists who advance innovative solutions that overcome what had previously seemed to be difficult, possibly intractable, problems. In “fishy” stories, scientists are typically the antagonists, involved in stories that introduce questions about their judgments, ethics, or motives. Often in these stories, some other external agent introduces a conflict that can compromise the researcher, as when a pharmaceutical company’s funding undermines the integrity of a clinical trial (and clinical researcher).

The two case studies we explore fall squarely in the “nifty” camp. Each seeks to engage the public by telling stories about how elegant science has introduced provocative but clear understandings of a previously perplexing problem. In each case, this engaging narrative can come at a cost.

#### First Case Study: Implicit Bias

##### *Case Summary*

*The narrative.* Despite significant social and policy advances in civil rights, discrimination on the basis of race, ethnicity, gender, sexual orientation, and other social categories continues to undermine modern societies. Social psychologists researching implicit bias claim to have found an elegant way of detecting hidden but pervasive roots of discrimination. Through the application of a straightforward cognitive test, they now state that they can measure the hidden evaluative biases that can cause well-meaning individuals to discriminate. By distributing their test online and by communicating the science behind this inventory through the

popular media and press, researchers are providing the public with new insights that can make them more aware of sources of continued discrimination that may exist within them; insights that might in some instances help individuals override tendencies to discriminate.

*Unintended influence.* By declaring that they have unearthed a pervasive and consequential source of bias that had previously been hiding in the unconscious, researchers might be promoting public perceptions that in some instances increase rather than decrease discriminatory behavior.

### *Background*

Starting in the 1980s, scholars began arguing that greater understanding of prejudice and discrimination might be gained by shifting from descriptions based on “explicit” attitudes and biases, which have typically been assessed in research via self-report, to descriptions based on “implicit” attitudes and biases, assessed via a range of new cognitive response tests (Greenwald, McGhee, & Schwartz, 1998). The hope was that implicit assessment tools would capture consequential forms of bias that people are typically unwilling or unable to report with standard survey instruments. Alongside this effort to advance new understandings of the implicit roots of prejudice have been wide-ranging efforts to promote belief in the science of implicit bias measurement.

The first major effort to raise public awareness can be traced to a press conference held in 1998 by a small group of researchers announcing the launch of an online Web site hosted at that time by the University of Washington (and later by Yale University and now by Harvard University; <https://implicit.harvard.edu/>). With this new webpage, members of the general public could submit to an array of online psychometric batteries, after which they would receive feedback on how implicitly biased they might be against a range of different social groups. A university press release posted later that day suggests that researchers told those in attendance that “90–96%” of the general public possesses implicit biases that this new inventory can uncover (Schwarz, 1998). With newer scoring conventions for this test (termed the “Implicit Association Test” or IAT), roughly three-quarters of the millions who have been given feedback on the site have been told that they hold implicit biases against historic targets of discrimination (e.g., African Americans, Muslims, Latinos, women, the elderly, and members of the LGBTQ community).

Decades after the original launch, IAT researchers continue to promote the narrative that an innovative new instrument can accurately reveal hidden biases. Through this simple test, which merely measures the speed with which respondents associate good and bad concepts with different social groups or categories, previously unseen prejudices ostensibly are revealed. Increasingly, researchers also claim that scores on this test do in fact predict behavioral forms of

discrimination, suggesting the test measures something that should concern the public. The two aspects of this narrative—that this simple test accurately captures hidden bias and that scores on the test predict behavior—can be found in a quote taken from a recent popular press book, *Blindspot: Hidden Biases of Good People*. There, Professors Mahzarin R. Banaji and Anthony G. Greenwald (2016) state,

“First, we now know that automatic White preference is pervasive in American society—almost 75 percent of those who take the Race IAT on the Internet or in laboratory studies reveal automatic White preference . . . Second, the automatic White preference expressed on the Race IAT is now established as signaling discriminatory behavior. It predicts discriminatory behavior even among research participants who earnestly (and, we believe, honestly) espouse egalitarian beliefs. That last statement may sound like a self-contradiction, but it’s an empirical truth.” (p. 47)

