

Four cultures: new synergies for engaging society on climate change

The scientific community has largely reached consensus that climate change is real, is exacerbated by human activities, and is causing detectable shifts in both living and non-living components of the biosphere. Yet, documenting and predicting the ecological, economic, social, and cultural consequences of climate change have not yet stimulated an appropriately strong and rapid societal response, especially in the US. Climate-change impacts, and the related environmental degradation and species extinctions, continue to increase at rates far steeper than the rate of social change. If this trend continues, we may well miss our last chances to take appropriate action.

We join with the authors of the papers in this Special Issue of *Frontiers* in stressing that scientists and scientific knowledge alone cannot create the resources and infrastructure needed to instigate societal change. In this commentary, we expand on the calls of our colleagues by drawing attention to the need for truly multidisciplinary collaborations across academic and other institutions. Here, we provide insights, revelations, and conclusions from the 16-member Columbia River Quorum, which was composed of scientists, scholars, and professionals - four representatives from each of what we describe below as the four academic "cultures" - who met in Oregon in 2009 for the first of what we hope will be many similar summits across the world. The goal of that meeting was to identify and build synergies by which members of traditionally separate disciplinary cultures - specifically the environmental sciences, philosophy and religion, the social sciences, and the creative arts and professions - can accomplish collaboratively what none are capable of doing alone.

As Groffman *et al.* (2010) illustrate in this issue, the instinct of scientists faced with slow and inadequate societal responses to looming environmental emergencies has been to bring an ever-increasing amount of technical information to the public. Consequently, scientists have worked in relative disciplinary isolation, entering into interdisciplinary partnerships only to amplify their own voices. This strategy assumes that the appropriate technical information, offered in the right place and at the right time, is sufficient to motivate people to take action. Various studies, as well as the historical inefficacy of this strategy, call this assumption into question. Nor are attempts to influence public opinion "from the top down" likely to be effective. If public communication is defined as a marketing campaign to "sell" the public on science, to "rebrand" the climate debate, to support "pro-science" political leaders, or to trump "deniers" and "anti-science" advocates, then such strategies will likely fuel polarization and public disengagement.

Instead, building societal action in response to climate change will require a new communication infrastructure, in which the public is (1) empowered to learn about both the scientific and social dimensions of climate change, (2) inspired to take personal responsibility, (3) able to constructively deliberate and meaningfully participate, and (4) emotionally and creatively engaged in personal change and collective action. To achieve these goals, we envision a restructuring of societal interactions - including partnerships among individuals, academia, the media, science organizations, faith-based groups, businesses, and a diversity of stakeholders across local communities - so that communication efforts about climate change become more diverse, more personal, more interactive, more compelling, and more participatory.

• A new communication infrastructure

A half-century after the publication of CP Snow's influential "two cultures" essay (Snow 1960), which suggested that a lack of communication between the sciences and the humanities was a major hindrance to solving the world's problems, we are called again to recognize the need for bridges between the sciences and other disciplines. Such connections are necessary if we are to recognize that currently disparate disciplines must work together to bring many sources of specialized knowledge and experience to bear on societal engagement and solutions to climate change and other environmental problems. Engaging storylines and participatory forms of expression - built on rigorous, accessible science, shared values, and personal relevance - will require collaboration from the four cultures and the direct involvement of the public.

As conceptualized in Figure 1:

- *Environmental sciences* provide the environmental data and models that allow us to understand the world and to make predictions.
- *Philosophy and religion* ground a society's discourse about what is good, what is right, and what is of value.
- *Social sciences* provide theories and data relative to the mental models, narratives, and frames of reference that the public uses to understand and make decisions about complex and uncertain issues, such as climate change.
- *Creative arts and professions*, including nature and poetry writing, documentary filmmaking, multimedia design, and journalism, tell inspiring and emotional stories that shape human actions, provide different forms of learning, sponsor deliberation, and provoke action.

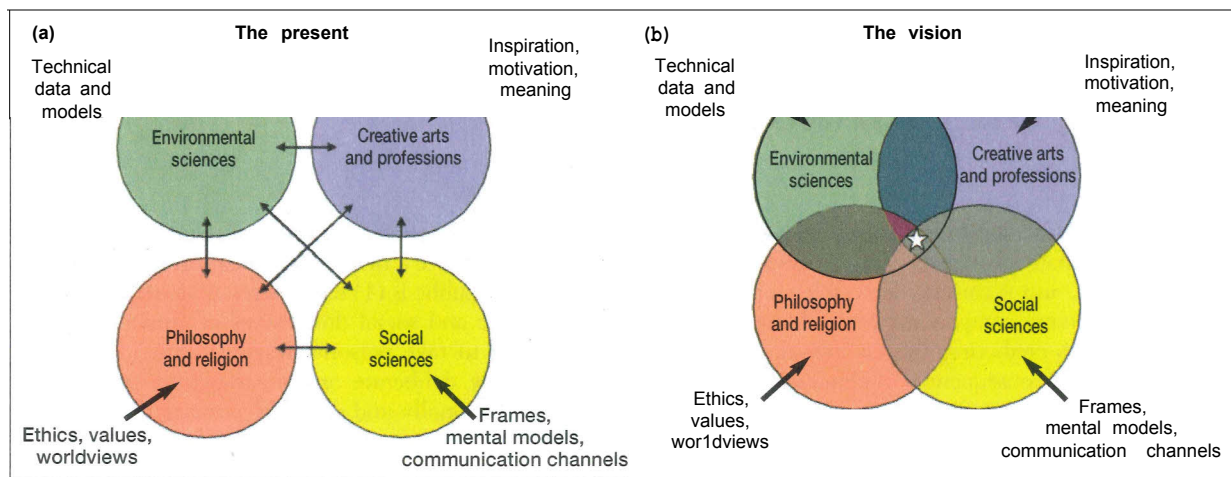


Figure 1. Transforming the four cultures (colored circles). (a) The present: the four cultures address environmental problems independently, or sometimes in pairs or triad collaborations (as illustrated by double-sided arrows between isolated circles), which have not yet fostered sufficient action. (b) The vision: the four cultures engage fully and equally with each other (as indicated by the star symbol within overlapping circles), where novel synergies foster rapid and effective societal responses to environmental challenges.

