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What People Know

What does the public know, and how much do they care, about Arctic environmental change? What do their patterns of awareness and concern imply for science communication? Such questions motivate research that began in 2006 with a “polar module” of knowledge and concern items on the U.S. General Social Survey (GSS). Responses to that survey display levels of public concern that might be encouraging, but have a darker side as well. Political orientation influences how people answer every concern question, from the Inuit way of life to preserving Antarctica for science (Hamilton 2008). Education and science knowledge matter too, but *the effects of education and knowledge vary with political beliefs*. Among liberal and moderate respondents, for example, expressed concern about polar change increases with education. Among the most conservative respondents, however, concern *decreases* with education. **Figure 1** illustrates this relationship with a survey question about sea level rise.

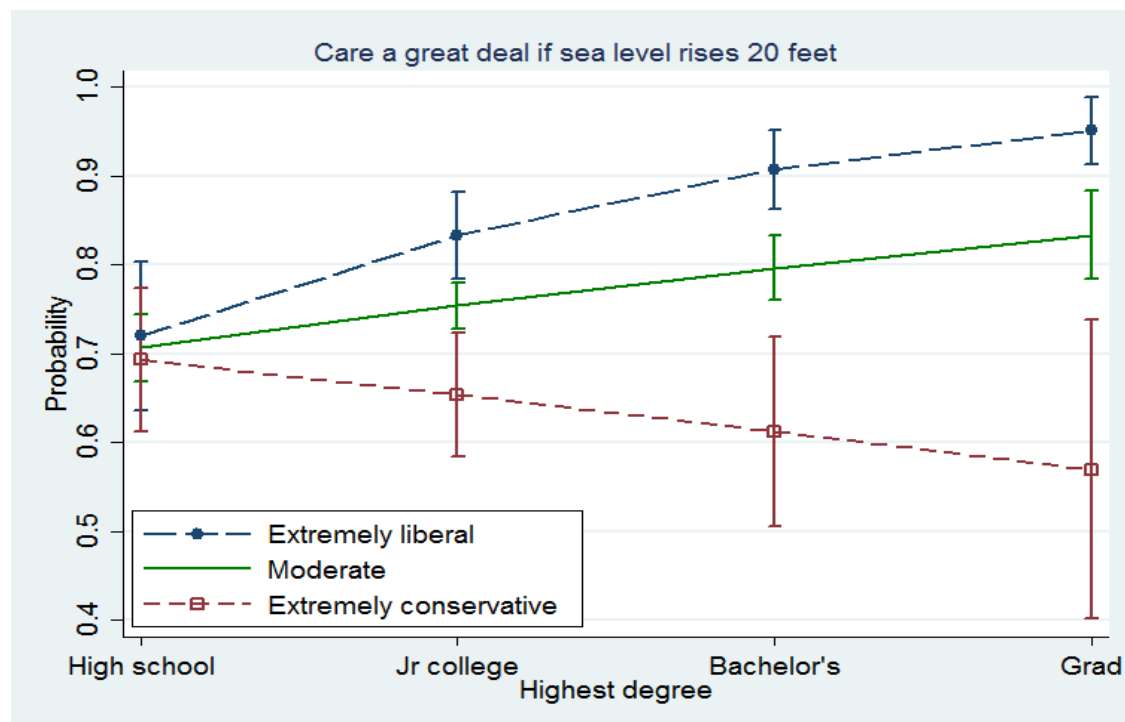


Figure 1: Probability that people say they would care “a great deal” if sea levels rose 20 feet, flooding coastal areas. Calculated from a logit regression analysis with adjustments for gender, age, income, and five indicators of science knowledge (Hamilton 2008). Bars depict 95 percent confidence intervals, which are partly a function of data density.

The striking pattern of Figure 1, echoed on other questions, was a new finding. Initially it might have been dismissed as a peculiarity of these data. The hypothetical behind Figure 1, a twenty-foot rise in sea level, is not a near-future threat. It corresponds to melting the entire Greenland Ice Sheet, and some respondents presumably are rejecting its plausibility rather than saying they really would not care if such a thing happened. But within a few years, similar *education*×*politics* interactions were noticed with diverse climate and environmental questions on half a dozen other surveys (McCright and Dunlap 2011; Hamilton 2011). Further replications followed, including analysis of later GSS data where the same polar questions were repeated. A *science literacy*×*politics* interaction similar to Figure 1 was observed with objectively-tested science literacy on the X axis in place of education: Concern about sea level and other changes increases with science literacy among liberals and moderates, but declines with science literacy among the most conservative (Hamilton et al. 2012). Cognitive studies have established the phenomenon of accepting or rejecting information selectively, in conformity with preexisting beliefs (Munro and Ditto 1997; Taber and Lodge 2006). Such *biased assimilation* could occur disproportionately among those nominally better informed, with consequences that particularly separate them on topics related to climate change (Corner et al. 2011; Kahan 2013).