### *Communicator Intentions*

We assume that IAT researchers wish to make the world a better place, and this suggests some laudable reasons for communicating with the public through IAT promotion. It seems to us that researchers wish to promote public dialogue that is not only informed by the science of implicit bias but that might in the process reduce the prevalence of discrimination. Researchers have suggested, for instance, that IAT science communications might promote “unconsciousness raising” in the public, a form of self-examination that could cause well-meaning individuals to begin the work of correcting for their hidden discriminatory biases (e.g., Jost et al., 2009). Researchers have also positioned IAT as the catalyst for positive change, as when one of the architects of this test, Professor Mahzarin Banaji, told one media outlet that “When good people discover their blind spots [through the IAT], they are inherently motivated to wish to change. I try to make use of that motive to do good and take it one step further—to ask about the extent to which people are willing to doubt their own intuitions” (Henneman, 2014).

### *A Case of Misinformation*

Our focus is on the influence exerted by IAT science communications, not the accuracy of any particular pronouncement. However, we feel that it is necessary to pause briefly to state that researchers in this area have communicated their findings to the public in ways that might promote misinformation. We provide an Appendix that covers this concern. For the purposes of the current argument, however, we set aside any reservations and adopt an assumption we do not in fact endorse, that IAT science communications on the whole present sufficiently accurate and informative descriptions of the underlying science. Independent of this working assumption, the influence of IAT science communications remains a meaningful empirical question.

*Intended Consequences*

We first consider the possible consequences of science communications surrounding the IAT that IAT researchers would likely want. It seems certain to us that the IAT has shaped public dialogue in ways that IAT researchers intended. We are writing this review article just a few months after a highly publicized incident at a Starbucks in Philadelphia. Two African American men were escorted away in handcuffs, after one of the employees had first refused to grant them bathroom access and then later called the police on them. These events occurred, ostensibly because the men indicated a desire to wait for an acquaintance to arrive before they made any orders. In response to the media firestorm that followed, Starbucks' CEO Kevin Johnson closed thousands of stores across the country for 1 day to hold implicit (and "unconscious") bias training. The hope is that such training might educate employees about the subtle ways implicit racial and sexual biases can influence interactions with customers and other employees.

The unfortunate reality is that an extensive meta-analysis reveals that implicit-bias training tends not to alter behavior (Forscher et al., 2018). It is possible that other good can come from this effort, however. By embracing the notion that bias existed within his own company and by declaring the need for institutional change, Johnson might have promoted open discussions and dialogues around racial bias that can promote greater awareness and positive change.

We also note the Starbucks incident came less than a year after the hashtag #MeToo began drawing public attention to high rates of sexual assault and sexual harassment in the workplace. Although this movement first gained notoriety through high-profile posts of female celebrities alleging rape and other forms of overtly and explicitly hostile and sexualized aggression, it also has drawn attention to other often subtle, but equally important forms of bias that can affect women in the workplace, from having their opinions and skills minimized to being talked over by men. Prior to #MeToo was Black Lives Matter, which also started as a hashtag. This movement gave voice to anger at the acquittal of a White man in the shooting death of a young African American, growing into an international movement designed to promote dialogue on racial profiling, particularly in the killings of Blacks by police officers. These events are often presented in media reports as resulting from implicit racial biases (although research has failed to find clear links between measured implicit biases and shooter biases; Glaser & Knowles, 2008; James, James, & Vila, 2016).

These events illustrate that, by any reasonable metric, public engagement in the science of implicit bias has been a huge success for researchers hoping to shape public dialogue that can advance progressive change. It seems plausible that that "outreach" by scientists working in this area helped prepare the public for positive change. Independent of this possibility, however, there are signs that IAT science communications have also promoted other, unintended, effects.

*Unintended Consequences*

What is the evidence that knowledge of the IAT and the experience of being diagnosed by a test does in fact help well-meaning individuals act in a less biased fashion? In the most direct test of this question, Vorauer (2012) had White Canadian participants interact with either a White or Aboriginal individual in a simulated work task. She found that, if Whites had completed a race-relevant IAT prior to the interaction, the quality of interactions with the Aboriginal work partner *diminished* (relative to the quality of interactions with the White work partner). No such effects were evident if participants instead (1) completed an IAT that was unrelated to race, (2) completed an explicit rather than implicit measures of anti-Aboriginal prejudice, or (3) if they interacted with a White instead of an Aboriginal partner. In mediation analysis, Vorauer found evidence that the mere act of taking the IAT caused White participants to adopt a more cautious approach to their interactions with the Aboriginal partner, which led them to inadvertently produce nonverbal signals suggesting discomfort, which was in turn perceived by their interaction partners as unfriendly.

