Can weight of evidence strategies help audiences evaluate truth claims when the science is controversial?

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Science communicators the world over fret over how to present truth claims in contested situations, particularly when the best evidence suggests that one claim is more likely to be true than others. Journalistic norms often limit a reporter's freedom to adjudicate these claims in stories, and audiences in many countries—habituated to the role of the journalist as a "translator" rather than an "evaluator" of evidence—also may react badly to stories that attempt to sort out the most valid claims. Charges of "biased reporting" often accompany such efforts, leading journalists to make strenuous efforts to distance themselves from validity judgments by, for example, giving equal space to all claims in a story or by concentrating solely on "accuracy," defined here as achieving a good fit between what a source says and what the story reports. None of these tactics is good for the reader who, faced with "he said/she said" accounts, typically concludes that "nobody knows what's true!" Given those challenges, this panel will examine strategies for building journalistic stories about contested science issues in ways that are consistent with journalistic norms and that may enhance the ability of audiences to understand that not all truth claims are created equal while helping them determine which truth claims are likely to be more valid than others.

A Test of Weight-of-Evidence Reporting

Journalists often have neither the knowledge nor the time to adjudicate scientific truth claims, making stories that actually evaluate the scientific evidence behind such claims rare. Attempts by journalists to distinguish between more and less valid claims are often met with accusations of "bias," particularly from audiences who believe that journalism's proper role is to explain, not to advocate (Dunwoody & Konieczna, M, 2013).

These constraints have historically produced stories about controversial science issues that balance conflicting voices, literally giving equal space or time to truth claims even when the evidence on behalf of the validity of a claim is sparse. Scholars characterize these accounts as featuring "false balance" (Dixon & Clarke, 2013).

Balanced stories are a means of saying to audiences that "the truth is in here somewhere." But that is not the message that readers/viewers take away. Instead, a narrative that seems to give credibility to more than one truth claim leads audience members to assign greater uncertainty to all the truth claims. In other words, they conclude that, in essence, "nobody knows what's true" (Corbett & Durfee, 2004).

One alternative for science journalists would be sharing with audiences how experts are arrayed along the continuum of truth claims. Called "weight-of-evidence reporting," this strategy rests on the assumption that many individuals who are unwilling to invest time in systematically processing evidence for or against particular claims may find statements about "what most scientists in the field think is true" to be helpful as a type of evidence.

We tested this idea in a field experiment (Kohl, P, Kim, S-Y, Peng, Y, Akin, H., Koh, E., Howell, A.P. & Dunwoody, S., 2014) that offered participants stories about a contested science issue—two competing theories about how the brain recognizes faces—that featured false balance (equal space) or weight-of-evidence narratives (a clear indication that knowledgeable scientists find one theory more valid than the other). Our dependent variables were two in number: (1) What do scientists believe to be the correct theory? (external uncertainty) and (2) What theory does the study participant believe to be the correct one? (internal uncertainty)

After reading a version of the story that contained some combination of false balance and weight-of-evidence content, the 352 participants—students at a large university in the United States—answered questions about external and internal validity.

We found that giving equal space to each theory made subjects more likely to judge that scientists supported the minority theory while the presence of weight-of-evidence information had the opposite effect, increasing participants' perceptions that scientists support the majority theory. This suggests that story content did influence perceptions of external validity: what scientists believe to be true.

But the manipulations did not have the same effect on internal validity: participants' assessments of what they personally thought was true. Put another way, although the story content seemed to influence perceptions of scientists' validity judgments, neither false balance nor weight-of-evidence content appears to have influenced audience memberss personal validity judgments.

Although modest, these findings offer encouragement for continued study of weight-of-balance strategies in reporting on controversial science.

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A Heavy Weight to Bear:
Can Weight-of-Evidence Narratives Succeed in the Face of Ideology?

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Public understanding of science and technology has become critical in a society where scientific advancements have increasingly played a role in the development of our economy, health and wellbeing (Dearing, 2004). However, when it comes to dissemination of science and technology news, journalists and the mass media have traditionally served as the middle men who translate information from peer-reviewed scientific papers, usually full of jargon and technical language, into a more accessible form for the general public (Corbet and Dunfee, 2004). Thus, the way journalists portray scientific news stories will have an impact on public understanding of science, and this is especially true when reporting controversial scientific issues.

"Objectivity" and "balance" are two journalistic norms used when reporting on news stories. "Objective" reporting is fair and neutral; it contains only the facts and not the journalist's opinion on the topic. The "balance" rule requires journalists to devote equal-space to, and represent, both "sides" of the story--in other words giving a

"balanced" representation of different views of a given issue (Dearing, 2004; Clarke, 2008; Dixon & Clarke, 2012). However, balanced reporting can present problems for public understanding of science and technology issues where there is clear scientific consensus (Boykoff & Boykoff, 2004). An example is journalistic coverage of what Dearing (1995) calls maverick science – claims accepted by only one or a few scientists but that have been rejected by thousands of mainstream scientists in the scientific community. A good example would be the assertion that HIV does not cause AIDS.

