

Chapter 4

Information Ecosystems: Crafting and Curating Comprehensive Systems for Fact-finding and Fact-checking

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4.1 Introduction

The first ecosystems chapter and associated lectures begins with the exhortation, *carpe veritas*--seize the truth. That chapter emphasizes the importance of information in the thriving of humans and other creatures. Information facilitates the ability of organisms to secure life-giving materials and to avoid predators and other dangers. Thus, the chapter and lectures suggest that all life operates under an **information imperative**—the very nature of living organisms creates a need for information to promote thriving. As a result, all living creatures operate according to an imperative to gather information and utilize it in adaptive responses to the environment. This information imperative results in selective advantage for creatures with enhanced information gathering capacities. Thus, the first ecosystems chapter goes on to outline how evolutionary selection often functions to create creatures capable of employing ever more complex and efficient versions of what the chapter and lectures call **information ecosystems**. In humans, information ecosystems consist of sets of sources (senses, artifacts, places, organizations, and individuals) for gathering information, evaluating claims, estimating likelihoods, or pondering the adequacy of one's worldview. The previous (second ecosystems) chapter discusses the limitations and potential pitfalls of the solutions to information superabundance built into internet search and social media news feeds. That chapter then outlines the sorts of exploitive and cooptive strategies employed primarily by individuals in the current information era. Finally, the chapter discusses pro-social, anti-social, and intermediary strategies adopted by institutions and organizations for limiting or otherwise manipulating information flow.

This chapter and lectures switches from the cautionary to the proactive, forwarding concrete proposals about how best to create, maintain, and use a personal information ecosystem that maximizes benefits and minimizes dangers. Specifically, this chapter urges two interrelated approaches to gathering and evaluating information. First, one of the best ways for someone to accomplish the goal of information gathering and evaluation is to create, refine, and maintain a vibrant information ecosystem. Second, an effective critical thinker counts research skills among their set of critical thinking tools. Effective thinkers develop the skills and the infrastructure necessary to proactively find and verify information that augments, corrects, and renders their belief systems and worldview more consistent, systematic, and comprehensive.

4.2 Creating and Utilizing an Information Ecosystem

Given the important role of information seeking and information sharing in human thriving, a natural question arises; "how ought one to go about seeking and verifying information in the context of today's society?" Creating, refining, and regularly utilizing information ecosystem provides students with a powerful tool for gathering and verifying information in the context of contemporary society. One can think of an information ecosystem as an artificially augmented sensory system—an information gathering prosthesis. Thus, each element of an information ecosystem (ideally) provides its user with a reliable conduit for information just as sight, hearing, and touch provide people with reliable conduits for information. Likewise, an information ecosystem allows one to cross-validate sources and determine the veracity of information in much the same way one can use one's sense of touch to verify information from the visual system.

So, an information ecosystem consists of a set of sources (senses, artifacts, places, organizations, and individuals) one regularly consults to gather information, evaluate claims, estimate likelihoods, or when pondering the adequacy of one's belief systems and worldview. As noted in the last chapter, most people already have the seeds of an information ecosystem in the bookmarks of their browser, the favorites menu of their television, and their friends and family. However, such seeds can only serve as the basis from which the

inception of a robust information ecosystem springs. The critical thinker seeks to create and curate a robust and comprehensive information ecosystem—as opposed to a collection of bookmarks. Effective critical thinkers cultivate and regularly consult a systematic and integrated set of sources. One’s bookmarks, favorite channels, and acquaintances can serve as a starting point. However, one must develop, refine, and constantly recalibrate one’s information ecosystem. To expand the breadth and depth of one’s ecosystem one should perform searches, compare sources with friends, family, and teachers, as well as consult the sources and references of already existent ecosystem elements.

But, as noted in the last chapter, even one’s best efforts at ecosystem building cannot anticipate everything one might need in an ever-evolving and increasingly complex world. This chapter and lectures, therefore, emphasizes learning how to learn and how to research as essential and invaluable skills for the 21st century. For example, suppose that you wonder how solvent social security will be in 75 years. Where might you go to get such information? One place you might go is the social security website. There you can probably find the [2020 OASDI Trustees Report](#), a 276 page non-partisan report. If you don’t have enough interest to wade through 276 pages, you can probably find [the summary report on social security and medicare](#) annual report for 2020. If you want an even friendlier summary together with some analysis you can find the 2016 article by [Robert Pear](#) in the *New York Times* or [Drew Desilver’s](#) 2015 Pew Research Article or [Caitlin Emma’s](#) discussion of the impact of the pandemic on social security.¹⁻³ However, you likely won’t encounter any of these sources without some skill and experience in researching topics.

The HPV example from the last chapter and the above social security discussion illustrate how one ought to gain facility in seeking information on a case by case basis. However, one should also develop an information ecosystem. One can think of an information ecosystem as one’s personalized information infrastructure. It provides one with a basic set of sources for everyday discovery, fact-finding, and fact-checking. But, how ought one to go about creating an information ecosystem for oneself? This chapter and lectures suggest that one start by establishing a foundation of good sources. Friends, parents, professors, etc. not only serve as good potential sources, they also prove good sources for suggestions about other sources. Certainly a large part of one’s sources will come from the internet and other forms of popular media.

4.2.a Desirable Properties of Individual Elements of an Information Ecosystem

Our information ecosystems are human creations serving as artificial sensory systems. Contemporary ecosystems allow people to gather and verify information from all over the world and across the ages. These systems offer up their treasures through staggering variety of sources, and in an equally dazzling array of mediums. Clearly having an information ecosystem has tremendous benefits. But, what sort of properties ought the elements of one’s ecosystem to have? This chapter and associated lectures organize the discussion around two classes of properties: First, the exposition focuses on desirable properties for individual sources included in one’s information ecosystem. In other words, the discussion answers the question, “what properties should people seek in selecting individual sources for their ecosystems?” Second, the discussion turns to properties of the ecosystem overall. For example, one would like one’s ecosystem to include a diversity of media—many different kinds of individual sources such as newspapers, magazines, etc.. However, an individual element will not have the property of diversity of media in that it will be an instance of only one of these types. In other words, this second line of discussion answers the question, “what properties should an information ecosystem have besides some good individual sources?” Of course, some properties seem to

apply to both individual sources and to the system overall. For example, one would like the individual elements of one's ecosystem (sources) to exhibit reliability (accuracy), but an ecosystem composed of reliable individual sources will itself prove reliable.

4.2.a.1 Accuracy: Reliability, Integrity, and Their Counter-Tendencies

Recall that all the previous chapters suggest that one of the primary goals of critical thinking consists in the adoption of well-evinced, true, and relevant beliefs as well as the rejection of poorly-evinced, false, and irrelevant beliefs. An information ecosystem can prove invaluable to the development of a worldview containing well-evinced beliefs, but only if the information ecosystem contains reliable information sources. Thus, **accuracy** suggests itself as a first and obvious candidate property for the elements of one's ecosystem. Accurate information sources give one access to true and/or highly evinced information. However, the desirable sense of accuracy applies both to the current information as well as to the information source over many uses and across time. Thus, one ought to understand accuracy in terms of two dispositional properties. On the one hand, accurate sources exhibit **reliability**, or the tendency to deliver true and/or highly evinced information. On the other hand, accurate sources must also demonstrate **integrity**, or the commitment to reliability and transparency by the operators of the source. Reliable news sources consistently deliver true or highly evinced information. Integrity refers to the commitment of the information source to producing and distributing true and highly evinced information, as well as to openly correcting errors whenever they occur. Though reliability and integrity tend to correlate with each other, they need not always coincide. For instance, in difficult tasks like prediction a source may exhibit great integrity, but face real limits on potential reliability. NOAA estimates that long-term (6-10 day) weather forecasts, to take a case, are about 40% accurate.⁴ Likewise, when an information source produces a false, misleading, or poorly evinced report, their reaction to failure can provide important insight into their level of integrity.

One should try to develop a sense of the **integrity** of the news and information outlets in one's information ecosystem. Integrity, though essential in evaluating ecosystem sources, is neither absolute nor unchanging. Independent reporting and political blogs can break legitimate news, but they often fail to properly fact-check their reports and/or improperly distort the details to misrepresent the reality on the ground. The news outlets discussed in this section exhibit either isolated cases or prolonged periods of low accuracy, but they are not counterfeit news organizations. While presenting inaccurate reports and/or exhibiting bias, they do not necessarily intend to spread disinformation or propaganda. How ought one to determine a source's integrity? Reputation certainly helps—especially the appraisal of independent unbiased evaluators. For instance, have these sources won awards like the Pulitzer? However, one can often learn whether to trust what one reads or hears from a source based upon the information source's journalistic and/or self-monitoring practices as demonstrated over time. For example, versions of the following e-mail were widely circulated on the internet. The British newspaper, *The Daily Mail*,⁵ as well as FOX News⁶⁻⁹ reported the information in this e-mail as a news report, and many congress people, ex. Rep. Michele Bachmann (R. Minn.), cited FOX and other outlets in further propagating this false claim:

I have no first-hand [sic] knowledge of this, just passing along. I could not believe [sic] this was true (but had also heard it on the air, thought was hype), but when you Google it and read a number of sites, it does appear to be true. Tell him to stay there!!!

Just in case some of you don't follow current events as closely as I do (yes, I am a "news-junkie") you may have missed the following information since it never appears in our wonderful newspapers or on most TV news. The Barack Obama family is leaving tomorrow for a ten day trip to India. This is going to be an historical and incredible trip, mostly in the numbers of people going, costs, etc.

- 1) The entourage will include THREE THOUSAND people
- 2) FORTY aircraft will be making this trip
- 3) TWO marine helicopters are being dismantled, flown to India, put back together to fly the Obama's [sic] around the country
- 4) The entire 500 room Taj Mahal Hotel has been reserved for this group
- 5) Cost is estimated to be \$200 million PER DAY for ten days
- 6) Keep this in mind when you get the next notice of an increase in your taxes!!!

No one should ever wonder why taxpayers are angry about this type of extravagance while most citizens are struggling with day-to-day costs of living, etc.



Both Fact-check.org and Snopes debunked this story.^{10, 11} In actuality, this "story" first broke in the U.S. on blogs widely perceived as extremely partisan right-wing sites that lack journalistic integrity, like Breitbart.^{12, 13} The original source for this report was a rural Indian newspaper, the *Press Trust of India*. The *Press Trust of India* cited an unnamed Indian official as their source. The White House and the Department of Defense specifically denied the report, labeling it "absurd." To put the claims in perspective, the report claims the trip would cost 200 million dollars a day. However, at that time the US spent 178 million dollars a month to run the entire war in Afghanistan. 34 warships represent 10% of the entire US navy. No news outlets that reported this "story" cited a source, nor did they retract the story when its obvious falsity became clear.

FOX News has long had questionable status in the news industry as has Rupert Murdoch, who owns Fox News.¹⁴ Murdoch's British newspaper, *The News of the World*, gained international infamy when its practice of hacking phones and computers as well as bribing police officers were publically revealed. Though the paper spent years actively covering-up the practice, ultimately the scope of the scandal caused News Corp to shut down the paper, with several reporters, editors, and even lawyers arrested and charged. Investigations eventually revealed that *The News of The World* had hacked the phones of celebrities, politicians, the British Royal Family, several murdered schoolgirls, relatives of dead British soldiers, and victims of the 2005 bombings in London.¹⁵⁻¹⁷ The scandal also exposed the tremendous influence wielded by Murdoch in British politics. For instance, then British Prime Minister David Cameron hired former *News of the World* editor Andy Coulson as communications director after winning the election—with Murdoch's support. Many current and former British politicians testified regarding the influence of Murdoch on British politics.¹⁸ The British House of Commons report on the phone hacking concludes:¹⁹

On the basis of the facts and evidence before the Committee, we conclude that, if at all relevant times Rupert Murdoch did not take steps to become fully informed about phone-hacking, he turned a blind eye and exhibited wilful blindness to what was going on in his companies and publications. This

culture, we consider, permeated from the top throughout the organisation and speaks volumes about the lack of effective corporate governance at News Corporation and News International. We conclude, therefore, that Rupert Murdoch is not a fit person to exercise the stewardship of a major international company. (p.70)

Fox News' president until 2016, [Roger Ailes](#), spent nearly thirty years as a high-powered political consultant associated with many questionable campaign practices and political figures.²⁰ Indeed, Ailes began his consulting career with Nixon's 1968 campaign. Ailes built a highly profitable media outlet with high viewership. However, many kinds of criticisms of Fox News have emerged from many quarters. A 2010 [New York Times](#) article quotes Mathew Freud, Murdoch's son-in-law and a public relations executive, disparaging Ailes and Fox News:²¹

"I am by no means alone within the family or the company in being ashamed and sickened by Roger Ailes's horrendous and sustained disregard of the journalistic standards that News Corporation, its founder and every other global media business aspires to," said Matthew Freud....