Why might contact with the IAT result in an increase in behavioral bias? One possibility is that it causes individuals to try *not* to exhibit biases. Respondents might infer from taking this test or from media descriptions of the underlying science of this test that they, and other well-meaning individuals, should try to inhibit their more natural, implicit biases. However, a large scientific literature suggests that behavioral-inhibition strategies such as this often backfire (Wegner & Schneider, 2003). Some research even suggests that attempts to inhibit racial biases (whether the bias is present or not) will have precisely these effects. Apfelbaum, Sommers, and Norton (2008) found that, after being instructed *not* to act in a biased fashion, White participants acted in a *more* biased fashion during their interactions with Black individuals. These and other studies strongly suggest that a seemingly elegant test intended to reveal and alter powerful and pervasive implicit biases might, in fact, be increasing the very discriminator behaviors it seeks to address (and see Frantz, Cuddy, Burnett, Ray, & Hart, 2004; Sasaki & Vorauer, 2013).

Such communications might also cause problems through mechanisms other than behavioral inhibition. One possibility is that, by claiming that implicit biases are not just common but also strong and pervasive, IAT science communicators might be reinforcing normative beliefs that lower behavioral constraints. Such effects have been demonstrated by social influence researchers, who have found that attempts to discourage problem behaviors can backfire, if the communication inadvertently reinforces the view that the problem behaviors are common (see Blanton & Burkley, 2008; Blanton & Hall, 2009; Cialdini et al., 2006). For instance, Hall and Blanton (2009) found that attempts to reduce risky sex can increase the perception that risky sex is common, possibly promoting boomerang effects. Duguid and Thomas-Hunt (2015) suggest that parallel effects can occur

in bias-reduction efforts. They had participants read messages designed to reduce gender bias, but they randomly assigned them to read to variants of the message that either emphasized the high or low prevalence of gender stereotyping in modern society. Their results indicated that the high-prevalence messages increased later gender stereotyping among participants, relative to what would be expected after exposure to low-prevalence messages. These results suggest that perhaps when people are told that implicit biases are common (which is one of the dominant messages advanced in IAT science communications), normative constraints that typically help to hold such biases in check are actually reduced.

### *Summary*

Researchers who developed the IAT have for decades claimed to have designed a straightforward measure that cleanly captures and calibrates hidden implicit biases. Although such claims might have engaged the public in a way that has helped advance the dialogue of progressive activist movements, these statements might at the same time have introduced a narrative that increases discrimination by promoting counterproductive attempts to inhibit implicit bias and by reinforcing beliefs that normalize discrimination.

## **Second Case Study: Wise Interventions**

### *Case Summary*

*The narrative.* Researchers who work to combat historic inequities affecting minority populations (e.g., racial and ethnic disparities in health and education) have typically pursued multifaceted interventions, where complex problems are tackled from multiple angles, on multiple fronts. In contrast, a group of social psychologists have promoted what they term “a new science of wise interventions,” one that they say has the potential of introducing more efficient (and elegant) science-based solutions. Researchers working in this tradition seek to identify singular psychological processes that can be directly targeted, to help remedy social problems. In the resulting interventions, researchers introduce low-cost, low-effort, and often single-shot interventions that they predict will exert powerful and sustained effects on behavior. When these interventions do succeed at helping to reduce inequities facing minority populations, media coverage tends to focus public attention on the seeming ease with which social psychologists are able to remedy longstanding social problems.

*Unintended influence.* By engaging audiences with a narrative suggesting that scientists have crafted simple but elegant fixes to longstanding social inequities, science communications might be promoting the view that the historically

disadvantaged are deserving of blame for enduring disadvantages that they themselves could just have easily fixed.

### *Background*

Most longstanding social problems arise from complex circumstances. If such were not the case, these problems would not remain longstanding social problems. It is for this reason that behavioral scientists who develop psychological interventions to tackle real-world problems typically tackle them on multiple fronts. Consider as one example research guided by the Reasoned Action Framework (RAF; Fishbein & Ajzen, 2010). This approach to behavior change focuses researchers' attention to (1) proximal determinant of volitional behavior (intention), (2) intermediate determinants of behavior (perceived norms, attitudes, and perceived control), and (3) more distal expectancies and beliefs that influence behavioral intention through their effects on the intermediate and proximal indicators. Researchers working from this tradition thus tend to design interventions that target these multiple determinants of behavioral decision making. This tradition also emphasizes full-throated interventions, where pathways are hit forcefully, over multiple sessions, from multiple angles (Fisher et al., 2009).

