SACRED BOVINES

ALTERNATIVE FACTS & FAKE NEWS

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"Mendacity!" Big Daddy repeatedly exclaims in Tennessee Williams's classic drama *Cat on a Hot Tin Roof*. "Do you know what that is?" he continues in his deep Southern drawl. "It's lies and liars!" Big Daddy was talking about hidden family secrets, but he might just as well have been talking about anti-vaxxers, climate change deniers, or other purveyors of public disinformation. The discounting and outright dismissal of facts has become big business of late.

The process of finding and confidently ascertaining facts is central to science. But also outside of science. For example, investigative journalists probe current events, often seeking newsworthy information that certain interests try to hide from public view. Military intelligence experts seek credible testimony and evidence about national security risks. Grand juries hear from witnesses and assess evidence in pursuit of criminal justice. They all rely on the same methods as science – to justify claims with reliable material evidence and indirect testimony about that evidence.

Ordinary persons rely on facts, too. As consumers, they confront claims about energy-saving appliances or "tested" remedies for arthritic pain, memory loss, or wrinkling skin. As citizens, they participate in discussions about social policy. Are needle-swap programs effective in limiting the spread of HIV and hepatitis among drug users? Are GMO crops safe to eat? Does teaching about abstinence significantly lower teen pregnancy? What factors foster gun violence? Ironically, in these four cases, policymakers have disregarded or peripheralized the facts from scientific studies. Everyone has a stake in understanding how to distinguish facts from lies.

Worse, perhaps, some claims now purport to be bolstered by science when they are not. One encounters suspect claims about diets, remarkable health treatments, or supposedly eco-friendly products. Political leaders issue false or misleading pronouncements about climate change – even as they pretend to defend good science (*Sacred Bovines*, April 2015). The same applies to other factual claims, whether about automobile fuel economy or economic statistics. We have entered a disturbing Era of Mendacity – of fake news and alternative facts.

Fake news has real consequences. Consider the case of two friends returning from a day's visit to a waterfall in India. Fake news that they were child kidnappers spread on instant messaging, and in the next village they were stopped and brutally beaten to death by a mob. That was not an isolated case. Over a two-month period in northeast India this year, viral rumors have contributed to the lynchings of more than 20 people, variously alleged to be involved in organ harvesting or child trafficking. In one case, a rumor-buster was himself killed with bricks and bamboo sticks (France-Presse, 2018; Gowen, 2018). In a similar way, sketchy military intelligence can have major implications for international relations, even war. Bad science has even made its way into dozens of decisions by the U.S. Supreme Court, distorting justice. Everyone has a stake in reported facts and their trustworthiness. How does one discern fact from fiction, fact from fallacy, fact from fake news? Teaching about information con-artists and the methods used by scientists to ascertain facts seems more important than ever.

The Speed of Lies

Many people believe that the truth ultimately prevails. William Shakespeare originated a now common phrase in the *Merchant of Venice*, in a scene where a clownish servant teases his blind father (Act II, Sc. 2):

> truth will come
> to light; murder cannot be hid long; a man's son
> may, but at the length truth will out.

That is, there is a general unexamined assumption (this month's *Sacred Bovine*) that the "truth will out." Yet, as the cases of lynchings in India demonstrate, sometimes lies travel faster than truth. The time lag opens a window to significant short-term consequences.

Indeed, what is the speed of truth? One might approach the question scientifically, just as one might measure the speed of light or the speed of sound. Recently, a team at MIT examined the diffusion of over 100,000 stories on Twitter, both true and false, between 2006 and 2017 (Vosoughi et al., 2018). They quantified the depth, breadth, size, and virality of the rumor cascades. Their findings? Lies travel faster. Lies reached 1500 people six times faster than truth. Lies also travel farther (through more retweeting). Lies travel more broadly (to a wider array of end users). And in sheer numbers, lies reach more people. Truth diffused to 1000 persons, at most. Lies reached up to 100,000 persons. In addition, more people retweeted lies than the truth. Lies had a 70% greater chance of being passed on. Under such conditions, truth does not seem guaranteed.

The study also considered factors that contributed to the diffusion of lies versus truth. One key feature was novelty. Socially, people value being "informed." Surprising news triggers resharing. "Can you believe…?!!" The answer is: probably not. With Twitter, one might suspect the influence of automated bots. Indeed, they do seem to accelerate the spread of news. But analysis shows that they affect

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truth and lies about equally. The upshot is that promoting truth may depend more on social and psychological factors than just on harping on the evidence alone – or blaming the technology.

○ Cognitive & Social Factors in the Transmission of Information

If one is aware of how lies spread, one can begin to defuse their influence. In an earlier column, I described five elements commonly used by science con-artists (Allchin, 2012). They generate trust and belief through (1) style, (2) disguise, (3) exploiting social emotions, (4) conjuring doubt, and (5) flooding the media. The proliferation of fake news underscores the urgency of teaching about those tactics in broader contexts.

First, information con-artists flood the Internet and airwaves with their message. Often, they pay to have their bogus claims broadcast more widely or prominently. For example, advertising on Google is often tied to keywords in the user's search. That's one way climate-change naysayers have gained traction, by appearing higher on the list of search results. The prevalence or availability of a message matters. People assess the reliability of information in part by gauging the beliefs of others. We tend to trust – and thus are susceptible to – the voice of the herd. So, people can now buy influence through a company that generates fake extra views for their YouTube channel. Or writes fake positive reviews on Amazon or Yelp. Or creates fake followers on Twitter. More mendacity. A majority of individuals – perhaps as many as 95% – tend to follow what others do. Of course, there is a fine line between following the "wisdom of the crowd" and unhealthy mob behavior. Sadly, merely flooding the media with disinformation increases the chances that it is believed.