Indeed, [Wikipedia](#) used to maintain two separate Fox News pages—pages Fox News has tried to edit.²² One page describes Fox News while a separate page details the many controversies around Fox News.²³ The controversy page provides a succinct summary of the numerous controversies. For instance, past studies indicate Fox News airs more than double the number stories containing personal opinions (68% of stories) than the next highest source, MSNBC (27% of stories),^{24, 25} exhibits higher levels of reporting bias,²⁶ exhibits high-level editorial bias,²⁷ and results in lower viewer knowledge of current issues.²⁸⁻³⁰ [Robert Greenwald](#) produced a highly critical documentary, [Outfoxed: Rupert Murdoch's War on Journalism](#), in 2004 that he distributed through the liberal public policy group [MoveOn.org](#). The documentary focuses on Murdoch and Fox News, covering many of the controversies with an explicit and well-defined negative slant.³¹⁻³³



(Left) Rupert Murdoch Adapted from [Salon](#). (Center) Roger Ailes adapted from [MediaBistro](#). Short version of John Stewart's [Daily Show](#) Response to Ailes' claim that Stewart told him he was a socialist. Click on image to play movie. Complete segment on [Youtube](#).

Fox News currently stands out as particularly suspect with regards to reliability and accuracy. However, maintaining high levels of factual accuracy poses a problem for any information generator--a large news organization and textbook authors alike. For instance, USA reporter [Jack Kelley](#) resigned in 2004 after it became clear that he had been falsifying stories for years.³⁴ The [New York Times](#) reported that the primary source for Kelley's 1999 (front page) *USA Today* article on Kosovo had explicitly contradicted many of the details in Kelley's article.³⁵ During his rise to associate editor [Stephen Randall Glass](#) fabricated material in some 21 of 47 articles he wrote for *The New Republic* before he was exposed and fired.³⁶⁻³⁸



Stephen Randall Glass who fabricated material in over 20 articles in *The New Republic*. From: Slate.com



Jack Kelley who falsified stories for years as a foreign correspondent for *USA Today*. From: The Washington Post

The response of an information source when it discovers errors in its reporting provides one with an important measure of that information source’s potential with regards to accuracy in the future. To their credit, USA Today did publish an apology and article on Kelley’s misdeeds as did The New Republic when Glass’ misdeeds came to light.^{37, 39} After a number of cases where Fox News created a [false impression](#) by using footage from other

times as part of a current story, the news channel issued a “[zero tolerance](#)” policy for such errors.^{40, 41} However, to the best of my knowledge, no reporter at FOX News has ever lost their job over misrepresentations and inaccuracies. [Media Matters](#) later [reported](#) how Fox failed to apply the policy in a



Video of Bret Baier’s retraction of his false and poorly sourced report. Click on image to view. From: Youtube

case where Fox clearly distorted poll results on global warming to get the false report that 94% of Americans thought it somewhat or very likely that scientists falsified research. The Fox numbers in this report added up to 120%--20% more Americans than actually exist!!^{42, 43} The Fox poll story followed their issuance of the “zero tolerance” policy by two weeks. Recently, FOX news anchor Bret Baier incorrectly reported on November 2nd 2016 that Hillary Clinton’s private server had been hacked by five foreign intelligence services and she was about to be indicted over her charitable foundation. Baier ultimately issued a retraction of his report in which he admitted that the story was poorly sourced,

but continued to stand by parts of the report.^{44, 45} Baier suffered no penalties from FOX news and continues to host Special Report with Bret Baier at Fox News. Fox News does not stand alone in failing to adequately address inaccuracies in their reporting.



Jessica Lynch receiving her Bronze Star, Prisoner of War Medal, and Purple Heart in 2003.



Donald Walters (1969-2003) From MSNBC

Another example of news reporting that proved nearly completely inaccurate comes from *The Washington Post*. I draw my details of this story primarily from Donald Campbell’s *Getting It Wrong* and Richard Lowry’s *Marines in the Garden of Eden*.^{46, 47} On March 23rd in 2003 a US convoy in Iraq made a wrong turn that led into Iraqi-held territory where Iraqi soldiers ambushed the convoy. The ambush ended with 11 US soldiers dead or dying and 6 others taken prisoner. One of the captured soldiers was 19 year-old, [Jessica Lynch](#), who had suffered severe injuries when her Humvee crashed during the ambush.⁴⁸ The Iraqis transported Lynch to Saddam Hussein Hospital.

Nine days later US forces staged a successful rescue operation. Two days after that operation *The Washington Post* published an article on Lynch and her rescue. The article portrayed Lynch as fighting even after sustaining multiple gunshot wounds. According to the story, Lynch fired her weapon until she ran out of ammunition. The article cited “U.S. Officials”; those individuals remain unidentified.

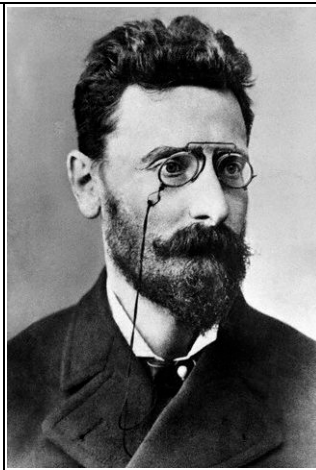
It turns out that Lynch, knocked unconscious and severely injured during the crash, had never fired her weapon or been shot. Researchers suspect that the actions attributed to Lynch were based upon hastily translated and confused battle communications. Lynch served her country admirably, still suffers the effects of her injuries, and received an honorable discharge. She now teaches school. It appears [Donald Walters](#), a cook with the 507th Maintenance Company and father of three young daughters, performed at least some of the selfless and heroic actions originally attributed to Lynch.⁴⁹ Walters apparently remained behind providing covering fire that allowed other soldiers to escape. In his book, *Marines in the Garden of Eden*, Richard Lowry tells readers that, “we know that he risked his life to save his comrades and was separated from the rest of the convoy, deep in enemy territory. We know that he fought until he could no longer resist.” (pp.134-5) In 2004 Walters was laid to rest and the army presented his wife with his posthumously awarded Purple Heart, Prisoner of War Medal, and Bronze Star. The Army later changed Walter’s Bronze Star to a Silver Star. Lynch and her parents denied the account in *The Washington Post* and requested people donate to charity and relief organizations rather than send her flowers. In 2007 Lynch testified before the [United States House Committee on Oversight and Government Reform](#) where she reiterated her denial of the original account of her actions.⁵⁰

The *Washington Post* eventually—ten weeks later—acknowledged the inaccuracy of their report. However, they did so only after the story had faded significantly from the minds of Americans and long after the actual events had become widely known. Moreover, the manner in which the *Washington Post* retracted their mistakes obscured that they had misreported and deflected blame for the factual errors towards others. According to Campbell:⁴⁶

The *Post* waited ten weeks before revising the Lynch story,[sic] doing so in a 5,500 word report that began on the front page and continued on two inside pages.[sic] The article’s first paragraphs were worded to suggest it was an update about Lynch and her slow recovery from serious injuries. But the article’s continuation on page 16 presented the embarrassing news... The *Post* acknowledged what by then was becoming widely known: Lynch “was neither shot nor stabbed.” ... The *Post* faulted the U.S. Military and the administration of President George W. Bush for failing to correct an error for which the *Post* was responsible. (p.150)

The Lynch episode represents an isolated failure at the Washington Post that most watchdogs view as an exception and not a rule. When news outlets fall into a pattern—as opposed to isolated cases—of poor journalistic practices without abandoning the pretense of journalistic standards, scholars categorize their work as **yellow journalism**. Historically, [William Randolph Hearst](#) and [Joseph Pulitzer](#) inspired the term “yellow journalism” through their practices—primarily in New York City during the 1890s.^{46, 51-54} **Yellow journalism** involves sensationalism—usually scandals or fear mongering—lavish imagery, and poorly documented, often false or misleading journalism. Yellow journalists and organizations spend parts of their careers as legitimate journalists and news organizations. They present themselves as having high accuracy standards, but show significant tendencies towards poor accuracy for significant periods of time—often to boost revenue. Historians assign Hearst, for example, a role in manipulating public sentiment in favor of the Spanish-American

War as well as for the prohibition on marijuana and commercial hemp.^{55, 56} In 1927 Hearst famously published fraudulent documents implicating Mexico in the 1912 Nicaraguan rebellion and U.S. invasion. Though the careers of both Pulitzer and Hearst display periods of poor journalistic practice, each man also



William Randolph Hearst
(1863-1951)
Adapted From old-picture.com

James Creelman
(1859-1915)
From Wikipedia

Joseph Pulitzer
(1847-1911)
From Wikipedia

made contributions to American journalism. Pulitzer produced a number of hard-hitting investigative reports, moved away from yellow journalism, and founded the Pulitzer Prizes.⁵² For instance, Pulitzer exposed an illegal forty million dollar payment made by the United States to buy shares of the Compagnie

Nouvelle du Canal de Panama as part of the Hay–Bunau-Varilla Treaty of 1903 (which granted the United States the control of the Panama Canal Zone). Hearst dramatically increased international news coverage in his papers. Ironically, Hearst’s proclivity for activist editorial policies has become enshrined in a what Donald Campbell argues is a sensationalist fabrication.^{46, 54} Hearst has long been associated—even in historian’s accounts—with perhaps the most infamous sound bite of yellow journalism—“You furnish the pictures—I’ll furnish the war.” The quote comes from a book by James Creelman, a former Hearst reporter in Cuba during the period prior to the outbreak of the Spanish-American War and is generally thought to be apocryphal.^{57, 58}

Often times critical thinkers can identify yellow journalism in cases of significant stories when other news organizations either do not report the story, report it a consistently different manner, or when other news organizations fail to independently confirm the reporting. Reporters and news organizations sometimes report a story before anyone else. For example, Jeffrey Goldberg recently broke a story titled, “Trump: Americans Who Died in War Are ‘Losers’ and ‘Suckers’.”⁵⁹ Goldberg’s story originally appeared as an isolated and sensational story. However, multiple news organizations soon published independent confirmation of many of Goldberg’s claims. Similarly, The Boston Globe published a shocking series entitled “Spotlight Investigation: Abuse in the Catholic Church” detailing sexual abuse and cover-ups within the Catholic Church.⁶⁰ Again, while the initial reporting appeared as isolated and sensational, multiple news organizations soon published independent confirmation. The newspaper won the Pulitzer Prize and several of the figures named in the reporting were ultimately convicted. Thus, major news stories may originate in isolation, but other news organizations will confirm and report stories that have a basis in fact. Conversely, stories that cannot be confirmed by other news organizations, are not reported by other news organizations, or are reported quite differently by multiple other news outlets are likely yellow journalism.

