

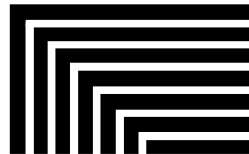
Library Technology

R E P O R T S

Expert Guides to Library Systems and Services

Combating Fake News in the Digital Age

Joanna M. Burkhardt



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Combating Fake News in the Digital Age

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Abstract

The issue of fake news has become very prominent in recent months. Its power to mislead and misinform has been made evident around the world. While fake news is not a new phenomenon, the means by which it is spread has changed in both speed and magnitude. Social media platforms like Facebook, Twitter, and Instagram are fertile ground for the spread of fake news. Algorithms known as bots are increasingly being deployed to manipulate information, to disrupt social media communication, and to gain user attention. While technological assistance to identify fake news are beginning to appear, they are in their infancy. It will take time for programmers to create software that can recognize and tag fake news without human intervention. Even if technology can help to identify fake news in the future, those who seek to create and provide fake news will also be creating the means to continue, creating a loop in which those who want to avoid fake news are always playing catch up.

Individuals have the responsibility to protect themselves from fake news. It is essential to teach ourselves and our students and patrons to be critical consumers of news. This issue of *Library Technology Reports* (vol. 53, no. 8), “Combating Fake News in the Digital Age,” is for librarians who serve all age levels and who can help by teaching students both that they need to be aware and how to be aware of fake news. Library instruction in how to avoid fake news, how to identify fake news, and how to stop fake news will be essential.

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History of Fake News

“Massive digital misinformation is becoming pervasive in online social media to the extent that it has been listed by the World Economic Forum (WEF) as one of the main threats to our society.”¹

Fake news is nothing new. While fake news was in the headlines frequently in the 2016 US election cycle, the origins of fake news date back to before the printing press. Rumor and false stories have probably been around as long as humans have lived in groups where power matters. Until the printing press was invented, news was usually transferred from person to person via word of mouth. The ability to have an impact on what people know is an asset that has been prized for many centuries.

Pre-Printing Press Era

Forms of writing inscribed on materials like stone, clay, and papyrus appeared several thousand years ago. The information in these writings was usually limited to the leaders of the group (emperors, pharaohs, Incas, religious and military leaders, and so on). Controlling information gave some people power over others and has probably contributed to the creation of most of the hierarchical cultures we know today. Knowledge is power. Those controlling knowledge, information, and the means to disseminate information became group leaders, with privileges that others in the group did not have. In many early state societies, remnants of the perks of leadership remain—pyramids, castles, lavish household goods, and more.

Some of the information that has survived, carved in stone or baked on tablets or drawn in pictograms, extolled the wonder and power of the leaders. Often

these messages were reminders to the common people that the leader controlled their lives. Others were created to insure that an individual leader would be remembered for his great prowess, his success in battle, or his great leadership skills. Without means to verify the claims, it’s hard to know whether the information was true or fake news.

In the sixth century AD, Procopius of Caesarea (500–ca. 554 AD), the principal historian of Byzantium, used fake news to smear the Emperor Justinian.² While Procopius supported Justinian during his lifetime, after the emperor’s death Procopius released a treatise called *Secret History* that discredited the emperor and his wife. As the emperor was dead, there could be no retaliation, questioning, or investigations. Since the new emperor did not favor Justinian, it is possible the author had a motivation to distance himself from Justinian’s court, using the stories (often wild and unverifiable) to do so.

Post-Printing Press Era

The invention of the printing press and the concurrent spread of literacy made it possible to spread information more widely. Those who were literate could easily use that ability to manipulate information to those who were not literate. As more people became literate, it became more difficult to mislead by misrepresenting what was written.

As literacy rates increased, it eventually became economically feasible to print and sell information. This made the ability to write convincingly and authoritatively on a topic a powerful skill. Leaders have always sought to have talented writers in their employ and to control what information was

produced. Printed information became available in different formats and from different sources. Books, newspapers, broadsides, and cartoons were often created by writers who had a monetary incentive. Some were paid by a publisher to provide real news. Others, it seems, were paid to write information for the benefit of their employer.

In 1522, Italian author and satirist Pietro Aretino wrote wicked sonnets, pamphlets, and plays. He self-published his correspondence with the nobility of Italy, using their letters to blackmail former friends and patrons. If those individuals failed to provide the money he required, their indiscretions became public. He took the Roman style of *pasquino*—anonymous lampooning—to a new level of satire and parody. While his writings were satirical (not unlike today's *Saturday Night Live* satire), they planted the seeds of doubt in the minds of their readers about the people in power in Italy and helped to shape the complex political reality of the time.³

Aretino's pasquinos were followed by a French variety of fake news known as the canard. The French word *canard* can be used to mean an unfounded rumor or story. Canards were rife during the seventeenth century in France. One canard reported that a monster, captured in Chile, was being shipped to France. This report included an engraving of a dragon-like creature. During the French Revolution the face of Marie Antoinette was superimposed onto the dragon. The revised image was used to disparage the queen.⁴ The resulting surge in unpopularity for the queen may have contributed to her harsh treatment during the revolution.

Jonathan Swift complained about political fake news in 1710 in his essay "The Art of Political Lying." He spoke about the damage that lies can do, whether ascribed to a particular author or anonymous: "Falseness flies, and truth comes limping after it, so that when men come to be undeceived, it is too late; the jest is over, and the tale hath had its effect."⁵ Swift's descriptions of fake news in politics in 1710 are remarkably similar to those of writers of the twenty-first century.

American writer Edgar Allan Poe in 1844 wrote a hoax newspaper article claiming that a balloonist had crossed the Atlantic in a hot air balloon in only three days.⁶ His attention to scientific details and the plausibility of the idea caused many people to believe the account until reporters failed to find the balloon or the balloonist. The story was retracted four days after publication. Poe is credited with writing at least six stories that turned out to be fake news.⁷

Mass Media Era

Father Ronald Arbuthnott Knox did a fake news broadcast in January 1926 called "Broadcasting the

Barricades" on BBC radio.⁸ During this broadcast Knox implied that London was being attacked by Communists, Parliament was under siege, and the Savoy Hotel and Big Ben had been blown up. Those who tuned in late did not hear the disclaimer that the broadcast was a spoof and not an actual news broadcast. This dramatic presentation, coming only a few months after the General Strike in England, caused a minor panic until the story could be explained.

This fake news report was famously followed by Orson Welles's *War of the Worlds* broadcast in 1938. *The War of the Worlds* was published as a book in 1898, but those who did not read science fiction were unfamiliar with the story. The presentation of the story as a radio broadcast again caused a minor panic, this time in the United States, as there were few clues to indicate that reports of a Martian invasion were fictional. While this broadcast was not meant to be fake news, those who missed the introduction didn't know that.⁹

On November 3, 1948, the *Chicago Daily Tribune* editors were so certain of the outcome of the previous day's presidential election that they published the paper with a headline stating, "Dewey Defeats Truman." An iconic picture shows President Truman holding up the newspaper with the erroneous headline. The caption for the picture quotes Truman as saying, "That ain't the way I heard it."¹⁰ The paper, of course, retracted the statement and reprinted the paper with the correct news later in the day. This incident is one reason that journalists at reputable news outlets are required to verify information a number of times before publication.

It is easy to see that fake news has existed for a long time. From the few examples described above, the effects of fake news have ranged widely, from amusement to death. Some authors of fake news probably had benign motivations for producing it. Others appear to have intended to harm individuals, families, or governments. The intended and unintended consequences of fake news of the pre-internet era were profound and far-reaching for the time. As the means of spreading fake news increased, the consequences became increasingly serious.

Internet Era

In the late twentieth century, the internet provided new means for disseminating fake news on a vastly increased scale. When the internet was made publicly available, it was possible for anyone who had a computer to access it. At the same time, innovations in computers made them affordable to the average person. Making information available on the internet became a new way to promote products as well as make information available to everyone almost instantly.

Some fake websites were created in the early years of generalized web use. Some of these hoax websites were satire. Others were meant to mislead or deliberately spread biased or fake news. Early library instruction classes used these types of website as cautionary examples of what an internet user needed to look for. Using a checklist of criteria to identify fake news websites was relatively easy. A few hoax website favorites are

- *DHMO.org*. This website claims that the compound DHMO (Dihydrogen Monoxide), a component of just about everything, has been linked to terrible problems such as cancer, acid rain, and global warming. While everything suggested on the website is true, it is not until one's high school chemistry kicks in that the joke is revealed—DHMO and H₂O are the same thing.
- *Feline Reactions to Bearded Men*. Another popular piece of fake news is a “research study” regarding the reactions of cats to bearded men. This study is reported as if it had been published in a scientific journal. It includes a literature review, a description of the experiment, the raw data resulting from the experiment, and the conclusions reached by the researchers as a result. It is not until the reader gets to the bibliography of the article that the experiment is revealed to be a hoax. Included in the bibliography are articles supposedly written by Madonna Louise Ciccone (Madonna the singer), A. Schwartzenegger (Arnold, perhaps?), and Doctor Seuss and published in journals such as the *Western Musicology Journal*, *Tonsological Proceedings*, and the *Journal of Feline Forensic Studies*.
- *city-mankato.us*. One of the first websites to make use of website technology to mislead and misdirect was a fake site for the city of Mankato, Minnesota. This website describes the climate as temperate to tropical, claiming that a geological anomaly allows the Mankato Valley to enjoy a year-round temperature of no less than 70 degrees Fahrenheit, while providing snow year-round at nearby Mount Kroto. It reported that one could watch the summer migration of whales up the Minnesota River. An insert shows a picture of a beach, with a second insert showing the current temperature—both tropical. The website proudly announces that it is a Yahoo “Pick of the Week” site and has been featured by the *New York Times* and the *Minneapolis Star Tribune*. Needless to say, no geological anomaly of this type exists in Minnesota. Whales do not migrate up (or down) the Minnesota River at any time, and the pictures of the beaches and the thermometer are actually showing beaches and temperatures from places very far south of Mankato. It is true that Yahoo,

the *New York Times*, and the *Minneapolis Star Tribune* featured this website, but not for the reasons you might think. When fake news could still be amusing, this website proved both clever and ironic.

- *MartinLutherKing.org*. This website was created by Stormfront, a white supremacist group, to try to mislead readers about the Civil Rights activist by discrediting his work, his writing, and his personal life.¹¹ The fact that the website used the .org domain extension convinced a number of people that it was unbiased because the domain extension was usually associated with nonprofit organizations working for good. The authors of the website did not reveal themselves nor did they state their affiliations. Using Martin Luther King's name for the website insured that people looking for information about King could easily arrive at this fake news website. This website is no longer active.

HOAX Websites

DHMO.org
www.dhmo.org

“Feline Reactions to Bearded Men”
www.improbable.com/airchives/classical/cat/cat.html

“Mankato, Minnesota”
http://city-mankato.us

“Martin Luther King, Jr.”
www.martinlutherking.org

Global Reach of Fake News

Initial forays into the world of fake news fall into the category of entertainment, satire, and parody. They are meant to amuse or to instruct the unwary. Canards and other news that fall into the category of misinformation and misdirection, like the Martin Luther King website, often have more sinister and serious motives. In generations past, newspaper readers were warned that just because something was printed in the newspaper did not mean that it was true. In the twenty-first century, the same could be said about the internet. People of today create fake news for many of the same reasons that people of the past did. A number of new twists help to drive the creation and spread of fake news that did not exist until recently.

Twenty-first-century economic incentives have increased the motivation to supply the public with fake news. The internet is now funded by advertisers

rather than by the government. Advertisers are in business to get information about their products to as many people as possible. Advertisers will pay a website owner to allow their advertising to be shown, just as they might pay a newspaper publisher to print advertisements in the paper. How do advertisers decide in which websites to place their ads? Using computing power to collect the data, it is possible to count the number of visits and visitors to individual sites. Popular websites attract large numbers of people who visit those sites, making them attractive to advertisers. The more people who are exposed to the products advertisers want to sell, the more sales are possible. The fee paid to the website owners by the advertisers rewards website owners for publishing popular information and provides an incentive to create more content that will attract more people to the site.

People are attracted to gossip, rumor, scandal, innuendo, and the unlikely. *Access Hollywood* on TV and the *National Enquirer* at the newsstand have used human nature to make their products popular. That popularity attracts advertisers. In a *Los Angeles Times* op-ed, Matthew A. Baum and David Lazer report “Another thing we know is that shocking claims stick in your memory. A long-standing body of research shows that people are more likely to attend to and later recall a sensational or negative headline, even if a fact checker flags it as suspect.”¹²

In the past several years, people have created websites that capitalize on those nonintellectual aspects of human nature. Advertisers are interested in how many people will potentially be exposed to their products, rather than the truth or falsity of the content of the page on which the advertising appears. Unfortunately, sites with sensational headlines or suggestive content tend to be very popular, generating large numbers of visits to those sites and creating an advertising opportunity. Some advertisers will capitalize on this human propensity for sensation by paying writers of popular content without regard for the actual content at the site. The website can report anything it likes, as long as it attracts a large number of people. This is how fake news is monetized, providing incentives for writers to concentrate on the sensational rather than the truthful.

The problem with most sensational information is that it is not always based on fact, or those facts are twisted in some way to make the story seem like something it is not. It is sometimes based on no information at all. For example:

Creators of fake news found that they could capture so much interest that they could make money off fake news through automated advertising that rewards high traffic to their sites. A man running a string of fake news sites from the Los Angeles suburbs told NPR he made between \$10,000 and \$30,000 a month. A computer science student in

the former Soviet republic of Georgia told the *New York Times* that creating a new website and filling it with both real stories and fake news that flattered Trump was a “gold mine.”¹³

Technological advances have increased the spread of information and democratized its consumption globally. There are obvious benefits associated with instantaneous access to information. The dissemination of information allows ideas to be shared and formerly inaccessible regions to be connected. It makes choices available and provides a platform for many points of view.