Communication research in the social sciences shows that technical knowledge is only loosely connected to collective decisions and to individual preferences. Many members of the public lack either the ability or the motivation to be well informed about the technical details of the science of climatology, choosing instead to rely on social identity, cultural traditions, personal experience, localized knowledge, and/or the popular media to make sense of climate-related issues. As a result, communication about climate change will most effectively move people to action when it is framed not as a matter of science, but rather in terms of the values strongly held by a particular group or around a subject that is already familiar and of concern.

Allies in communicating about climate change will be found among society's storytellers, including novelists, poets, and other creative writers; journalists; musicians; documentary filmmakers; film and television producers; visual artists; and practitioners of the burgeoning variety of online social media. With the aid of environmental and social scientists, and inspired by moral and religious philosophers, these creative artists and associated professionals can accurately communicate about science in imaginative, compelling, and novel ways. Perhaps more importantly, they can provide the context for values-based discussions of how we ought to act in the face of the challenges presented by climate change and, increasingly through digital media and innovative deliberative forums, the resources and opportunities for direct participation by the public.

• Recommendations

If we are to achieve a fundamental shift in societal consciousness on climate change, then leaders from the four cultures must first recognize the need for collaboration

and should subsequently be provided with the institutional resources and incentives that break down disciplinary prejudices and barriers to cooperation.

As Whitmer *et al.* (2010) explore in this issue, this cultural shift begins with a reconsideration of the institutional goals of universities, which, along with their faculty and students, are uniquely positioned to provide more than just research and scholarship. Academia is called upon - as a matter of social responsibility - to address the challenges of climate change, especially because universities influence their local and regional communities. In short, with regard to climate change and other environmental issues, we argue for a reassessment, particularly from tenured professors, of how relevant faculty from across the four cultures define their work and mission. However, this shift in philosophy and professional outlook will come only with new incentives and resources that foster intersections and capacity building. Also in this issue, Whitmer *et al.* (2010), Osmond *et al.* (2010), and Pace *et al.* (2010) consider the roles and norms of universities, interface organizations, and individual scientists, respectively, and to their conclusions we add the following recommendations:

- (1) Increased funding from the National Science Foundation and other granting agencies for communication research and informal learning initiatives is an important recent development. However, we also recommend that funding agencies increase the "broader impacts" proportion of any research grant related to climate science, requiring the funds to be spent on cross-disciplinary-guided public outreach. This would provide the incentive and the capacity for principal investigators in the sciences to collaborate with members of the other cultures on communica-

tion initiatives. In addition, we recommend that the "broader impacts" proportion from each grant be pooled at the university level. A committee made up of faculty drawn from the four cultures would invest this money in a few carefully chosen and planned large-scale public outreach initiatives that would be coordinated with representatives from local media organizations, school districts, businesses, faith-based institutions, museums, and the arts community. This committee would also enable greater coordination among existing university interface organizations and offices, including Land Grant and Sea Grant extension offices, university research communications, and community relations.

- (2) To catalyze additional collaboration and innovation, we advocate the launch of multiple digital news communities and social media sites, focused on the four-culture synergies identified in this commentary. Existing news sites and blogs can also be applied to this network. The focus of a digital news community - covering and promoting partnerships and activities across the relevant institutions - can be local (eg San Francisco), regional (eg upstate New York), national (eg the US), or international (eg the EU).

The primary intended users of, and participants in, these digital news communities would be members of the four academic cultures and their potential partners, including individual contributors from the lay public, for whom the content (1) provides an engine for identifying and Circulating best practices, knowledge, and ideas that cut across disciplinary boundaries and (2) promotes cooperation. To advance these communities and their content, we propose that:

- Professional and amateur films and other creative media, which either show four-culture collaborations in action or are the outcomes of such collaborations, be produced and hosted.
- A veteran journalist should be hired as a news editor, and articles should be commissioned from freelance journalists and graduate students - who produce original reporting that tracks the intersections and collaborations between the four cultures on climate change.

Other contributors of content would be "citizen journalists" from across communities, sharing ideas and reports of setbacks, innovations, and successes.

- Social media tools could be used to "match up" members from the different disciplines to discover shared interests and complementary expertise, and to plan and coordinate a diversity of communication and public outreach initiatives.

We call on the members of our respective disciplines to actively seek partnerships with representatives of other academic cultures, in a collective effort to tackle climate change and other environmental issues. Preventing the worst effects of current environmental threats may well require the greatest exercise of the human imagination the world has ever seen. We challenge readers to put their minds together, to bridge the great wellsprings of human understanding - including the natural and social sciences, philosophy, religion, and the creative arts - to "re-imagine" how we live on Earth. The urgency of the moment is matched only by the magnitude of the opportunity for meaningful change.

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