Because of the possibility of willful Jack-Kelley-like fraud, a typo, or some strain of yellow journalism one should always try to keep some fact-checking and debunking sites in one’s information ecosystem. Debunking sites also prove extremely useful when one gets information from e-mails, political campaigns, advertisements, etc.. Additionally, even generally reliable sources like the oft-linked Wikipedia can contain

some real whoopers. I, for instance, have found incorrect mathematical formulas, unsourced quotes, misquotes, and other inaccuracies on Wikipedia pages. Nevertheless, Wikipedia is now demonstrably on par with such professional encyclopedias as *Encyclopedia Britannica* in terms of accuracy. Wikipedia also has the distinction of being vastly more comprehensive. Wikipedia even maintains a page on their reliability.⁶¹⁻⁶⁷ To their credit, Wikipedia has implemented a series of editorial features to improve accuracy and help readers assess the quality of the information in a given page. Wikipedia also has initiated programs to broaden the scope of its articles and editors in order to internationalize its focus beyond the interests of the white males from North America and Europe who largely created and currently use it.^{65, 68} Even with these efforts by Wikipedia, students should use Wikipedia as well as other general information sources with appropriate care including consulting multiple other sources and fact-checking. Fact-checking sites tend to fall into two categories: Some sites, like factcheck.org, specialize primarily in political fact-checking. Other sites have a much more general focus, like [Snopes](http://Snopes.com). Even general sites tend to focus on urban legends and internet-based misinformation.

4.3.a.2 Fecundity

A news source exhibits **fecundity** if it provides more than just the bare facts. Importantly, a fecund news source provides unbiased context and/or analysis regarding the information it reports. Fecund sources not only report facts, they call one's attention to breaking news or trends and provide background (i.e., a larger or more appropriate context) on the news they report. A negative example illustrates my point: FOX News reported that President Obama's bus from his 2011 summer jobs tour had been made in Canada. The Fox News report suggested that the President's summer jobs tour represented a bit of disingenuous politicking. After all, how could the president travel around the country arguing for a jobs program on a bus made in a foreign country by foreign workers?! However, FOX News did not report relevant background information about the story. For instance, the reporters of Fox News failed to point out that the secret service bought the bus—the president had no input into the decision. FOX also failed to point out that President Bush's bus came from Canada as well and that the 2012 Republican presidential candidate would also ride a Canadian-made bus during the election. In this instance, Fox News failed to exhibit fecundity in that their reporting did not include important contextual elements that would aid people in understanding the significance of the information in their report. Furthermore, the Fox News analysis, that is, the interpretation of the facts included in their report, proved woefully inaccurate. A fecund news source provides information consumers with accurate analysis and relevant contextual information allowing consumers to understand the significance of the facts reported. Fecund news sources often also provide people with information about likely future developments. In this way a fecund news source allows one to anticipate how the world will likely unfold. For instance, a fecund story on a potential covid-19 vaccine will likely include current vaccine candidates, a realistic timeline for development and approval, expert estimates of the potential safety of such vaccines, expert estimates of immunity conferred by such vaccines, likely length of conferred immunity, etc..

An important feature of a fecund source consists in the relationship between what information it presents to consumers and what it does not. As we will see repeatedly throughout the course, cognizers must always balance the benefits of additional information against the difficulties that added information poses to effective reasoning, remembering, and decision making. One cannot remember everything about every tiger one has seen. Nor can one search through all that information for relevant bits in a timely and efficient manner. "I once saw a tiger with 32 black stripes," proves of little use when a tiger is running towards you. In

contrast, accessing the generalization that “tigers are dangerous,” may well prove the difference between living another day and a painful death.

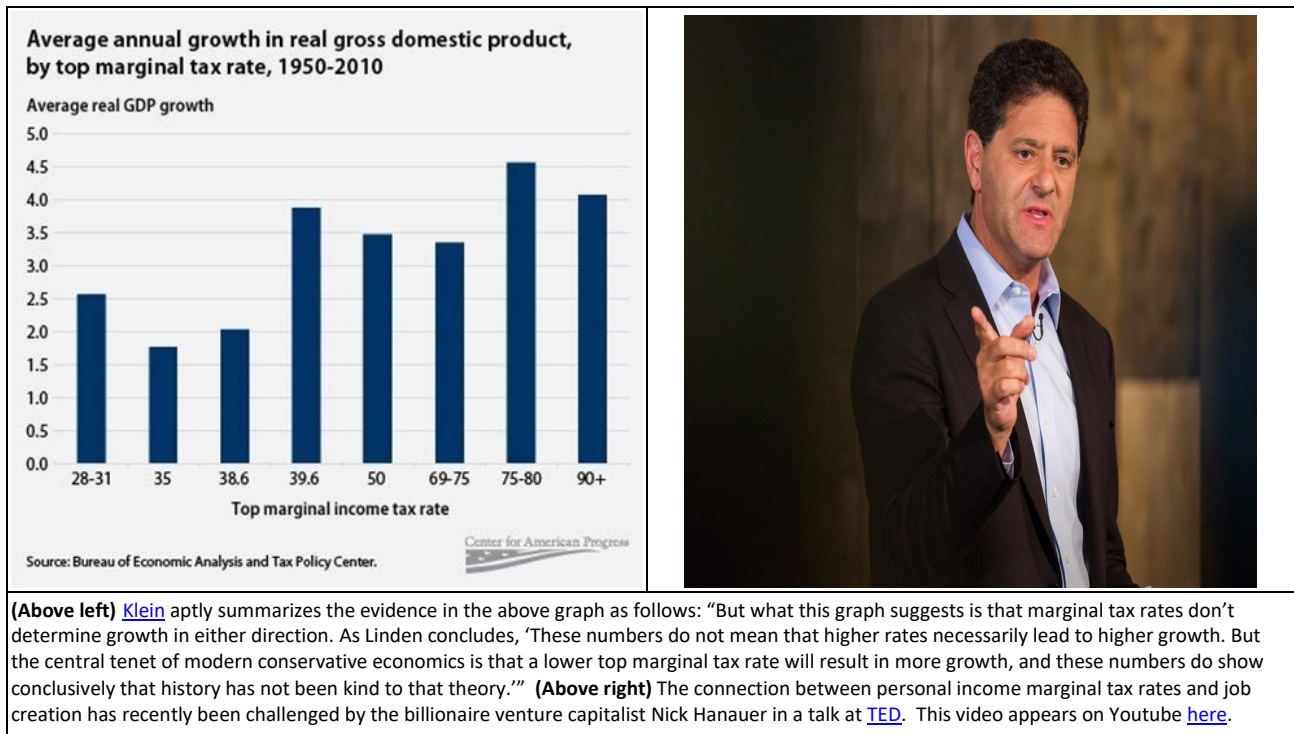
While one does not want information sources burying readers in an avalanche of minutia, contemporary sources have come to exhibit an undesirable degree of homogeneity and narrowness of focus. The Pew Research Center’s 2008 Executive Summary of their *State of the Media Report* expresses the worrisome dimensions of this problem as follows:⁶⁹

The agenda of the American news media continues to narrow, not broaden. ... A comprehensive audit of coverage shows that in 2007, two overriding stories — the war in Iraq and the 2008 campaign — filled more than a quarter of the newshole and seemed to consume much of the media’s energy and resources. And what wasn’t covered was in many ways as notable as what was. Other than Iraq — and to a lesser degree Pakistan and Iran — there was minimal coverage of events overseas, some of which directly involved U.S. interests, blood and treasure. At the same time, consider the list of the domestic issues that each filled less than a single percent of the newshole: education, race, religion, transportation, the legal system, housing, drug trafficking, gun control, welfare, Social Security, aging, labor, abortion and more. A related trait is a tendency to move on from stories quickly. On breaking news events — the Virginia Tech massacre or the Minneapolis bridge collapse were among the biggest — the media flooded the zone but then quickly dropped underlying story lines about school safety and aging infrastructure. And newer media seem to have an even narrower peripheral vision than older media. Cable news, talk radio (and also blogs) tend to seize on top stories (often polarizing ones) and amplify them. The Internet offers the promise of assoregating ever more sources, but its value still depends on what those originating sources are providing. Even as the media world has fragmented into more outlets and options, reporting resources have shrunk. (p.4)

In addition to an ever decreasing focus, many politicians and even journalists misrepresent the facts or reveal only part of the facts as part of a grossly manipulative, selfish, cynical, and tremendously profitable pretext. For example, during the course of 2010 and 2011 many politicians and commentators deplored the idea of allowing the highest marginal tax rates—the rates on income exceeding \$178,650—to return to the levels of the Clinton presidency. These individuals often buttressed their opposition by arguing that taxing incomes in excess of \$178,650 at a higher rate kills job creation. How do these taxes kill jobs? People with incomes in excess of \$178,650 create the vast majority of jobs—they are “job creators.” Allowing tax policy to concentrate wealth in the hands of these job creators, the argument goes, results in their creating jobs. In other words, the theory supposes something like the hypothesis that these people act according to the rule, “I have more money. I should create some more jobs.”

I personally find it highly implausible that giving a very small number of very wealthy individuals more money will motivate them to create jobs regardless of economic conditions or the ability of average consumers to buy their products. But, what facts might one consider in evaluating the job creator argument? One plausible set of facts one might consult is the historical data about the relationship between marginal tax rates and gross domestic product (GDP) rates. GDP measures how much wealth a country produces. If taxing the wealthiest Americans by implementing a higher marginal tax rate on their income in excess of \$178,650 kills jobs, such a tax rate should also negatively impact GDP in that less wealth production results from fewer people working.

The box (below) contains a convenient summary table indicating the relationship—rather, the lack of relationship--between the top marginal tax rates and the growth of real GDP between 1950 and 2010 that



(Above left) Klein aptly summarizes the evidence in the above graph as follows: “But what this graph suggests is that marginal tax rates don’t determine growth in either direction. As Linden concludes, “These numbers do not mean that higher rates necessarily lead to higher growth. But the central tenet of modern conservative economics is that a lower top marginal tax rate will result in more growth, and these numbers do show conclusively that history has not been kind to that theory.” (Above right) The connection between personal income marginal tax rates and job creation has recently been challenged by the billionaire venture capitalist Nick Hanauer in a talk at TED. This video appears on Youtube here.

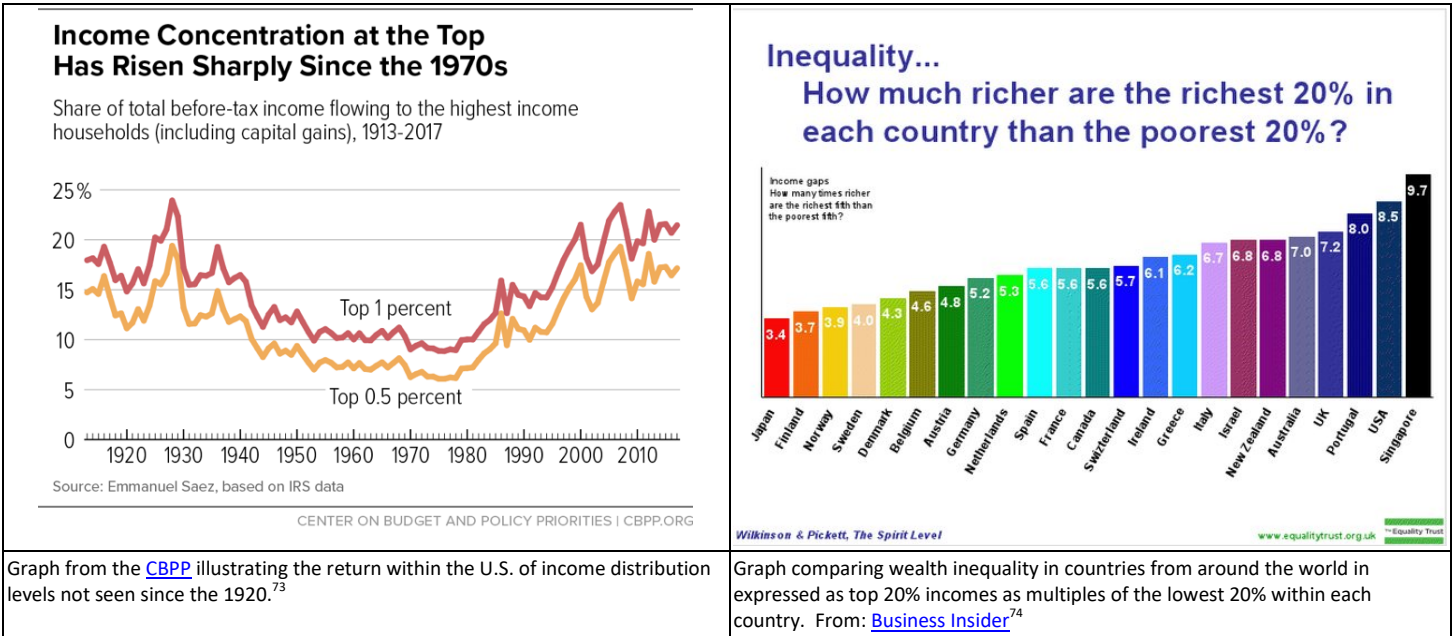
appears in an article by Ezra Klein.⁷⁰ Michael Linden at the Center for American Progress created the chart based upon numbers from the US Bureau of Economic Analysis and the Tax Policy Center.^{71, 72} The graph indicates that over a 60 year period the average real GDP growth has not fallen during periods of high marginal tax rates. Importantly, the GDP has NOT increased during periods of low marginal tax rates. If any relationship exists between top marginal tax rates and GDP growth, higher marginal tax rates appear to correlate with greater GDP growth. Of course other factors affect the GDP numbers, but a complete failure of the data to suggest low marginal taxes rates result in higher GDP over a 60 year period suggests, at the very least, that marginal taxes rates on wealthy Americans impact employment little if any.

