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Short communication

Perceptions of scientific dissent undermine public support for environmental policy

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ABSTRACT

This article shows that even modest amounts of scientific dissent reduce public support for environmental policy. A survey experiment with 1000 Americans demonstrates that small skeptical scientific minorities can cast significant doubt among the general public on the existence of an environmental problem and reduce support for addressing it. Public support for environmental policy is maximized when the subjects receive no information about the scientific debate, indicating that the general public's default assumption is a very high degree of scientific consensus. Accordingly, a stronger scientific consensus will not generate public support for environmental policy, unless skeptical voices become almost silent.

1. Introduction

Environmental problems are often so complex and technical that scientific knowledge is necessary to evaluate their severity. However, studies have noted that instead of resolving policy controversies, science can become a vehicle of conflict by strengthening the prior beliefs of different sides (Sarewitz, 2004; Pielke, 2007; Hoffman, 2011). Moreover, the inherent difficulty of many environmental problems undermines the effectiveness of communication because there is a mismatch between their "usual modes of understanding" and what is needed to grasp the essence of the problem (Oreskes, 2004; Moser, 2010; Weber et al., 2011). In politically salient cases such as climate change, there is also the possibility that opponents of action deliberately mislead the public (Oreskes and Conway, 2010). Often, science communication fails to inform the public about the severity of the problem. Instead of providing the public with information about the state of the art, science communication is either ineffective or even worsens the situation.

When does the general public believe the scientific consensus to be strong enough to warrant action? How much does public support for environmental policy depend on scientific consensus? These are the questions this article addresses. As noted above, several scholars have challenged the idea that scientific knowledge about a severe environmental problem automatically creates public concern and prompts rapid policy action by the government. We conduct an empirical analysis to evaluate the sensitivity of public

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opinion about environmental problems to scientific dissent. We do this by exploring how much scientific dissent is needed to significantly undermine the public's support for environmental regulation. If scientific communication were easy, one would expect public support for environmental regulation to remain high, as long as the vast majority of scientists believe the problem to be a serious one.

Our simple experimental approach to the effect of scientific dissent on public support for policy fills an important gap in the literature. Although there are observational studies on public perceptions of the scientific debate on environmental problems such as global warming and nuclear power (Johnson and Scicchitano, 2000; Krosnick et al., 2000; Dunlap McCright, 2008; Ding et al., 2011; Kahan et al., 2012; Leiserowitz et al., 2013), and some have examined the role of scientists as a trusted source of information both experimentally (Rabinovich et al., 2012) and in a traditional survey (Malka et al., 2009), there are few experimental studies that shed light on how people's beliefs vary with the perceived degree of scientific consensus. While one experimental study examines how controversy influences people's perceptions of scientific reporting in newspapers, it does not compare different levels of scientific consensus and the sample only comprises undergraduate students (Corbett and Durfee, 2004). Another study analyzes the effect of experimentally manipulated uncertainty among different types of recipients, finding that the respondent's belief about the nature of science conditioned the effect of uncertainty on willingness to engage in environmental behavior, but the participants were students and the study did not analyze support for regulation (Rabinovich and Morton, 2012).

Given that scientists remain among the most trusted public authorities in the United States (Lang and Hallman, 2005; Gauchat, 2011, 2012; Leiserowitz et al., 2013), it is important to understand when and why the public accepts the scientific consensus as a legitimate basis of policy formulation. If the origins of such trust were better understood, policy interventions to improve public awareness could be designed. In other words, understanding the sources of trust could improve science communication. In this sense, this article contributes to the literature on the interactions between scientific debates and public opinion.

To investigate the issue, we conducted a survey experiment on a sample of 1000 American adults between the ages of 18 and 65 in November 2010. The sample is nationally representative across standard population characteristics such as gender, age, race, and education. We presented the respondents with information about a hypothetical study concerning changes in the levels of biochemical oxygen demand (BOD), a commonly used measure for effluent water pollution, in American lakes and rivers. The control group was told that such a study had been conducted, while the treatment groups were given additional information about the proportion of scientists who believe the study methodology is sound: 60, 80, and 98 percent to capture varying degrees of scientific consensus. In the treatments, the remaining proportion of scientists was presented as questioning the merits of the study.

We found that even a relatively small scientific minority can significantly reduce public support for addressing the environmental problem in focus. While support levels were high when 98 percent of scientists agreed that the problem is real, there was a substantively large and statistically significant drop with 80 percent of scientists being presented as skeptical. Since a one-fifth minority is common in the case of new and complex environmental problem, this means that the scientific community can only convince the public about the existence of a problem with a high degree of consensus. In other words, even a modest amount of scientific dissent significantly decreases public support for environmental policy.

2. Research design

In the survey, 1000 English-speaking Americans of age 18–65 were interviewed about a variety of economic and political issues in November 2010, immediately following a midterm election. The survey experiment discussed here was part of a broader survey implemented by the 2010 Cooperative Congressional Election Study (CCES). This is an opt-in, on-line survey managed by a research team at Harvard University and implemented by YouGov/Polimetrix (http://projects.iq.harvard.edu/cces/book/sample-design). The respondents were chosen so that each matches a randomly drawn individual from the general population. In other words, the survey respondents are selected so that they represent the broader American population based on official data from the United States census. Although the survey responses are collected on-line, the pool of respondents matches well with the broader American population along standard covariates such as age, gender, education, income, and race. Survey weights along these lines are used in the analysis. The response rate for both of our two outcome variables was 83.8 percent.

In the survey, the respondents were given hypothetical information about a study related to water pollution. Each respondent was randomly assigned to a control group or one of four treatment groups, each with equal probability (1/4). The wording of the treatments our outcome variable was as follows:

> *According to a recent scientific study of pollution problems, biochemical oxygen demand has increased in rivers and lakes throughout the country due to industrial activity. [TEXT A]. Reducing biochemical oxygen demand is technically feasible but economically costly.*

The control group received no additional information: for them, [TEXT A] was left empty. The three treatments were of the following format:

> *About [PERCENTAGE YES] percent of all scientists believe that the results are credible. However, the other [PERCENTAGE NO] percent argue that the results are weak and that further research is required.*

The percentages for [PERCENTAGE YES] were 60, 80, and 98; the percentage for [PERCENTAGE NO] were 40, 20, and 2. As the number of supportive scientists grows, scientific dissent decreases. Since the control group received no information,