However, in a largely unregulated medium, supported and driven by advertising, the incentive for good is often outweighed by the incentive to make money, and this has a major impact on how the medium develops over time. Proliferation of fake news is one outcome. While the existence of fake news is not new, the speed at which it travels and the global reach of the technology that can spread it are unprecedented. Fake news exists in the same context as real news on the internet. The problem seems to be distinguishing between what is fake and what is real.

Notes

1. Michela Del Vicario, Alessandro Bessi, Fabiana Zollo, Fabio Petroni, Antonio Scala, Guido Caldarelli, H. Eugene Stanley, and Walter Quattrociocchi, “The Spreading of Misinformation Online,” *Proceedings of the National Academy of Sciences of the United States of America* 113, no. 3 (January 19, 2016): 534, <https://doi.org/10.1073/pnas.1517441113>.
2. Procopius, *Secret History*, trans. Richard Atwater (New York: Covici Friede; Chicago: P. Covici, 1927; repr. Ann Arbor: University of Michigan Press, 1961), <https://sourcebooks.fordham.edu/basis/procop-anec.asp>.
3. “Pietro Aretino,” Wikipedia, last updated August 7, 2017, https://en.wikipedia.org/wiki/Pietro_Aretino.
4. Robert Darnton, “The True History of Fake News,” *NYR Daily* (blog), New York Review of Books, February 13, 2017, <http://www.nybooks.com/daily/2017/02/13/the-true-history-of-fake-news/>.
5. Jonathan Swift, “The Art of Political Lying,” *Examiner*, no. 14 (November 9, 1710), para. 9, repr. in Richard Nordquist, “The Art of Political Lying, by Jonathan Swift,” ThoughtCo., last updated March 20, 2016, <https://www.thoughtco.com/art-of-political-lying-by-swift-1690138>.
6. Edgar Allan Poe, “The Balloon Hoax,” published 1844, reprinted in PoeStories.com, accessed September 6, 2017, <https://poestories.com/read/balloonhoax>.
7. Gilbert Arevalo, “The Six Hoaxes of Edgar Allan Poe,” HubPages, last updated March 30, 2017, <https://hubpages.com/literature/The-Six-Hoaxes-of-Edgar-Allan-Poe>.
8. A. Brad Schwartz, “Broadcasting the Barricades,” A. Brad Schwartz website, January 16, 2015, <https://>

- abradschwartz.com/2015/01/16/broadcasting-the-barricades/.
9. "The War of the Worlds (radio drama)," Wikipedia, last updated August 24, 2017, [https://en.wikipedia.org/wiki/The_War_of_the_Worlds_\(radio_drama\)](https://en.wikipedia.org/wiki/The_War_of_the_Worlds_(radio_drama)).
 10. Tim Jones, "Dewey Defeats Truman," Chicago Tribune website, accessed September 6, 2017, www.chicagotribune.com/news/nationworld/politics/chi-chicagodays-deweydefeats-story-story.html.
 11. Keith Thomson, "White Supremacist Site Martin-LutherKing.org Marks 12th Anniversary," *The Blog*, HuffPost, last updated May 26, 2011, www.huffingtonpost.com/entry/white-supremacist-site-ma_b_809755.html.
 12. Matthew A. Baum and David Lazer, "Google and Facebook Aren't Fighting Fake News with the Right Weapons," op-ed, *Los Angeles Times*, May 8, 2017, www.latimes.com/opinion/op-ed/la-oe-baum-lazer-how-to-fight-fake-news-20170508-story.html.
 13. Angie Drobnic Holan, "2016 Lie of the Year: Fake News," PolitiFact, December 13, 2016, www.politifact.com/truth-o-meter/article/2016/dec/13/2016-lie-year-fake-news/.

How Fake News Spreads

Word of Mouth

News has always been disseminated by word of mouth. Early humans lived in small groups, moving from place to place as needs required. As the human population grew, there was greater need for communication. Contact between groups became more common, and the connections between groups became more complex.¹ News was still spread by word of mouth, but there was more to tell. There were, of course, subsistence details to convey, but there was also family news to share, gossip to pass on, fashion trends to consider, and theological questions to answer. There were few means to verify news that came from outside the local group. If a traveler arrived from a distance and said that the people in the next large town were wearing silk rather than skins, there was no way to verify this information without visiting the distant place in person.

Presumably as people came to view local resources as belonging to the group, there might have been incentive to mislead outsiders about the size of the population protecting those resources or to understate the quality or amount of resources. If a resource was scarce or valuable, there might be reason to provide misinformation. However, because news was oral, there is no record. We can't know exactly what was said.

Written Word

Groups began to create tools that would allow them to tell a story, keep track of numbers, give directions, and so on about the same time as populations became sedentary and began to grow. In the Middle East, farmers, landowners, politicians, and family

historians began to invent the means to keep track of, remember, and convey information.² Some groups used pictures, some used counting devices, and eventually systems of writing were born. Written information posed its own set of problems.

First, there is the problem of writing material. Some people used stone for a writing surface.³ Marking stone takes a lot of time and effort. The result is permanent, but it is hard to carry around. Some groups used clay as a writing surface.⁴ This is a terrific material to use if you want to make your information permanent. Mark the clay, fire it, and the information is available for a long period of time. The downside of clay is that it is relatively heavy, it takes up a lot of room, and it breaks easily. This makes it somewhat difficult to transport. The Egyptians used papyrus (labor intensive and expensive).⁵ Native Americans used tree bark (delicate and easily damaged).⁶ People with herds of animals used animal skins to make parchment and vellum (not always available when required, lots of preparation needed).⁷ The Incas used knotted cords called *quipus* that acted as mnemonic devices as well as counting devices.⁸

Second, not everyone knew the secret of how to interpret the writing between groups or even inside a group. If knowledge is power, knowing how to read allowed people to assume the reins of power and to limit access to information, thus controlling what people did or did not know. This control made people dependent on those who knew the secret. As we saw above, some people did not hesitate to offer fake news to serve their own purposes to manipulate or influence those who could not read.

While the elite used systems of writing, the non-literate members of the group would have continued to use word-of-mouth transmission of information.

Information was conveyed from those in power by proclamation. A representative of the leader would be sent to read out a message to those who could not read but who had a need to know. Again there was no guarantee that the information being read was written truthfully, nor that it was read accurately to the non-literate public. What people knew in the early stages of literacy was controlled by the literate.

Different writing systems required translators to convey information between groups. Here again, the honesty and or accuracy of the translation had a large effect on the exact information that people received. The same is true today. We often see articles that essentially “translate” information from highly technical and specialized fields into information most people can understand. The translator’s motives can influence what is reported and what language is used to report it. In the Wild West of the internet world, it’s hard to know what a translator’s motives are without spending an inordinate amount of time checking out the author’s credentials.

Printed Media

As more people became literate, it became harder to control information. More information appeared in printed form. More kinds of information were shared.⁹ Printed information was carried from place to place, and as new and faster means of transportation became available, people got news faster and more often. As means of spreading news widely and quickly, without intervention or translation, became more common, it was harder to control the messages people saw and heard. Newspapers, magazines, telegraph, and eventually radio, television, and the internet provided multiple avenues to transmit information without necessarily getting permission from the state or other power holder. As new media inventions became viable, they were used to share the news and other information, creating a wide range of options for news seekers.

Internet

With the birth and spread of the internet, it was thought that a truly democratic and honest means of sharing information had arrived. Control of the content accessible via the internet is difficult (but not impossible), making former information power holders less powerful. Anyone with access and a desire to share their thoughts could use the internet to do so. At first the technological requirements for creating a web page were beyond most individuals, but companies who saw a market built software that allowed “non-programmers” to create a web page without any

knowledge of the computer code that was actually responsible for transmitting the message.

Information can now come from anywhere and at any time. Literally billions of actors can participate in the spread of information. The rate of flow of information and the sheer volume of information are overwhelming and exhausting. The democratization in information allows everyone and anyone to participate and includes information from bad actors, biased viewpoints, ignorant or uninformed opinion—all coming at internet users with the velocity of a fire hose. The glut of information is akin to having no information at all, as true information looks exactly like untrue, biased, and satirical information.

Added to the overwhelming amount of information available today is the impossibility for anyone to know something about everything. The details about how things work or what makes them function are beyond most individuals. What makes a cellphone work? What happens when you store something “in the cloud”? How does a hybrid car engine know which part of the engine to use when? What is the statistical margin of error, and how does it affect polls? Are vaccines harmful? Did the Holocaust really happen? Arthur C. Clarke’s Third Law states, “Any sufficiently advanced technology is indistinguishable from magic.”¹⁰ What this means in terms of fake news is that people are vulnerable to being misinformed because, in a world where all things seem possible, they have little or no basis for separating truth from fiction. It’s hard to find a trusted source, so all sources must be trustworthy or all must be suspect.

When the internet was made available to the general public in the 1990s, it was seen as a means of democratizing access to information. The amount of information that became available began as a trickle and turned into a Niagara, fed by a roaring river of new content. It became wearisome and then almost impossible to find a single piece of information in the torrent. Search engines were developed that used both human and computer power to sort, categorize, and contain much of the content on the internet. Eventually Google became the go-to means for both access to and control of the flood of information available, becoming so common that *Google* became a verb.

Computerization of information has a number of benefits. Large amounts of information can be stored in increasingly small spaces. Records of many kinds have become public because they can be conveyed electronically. With the advent of the internet, people can benefit from the combination of computerization and access, allowing information to be sent and received when and where it is needed. New devices have been invented to supply the fast and furious appetite for information. New types of information and new avenues for communication have become commonplace in the last decade. More and newer

versions of devices and platforms appear with increasing frequency. Originally this explosion of information available to the public was viewed as the democratization of power for the benefit of everyone, but this view didn't last long.¹¹

This utopian view of the benefits of the computerization of information began to be overshadowed almost immediately. The concept of free information for the masses required that someone other than the consumers of that information pay for it. To make paying for the internet attractive, data was needed. Automatic software programs were developed to perform repetitive tasks that gathered data. These programs were known as *bots*—short for *robots*. What they collected became a commodity. Data collected by bots showed what sites were being used and what products were being purchased, by whom, and how often. This information could be used to convince advertisers to pay to place their advertisements on websites. The data could also be offered for sale to prospective clients to use for their own purposes. Through using bots, it became possible to harvest a wide variety of information that could be sold. Once bots were successfully programmed to collect and send information, that ability was expanded for uses far beyond simple advertising.

Social Media

The advent of social media presented another opportunity for advertising to specific and targeted groups of people. On social media sites such as Facebook and Twitter, information is often personal. These platforms are used to find like-minded people, to stay in touch with family and friends, to report the news of the day, and to create networks among people. These platforms provide an easy way to share information and to make connections. Social media networks provide a shorthand method of communication using icons to indicate approval and various emotions. This allows people to respond to items posted on their pages without actually having to write something themselves. If they enjoy something, the push of a button allows that message to be conveyed. If they wish to share the information with friends and followers, a single click can accomplish that task. It is possible for bots to be programmed to count those clicks and respond to them.

News outlets, advertisers, political parties, and many others have created web pages that can be directed to the accounts and networks of social media users using programmed algorithms called bots. The bots can be programmed to search for information on the internet that is similar to what a social media user has already clicked on, liked, or shared. They can then inject that new information into what the user sees.¹² So, for example, rather than seeing stories from

hundreds of news outlets, a bot will find news outlets that are similar to those already being viewed. Bots provide users with easy access to information about things they already like. By following links between accounts, bots can push information to the friends of a user as well. This means that friends begin to see the same array of information. Eventually one user and the friends and followers of that individual are seeing only information they agree with. This creates an information bubble that makes it appear that the likes of the group inside the bubble represent the likes of the majority of people (because the group inside the bubble never sees anything contrary to its preferences).

In *Imperva Incapsula's* 2015 annual report on impersonator bot and bad bot traffic trends, Igal Zeifman states, "The extent of this threat is such that, on any given day, over 90 percent of all security events on our network are the result of bad bot activity."¹³ Social and political bots have been used for the purposes of collecting and sharing information. In the last decade, there has been a concerted effort to design bots and bot practices that work to steer populations in general toward a particular way of thinking; to prevent people from organizing around a specific cause; and to misdirect, misinform, or propagandize about people and issues.¹⁴ The bots work much faster than humans can and work 24/7 to carry out their programming.

Humans assist bots in their work by liking and sharing information the bots push at them, often without reading the information they are sending along. Tony Haile, CEO of Chartbeat, studied "two billion visits across the web over the course of a month and found that most people who click don't read. In fact, a stunning 55% spent fewer than 15 seconds actively on a page. . . . We looked at 10,000 socially-shared articles and found that there is no relationship whatsoever between the amount a piece of content is shared and the amount of attention an average reader will give that content."¹⁵ This means that once a message has reached a critical number of people via bots, those people will assist in the spread of that information even though more than half of them will not have read it. The manipulation of computer code for social media sites allows fake news to proliferate and affects what people believe, often without ever having been read beyond the headline or caption.

Notes

1. "History of Communication," Wikipedia, last updated August 28, 2017, https://en.wikipedia.org/wiki/History_of_communication.
2. Joshua J. Mark, "Writing," *Ancient History Encyclopedia*, April 28, 2011, www.ancient.eu/writing/.
3. "Stone Carving," Wikipedia, last updated August 30, 2017, https://en.wikipedia.org/wiki/Stone_carving.

