

# Are Experts (News)Worthy? Balance, Conflict and Mass Media Coverage of Expert Consensus

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## Abstract

Overlooked in analyses of why the public often rejects expert consensus is the role of the information environment. News coverage of expert consensus on general matters of policy is likely limited as a result of journalists' emphasis in news production on novelty and drama at the expense of thematic context. News content is also biased towards *balance* and *conflict*, which may dilute the persuasiveness of expert consensus. This study presents an automated and manual analysis of over 280,000 news stories on ten issues where there are important elements of agreement among scientists or economists. The analyses show that news content typically emphasizes arguments aligned with positions of expert consensus, rather than providing balance, and only occasionally cites contrarian experts. More troubling is that expert messages containing information about important areas of agreement are infrequent in news content, and cues signaling the existence of consensus are rarer still.

The continued confusion in a sizable portion of the American public over the degree of scientific consensus on anthropogenic climate change raises a broader question of why there are substantial differences in opinion between the public and experts on a wide range of issues (Pew Research, 2015; Sapienza & Zingales, 2013). A growing experimental literature has shown that experts, when in consensus, can be persuasive on highly technical issues (Johnston & Ballard, 2016; Lewandowsky et al. 2012; van der Linden et al., 2016), but processes of motivated reasoning often prevent citizens' assimilation of counter attitudinal signals from experts on other highly charged issues (Kahan et al., 2012; Lewandowsky & Oberauer, 2016). The fault for sharply diverging opinions may not entirely rest with citizens, however. For instance, we know that features of media coverage, such as a journalistic norm of providing balanced coverage may instil confusion among news consumers about the state of expert opinion. There is some evidence that this form of reporting once guided climate change coverage (Boykoff & Boykoff, 2004; Zehr, 2000).

Little effort has been made to systematically examine the media environment to illustrate the prevalence of information on expert consensus across a wide range of issues, nor to examine whether consensus is presented in a way that is conducive to influencing public attitudes. This study presents an automated and manual content analysis of over 280,000 articles and transcripts on ten issues where there is important agreement among scientists and economists. The results suggest that journalists generally craft news content that emphasize arguments aligned with consensus positions among relevant experts rather than providing strictly balanced coverage. And, importantly, they do not provide balance to the perspective of the expert community by citing contrarian experts – often labelled as *false balance* by media critics. More problematic is the tendency of journalists to situate messages from experts amidst claims and counterclaims by polarizing political actors – even on low salience issues – which may prime citizens to resist messages signaling expert agreement.

The most troubling finding presented below, however, is that messages from experts relevant to important areas of consensus are not common in media content even when such content is directly relevant to that consensus. Clear cues signaling the existence of agreement or consensus among experts are rarer still. The news media does a poor job of informing citizens of expert consensus where it exists.

## Media Bias and the Presentation of Expert Opinion

Experts and scientists are in agreement on a wide range of topics. Ideally, citizens should be informed of these important areas of agreement so they can take them into account when forming opinions on relevant issues. It is here where the news media play a critical role. On complex issues, citizens rely on signals or cues sent from relevant communities of experts carried in news coverage as they rarely encounter policy experts in their social circles (Wilson, 1995). These cues are particularly valuable if they communicate the existence of expert agreement or consensus (Johnston & Ballard, 2016; Lewandowsky et al., 2012; van der Linden et al., 2016). However, much of the literature on the influence of source cues on public opinion, such as from experts, fails to examine the cueing environment in the media (see Gilens & Murkawa, 2002 for a broader discussion). These studies implicitly assume that messages or cues from experts are available in the information environment of the average citizen and that they are presented in a way that is easy for them to process.

However, there are strong theoretical grounds to suspect that the mass media routinely fails on both counts. Technological changes through the 20th and early 21st centuries have magnified the competition that exists between media organizations for consumers and advertisers (Bennett & Iyengar, 2009). The media marketplace has fragmented and outlets are struggling to make profits. This pressure has directly influenced decision making by making economic considerations more important (Bagdikian, 2004). As Shoemaker and Reese (2014) note “media personnel are now more likely to evaluate each news item in terms of how it will affect circulation and/or ratings” (p.140). The new economic reality – combined with the rise of corporate ownership (Bagdikian, 2004) – means that media outlets are more risk-averse and increasingly responsive to the tastes of news consumers.

It is in this context that perceptions of newsworthiness are being shaped. An increasing need to be responsive to consumer demand has magnified several important regularities in news content. Coverage is likely to be *personalized* (Bennett, 2007), *dramatized* (Boykoff & Boykoff, 2007), and focused on *novelty* (Wilkins & Patterson, 1991). This combination leads political issues to be framed in ways that are superficial and episodic. As Bennett (2007) notes, news stories give “preference to the individual actors and the human interest angles in events while

downplaying institutional and political considerations that establish the social context of events” (p. 26). News content will typically eschew linkages between stories and continuity in coverage in favour of covering controversial events and personalities (Iyengar, 1991).

Experts are likely to be cited at some level in news coverage because of the media’s reliance on official sources (McManus, 2000; Steel, 1990) and can provide institutional and social context to certain issues when used to their full potential. One essential piece of context to a policy discussion is the existence of expert agreement or consensus on questions central to that debate. Unfortunately, expert consensus may not be prominent in news coverage because consensus, by its very nature, leaves little room for drama and novelty. It requires journalists to use a single angle repeatedly, like the growing threat of global warming (Boykoff & Boykoff, 2007; Hilgartner & Bosk, 1988). And, discussion of central questions of public policy, like whether trade protectionism is generally welfare-enhancing or reducing, is unlikely to find its way into media coverage that is episodic and fragmented rather than thematic and context-rich (Iyengar, 1991). This motivates the first set of research questions in this paper:

RQ1: How often do news media use experts as sources to support positions on central questions of policy that have broad expert agreement? Do journalists use clear cues to signal the existence of expert agreement or consensus when appropriate?

Even when expert consensus is features in news content, it is possible that it is not presented in a clear and persuasive manner. One issue is that a journalistic norm of objectivity encourages the equitable presentation of at least two sides of a debate in news stories (Dunwoody, 1999) – often labeled *balance*. In part, this norm exists because both journalistic and societal beliefs value news for being covered in an even-handed manner (Giannoulis et al., 2010; Schudson, 1978). But it is also a mechanism to protect journalists from attacks that might undermine their credibility (Hallin, 1986; Shoemaker & Reese, 2014). This practice also furthers journalists’ need for personalized and dramatized coverage (Stocking, 1999; Zehr, 2000).

