The Curse of the Carl Sagan Effect

by Julien Musolino

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I once heard a colleague remark that even the best scientific ideas would be useless unless they are communicated. Where would we be today, he mused, if **Galileo Galilei**, **Isaac Newton**, **Charles Darwin**, or **Albert Einstein** had kept their discoveries to themselves? Part of what makes science so successful is a mode of communication based on a culture of openness and the free exchange of ideas. In scientific circles, the principal vehicles of dissemination are peer-reviewed publications and presentations at professional meetings. Through these venues, scientists communicate with other scientists. But should researchers also engage with the general public in an effort to popularize science? On this question, academic culture, for all its emphasis on openness and the value of knowledge, is mired in a curious kind of doublespeak.

On the one hand, academic institutions, professional societies, and funding agencies make it clear that engaging the general public is an important part of their mission, and they explicitly encourage researchers to do so. As neuroscientist **Susana Martinez-Conde** points out, in the United States, the National Science Foundation evaluates grant proposals not only on the basis of intellectual merit but also on their potential to make a broader impact on society. One such impact is the dissemination of research findings to the public. In the United Kingdom, the Royal Society encourages researchers to engage more fully with the public. In France, the National Center for Scientific Research (CNRS) explains that one of its top priorities is to strengthen the relations between science and society.

On the other hand, researchers who engage in public outreach find that, by and large, their efforts are not rewarded by their institutions. This does not mean that specific awards do not exist, but rather, as Martinez-Conde explains, that "Most disseminators incur no net penalty — and may even benefit slightly — yet they obtain few or no institutional rewards for their communication activities." Compounding the problem is the lingering perception within academia that scientists who perform outreach activities are of a lesser caliber than those who keep their nose closer to the grindstone and deal exclusively in the pursuit of new knowledge.

This stereotype even has a name. It's called the "Carl Sagan Effect." The late **Carl Sagan**, an astronomer and famous science popularizer, failed to receive tenure at Harvard and was later denied membership in the prestigious National Academy of Sciences. The reason, according to his biographers, is that his success as a public ambassador of science led to the perception that he was a second-rate scientist. Ironically, a later analysis of Sagan's scientific output revealed that his accomplishments were on a par with those of other members of the National Academy. In a similar vein, while many scientists agree that public outreach is important, and even part of a researcher's duty, a 2006 report by the Royal Society of London found that public engagement was believed to be carried out by those who were not "good enough" for an academic career, adding that such activities were regarded as "light" or "fluffy."

And yet, systematic studies involving thousands of participants across more than ten different countries all point to the conclusion that the Carl Sagan Effect is a myth. In fact, exactly the opposite is true. Researchers with popular publications, compared to those without, are more active academically, work longer hours, score better on standard measures of academic excellence, and have higher academic rank. Moreover, these conclusions are consistent across countries and fields of publication. In my own experience, I have found that communicating with the general public has improved both my writing and my thinking.

There are a number of excellent reasons why public dissemination of science should rank high on the agenda of academic institutions. In a recent manifesto, neuroscientist and popular science writer **David Eagleman** explains why. One reason is that scientists rely heavily on the taxpaying public for their livelihood. It is therefore incumbent upon us, denizens of the ivory tower, to express our gratitude to our backers and explain to them in plain language what their hard-earned dollars allow us to do, what we discover, and why it matters. As Eagleman puts it, "Would you invest billions in an industry that doesn't share its accomplishments, landmarks, open questions, and goals?"

Another reason is to inspire and foster critical thinking. A few years ago, I taught an upper-level undergraduate seminar at my home institution, Rutgers University, and had to argue with about a third of the class that the age of the Earth is a matter of fact and not a matter of opinion. Every semester, I talk to students who do not accept that evolution is fact. One of them, a science major, once explained to me that science is about what can be measured and reproduced in a laboratory. If nobody was around to witness human evolution, he continued, we have no grounds for claiming that it actually took place. Sadly, the perils of the endemic lack of critical thinking in our society are all too familiar to those concerned with such questions, and well-documented, too. In his book *Good Thinking*, for example, **Guy P. Harrison** chronicles the large-scale effects of our collective critical-thinking blind spots and their associated woes.

Public dissemination of science should also be encouraged because it can inform public policy. Last year, **President Barack Obama** issued an executive order supporting the use of behavioral science insights to better serve the American people. The first paragraph explains that

"A growing body of evidence demonstrates that behavioral science insights — research findings from fields such as behavioral economics and psychology, about how people make decisions and act on them — can be used to design government policies to better serve the American people." More than a century ago, the geneticist and Nobel Laureate **Hermann Joseph Muller** already urged his peers to engage in public outreach, stressing that it was imperative for scientists to help educate the public, for reasons not dissimilar to those expressed in Obama's executive order.

Rewarding researchers who engage in efforts to popularize science is also vital to fend off the deluge of misinformation that reaches the shores of public opinion on a daily basis. In their book *Merchants of Doubt*, historians **Naomi Oreskes** and **Erik M. Conway** chronicle the decades-long campaign run by entrenched political and corporate interests to mislead the public on issues ranging from tobacco smoke to global warming. Why didn't scientists stand up, the authors ask. The answer is an ominous reminder of the dangers posed by the persistence of the Carl Sagan Effect. Speaking of mainstream scientists, Oreskes and Conway remark that "They consider their 'real' work to be the production of knowledge, not its dissemination, and they often view these two activities as mutually exclusive. Some even sneer at colleagues who communicate to broader audiences, dismissing them as 'popularizers.'"

These reasons represent only the tip of a much larger iceberg, but they suffice to illustrate what should be a truism, namely that science matters, and that a scientifically-educated public is essential to the fulfillment of our democratic ideals. At present, there is widespread agreement that researchers ought to engage in efforts to popularize science. There are also excellent reasons, both intellectual and practical, for supporting such practices. At the same time, two obstacles still stand in the way. The first is psychological and the second institutional. In the current academic ethos, public outreach is still stigmatized. Moreover, academia does not provide the incentive structures necessary to further encourage outreach activities. All this suggests that it is time for academic institutions to start acting on their professed aspirations, help dispel old myths with fresh information, and begin devising ways to reward researchers who dare to make the truth heard beyond the confines of the ivory tower.

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