4. "Clay Tablet," Wikipedia, last updated August 25, 2017, https://en.wikipedia.org/wiki/Clay_tablet.
5. Joshua J. Mark, "Egyptian Papyrus," *Ancient History Encyclopedia*, November 8, 2016, www.ancient.eu/Egyptian_Papyrus/.
6. "Uses for Birchbark," NativeTech: Native American Technology and Art, accessed September 6, 2017, www.nativetech.org/brchbark/brchbark.htm.
7. "Differences between Parchment, Vellum and Paper," National Archives website, US National Archives and Records Administration, accessed September 6, 2017, <https://www.archives.gov/preservation/formats/paper-vellum.html>.
8. Mark Cartwright, "Quipu," *Ancient History Encyclopedia*, May 8, 2014, www.ancient.eu/Quipu/.
9. Winstone Arradaza, "The Evolution of Print Media," Prezi presentation, November 11, 2013, <https://prezi.com/qpmlecfqibmh/the-evolution-of-print-media/>; "A Short History of Radio with an Inside Focus on Mobile Radio," Federal Communications Commission, Winter 2003–2004, https://transition.fcc.gov/omd/history/radio/documents/short_history.pdf; "Morse Code and the Telegraph," History.com, accessed September 6, 2017, www.history.com/topics/inventions/telegraph; Andrew Anthony, "A History of the Television, the Technology That Seduced the World—and Me," *Guardian*, September 7, 2013, <https://www.theguardian.com/tv-and-radio/2013/sep/07/history-television-seduced-the-world>.
10. Arthur C. Clarke, *Profiles of the Future: An Inquiry into the Limits of the Possible* (London: V. Gollancz, 1973), 39.
11. Peter Ferdinand, "The Internet, Democracy and Democratization," *Democratization* 7, no. 1 (2000): 1–17, <https://doi.org/10.1080/13510340008403642>.
12. Tarleton Gillespie, "The Relevance of Algorithms," in *Media Technologies: Essays on Communication, Materiality and Society*, ed. Tarleton Gillespie, Pablo J. Boczkowski, and Kirsten A. Foot (Cambridge, MA: MIT Press, 2014), 167–94; Alessandro Bessi and Emilio Ferrara, "Social Bots Distort the 2016 U.S. Presidential Election Online Discussion," *First Monday* 21, no. 11 (November 7, 2016), <http://journals.uic.edu/ojs/index.php/fm/rt/printerFriendly/7090/5653>; Tim Hwang, Ian Pearce, and Max Nanis, "Socialbots: Voices from the Fronts," *Interactions*, March/April 2012: 38–45; Emilio Ferrara, Onur Varol, Clayton Davis, Filippo Menczer, and Alessandro Flammini, "The Rise of Social Bots," *Communications of the ACM* 59, no. 7 (July 2016): 96–104.
13. Igal Zeifman, "2015 Bot Traffic Report: Humans Take Back the Web, Bad Bots Not Giving Any Ground," *Imperva Incapsula Blog*, December 9, 2015, <https://www.incapsula.com/blog/bot-traffic-report-2015.html>.
14. Samuel C. Woolley, "Automating Power: Social Bot Interference in Global Politics," *First Monday* 21, no. 4 (April 4, 2016), <http://firstmonday.org/ojs/index.php/fm/article/view/6161/5300>; Peter Pomerantsev and Michael Weiss, *The Menace of Unreality: How the Kremlin Weaponizes Information, Culture and Money* (Institute of Modern Russia and *The Interpreter*, 2014), www.interpretermag.com/wp-content/uploads/2015/07/PW-31.pdf; Bence Kollanyi, Philip N. Howard, and Samuel C. Wooley, *Bots and Automation over Twitter during the U.S. Election*, Data Memo 2016.4 (Oxford, UK: Project on Computational Propaganda, November 2016), <http://comprop.oii.ox.ac.uk/wp-content/uploads/sites/89/2016/11/Data-Memo-US-Election.pdf>; Paul Roderick Gregory, "Inside Putin's Campaign of Social Media Trolling and Fake Ukrainian Crimes," *Forbes*, May 11, 2014, <https://www.forbes.com/sites/paulroderickgregory/2014/05/11/inside-putins-campaign-of-social-media-trolling-and-faked-ukrainian-crimes/>; Brian T. Gaines, James H. Kuklinski, Paul J. Quirk, Buddy Peyton, and Jay Verkuilen, "Same Facts, Different Interpretations: Partisan Motivation and Opinion on Iraq," *Journal of Politics* 69 no. 4 (November 2007): 957–74; Sara El-Khalili, "Social Media as a Government Propaganda Tool in Post-revolutionary Egypt," *First Monday* 18, no. 3 (March 4, 2013), <http://firstmonday.org/ojs/index.php/fm/rt/printerFriendly/4620/3423>.
15. Tony Haile, "What You Think You Know about the Web Is Wrong," *Time.com*, March 9, 2014, <http://time.com/12933/what-you-think-you-know-about-the-web-is-wrong/>.

Can Technology Save Us?

Technology of Fake News

Fake news sites target the filter bubbles of groups most aligned with that news. They use the power of social media to do so. Initially fake news of the social media era was relatively easy to spot. The claims of early social media fake news purveyors were often meant as entertainment. Language, fonts, and links were often indicators that could be used to determine veracity. It took only a short time for fake news to become more insidious, more plentiful, more subtle, and subverted for manipulation of information and public opinion. Fake news has many new social media outlets where it can appear and can spread quickly via both human and nonhuman actors. During the 2016 presidential election cycle for example, fake news appeared often.¹ Determining what news was to be believed and what news was to be ignored became more a case of party affiliation than good sense.

Fake news sites and stories are shared for many different reasons. Some readers find the stories amusing. Some find them alarming. Others find them affirming of their beliefs. Many people share fake news without ever having read the content of the article.² Sharing of fake news, whether because it is amusing or because people think it is real, only exaggerates the problem. Did Pope Francis endorse candidate Donald Trump? No, but that didn't stop the story from appearing on social media and spreading widely.³ Did Hillary Clinton run a child sex ring out of a Washington, DC, pizza shop? No, but that didn't stop a man with a gun from going there to exact vengeance.⁴

In the early days of the internet, fake news was not a big problem. There were some websites that sought to spoof, mislead, or hoax, but mostly it was all in good fun. While some websites sought to

spread misinformation, their numbers were limited. It seemed as if the authority to shut down malicious websites was invoked more often. Creating a website on the early internet took time, effort, and computer programming skills that limited the number of people who could create fake news sites.

During the last decade, as an offshoot of the stream of information provided by the internet, social media platforms, such as Facebook and MySpace, were invented so that individuals could connect with others on the internet to point them to websites, share comments, describe events, and so on.

Following that came the invention of another type of social media—Twitter—which allows people to send very brief messages, usually about current events, to others who choose to receive those messages. One could choose to “follow” former President Barack Obama's Twitter postings—to know where he is going, what is on his agenda, or what is happening at an event. This kind of information can be very useful for getting on-site information as it happens. It has proved useful in emergency situations as well. For example, during the Arab Spring uprisings, Twitter communications provided information in real time as events unfolded.⁵ During Hurricane Sandy, people were able to get localized and specific information about the storm as it happened.⁶ Twitter is also a convenient means of socializing, for getting directions, and for keeping up-to-date on the activities of friends and family.

The power of the various tools that use the power of the internet and the information supplied there is epic. The spread of the technology required to make use of these tools has been rapid and global. As with most tools, the power of the internet can be used for both good and evil. In the last decade, the use of the

internet to manipulate, manage, and mislead has had a massive upswing.

Big Data

The collection of massive amounts of data using bots has generated a new field of study known as “big data.”⁷ Some big data research applies to the activities of people who use the internet and social media. By gathering and analyzing large amounts of data about how people use the internet, how they use social media, what items they like and share, and how many people overall click on a link, advertisers, web developers, and schemers can identify what appear to be big trends. Researchers are concerned that big data can hide biases that are not necessarily evident in the data collected, and the trends identified may or may not be accurate.⁸ The use of big data about social media and internet use can result in faulty assumptions and create false impressions about what groups or people do or do not like. Manipulators of big data can “nudge” people to influence their actions based on the big data they have collected.⁹ They can use the data collected to create bots designed to influence populations.¹⁰

Bots

Information-collecting capabilities made possible by harnessing computer power to collect and analyze massive amounts of data are used by institutions, advertisers, pollsters, and politicians. Bots that collect the information are essentially pieces of computer code that can be used to automatically respond when given the right stimulus. For example, a bot can be programmed to search the internet to find particular words or groups of words. When the bot finds the word or words it is looking for, its programming makes note of the location of those words and does something with them. Using bots speeds up the process of finding and collecting sites that have the required information. The use of bots to collect data and to send data to specific places allows research to progress in many fields. They automate tedious and time-consuming processes, freeing researchers to work on other tasks.

Automated programming does good things for technology. There are four main jobs that bots do: “Good” bots crawl the web and find website content to send to mobile and web applications and display to users. They search for information that allows ranking decisions to be made by search engines. Where use of data has been authorized, the data is collected by bot “crawlers” to supply information to marketers. Monitoring bots can follow website availability and monitor the proper functioning of online features.

This kind of data collection is useful to those who want to know how many people have looked at the information they have provided. “In 1994, a former direct mail marketer called Ken McCarthy came up with the clickthrough as the measure of ad performance on the web. The click’s natural dominance built huge companies like Google and promised a whole new world for advertising where ads could be directly tied to consumer action.”¹¹ Counting clicks is a relatively easy way to assess how many people have visited a website. However, counting clicks has become one of the features of social media that determines how popular or important a topic is. Featuring and repeating those topics based solely on click counts is one reason that bots are able to manipulate what is perceived as popular or important. Bots can disseminate information to large numbers of people. Human interaction with any piece of information is usually very brief before a person passes that information along to others. The number of shares results in large numbers of clicks, which pushes the bot-supplied information into the “trending” category even if the information is untrue or inaccurate. Information that is trending is considered important.

Good bots coexist in the technical world with “bad” bots. Bad bots are not used for benign purposes, but rather to spam, to mine users’ data, or to manipulate public opinion. This process makes it possible for bots to harm, misinform, and extort. The *Imperva Incapsula* “2016 Bot Traffic Report” states that approximately 30 percent of traffic on the internet is from bad bots. Further, out of the 100,000 domains that were studied for the report, 94.2 percent experienced at least one bot attack over the ninety-day period of the study.¹² Why are bad bots designed, programmed, and set in motion? “There exist entities with both strong motivation and technical means to abuse online social networks—from individuals aiming to artificially boost their popularity, to organizations with an agenda to influence public opinion. It is not difficult to automatically target particular user groups and promote specific content or views. Reliance on social media may therefore make us vulnerable to manipulation.”¹³

In social media, bots are used to collect information that might be of interest to a user. The bot crawls the internet for information that is similar to what an individual has seen before. That information can then be disseminated to the user who might be interested. By using keywords and hashtags, a website can attract bots searching for specific information. Unfortunately, the bot is not interested in the truth or falsehood of the information itself.

Some social bots are computer algorithms that “automatically produce content and interact with humans on social media, trying to emulate and possibly alter their behavior. Social bots can use spam malware, misinformation slander or even just noise”

to influence and annoy.¹⁴ Political bots are social bots with political motivations. They have been used to artificially inflate support for a candidate by sending out information that promotes a particular candidate or disparages the candidate of the opposite party. They have been used to spread conspiracy theories, propaganda, and false information. Astroturfing is a practice where bots create the impression of a grassroots movement supporting or opposing something where none exists. Smoke screening is created when a bot or botnet sends irrelevant links to a specific hashtag so that followers are inundated with irrelevant information.

When disguised as people, bots propagate negative messages that may seem to come from friends, family or people in your crypto-clan. Bots distort issues or push negative images of political candidates in order to influence public opinion. They go beyond the ethical boundaries of political polling by bombarding voters with distorted or even false statements in an effort to manufacture negative attitudes. By definition, political actors do advocacy and canvassing of some kind or other. But this should not be misrepresented to the public as engagement and conversation. Bots are this century's version of push polling, and may be even worse for society.¹⁵

Social bots have become increasingly sophisticated, such that it is difficult to distinguish a bot from a human. In 2014, Twitter revealed in a SEC filing that approximately 8.5 percent of all its users were bots, and that number may have increased to as much as 15 percent in 2017.¹⁶ Humans who don't know that the entity sending them information is a bot may easily be supplied with false information.

Experiments in Fake News Detection

Researchers have studied how well humans can detect lies. Bond and DePaulo analyzed the results of more than 200 lie detection experiments and found that humans can detect lies in text only slightly better than by random chance.¹⁷ This means that if a bot supplies a social media user with false information, that person has just a little better than a 50 percent chance of identifying the information as false. In addition, because some bots have presented themselves and been accepted by humans as "friends," they become trusted sources, making the detection of a lie even more difficult.

