Effects of alternative framing on the publics perceived importance of environmental conservation

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Effective communication of science to the general public is important for numerous reasons, including support for policy, funding, informed public decision making, among others. Prior research has found that scientists participating in public policy and public communication must frame their communication efforts in order to connect with audiences. A frame is the mechanism that individuals use to understand and interpret the world around them. Framing can encourage specific interpretations and reference points for a particular issue or event; especially when meaning is negotiated between the media and public audiences. In this study, we looked at the effect of framing within an environmental conservation context. To do this we had survey respondents rank common issues, among them being environmental conservation, from most important to least important for the government to address. We framed environmental conservation using three synonymous terms (environmental security, ecosystem services, and environmental quality) to assess whether there was an effect on rankings dependent on how we framed environmental conservation. We also investigated the effect of individuals' personality characteristics (identity frame) on those environmental conservation rankings. We found that individuals who self-identified as environmentalist were positively associated with ranking highly (most important) environmental conservation when it was framed as either environmental quality or ecosystem services, but not when it was framed as environmental security. Conversely, those individuals who did not rank themselves highly as self-identified environmentalists were positively associated with environmental conservation when it was framed as environmental security. This research suggests that framing audience specific messages can engender audience support in hot-button issues such as environmental conservation and climate change.

Keywords: framing, conservation, identity frames, environmental issues, communication

Introduction

Communicating science to the public is cited (Bauer, 2008; Nisbet and Scheufele, 2009; Besley and Tanner, 2011) as an important, but potentially difficult, task for many scientists. Without accurate and persuasive conveyance to the public, science can often have little broader value (McNutt, 2013). In important issues such as global climate change, the scientific consensus does not translate to broader public. For example, a review of thousands of refereed scientific publication reports a

97% consensus among scientists of anthropogenic-induced climate change (Cook et al., 2013). Yet, among the American public, only 39% identify as "concerned believers" in climate change (Saad, 2014b) and just 57% of the American public believe human activities are to blame for climate change (Saad, 2014a). Another example area that has recently been a highly disputed public controversy is public health and in particular, the choice to vaccinate. False information published in the late 1990's (Wakefield et al., 1998) concerning an autism-vaccine link has had long lasting impacts on public health communication continuing to this day (Flaherty, 2011). In a recent study on vaccine safety, half of the respondents reported concern for adverse effects and 11.5% refused a recommended vaccine (Freed et al., 2010). These examples make it is clear the importance for the general public to receive and use the correct scientific information given the ubiquitous choices they make about scientific issues, and take subsequent action on a daily basis.

Framing can promote certain interpretations, evaluations, and solutions by emphasizing particular facets of an event or issue (Entman, 2004). Frame theory, initially defined by Goffman (1974), is the mechanism in which people interpret what is going on around them. Frames also help to simplify complex issues by placing greater weight on some considerations and arguments rather than others, showing why an issue might be a problem, who or what might be responsible, and what should be done. Additionally, frames can provide common reference points and meaning between experts, the media, and the public (Groffman et al., 2010). A powerful example of framing was offered by scientist EO Wilson (Wilson, 2006), who partnered with evangelical Christian leaders, in discussing environmental stewardship in terms of morality and ethics. In reframing, they are engaging an audience that might not attend to climate change issues because of the scientific foundation (Groffman et al., 2010). In the context of this paper, we define framing as certain written word constructs that may change or influence interpretation of information.

While the success of public uptake and interaction with scientific information can be based on a number of different variables such as: public trust (Haerlin and Parr, 1999), personal interaction (Kempe et al., 2011; Silvertown et al., 2011), attitudes (Riddiough et al., 1981), and awareness (Littledyke, 2008); how scientists frame science to public in their communication is equally as important. Academics and professionals have long acknowledged framing as a powerful tool and asset when addressing issues within the sciences and to the public at large (Levin et al., 1998; Wiederhold, 2011). Research on framing effects have found that scientists participating in public policy and public communication must frame their communication efforts to connect with audiences (Nisbet et al., 2003; Nisbet and Huge, 2006; Nisbet and Mooney, 2009).

Considering the power and influence of frames in communication, capitalizing on framing as a common practice for science communication is relatively unseen. Indeed, Nisbet and Mooney (2009) detailed the influence and effectiveness of frames: from motivation; influencing behavior; garner support for issues; finding common ground; and defining issues.

