

1 More than Facts Alone

In 2015, the Flint Water Crisis made national headlines as community members made public pleas regarding the quality of their water after the city's water supply was switched to the Flint River. Twelve people died due to an outbreak of Legionnaires' disease from the bacteria-filled water with reports noting that these deaths were likely undercounted. Additionally, tens of thousands of residents, including as many as 12,000 children, were exposed to toxic levels of lead for a year and a half (Denchak, 2024). The emotional advocacy of individuals such as Ariana Hawk and Melissa Mays captured people's attention, who spoke out as mothers worried about the health of their families (Erwin, 2024). In her cover story in *TIME Magazine*, Hawk told the story of her two-year-old son, Sincere, who was covered in rashes due to being bathed in lead-filled water. Hawk said, "All we are asking for is you to take care of these kids, because they are our future, and if we don't have a future, [then] what is there left for us" (Erwin, 2024). Mays recounts the horror of realizing that when she "was handing my kids the clear water, I was poisoning them" (DiFelice, 2024). After partnering with local water quality experts, Mays filed the first lawsuit for health damages against the city of Flint for failure to treat the water and prevent harmful corrosion. The stories that Hawk, Mays, and many others told of the harm befalling their children resonated with people around the country appalled at the lack of government action (Thomas, 2020).

The power of motherhood as an identity to motivate action has been well-documented in research about science communication and environmental advocacy (e.g., Peeples and DeLuca, 2006; Murphy, 2017; Thomas, 2018, 2020; Onís, 2019). Jennifer Peeples and Kevin DeLuca (2006), for example, analyzed "strategic motherhood" in a publication responding to toxic waste in the environment, linking its success in part to the use of a "feminine style" of communication (p. 65). Drawing on Karlyn Kohrs Campbell's (1989) work, Peeples and DeLuca (2006) describe feminine style as a style of communication that women are socialized into that is characterized by "personal tone, disclosure of personal experiences, reliance on anecdotes and analogies as primary forms of evidence, . . . and encouragement of audience identification and participation" (p. 65). Although feminine style is not used exclusively by mothers, mothers can invoke a feminine style to advocate for causes and raise consciousness. For example, the Boston Women's Health Book Collective used feminine style to elevate women's voices about their own bodies and health (Hayden, 1997). Instead of repeating facts or drawing solely from traditional medical and scientific sources of information, mothers as science communicators use personal stories to create a sense of collective identity that invites audiences to

occupy a similar positionality of caregiver, nurturer, and protector over future generations (Peeples and DeLuca, 2006).

Connecting to a topic through shared values and common identities is called “identification,” in which people can become persuaded through the process of recognizing similarities with one another (Burke, 1950). For Kenneth Burke (1950), identification is the first step in influencing others as opposed to facts or knowledge. In some cases, relying solely on facts can be detrimental to one’s argument. For example, scientific topics such as climate change have become politicized to the point where additional information is often met with resistance. Studies have found that increases in climate information can lead to backfire effects, where people double down on their disbelief in climate change, motivated reasoning, where people reach a preferred conclusion despite presented evidence, and apathy, where people avoid engaging in the topic entirely (e.g., Hart and Nisbet, 2012; Bloomfield *et al.*, 2020; Ma and Hmielowski, 2022).

In controversial or polarized situations, attending to identification can help circumvent initial negative or apathetic responses (e.g., Jones and Crow, 2017). Identification through the shared experience of motherhood can be powerful because of the identity’s ubiquity and near-universal recognition as an important interest group. Sara Hayden (2003) argues that maternity appeals “tap into a common and powerful metaphor” of the “power of the mother within the family structure” (p. 211). Even if someone does not fully understand an issue, such as toxic water levels, they can understand the pain of mothers caring for sick children. Instead of relying solely on facts or technical information about water quality, the mothers of Flint advocated using “non-traditional, feminine sources” of information that emerged from their position as mothers to draw attention to an important health issue (Hayden, 1997, p. 130).

Mothers’ advocacy in the Flint Water Crisis demonstrates the importance of storytelling and identity to call attention to local crises and environmental problems. From contemporary disagreement over proper responses to the COVID-19 pandemic to controversies over the long-established processes of evolution, communication issues plague the domains of science, health, medicine, and technology. Where public discourse has stalled on scientific topics, storytelling and identity can reinvigorate attention and action. Considering the power that maternal appeals have on the political stage (Hayden, 2003), I focus on the identity of motherhood and how contemporary mothers have become influential science storytellers.