Balance as form of bias means that experts in line with the mainstream consensus will often be featured in coverage alongside those that are not representative of the broader expert

community – often labeled *false balance* by media critics. Conflict between experts as portrayed in the media may increase public perceptions of uncertainty in expert findings, thus leading to divergence between public and expert opinion on key issues (Koehler, 2016). Some experimental research has found that exposure to dueling experts can increase perceptions of disagreement among experts (Clarke et al., 2015; Dixon et al., 2015; Koehler, 2016). Other studies have had more mixed results (Corbett & Durfee, 2004; Jensen & Hurley, 2012). Nevertheless, there is reason to suspect such falsely balanced coverage of expert consensus may, at times, engender confusion among citizens about the state of expert knowledge and have further, downstream effects on public attitudes.

A number of scholars have argued that false balance was common in media coverage of climate change in the United States where journalists pitted the IPCC consensus against dissenting scientists that often had ties to conservative groups and the fossil fuel industry (Boykoff & Boykoff, 2004; Zehr, 2000; though for a more skeptical account see Merkley & Stecula, 2018, and Stecula & Merkley, 2019). This has also been observed in other areas of science-based policy (Dearing, 1995; Dunwoody, 1999; Stocking, 1999). This discussion leads to the second set of research questions pursued here:

RQ2: To what degree does news coverage provide a balance of perspectives on areas of expert agreement? How often are contrarian experts presented in coverage alongside those who are in line with the mainstream of the expert community?

The tendency of journalists to dramatize the news means that coverage of a policy area will also be laced with *conflict*. Taken together with the norm of balance, this means consensus information from experts will often be contested in coverage by polarizing political actors (Bennett, 1990; Merkley & Stecula, 2018; Trumbo, 1996). We know that citizens often form opinions on political issues by following cues from party elites, ideological organizations, and interest groups (Cohen, 2003; Lupia, 1994; Mondak, 1993). Scholars have debated whether the use of these cues by citizens comes from a rational need to make decisions in line with their interests with little information (Lupia & McCubbins, 1998) or unconscious and automatic responses to information driven by affect

(Lodge & Taber, 2014). Whatever the cause, the presence of these actors in political coverage may limit the persuasiveness of experts by priming citizens to resist their messages.

RQ3: How often do news media present influential and polarizing information sources that oppose the stated position of the expert community such as parties, interest groups, or ideological organizations?

These three sets of questions motivate much of what follows. However, journalistic practices may also vary across issues, media format, outlet ideology, and even over time. For example, broadcast and cable formats are more conducive to episodic coverage compared to print (Shoemaker & Reese, 2014). Coverage of relevant expert messages should be less frequent in these media. We know that cable news typically caters to politically engaged audiences (Levendusky, 2013; Prior, 2013) and focus more attention on conflict (Feldman et al., 2012; Sobieraj & Berry, 2011). They might be more likely to situate expert messages in the context of political conflict. Where possible, I will draw comparisons related to my three sets of research questions across issues and media outlets, and over time.

## Data and Methods

We cannot possibly analyze news coverage of all areas of expert agreement that attract media attention, nor do we know what the population of such issues looks like. The best that can be done is to select issues across dimensions we think are important. I selected nine issues that varied in whether they are related to the natural sciences or economics and in the direction of elite cues. This latter dimension was chosen to rule out bias in news coverage of experts that could be driven by partisanship. The tenth issue is climate change, which has been a dominant focus of the science communication literature.

Democrats and liberal advocacy groups tend to be opposed to the economic consensus on rent control and skeptical of the safety of GMOs and nuclear power. Republicans and conservatives are typically more hostile towards Federal Reserve independence and road pricing,

and are more inclined than Democratic elites to view immigration as an economic harm to Americans. There are also some issues with no clear direction of party cues. There is generally cross-partisan support for childhood vaccinations. Backing for farm support programs cut across farm state lines, while Democratic presidents and Republican lawmakers have advanced an agenda of free trade in lockstep. Together, these ten issues feature critical areas of expert agreement that economists and science advocates have emphasized in the hopes of influencing public policy. More information on the nature of the expert consensus on each issue I selected can be found in Appendix A of the supplementary materials.

I gathered media coverage from the *Lexis* and *LexisNexis Academic* services using keywords and subject tags (found in Appendix B of the supplementary materials) selected for coverage rather than precision to draw in all possible news coverage that relate to my issues. The keywords and phrases also carefully avoided reference to experts. I selected sources to cover the primary news media (newspaper, newswire, broadcast, and cable), and, where feasible, the ideological spectrum. So I chose the *New York Times* and the *Washington Post* as liberal-leaning newspapers, along with *USA Today*. I also included the *Houston Chronicle*, the *Dallas Morning News*, and the *San Diego Union-Tribune* as a trio of conservative leaning newspapers.<sup>1</sup> I downloaded transcripts from the three big cable and broadcast networks, along with news content from *the Associated Press* newswire. Table B1 in the supplementary materials provides the total number of articles or transcripts across issues. This is by no means a complete picture of the coverage of these issues, but it is a significant and ideologically balanced slice of the media environment that covers how the vast majority of Americans receive their news.

In total, I collected nearly 300,000 articles and transcripts. Each of these articles is related in some way to one of the ten issues I am studying. But not all of these articles are especially relevant, in the sense that not all of them spoke to the specific area on which experts agree. For

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<sup>1</sup> The *Dallas Morning News* and the *San Diego Union-Tribune* both endorsed Republican presidential candidates in every cycle from 1980 to 2012. The *Houston Chronicle* endorsed the Republicans in 8 of 9 presidential election cycles. In contrast, the *New York Times* and *Washington Post* endorsed Democrats in every cycle in that period, with one exception. Newspaper endorsement histories can be found here: <https://noahveltman.com/endorsements/>.

example, most immigration stories likely do not focus on the economic effects of immigration, but rather the politics of illegal immigration or refugee flows. Similarly, some climate change coverage may cover the politics of climate mitigation or industry development of alternative energy sources, rather than climate science or climate impacts. I needed to distinguish these especially relevant articles from the others. However, there are far too many articles for me to manually code, so I trained software to do the coding for me.