To improve the odds of identifying false information, computer experts have been working on multiple approaches to the computerized automatic recognition of true and false information.¹⁸

Written Text

Written text presents a unique set of problems for the detection of lies. While structured text like insurance claim forms use limited and mostly known language, unstructured text like that found on the web has an almost unlimited language domain that can be used in a wide variety of contexts. This presents a challenge when looking for ways to automate lie detection. Two approaches have been used recently to identify fake news in unstructured text. Linguistic approaches look at the word patterns and word choices, and network approaches look at network information, such as the location from which the message was sent, speed of response, and so on.¹⁹

Linguistic Approaches to the Identification of Fake News

The following four linguistic approaches are being tested by researchers:

In the Bag of Words approach, each word in a sentence or paragraph or article is considered as a separate unit with equal importance when compared to every other word. Frequencies of individual words and identified multiword phrases are counted and analyzed. Part of speech, location-based words, and counts of the use of pronouns, conjunctions, and negative emotion words are all considered. The analysis can reveal patterns of word use. Certain patterns can reliably indicate that information is untrue. For example, deceptive writers tend to use verbs and personal pronouns more often, and truthful writers tend to use more nouns, adjectives, and prepositions.²⁰

In the Deep Syntax approach, language structure is analyzed by using a set of rules to rewrite sentences to describe syntax structures. For example, noun and verb phrases are identified in the rewritten sentences. The number of identified syntactic structures of each kind compared to known syntax patterns for lies can lead to a probability rating for veracity.²¹

In the Semantic Analysis approach, actual experience of something is compared with something written about the same topic. Comparing written text from a number of authors about an event or experience and creating a compatibility score from the comparison can show anomalies that indicate falsehood. If one writer says the room was painted blue while three others say it was painted green, there is a chance that the first writer is providing false information.²²

In Rhetorical Structure (RST), the analytic framework identifies relationships between linguistic elements of text. Those comparisons can be plotted on a graph, Vector Space Modeling (VSM) showing how close to the truth they fall.²³

Networks

In approaches that use network information, human classifiers identify instances of words or phrases that are indicators of deception. Known instances of words used to deceive are compiled to create a database. Databases of known facts are also created from various trusted sources.²⁴ Examples from a constructed database of deceptive words or verified facts can be compared to new writing. Emotion-laden content can also be measured, helping to separate feeling from facts. By linking these databases, existing knowledge networks can be compared to information offered in new text. Disagreements between established knowledge and new writing can point to deception.²⁵

Social Network Behavior using multiple reference points can help social media platform owners to identify fake news.²⁶ Author authentication can be verified from internet metadata.²⁷ Location coordination for messages can be used to indicate personal knowledge of an event. Inclusion or exclusion of hyperlinks is also demonstrative of trustworthy or untrustworthy sources. (For example, TweetCred, available as a browser plugin, is software that assigns a score for credibility to tweets in real time, based on characteristics of a tweet such as content, characteristics of the author, and external URLs.²⁸) The presence or absence of images, the total number of images by multiple sources, and their relationships and relevance to the text of a message can also be compared with known norms and are an indicator of the truth of the message. Ironically, all of this information can be collected by bots.

Experiments in Bot and Botnet Detection

A variety of experiments have been conducted using multiple processes to create a score for information credibility.²⁹ Research groups are prepared to supply researchers with data harvested from social media sites. Indiana University has launched a project called Truthy.³⁰ As part of that project, researchers have developed an “Observatory of Social Media.” They have captured data about millions of Twitter messages and make that information available along with their analytical tools for those who wish to do research. Their system compares Twitter accounts with dozens of known characteristics of bots collected in the Truthy database to help identify bots.

Truthy

<http://truthy.indiana.edu/about/>

DARPA, Defense Advanced Research Projects Agency, is a part of the US Department of Defense. It is responsible for the development of emerging technologies that can be used by the US military. In early 2015, DARPA sponsored a competition whose goal was to identify bots known as influence bots. These bots are “realistic, automated identities that illicitly shape discussions on social media sites like Twitter and Facebook, posing a risk to freedom of expression.”³¹ If a means of identifying these bots could be discovered, it would be possible to disable them. The outcome of the challenge was that a semi-automated process that combines inconsistency detection and behavioral modeling, text analysis, network analysis, and machine learning would be the most effective means of identifying influence bots. Human judgment added to the computer processes provided the best results.

Many other experiments in the identification of bots have been reported in the computer science literature.³² Bots and botnets often have a specific task to complete. Once that task is completed, their accounts are eliminated. Detecting bots and botnets before they can do harm is critical to shutting them down. Unfortunately, the means for detecting and shutting down bots are in their infancy. There are too many bot-driven accounts and too few means for eliminating them.

What happens to the information that bots collect is one part of the story of fake news. During the 2016 US presidential campaign, the internet was used to advertise for political candidates. Official campaign information was created by members of each politician’s election team. News media reported about candidates’ appearances, rallies, and debates, creating more information. Individuals who attended events used social media to share information with their friends and followers. Some reports were factual and without bias. However, because political campaigns involve many people who prefer one candidate over another, some information presented a bias in favor of one candidate or not favoring another candidate.

Because it is possible for anyone to launch a website and publish a story, some information about the political candidates was not created by any official of the campaign. In fact, many stories appeared about candidates that were biased, taken out of context, or outright false. Some stories were meant as spoof or satire; others were meant to mislead and misinform. One story reported that the pope had endorsed presidential candidate Donald Trump. In any other context, the reader would likely have no trouble realizing that this story was not true.

Enter the bots. There have been some alarming changes in how, where, and for what bots are used in the past ten years. Bots are being programmed to collect information from social media accounts and push information to those accounts that meet certain criteria.

Social networks allow “atoms” of propaganda to be directly targeted at users who are more likely to accept and share a particular message. Once they inadvertently share a misleading or fabricated article, image video or meme, the next person who sees it in their social feed probably trusts the original poster, and goes on to share it themselves. These “atoms” then rocket through the information ecosystem at high speed powered by trusted peer-to-peer networks.³³

Political bots have been central to the spread of political disinformation. According to Woolley and Guilbeault, the political bots used in the 2016 US elections were primarily used to create manufactured consensus:

Social media bots manufacture consensus by artificially amplifying traffic around a political candidate or issue. Armies of bots built to follow, retweet, or like a candidate’s content make that candidate seem more legitimate, more widely supported, than they actually are. Since bots are indistinguishable from real people to the average Twitter or Facebook user, any number of bots can be counted as supporters of candidates or ideas. This theoretically has the effect of galvanizing political support where this might not previously have happened. To put it simply: the illusion of online support for a candidate can spur actual support through a bandwagon effect.³⁴

The Computational Propaganda Research project has studied the use of political bots in nine countries around the world. In Woolley and Guilbeault’s report on the United States, the authors state, “Bots infiltrated the core of the political discussion over Twitter, where they were capable of disseminating propaganda at mass-scale. Bots also reached positions of high betweenness centrality, where they played a powerful role in determining the flow of information among users.”³⁵

Social bots can affect the social identity people create for themselves online. Bots can persuade and influence to mold human identity.³⁶ Guilbeault argues that online platforms are the best place to make changes that can help users form and maintain their online identity without input from nonhuman actors. To do that, researchers must identify and modify features that weaken user security. He identifies four areas where bots infiltrate social media:

1. Users create profiles to identify themselves on a social media platform. It is easy for bots to be programmed to provide false information to create a profile. In addition, the accessibility of the information in the profiles of other social media users is relatively easy to use to target specific populations.
2. In person, humans rely of a wide range of signals to help determine whether or not they want to trust

someone. Online users have more limited options, making it much easier for bots to pretend to be real people. For platforms like Twitter, it is significantly easier to imitate a human because the text length is short and misspellings, bad grammar, and poor syntax are not unusual. Guilbeault indicates that popularity scores are problematic. He suggests, for example, “making popularity scores optional, private, or even nonexistent may significantly strengthen user resistance to bot attacks.”³⁷

3. People pay attention to their popularity in social media. A large number of friends or followers is often considered to be a mark of popularity. That can lead to indiscriminate acceptance of friend requests from unknown individuals, providing a place for social bots to gain a foothold. Bots send out friend requests to large numbers of people, collect a large following, and, as a result, become influential and credible in their friend group.
4. The use of tools such as emoticons and like buttons help to boost the influence of any posting. Bots can use the collection of likes and emoticons to spread to other groups of users. This process can eventually influence topics that are trending on Twitter, creating a false impression of what topics people are most interested at a given time. This can, of course, deflect interest in other topics.³⁸

While Guilbeault has identified practices on social media platforms where improvements or changes could be made to better protect users, those changes have yet to be made. A groundswell of opinion is needed to get the attention of social media platform makers. The will to remove or change a popular feature such as popularity rating doesn’t seem likely in the near future. In fact, while research is being done in earnest to combat the automated spread of fake or malicious news, it is mostly experimental in nature.³⁹ Possible solutions are being tested, but most automatic fake news identification software is in its infancy. The results are promising in some cases, but wide application over social media platforms is nowhere in sight. The research that exists is mostly based on identifying and eliminating accounts that can be shown to be bots. However, by the time that has been accomplished, whatever the bot has been programmed to do has already been done. There are very few means to automatically identify bots and botnets and disable them before they complete a malicious task.

Google and Facebook Anti-Fake News Efforts

The social media platforms and search engines themselves have made some efforts to help detect and flag fake news. Facebook created an “immune system” to

help protect itself from infection by bots.⁴⁰ Google announced that it will increase its regulation of advertising and linked-to websites.⁴¹ Facebook has turned over the verification of information to five leading fact-checking organizations.⁴² Facebook has also initiated a feature in parts of Europe called Related Articles, which provides readers with access to the results of fact-checking of original stories.⁴³ Google Digital News Initiative is creating programs to help users verify information themselves with Factmata. Overall, these attempts are reactive at best. The sheer volume of potential misinformation and the difficulty in identifying and shutting down bot accounts make these attempts seem feeble.

Factmata

<http://factmata.com/>

It seems that the battle of the computer programmers will continue indefinitely. When one side develops a new means of manipulating information to mislead, misinform, or unduly influence people, the other side finds a way to counter or at least slow the ability to make use of the new idea. This cycle continues in a seemingly endless loop. Using technology to identify and stop fake news is a defensive game. There does not appear to be a proactive means of eliminating fake news at this time. Money, power, and political influence motivate different groups to create computer-driven means of human control.

Notes

1. Andrew Zaleski, "How Bots, Twitter, and Hackers Pushed Trump to the Finish Line," *Backchannel, Wired*, November 10, 2016, <https://www.wired.com/2016/11/how-bots-twitter-and-hackers-pushed-trump-to-the-finish-line/>; Alessandro Bessi and Emilio Ferrara, "Social Bots Distort the 2016 U.S. Presidential Election Online Discussion," *First Monday* 21, no. 11 (November 7, 2016), <http://journals.uic.edu/ojs/index.php/fm/rt/prINTERfriendly/7090/5653>.
2. Tony Haile, "What You Think You Know about the Web Is Wrong," *Time.com*, March 9, 2014, <http://time.com/12933/what-you-think-you-know-about-the-web-is-wrong/>.
3. Don Evon, "Nope Francis," *Snopes*, July 24, 2016, www.snopes.com/pope-francis-donald-trump-endorsement/.
4. Marc Fisher, John Woodrow Cox, and Peter Hermann, "Pizzagate: From Rumor, to Hashtag, to Gunfire in D.C.," *Washington Post*, December 6, 2016, https://www.washingtonpost.com/local/pizzagate-from-rumor-to-hashtag-to-gunfire-in-dc/2016/12/06/4c7def50-bbd4-11e6-94ac-3d324840106c_story.html.

5. D. Parvaz, "The Arab Spring, Chronicled Tweet by Tweet," *Al Jazeera English*, November 6, 2011, www.aljazeera.com/indepth/features/2011/11/2011113123416203161.html; Sara El-Khalili, "Social Media as a Government Propaganda Tool in Post-revolutionary Egypt," *First Monday* 18, no. 3 (March 4, 2013), <http://firstmonday.org/ojs/index.php/fm/rt/prINTERfriendly/4620/3423>.
6. "Twitter Served as a Lifeline of Information During Hurricane Sandy," Pew Research Center, FactTank, October 28, 2013, www.pewresearch.org/fact-tank/2013/10/28/twitter-served-as-a-lifeline-of-information-during-hurricane-sandy/.
7. David Turner, Michael Schroeck, and Rebecca Shockley, *Analytics: The Real-World Use of Big Data in Financial Services*, executive report (Somers, NY: IBM Global Services, 2013).
8. Kate Crawford, "The Hidden Biases in Big Data," *Harvard Business Review*, April 1, 2013, <https://hbr.org/2013/04/the-hidden-biases-in-big-data>.
9. Dirk Helbing, Bruno S. Frey, Gerd Gigerenzer, Ernst Hafen, Michael Hagner, Yvonne Hofstetter, Jeroen van den Hoven, Roberto V. Zicari, and Andrej Zwitter, "Will Democracy Survive Big Data and Artificial Intelligence?" *Scientific American*, February 25, 2017, <https://www.scientificamerican.com/article/will-democracy-survive-big-data-and-artificial-intelligence/>; previously published in *Scientific American's* sister publication *Spektrum der Wissenschaft* as "Digitale Demokratie statt Datendiktatur."
10. Steven J. Frenda, Rebecca M. Nichols, and Elizabeth F. Loftus, "Current Issues and Advances in Misinformation Research," *Current Directions in Psychological Science* 20, no. 1 (2011): 20–23.
11. Haile, "What You Think You Know."
12. Igal Zelfman, "Bot Traffic Report 2016," *Imperva Incapsula Blog*, January 24, 2017, <https://www.incapsula.com/blog/bot-traffic-report-2016.html>.
13. Onur Varol, Emilio Ferrara, Clayton A. Davis, Filippo Menczer, and Alessandro Falommini, "Online Human-Bot Interactions: Detection, Estimation and Characterization," in *Proceedings of the Eleventh International AAAI Conference on Web and Social Media (ICWSM 2017)* (Palo Alto, CA: AAAI Press, 2017), 280.
14. Emilio Ferrara, Onur Varol, Clayton Davis, Filippo Menczer, and Alessandro Flammini, "The Rise of Social Bots," *Communications of the ACM* 59, no. 7 (July 2016): 96.
15. Philip N. Howard, *Pax Technica: How the Internet of Things May Set Us Free or Lock Us Up* (New Haven, CT: Yale, 2015), 211.
16. Twitter, Inc., Form 10-Q, Report for the Quarterly Period Ended June 30, 2014, US Securities and Exchange Commission file number 001-36164, www.sec.gov/Archives/edgar/data/1418091/000156459014003474/twtr-10q_20140630.htm; Varol et al., "Online Human-Bot Interactions."
17. Charles F. Bond and Bella M. DePaulo, "Accuracy of Deception Judgments," *Personality and Social Psychology Review* 10, no. 3 (2006): 214–34.
18. Niall J. Conroy, Victoria L. Rubin, and Yimin Chen, "Automatic Deception Detection: Methods for Finding Fake News," *Proceedings of the Association for Information Science and Technology* 52, no. 1

