

Measures of Cognitive Distance and Diversity.

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1 Introduction

How can we measure and classify causal belief systems of Americans regarding the economic, political, social and technological causes and consequences of global climate change? How diverse are these beliefs, and what factors explain this diversity? And how do these beliefs compare with those of their representatives? These are the questions that this study will analyze using theory and methods not usually employed in this field.

Prior studies measure causal beliefs regarding climate change by presenting individuals with predefined lists of presumably relevant items and average responses to individual questions (Bostrom et al., 1994; Maibach et al. 2011; Krosnik et al. 2006). In contrast, we elicit salient concepts from individuals and construct individual causal systems of beliefs. Cognitive scientists are accruing rich evidence that we reason and learn on the basis of causal explanations (Lombrozo, 2006, Anderson 2008), and Urpelainen and Aklin (2013) show that opposing arguments (frames) surrounding energy policy cancel out, leaving attitudes unchanged. Thus, to explain why and when an argument takes hold and shapes preferences, we argue it is necessary to analyze how a particular argument interacts with a persons pre-existing web of related beliefs. Rational choice theories take preferences over policy dimensions as given and predict how political processes aggregate them to determine outcomes. Consistent with this framework, public opinion research often focuses on measuring peoples policy preferences. Our approach breaks with tradition, as we believe that a sole focus on attitudes, rather than on factors that can explain them, shrouds much of the drivers of political life. The

formulation of a preference is but the final step in the process of using our systems of knowledge to apprehend complex real-world problems. Thus, unsurprisingly, studies are inconclusive as to the effect of economic self-interest on policy preferences (Lewis-Beck and Stegmaier, 2000): this question cannot be resolved without knowing what people individually believe regarding the cause-effect links between a policy and their welfare. In fact, when economic stakes are unambiguous, both to voters and to the researcher, they have been found to matter (Sears, 1979). Public opinion theorists have long found opinion to be very unstable (Converse, 1965; Zaller, 1992).

While this instability was long seen as a sign of the public's incompetence, framing theory suggests that people are sensitive to the multi-dimensionality of policy issues and that framing (i.e. focusing on specific considerations) can consequently influence opinion (Druckman and Chong, 2007), albeit in non-erratic ways. This helps explain why, despite instability, people are found to have clear opinions about specific bills and to hold their representatives accountable on this basis (Ansolabehere and Jones, 2010). Framing theory thus goes one step deeper in the cognitive structure underlying opinion but it so far has looked at frames in isolation. Measuring causal belief systems is the first step towards studying how frames interact within a system of beliefs. This will provide the foundations - currently missing (Druckman and Chong, 2007) - for theorizing which frames gain prominence and how they are related to more stable world-views, thus contributing to our understanding of opinion dynamics.

Further studies will study how belief systems interact with exposure to arguments to affect opinion, as well as how citizens perceive their representatives' beliefs and use those to understand and predict political behavior and vice versa. To carry out our analysis, we follow the pioneering work of Robert Axelrod (1976) of conceptualizing belief systems as causal maps. Causal maps are represented as directed graphs, where nodes are concepts and edges are asserted causal relations between these concepts (negative, zero etc.). Concepts are differentiated into intervention nodes (policies), value nodes (end-goals), and mediating variables. To construct these causal maps for elected officials, we use tools from computational linguistics to extract causal assertions from the Congressional Record from 1970 to today yields the diversity and evolution of causal beliefs of officials over time. To construct these causal maps for the U.S. population, we propose to survey a large number of respondents via Amazon Mechanical Turk (MTurk), a Web-based platform for recruiting and paying subjects to perform tasks. Although not

as representative as national probability samples, MTurk has been shown to yield similar results (Berinsky, Huber and Lenz, 2012) for a fraction of the cost. To obtain as complete a graph as possible without priming a subject, we designed a method based on snow-ball sampling that is used to obtain social networks. Starting from one concept, the instrument uncovers the graph by iteratively asking for the causes and consequences of the concepts thus elicited.

Using this large sample of causal graphs, we first examine whether beliefs explain policy preferences by evaluating the degree to which the former predict the latter. Second, we construct typographies of belief systems and evaluate the degree to which clusters of beliefs found among Congressmen actually represent those found amongst the public. To build typographies, we use information theoretic measures to measure the distance between causal maps and the diversity of collections of such maps. We also use the computer-assisted clustering tool developed by Grimmer and King (2011). From the sample of causal maps, we will obtain measures of cognitive diversity within and across clusters and geopolitical units (using the n-point, or generalized Jensen-Shannon Divergence), yielding a rich description of the American mental landscape related to climate change. The distance and diversity measures allow us to focus on specific dimensions of belief systems: variation in values (e.g., American prosperity vs. local economic interests), in thinking styles (e.g., whether people think in terms of feedback loops or more linearly) and in key mediating variables. Thus, we can identify group specific concerns that have not been recognized in the literature. Second, we can identify the predominant sources of disagreement in the population: do they concern end-goals, or disagreements about how those come about (causal mechanisms at play in the world)? Finally, we will measure the degree of association between the political and economic context of respondents and their beliefs. Drawing on framing theory (Druckman and Chong, 2007), we hypothesize that respondents living in urban areas of swing states, having been exposed to more competing frames, will have more complex graphs spanning a wider set of considerations than respondents in ideologically stable states. We will also evaluate whether the relatedness of a persons sector of employment to different energy sectors is associated with increased prevalence of beliefs related to local economic impacts.

2 References

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