Specifically, I made use of *RTextTools* – an R package that allows me to train an ensemble of predictive algorithms on a limited sample of manually coded articles. These algorithms learn how to classify articles from my own coding. I can then use these trained algorithms to classify my entire corpus of almost 300,000 articles and transcripts. Supervised machine learning techniques are increasingly used by scholars to study large volumes of text, including news content (Grimmer & Stewart, 2013; Lacey et al., 2015; Young & Soroka, 2012).

I manually coded 500 articles for each issue as “1” if they contained discussion related to the area of expert agreement for a given issue, and “0” if otherwise to train the machine (750 articles were coded for immigration for a total of 5250 articles). I refer to this classification as *topic relevance*.<sup>2</sup> The general coding rules are shown in Appendix C of the supplementary materials. I used a random sample of 400 of these manually coded articles on each issue to train four categorization algorithms in the *RTextTools* package. The machine classifies articles as “1” if 3 of the 4 algorithms agreed it was relevant. I then tested the trained algorithms on the remaining 100 manually coded articles for each issue to evaluate the reliability of the machine coding. Accuracy and precision scores were calculated for this evaluation, which are shown in Table D1 in the supplementary materials.<sup>3</sup>

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<sup>2</sup> An undergraduate research assistant randomly coded 200 articles for relevance. Our coding was in 90% agreement, with a Krippendorff’s Alpha score of 0.79. More details on manual coding validation can be found in Appendix G in the supplementary materials.

<sup>3</sup> Accuracy tells us how often the algorithm got it right ( $(\text{True Positives} + \text{True Negatives})/\text{Total}$ ). But, the purpose of this analysis is to zero in on a sample of articles for manual coding. As such the more important measure of performance is how many true positives

Overall accuracy of the algorithm ensemble ranges from 80% on trade protectionism to 92% for Federal Reserve and farm support coverage with an average of 88% across all issues. Even more impressive are the precision scores. It ranges from 0.8 for trade protectionism and the Federal Reserve to 1.00 for road pricing with an average of 0.9. In other words, a best estimate for the rate of false positives is 10% across all issues. After training the algorithms, they were used to predict the topic relevance of the full corpus of nearly 300,000 news stories. Rates of topic relevance varied considerably across issues, from a low of 2% for immigration to a high of 58% of GMOs. These are shown in Table C1 in the supplementary materials for each issue.

Next, I built dictionaries of keywords and phrases for each issue using the R package *Quanteda*. This allowed me to count the number of references to experts in news coverage and construct a measure that captures the share of coverage with these references, referred to as *expert citations* throughout this paper. On economic issues, the dictionary contains categories for economists and policy analysts, along with a category to capture generic references to experts, featuring words such as analyst, expert, specialist, and professor. On natural science issues, the generic category was maintained, along with categories specific to each issue. These dictionaries, which can be found in Appendix E in the supplementary materials, aim for coverage rather than precision and thus set an upper limit on the share of coverage that may contain discussion of the state of expert knowledge on these issues.

The result of my automated analysis is that I am able to identify stories with content relevant to the expert consensus central to each issue – or *topic relevance* – and whether or not there are *expert citations* in any given article. However, this information does not tell us a lot about whether or not expert consensus on an important dimension of a policy issue is being clearly conveyed to readers and viewers. So, for example, are these expert citations conveying information related to the expert consensus of interest? Are there clear cues conveying the level of expert agreement? Are expert voices contested by political interests or contrarian experts? These are more nuanced questions that deserve more delicate treatment.

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we have relative to all articles that were coded as relevant. This is what the precision score gets us (True Positives/[True Positives + False Positives]).

In order to answer these questions, I manually coded a stratified random sample of articles and transcripts that were classified as both relevant *and* having an expert citation according to my automated analysis. My aim was to code 100 articles for each relevant subset of sources on each issue. So I coded 100 randomly selected articles each for Republican-leaning newspapers, broadcast sources, liberal cable outlets, and so on. For most issues, particularly those of lower salience and for cable and broadcast coverage, there were not 100 articles or transcripts for a relevant media subset. I coded all the articles within that subset in such cases. Coding criteria can be found in Appendix F in the supplementary materials.

I manually coded the resulting sample of 3,147 articles and transcripts in ways related to my three sets of research questions. First, I coded features of articles related to the presentation of expert messages to examine whether messages conveying the position of the expert community are present and whether journalists clearly signal there is agreement within the community. At the most superficial level my automated analysis can tell us whether or not there is an *expert citation* in the text of an article. Of articles with these citations only some of them will contain a message from, or attributed to, an expert that is related to the area of expert agreement for a given issue. Experts could also be used to describe the state of the world or how certain policies work. Or, they may be asked to make predictions about the future. The important point is that they can do all of this without fundamentally speaking to the area of expert agreement on each issue *even when there is some content in the article that is related to that question*. So I code my articles for whether or not any expert citation in the story is linked to a message from an expert related to the consensus for that issue (Present/Absent). I call these *expert messages*.

Expert messages related to consensus can provide compelling insight into a particular question for the average reader of a news article. On their own, however, they may lead some citizens to wonder whether the stance attributed to the expert reflects their personal view alone or is representative of the broader expert community. After all, there are plenty of areas on which experts are in disagreement. So I code for whether the journalist or expert uses a cue that signals to readers or viewers that the expert message is related to some broader agreement in the expert community (Present/Absent). This cue could range in its concreteness from crystal clear statements that indicate there is an expert consensus on the question, to vaguer statements

like “experts agree that...” I refer to the subset of expert messages that contain such signals as *agreement cues*.

I further parse the agreement cue category. Many of these cues are imprecise in their presentation of the balance of opinion in the broader expert community. A statement like “many experts believe...” or “scientists say...” is not sending a clear and unambiguous statement that there is supermajority or consensus agreement within the expert community on a pertinent question. So, I code agreement cues for whether or not there is such an unambiguous signal (Present/Absent). Statements like “most experts say...”, “a large majority of economists believe...”, or “there is a scientific consensus that...” all qualify as a *consensus cue*. Armed with this coding, I can illustrate the prevalence of each type of expert signal in relevant and total news content on my ten issues, where each finer-grained distinction provides more informative value to citizens on the state of expert knowledge.