As effective as interventions from this tradition can be and often are, they present challenges to *science communicators* interested in using "storytelling" to engage the general public. Researchers who pursue powerful, multifaceted interventions of course find their own work exciting, but if they wish to engage the general public, by communicating this work to them, they will likely find few surprising or counterintuitive "hooks" they can emphasize in their presentations. Imagine trying to communicate science to a general audience and ask yourself this question: What is the interesting story to tell an audience about how achievement gaps can be reduced from strong, multifaceted, longitudinal intervention that target intention through attitudinal, normative, and control perceptions? It is hard to locate a "short and punchy" narrative or hook that can be used to engage audiences in a study like this. But, there are alternative approaches that lend themselves to storytelling.

Contrasted with the multifaceted approach to intervention is a tradition that has its genesis in experimental social psychology, where researchers have often gone in search of subtle manipulations that can exert surprisingly large effects (e.g., Mook, 1983). In recent years, approaches based on this tradition have been generating renewed scientific interest. Walton (2014) has argued that the last decade has given rise to what he has termed a "new science of wise psychological interventions." This new tradition builds off earlier experimental traditions, in that it seeks to locate subtle but straightforward ways of influencing behavior through a single pathway. It differs from that tradition, however, in that it employs such

manipulations in applied field settings, which in the past have been dominated by researchers pursuing multifaceted approaches.

The hope with “wise interventions” is that these strategies might be functionally equivalent to pulling a lever that produces lasting change, with seeming ease (Yeager et al., 2014). A study by Sherman et al. (2013) illustrates the approach. These researchers were interested in reducing an academic achievement gap commonly observed between Latino and White middle school children. Based on prior laboratory studies pointing them to the potential utility of an affirmation approach (Taylor & Walton, 2011), they had Latino and White middle school children pick values that were important to them from a list of alternatives that included such options as “being good at art,” “being religious,” and “having a sense of humor.” Students were then asked to explain why these values were important to them, in a few sentences. As a result of this seemingly trivial intervention—pursued just one time near the start of the academic year—the researchers report that Latino students in the affirmation condition later had higher grades relative to those in a control condition, with grade effects lasting over the course of 3 years. White students, in contrast, were unaffected by the intervention.

We think our personal reactions to this study are similar to those that many other social scientists or lay people would have—we personally find the size and durability of this published intervention effect, obtained with a seemingly trivial, one-shot intervention, to be provocative and bordering on shocking. This study thus presents precisely the type of research that generates media narratives drawing attention to the beneficial effects of powerful, elegant science. In fact, we (Ikizer & Blanton, 2016) searched for press coverage of all of the wise intervention studies reported in Taylor and Walton’s (2011) seminal review and found media coverage in 21 of the 23 programs of research featured. These stories fit neatly within the elegant-science narrative. They tell stories of smart scientists coming up with straightforward solutions to seemingly intractable social problems.

The study just described received such media coverage. Sherman et al. (2013) was described to the public through a press release from Stanford University, with the title “Simple Interventions Bridge the Achievement Gap between Latino and White Students” (Rigogliso, 2013).<sup>1</sup> This initial press release was picked up by

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<sup>1</sup> This original press release did contain some exaggeration of the findings. Unlike claims made in that document, researchers did not “bridge” or “close” the gap between Latinos and White students with their intervention, although the reporting on it suggested this was the case. This is a common misrepresentation in media reports of work on academic achievement gaps, and it arises from researcher’s reliance on covariate-adjusted analyses (where strong predictors of academic performance were statistically controlled in planned comparisons). This approach can make it appear to nonexperts that group differences in the affirmation condition disappeared (as effects of ethnicity became statistically nonsignificant in the covariate-adjusted comparison), even though the actual grades of the two groups were still significantly different. (See Jussim, Crawford, Stevens, Anglin, & Duarte, 2016; Sackett, Hardison, & Cullen, 2004 for fuller discussion of this analytic tradition and how it has resulted in misreporting stereotype-threat interventions.)

various media outlets, in article that had titles such as “8 Proven Ways to Help Close the Achievement Gap.” Consistently across the news coverage we were able to locate, journalists embraced a narrative emphasizing how a simple affirmation intervention exerted a powerful influence on Latino youth; one that overcame a problem that to date has confounded educators. It is no trivial task designing a behavioral intervention that works—much less one that makes progress on a longstanding problem—and so wise interventions such as this are deserving of media attention. However, the degree of attention this particular class of studies receives also makes their influence worthy of a closer look.