There are many storytellers who compete for our attention and adherence around scientific topics. The “rival stories” they tell present different projections of the world and our place in it, can draw upon different group memberships, and

can have vastly different implications for public engagement with science (Fisher, 1984, p. 14). Rival storytellers to science can stem from a variety of political, cultural, religious, or social groups (Bloomfield, 2024). For example, in 2020, during the early stages of the COVID-19 pandemic, some Orthodox Jewish communities in New York did not follow prevention protocols and continued their religious practices of large gatherings, meaning that the community was hit hard by the virus's spread (Goldberg, 2020). In this case, medically based government mandates to lock down and socially distance were rivaled by oppositional knowledge from a religious community to maintain their practices of prayer gatherings.

An appreciation of storytelling and identity acknowledges the role that other sources of information play, such as religion and politics, in informing one's acceptance of scientific conclusions. In other words, people's experiences and group memberships influence the uptake of scientific information beyond what they might hear from technical and scientific sources. These competing sources of information can lead to gaps between scientific conclusions and public understanding on topics such as evolution, climate change, genetically modified organisms, and other topics. These gaps have long been explored as "problems" or "obstacles" to overcome, with the proposed solution oftentimes being to give the public more knowledge and information. This "information deficit model" approach to public understanding of science has been largely replaced in the literature with more interactive, engagement-based models that provide opportunities for acknowledging and incorporating multiple ways of knowing (Potochnik and Jacquot, 2025).

It is important to note that storytelling and identity are also part of the scientific process (e.g., Fisher, 1994; Bloomfield, 2024). For example, when scientists write grants, they tell the story of their research experience to argue that they are the best people to perform the proposed research (Sohn, 2019). When scientists give presentations, they tell the story of the research process and their involvement in it. Philip Wander (1976) referred to these practices as "the rhetoric of science," which describes the use of symbols and the presence of persuasion and influence within scientific practices. For example, Wander (1976) notes that successful scientific products "must convince [their] audience that the research topic is worthy of study, the appropriate tools were used, and used correctly, and that the researcher knew what he or she was doing" (p. 226). Although it is common for scientists to downplay the role of human decision-making within their practices (Ceccarelli, 2018), human influence pervades all aspects of scientific discovery and communication.

Attempting to cull the influences of storytelling and to ignore the identities of scientists is itself a type of story about what knowledges the scientific

community holds as valuable. Leah Ceccarelli (2001) argues that scientific discourse is the result of “*both* authorial cunning and institutionalized discursive practices” (p. 321, emphasis in original). Scientists, thus, are individual actors who produce communication as a “point of origin” of information (Campbell, 1997, p. 123) and are part of a social community that is highly disciplined by institutional norms. These norms often include an aversion to rhetorical techniques such as story in pursuit of objectivity (e.g., Katz, 2013; Jones and Crow, 2017).

In our polarized world plagued with compounding crises, it is perhaps more important than ever to cut through the noise of misinformation and information overload with clear, effective science communication. Instead of relying on information alone, science communicators can use stories to capture people’s attention and tap into identities to motivate new beliefs, understandings, and actions. In this way, science communicators can dig into the inherent narrativity and importance of identity within the scientific process while connecting scientific information to the values and concerns of the general public.

I am interested in the interconnections between stories and identity, specifically within scientific contexts. To illustrate this nexus, I explore current literature regarding their relationship in science communication. Then, I outline important identities that circulate in prominent scientific stories, such as those about environmental pollution, climate change, vaccination, and COVID-19. Continuing my introductory case study, I dive into the identity of mothers as science storytellers by separating gender and motherhood into their own category. This organization sets the foundation for deeper analysis in the following section about how the identity of motherhood emerges in activism around climate change and vaccination.

The Relationship between Stories and Identity in Science

When we encounter new information, it is filtered through our existing frameworks and understandings. The new information is evaluated against our previous beliefs and results in one of three choices: (1) rejecting the new information to stay loyal to our previous beliefs, (2) accepting the new information and breaking free from previous beliefs, or (3) bargaining with the new principles or “stretching” our previous beliefs to find compromise between them (Burke, 1984). Option 1 is often the simplest – new information is not adopted and thus has no immediate effect or change on a person’s daily life.