- (2015), <https://doi.org/10.1002/pr2.2015.145052010082>.
19. Jeffrey Hancock, Michael T. Woodworth, and Stephen Porter, "Hungry like the Wolf: A Word-Pattern Analysis of the Languages of Psychopaths," *Legal and Criminological Psychology* 18 (2013): 102–14; David M. Markowitz and Jeffrey T. Hancock, "Linguistic Traces of a Scientific Fraud: The Case of Diederick Stapel," *PLOS ONE* 9, no. 8 (2014), <https://doi.org/10.1371/journal.pone.0105937>; Rada Mihalcea and Carlo Strapparava, "The Lie Detector: Explorations in the Automatic Recognition of Deceptive Language" (short paper, Joint Conference of the 47th Annual Meeting of the Association for Computational Linguistics and 4th International Joint Conference on Natural Language Processing of the Asian Federation of Natural Language Processing, Singapore, August 2–7, 2009).
 20. Momchil Hardalov, Ivan Koychev, and Preslav Nakov, "In Search of Credible News," in *Artificial Intelligence: Methodology, Systems, and Applications: 17th International Conference, AIMS 2016, Varna, Bulgaria, September 7–10, 2016, Proceedings*, ed. C. Dichev and G. Agre (London: Springer, 2016), 172–80; Markowitz and Hancock, "Linguistic Traces," E105937; Mihalcea and Strapparava, "The Lie Detector."
 21. Song Feng, Ritwik Banerjee, and Yejin Choi, "Syntactic Stylometry for Deception Detection," in *Proceedings of the 50th Annual Meeting of the Association for Computational Linguistics* (New York: Association for Computational Linguistics, 2012), 171–75, www.aclweb.org/anthology/P12-2034.
 22. Victoria L. Rubin and Tatiana Lukoianova, "Truth and Deception at the Rhetorical Structure Level," *Journal of the Association for Information Science and Technology* 66, no. 5 (2015): 905–17.
 23. Jacob Ratkiewicz, Michael Conover, Mark Meis, Bruno Goncalves, Snehal Patil, Alessandro Flammini and Filippo Mercer, "Truthy: Mapping the Spread of Astroturf in Microblog Streams," in *WWW '11: Proceedings of the 20th International Conference Companion on World Wide Web* (New York: Association of Computational Linguistics, 2011), 249–52, <http://doi.org/10.1145/1963192.1963301>; Zhiwei Jin, Juan Cao, Yongdong Zhang, Hianshe Zhou, and Qi Tian, "Novel Visual and Statistical Image Features for Microblogs News Verification," *IEEE Transactions on Multimedia* 19, no. 3 (March 2017): 598–608.
 24. Victorial L. Rubin, Yimin Chen, and Niall J. Conroy, "Deception Detection for News: Three Types of Fakes," in *ASIST 2015: Proceedings of the 78th ASIS&T Annual Meeting*, ed. Andrew Grove (Silver Spring, MD: Association for Information Science and Technology, 2015); Myle Ott, Claire Cardie, and Jeffrey T. Hancock, "Negative Deceptive Opinion Spam," in *The 2013 Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies: Proceedings of the Main Conference* (Stroudsburg, PA: Association of Computational Linguistics, 2013), 497–501; Xin Luna Dong, Evgeniy Gabrilovich, Kevin Murphy, Van Dang, Wilko Horn, Camillo Lugaresi, Shaohua Sun, and Wei Zhang, "Knowledge-Based Trust: Estimating the Trustworthiness of Web Sources," *Proceedings of the VLDB Endowment*, arXiv:1502.03519v1 [cs.DB] February 12, 2015.
 25. Giovanni Luca Ciampaglia, Prashant Shiralkar, Luis M. Rocha, Johan Bollen, Fillippo Menczer, and Alessandro Flammini, "Computational Fact Checking from Knowledge Networks," *PLOS ONE* 10, no. 6 (2015), <https://doi.org/10.1371/journal.pone.0128193>.
 26. Hamdi Yahuaoui Al-Mutairi and Hazem Raafat, "Lattice-Based Ranking for Service Trust Behaviors," *Knowledge Based Systems* 102 (2016): 20–38; Carlos Castillo, Marcelo Mendoza, and Barbara Poblete, "Predicting Information Credibility in Time-Sensitive Social Media," *Internet Research* 29, no. 5 (2013): 560–88.
 27. Benjamin Paul Chamberlain, Clive Humby, and Marc Peter Deisenroth, "Probabilistic Inference of Twitter Users' Age Based on What They Follow," Association for the Advancement of Artificial Intelligence, arXiv:1601.04621v2 [cs.SI], February 24, 2017.
 28. Aditi Gupta, Ponnurangam Kumaraguru, Carlos Castillo, and Patrick Meier, "TweetCred: Real-Time Credibility Assessment of Content on Twitter," in *Social Informatics: SocInfo 2014*, ed. L. M. Aiello and D. McFarland (London: Springer, 2014), 228–43.
 29. Zhao Liang, Ting Hua, Chang-Tien Lu, and Ing-Ray Chen, "A Topic-Focused Trust Model for Twitter," *Computer Communications* 76 (2016): 1–11; Victoria L. Rubin, Niall J. Conroy, and Yimin Chen, "Towards News Verification: Deception Detection Methods for News Discourse" (paper, Hawaii International Conference on System Sciences [HICSS48] Symposium on Rapid Screening Technologies, Deception Detection and Credibility Assessment Symposium, Kauai, HI, January 2015), <http://works.bepress.com/victoriarubin/6/>; Rubin, Chen, and Conroy, "Deception Detection for News"; Diego Saez-Trumper, "Fake Tweet Buster: A Webtool to Identify Users Promoting Fake News on Twitter," in *HT '14: Proceedings of the 25th ACM Conference on Hypertext and Social Media* (New York: Association for Computing Machinery, 2014), 316–17, <https://doi.org/10.1145/2631775.2631786>; Chen Yimin, Niall J. Conroy, and Victoria L. Rubin, "News in an Online World: The Need for an 'Automatic Crap Detector,'" *Proceedings of the Association for Information Science and Technology* 52, no. 1 (2015), <https://doi.org/10.1002/pr2.2015.145052010081>.
 30. Clayton A. Davis, Giovanni Luca Ciampaglia, Luca Maria Aiello, Keychul Chung, Michael D. Conover, Emilio Ferrara, Alessandro Flammini, et al., "OSoMe: The IUNI Observatory on Social Media," preprint, PeerJ Preprints, accepted April 29, 2016, <https://doi.org/10.7287/peerj.preprints.2008v1>.
 31. V. S. Subrahmanian, Amos Azaria, Skylar Durst, Vadim Kagan, Aram Galstyan, Kristina Lerman, Linhong Zhu, et al., "The DARPA Twitter Bot Challenge," *Computer*, June 2016, 38.
 32. Norah Abokhodair, Daisy Yoo, and David W. McDonald, "Dissecting a Social Botnet: Growth, Content and Influence in Twitter," *Proceedings of the 18th ACM Conference on Computer Supported Cooperative Work and Social Computing* (New York: Association for Computing Machinery, 2015), 839–51, <https://doi.org/10.1145/2701731.2701739>.

- .org/10.1145/2675133.2675208; Lorenzo Alvisi, Allen Clement, Alessandro Epasto, Silvio Lattanzi, and Alessandro Panconesi, “SoK: The Evolution of Sybil Defense via Social Networks,” in *Proceedings of the 2013 IEEE Symposium on Security and Privacy* (Piscataway, NJ: Institute of Electrical and Electronics Engineers, 2013), 382–96, <https://doi.org/10.1109/SP.2013.33>; Yazan Boshmaf, Ildar Muslukhov, Konstantin Beznosov, and Matei Ripeanu, “The Socialbot Network: When Bots Socialize for Fame and Money” (paper, 27th annual Computer Security Applications Conference, ACSAC 2011, Orlando, FL, December 5–9, 2011); Qiang Cao, Xiaowei Yang, Jieqi Yu, and Christopher Palow, “Uncovering Large Groups of Active Malicious Accounts in Online Social Networks” in *CCS ’14: Proceedings of the 2014 ACM SIGSAC Conference on Computer and Communications Security* (New York: ACM: 2014), 477–88, <https://doi.org/10.1145/2660267.2660269>; Clayton Allen Davis, Onur Varol, Emilio Ferrara, Alessandro Flammini, and Filippo Menczer, “BotOrNot: A System to Evaluate Social Bots,” in *WWW ’16 Companion: Proceedings of the 25th International Conference Companion on World Wide Web*, 273–74, <https://doi.org/10.1145/2872518.2889302>; Chad Edwards, Autumn Edwards, Patric R. Spence, and Ashleigh K. Shelton, “Is That a Bot Running the Social Media Feed?” *Computers in Human Behavior* 33 (2014) 372–76; Aviad Elyashar, Michael Fire, Dima Kagan, and Yuval Elovici, “Homing Social Bots: Intrusion on a Specific Organization’s Employee Using Socialbots” in *ASONAM ’13: Proceedings of the 2013 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining* (New York: ACM, 2013), 1358–65, <https://doi.org/10.1145/2492517.2500225>; Carlos Freitas, Fabricio Benevenuto, Saptarshi Ghosh, and Adiano Veloso, “Reverse Engineering Socialbot Infiltration Strategies in Twitter.” arXiv:1405.4927 [cs.SI], May 20, 2014; Russell Frank, “Caveat Lector: Fake News as Folklore,” *Journal of American Folklore* 128, no. 509 (Summer 2015): 315–32; Varol et al., “Online Human-Bot Interactions”; Claudia Wagner, Silvia Mitter, Christian Körner, and Markus Strohmaier, “When Social Bots Attack: Modeling Susceptibility of Users in Online Social Networks” in *Making Sense of Microposts: Proceedings of the WWW ’12 Workshop on “Making Sense of Microposts,”* ed. Matthew Row, Milan Stankovic, and Aba-Sah Dadzie (CEUR Workshop Proceedings, 2012), <http://ceur-ws.org/Vol-838>.
33. Claire Wardle, “Fake News: It’s Complicated,” First Draft News, February 16, 2017, <https://medium.com/1st-draft/fake-news-its-complicated-d0f773766c79>.
 34. Samuel C. Woolley and Douglas R. Guilbeault, *Computational Propaganda in the United States of America: Manufacturing Consensus Online*, Computational Propaganda Research Project, Working Paper 2017.5 (Oxford, UK: Project on Computational Propaganda, 2017), 8, <http://comprop.oii.ox.ac.uk/2017/06/19/computational-propaganda-in-the-united-states-of-america-manufacturing-consensus-online/>.
 35. Woolley and Guilbeault, *Computational Propaganda*, 22.
 36. Douglas Guilbeault, “Growing Bot Security: An Ecological View of Bot Agency,” *International Journal of Communication* 10 (2016): 5012.
 37. Guilbeault, “Growing Bot Security,” 5012.
 38. Guilbeault, “Growing Bot Security,” 5003–21.
 39. Samuel C. Woolley and Philip N. Howard, “Political Communication, Computational Propaganda, and Autonomous Agents.” *International Journal of Communication* 10 (2016): 4882–90; Sam Woolley and Phil Howard, “Bad News Bots: How Civil Society Can Combat Automated Online Propaganda,” TechPresident, December 10, 2014, <http://techpresident.com/news/25374/bad-news-bots-how-civil-society-can-combat-automated-online-propaganda>; Jonathan Stray, “Defense against the Dark Arts: Networked Propaganda and Counter-propaganda.” Jonathan Stray website, February 24, 2017, <http://jonathanstray.com/networked-propaganda-and-counter-propaganda>.
 40. Tao Stein, Ergond Chen, and Karan Mangla, “Facebook Immune System,” in Proceedings of the 4th Workshop on social network systems. Article #8. *EuroSys Social Networks Systems (SNS)* 2011, April 10, 2011 Salzburg, <http://www.cse.iitd.ac.in/~siy107537/sil765/readings/a10-stein.pdf>.
 41. Charles Warner, “Google Increases Regulation of False Ads and Fake News,” *Forbes*, January 25, 2017, <https://www.forbes.com/sites/charleswarner/2017/01/25/google-increases-regulation-of-false-ads-and-fake-news/>.
 42. Emily Bell, “Facebook Drains the Fake News Swamp with New, Experimental Partnerships,” Little Green Footballs, December 15, 2016, http://littlegreenfootballs.com/page/322423_Facebook_Drains_the_Fake_News_.
 43. Kathleen Chaykowski, “Facebook Expands Fight against Fake News with Automatic, Related Articles,” *Forbes*, August 3, 2017, <https://www.forbes.com/sites/kathleenchaykowski/2017/08/03/facebook-expands-fight-against-fake-news-with-automatic-related-articles/>.

Can We Save Ourselves?