### *Intended Influence*

Wise intervention researchers wish to make the world a better place. In the case of Sherman et al. (2013), this means helping to diminish academic achievement gaps. Reporting on this study might have helped in these efforts by promoting more positive views of the untapped potential of the historically disadvantaged. Favorable reporting might also push back against negative stereotypes and positively impact the views of parents, educators, and even minority youth by highlighting the often untapped potential of Latino children. Favorable reports of wise interventions might also promote greater belief in science-based approaches, in this case promoting greater support for science-informed educational policies. These are all desirable outcomes.

### *Unintended Influence*

A vigorous science of science communication will also consider plausible downsides to public presentations of science. One concern that drew our attention to this topic is that, by presenting seemingly quick and easy fixes to enduring social inequities, media coverage of wise interventions might alter public opinion in ways that leads to greater blame of minorities for current disadvantage. This prediction follows from research suggesting that when ascribing blame, perceivers often “work backward” from known events to locate any voluntary actions that might be deemed a cause (e.g., Hilton & Slugoski, 1986). This process can result in greater blame of individuals experiencing misfortune, if perceivers can easily “cognitively undo” such a circumstance (e.g., McClure, Hilton, & Sutton, 2007; Spellman & Gilbert, 2014). By introducing seemingly simple fixes to longstanding problems, science communications describing wise interventions might inadvertently make it easier for the general public to “imagine away” the circumstance of the historically disadvantaged, resulting in greater blame.

We empirically tested this hypothesis in three studies where we exposed online community samples to news reports developed from actual media coverage communicating the seeming ease with which wise interventions appear to reduce

racial achievement gaps and health inequities (Ikizer & Blanton, 2016). We then measured participants' attitudes toward the minority populations and perceptions of their responsibility for their circumstance. In each of the studies, we used media content taken directly from original press coverage of wise intervention research, making only minor edits to increase experimental control and consistency across studies. Most critically, we edited coverage so that in all three studies, the media reports focused attention of (White) study participants on interventions designed to address health disparities and achievement gaps affecting African Americans.

We focused reports in this way, because past research has documented willingness on the part of many Whites to blame African Americans for any disadvantage (Alicke, 2000; Dovidio & Gaertner, 2002; Sidanius, Pratto, & Bobo, 1996), and so we felt that media coverage of wise interventions might magnify such tendencies. We thus hypothesized that media coverage of wise interventions targeting African Americans' disadvantaged circumstances could magnify preexisting tendencies to blame, such that the wise intervention heightened the tendency of Whites to blame African Americans for their circumstances.

Our first study adapted the original press release from the Sherman et al.'s (2013) study described above (Rigoglioso, 2013). In the experimental condition, participants read about an affirmation manipulation designed to reduce the achievement gap between African American and White middle school children. In the control condition, participants read a press release describing an intervention that had the same results but that was not "wise"—rather, it was a multifaceted intervention designed to reduce the same achievement gap. This news article drew on the same press release material, but it instead described results of an actual school-based program designed by Slavin and Madden (2006), titled "Success for All." This intervention shared the same goal of reducing minority achievement gaps, but it was designed to influence behavior by targeting a multitude of pathways (e.g., through changes in the school curriculum, the addition of tutors and incorporation of regular assessments).

Result of the study supported predictions by showing that those who read about a wise intervention (when compared to those who read about a multifaceted intervention) more highly endorsed the view that African Americans can easily overcome historic disadvantages through personal effort. A follow-up study replicated this effect and showed it was most pronounced when media reports described interventions focusing on improving the lives of African Americans, as opposed to students at a historically White college. A third and final study established that media reports led to greater blame of African Americans among White conservatives than White liberals. It thus appears that wise intervention science communications reinforce beliefs among political conservatives that minority populations can and should fix their problems on their own (see Christopher, Zabel, Jones, & Marek, 2008; Federico & Sidanius, 2002).