Option 2 can be very difficult because our existing frameworks are cultivated throughout our lifetimes. Providing someone with new information may not simply be an incremental increase of new information, but a shattering of their

worldview or their sense of self. For example, telling someone to “trust the science” about climate change may activate a religious identity that links scientific knowledge with evolutionary science, which challenges their faith (McCammack, 2007). Or, telling someone that medical science advises people to wear masks and quarantine at home may go against people’s beliefs in individualism, work ethic, and their notions of masculinity (BBC News, 2020; Paliewicz and Bloomfield, 2023). It is rare for people to completely shift their mindsets because of how psychologically and emotionally taxing such changes can be.

Burke (1984) called option 3 “casuistic stretching,” to reflect how the adoption of new information leads to people stretching or compromising their old beliefs to make way for new ones. Another way to conceptualize casuistry is through the idea that people are torn between “competing duties or obligations” (Lynch, 2008). Paul Lynch (2008) defined casuistry as people “maintain[ing] their moral obligations while at the same time remaining sensitive to circumstances,” such as believing that killing people is wrong but also understanding the exception of killing in self-defense. When casuistry occurs, it is hard to gauge what exactly from the old and the new beliefs will be retained and what will be stretched or modified, which can lead to uncertainty.

In analyzing religious responses to climate science in a previous publication, I identified “bargainers” as those who stretch scientific information to make the reality and severity of climate science fit their existing worldview of climate inaction (Bloomfield, 2019a). Instead of rejecting scientific information outright, bargainers tend to misconstrue or modify scientific information. For example, the Heartland Institute is a conservative think tank that argues that increased CO₂ will lead to more efficient photosynthesis, which will lead to better crop yields and food security (Watts, 2019). These conclusions are in stark contrast to evidence from scientific organizations that climate change will not benefit crops.¹ Because they draw upon scientific information and interpret it through their lens of climate skepticism, bargainers may seem more reasonable than those who reject scientific information outright despite still being damaging to public engagement with science.

Casuistic stretching can also lead to positive mindset shifts because it enables people to retain the familiarity of their worldview while making room for new information. Someone who does not believe climate change is a problem, for example, might stretch their perspective to be concerned if climate change is

¹ While small increases in CO₂ have some benefits for plant growth, the amount of CO₂ and other cascading effects from climatic changes such as weather changes, drought, and disease vulnerability more than outweigh those initial minor boosts (Taub, Miller and Allen, 2008; Singh *et al.*, 2023).

connected to something they deeply care about, such as their business, family welfare, or their community (Wang *et al.*, 2018). Susie Wang and colleagues (2018) found that people exhibit “strong emotional responses” when they perceive an “object of care” to be under threat from climate change, which “motivates caring about climate change itself, and in turn predicts [environmental] behavior” (p. 25). One shared value that researchers have explored linking to climate change is health. Studies find that framing climate change as a public health matter through discussing air and water pollution can lead to greater concern about climate change and support for climate mitigation policies (e.g., Petrovic *et al.*, 2014; Kotcher *et al.*, 2021).

Identifying with one another can help to reduce the threat of receiving new information. In a series of studies, an interdisciplinary research team found that group members who identified two things they had in common before completing a climate consensus activity led to improved efficiency compared to group members who discussed an article with facts about climate change (Bloomfield *et al.*, 2020; van Swol *et al.*, 2021). Instead of focusing on information and facts, which can make some people defensive, telling people to reflect on their similarities with others encourages positive feelings about the activity and their groupmates.

This research should not imply that facts or statistics should be abandoned. Indeed, information is the backbone of science communication because our primary goal is to educate. However, facts alone may not be enough to create connection between people and a topic; more often, people care about a topic because it directly impacts them, or they feel for those who are impacted. Identification is thus mediated through what is called “psychological distance” (Milfont, 2013). Because climate change can be seen as intangible or distant, appealing to more present and overt impacts can help bridge the psychological distance between audiences and the topic (Wang *et al.*, 2018).

Another way to close psychological distances between people and abstract scientific topics is through storytelling. Stories take an alternative psychological pathway that can foster emotional connections and motivate action (Slater and Rouner, 2002). There is evidence that narratives have immediate positive impacts on understanding, comprehension, and retention of information (Machill, Köhler and Waldhauser, 2007; Busselle and Bilandzic, 2009; Murphy *et al.*, 2011) that persist over time (Oschatz and Marker, 2020), including for scientific topics. For example, narratives can improve responses to new biotechnologies (e.g., Yang and Hobbs, 2020) promote pro-environmental attitudes and behavioral intention (e.g., Dahlstrom, 2014; Sangalang and Bloomfield, 2018), improve health outcomes (e.g., Kim *et al.*, 2012; Walter, Demetriades and Murphy, 2019), increase belief in the

authenticity of scientists (e.g., Saffran *et al.*, 2020), and improve hazard preparedness (e.g., Shanahan *et al.*, 2019).