The GSS discoveries inspired surveys with more detailed knowledge questions, including a series of statewide polls in New Hampshire (Hamilton 2012). **Figure 2A** charts responses pooled from five 2011–2014 New Hampshire surveys that asked:

Which of the following three statements do you think is more accurate? Over the past few years, the ice on the Arctic Ocean in late summer ...
covers less area than it did 30 years ago;
declined but then recovered to about the same area it had 30 years ago; or
covers more area than it did 30 years ago.

The first answer above (rotated in the actual interviews) is unambiguously correct. As measured from satellite imagery, late-summer Arctic sea ice area in recent years has fluctuated around levels more than a million square kilometers below those of 30 years before (**Figure 2B**). Encouragingly, 71 percent of the New Hampshire survey respondents answered this question correctly. A similar proportion (68 percent) answered correctly on a 2011 nationwide survey (Hamilton 2012).

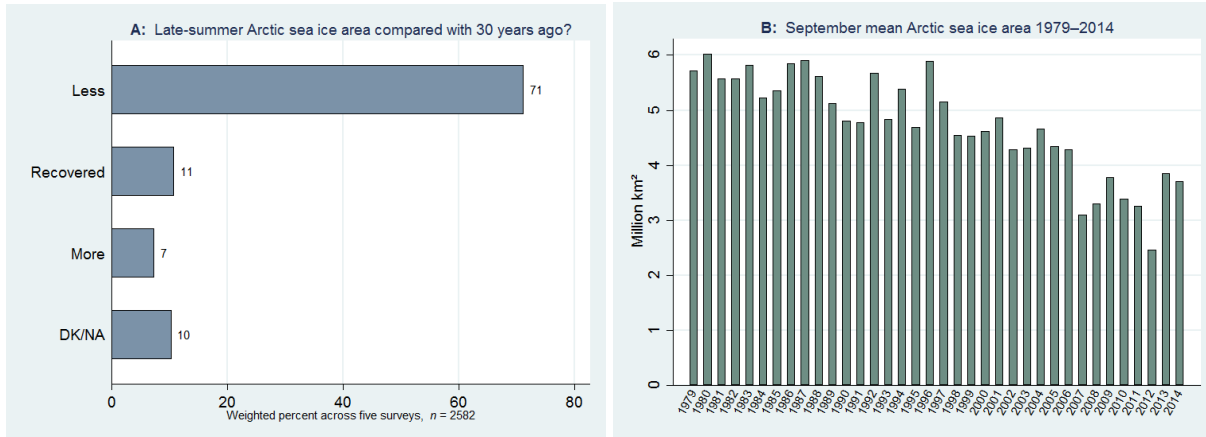


Figure 2: Response to sea ice question on five New Hampshire surveys (A), and observed September ice area (B).

Although most people get this right, accuracy varies with politics. **Figure 3** tracks the percentage of “less area” responses, showing the persistence of partisan divisions. Overall about 84 percent of Democrats, 74 percent of Independents, 68 percent of Republicans, and 50 percent of Tea Party supporters know or guess that Arctic sea ice has declined (definitions in Hamilton and Saito 2015). The gap between non-Tea Party Republicans and Independents is relatively narrow, compared with a wider gap separating non-Tea Party Republicans from Tea Party supporters.

