POLITICS

Echo chambers and false certainty

Climate change continues to be a controversial issue among political elites in the US. New research shows how ideological views become entrenched through 'echo chambers'.

Justin Farrell

In recent years, climate change has become a launch pad for much larger debates about who can claim scientific objectivity and authority in a democratic society. The social-scientific community has devoted a significant amount of energy to understand why the reality of anthropogenic climate change has become such a highly polarized issue, especially in the US.

So what have we learned from all of this social science? Several notable things, which include (but are not limited to) the fact that the news media plays a critical role, that think-tanks exert influence through an organized counter-movement, and that political polarization in congress shapes how the issue is debated[1–3]. In *Nature Climate Change,* Lorien Jasny and colleagues[4] now suggest that many social-scientific explanations like these rely on a mechanism called echo chambers. This mechanism remains informal and has not yet been tested empirically.

The echo chamber concept describes the way in which information can be amplified and repeated within enclosed networks of ideologically similar individuals, leading to the further entrenchment of ideas and beliefs. People acquire and interpret information within their daily social networks. The structure of peoples' social worlds, and the range of information available within these worlds, can sometimes act to confirm what people already believe rather than encouraging open dialogue or critical reasoning. It does so by reinforcing and amplifying certain information, while at the same time shielding new or alternative information from penetrating communication lines between actors in the social network.

Scholars have known for some time that social networks dramatically influence how people receive and interpret information. Jasny *et al.* build on this literature by formalizing an empirical model of echo chambers within the US climate policy network. Their model has two parts. The first part is the 'echo', where a person acquires information that confirms what they already believe. This is akin to the confirmation bias phenomenon in psychology. The second part of the model is the 'chamber,' referring to the social world of relationships that structure and make possible the sending and receiving of information that confirms what actors already believe. Jasny and colleagues note that the structure of the chamber involves at least three actors, which includes the speaker, the receiver, and a mediating actor who can pass along information.

ANDREA IZZOTTI / ISTOCK / THINKSTOCK

Policymakers are likely to seek out and repeat viewpoints that are ideologically similar to their own, creating 'echo chambers' within institutions such as the United States' Congress.

The larger contribution of this study is that it advances the analysis of echo chambers beyond informal description. The authors collect new quantitative data to empirically test the concept, using climate change politics as a case study. The authors surveyed 64 elite actors engaged in US climate politics, asking their views on anthropogenic climate change, and most importantly, asking where they get their information about climate change. Linking elite opinion data about climate politics with networks and sources of information is a simple yet powerful way to test whether echo chambers are more likely to occur within like-minded groups in the climate policy debate.

The central empirical finding is that the political actors in their sample obtained information about climate change from many of the same sources, meaning echo chambers are indeed present in US climate politics. What are the repercussions of this finding? Jasny *et al.* note that while tightly bonded networks like these might be good for other spheres of life, such as friendship or generosity, when it comes to political communication, this sort of network structure tends to severely circumscribe flows of information to a handful of actors. Thus, echo chambers can lead to the perception of false certainty. In the case of climate change, conservative echo chambers have amplified a false

certainty that anthropogenic climate change is up for debate, when in fact outside of this echo chamber there is overwhelming evidence and scientific agreement about climate change.

This study has several implications for future research. First, and most significantly, while we know a lot about individual-level climate change attitudes, we need much more research that links these attitudes quantitatively to the larger institutional structures within which US climate politics has developed. Jasny *et al.* take a crucial step by formalizing and testing one such approach, but much more empirical work along these lines is needed to understand the social relationships within which attitudes are generated and reinforced in the first place.

Second, while this study identifies the structure of the echo chamber, it leaves future research to document the sources of the information itself — who gets to decide what information makes it into the 'chamber' to begin with? A complex mix of political, scientific, and industry interests — which also have particular social network structures and reverberate certain information and ideas — will need to be considered.

Third, the potential for echo chambers has seemingly increased with the proliferation of social media and online news, and thus researchers might examine how and why something in the climate politics arena goes viral and what, if any, connection this has to the echo chamber concept.

Lastly, Jasny and colleagues remind us that despite being perceived as a negative phenomenon, echo chambers are inherently neutral, and their normative appraisal is dependent on the context and subjective value of the information being communicated. So, on a more hopeful note, future research might examine how the echo chamber phenomenon could be reinterpreted and utilized as a positive force in democratic society, especially around issues like climate change, where information diffusion and ideological entrenchment continue to have important consequences. ❐

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HYDROLOGY

Climate change comes to the Sahel

Persistent drought in the Sahel in the 1970s and 1980s was caused by subtle changes in global sea surface temperatures. Now model results show that the direct effect of increasing greenhouse-gas concentrations led to the subsequent recovery.

Alessandra Giannini

The Sahel is the semi-arid southern shore of the Saharan 'sea of sand'. It holds a special place in climate science, because of the long-standing debate on the causes of persistent drought in the 1970s and 1980s. Since the driest mid-1980s, which include 1984 — the year of the Ethiopian famine made famous by Live Aid — there has been a recovery in rainfall[1], provoking further questions on what controls precipitation in the region. Writing in *Nature Climate Change*, Buwen Dong and Rowan Sutton[2] suggest that higher atmospheric concentrations of greenhouse gases, and the consequent atmospheric temperature increase known as the direct effect, were primarily responsible for the recovery. Given the high climatic vulnerability of the region, this study[2] is sure to captivate a broader audience, including development practitioners. This presents an opportunity to synthesize current understanding of the dynamics of future climate change in the context of past drought persistence.

The twentieth-century evolution of Sahel rainfall — including the decades of anomalously abundant rains that preceded the long-term drought — has been attributed to sea surface temperature (SST) variations. This was conclusively demonstrated only in 2003[3], freeing Sahelian farmers and pastoralists from blame[4]. Prior attempts to attribute variations in Sahel rainfall to emissions from industrialization presented arguments for indirect effects, whereby emissions, both greenhouse gases (GHGs) and aerosols, affect rainfall by inducing persistent SST anomalies[5]. For example, the cooling effect of sulphate aerosols on the surface temperature of the North Atlantic, the moisture source for the West African monsoon, has long been recognized as a key component of late 20th century Sahelian drought[6]. The generalized warming of the oceans attributed to GHGs, that emerged around 1970, is understood to have exacerbated drought persistence in the 1970s and 1980s[3,7,8]. Comparison to El Niño events[9] is illustrative: warming of the oceans locally favours the rising motions in deep convection that cause the air to cool, and water vapour in it to condense and fall in precipitation. At the same time, it raises the bar for the same processes to occur globally, because convection communicates the surface warming to the upper levels of the troposphere. As the upper-tropospheric warming spreads, it stabilizes columns of air remote from the surface warming itself. When this "upped ante for convection" cannot be met, tropical land dries[7], as in the case of the Sahel[10].

In contrast to previous periods of persistently abundant or deficient rainfall, the recent recovery in the Sahel is characterized by increased year-to-year variability[1]. This variability can be understood by revisiting the two elements implicated in drought — variations in North Atlantic SSTs, and warming of the tropical oceans. Whether due to a decrease in atmospheric aerosol loading prompted by legislation in the US and Europe, or to a recovery in the strength of the Atlantic Meridional Overturning Circulation[11], the North Atlantic is now also warming.