What did the numerous news organizations, commentators, and politicians make of this lack of relationship in GDP-to-tax-rate data? Unfortunately, and I cannot recall a single news organization, commentator, or politician during this time who acknowledged and/or address the facts about the relationship between the highest marginal tax rates and the gross domestic product (GDP), nor did those espousing the position that marginal tax rates should not increase address GDP data. Perhaps all of these individuals simply did not know of these commonly available, easily accessible, and obviously relevant facts. Perhaps they had an account of why their view retained plausibility given the facts. I can’t say. However, the failure of those politicians, news organizations, and commentators to address this data in articulating and defending their views represents an excellent reason to stop listening to them, voting for them, etc.. One certainly ought to take any policy recommendations and/or views from these people with a high degree of skepticism.

Venture capitalist Nick Hanauer voices a similar skepticism (above) regarding the notion that decreasing personal marginal taxes on very high income individuals creates jobs. Instead, Hanauer offers an alternative account of the engine of job-creation in capitalist societies. Hanauer suggests that job creation occurs when demand for products forces business to add workers to meet demand. Hanauer suggests that demand is not created by concentrating wealth. Rather, demand comes from large numbers of people having enough money to spend on products. As Hanauer notes, he makes hundreds or thousands of times as much as a middle-class

worker—yet he does not, for example, buy hundreds or thousands of pairs of jeans, hundreds of houses, thousands of cars, etc.. As a result, increasing the post-tax income of large numbers of people allows them to buy the jeans, houses, cars, and etc. that Hanauer and his fellow billionaires simply do not need and do not buy.

I must make one last point for the sake of this text’s fecundity. In thinking of tax policy, one ought to consider

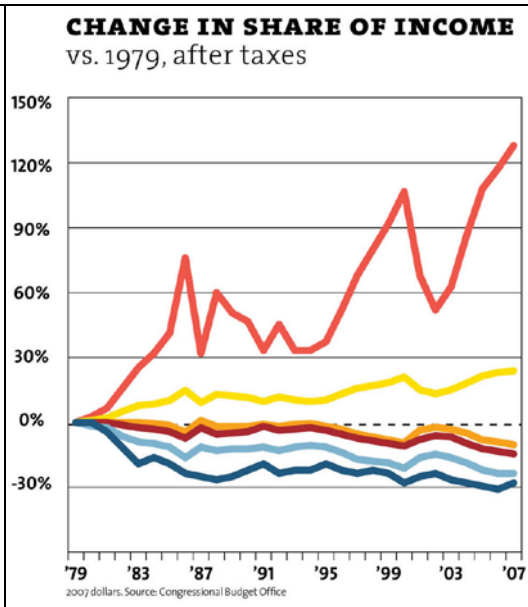
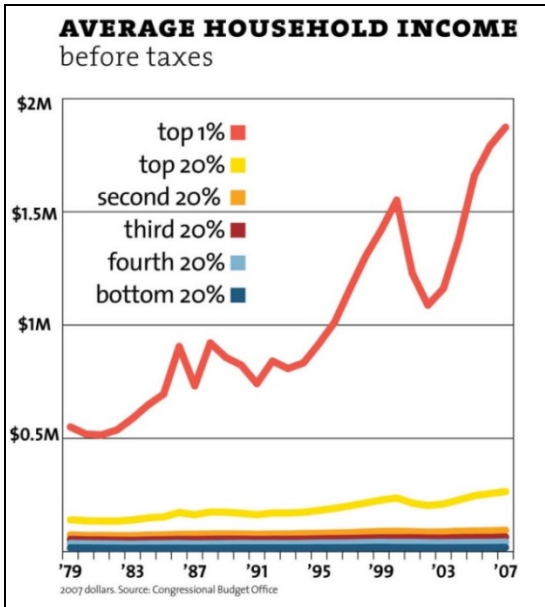


Graph from the [CBPP](#) illustrating the return within the U.S. of income distribution levels not seen since the 1920.⁷³

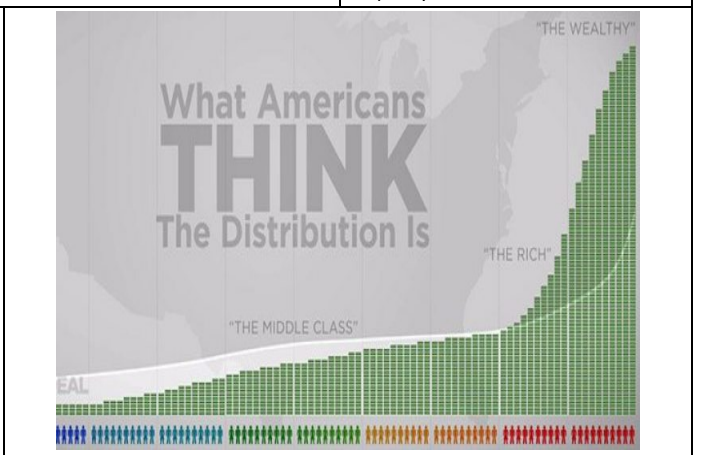
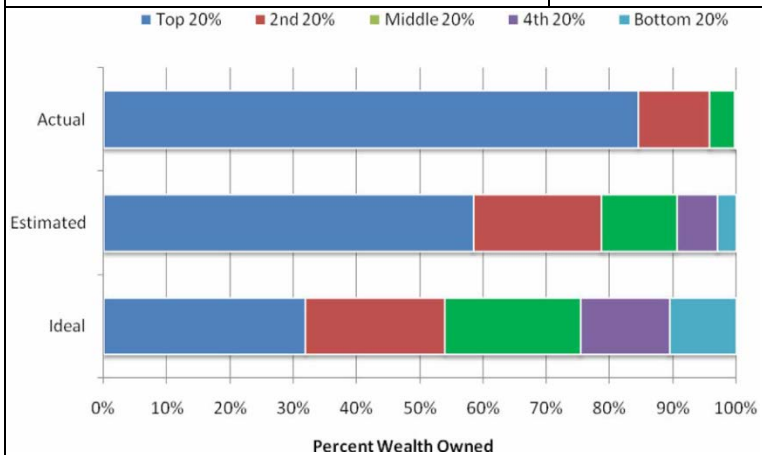
Graph comparing wealth inequality in countries from around the world in expressed as top 20% incomes as multiples of the lowest 20% within each country. From: [Business Insider](#)⁷⁴

the impact of tax policy on real people. So, besides GDP, one ought to consider the impact of statutory marginal tax rates on measures like household income and percentage of national wealth. The data regarding household income and wealth indicate a clear and undeniable relationship; lowering the top marginal rates has contributed to the greatest disparity of wealth and income in the history of the United States.⁷⁵⁻⁸⁰ In above left graph one can see the impact of the Reagan administration’s [Economic Recovery Tax Act of 1981](#), which lowered the top personal margin tax rate from 70% to 50% and decreased the highest Capital Gains Tax rate from 28% to 20%. This dramatic increase in before tax income further accelerates after the [Tax Reform Act of 1986](#), which cut the highest personal income tax rate from 50% to 38.5% and ultimately to the top marginal income tax rate of 35% and top capital gains tax of 15% we have today.^{81, 82} The top right graph places wealth disparity in the United States in the larger context of the rest of the world, which has also seen increasing wealth disparity.

Certainly, lowering the top marginal and capital gains taxes has immediately preceded and correlates with this phenomenon of excessive wealth disparity. Additionally, the disparity between white Americans and Americans of other ethnicities has also grown to levels higher than in the 1960s.⁷⁸⁻⁸⁰ The table (below) provides helpful charts tracing (1) changes in wealth from 1979-2007, (2) changes in income from 1979-2007, and (3) the divergence between the facts, people’s perception of the facts, and their view about what levels would be appropriate. This data indicates that Americans tend to underestimate wealth disparity. Even with this underestimation, however, Americans still find that their lower estimates exceed the level of wealth disparity that they find ideal or acceptable.



(Top Left) Chart diagramming average household income according to income class from 1979. Note: Period from 1999 to 2003 corresponds to the Clinton tax increases and the period of greatest economic expansion during his presidency. The period from 2003 until 2007 corresponds to the Bush tax cuts and the relatively stagnant economy prior to the economic collapse in 2008. (Top Right) The percentage of share of income for each income class from 1979 to 2007. Both of the above charts come from [Mother Jones](#) with a plethora of interesting charts created from Congressional Budget Office Data.⁸³ (Bottom Left) Results of a Harvard business school poll of Americans about income equality included in a [2011 paper](#) on the topic.⁸⁴ (Bottom Right) A 2012 video from [Politizane](#) that discusses the wealth inequality data.



Fecund sources provide more than just the bare facts. Such news sources provide unbiased, relevant, accurate, and insightful context and/or analysis regarding the information they report. Fecund sources not only report facts, they call one's attention to breaking news, to trends, and to relevant unbiased background information. Fecund information sources, likewise, help one to understand how best to use information in one's decisions and expectations for the future. The value of such sources consists in their helping one to assess the significance of events, differentiating isolated events from trends, and anticipating potential future developments, and the unbiased nature of background information.

4.2.a.2.a Creating an Information Ecosystem Rich in Fecund Sources

How ought one to try to create an ecosystem rich in fecund sources? One strategy mixes primary news sources, aggregators—especially news aggregators—together with opinion and analysis sources. As the Pew quote above indicates, the number of primary news sources has steadily declined during the last thirty years. **Primary news sources** investigate and generate their own content. Such efforts prove expensive, while hiring a bunch of "talking heads" or using the material generated from other sources proves much less expensive. Indeed, Hearst invested a great deal of money in generating content—especially international content. Thus, primary sources prove crucial, not just to the overall fecundity of one's personal ecosystem, but to the overall health of information gathering.