Recent research has suggested that weight-of-evidence narratives (WOE) —in which journalists make clear where mainstream scientific opinion lies--can successfully shift audience perceptions about what scientists believe to be true (Dunwoody, 2005). Thus, weight-of-evidence strategies can be powerful tools in informing lay audiences about scientific claims.

However, other researchers suggest that political ideology can affect the reception and processing of scientific and risk related information on a small subset of scientific topics (e.g. vaccines, climate change, GMOs, and several others) (Kunda, 1990; Nir, 2011; Hart & Nisbet, 2012). The purpose of this research was twofold: (1) to evaluate the impact of weight-of-evidence narratives in public understanding of controversial scientific topics, and (2) to understand the role of political ideology/affiliation on the impact of weight-of-evidence strategies.

We focused on the issue of climate change and genetically modified food. The experimental design for this study involved the use of a modified newspaper article containing either information on climate change or genetically modified food. Each article was modified to contain either one of the following conditions: (1) WOE narrative (2) balanced narrative or (3) both, and participants were randomly assigned to one of the six conditions.

We are still collecting data from our survey. However, we expect that political ideology will play a role in the acceptance or rejection of WOE narratives about controversial science topics. We expect that when individuals with different ideologies are presented with information on a controversial scientific issue, they will engage in motivated reasoning in order to still support their prior beliefs. For example, when Republicans read information on climate change, presented with a balanced narrative,

they will focus on the side that agrees with them as a support to their prior attitudes on this issue. However, when presented with information in a WOE narrative, Republicans will engage in stronger motivated reasoning and potentially become more convinced that the narrative is wrong and biased against them.

Weight-of-evidence narratives are a relatively new concept and more research on this subject is needed. Thus, we hope that the data obtained from this experiment can help to shed a light on the strengths and weaknesses of this new construct – which in turn will help guide journalists and science communicators in their use of weight – of – evidence narratives.

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Journalists' perceptions and reporting on scientific uncertainty and risks of nanotechnology

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Science journalists are responsible for the media coverage of nanoscale science and technology (NST). This key technology has the potential to fundamentally influence and change the lives of many people (Wilkinson et al., 2007). However, there is also much scientific uncertainty about the long-term impact of synthetized nanoparticles on human health and the environment (Friedman & Egolf, 2005, 2011). Aside from NST, journalists use different styles to report on scientific issues, based on these journalists' deployment of (un)certainty claims (Stocking & Holstein, 2009); this has been supported by several content analyses of media's science coverage (Cooper et al. 2012; Zehr, 2000).

In the case of NST, the media were found to report on this emerging technology as mostly based on highly certain evidence (Ebeling, 2008). Uncertain scientific evidence is only rarely represented (Cacciatore et al., 2012; Dudo, Dunwoody & Scheufele, 2011; Metag & Marcinkowski, 2013). While uncertainty surrounds both the risks and the

benefits of NST, there appears to be a bias: The media's depiction of this issue seems to predominantly connect scientific uncertainty with the potential risks of this technology, rather than its benefits: Friedman and Egolf (2011) found that half of the articles reporting on NST-risks in the US and the UK mention scientific uncertainty; however, these authors did not consider media coverage of NST benefits. Metag and Marcinkowski (2013) found that for Germany, Austria, and Switzerland, scientific uncertainty was related to the coverage of unspecific risks that NST might cause.

As most often investigations give an overview on NST reporting, but no profound attention to the relationship between scientific uncertainty or certainty and risks and benefits, respectively; this contribution wants to give deeper insight and combined two methods, in which the samples and the main categories of interest were synchronized. Firstly, German science journalists (n = 21) were interviewed about their NST reporting in qualitative, semi-structured interviews. Secondly, a full-sample quantitative content analysis of NST-media reports (n = 204) of 2010 and 2011 analyzed to what extend journalists' perceptions are in line with the recent media coverage of NST.

Based on a correspondence analysis, the interviewed science journalists were classified into four types. *Skeptics* predominantly focused on uncertainty in scientific studies and research findings, mainly relating to medical or environmental risks. *Balancers* mainly focused on medical risks and benefits, with coverage balanced between representing research findings as certain and uncertain. *Advocates* stressed scientific certainty with regard to medical and environmental benefits, as well as improved product characteristics. Finally, *Ambivalents* reported on benefits or balance benefits and risks. Science journalists of this type reported that they most often represent research findings as uncertain. Based on a cluster analysis, the media coverage of NST was classified into four coverage types: *Benefits of NST applications*, *Scientific certainty of NST research*, the *Political discourse about scientific uncertainty and risks*, and *Benefits of NST in the field of medicine*.

When comparing these coverage types to the journalistic types, perceptions of science journalists and their actual reporting on NST differed in a number of key ways, but this comparison also validated the connection between scientific uncertainty and risk coverage, opposed to a connection between scientific certainty and benefits. This

connection is critical from a scientific point of view, but reasonable from a journalistic one (Stocking & Holstein, 2009): In their coverage, journalists predominantly focus on benefits of emerging technologies, which are represented as scientifically certain.

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