In a meta-review of narratives' use in science and health communication, Matthew Dudley and colleagues (2023) found that nearly 70 percent of studies demonstrated that narratives improved communication effectiveness when compared to nonnarrative or instructional forms of communication on topics such as tobacco reduction, cancer screening, environmental conservation, nutrition, and sexual health, among others. They concluded that stories are largely effective in communicating scientific information because they make information more accessible, increase attention to and retention of information, stimulate emotional connections, and delay the formation of counterarguments (Dudley *et al.*, 2023, pp. 8–9).

Science communication, therefore, is not only stating facts about a topic but is also about adapting the information to connect with who and what people care about, who they are and how they define themselves, and the social groups they belong to. To build on these broader conceptualizations of the relationship between stories, identity, and science, I now analyze specific stories and identities that influence science communication. I focus on topics of the environment and health due to the case studies of climate change and vaccination that are examined in the next section.

Important Identities in Science Storytelling

Storytelling and identity are intimately related. Walter Fisher (1984) notes that the stories we tell about ourselves are connected to our notions of identity. He argues, “Any story, any form of rhetorical communication, not only says something about the world, it also implies an audience, persons who conceive of themselves in very specific ways. If a story denies a person's self-conception, it does not matter what it says about the world” (Fisher, 1984, p. 14).

Stories call forth particular audiences who see themselves in the story, or as Fisher (1984) describes it, who “dwell” within the story (p. 6). When stories challenge our fundamental notions of identity, they, and the information they contain, may be rejected. For example, I have previously argued that climate stories may be rejected because people consider themselves to be generally good, which is in opposition to climate stories in which people's actions are blame-worthy regarding environmental damage (Bloomfield, 2024). Additionally, narratives about debunked links between vaccines and autism may work to unite parents overcome with emotions such as “helplessness, resentment, bitterness, anger, and guilt that somehow their children's condition was their fault” by shifting blame onto an identifiable cause (Hoppin, 2016, p. 52). Stories can appeal

to particular identities that can call forth additional stories to represent their experiences and attitudes.

In what follows, I outline some of the identities that influence science communication, engagement, and advocacy. Integral in analyzing these identities are the stories they tell and the worldviews they uphold. These descriptions are not meant to be exhaustive or generalizable across all members of these different groups, but to provide preliminary information about important relationships and factors within the science communication ecosystem. Survey data, scholarly literature, and examples from public discourse provide a foundational look at the various ways that identities and stories can intersect with scientific topics, which invite further examination of these relationships and how they influence science communication.

There are a variety of prominent and vocal identities within science communication, including political identities, religious identities, and demographic identities such as race, gender, class, sexuality, ability, and age. These identities overlap with one another; one is never only one identity, even if some are more salient than others in different circumstances. Discussing them separately is not meant to suggest that they operate in isolation, but to gather relevant literature that links these identities to scientific engagement and understanding.

Political Affiliation and the Economy

Political affiliation is an important identity marker, especially in our polarized world. The rise of fringe political beliefs disrupts political norms and reinvigorates important societal questions. For example, far-right political discourse includes Holocaust deniers who doubt the verified historical existence of concentration camps and the genocide of six million Jewish people during the 1930s and 1940s in Europe (Art, 2013, p. 128). This discourse may also promote ecofascist beliefs that tie environmental protection to (White) nationalism or reinforce exploitation of the environment as a societal good (Forchtner, 2019). Laws and executive orders in 2024 and 2025 in the United States and Europe have conflated gender with biological sex, which goes against scientific and medical consensus that our understanding of sex is a spectrum rather than a binary (Ainsworth, 2015). It is at our own detriment that we ignore the role of politicians, public officials, and thought leaders as influential bridges between scientific topics and public engagement with them.

Scientific topics are subject to misinformation not only from political leadership but also from circulation in alternative news media and online spaces. Vaccine hesitancy, for example, is partially on the rise due to polarized political discourse from media pundits, where increased social media use, specifically