One can find an excellent example of content generators that have fallen silent in free weekly free newspapers. When I was a graduate student weekly free newspapers provided readers with movie times, live music information, etc.. But, people like myself could find wedged in between the ads, show times, horoscopes, etc., a treasure-trove of well-researched, articulate, and thoughtful investigative news articles on local, regional, and even national topics. These articles tended to focus upon topics outside the normal purview of the mass media—making them invaluable. Sadly, large corporations began to buy these free weekly papers in the eighties and nineties. As these ad-powered journalistic labs fell under the umbrella of big business their investigative efforts withered under a corporate model that maximizes profits with minimal investment. This “don’t hunt heartache—chase profits” mentality, while quite natural from a business perspective, disincentivizes the investment in investigative journalism—even the relatively emaciated incentives supplied by free papers. If students wish to get a sense of how such free weeklies once worked, I suggest they consult one of the last bastions of such papers—the [Village Voice](#). When I checked the Voice I found it was running an article by iconic Voice journalist Nat Hentoff rebutting the decades-old common wisdom that its refusal to sell itself to big media meant it was dead for sure. Even so, *The Village Voice* announced on August 22, 2017 that it would cease publishing print editions.⁸⁵

In addition to primary sources, **news aggregators** allow one to find an often eclectic (and just as often uninspired) collection of the various media outlets. Aggregation sites, such as Yahoo News and Google News collect and link to news posted across the internet, but primarily from online newspapers, magazines and blogs. Google, Apple, and the Associated Press also have news aggregator phone apps that compete with apps like Feedly and Smart News. News aggregators rarely, if ever, generate content—they simply crawl the web and centralize their results. Some news aggregators collect general information, others focus on particular topics. As noted in the first ecosystems chapter, one common trend emerging in technology involves meta-analysis of vast swaths of data. Sites collect and analyze data such as sites visited before you came, what you click on, and where you go next. These data crunching AI systems help companies and individuals spot trends, target ads, and present visitors with products, news, ads, etc. that appeal to them. An article by Steve Lohr on this very trend appeared in the [New York Times](#) during the 2012 revision of this chapter.⁸⁶ Data collection and meta-analysis technology raises red flags for many people in that it encroaches even further upon the vanishing frontier of person privacy and threatens manipulation and exploitation of Orwell-Meets-Standard-Oil proportions. These seem like real concerns, but Lohr and most others have missed another troubling aspect of such trends—such practices must somehow navigate between the collateral results of a tyranny of the masses and a tyranny of one’s own egoistic perspective. “Tyranny” might conjure images of conspiracy and repression, but this phenomenon involves no ill-intent. Consider an example: Pandora and Netflix are truly terrible at suggesting songs and movies I will like. The Yahoo News crawler rarely presents me with a story I really want to read. Why? I’m not very typical. I’m not special. I just differ in, for instance, my information seeking goals from many Americans. I also go to some length to minimize my personal tracking patterns. Thus, as these cloud-based meta-analysis programs grow in their impact and scope, I increasingly find news aggregators focusing upon those articles and topics that other people find interesting. The net result, in the best case scenario, finds me having to search longer and finding fewer articles that reflect my interests.

Finally, as demographics and meta-analysis continue to shape information sources within the internet and across other media all sources, current trends will likely continue. That is, information outlets will likely

continue to focus upon a small number of issues and areas. The current trend towards creating information presentations designed to appeal to people's perspectives will likely continue. Information outlets probably will continue to devote relatively low proportions of their resources to the sorts of investigation and source checking necessary for news creation. Such developments increase the potential for false, misleading claims as well as an ever increasing number of uncovered, yet important stories. These developments make cultivating a suite of independent, non-partisan fact-checking sources together with fecund sources increasingly important.

4.2.b Desirable Properties for an Information Ecosystem

So, the information sources within one's ecosystem ought to exhibit fecundity as well as the dual aspects reliability and integrity that together compose accuracy. Is it enough to collect some accurate and fecund information sources? Absolutely not! What properties ought a good information ecosystem to possess? I suggest three properties; scope, limited slant, and diversity of media.

4.2.b.1 Scope

One important property of a good information ecosystem consists in a large scope. Specifically, an information ecosystem with a large scope contains sources providing information on a wide variety of topics. Thus, a good information ecosystem provides one with the resources to gather information or check facts regarding topics as diverse as world politics and human anatomy. Similarly, different information sources have different specialties, different standards, and different timelines. An information ecosystem with a large scope contains a diverse set of sources so as to take advantage of their different specialties, standards, and timelines.

Competent, literate thinkers and decision makers actively and regularly inform themselves on a range of important topics. Ignorance, like that which led a vice presidential candidate Sarah Palin to classify Africa as a country,^{87, 88} arguably represents a potential danger to oneself and to others. Some topics simply prove too important for one to ignore; one's information ecosystem needs to have sufficient resources to facilitate a good breadth and depth of knowledge—resources that the owner regularly taps. Information ecosystems that allow their users to develop and maintain a great depth and breadth of knowledge exhibit a large scope. Ultimately, each person must choose their topics, but I urge all students to regularly inform themselves about history, law, science and medicine, politics, economics and finance, as well as current world, national and local events.

One can find a poignant illustration of how informing oneself about world events can greatly affect one's life and future in the earlier discussion of SOPA and PIPA. As noted above, the House and Senate backed away from these bills after public outcry. Even better, the FCC ruled to classify internet service providers as telecommunications services and the federal appeals courts upheld that ruling. End of story, right? Not so fast. Take another iteration of this story: By reading about world events one can learn that efforts to end net neutrality like those in SOPA and PIPA live on. The same mechanisms that would impinge upon net neutrality in SOPA and PIPA have found their way into much less visible international treaties signed by the United States. These treaties may well become international law. According to a [New York Times](#) article:⁸⁹

The European activists are hoping to use similar pressure to stop the international [Anti-Counterfeiting Trade Agreement](#), or ACTA, which is meant to clamp down on illegal commerce in copyrighted and

trademarked goods. Opponents say that it will erode Internet freedom and stifle innovation. About 1.5 million people have signed a [Web petition](#) calling for the European Parliament to reject ACTA, which some say is merely SOPA and PIPA on an international level.

The article goes on to note that the US signed on to ACTA in 2011, and that ACTA does not need ratification by the US to become international law—a law governing the US and its citizens. Similar worries surrounded the TPP trade agreement; though discussions in the 2016 election cycle rarely mentioned it. As a result, reading about technology and politics can reveal issues that affect one’s life and thereby provide one with a means of preventing harm and cultivating benefits in one’s everyday life.

Consider another example: If more Americans had a deeper and broader knowledge of the history of the United States, they would know that for a very long period only older, white, land-owning, men determined the fate of everyone in the country through voting.⁹⁰⁻⁹² For example, Donald Ratcliffe reports that in 1790, “[North Carolina and New York] lowered the requirements to vote in a house election but retained the earlier property qualification for the upper house: 50 acres in the former, £100 freehold in the latter.”⁹² (p.229) Indeed, Alexander Keyssar notes:⁹¹

Until the 1960s most African Americans could not vote in the South. Women were barred from voting in a majority of jurisdictions until 1920. For many years, Asian immigrants were disfranchised because they could not become citizens, and Native Americans lacked the right to vote far more often than they possessed it. In the early nineteenth century, moreover, states generally granted the franchise only to property owners, and well into the twentieth century paupers often were prohibited from voting. The list could, does, and (in later chapters) will go on: for much of American history, the right to vote has been far from universal. (p.XVI)

Such context potentially puts recent legislation requiring various forms of voter identification in a quite different light.⁹³⁻⁹⁷ Voting rights are granted both through the constitution (Federal) and through state laws and constitutions. Historically, the constitution did not grant most United States citizens suffrage (the right to vote) at the federal level during nearly the first hundred years of its existence. The [15th amendment](#) extended suffrage (at least in principle) to male adult citizens of other ethnicities by prohibiting the denial of voting rights on the basis of “race, color, or previous condition of servitude” in 1870.⁹⁸ Women’s suffrage had to wait until the [19th amendment](#) passed in 1920 making the United States the 26th nation to legalize women’s suffrage!^{99, 100} Votes on a women’s suffrage amendment (the 19th amendment) failed in 1915, 1918 (twice), and 1919. Finally, in May 1919 the measure passed. By the summer of 1920 Tennessee’s ratification gave the nineteenth amendment the necessary 36 states, and it was added to the constitution.

Even today people seek to disenfranchise groups of people from voting through enacting legislation just as people did between 1870 and 1967 with laws often collectively known as “Jim Crow Laws.”¹⁰¹⁻¹⁰⁶ Many people think of Jim Crow Laws as referring to a small number of laws, passed by a small number of states, and affecting only people of African-American descent. However, I suggest that one consider a wider definition of Jim Crow laws including all laws defined by their general intent—to deprive a class or classes of people the civil rights and the opportunities provided to other citizens—and not in terms the historical reference. Likewise, I encourage students to consider the view that these laws are part of a wider history of institutionalized racism, sexism, and classism affecting many ethnicities, women, as well as the less affluent. Though often portrayed as southern laws aimed against African Americans, 41 states had laws segregating, denying voting rights, and prohibiting or restricting interracial marriage.¹⁰⁷ These laws applied to African Americans, Native Americans,



Video of Clinton discussing recent voting laws while addressing the [Campus Progress National Conference](#). From: [CPNC](#)

Asians, and/or Hispanics. For instance, Arizona passed a law declaring illegal and void all marriages between whites and "Negroes, Mulattoes, Indians, Mongolians." In 1870 California passed a law mandating that African Americans and Native Americans attend separate schools. The [California constitution](#) was amended in 1879 to prohibit the hiring of Chinese people by corporations or public works. Additionally, the constitution denied voting rights to all Chinese people living in California regardless of citizenship, prohibited them from contracting for their labor, banned the immigration of Chinese people (specifically, they could not be "imported"), and imposed

restrictions on their residency.¹⁰⁸

Former President Clinton recently spoke out (above) about this renewed trend of states passing laws making it more difficult to vote. Similarly, U.S. courts have struck down several voter ID laws because they place undue burden on the voter or selectively disadvantage certain classes of people.¹⁰⁹⁻¹¹¹ The state of Alabama, for example, passed an ID law and then closed every driver's license bureau in a county in which 75 percent or more of registered voters were African-Americans. In all, only 2 of 10 counties with the highest percentages of nonwhite voters retained a driver's license bureau.¹¹² Students interested in the state of voter rights and voter ID laws might begin with the [Wikipedia](#) page on the topic.¹¹³ If one believes that the United States is the greatest democracy in the world, for instance, one needs to recognize the bitter and violent truth about voting rights in the United States. If one values voting rights, then in order to avoid falling back into the less democratic past one needs to recognize the historic denial of voting rights, the repeated attacks on voting rights, and the groups that were historically disenfranchised. Voting and protecting voting rights represents not only a necessary service to the country—it honors the sacrifices of those who gave their time and even their lives to protect and expand this right.

In summary, information and information seeking not only makes one aware of current and past events, it allows one to see current events in perspective; it relates events to one's values and the likely effects of events on oneself, one's state, one's nation, and the world. One ought to craft ecosystems that provide the resources to gather information or check facts regarding topics as diverse as the difference between statutory and effective tax rate and the artistic influences of Pablo Picasso. Likewise, an information ecosystem with a large scope contains a diverse set of sources covering an equally diverse set of topics so as to take advantage of their different specialties, editorial standards, ownership, and timelines.

4.2.b.2 Limited Slant

Since one creates an information ecosystem as a tool for oneself, it will naturally contain a certain slant. More conservative individuals will likely develop information ecosystems with a conservative slant. Likewise, more liberal individuals will likely develop information ecosystems with the liberal slant. People who like science will have an information ecosystem with more sources about scientific discoveries and theories. People who like technology and gadgets will have more sources about these topics. Sports enthusiasts will have more sources providing them with information about developments in sports. Having a slant proves desirable in an information ecosystem just as modifying one's phone by downloading apps can enhance its usefulness by customizing its capabilities to its user. However, as the discussion of personalization in the last chapter

indicated—when it comes to slant, we all live in danger of having too much of a good thing. Students should actively cultivate quality sources with alternative perspectives including alternative political, religious, and policy views as well as international news sources.