Second, I coded several features related to the entire article that might limit the persuasiveness of expert consensus – *balance* and *conflict*.

- *Balance* (-1 to 1): The overall balance of arguments in an article related to positions of expert agreement.
  - A score of 1 means that the relevant information contained in the article was entirely aligned with the position of the mainstream expert community, while -1 was entirely against that position. It was insufficient to simply note alternative perspectives exist on an issue – the journalist had to spend some space paraphrasing their argument or quoting a source in support.
  - Scores of 0.5 and -0.5 were assigned if there was a notable emphasis in the article for perspectives in either direction, but there is still some evidence of a balancing of perspectives by the journalist.
  - A score of 0 indicated that both perspectives were evenly balanced. Both sides were treated relatively equally in the content of the article.

The final two classes of codes only applied to articles in which an expert was cited to communicate a position on an area on which there is substantial expert agreement (i.e. an expert message).

- *False Balance* (Present/Absent): Contrarian experts were cited by journalists to balance the perspective of expert sources who relayed stances aligned with the expert community.
- *Polarizing opponent* (Present/Absent): Parties, advocacy organizations, or interest groups were cited in opposition to the position of expert sources that are aligned with the broader expert community.

All told, the manual coding gives us a clear picture of how often experts appear in coverage to relay important messages of agreement, and how frequently balance and conflict bias in news content muddy communication from experts.<sup>4</sup>

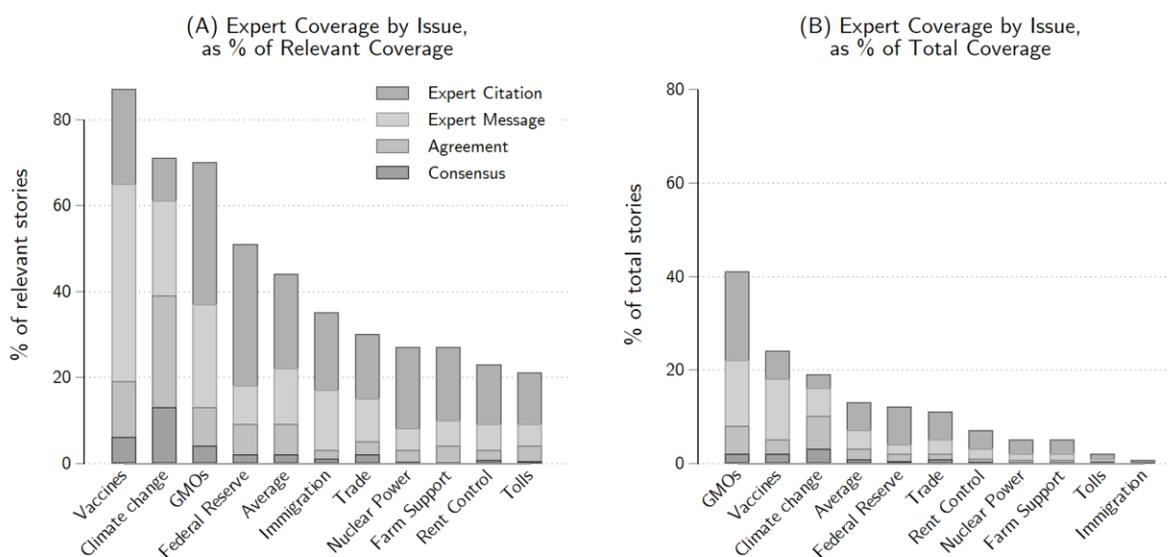


Figure 1. Prevalence of expert citations, messages, and cues in news coverage. (A) As a share of relevant coverage (i.e. coded “1” by the trained classification algorithms). (B) As a share of total coverage downloaded from *Lexis* and *LexisNexis Academic* using keywords and subject tags. Note: Expert citation means the automated dictionary picked up a reference to an expert in a news story, while expert message means the hand coding revealed a message in an article by an expert that was relevant to a position of expert agreement.

<sup>4</sup> An undergraduate research assistant randomly coded a sample of 250 articles to demonstrate the reliability of my manual coding. Across three metrics – percentage agreement, Gwet’s AC, and Krippendorff’s Alpha – the reliability of my manual coding generally ranged from good (0.6 to 0.8) to very good (0.8 to 1) according to Altman’s (1991) benchmarking scale. More details on the reliability tests can be found in Appendix G in the supplementary materials.

## Results

First, I discuss patterns of expert messages and consensus cues across issues and media format, and over time. Second, I present the results of manual coding that digs deeper into the presentation of expert information with a focus on balance and polarizing conflict in news coverage.

### The Frequency of Experts Messages in News Coverage

The main takeaway finding is that expert messages related to areas of consensus and clear cues signaling that consensus are simply not that common in news content. A minority of relevant news stories have an expert citation captured by the automated dictionary analysis (44%), while only half of these have a clear message related to an area of expert agreement based on my hand coding (22%). Only a fraction of these cues have a signal of agreement within the expert community (9%), and far fewer explicitly state there is majority or consensus agreement (2%). Messages from experts signaling information related to an area of agreement are infrequent, while cues indicating the existence of expert agreement or consensus are rarer still.

There is notable variation across issues in the presentation of expert messages. Panel A of Figure 1 presents the number of expert citations, messages, and cues expressed as a share of relevant news coverage across each of the issues in this study. The story is modestly better in vaccine (87%, 65%, 19%, and 6%) and climate change coverage (71%, 61%, 39%, and 13%). However, agreement cues only exceed 10% of coverage on these two issues and GMOs (13%). Agreement and consensus cues are only robustly used in climate change coverage.

The story is even more troubling when accounting for the fact that news coverage on these issues does not usually contain content relevant to an important area of expert consensus. Panel B of Figure 1 displays the prevalence of expert citations, messages, and cues, expressed as a share of the total volume of coverage gathered from *Lexis* and *LexisNexis Academic* using a variety of keywords and subjects tags indicating relevance for a policy area.