Most people have no clue how the technology that envelops them works or what physical principles underlie its operation. . . . Thus, the ‘limits of plausibility’ have vanished, and the ‘knowledge of the audience’ is constructed from Facebook feeds, personal experience, and anecdote.”¹ Notwithstanding, there are some things individuals can do and tools that can be used to mitigate the spread of fake news. While we might not be able to stop the creation of fake news, individuals can take steps to help themselves and others.

Learn about Search Engine Ranking

A first strategy to foiling the purveyors of fake news is to educate ourselves about how fake news is created and how it spreads. For example, when people search for information, they often use a search engine. The amount of information that is retrieved is always overwhelming. The vast majority of searchers do not look at links beyond the first page of results, and most people never get beyond the second link on the first page.² This makes the placement of information on the page of results very important. The criteria that drive the placement of information are complex and often opaque to the general public. The result is that search engine users accept whatever information appears at the top of the search results. This makes users very vulnerable to receiving and accepting misleading or even fake information. Learning how the ranking of websites is accomplished can at least forewarn users about what to look for.³

Be Careful about Who You “Friend”

In the world of social media, information is brought directly to us, rather than requiring us to search for it. That information is often shared and commented on with friends and followers. One reason fake news can spread is because we are not as careful as we should be about accepting friend requests. It is great to be popular, and one way of measuring popularity is to have a long list of friends and followers. It makes us feel good about ourselves. Because those friends and followers generally agree with what we already believe, having a lot of friends feeds our confirmation bias, which also makes us feel good about ourselves.

If and when friend requests are accepted, we make a psychological transition from thinking about the requestor as a stranger to thinking about the requestor as a friend. A certain amount of trust accompanies the change in status from stranger to friend. That new friend becomes privy to the inner circle of information in our lives and is also connected to our other friends and followers. We trust those friends to “do no harm” in our lives. We can unfriend or block someone if we change our minds, but that often happens after something bad occurs.

The friends list can be great when everybody on it is a human. However, it is possible for social media friends to be bots. These bots are, at best, programmed to gather and provide information that is similar to what we like. Unfortunately, bots are sometimes programmed to gather and spread misinformation or disinformation. “A recent study estimated that 61.5% of total web traffic comes from bots. One recent study of

Twitter revealed that bots make for 32% of the Twitter posts generated by the most active account.⁴ About 30 percent of the bot accounts are “bad” bots.⁵

If we accept a bot as a friend, we have unknowingly made the psychological shift to trust this bot-friend, making any mis- or disinformation it shares more plausible. After all, friends don’t steer friends wrong. If an individual likes a posting from a bot, it sends a message to the individual’s other friends that the bot-posted information is trustworthy. “A large-scale social bot infiltration of Facebook showed that over 20% of legitimate users accept friendship requests indiscriminately and over 60% accept requests from accounts with at least one contact in common. On other platforms like Twitter and Tumblr, connecting and interacting with strangers is one of the main features.”⁶ People with large numbers of friends or followers are more likely to accept friend requests from “people” they don’t know. This makes it easy for bots to infiltrate a network of social media users.

It is very difficult to identify a friend or follower that is actually a bot. Even Facebook and Twitter have a hard time identifying bots. Bots are programmed to act like humans. For example, they can be programmed to send brief, generic messages along with the links they share. That makes them seem human. They can be programmed to do that sharing at appropriate times of day. If they don’t post anything for an eight-hour span, it makes them look like a human who is getting a good night’s sleep. They can also mimic human use of social media by limiting the amount of sharing or likes for their account. If they share thousands of links in a short period of time, they seem like machines. If the number of items shared by each bot is limited, they seem more like humans. Bots can even be programmed to mimic words and phrases we commonly use and can shape messages using those words and phrases. This makes their messages look and feel familiar, and they are, therefore, more believable.

If we friend a bot, that bot gets access to a wide variety of networked social media accounts and can spread fake news to our list of friends and followers. Those people can then share the fake news in an ever-widening circle. This means bots can influence a large number of people in a short period of time. Bots can also be linked into networks called botnets, increasing their ability to reshape a conversation, inflate the numbers of people who appear to be supporting a cause, or direct the information that humans receive.

ID Bots

It is possible to watch for bots, and we should make it a habit to do so before accepting friend requests. Some things we can do to protect ourselves from bots follow:

1. Accounts that lack a profile picture, have confused or misspelled handles, have low numbers of Tweets or shares, and follow more accounts than they have followers are likely to be bots. “If an account directly replies to your Tweet within a second of a post, it is likely automatically programmed.”⁷ Look for these signs before accepting a friend request.
2. Should a possible bot be identified, it should be reported. Everyone can learn how to report a suspected bot. Social media sites provide links to report misuse and propaganda.
3. Using a wide variety of hashtags and changing them on a regular basis, rather than relying on a single hashtag, can keep bots from smoke screening (disrupting) those hashtags.
4. If accounts you follow gain large numbers of followers overnight, that is probably an indication that bots are involved. Check the number of followers for new friends.
5. For those with the skills to do so, building bots that can counter the bad bots can be effective.⁸

Read before Sharing

Another reason fake news spreads and “goes viral” is because people (and bots) click Share without having read beyond the headline or without thinking about the content of the message. A headline may be misleading or may be unrelated to the story it is attached to. Headlines are meant to capture the attention, and they are often written to provoke a strong reaction. It is easy to provoke an emotional response with a sensational headline. Sharing the link with others without looking at the story attached can result in the spread of fake news. Read the content of a link before sharing it.

In 2015, Allen B. West posted a picture of US Muslims who were serving in the US military attending a regular prayer time. The caption for the picture was “Look at what our troops are being FORCED to do.” This caption implied that all US servicemen and -women were being required to participate in Muslim prayer services during the month of Ramadan. The picture was widely shared until it was revealed to be “fake news.”⁹

The idea that the US government would require its military personnel to participate in any religious observance is provocative. It elicits an emotional response, which often leads us to share both the story and our outrage with others—to spread the word. That knee-jerk reaction often causes us to react rather than take the time to consider what the plausibility of the story really is.

A strong emotional response to a picture, caption, or headline should act as a warning to slow down, think, and ask questions. The US military is part of

the US government. A strict separation of religion and government is guaranteed by the Constitution of the United States. The contradiction between the picture caption and what we know about how the US is governed should cause us to question the information. Yes, soldiers must follow orders, but why would soldiers be ordered to participate in a religious ceremony of any kind? Such orders would violate a fundamental principle on which the country was founded. If the information were true, that would mean that the democracy had failed and all those people sworn to uphold the rules of the democracy deposed. If that had happened, we would probably have heard about it from other sources. This brief thought process should bring the veracity of the posting into question. From there it takes just a minute to find out that the picture is of a regular Muslim prayer service in which US servicemen who are Muslims were participating—voluntarily. Invoking that brief moment of skepticism can prevent the spread of fake news.

Fact-Check

There are a growing number of fact-checking sites that make it their business to find out whether a story, caption, or headline is true or false. Instead of sharing the fake story with others, it is a good practice to check with a fact-checking site first to see what it has to say about the story. It's a good idea to keep a list of fact-checking sites handy for that purpose. Snopes maintains a list of known fake news websites. FactCheck's Spiral Viral page shows its findings about information most often questioned. It lists all questions and answers at its site as well.¹⁰

Some Fact-Checking Sites

Snopes (specializes in political fact checking)
www.snopes.com/

PolitiFact
www.politifact.com/

Hoax-Slayer (email and social media hoaxes)
www.hoax-slayer.com/

StopFake (fighting false information about events in Ukraine)
www.stopfake.org

FactCheck
www.factcheck.org

Factmata (fact checks chain email)
<http://factmata.com/> (fact checking using AI)

LazyTruth
www.lazytruth.com

SciCheck (fact checking for science-based claims)
www.scicheck.com

Twitter and Facebook are attempting to make use of fact-checking organizations so they can more readily identify fake news and, perhaps, identify bots that spread the fake news. Making regular use of fact-checking sites before sharing information with others on social media can help stop the spread of fake news. We can also engage with social media sites to encourage changes that will benefit users. For example, instead of counting clicks to determine popularity, metrics rating the amount of time spent at a site or page might be a better measure of interest. Moving away from the current popularity ratings based on click counting could help limit the spread of fake news. If enough users made it known that the current popularity ratings are not adequate, it might be possible to influence the social media makers to count something more meaningful.

Evaluate Information

We can help ourselves and our students by understanding how to evaluate sources and by routinely applying that knowledge to the sources we use.¹¹ What is a source? What source can be relied on to be accurate and reliable? What signs can help to identify a trustworthy source?

The word *source* can mean several things, even in the context of information literacy and fake news. A source can be the person who supplied information. A source can be the person who wrote a news article, report, or other piece. A source can be an organization that puts its name and reputation behind a piece of writing. There are also anonymous sources of two kinds: the first is the person who does not want his or her name revealed as the one who supplied the information to a reporter; the second is a person who hides his or her identity or affiliations while publishing his or her own information.

According to Dr. Anders Ericksson and colleagues, it takes 10,000 hours of practice to become an expert on something.¹² Whether it is playing baseball, playing the violin, or reporting the news, at least 10,000 hours of practice is required. That means that an expert will usually have at least 10,000 hours more experience than a novice. While some controversy exists about the exact number of hours required, the nub of the

argument is that it requires substantial experience and knowledge of a subject to make one an expert. Experts always know more about their subject than nonexperts do.

It is important to remember that experts are usually experts in one or two specific things. No one is an expert in everything. If we are looking for expertise in the history of the Civil War, we would not seek out an expert in open heart surgery. For information seekers, it should be habitual to look for biographical information about authors to get some idea of how much experience that author has with the subject being written about. Education, years on the job, applied experience, prizes won—all these items serve as credentials to help verify an author's level of expertise. It is relatively easy to check the veracity of biographical information using the internet.

Because the internet is available to everyone, anyone can write and post what they like, whether they have any expertise or experience with the subject. A teenager in Macedonia invented news stories about Donald Trump for months before the US presidential election in 2016.¹³ Those stories appeared along with stories written by reputable journalists working for trusted news sources. The algorithms that make stories from legitimate news sources and fake news sources appear on a social media newsfeed are based on information that people have responded to (clicked on, liked, commented on, or shared) previously. That means if a social media user clicks on an article written by the Macedonian teenager, it is much more likely that user will see more of the same, rather than articles from real news sources. It is unlikely that a teenager in Macedonia would know more about a US political figure than a seasoned political journalist from the United States. Checking the credentials of an author is another way of avoiding fake news.

Experience and education do not always result in unbiased reporting. The reputation of the organization that supports (employs) a reporter also serves as a means of evaluating a source. Publishers that have been in the news business for a while get a reputation based on the accuracy, reliability, and slant of the stories they publish. The *New York Times*, *Wall Street Journal*, Fox News, and CNN have built their reputations by selecting reporters who write the stories and then by selecting the stories those authors produce. The publishers act as gatekeepers for the news. For those publishers with a track record for providing accurate reporting, their reputation can serve as a credential and can reflect that reputation on their reporters.

It is true that reporters with valid credentials who write for reputable news outlets sometimes mislead or misinform. The monetization of internet-based news is responsible for at least some misinformation. The relentless 24/7 flow of news also puts pressure on reporters and publishers to release information

quickly, sometimes before the facts have been completely verified. The need for speed can also cause one news outlet to simply repost a report from another news outlet, even if the facts have not been verified.

Producers of *On the Media* have provided informational sheets in their “Breaking News Consumer’s Handbook.” Several points they list speak to the pressure for legitimate news sources to release information quickly. They offer pointers about the language reporters use and what specific phrases mean regarding the reliability of the information they supply.¹⁴ *On the Media* also suggests that part of the verification process for news stories should be geographic. Sources geographically close to the incident being reported are more likely to have reporters at the site and will therefore be closest to the unfolding event. Checking the geographic location of a story can help to evaluate its authenticity.

It is good practice to follow any links or citations given in a story. Fake news writers often include links and citations to make their posts seem more credible. However, those links may not connect to any information that is relevant to the original post. A Fact-Check report posted on November 18, 2016, found the following:

Another viral claim we checked a year ago was a graphic purporting to show crime statistics on the percentage of whites killed by blacks and other murder statistics by race. Then-presidential candidate Donald Trump retweeted it, telling Fox News commentator Bill O’Reilly that it came “from sources that are very credible.” But almost every figure in the image was wrong—FBI crime data is publicly available—and the supposed source given for the data, “Crime Statistics Bureau—San Francisco,” doesn’t exist.¹⁵

A quick and easy check for the veracity of a source that seems questionable is to go to the homepage of the news source and look at what other articles are being posted. While one story may sound plausible, there may be others that are less so. By looking at the site in the aggregate, it is sometimes possible to determine the purpose and tone that will help identify the site as legitimate or bogus.

Some fake news sites will reuse older information retrieved from other sites to mislead by association. For example, President Donald Trump credited himself with convincing Ford Motor Company, after his election, to move the production of one of their vehicles from Mexico to Ohio. However, the original publication date of the announcement by Ford was August 2015, long before Mr. Trump was elected. Similarly, in 2015, then-candidate Trump suggested that he had influenced Ford to move its plant, citing a story on Prntly.com. In fact, the original story came from CNN in March 2014 and referred to moving some assembly work to Ohio. The plant to be built in Mexico was still being built in Mexico.¹⁶

Seek Information beyond Your Filter Bubble

We can avoid fake news by leaving our filter bubbles and seeking out opinions that do not agree with our own. Comparing sources is always a good idea. Comparing sources that illustrate different points of view can often give some context to the interpretation of the information being offered. If CNN says one thing about a news story, it is likely that Fox will also cover the same story. The differences between the two stories will often identify the “middle ground” where the truth often lies.