4.2.b.3 Alternative Perspectives: Countering Confirmation Bias, Belief Perseverance, and the Rebound Effect

I strongly encourage students to make a conscientious effort include sources in their information ecosystem that provide them with alternative perspectives and worldviews. One reason why one should strive to include information sources with alternative slants in one's information ecosystem consists in the potential of such sources to temper biases in how human beings gather and process information. Over millions of years the human brain has developed to exhibit innate dispositions that determine how humans process information. Psychologists refer to one of these innate dispositions of human information processing as “confirmation bias” (also called “confirmatory bias” and “myside bias”).¹¹⁴ **Confirmation bias** works to shape how humans gather, remember, and utilize information. Specifically, human beings exhibit confirmation bias when they preferentially seek out or interpret information confirming their existing or potential attitudes or beliefs. One can think of confirmation bias as serving a useful purpose insofar as it leads someone to look for information that will provide additional evidence for their beliefs. Nevertheless, confirmation bias also acts to reinforce one's beliefs—even in the face of strong disconfirming evidence. For instance, Robert Carroll gives a nice example of confirmation bias in the [skeptic's dictionary](#). Carroll notes that many psychic researchers have adopted a practice of letting the psychic or the experimenter decide when the trials for an experiment start and stop. As Carroll notes,¹¹⁵

In many tests of psychic powers the subject is allowed to start or stop whenever he or she feels like it. For example, the subject may go through some warm-ups trying to psychically receive numbers or Zener card icons being psychically transmitted by another person. The responses of the warm-ups are recorded, however, and if they look good (i.e., seem to be better than would be expected by chance) then the responses are counted in the experimental data. If not, then the data is discarded. Likewise, if the psychic has had a good run at guessing numbers of card suits and starts to have a bad run, he can call it quits.

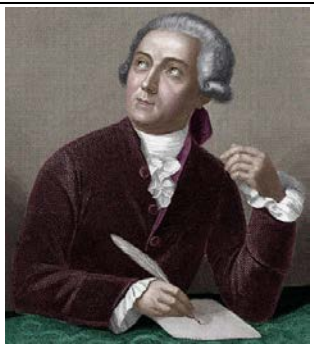
In other words, the optional start/stop allows a researcher, even a conscientious researcher, to bias the results of an experiment either for or against psychic powers. How could this happen? It's easy. Optional start/stop allows the experimenter or subject, in effect, to choose the data that counts as evidence for or against psychic powers. Indeed, concerns about the bias of the experimenter or subject affecting data prompted the introduction of “blind studies.” In blind studies the experimenter, the subjects, or both do not know, for instance, whether an individual subject is getting the medication or an inert substance.

One can find a less rarified example of confirmation bias in the lasting impact of first impressions. If someone comes off as, say, racist when you first meet them, you might look for more evidence of their racism in future encounters. You might interpret their actions and what they say in light of your suspicion. You are not nearly so likely to look for evidence that would disconfirm your suspicions.



Joseph Priestley
(1733-1804)

Adapted from [Wikipedia](#)



Antoine Lavoisier
(1743-1794)

Adapted from [Sciencephoto.com](#)

Similarly, **belief perseverance** names a human tendency to resist changing beliefs or modifying the confidence assigned to a belief once that belief has been formed. A nice example of belief preference comes from the history of science. [Joseph Priestly](#) was a gifted scientist who discovered (isolated) what we now call oxygen in 1774, publishing the first paper on it in 1776.¹¹⁶ However, Priestly held that the gas was "dephlogisticated air"—air that had no phlogiston. [Phlogiston theory](#), a common theory at the time held that combustion released a substance, phlogiston, from combustible

materials.¹¹⁷ Phlogiston literally means “fire stuff.” A controversy arose when a French chemist named [Antoine Lavoisier](#) published *Réflexions Sur le Phlogistique Pour Servir de Suite à la Théorie de la Combustion et de la Calcination* in 1777.^{118, 119}

Lavoisier’s article marshals a body of evidence against the idea of phlogiston and in favor of oxygen. Lavoisier held that combustion resulted from oxygen binding to the burning material—not phlogiston leaving it. One important bit of data that surfaced was that the products of combustion had a greater mass than the original material. Evidence against phlogiston theory continued to mount, yet Priestly never accepted oxygen theory. He perseverated in his belief in phlogiston theory.

In a more modern setting, Politico published an article in 2019 on the first day of impeachment hearings reporting that 62% ± 2% of Americans in their poll reported that there was “no chance” they would change their minds about the impeachment of President Trump.¹²⁰ Only 10% ± 2% report that there was a “strong” or “some” chance they would change their view. This poll suggests that any facts, exculpatory or incriminating, reported and/or discovered during the hearing would not impact the beliefs of a majority of Americans. The article also noted that polls had shown little change in public sentiment since Speaker Pelosi announced the inquiry in September. Politico polls reported 50% ±2% supported the inquiry in early October and 44% ±2% opposed it, while 50% ±2% supported the inquiry in mid-November and 41% ±2% opposed it.

What ought one to do to combat the potentially cognitively toxic cycle of preferentially seeking out evidence that confirms your views and discounting the evidential value of new data after one forms one’s initial impression? This chapter recommends exposing oneself to sources with high levels of accuracy and fecundity but of different slants. However, this recommendation comes with a caveat (warning). Some research suggests that when people are exposed to evidence that challenges emotionally or cognitively salient beliefs—like the beliefs at the core of one’s worldview—these people often report increased confidence in their belief.¹²¹⁻¹²⁵ Researchers label this tendency to respond in a contrary fashion to disconfirming evidence “the backfire effect.” Does the backfire effect mean that people can do nothing to mitigate confirmation bias and belief perseverance? I would say no. However, effective critical thinkers must maintain a desire to form only true or highly evinced beliefs. One must maintain an open mind—even when the emotional and/or ideological stakes are high. Likewise, research does suggest that repeatedly exposing oneself to potentially disconfirming evidence does mitigate belief perseverance and the backfire effect.

In summary, humans naturally seek confirmatory evidence for their beliefs. Humans likewise perseverate in their beliefs once formed, and even sometimes increase their confidence in beliefs in the face of disconfirming

evidence. While these tendencies are not inherently bad, one ought to expose oneself to thoughtful alternative viewpoints to try to temper one's inclination to discount evidence against one's beliefs and to seek only evidence that confirms one's beliefs. By introducing elements into one's information ecosystem that differ in their slant, one creates a channel for alternative perspectives. Likewise, by cultivating an awareness of the variety of opinion, the arguments offered by others, the facts deemed relevant to an issue, etc. one can appreciate—and hopefully better understand—the range of views on that issue. Such awareness lays a foundation for meaningful and respectful interaction among individuals in a free society.

4.2.b.3 Diversity of Media

The final desirable property for one's information ecosystem is a **diversity of media**. Different media—kinds of information sources—have different strengths and weakness. The information ecosystem lectures and chapters emphasize internet-based information sources. However, one ought to develop a diversity of media within one's ecosystem. One should include print, audio, and video sources. Print sources ought to include books, newspapers, and magazines. One should draw from the internet, conventional mass media (radio, and television), as well as governmental agencies and professional organizations. Indeed, businesses, institutions, and savvy individuals rely heavily upon the rich and diverse cornucopia of governmental information—including such sources as the Bureau of Labor Statistics, The US Census, or the FBI crime statistics. It is within this context that the potential disappearance of public data mentioned in the previous chapter takes on such an ominous caste. Other data sources include the [Internet Archive](#) and Google's massive [publicdata](#) collection. Within a form of media—like newspapers—one ought to cultivate a diversity of sources from local, national and international outlets. Indeed, the best articles I read on the 2020 Black Lives Matter protests where from local newspapers reporting on protests within their city. For instance, the articles on the protests from The Oregonian in Portland painted a different, much more nuanced picture of the protests than national newspapers. Many local newspapers are online and available free of charge.

Taken together these practices help to balance one's information ecosystem. Each forum has differences in their mode of presentation, emphasis, regulative and professional norms, as well as primary ownership. Radio, for instance, does not require as much attention in that one does not watch it. It also can include listener interaction. Books, in contrast, tend to include much greater depth of information than other media and have a much longer timeline from event to report. Newspapers and television, while often lacking the depth of insight of books, have a much shorter timeframe. Newspapers and television can report on events in a matter of minutes or hours, whereas books appear on a scale of months or years.

The desire to encourage diverse viewpoints and minimize the potential for abuse of influence and power provides a second crucial reason to maintain a diverse ecosystem at both the personal and societal level. One current threat to vibrant information ecosystems in the U.S. is the rapidly decreasing diversity of media ownership.¹²⁶⁻¹²⁸ Indeed, people expressed shock in 1983 Ben Bagdikian reported that fifty corporations controlled 90% of all media in the U.S.. A mere seven years after the Telecommunications Act of 1996, Bagdikian told readers that, “by 2003, five men controlled all these media once run by the fifty corporations of twenty years earlier.”¹²⁷ (p.27) Diversity of media ownership promotes diversity of editorial perspectives, increases sensitivity to local issues, increases topics of coverage, limits the ideological and political influence of particular organizations, lowers inaccuracies, and increases corrections of errors. The dangers of media consolidation find illustration in the above discussion of Rupert Murdoch and William Randolph Hearst.

On an additional fecund note, spending a more time reading, as opposed to watching television or listening to the radio, appears to have significant cognitive benefits both during development and during the course of one's life. For instance, a number of recent studies suggest that people who have read throughout their lives develop a greater "cognitive reserve" that acts to prevent age-related mental decline.^{129, 130} Other benefits include vocabulary growth, improved verbal and written language fluency, emotional and psychological well-being, as well as enhancing and preserving functioning in the brain's visual and language processing areas.¹²⁹⁻¹³⁴

4.3 Maintaining and Refining an Information Ecosystem

You have created a great information ecosystem—mission accomplished. Not really. The work does not end once one creates an information ecosystem. Like any tool, an information ecosystem requires maintenance and care. One has to change the oil in one's car, rotate tires, and so on. In fact, just properly inflating the tires on one's car can potentially impact gas mileage significantly:¹³⁵

You can improve your gas mileage by up to 3.3 percent by keeping your tires inflated to the proper pressure. Under-inflated tires can lower gas mileage by 0.3 percent for every 1 psi drop in pressure of all four tires. Properly inflated tires are safer and last longer.

Many things can cause an information ecosystem to need a tune-up--sources may disappear, sources may change their mission, the very nature of media can change overtime, and one's interests, slant as well as needs may change overtime. For example, *Pew's State of the News Media 2012* discusses the changes to news media resulting from the increasing popularity of mobile devices and social media.¹³⁶ The remainder of the chapter briefly outlines some general strategies with regard to fine-tuning the properties desirable in sources and ecosystems discussed above.