Only a minority of stories contain both an expert citation and content relevant to the consensus in the expert community (13% of the total). Of these, only half contain messages from

experts that speak to the area of agreement (6% of the total), only a fifth have a cue that signals expert agreement (3% of the total), and 1 in 20 have a clear consensus cue (0.6% of the total). Again, there is variation across issues. The media does the best job on these metrics in its coverage of climate change (27%, 19%, 16%, 10%, and 3%) and vaccines (28%, 24%, 18%, 5%, and 2%) and the worst in its coverage of immigration (20%, 1%, 0.5%, 0.1%, and 0.04%) and nuclear power (31%, 5%, 2%, 0.6%, and 0.4%). The news media does not often cover expert consensus where it exists (RQ1).

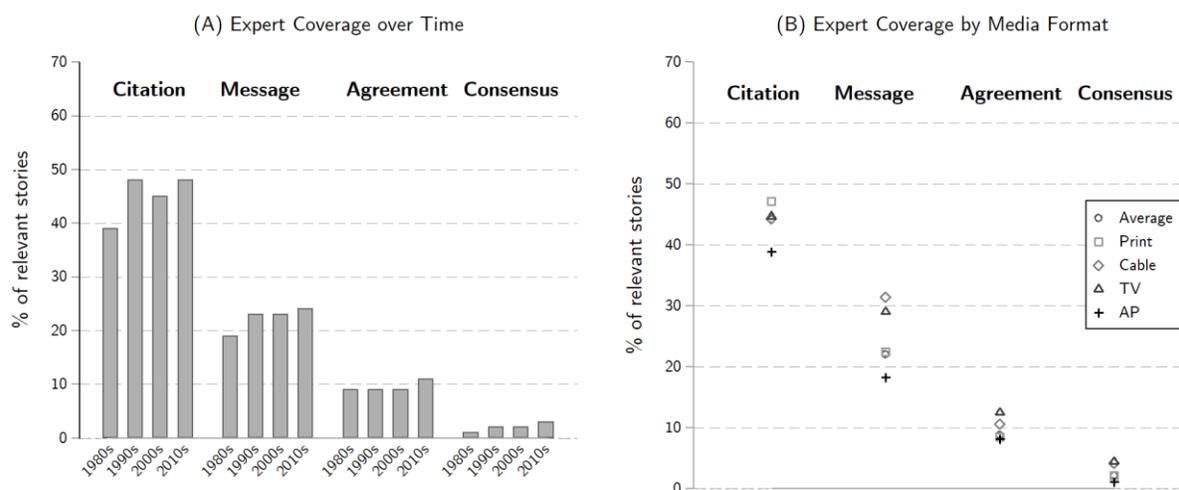


Figure 2. Share of relevant coverage with expert citations, messages, and cues. (A) Comparisons over time. (B) Comparisons by media format. Average represented by the circle. Note: All results expressed as a share of relevant news coverage (i.e. coded “1” by the trained classification algorithms).

Panel A of Figure 2 presents the share of expert citations, messages, and cues over time. The results here are expressed as a share of content that the machine classified as relevant. It shows that the tendency of journalists to cite experts has gone up since the 1980s, rising from 39% of relevant coverage to 48% after 2010. Likewise, their coverage of expert messages related to areas of consensus has increased slightly from 19% in the 1980s to 24% after 2010. However, agreement and consensus cues have remained low and stagnant. There are important differences in this regard across issues, however. On those related to the natural sciences, journalists appear to increasingly use agreement and consensus cues. For example, agreement cues have increased in coverage of nuclear power (2% to 7%), vaccines (10% to 26%), and GMOs (11% in the 1990s

to 23% after 2010), while consensus cues have become more common in climate change (9% to 16%), vaccine (0% to 10%), and GMO coverage (3% in the 1990s to 9% after 2010). This pattern was generally not found on economic issues. The full results displaying differences across issues and over time can be found in Table H1 in the supplementary materials.

Panel B of Figure 2 presents the share of expert citations, messages, and cues across different media formats for all issues combined. The AP newswire cites experts less frequently than other formats (38%). The share of relevant coverage with expert messages on an area of agreement is modestly higher in cable (31%) and broadcast news (29%), but it is worth noting that these formats contained far less content relevant to areas of expert agreement at the outset. All media formats were unlikely to provide agreement or consensus cues.<sup>5</sup>

### Balance and Polarizing Conflict in News Coverage of Experts

So far the story presented has been bleak. The media does not often carry messages from experts, and it is rarer still that they convey information about expert consensus (RQ1). This is true even when coverage is directly relevant to the consensus at hand. Scholarship examining why experts and the public are often offside need to account for this important shortcoming of the information environment, rather than attributing it almost entirely to the motivational deficiencies of average citizens.

However, there is one area where the media at least partially defy pessimistic expectations: balance (RQ2). To be sure, most articles displayed some balance of perspectives in favour and opposed to the stance of the expert community, but emphasis in either direction could be detected in around 80% of news stories. Journalists typically orient coverage in favor of the position of the mainstream expert community. 56% of articles emphasize arguments that

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<sup>5</sup> There is also some indication of partisan or ideological bias among outlets. Republican-leaning outlets (e.g. *Fox News*) were less likely than Democratic-leaning outlets (e.g. *CNN*) to feature expert citations or messages on issues where Republican and conservative elites resist expert consensus. The reverse is true on issues where Democratic-elites resist expert consensus. Results displayed in panel A of Figure H1 of the supplementary materials.

support the expert position compared to 23% that emphasize arguments opposed to areas of expert agreement across the issues used here.