A second factor in spreading lies is social emotions: the common desire to feel part of a group. Pursuit of a sense of belonging can bend beliefs. People tend to align their ideas and values to "fit in" and to show solidarity with those around them (Kahan, 2013). For example, persistence of belief in creationism is strongly influenced by the dynamics of social cohesion (*Sacred Bovines*, February 2013). Similar behavior is found among those who reject the human causes of climate change. Crudely, group membership or loyalty to family can easily trump evidence. Sociologist of science Bruno Latour provocatively called that form of thinking "sociologics": reasoning based on the strength of social connections rather than on traditional deduction. Thus, the need for social identity and acceptance may help perpetuate conspiracy theories as much as any misunderstanding of how science checks facts. Similarly, social networks that bring like-minded people together foster mutual accord, intolerance of dissent, and large-scale attitudinal polarization. Social dynamics seem to contribute significantly to the uncritical acceptance of fake news – and to the dismissal of relevant evidence.

These two factors (flooding the media and exploiting social emotions) are tactics exploited by both science con-artists and purveyors of fake news. Another factor that contributes significantly to the reception of misinformation is *prior beliefs and values*. New information is subject to mental filters. Evidence that concurs with one's current beliefs is readily accepted (without critical review), while evidence that challenges those ideas receives extra scrutiny or is discounted: what is known as *confirmation bias*. All sorts of websites exist for fact-checking, but their value is limited if no one feels the need to consult them. Likewise, a plausible explanation combined with a few examples can often convince someone of an "agreeable" but ultimately unfounded claim. Suggestiveness can substitute for documented facts. The "truth will out" only with more complete or systematic evidence – and the motivation to find it.

Even worse, perhaps, values, ideology, and feelings can also influence how one views facts, a more potent process that psychologists call "motivated reasoning" (Kunda, 1990). That is, a willingness to believe can strongly influence actual belief. One can even dismiss contradictory evidence outright. Motivated reasoning underlies some of the most strident anti-science sentiments (Kraft et al., 2015). Cognitive studies have documented how political beliefs lead individuals to reject scientific consensus and even the relevance of evidence on issues from climate change to the safety of nuclear waste disposal to the social consequences of carrying concealed weapons (Kahan et al., 2011). Other investigations have shown how local economic conditions prime the thinking of residents on the reality and causes of climate change. As noted above, ideological interpretations of evidence can further intersect with mental processes that preserve a sense of loyalty to and affinity with important groups (Kahan, 2013). In short, ideology can make any individual vulnerable to accepting a claim that has no factual merit or rejecting one that does.

○ Immunization by Inoculation

What is to be done? First, exposing lies promptly is important. It's easier to prevent errors than to fix them and the harm done in the interim. That means being prepared to identify misinformation, disable it, and curb its spread.

One could, of course, instruct students to debunk each false claim on its own, with rules of evidence and a healthy library of fact-checking websites. But this requires too much effort. Instead, one can "inoculate" individuals to fake news. Recent research confirms the adage that "forewarned is forearmed." When individuals become aware of the strategies used to spread misinformation, they are better able to recognize it and neutralize its effect (Cook et al., 2017). So, teaching about those tactics seems critical to disarming "alternative facts." Again, the con-artist's ploys include

- style, aimed to evoke trust
- disguise, or the falsified appearance of expertise
- exploiting social emotions
- conjuring doubt
- flooding the media (Allchin, 2012)

Case stories and examples from history can help convey the basic lesson. An excellent documentary that vividly unmasks the disinformation "playbook" is *Merchants of Doubt*. For an extended student inquiry activity on trust and credibility, see Zemplén (2009).

Equally important, perhaps, is teaching about our cognitive vulnerabilities. We should understand how our minds work unchecked, potentially misleading us. With practice, we can be alert to and outsmart our unfruitful habits and intuitions. Of course, our tendencies may be easier to appreciate by first seeing how they affect *other* people. All unconsciously. Confirmation bias and motivated reasoning can cripple our own efforts to get to the facts. Just understanding this allows us to monitor our reasoning for possible lapses.

Ideally, self-analysis needs to be coupled with an underlying respect for truth. Commitment to the value of facts over the other values that can distort thinking is essential. "A necessary condition

to overcome individual biases and motivated reasoning appears to be that individuals be sufficiently motivated by accuracy goals rather than partisan goals" (Kraft et al., 2015, p. 131). Instilling this value may be a far more difficult challenge, but one may use illustrative parables from history. Namely, we can simply come to appreciate the dangers of lies in the present, by seeing their costs in the past.

We have experienced a crisis of credibility before. When the printing press appeared in Europe, information suddenly flowed across the landscape with unprecedented speed and scale. So, too, did misinformation. Huge encyclopedias emerged, but they amassed claims from far and wide without discrimination. That thirst for recording knowledge generated a now familiar problem: knowing what (or whom) to trust. Confronting that dilemma led, in time, to an institutional framework that we now call modern science. The seventeenth century witnessed the rise of testing and validating; the reporting of methods and results; and societies that oversaw credible testimony, peer review, and publication. So too, now, with the Internet and technologies for rapid communication. The new media allow information to spread faster than the ability to sort truth from falsehood. In our new Era of Mendacity, we need to adapt, by amplifying and extending the methods of science. The "truth will out" only with dedicated effort and work. That is the challenge now for science teachers: to help disarm information con-artists, and to reduce the adverse effects of fake news and alternative facts, by raising an understanding of their tactics and of the scientific methods for validating facts.

For complete references, see http://sacredbovines.net/fake-news.pdf

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