Additionally, identity frames can impact decision-making and interpretations of information. Identity frames can classically be defined as a cognitive framework or scheme of the characteristics belonging to individuals, or categories of individuals, we identify within and from our social experiences (Abrams and Hogg, 1987; Guichard, 2001). For example, in a study on the effect of identity on European Union officials, researchers found that personal identity associated with home-country affiliation affected member political actions and beliefs while participating in inter-governmental policy development (Egeberg, 1999). These personal identity frames can have important implications for decision making by the public on particular divisive or emotionally charged issues such as environmental protections and climate change.

In this paper we seek to address the issue of framing in science communication from an environmental context. Particularly, we focus on the effect of framing environmental conservation in terms of perceived importance by the public. We also seek to investigate the potential connection between individuals' identity frames of common conservation terms within an environmental context.

Methods

To assess the effect of framing of environmental issues on individuals' perceived importance of these issues, we generated items on various aspects of environmental issues and identity as a part of a broader survey on local greenspaces, environmental beliefs, environmental knowledge, views of the nature of science, and personality factors. These 30 survey items were vetted through focus groups for internal consistency and validity. Environmental knowledge survey items were taken from The National Environmental Education and Training Foundation (NEETF) and Roper Starch Worldwide (1999). This metric is widely known and quite robust to allow us to compare our results to other studies. Survey items for this paper were composed of five-point Likert-scale and dichotomous choice (see Appendix— Supplementary Material, for survey items).

To assess framing in an environmental communication context we generated a set of issue ranking items. Participants were asked to rank 10 issues from 1 to 10 of importance for the American public to address or solve, where a ranking of 1 was most important and a ranking of 10 was least important. Issues could not share rankings of importance, thus individuals' had to prioritize some issues over others. Seven of the 10 issues participants had to rank were: curing cancer; improving quality of US education; decreasing crime and drug use; reducing health care costs; decreasing poverty; growing the US economy; and reducing the budget deficit. Three of the issues were terms that are used synonymously in popular and refereed environmental literature: improving environmental quality; improving environmental security; and improving ecosystem services. Of these 10 issues, we were interested in the potential differential ranking of environmental quality, environmental security, and environmental services. These three terms, in the context of improving or garnering support for conservation of the natural environment, have the

potential to confer differing levels of importance to the public. Thus, framing, is this context, could be impacting scientific communication and public decision-making in a way we do not yet know.

Individuals living in six townships near a public university in New Jersey were mailed paper surveys with pre-stamped return envelopes. Those individuals were chosen by random sampling the online white pages listing for the six focal townships. Seventy-five surveys were sent to each township, totaling to 450 surveys sent but given that our method relied on dated addresses, we were not surprised to find that a number of surveys were returned unopened. This meant our effort was 380 surveys making our response rate 19.5%. There were 74 completed returns fairly evenly distributed across the townships. All surveys were kept anonymous and no identifying information was asked of participants.

All statistical analyses were performed in Minitab 17 Statistical Software (2010) package. A Principal Components Analysis (PCA) using a correlation matrix was used to inspect associations among Likert self-report being an environmentalist, having environmental knowledge and rank of terminology (i.e., environmental security, environmental, quality, and environmental protection). The purpose of our study was to look for emerging associations and not to test hypotheses. Therefore, for this research note, we chose to use PCA to inspect for preliminary associations only.

Results

Of the three terms, environmental quality was ranked the most important by participants with an average ranking of 4.730 out of a possible 10 points. Environmental security was ranked second with an average ranking of 6.290 out of a possible 10 points. Environmental services was ranked as the least important with an average ranking of 7.435 out of a possible 10 points.

We constrained our PCA to three components given that we had only five variables. These three components explained 77% of the variance in our dataset. To inspect for associations, we used loadings over ± 0.300 as a measure of weight of the construct on that component (see **Table 1**). For PC 1 (principal component), we found that labeling one's self as an environmentalist is positively associated with ranking highly environmental quality and ecosystem services. This was not the case, however, for environmental security. Environmental security and environmental knowledge were associated along PC 2 with the other variables not loading highly. On PC3, self-reported environmentalist and ecosystem services were associated and negatively associated with environmental security.