We can subscribe to publications that specifically provide information opposite from what we would get on social media. *Escape Your Bubble* is an online publication that gathers information about your political preferences and then provides you with information that comes from sources outside your political bubble. Its goal is to help people understand each other better. There are reasons why Republicans champion certain causes or hold certain opinions. They often do not agree with Democrats about the reasons a problem exists or how to fix it. It's good to get input from both sides in order to understand why people do what they do. Getting the facts from different perspectives can help to identify fake news.

Escape Your Bubble

<https://www.escapeyourbubble.com/>

We all have biases and preferences. It is important to acknowledge those biases and to keep them in mind, especially when confronted with information that does not support what that bias tells us. We must work hard to overcome confirmation bias because without effort we tend to dismiss information that does not agree with what we already believe is true. By at least considering information that disagrees, we can make a more informed decision or form a reasonable opinion. This is something we need to remember and consider in this era of fake news.

Be Skeptical

Approach news with skepticism. The psychology literature shows that in order to process information, we must initially accept or believe it. Just to make sense of something, the default is for the brain to believe it. It takes an additional (and more difficult) step to reject the information as false. As time passes, we tend to remember as true the first information we heard, read, or saw, even if it was not true and even if we know it was not true. The more times we hear

something, the better we remember it.¹⁷ So if we read, see, or hear fake news from a number of friends, followers, or bots, that information sticks in our memories, even if it is not true and even if we know it is not true. Finally, if some information contradicts a dearly held belief, the normal reaction is to reject that information and to more firmly believe what we already believe. This psychological fact allows humans to process information, but it also makes us vulnerable to those who manipulate information. Remaining skeptical is one way to combat the biases and psychological preferences built into our brains, at least long enough to consider alternatives.

Use Verification and Educational Tools

A wide variety of reliable news agencies provide information and tips to both their reporters and their readers for avoiding fake news. There are several projects underway to increase levels of trust in the legitimate media. The Trust Project at Santa Clara University in California is working to “develop digital tools and strategies to signal trustworthiness and ethical standards in reporting.”¹⁸ The Trust Project brings together news reporters and editors with the goal of restoring trust in the news media. This project has identified indicators for journalism including a series of checks that can be applied to news stories to indicate that the information has been vetted for honesty, reliability, ethical treatment, and so on. Articles are flagged with indicators that show fact verification has taken place, ethical standards have been observed, conflicts of interest have been exposed, and reporting versus opinion and sponsored content articles are flagged. Over seventy news organizations are collaborating on this project.

The Trust Project

<http://thetrustproject.org/>

The National Institute for Computer-Assisted Reporting is part of the 4,500-member association Investigative Reporters and Editors. NICAR provides the ability to combine information from varied digital sources, allowing reporters to verify information and to extract facts and data more easily. New tools help reporters with analysis, visualization, and presentation of structured data: Google Refine, ManyEyes (IBM), TimeFlow (Duke University), Jigsaw (Georgia Tech), the Sphinx Project (CMU), DocumentCloud, and ProPublica. All of these groups are working to help legitimate news sources provide readers with accurate and reliable content.¹⁹

National Institute for Computer-Assisted Reporting

<https://ire.org/nicar/database-library/>

Investigative Reporters and Editors Association

<https://www.ire.org/>

DocumentCloud

<https://www.documentcloud.org>

The Public Data Lab publishes *A Field Guide to Fake News*.²⁰ This guide describes “digital methods to trace production, circulation and reception of fake news online.”²¹ This publication was prepared for release at the International Journalism Festival in Perugia in April 2017. Its goal is to investigate fake news in its context including where it appears and how it circulates online.

A number of educational institutions have created classroom curricula to help students learn to be smart consumers of information, especially news.²² The Stanford History Education Group has created a classroom curriculum that includes a bank of assessments to test the ability to judge credibility of news reports.

Stanford History Education Group

<https://sheg.stanford.edu/>

The News Literacy Project is a nonpartisan national educational program that aims at teaching middle and high school students how to read and evaluate news stories. It has developed an online modular curriculum called Checkology that walks students, middle school through college, through the process of reporting the news, from on-site reporting to publication. Students can also learn how to create their own news stories, giving them practice in creating fair and unbiased reports, which, in turn, helps them to evaluate news stories from others.

News Literacy Project

www.thenewsliteracyproject.org

Consistent and persistent use of a handful of simple practices could help to identify fake news and to stop its spread. Putting those practices to use could remove or at least reduce the incentives that drive the creators of fake news. There are tools and techniques available to help people become informed and savvy news consumers. Legitimate news media sources are creating criteria and tagging to help people to identify and select “real” news. There are easy means to

escape our information bubbles and echo chambers. In the end, it is up to all individuals to do what they can to educate themselves about fake news and the technology that brings fake news to their doorstep. While we educate ourselves, we can help to educate our students and patrons.

Notes

1. David J. Helfand, “Surviving the Misinformation Age,” *Skeptical Inquirer* 41, no. 3 (May/June 2017): 2
2. Shannon Greenwood, Andrew Perrin, and Maeva Duggan, “Social Media Update 2016,” Pew Research Center: Internet and Technology, November 11, 2016, www.pewinternet.org/2016/11/11/social-media-update-2016/.
3. Evan Bailyn, “Your Guide to Google’s Algorithm in 2017: All Ranking Factors, Updates and Changes,” *SEO Blog*, FirstPageSage, November 21, 2016, <https://firstpagesage.com/seo-blog/2017-google-algorithm-ranking-factors/>.
4. Igal Zelfman, “Bot Traffic Report 2016,” *Imperva Incapsula Blog*, January 24, 2017, <https://www.incapsula.com/blog/bot-traffic-report-2016.html>.
5. Norah Abokhodair, Daisy Yoo, and David W. McDonald, “Dissecting a Social Botnet: Growth, Content and Influence in Twitter,” *Proceedings of the 18th ACM Conference on Computer Supported Cooperative Work and Social Computing* (New York: Association for Computing Machinery, 2015), 839–51, <https://doi.org/10.1145/2675133.2675208>.
6. Emilio Ferrara, Onur Varol, Clayton Davis, Filippo Menczer, and Alessandro Flammini, “The Rise of Social Bots,” *Communications of the ACM* 59, no. 7 (July 2016): 100.
7. Sam Woolley and Phil Howard, “Bad News Bots: How Civil Society Can Combat Automated Online Propaganda,” *TechPresident*, December 10, 2014, <http://techpresident.com/news/25374/bad-news-bots-how-civil-society-can-combat-automated-online-propaganda>.
8. Eryn Carlson, with reporting by Tama Wilner, “Flagging Fake News: A Look at Some Potential Tools and Strategies for Identifying Misinformation,” *Nieman Reports*, April 14, 2017, <http://niemanreports.org/articles/flagging-fake-news/>.
9. Tom Nichols, *The Death of Expertise: The Campaign against Established Knowledge and Why It Matters* (New York: Oxford University Press, 2017), 114.
10. Glenn Kessler, “The Fact Checker’s Guide for Detecting Fake News,” *Washington Post*, November 22, 2016, https://www.washingtonpost.com/news/fact-checker/wp/2016/11/22/the-fact-checkers-guide-for-detecting-fake-news/?utm_term=.920d6de37499.
11. Sam Wineburg, Sarah McGrew, Joel Breakstone, and Teresa Ortega, “Evaluating Information: The Cornerstone of Civic Online Reasoning,” Stanford History Education Group, Stanford Digital Repository, November 22, 2016, <https://purl.stanford.edu/fv751yt5934>.
12. K. Anders Ericsson, Ralf Th. Krampe, and Clemens Tesch-Romer, “The Role of Deliberate Practice in the

- Acquisition of Expert Performance,” *Psychological Review* 100, no. 3 (1993): 393–94.
13. Samantha Subranmanian, “Inside the Macedonian Fake-News Complex,” *Wired Magazine*, February 15, 2017, <https://www.wired.com/2017/02/veles-macedonia-fake-news/>.
 14. “Breaking News Consumer’s Handbook,” *On the Media*, WNYC, www.wnyc.org/series/breaking-news-consumers-handbook.
 15. Eugene Kiely and Lori Robertson, “How to Spot Fake News,” FactCheck.org, November 18, 2016, www.factcheck.org/2016/11/how-to-spot-fake-news/.
 16. Tony Haile, “What You Think You Know about the Web Is Wrong,” Time.com, March 9, 2014, <http://time.com/12933/what-you-think-you-know-about-the-web-is-wrong/>.
 17. Daniel T. Gilbert, “How Mental Systems Believe,” *American Psychologist* 46, no. 2 (1991): 107–19.
 18. Carlson, with Wilner, “Flagging Fake News,” Nieman Reports, April 14, 2017, <http://niemanreports.org/articles/flagging-fake-news/>.
 19. Sarah Cohen, “Computational Journalism,” *Communications of the ACM* 54, no. 10 (October 2011): 66–71.
 20. Liliana Bonegru, Jonathan Gray, Tommaso Venturini, and Michele Mauri, *A Field Guide to Fake News: A Collection of Recipes for Those Who Love to Cook with Digital Methods*, research report, first draft (Public Data Lab, April 7, 2017), <http://apo.org.au/node/76218>.
 21. Bonegru et al., *Field Guide*, 2.
 22. John Dyer, “Can News Literacy Be Taught?” Nieman Reports, April 14, 2017, <http://niemanreports.org/articles/can-news-literacy-be-taught/>.

How Can We Help Our Students?

Teach Information or Media Literacy

Students today have never lived in a world without computers and cellphones. They have always been immersed in technology and bombarded with information. This is normal for them. They use technology easily and accept new technology readily. They are willing to experiment and are quick to discard anything that is not entertaining or that takes too long to complete. They live in a world of 3-D, virtual reality, and predictive searching. They have a preference for visual rather than written material. They skim the surface of the information they receive, rather than doing a deep dive to thoroughly research a topic. They expect technology to work for them, at lightning speed, without the need for instruction or intervention.

Most people are confident that they know more than they do. Experiments conducted by David Dunning and Justin Kruger in 1999 showed that people who know relatively little about a subject are overconfident about their level of expertise in it.¹ The “Dunning-Kruger effect” finds that students and others overestimate what they know, despite knowing that they lack experience or knowledge of the subject. People in general tend to trust their social media friends, and students in particular tend to rely on social media for their information. The sources of information they trust are the ones their friends share with them. The expertise of the author, the possible bias of the producer, the geographic location of the creator, the facts that back up an assertion or claim, all take a back seat to the credibility of their friend network. This makes them particularly susceptible to manipulation. If they happen to have unknowingly friended a bot that feeds

them misinformation, they are likely to believe that information.

Helping individuals learn to be information- or media-literate is one of the single most important skills we can offer. It translates into the ability to understand, control, and apply information. In order to combat fake news, the first step should be to start teaching students early in their education. By the time students get to high school, which is typically the first place they encounter “information literacy” today, their learning habits are ingrained. We need to teach basic information literacy skills much earlier in life, and we need to repeat lessons throughout a student’s education.

Psychologically, the first thing we see or hear about a topic is what we remember as true. The more times we hear something repeated, the more likely it is that we will remember it, even if it is not true.² To start students on the road to information or media literacy, we need to start teaching those skills in elementary school so that critical thinking and questioning will become ingrained and habitual. We need to capitalize on children’s propensity to ask questions and encourage them to do so. We also need to help them learn how to find answers to their questions. A scaffolded curriculum of information literacy across the K–12 system would build a foundation that students could use to approach adult problems after graduation.

Students need guidance as they often lack life experience. Teaching students to seek out experts and to value those who have expertise in a subject will provide them with a key to avoiding fake news. With the democratization of access to information via the internet, it is easy to find information, but is it not

always easy to determine if that information came from an expert and trustworthy source.³ Students should understand that information coming from an expert source will be more reliable than information coming from an unknown source. Teachers should provide guidelines for students to use in identifying and selecting information supplied by experts.

As students reach high school, their tendency is to rely less on the expertise of their teachers and rely more on their friends. This is problematic in terms of fake news because many students get their news only from their social media newsfeed. Teens often share news they have received via social media because a headline or a picture, rather than the actual content of an article, has caught their attention. They are often unaware that they are receiving information from bots driven by algorithms based on the likes, shares, and clicks at their social media pages. They are often unaware that the information they see can be influenced by nonhuman actors. Students often do not seek out alternate sources of information, nor do they compare information to see how details might differ. We need to encourage them to do so and show them how. Technological interventions that are entertaining as well as instructive can help to get information across to teens.

Make Students Aware of Psychological Processes

Knowledge is power. When we are aware that we are psychologically programmed to believe information first and then reject it later if necessary, it becomes easier to insert skepticism into our analysis of news. This makes it easier to reject fake news if we can initially accept that it might be fake news. It is easier to dismiss the initial misinformation if we know our brain has a tendency to hold onto it. Explaining the psychological tendencies that could cause students to believe fake news, and reminding them of those tendencies periodically, can give them a means of examining that news more critically. Making students aware of how their brains are working can improve their performance.⁴

In college, students are often psychologically ready for a fresh start or at least exhibit a willingness to consider new ideas. At this critical juncture, it is important to provide the reasoning and the instruction that will help them to apply their critical-thinking skills to their new environment. The freshman experience concerning information literacy can be very important, as it can, if successful, create the basis for the rest of their college work. It is important to introduce academically related information-literacy concepts and skills at a time when they can be applied immediately to an assignment or problem. Skills concerning

fake news can be taught any time as fake news is a “hot topic” in the nonacademic world, and students will have the opportunity to apply what they learn immediately in their personal lives. Workshops, tutorials, YouTube videos, and games can be created based on the topic of fake news. The information-literacy skills conveyed in the exercises about fake news can be applied immediately, but can also be transferred to academic issues at the appropriate time.