4.3.a Accuracy and Fecundity

Since people use an information ecosystem to access and evaluate facts, an effective critical thinker occasionally steps outside of the normal mix and calibrates the accuracy, integrity, and slant of their ecosystem and sources therein. Likewise, an information ecosystem not only serves as a resource for checking facts and finding facts, it should foster one's goal of finding important information by calling one's attention to that information in a timely fashion. This section suggests three strategies for updating an ecosystem for accuracy and fecundity. **First, students can adopt an edit as you go strategy.** As the name suggests, one ought to keep track of cases when one's sources seem to mislead, misreport, or simply fail to report events. Getting things wrong or missing important facts and events entirely count against an information source. But, how an information source responds to such lapses can provide important information about future performance. Does the source acknowledge the error as an error in a timely fashion? If a source neglects or fails to report facts or events, how long does it take for them to catch-up? On this score, for instance, *USA Today* acknowledged the false reporting by Jack Kelley and publicly apologized. Washington Post showed much less exemplary conscientiousness in the specific case (discussed above) of Jessica Lynch. Fox news has developed a reputation for rarely issuing retractions. Similarly, when information foraging uncovers a particularly good piece of information, good critical thinkers consider adding that source to their information ecosystem on a preliminary basis. They might explore other reports from that source that moment, or check it a few times moving forward to see if it warrants inclusion. Of course, the hectic nature of daily routines often makes it difficult to consistently adopt an edit as you go strategy. You may find an

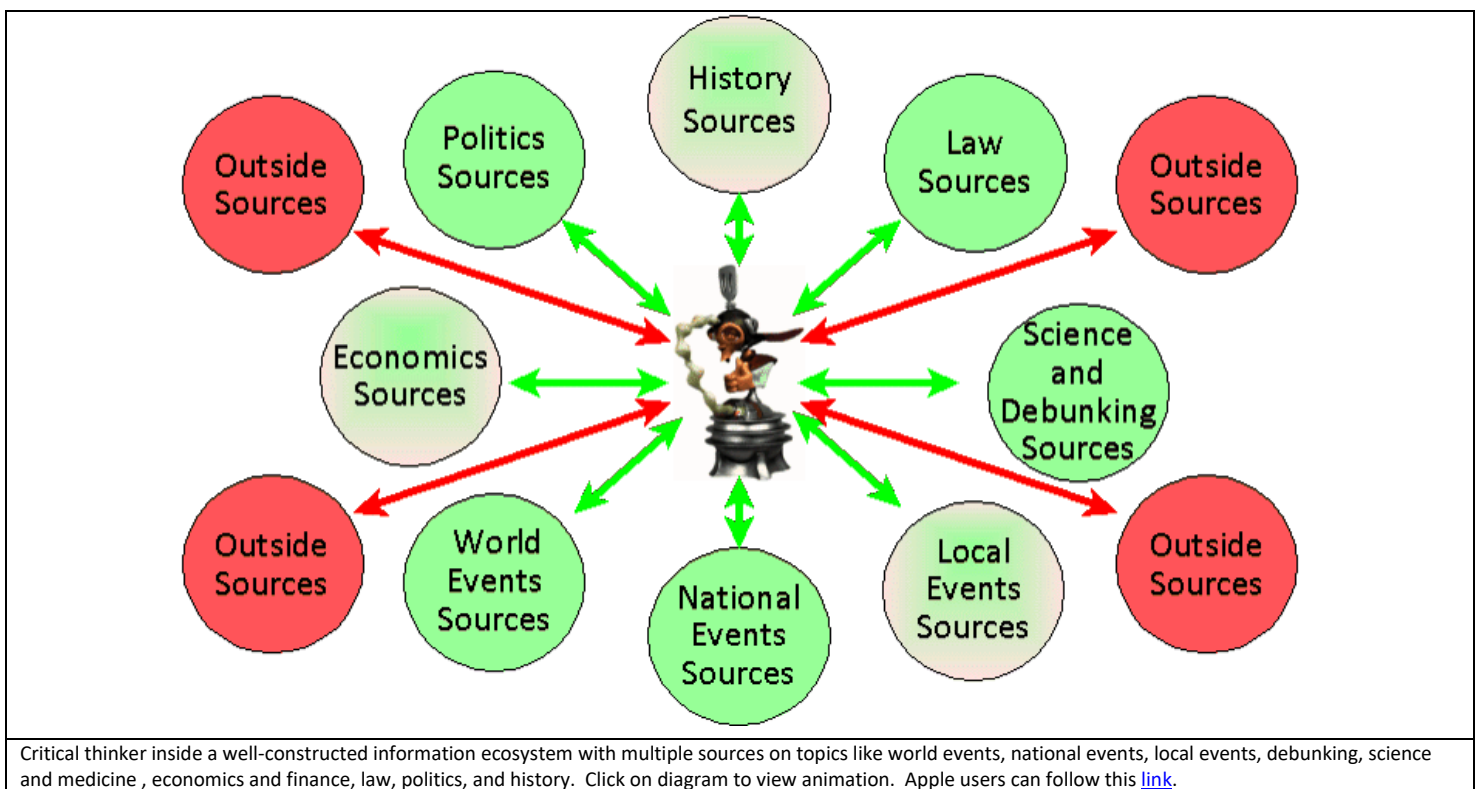
interesting source when researching a term paper or when talking to a friend, but that paper has to be written, and that lunch hour is just an hour.

Second, one ought to take some time and step out of one's normal ecosystem. One ought to explore sites from other countries, sites with different political slants, sites with different information specializations, sites one hasn't visited before, etc.. One ought to compare the reporting and emphasis of these sources to those in one's own ecosystem. Likewise, one ought to evaluate whether information that proved important appeared in one's ecosystem in a timely and accurate fashion. If one finds one's sources are not as reliable as they once were, or as they appeared, then one should modify one's ecosystem. If one discovers a new, promising site, add it.

Third, media watchdog sites devote their resources to monitoring and evaluating the accuracy and fecundity of individual media sources as well as classes of media sources. By consulting media watchdogs people can find independent appraisals of papers like the *New York Times* as well as information about traditional newspapers as a class of information sources. However, one has to exercise a certain degree of care in selecting media watchdogs as these organizations often approach the task of monitoring media from a particular perspective. The information awareness links page lists several media watchdogs that seem reasonably non-partisan (unless otherwise noted). Certainly the [Pew Research Center's Project for Excellence in Journalism](#) stands out among media watchdogs.

4.3.b Scope

A competent, literate thinker and decision maker actively and regularly informs themselves on a range of important topics. As one goes through life, events suggest areas where one might become better informed. Few people outside of finance devote much time to financial regulations and/or the trend towards greater and



greater deregulation beginning in the 1980s under Ronald Reagan. Efforts at deregulation continued through both Democratic and Republican presidencies. In 1992 the deregulation of the savings and loan industry led to the savings and loan crisis that cost tax payers about 124 billion dollars. Enron and commodities speculation resulted in a similar crisis in 2001. That same year the internet bubble crashed exposing the misleading and even fraudulent business practices in the tech sector. Such reckless practices were seen once again in the crisis in 2008. With each of these crises it became increasingly clear how important the financial industry and its regulation were to the world economy. All citizens must try as best as they can to have some understanding of local, national, and world events. Science and medicine, economics and finance, law, politics, and history stand out in my own experience as important areas in which all citizens should try to inform themselves.

The ecosystems chapters clearly presuppose that knowledge of history informs one's perception of the present. For example, the history of suffrage can lead to a more nuanced understanding of voter ID laws now popular in many states. Similarly, awareness of technology and law helped to prevent the passage of SOPA and PIPA. If one disliked George W. Bush's foreign policy, one should have noted in the 2012 election that almost all of Mitt Romney's foreign policy advisors spent time as policy advisors in the Bush administration. Similar examples of knowledge from science and medicine, politics, law, history, as well as economics and finance providing information crucial to correctly understanding current events seem inexhaustible in my own experiences.

But, how might one go about evaluating the scope of one's information ecosystem? **A yearly end-of-year check-up is one strategy.** At the end of each year, news organizations do various year-in-review pieces. Look at the major happenings listed in these reviews and ask yourself if your ecosystem informed you of these events in an accurate and fecund manner. Do you have sources in your ecosystem on this topic? Were your sources in the lead in reporting? You might search by years to try to identify the earliest or coverage of these events or you might review articles to identify the most accurate and fecund reporting. Likewise, when a major event comes to your attention, you can look to see if your information ecosystem was an early and accurate reporter of this trend. For instance, the sudden flurry of fake news articles around the 2016 election illustrates this point nicely. In this case, *The Washington Post*, *The New York Times*, and *Buzzfeed* seem like clear winners when it comes to early, accurate, and fecund reporting in 2016 regarding "fake news," personalization algorithms, and newsfeeds. Caitlin Dewey and Doug Gross emerge as earlier sources on counterfeit news.

4.3.c Limited Slant

If one thinks that one's system has taken on too much of a slant or one's own perspective has changed, then one ought to explicitly consider how best to adjust one's sources to create and appropriate slant. One ought likewise to adjust one's sources to insure an appropriate number of sources with perspectives that challenge one's own views. Often the most difficult aspect of this adjustment lies in reflecting upon one's own views and identifying one's own orientation. Moreover, reflecting upon one's own orientation and worldview helps critical thinkers to better understand who they are and their relationship to society and the world. Students might pick a top event from year end reviews and honestly ask themselves if they read or heard about this event from both their preferred and their alternative slants. For example, surveys show that about 40% of Americans do not know their credit score despite the important role it plays in their lives.¹³⁷

4.3.d Diversity of Media

Even within one's ecosystem one ought to track the actual sources of the information one finds within one's sources. For instance, you might be thinking that you are getting news from your favorite source, say the LA Times, when you are actually reading essentially the same story as you would in USA Today. A very large percentage of news stories draw upon or simply reproduce reports generated by the Associated Press (AP). The AP is huge news gathering organization providing a great deal of content to most news sources-- especially international news content. Despite its ubiquitous presence in US news, I suspect that the average student has very little knowledge of this organization, or awareness when reading their articles. The AP provides an economy of scale allowing news sources to focus their own reporting resources on more local stories. However, the size of the AP also results in a narrowing of available information and perspective in US news coverage. The AP once had a robust rival in the United Press International (UPI). However, in the 1980s and 1990s, the UPI dramatically scaled down their operations. [Reuters](#), [Agence France-Presse](#) (AFP), and [All Headline News](#) (AHN) also provide news stories though they tend to service news sources in other countries. Students can find more facts about the Associated Press and its rivals on, for instance, [Wikipedia](#).¹³⁸ I recommend students learn a little more about the AP to help understand the real structure of news delivery in the US.

4.4 Chapter Summary

This chapter focuses its exposition upon the development and maintenance of personal information ecosystems. The chapter and lecture discusses the sorts of properties that prove desirable in individual sources within one's ecosystem. After discussing properties of individual sources, the narrative turns towards desirable properties of the ecosystem itself. Finally, the chapter concludes by discussing the need for continually using, refining, and evaluating both individual sources and one's overall information ecosystem.

4.5 Key Terms

Accuracy: Accurate news sources exhibit the twin virtues of reliable reporting and integrity. In other words, accurate information sources regularly offer veridical, highly evinced reports, **and** on those occasions when these sources misreport, they identify and acknowledge their mistakes. Thus, one ought to understand accuracy in terms of two dispositional properties; reliability (the tendency to deliver true and/or highly evinced information) and integrity (the commitment to reliability).

Amateur reporting: Amateur reporting constitutes the second class of "fake news." Unlike news satirists, amateur reporting consists largely of people who post information that they collect or witness. For instance, people will often post videos, pictures, and/or written accounts of events that they research or witness. Amateur reporters generally intend to report facts. However, like comedic satirists, even conscientious amateur reporters often have no training in journalism. Such reporters are often unaware of and need not adhere to any journalistic practices, nor do they have a codified set of professional ethical standards. Amateur reporters tend to lack not just training, but the resources and motivation necessary to investigate and verify their reports.

Anti-social Restrictions on Information Sharing: Anti-social restrictions attempt to undermine or limit information exchange in order to benefit some member(s) or group(s) of society at the expense of others. Anti-social efforts to undermine or limit information flow come in a number of forms. The most chilling anti-

social measures combine two or more of these three deliberately malicious techniques to undermine information flow in an ecosystem: information suppression, disinformation and propaganda.

Availability Cascade: Timur Kuran and Cass R. Sunstein use the term, “availability cascades,” to refer to a self-proliferating process of information exchange. Specifically, the ease of information sharing together with the social pressures to conform combine to fuel a rapidly spreading acceptance of an idea or belief. As, Kuran and Sunstein note, “An availability cascade is a self-reinforcing process of collective belief formation by which an expressed perception triggers a chain reaction that gives the perception increasing plausibility through its rising availability in public discourse. The driving mechanism involves a combination of informational and reputational motives: Individuals endorse the perception partly by learning from the apparent beliefs of others and partly by distorting their public responses in the interest of maintaining social acceptance.” (Timur Kuran and Cass R. Sunstein p.683)

Belief Perseverance: Belief perseverance names a human tendency to resist changing one’s belief or modifying the confidence that one assigns to a belief once that belief has been formed. Belief perseverance works to render one increasingly resistant to new information—even highly reliable and predictive evidence.

Censorship (or Information Suppression): Information suppression or censorship has long been a staple of repressive governments and societal institutions. Information suppressors intend to deprive people of information in order to repress, control, or otherwise manipulate them. The typical tools of information suppression include; a dominant state-run media, prohibiting independent media, imprisoning journalists, murdering or allowing the murder of journalists, restricting internet access, monitoring and censoring the internet, and government harassment.