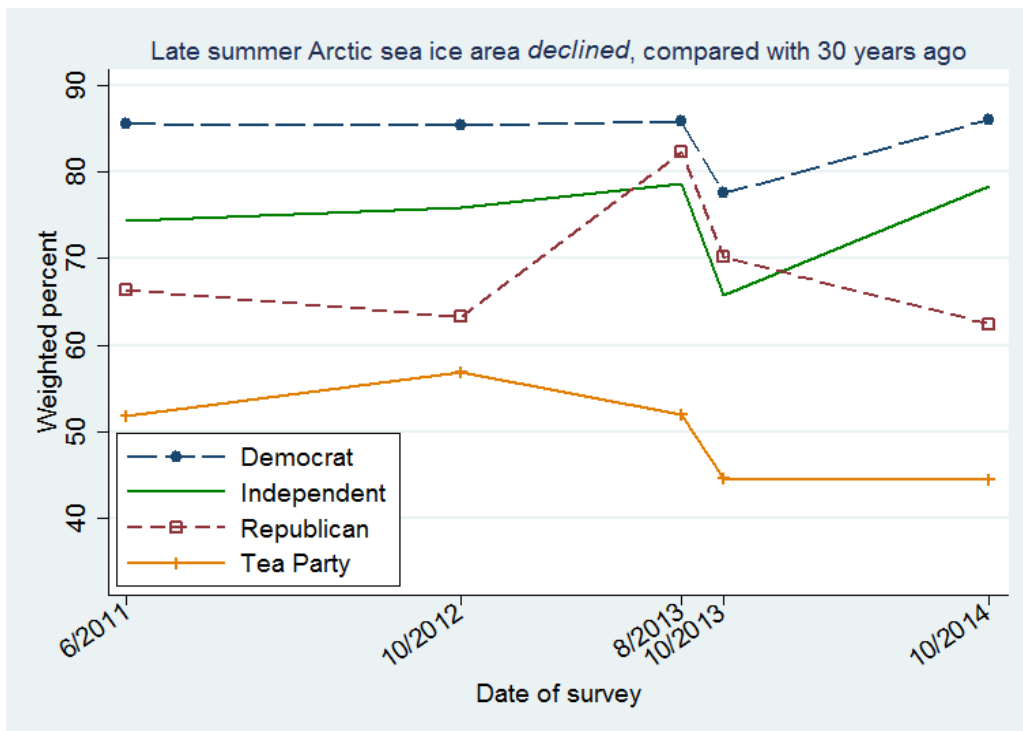


Figure 3: Percentage of “ice declined” responses by political party and approximate date of five New Hampshire surveys.

Surveys in October of 2012, 2013 and 2014 took place shortly after Arctic sea ice area had reached its annual minimum. There was scientific and media discussion at the time regarding the record low ice cover in 2012, or its somewhat higher levels in 2013 and 2014. Our surveys reflect these physical events only through a dip in the proportion of “less ice” responses in October 2013. Responses by Democrats and Independents bounce back to previous levels in 2014.

Arctic ice melting is an easy meme to recall from media reports, and one people might retain or dismiss depending on what they already believe about global warming. Consequently, responses to this question divide on political lines, and yet even among Tea Party supporters (who overwhelmingly reject anthropogenic climate change) half recognize the reality of Arctic ice decline. It is easy to find other survey questions, however, which have equally basic answers that are less memorable and cannot be deduced from ideology. For example, is the North Pole on thin ice over deep sea, or thick ice over land? What about the South Pole? Could sea ice or land ice potentially contribute more to sea level rise? On such questions the proportion of right answers drops sharply, and does not much correlate with politics.

Unlike ideologically-opaque polar knowledge, *self-assessed understanding* of climate change correlates more consistently with politics. Tea Party supporters, for example, rate their understanding the highest (Leiserowitz et al. 2011; Hamilton and Saito 2015). If political outlook filters or substitutes for information from science, that complicates the prospects for communicating about Arctic change. Survey results such as Figures 1 and 3 also highlight a middle ground, however, where science communication could be more direct.

Communicating with the general public about Arctic change encounters political and cultural challenges similar to those faced on broader science topics including evolution and climate change. Finding more effective science communication strategies is a focus of ongoing research, with divergent perspectives that could be characterized as *top-down* (divisions are driven by messaging from political, media or economic elites) or *bottom-up* (divisions reflect psychological, ideological or cultural identity). Some authors suggest that scientific consensus forms a “gateway belief” for accepting science information (Van der Linden et al. 2014), while others argue for an adaptive, culturally nuanced approach (Kahan forthcoming). Arctic change remains distant and abstract for most people, hence known through preconceptions, media or scientists. Its manifestations are not abstract for Arctic residents, however, whose voices may become more prominent.

Acknowledgments

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