Discussion

It is clear from this research, the impact of how we communicate scientific concepts extends beyond what was previously thought. Indeed, individuals who self-identified as environmentalists were more likely to associate and respond strongly with words like service and quality, whereas those individuals who did not identify as environmentalists may find these words equally or

TABLE 1 | Principal component analysis (PCA) for the first three components.

	PC1	PC2	PC3
Environmentalist	−0.508	0.197	0.527
Environmental knowledge	−0.252	0.739	0.020
Environmental quality	0.544	−0.118	0.239
Environmental security	0.376	0.569	−0.480
Ecosystem services	0.491	0.279	0.659

less appealing than the word security. This finding can have definite impacts for scientists as they communicate issues within the public forum to various groups of people, particularly those people who are divided on their personal and political values. Schuldt et al. (2011) found that individuals who identified as Republicans were significantly affected by question wording, and subsequently were less likely to endorse global warming than when it was framed as climate change, where as Democrats were equally responsive to both terms.

Successful science communication is not only critical for a supportive, literate, and engaged public, but key to success of future generations (Durant et al., 1989; Ziman, 1991; Cajas, 2001; Slovic et al., 2013). Communicating important scientific concepts to the public at large has proven to be a messy and complicated challenge with varying levels of success. This disconnect between scientific findings and public opinion in the context of climate change clearly demonstrates this. While science communication is a complex issue, frames play an important role. In a recent study from the United Kingdom, researchers found that shifting climate action discussions from a negative frame (possibilities of losses) to a positive frame (possibilities of losses not materializing), participants had stronger environmental behavior intentions despite high uncertainty conditions (Morton et al., 2011). The potential to overcome uncertainty in public discussions of climate change is undeniably important.

The implications of this research suggests that how scientists frame their communications in an environmental context to the public, and particular audiences within the public, can have the potential to influence person decision making and policy. Further, similar findings in previous work on climate change found reframing climate change as a public health issue engendered greater response from participants (Maibach et al., 2010). Additionally, Bain et al. (2012) found that framing climate change action to climate change deniers as increasing consideration for one another or improving technological/economic development, those individuals were more supportive of pro-environmental actions. This re-framing from avoidance of environmental harm to improvement of society motivated individuals traditionally left out of the climate change action conversation.

A simple difference in framing environmental protection and conservation three different ways (security, quality, and services) seemed to significantly affect the importance of addressing the issue for the participants. Additionally, identity frames seem to also play an important role in participant decision-making. Within this work we see distinct separation in the rankings

of importance between those individuals who self-identify as environmentalists and those who do not. Individuals who most identify as environmentalist seem to respond more positively to environmental conservation in terms of protecting quality for its own sake. Whereas those individuals who least identified as environmentalists seem to respond more positively to protecting the environment when it was framed as a matter of national security. The impact of these identity frames in participant responses, and the associated implications on decision-making, highlights the additional complexity when developing successful communication strategies. This suggests awareness of key audience personality characteristics could help tailor messages about important scientific issues to make those audiences more receptive, as supported by various studies work (Wilson, 2006; Groffman et al., 2010).

Further work is needed to investigate framing phenomenon in environmental communication on a broader scale. Concurrently, particular predictive linkages between personality and demographic characteristics should be investigated further. Numerous studies have highlighted the connection between personality characteristics and political leaning (e.g., Lewis and Bates, 2011; Verhulst et al., 2012). These links between political affiliations and personal and policy decisions have been well-documented, which have broad implications for issues such as climate change. A recent study on predictive characteristics of climate change deniers found that, while controlling for political leaning, race, and gender, being a conservative white male was significantly linked to indicators of climate change denial (McCright and Dunlap, 2011).

Additionally, work from personality psychology shows that personality types of Ph.D climate change scientists and that of the general public in the U.S. differ greatly in core components. Using the Myers-Brigg Type Indicator personality test, Weiler et al. (2012) found that climate scientists were significantly more likely to prefer sensing over intuition while taking in new information around them, and judging over perceiving while dealing with their surroundings than the general public. Thus, these demographic characteristics that have the potential for predictive power in audience decision-making can greatly help scientists frame communication efforts appropriately.

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Supplementary Material

The Supplementary Material for this article can be found online at: http://journal.frontiersin.org/article/10.3389/fenvs.2015.00036/abstract

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