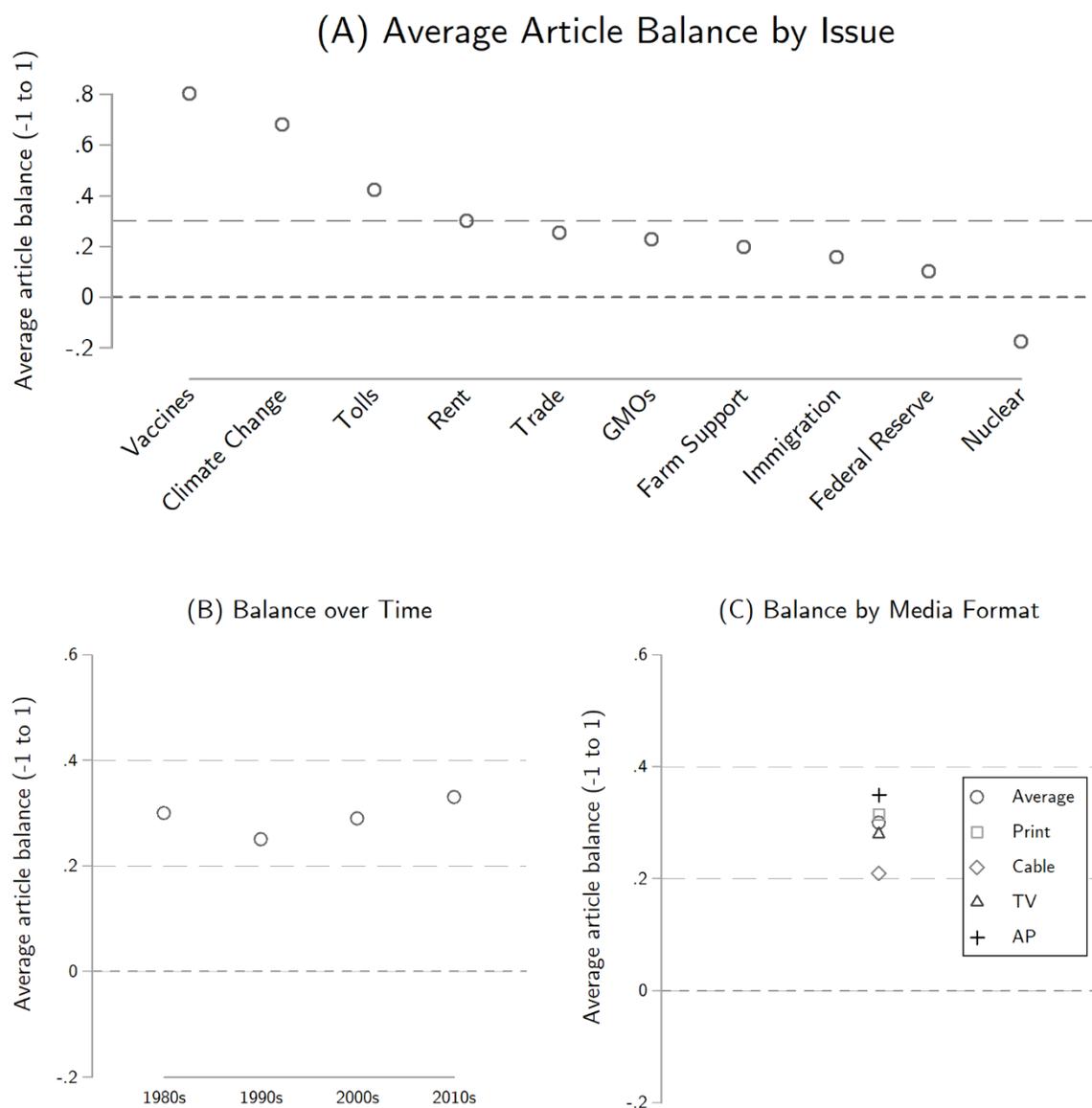


Figure 3. Average article balance in relevant news content with expert references. (A) Comparisons by issue. Dashed line represents the average. (B) Comparisons over time. (C) Comparisons by media format. Average of all media types represented by the circle. Solid line at 0 represents balanced coverage, on average. Note: Scale runs from -1, where all arguments in the news story reject the expert position, to 1, where all arguments support the expert position. 0 represents a relatively equal balance of perspectives.

The balance score I use here ranges from -1, where all arguments used in the news story reject the expert position, to 1, where all arguments support the expert position. 0 means that, on average, coverage is evenly balanced between positions in support of and opposed to the expert position. The media scored 0.3 on this measure, averaged across format and all issues, indicating a modest orientation towards expert positions in relevant news coverage.

Panel A of Figure 3 displays the average balance score for news stories across issues, where the dashed line indicates the average across all of these issues. Climate change and vaccine coverage appear to be the most reflective of mainstream expert positions (0.61 and 0.80). The climate change score rises to 0.87 when excluding *Fox News*, whose coverage of climate change is unsurprisingly oriented against the expert consensus (-0.17). In contrast, nuclear power coverage leans modestly against the position of the expert community (-0.18). This illustrates that there is no clear dividing line between issues of natural science and economics on this dimension. The safety of GMOs and nuclear power are far more contested in news coverage than the reality of climate change or the safety and efficacy of vaccines.

Panel B of Figure C shows that balance has been steady on average over time, fluctuating between a low of 0.25 in the 1990s to a high of 0.33 after 2010. This average masks some heterogeneity across issues. News coverage increasingly emphasizes arguments supporting positions of expert consensus on the economic effects of immigration, rising from -0.11 in the 1990s to 0.34 after 2010. The same is true in news content on the safety of GMOs (0.19 to 0.35), Federal Reserve independence (-0.50 to 0.16), and federal farm support over the same time period (0.05 to 0.61). In contrast, both road toll (0.69 to 0.09) and rent control news content (0.39 in the 1980s to 0.06 after 2000) increasingly emphasize arguments opposed to expert consensus.

Climate change news coverage, for its part, shows movement away from the position of expert consensus, falling from 0.76 in the 1980s to 0.64 after 2000, but this change is an artifact of *Fox News's* entry into the sample. Without Fox, climate change content has moved towards the position of expert consensus, rising from 0.76 in the 1980s to 0.86 after 2000. The full results can be found in Table H2 of the supplementary materials. Panel C of Figure 3 presents the

average balance score for news stories across different types of media format for all issues combined. Balance is more common in cable news, as we would expect (0.2).<sup>6</sup>