*Summary*

The common narrative advanced in wise intervention science communications may promote public opinions that are more and not less critical of minorities. By engaging the public with stories of scientists crafting simple but powerful psychological interventions to reduce minority disadvantage, media coverage might be reducing concern for and increasing blame of the historically disadvantaged.

**An Agenda for the Science of Science Communication**

Our two case studies illustrate the value of turning research attention toward the influence that science communicators have, above and beyond a communicator's ability to engage and inform the public. Such work should pay attention to both intended and unintended influences. We thus are calling for greater attention to what Jamieson, Kahan, and Scheufele (2017) termed the *Science of Science Communication*. We see value in research that is focused on building stronger theoretical frameworks to help scientists understand the intended and unintended influences of their science communications, following two complementary paths. Research providing *critical analyses* will help scientists understand the consequential effects of common scientific communications generated by their own disciplines—as measured by impact on the judgments and behavior of individuals and on broader public opinions that shape policy through public discourse, debate, and political action. Research focused on *strategic analyses* will help scientists develop evidence-based strategies of exerting positive influence on consequential outcomes through accurate science communication, at times with a focus on understanding how best to counteract past unintended influences.

**Critical Analysis***Identifying Dominant Communication Content and Narratives*

Healthy sciences, like healthy people, engage in moments of self-reflection. We see value in researchers stepping back at times to survey the dominant messages that their fields are introducing into the public domain, so that their impact can be empirically studied. Our two case studies were chosen in large part with this concern in mind.

Over the last two decades, implicit bias has been one if not the largest “media exports” produced by the field of social psychology. Starting with the launch of the demonstration webpage in 1998 and later as a result of coverage in the popular press and wide-ranging media coverage, common representations of the science of implicit bias have shaped popular culture, public discourse and altered policy debates. Whether any given social psychologist embraces or rejects claims

commonly found in IAT science communications, all have cause to better understand the consequential effects popular portrayals are having on public perception.

In contrast, our second case study focused on a concept that is relatively new and likely not on the radar for most of the general public. However, research in this tradition does generate media attention, even if the public might not know the label. The narrative driving this type of storytelling is also a variant of the common “nifty” class of science stories, where complex problems are tackled by innovative science (Dobbs, 2010). Social psychologists, as a group, rely heavily on this narrative when they seek to engage the general public (despite recent crisis driving many new “fishy” narratives in the press; Earp & Trafimow, 2015). This field has long traditions of pursuing experimental manipulations designed to generate powerful effects, through the application of small, seemingly trivial manipulations. Wise interventions are a direct outgrowth of this culture, and so the resulting science communications are representative of how this field seeks to engage the public. It thus seemed relevant to us to step back and take stock of what sorts of inferences the public draws when they exposed to media reports.

Our hope is that if scientists in other fields also step back and survey their own disciplines, they can begin to identify the dominant messages and common narratives that drive their communications with the public. We focused in our two examples on what we have termed the elegant-science narrative, because we felt it had relevance to our own discipline, but potential engagement strategies must be expanded (see Jamieson, 2018; Kaplan & Dahlstrom, 2017; Zivkovic, 2011). For instance, researchers can focus on the consequences of adopting narrative of incremental advance versus scientific breakthrough (Hilgard, & Jamieson, 2017). They can focus on the consequences of ascribing agency to the problems that science work to confront or the solutions scientists seek to advance (Bell, McGlone, & Dragojevic, 2014). They can focus on the consequences of portraying scientific revision as evidence of a “crisis” or as “self-correction” (Jamieson, 2018). The range of strategies scientists can adopt in their efforts engage general audiences, is far greater than anything we can inventory here, but we think this inventory should be taken and critically examined. Whenever narratives take root and shape popular communications from a given discipline, concerned scientists should take note and consider both their intended and unintended effects.

#### *A Mixed-Methods Approach*

We leave it to researchers in other disciplines to identify the messages that dominate their sciences. Once such assessments are made, we see value in moving to empirically evaluating the consequential effects that such messages might be having on public perception and opinion, with a careful eye to the rhetorical strategies researchers use to try to engage and inform the public. Mindful of the “curse of knowledge” and other biases that might make it hard for researchers to see

outside their own perspectives, we see value in starting these efforts with pilot studies that rely on elicitation methods that can reveal hidden meanings and influences (e.g., Fisher, Fisher, & Aberizk, 2018). This work can be paired with systematic reviews that help to locate the mechanisms through which communications exert influence.