Tie Information Literacy to Workplace Applications

Building a curriculum to serve college students is critical to producing the workforce practices employers are looking for. It is critical to tie information literacy to the world outside academia and beyond college. Students need to know how important the information literacy skills are going to be to their future success in the working world.⁵ Most students will not have access to the research databases available to them at the university level once they move into the working world. Students are usually familiar with common platforms such as Google and Facebook. Lessons involving Google and social media platforms can provide a focus for instruction using sources students might have available to them as workers and that they will certainly use in their everyday lives. Tips, shortcuts, and cautions can center on the issue of fake news, to make a class or workshop content relevant while teaching valuable skills.

The information literacy skills and concepts students are taught need to be offered in memorable ways, across the curriculum. Offer students instruction options in as many media as possible. Remember students today are visual people for the most part. They don't read deeply, and they tend to reject anything that has no entertainment value. A YouTube video can have more impact than an in-class demonstration. A comic book about information literacy problem solving can be more memorable than a checklist hand-out. Make sure the tools you make available are easily accessible electronically. A problem-solving online game can be effective as well as entertaining. Having students create information literacy projects centered on issues they feel are important could offer them an opportunity for deeper understanding of the subject and provide valuable insight. Get input from students about what teaching tools they find most effective and compelling.

Collaborate with a film studies class, an art class, or a computer engineering class to address information literacy topics in new and interesting ways. Partner with other instructors as often as possible to allow students to get information literacy training in more than one setting, while they are learning another

subject. This will allow students to understand the applicability of information literacy to other subjects.

Have students work on hands-on exercises that demonstrate the need for care in selecting sources. In memory studies, it has been shown that people remember better if they have done something themselves.⁶ Rather than telling or showing students how to find a source or check for factuality, plan instruction so that the students do the work, guided by the teacher. Go the next step and have students apply what they learn in one setting to a problem in another setting. It has also been shown that students benefit from working in groups. Allowing instruction to take place in small groups with input as necessary from a roaming instructor will help students to learn from one another and to better remember what they learned.

Teach Students to Evaluate Information

Teach students about author credentials and how to evaluate them. *Credential* is a term librarians often use, but many students do not know exactly what the term means. What is a credential? What credentials are legitimate indicators of expertise? Acceptable credentials will vary from subject to subject, so the definition is hard to pin down. Academic researchers often try to use sources with peer-review processes in place to do the vetting of authors for them. Unfortunately, in daily life those academic sources do not always serve. They require extra steps to access, and they often require affiliation with an organization that supplies the sources. Most people receiving news from social media are not likely to check that news against an academic database or other reliable source in any case. It can be time consuming to discover an author's credentials. Students will benefit from instruction in what constitutes a credential, where to find evidence of credentials, and why it's worth the time it takes to discover an author's credentials.

In the same way, students should be encouraged to think about bias. Everyone has biases that shape their worldview. That worldview has an impact on the interpretation of events. In reporting on a controversial situation, a journalist should strive for objectivity, but bias can color the representation of the event. It can have an effect on what an eyewitness sees. It can have an effect on the words a reporter chooses when writing a story. Knowing the point of view of the author will help students to identify bias. Biographical information about the author can be helpful in this regard, as is knowing the viewpoint and reputation of the organization the reporter works for. Have students consider, for example, how a reporter working for the NRA might present information about a school shooting. That same school shooting will probably

be reported differently by a reporter writing for an anti-gun group. When confronting controversial subjects, students should be given instruction that will help them find information from both sides of the story. Once students understand why the credentials of authors are important and how those credentials inform the reader of possible bias, have a discussion to help them to understand why they should not rely on anonymous sources of information.

Teach Information Literacy Skills and Concepts

Concentrate on information literacy concepts and skills, rather than teaching students how to use a particular tool. Use those general concepts and skills in concert with exercises that allow students to explore a variety of research tools. Instructors will never have enough time to demonstrate every database for students. It is more efficient to explain to students how databases work in general and then have them use a variety of databases to experience how they differ from one another. Students have been using computer databases most of their lives—Google, Facebook, Twitter—and they frequently learn how to use them by trial and error rather than by reading a help page or following step-by-step instruction sheets. Have them spend their time applying searching and evaluation skills to content rather than learning how to use a particular database.

Make fact-checking sites known and available (see gray box). If students are taught to be skeptical about information, they should have questions about the truth of the news they access. In order to verify news as real or fake, students should be given the tools necessary to do so. Rather than relying on their network of friends or the popularity rating of a post, students should be directed to fact-checking sites, and information about what those sites are should be readily available at multiple locations—websites, social media pages, printable lists, and so on.

Snopes
www.snopes.com

PolitiFact
www.politifact.com

FactCheck
www.factcheck.org

Show students the importance of following up on citations and links. Information literacy instructors have used an article called “Feline Reactions to

Bearded Men” to demonstrate the importance of considering all aspects of an article. The article appears to be reporting the results of a research experiment and is formatted to look like a legitimate research article. It is only when one examines the bibliography that things begin to look suspicious. There are articles listed in the bibliography supposedly authored by Madonna and Dr. Seuss, for example. Nonexistent journals are cited as well.⁷ An unwary or novice researcher might be led to believe that the article was reporting on serious research. In the same way, fake news may contain links and citations to articles and other information simply to give the story the look of serious research and reporting. In fact, the links may lead to information that is false, biased, or completely unrelated to the subject. It is important to follow links and citations to verify that they support the claims made in the original piece.

Show students how easy it is to create a fake website using a URL that looks very similar to a legitimate website. Many fake news sites use web addresses that are very similar to the web addresses of legitimate news agencies. It is very easy to assume that the news being displayed is true if one is convinced that the source is legitimate. Unusual add-ons after the domain name, replacement of a capital letter with a small letter, replacing a 1 (numeral one) with an l (lower-case letter L) or vice versa are all tiny details that can make the difference between getting real news and getting fake news.

Teach students to use critical-thinking skills to evaluate a post before they send it on to friends or followers. This could mean training that examines the psychology of memory, the explanation of algorithms and other computer-related processes, or the examination of author credentials. Since librarians typically have a very limited amount of time in which to convey their message, the information must be stripped to the bare essentials for classroom use. This would be a good place to make creative use of technology to create lessons that get the message out electronically, making them available at any time. Lessons online can be assigned for homework or preparation for a class, rather than in a face-to-face class. Make a series of TED-style talks about critical thinking, for example, and post them on the library web page or Facebook page.

Teach students about privacy issues. Students are fairly cavalier about providing personal information online in order to accomplish something. They are often unaware of what happens to the information they supply. Revealing basic information to set up a profile or gain access to a website doesn't seem invasive. However, many groups that ask for basic information sell that information to others.⁸ There are groups that buy information from multiple sources, and using the power of computing, put an individual's

profile from multiple sites into one file, which may reveal more than one might wish. Individually, the profiles are not necessarily useful, but in the aggregate, they can reveal private information without the knowledge of the individual.

Teach students to slow down. Research shows that the average time spent on a web page is less than fifteen seconds.⁹ While this might be enough time to grasp the content of a headline, it is not enough time to examine the meaning of the content or to determine where the information came from. Allowing sufficient time to absorb the content of a page is critical to understanding the message. Taking the time to think about the content of a web page before passing it on to someone else will help to stop the spread of fake news.

Teach the Teachers

Teach the teachers. While librarians have been immersed in information literacy for decades, other teachers have not necessarily had information literacy at the forefront of their curricular objectives. As the automated provision of information has become unavoidable, and the manipulation of that information for good or evil is now in the hands of anyone with sufficient coding skills to accomplish it, teachers at all levels in all subject areas are ready to benefit from the decades-old expertise of librarians. Librarians should make their information literacy instruction materials readily available and advertise their location. Offer workshops and instruction to faculty and others who influence students. Giving workshops for teachers in the late summer or early fall will help them understand the problems associated with fake news and prepare them to help their students. This is also the time to act as a liaison with writing and tutoring centers of all levels and kinds to share information literacy lessons with them. By teaching the teachers we can expand our reach beyond the fifty-minute one-shot session. Cooperation and collaboration with instructors in every subject area will help students to solidify their skills in information literacy and to avoid fake news.

Conclusion

The creation and spread of fake news is a problem that seems ingrained in human nature. It has existed for millennia and has been used to sway public opinion, smear reputations, and mislead the unwary. In the digital age, information travels much more widely and much faster than it ever has before. Computer power makes it easy to manipulate huge amounts of data, aggregate data from past and present research, and

democratize access to information. Computer power also makes it easy for those who know how to “game the system” for their own purposes. Fake news online is difficult to identify, its source is difficult to identify, and the means of making it stop are not yet known.

Information literacy focusing on social media and fake news appears to be the best option for allowing students, teachers, and the general public to avoid being taken in by those who create fake news. In the past, people were told, “Don’t believe everything you read in the newspaper.” More recently, people have been told, “Don’t believe everything you see on television.” Today the warning must be, “Don’t believe everything you see, hear, or read on social media.” Healthy skepticism and rigorous evaluation of sources—authors, publishers, and content—are key to avoiding fake news.

Notes

1. Justin Kruger and David Dunning, “Unskilled and Unaware of It: How Difficulties in Recognizing One’s Own Incompetence Lead to Inflated Self-assessment,” *Journal of Personality and Social Psychology* 77, no. 6 (1999): 1121–34.
2. Daniel T. Gilbert, “How Mental Systems Believe,” *American Psychologist* 46, no. 2 (1991): 107–19.
3. Tom Nichols, *The Death of Expertise: The Campaign against Established Knowledge and Why It Matters* (New York: Oxford University Press, 2017).
4. Michael S. Ayers and Lynne M. Reder, “A Theoretical Review of the Misinformation Effect: Predictions from an Actuation-Based Memory Model,” *Psychonomic Bulletin and Review* 5, no. 1 (2008): 1–21; Meital Balmas, “When Fake News Becomes Real: Combined Exposure to Multiple News Sources and Political Attitudes of Inefficacy, Alienation and Cynicism,” *Communication Research* 41, no. 3 (2014): 430–54; André Blais, Elisabeth Gidengil, Patrick Fournier, and Jiyoung Kim, “Political Judgments, Perceptions of Facts, and Partisan Effects,” *Electoral Studies* 29 (2010): 1–12; Prashant Bordia and Nicholas DiFonzo, “Psychological Motivations in Rumor Spread,” in *Rumor Mills: The Social Impact of Rumor and Legend*, ed. Gary Alan Fine, Veronique Campion-Vincent, and Chip Heath (Piscataway, NJ: Aldine Transactions, 2005), 87–101; R. Kelly Garrett, “Echo Chambers Online? Politically Motivated Selective

- Exposure among Internet News Users,” *Journal of Computer-Mediated Communication* 14 (2009): 265–85; Stephan Lewandowsky, Ullrich K. H. Ecker, Colleen M. Seifert, Norbert Schwarz, and John Cook, “Misinformation and Its Correction: Continued Influence and Successful Debiasing,” *Psychological Science in the Public Interest* 13, no. 3 (2012): 106–31; Michelle L. Meade and Henry L. Roediger III, “Explorations in the Social Contagion of Memory,” *Memory and Cognition* 30, no. 7 (2002): 995–1009; Danielle C. Polage, “Making Up History: False Memories of Fake News Stories,” *Europe’s Journal of Psychology* 8, no. 2 (2012): 245–50; Betsy Sparrow and Ljubica Chatman, “Social Cognition in the Internet Age: Same as It Ever Was?” *Psychological Inquiry* 24 (2013): 273–92; Adrian F. Ward, “Supernormal: How the Internet Is Changing Our Memories and Our Minds,” *Psychological Inquiry* 24 (2013): 341–48.
5. Tyler Omoth, “The Top 5 Job Skills That Employers Are Looking for in 2017,” TopResume, accessed September 7, 2017, <https://www.topresume.com/career-advice/the-top-5-job-skills-that-employers-are-looking-for-in-2017>; Susan Adams, “The 10 Skills Employers Most Want in 20-Something Employees,” *Forbes*, October 11, 2013, <https://www.forbes.com/sites/susanadams/2013/10/11/the-10-skills-employers-most-want-in-20-something-employees/#4a06d13a6330>.
 6. Gilbert, “How Mental Systems Believe.”
 7. Catherine Maloney, Sarah J. Lichtblau, Nadya Karppok, Carolyn Chou, and Anthony Arena-DeRosa, “Feline Reactions to Bearded Men,” *Improbable Research* (blog), accessed September 6, 2017, *Annals of Improbable Research*, www.improbable.com/airchives/classical/cat/cat.html.
 8. David Auerbach, “You Are What You Click: On Microtargeting,” *Nation*, February 13, 2013, <https://www.thenation.com/article/you-are-what-you-click-microtargeting/>; Nicholas Diakopoulos, “Rage against the Algorithms,” *Atlantic*, October 3, 2013, <https://www.theatlantic.com/technology/archive/2013/10/rage-against-the-algorithms/280255/>; Tarleton Gillespie, “The Relevance of Algorithms,” in *Media Technologies: Essays on Communication, Materiality and Society*, ed. Tarleton Gillespie, Pablo J. Boczkowski, and Kirsten A. Foot (Cambridge, MA: MIT Press, 2014), 167–94.
 9. Tony Haile, “What You Think You Know about the Web Is Wrong,” *Time.com*, March 9, 2014, <http://time.com/12933/what-you-think-you-know-about-the-web-is-wrong/>.

Notes

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