Comedic News Satire: Comedic news satirists produce one variety of “fake news.” Satirists usually make no pretense of providing objective, serious news. Though often written by very well-informed people and extensively fact-checked, satirists intend to produce comedic entertainment rather than news. Even conscientious news satire comedians often have no training in journalism. Such comedians need not adhere to any journalistic practices, they have no codified professional ethical standards, and they do not even have to believe their own material. Likewise, news satirists generally lack the resources to conduct independent investigative research on the topics they cover. They must rely upon primary news sources for the vast majority of their information.

Confirmation Bias: Confirmation bias is an innate disposition shaping human thought. Confirmation bias works to shape how humans gather, remember, and utilize information. Specifically, human beings exhibit confirmation bias when they preferentially seek out (or interpret) information to confirm their existing or potential attitudes or beliefs. One can think of confirmation bias as serving a useful purpose insofar as it leads someone to look for information that will provide additional evidence for their beliefs. Nevertheless, confirmation bias also acts to reinforce one’s beliefs—even in the face of strong disconfirming evidence.

Counterfeit News: The second class of “fake news” is counterfeit news. Counterfeit news sources generally, but not always, seek to profit from fabricating sensational “news” stories. Thus, counterfeit news sources create false news for the same reasons currency counterfeiters create fake money. Counterfeit news creators deliberately deceive in order to make money from advertising revenue that their articles create.

Contextualized (Contextualization): A term used to describe how human reasoning and assessment of one's own reasoning and the reasoning of others is strongly shaped by the content of one's inferences or argument as well as the context of those inferences or arguments. For example, people tend to judge arguments as better when they agree with the conclusion of the argument and worse when they disagree with the conclusion. This particular content effect is called the belief bias.

Diversity of Media: Good information ecosystems incorporate a diversity of media. Different media—kinds of information sources—have different strengths and weakness. One ought to include print, audio, video sources. Print sources ought to include books, newspapers, and magazines. One should draw from the internet, conventional mass media (radio, and television), as well as governmental agencies and professional organizations. Within a form of media—like newspapers—one ought to cultivate a diversity of sources from local, national and international outlets. Taken together diverse media sources help to balance one's ecosystem by introducing different modes of presentation, emphases, timelines, ownership, as well as regulative and professional norms.

Disinformation: Practitioners of disinformation seek to undermine trust in standard information sources and institutions with the goal of supplanting objective, independent information sources, intimidating rivals, and manipulating public opinion. Practitioners of disinformation seek to infect information ecosystems with ideologically biased information as well as false and contradictory information. Practitioners of disinformation are disruptors. They do not wish to convince so much as to confuse. The practitioner of disinformation seeks always to muddy the informational waters, undermine trust in independent information sources, and ultimately to force either a state of general disbelief or a state of dogmatic confirmation bias among individuals.

Fecundity: A news source exhibits fecundity if it provides more than just the bare facts. A fecund information source provides unbiased context and/or analysis along with the bare facts. This makes generating fecund information extremely hard in that one must walk a line between analysis and opinion. Such sources are very likely to report significant news in a timely fashion; they call one's attention to breaking news or trends and report news that other sources may not even notice. Fecund information sources prove highly valuable in that they help one to assess the significance of events, to differentiate isolated events from trends, and anticipate potential future developments. Fecund information sources, likewise, help one to understand how best to use information in one's decisions and expectations for the future. The value of such sources consists in their helping one to assess the significance of events, differentiating isolated events from trends, and anticipating potential future developments.

Filter Bubble: Eli Pariser suggests that the widespread and unmonitored use of personalization programs in search engines and news feeds acts to create a self-reinforcing bubble of idiosyncratic information around users, sheltering them from opposing viewpoints as well as denying them access to new ideas and perspectives. Filter bubbles potentially turn each of us into unwitting cyber-rubes lost within the biases and idiosyncrasies of our ever more parochial filter bubbles. For Pariser personalization can combine isolation and ignorance with little to no user oversight or insight regarding how their information gets selected. Pariser notes that

the new generation of Internet filters looks at the things you seem to like—the actual things you've done, or the things people like you like—and tries to extrapolate. They are prediction engines,

constantly creating and refining a theory of who you are and what you'll do and want next. Together, these engines create a unique universe of information for each of us-what I've come to call a filter bubble-which fundamentally alters the way we encounter ideas and information. (p.9)

Information Ecosystem: An information ecosystem consists of a set of senses, artifacts, organizations, places and/or people one regularly consults to gather information, evaluate claims, or when pondering the adequacy of one's worldview. Good information ecosystems should include straight news sources, analysis and commentary sources, fact-checking and debunking sources. These sources should provide information on a range of important topics like history, law, science and medicine, politics, economics and finance, as well as current world, national and local events.

Information Environment: Nearly all living creatures inhabit an information environment just as they inhabit a biological environment. The types of information available, the manner of that availability, the ease of access, as well as the spatial and temporal horizons define this information environment. For example, the information environment of magnetotactic bacteria consists only of its relationship to the Earth's magnetic declination—the Earth's magnetic field lines pointing towards the geographic north pole.

The Information Imperative: Even simple living creatures like plants and bacteria need information to thrive. For instance, plants use information about the direction of light to adapt their growth patterns to maximize exposure. Magnetotactic bacteria use information about the Earth's magnetic field to move towards anaerobic environments and to avoid oxygen rich environments. Indeed, for most animals the ability to secure life-giving materials like water and food from the environment depends upon their ability to gather and process information in their environment. Likewise, for many living things, avoiding predators and other dangers depends upon gathering information. One might call this an information imperative. That is, our very nature as living organisms creates a need for information to promote thriving. As a result, it is an imperative of all living creatures to gather information and utilize in adaptive responses to the environment.

Information Superabundance: Most humans now have access to so much information that one of their primary cognitive challenges has become finding relevant information in a horizonless and largely uncharted repository. Sometimes people need information that simply has not been generated or disseminated, but increasingly people struggle to find reliable information that exists somewhere in a vast sea of existent data.

Information Suppression (or Censorship): Information suppression or censorship has long been a staple of repressive governments and societal institutions. Information suppressors intend to deprive people of information in order to repress, control, or otherwise manipulate them. The typical tools of information suppression include; a dominant state-run media, prohibiting independent media, imprisoning journalists, murdering or allowing the murder of journalists, restricting internet access, monitoring and censoring the internet, and government harassment.

Limited Slant: Since one creates an information ecosystem as a tool for oneself, it will naturally contain a certain slant. More conservative individuals will likely develop information ecosystems with a conservative slant. Likewise, more liberal individuals will likely develop information ecosystems with the liberal slant. People who like science will likely have an information ecosystem with more sources about scientific discoveries and theories. People who like technology and gadgets will have more sources about these topics. Sports enthusiasts will have more sources providing them with information about developments in sports.

Having a slant proves desirable in an information ecosystem just as modifying one's phone by downloading apps can enhance its usefulness by customizing its capabilities to its user.

Nevertheless, students ought to make a conscientious effort include sources in their information ecosystem that provide them with alternative perspectives and worldviews. Students should actively cultivate quality sources with alternative perspectives including alternative political, religious, and policy views as well as international news sources. One reason why one should strive to include information sources with alternative slants in one's information ecosystem consists in the potential of such sources to temper biases in how human beings process information.

Memes: Memes are images, videos, and/or short messages that convey an idea, norm, cultural practice, or perspective in a highly trenchant manner often using comedy. Memes often propagate through push strategies and social media in a manner somewhat analogous to propagation of genes through a population. Richard Dawkins adopts the name meme from the Greek word *mimema* meaning imitated in his 1976 book *The Selfish Gene*.⁷³ For Dawkins' memes refer to self-replicating units like behaviors or ideas, the spread of which through a population causes human behaviors or culture to change and evolve.

Minimally Adequate Comprehensiveness: The property of minimally adequate comprehensiveness proves a highly desirable property of belief systems. A minimally adequate belief system contains a sufficient amount and variety of information to adequately guide one in one's typical or intended decisions and actions. For example, people without a basic understanding of the functioning of the Federal Reserve System lack a belief system with minimally adequate comprehensiveness to evaluate the need for reform or abolition of the Federal Reserve System.

News Aggregation Sites: Aggregation sites, such as Yahoo news and Google news collect and link to news posted across the internet, but primarily from online newspapers, magazines and blogs. News aggregators rarely, if ever, generate content—they simply crawl the web and centralize their results. Some news aggregators collect general information, others focus on particular topics.

Personalized Search and News Feeds: Personalization algorithms filter search and news feeds by using information about your location, preferences, internet habits, search and buying history to predict what items best suit you personally. Skeptics worry that personalization's combination excessive customization with little to no user oversight effectively isolates and shields people from other perspectives and experiences—turning each of us into unwitting cyber-rubes lost within the biases and idiosyncrasies of our ever more parochial filter bubbles.

Primary News Sources: Primary news sources engage in the expensive and resource-intensive work required to investigate and generate their own content. Primary news sources are essential to a robust and functional information ecosystem.

Product Placement: Product placement occurs when advertisers work with content creators so that their products appear in films, television, music, music videos, sporting events, magazines, video games, and even books. Product placement can range from showing or mentioning the product (as in the video above) to integrating the product into the story itself (often called "brand integration").

Propaganda: Propaganda consists of intentionally biased persuasive rhetoric that often evokes fears, biases, and falsehoods to manipulate emotions, opinions, and actions. Propaganda proves most effective in the absence of institutions and contexts that reveal its cynical, excessive, one-sided, and/or false nature.

Pro-social Restrictions on Information Sharing: Societies often codify some limitations on information transfer, arguing that throttling information flow actually serves the greater social good. One might call these measures pro-social restrictions.

Pull Technology/Pull Strategies: Pull strategies deliver content in response to explicit user inquiries. Pull strategies act as more passive or responsive communicators, usually limiting content to the items explicitly requested. For example, if students go to the Main Branch of the New York City Public Library, they can request a copy of Russell's *The Problems of Philosophy*. A library staffer will respond to that request by retrieving a copy of that book from the stacks. The staffers retrieve only the books a person explicitly requests and only when the books have been requested.

Push Technology/Push Strategies: Push strategies initiate contact or provide information actively without a user soliciting that information. For instance, many phone apps now notify users of events; email apps notify users of new mail, operating systems inform users of updates, etc..

Scope: One important property of a good information ecosystem consists in a large scope. Specifically, an information ecosystem with a large scope contains multiple sources providing information on a wide variety of topics. Thus, a good information ecosystem provides one with the resources to gather or check facts regarding topics as diverse as world politics and human anatomy.

Sponsored Content: Sponsored content refers to advertising that appears in internet searches and media in a manner that closely resembles news and search content. These search and media companies make money every time visitors click on these ads. Most, if not all, legitimate companies indicate sponsored content. However, the ease with which one can identify ads varies significantly among search and media outlets.

Worldview: A worldview consists of those beliefs, values, and practices that constitute a person's understanding of themselves, society, and the universe as well as that person's significance and role within society and the universe. As such, a worldview provides a vehicle through which an individual conceptualizes and interprets themselves and the world. A worldview likewise facilitates our prediction, understanding, and evaluation of the behavior of ourselves and others; it guides our expectations of how the world will change over time. Likewise, worldviews act as a background context helping reasoners to notice, evaluate, and assimilate new information.

Yellow Journalism: Yellow journalism involves sensationalism—usually scandals or fear mongering—lavish imagery, and poorly documented, often false or misleading journalism. The term originally came into use to describe the journalism practiced by William Randolph Hearst and Joseph Pulitzer. Yellow journalists tend to be legitimate journalists who present themselves as having high accuracy standards, but who show significant tendencies towards poor accuracy—often to boost revenue. For instance, Hearst and Pulitzer needed high circulation for their papers that often cost a penny.

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