From these pursuits, scientists can then develop testable hypotheses. Tests of hypotheses that follow should then include applications of experimental methods, focused on general-theory building. Through random assignment to conditions, controlled message exposure, and systematic experimental manipulation, researchers can gain better understandings of the determinants of consequential science-communication effects. Our own work on wise interventions (Ikizer & Blanton, 2016) illustrates this approach, as we systematically varied the nature of the media report across experimental conditions in order to determine how the science narrative shaped perceptions of blame. Vorauer's (2012) research also illustrates this approach, as she manipulated the presence or absence of feedback from an IAT in order to determine how this exposure might shape cross-race interactions.

### *Individual Differences*

We also encourage researchers to investigate individual and group differences that might moderate reaction to science communication. We think much of this attention should be focused on differences resulting from political and ideological values and identities. Increased partisan polarization (Pew Research Center, 2017), the rise of "niche news," and the resulting echo chambers this creates (Stroud, 2011), along with the increased freedom the public has to selectively choose comforting media (Rodriguez et al., 2017; Stroud, 2010) all combine to increase the potential politicization of science communication (Gauchat, 2012). More than ever before, we live in what Kahan (2017) termed a "polluted science communication environment" (p. 45), where the public is likely to encounter comforting science interpretations that support their prior beliefs or impassioned arguments for rejecting science.

We thus think research scientists should be keeping a close eye on the way communication effects might vary as a function of social and political ideology. We described earlier that in Ikizer and Blanton (2016), we found evidence that wise interventions produced greater blame of the disadvantaged among political conservatives than liberals, but this is just one of any number of studies showing how partisan and political differences can alter reactions to science communications. For instance, Schuldt et al. (2011) found that the term "global warming" generated greater skepticism among Republicans but not Democrats than did reports of "climate change," ostensibly because warming could be cognitively discounted by reflecting on instances of cold weather. This and other studies show how the

influence science communicators exert will depend not just on ideological reactions audiences have to the content of the research but also to the subtle differences in how this content might be presented.

### *Summary*

There is great need for the scientific community to engage in a form of critical analysis that is self-reflective in nature. This work begins with efforts to survey the dominant science messages, narratives, and other rhetorical strategies used to engage audiences. Such work can help determine not only what information is being conveyed to the public but also how it is being framed and packaged to engage audiences. Researchers should then apply exploratory and confirmatory methods to develop and test theories about both the intended and unintended influences that dominant science communications are having on public perception, with an eye toward ideological difference that might moderate effects.

### **Strategic Analysis**

One way to avoid unintended effects is to develop messages with greater intention. Up to this point, we have focused on the influence science communicators might have, once the science has been communicated. Concerned scientist can and should turn this around and consider the effects they wish to have, utilizing sound scientific methods to craft informative messages that achieve desired ends.

### *Influence-Centered Science Communications*

Bruin and Bostrom (2013) provide what we think is a useful launching point for strategic science communication. Their framework is designed to teach members of the science community how to use “mental models research” to produce intended effects. The relevance of this framework to our own analysis is limited in a certain respect, as Bruin and Bostrom focus on ways to “inform people’s decisions and public debate” (p. 14062). We, in contrast, have been focused on influence. However, Bruin and Bostrom prescribe a series of steps that scientists can pursue in their efforts to inform the public that we think can be adapted in efforts to influence the public.

In the first step of their approach, researchers utilize elicitation methods and conduct scientific literature reviews to determine what their targeted audiences need to know in order to make more informed decisions. Researchers then (second step) identify what information their audience knows. From the identification of gaps in knowledge (between what was assessed in steps one and two), researchers can then (third step) design communications focused on reducing any discrepancies between what their target audience knows and what scientist think

it needs to know. This third step might involve iterative tests to determine what information the audience can comprehend and how attempts to close the gap shape knowledge, with a focus on articulating best practices. With this information in hand, researchers can then (fourth step) deliver communications to members of the target population and empirically evaluate how effective they are at narrowing the real-world deficits between knowledge needed and knowledge possessed.