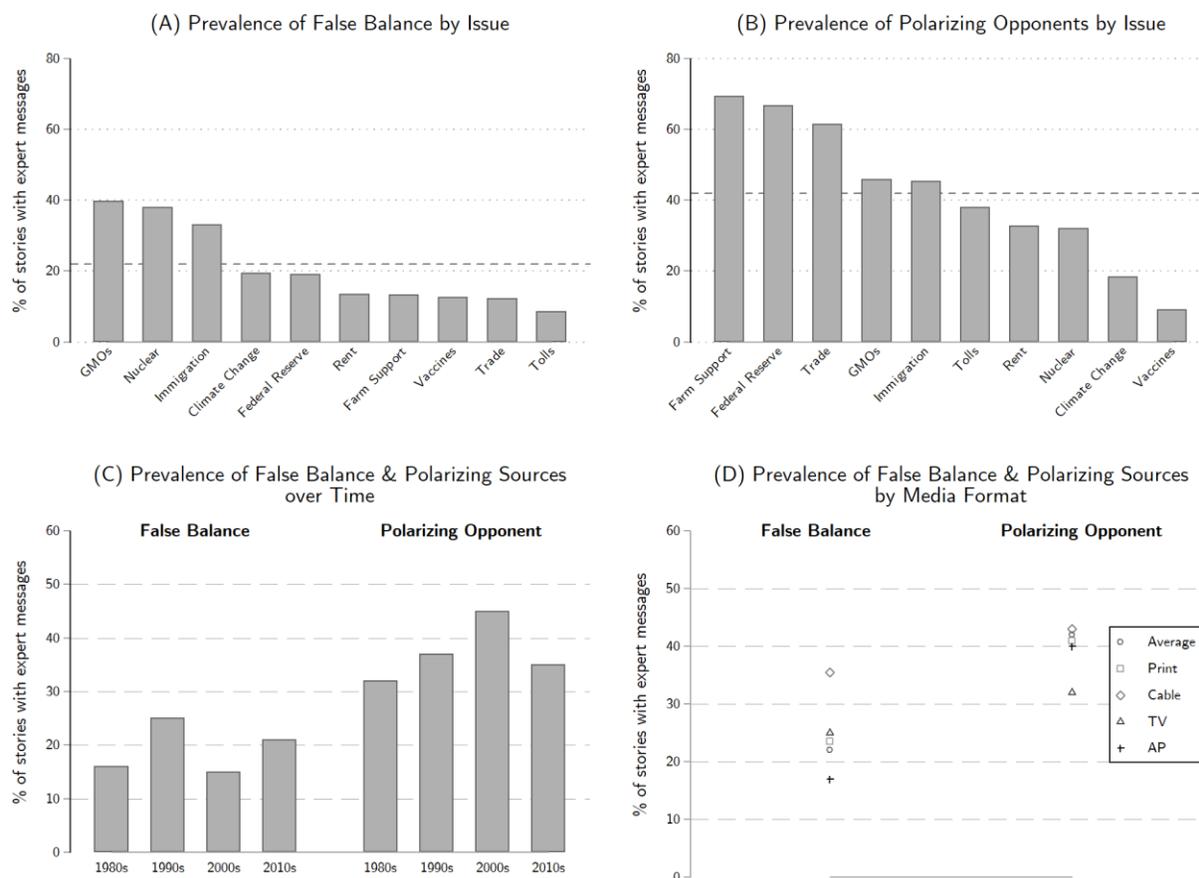


Figure 4. False balance and polarizing opponents in relevant news content with expert messages. (A) Prevalence of false balance by issue. Dashed line represents the average. (B) Prevalence of polarizing opponents by issue. Dashed line represents average. (C) Comparisons over time. (D) Comparisons by media format. Average across media types represented by the circle. Note: All results expressed as a share of coverage with a message from an expert related to an area of expert consensus.

<sup>6</sup> Again, there is some evidence of ideological or partisan bias among outlets. Democratic-leaning outlets are more likely than Republican-leaning outlets to emphasize arguments aligned with the expert consensus on issues where Republican and conservative elites resist expert consensus. The reverse is true on issues where Democratic-elites resist expert consensus. Results displayed in panel B of Figure H1 in the supplementary materials.

How likely are journalists to engage in much maligned *false balance* by citing contrarian expert sources (RQ2)? It turns out that this is not standard practice. False balance only occurs in 22% of coverage where expert messages are featured, averaged across media format and all issues. Panel A of Figure 4 shows that the prevalence of false balance is notably higher than the average on three issues: GMOs (40%), nuclear safety (38%), and immigration (33%), while rates of false balance in climate change and vaccine coverage are below the average represented by the dashed line in the figure. The contrast between the relatively high rates of false balance in GMO coverage and low rates in climate change (19%) and vaccine coverage (13%) are striking given the fact that most scholarly attention has focused on the latter two issues.

Panel B of Figure 4 shows that the practice of false balance has remained steady over time. There is, however, variation across issues. False balance has decreased in climate change coverage from 28% in the 1980s to 10% after 2010, and in news content on the economic effects of immigration, falling from 54% in the 1990s to only 5% after 2010. False balance has also decreased from 50% in the 1980s to 27% after 2010 in coverage of nuclear power. The decline of false balance, however, is not common to all natural science issues used here. It has increased from less than 1% of content in the 1990s to 40% after 2010 in GMO news coverage. The full results can be found in Table H2 of the supplementary materials. Panel C of Figure 4 plots the share of coverage with expert messages characterized by false balance across media format. The prevalence of false balance is notably higher in cable news (36%).

It is comparatively more common for journalists to satisfy their norm of balance by citing political actors opposed to the expert position (RQ3). 42% of news stories with expert messages also have polarizing opponents, averaged across media format and all issues. Panel B of Figure 4 plots the substantial variation that exists across issues on this dimension with the average indicated by the dashed line. The citation of polarizing opponents is typically more common for economic issues like farm support (69%), Federal Reserve independence (67%), and trade (62%), while it is less common in articles about climate change (18%) and vaccines (9%). There is a clear divide between economic and science issues, with the former more frequently citing polarizing opponents.

Panel C shows that there has been a modest increase in the citation of polarizing opponents of expert consensus from 32% in the 1980s to 45% after 2000. These actors have

raised their profile more readily in news coverage related to rent control (31% to 43%), road tolls (12% in the 1980s to 38% after 2010), and GMOs (2% in the 1990s to 49% after 2010). In contrast, polarizing opponents have been cited less in coverage of free trade (71% in the 1980s to 33% after 2010). Panel D of Figure 5 displays the share of coverage with expert messages that feature polarizing political opponents across different media formats. The citation of polarizing opponents is comparatively more common in cable news (49%).<sup>7</sup>

## Discussion

There is little doubt that aggregate public opinion can often be at odds with experts on a wide variety of important issues. Most research that has tackled this issue views it primarily as a problem of information processing. Segments of the public are often motivated to resist messages due to their values and ideologies. Motivated skepticism is, to be sure, part of the problem, particularly on salient issues like climate change. But neglected in this narrative is the information environment. Lacking policy specialists in their social circles, most citizens learn about complex issues from the media, which are typically resistant to covering relevant context lacking in drama and novelty – much like expert consensus.