Systematic applications of this or similar methods can help researchers develop and then deliver communications that produce desired effects. But, again, the primary limitation of this approach as it relates to current analyses is that it is focused on information—on reducing knowledge gaps. This more narrow focus will be sufficient if one assumes that reductions in knowledge deficits will produce desired effects, but the generality of that assumption is one that we have questioned. Importantly, however, the Bruin and Bostrom (2013) framework also provides a flexible approach that can be expanded to incorporate the wider range of pathways to influence. The Reasoned Action approach described earlier could provide a template for applying this method for maximum effect (Fishbein & Ajzen, 2010). This framework draws attention to the proximal, intermediate, and distal determinants of behavior. Through careful movement through Bruin and Bostrom's steps, researchers can locate the attitudinal, normative, and control beliefs (as well as information deficits) that drive judgments and behaviors and the current deficits that science communications might target, so that messages can be crafted to produce intended results.

#### *Strategic Science Communication or Political Communication*

In our case studies and in many of the research examples cited, we painted a picture of well-meaning but unwitting scientists who at times stumble into unintended effects that cause harm. It is hard to see the good in any of that, but there is a defense to this type of mistake, alluded to earlier. In each instance we described—and whether for good or bad and whether researchers were right or wrong in their science characterizations—the scientists themselves were trying to open a dialogue about science with the public. This is a noble goal and there is an argument to be made that this is all that scientists truly can or should do. We noted before that to maintain the public trust, scientists might choose to focus on the facts as they see them and these facts alone—consequences be damned. In contrast, when scientists engage in extensive self-study to develop better strategies of exerting influence on topics that have social and political ramifications, they become social and political actors and they risk being perceived by the public as biased communicators.

We appreciate the need for scientists to maintain their principled role as neutral stewards of fact, agents who strive for objectivity in their pursuit of knowledge. Entire disciplines can be undermined and public trust eroded if scientists let

their social, political, and/or partisan concerns direct their research and alter their methods. We have argued, however, that the option of neutrality often ends where science communication begins, and public appeals by scientists, invoking the rigors of their scientific methods, will only go so far. We also view it as an open question whether scientists themselves will more typically be perceived as neutral and objective when they are strategic as opposed to detached in their communications. It is often from sincere and well-meaning attempts by scientists to communicate with the public what they find that both they and their sciences are rejected (see Lewandowsky & Oberauer, 2016).

When pursued in a principled fashion, efforts to develop accurate but also strategic science communications might mitigate backlash against scientists, such that they not only better inform the public but also more strongly influence public discourse and policy. In our view, science can only work in the public interest when it is not only communicated to the public but when it also is accepted by them. Individuals will differ in the values they bring to heated social issues, but most want to see policies that promote public health, increase social justice, and move back the date at which all life on our planet ends. To assist in these efforts, scientists must exert influence.

## Appendix

Science communications pertaining to the IAT have a history of overstating the science. We note that at the time of the first IAT press conference, not one research study had yet been published to back public claims that it measured hidden biases. In the decades since, research has revealed a host of artifacts that affect scores on this measure (see Blanton & Jaccard, 2015). So many problems were found in the first 5 years that IAT researchers revised their scoring algorithm, despite having already delivered millions of online diagnoses to the public using a prior scoring approach they now reject (Greenwald, Nosek, & Banaji, 2003). However, these changes appear to have made matters worse by introducing new artifacts (see Blanton, Jaccard, & Burrows, 2015). Researchers have also failed to critically evaluate the empirical standards they employ to uncover hidden biases (Blanton & Jaccard, 2006a, 2006b), and investigations into the veracity of these standards suggest that they can overestimate the prevalence and magnitude of implicit biases in general populations (Blanton, Jaccard, Strauts, Mitchell, & Tetlock, 2015). Also running in sharp contrast to public statements, large-scale meta-analyses have now shown that the IAT and other measures of implicit bias provide at best weak prediction of discriminatory behavior, with the *highest* aggregate estimates in comprehensive reviews roughly on par with what one would typically expect to obtain using poorly constructed, single-item self-report item (Carlsson & Agerström, 2016; Forscher et al., 2018; Oswald, Mitchell, Blanton,

Jaccard, & Tetlock, 2013, 2015). It is uncommon to find such qualifications in IAT science communications targeting the public.

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