Further, the media may be predisposed to providing balance in news content by citing contrarian experts or by presenting expert opinion as one of many perspectives in a charged political conflict. The former may confuse readers and viewers as to the true position of the expert community, while the latter may prime citizens to resist messages from experts at odds with the elites they support and their partisan and ideological identities. The lack of congruence between experts and the public may, in part, be an information problem on many policy issues.

Perhaps the most significant finding in the data presented above is how unusual it is for media to present relevant information from experts when they are in agreement. This paper represents the first effort to systematically examine news coverage of a wide range of issues with

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<sup>7</sup> There is evidence of partisan or ideological bias across outlets in the prevalence of false balance and polarizing opponents. Results displayed in panel C of Figure H1 in the supplementary materials.

substantial expert agreement from a large variety of outlets. Out of all stories about issues like climate change, immigration, and international trade, only a minority have expert citations (38%) and even fewer contain both an expert citation and content relevant to the consensus in the expert community (13%). Of these, only half contain messages from experts that speak to the area of agreement (6%), and only a fifth have a cue that signals expert agreement (3%). Expert cues are relatively more common in vaccine and climate change coverage, with agreement and consensus cues appearing primarily in the former, but even still the overall numbers are not that impressive. If we were to read 100 stories on a policy issue, on average we would only encounter an expert message related to an important area of expert agreement seven times, and a clear signal that there is agreement among experts three times. Clear signals of expert consensus that could allow citizens to update their policy opinions are rare indeed (RQ1).

That being said, there is some sign that journalists are increasingly likely to utilize consensus cues in their coverage – at least on questions related to the natural sciences. This trend, however, has not caught on in news coverage of economic issues, and we have to take into account the low baseline. For all the improvement noted here, they are still infrequent, both as a share of relevant news content and as a share of total news coverage on these issues.

When journalists do cover experts, their signal is not clouded by balance as much as we might expect (RQ2). On the whole, journalists place considerable emphasis on arguments supportive of the expert perspective (0.30 on the -1 to 1 scale of balance). There is no doubt that a norm of balance operates to a degree, as most articles provide some effort to illustrate arguments for and against positions of expert agreement, but it would be a mistake to then assume that most articles contain an equal balance of perspectives. Only a minority of stories have an approximation of balance on these issues (20%).

Again, there is some meaningful variance across issues. In particular, coverage of climate change (0.84, Fox excluded) and childhood vaccinations (0.80) stand out for having coverage that strongly emphasizes positions of expert agreement and that largely ignore critics. Balanced and oppositional coverage of climate change is primarily confined to the conservative media echo chamber – represented here by *Fox News* (-0.13). It is ultimately beyond this scope of this research to judge whether or not news coverage on this dimension is sufficient. Technocrats may think any effort at balance is misguided and those attached to norms of balanced coverage may

believe any emphasis on certain perspectives is problematic. What can be said is that any impression that the media provides truly balanced coverage on issues involving agreement among expert communities is mistaken and this is especially true for climate change and vaccines.

And what actors are cited in opposition to mainstream, expert communities? Surprisingly, instances of *false balance* between experts and contrarian specialists are relatively uncommon (RQ2, 22%), at least compared to the citation of opposing polarizing actors (RQ3; 42%). The former number is higher for natural science issues, but this is driven primarily by higher levels of false balance in coverage of the safety of GMOs (40%) and nuclear power (38%), compared to climate change (19%) and vaccines (13%). Although most scholarly work on false balance has emphasized its prevalence in climate change coverage, it appears that this issue is much more salient on other issues like GMOs. And the trend lines reinforce this point. The practice of false balance is on the steep decline in climate change coverage, but the same cannot be said for GMOs. More often than not, however, the media balance expert perspectives against those of political actors (RQ3) rather than other experts (RQ2).

The wide breadth of sources used in this analysis also allows me to compare the behaviour of different news outlets. The main takeaway is that the news media is more similar than it is different in their treatment of expert consensus. There are two modest exceptions to this. First, cable news, as expected, is modestly more likely to provide balanced coverage, which results in the more frequent citation of contrarian experts and polarizing political opponents. Second, there is some evidence that the partisan or ideological-lean of the outlet influences both the use of expert sources and the propensity to engage in false balance or the citation of polarizing opponents. These results can be found in Figure H1 of the supplementary materials.

Taken together, there are some important implications for future research and for efforts at science communication. Perhaps most importantly, they suggest we need to take the information environment seriously. Most areas of expert consensus exist on answers to rather technical questions. More often than not this information does not find its way into episodic, event-based news coverage. Although it is true that processes of motivated reasoning often block counter-attitudinal signals from experts, this is not universally the case. Scholars have shown that consensus cues from scientists can be persuasive even on a highly polarized issues like

climate change (Lewandowsky et al. 2012; van der Linden et al., 2016). Journalists have done a fair job conveying the existence of expert consensus on climate change with clear cues in coverage – a practice that has not been mirrored on other issues even when coverage is directly relevant to the expert consensus in question. Journalists need to extend this practice into other domains. Expert communities, for their part, need to do a better job in martialling consensus documents on important issues, as has been done on climate change, to allow journalists to more easily identify what points have widespread agreement among relevant experts and which do not.

There is a lesson for scholars as well. We need to be attentive to the way information from experts is typically communicated in the real world. More often than not we use stylized experiments for insight on how certain messages, such as those from experts, influence behaviour. However, this information never exists in isolation. More often than not expert messages are found alongside messages from polarizing information sources. It is not obvious that anything can or should be done to change journalistic practice on this front. Expert messages have relevance for policy debates, so parties, interest groups, and advocacy organizations will inevitably receive coverage and deserve to have their voices heard. We need a stronger understanding of the implications of this politicization on persuasion via expert consensus messaging. Are consensus cues persuasive in this context? If not, are there alternative ways of conveying messages of expert consensus that can be effective?

There are often large, problematic gaps between expert and public opinion across a range of issues. In order to fully understand why they exist, scholars need to take the information environment seriously and design treatments rooted in such analyses. Only then can journalists, educators, science communicators, analysts, and policymakers advance an agenda that can effectively address the problem.

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