Poirot

Digital Literacy made easy

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Wireframes

at: https://balsamiq.cloud/sba5o8/piax59m/r8469?f=N4IgUiBcCMA0IDkpxAYWfAMhkAhHAsjgFo4DSUA2gLoC%2BQA%3D

(**Note: Please use the notes section for a guided UX flow**)

Introduction

"The rap on me in government was that I saw every problem as a **communications problem.** I wouldn't say this was quite true, but I saw that communication was a critical part of every problem," writes Richard Stengel in the introduction to his book, Information Wars, about his time as the Under Secretary of State for Public Diplomacy and Public Affairs.

I am no Stengel, but that line explained more to me about my own approach to research, than I could have successfully articulated. As a former journalist and a life-long consumer of news stories, **communication** has become the dominant lens through which I view the world.

The rise of the internet, the ugly twist that the culture of content has taken over the last decade, and its realized and unrealized consequences have proven to a considerable extent that communication is the beating heart of the digital age. The most evident consequence of this problem has been the rise of the term and the **phenomenon of 'fake news'**.

My motivation entering this semester and this project was to find a way to leverage technology to fight fake news, and that's what I based the **design brief on**.

But as I began to read up on topics such as **news literacy** in the digital age, how i**ndividuals can empower themselves** to sift through news, how **information is created, de-contextualized and distributed** across the web, and how it spreads from one end of the globe to another, I began to realize that the 'meaning' of what we read online is made unclear by lack of context, the shrinking of time and space in to a single instance removed from reality, the dominance of advertising, among others. "Although the core principles of relevance, accuracy, and timeliness

have remained, when it comes to the presentation of news, journalism has been completely deconstructed". (Wenger, Owens, and Cain 2018)

This **deconstruction** is not visible to the reader unless they choose to dig deeper, using the **hyperlinked structure of the web** to sift what is fact, from what is opinion, and what is fiction. A reader is always intentionally or unintentionally, 'reading technical systems', which are also 'systems of cultural meaning and ideology'(Flanders 2017). In the case of content creation and consumption, these words take on a literal meaning.

At the same time, "popular news stories, are recycled and nearly identical versions of those stories" appear on the web all the time, discouraging original content production. "This is most compellingly demonstrated by research showing how seldom news consumers know the actual source of the news they are consuming." (Napoli 2018)

Anecdotally, this is true not just for journalism but for all content. Just knowing how to appear higher in Google's rankings allows some websites to get away with rehashing articles, subject matter, stories, and other forms of knowledge. This drives the crowds and the revenue by way of ads to such websites, creating an ecosystem in which original writing is rewarded less.

In an ideal world, **mass digital literacy** would help to reward good content over bad. But that requires more time and resources than we have, and far more political and educational will than policy-makers across the world have shown. It also needs to happen at speed.

In thinking about a possible course correction for this, there came the idea of a tool, **Poirot** (it was christened much later, but it is easier to address it like this), that would, in the **short-term** serve as a way to caution the reader about what they were reading, where they were reading it, what was there behind the text and the screen, and in the **long-term**, achieve the twin targets of making people **digital-literate** by way of awareness **as well as** in creating a more **responsible content creation and content consumption** culture, as companies might be discouraged to make websites for advertisements and money alone, by guiding the readers to the original source, as they might be encouraged to use authentic images, discouraged to allow for bots and spam on their web-pages, and maintain a healthy website, not just good web-pages. This could tip the

balance back in the favor of original writing and research, and steer a “technologically driven social change”.

So, what is Poirot?

The Design Solution

Poirot started off being an app that would **just aggregate data** from all the **fact-checking sites** in the world, and tell you whether what you were reading was fake or no. This was good and part of this carried over to the final project as well, but there were some gaps:

- It would do little for soft news which are not often fact-checked
- Content is produced at a rate far faster than it is being fact-checked. There had to be a real-time filter of news to **alert the reader**
- It would make the people reliant on that tag, rather than develop an understanding of their own that would help them move towards greater digital literacy
- More than the binary or fact and fiction, I was interested in the idea of the **multiplicity of interpretations** and perspectives that could be encouraged, which this app would not do

The **second iteration was a search engine.** This lasted for a short while. Computer interaction has become near ubiquitous with using one or two dominant search engines, and receiving results based on rank, as a list. To introduce something even slightly more complex was to discourage interaction and engagement, and reduce usability.
Even then, it had to cast as wide a net as a search engine does, because my personas included everyone who read anything online (in English). That is how I settled on the idea to **create a browser plugin**, with **a companion mobile application** because mobile browsers do not support browser plugins.

Poirot is an infrastructural tool which “creates the conditions of possibility” for the activity of reading through some of the structural elements of a web page and its place in structure of the www.
I wanted it to do many things at once:

- Tell the reader where and when something has first been published
- Tell the reader if the page had too many advertisements

- Tell the reader if the images and/or videos were edited, and if yes, to what extent
- Tell the reader what the general sentiment towards the content in front of them was
- Tell the reader if the website was trustworthy overall
- Give them a hint about the sentiment and language of the content itself
- Check to see if this content had been plagiarized or been lifted verbatim
- Tell the reader whether the story (in the case of hard news), had been fact-checked
- Tell the reader if the users involved (such as on a social media feed), were genuine or bots, if the comments on a website were spam or by real users
- Indicate the quantity and quality of the links in an out of the website

These directly borrow from the practices recommended by media literacy guidelines to help people discern trustworthy content from content that is not. ("Transparency" n.d.)

The general big idea is that based on these parameters **Poirot** will calculate a **final confidence score**, expressed as a percentage**,** to rate any particular web page the user is on.

Algorithmic functionality for individual aspects exists: one can use a software to tell us how much the images are edited, whether a social media account is a bot and if there is real engagement on the account or its only used as a promotional front, and more. These technologies are becoming more powerful every day. Poirot would just take them out of research papers and labs and use them in a **public-facing consumer product**. For examples, see (Shein 2018), (Park 2012) and (Goering and Thomas 2018).

Fully realized, the **Poirot score** will alert you the dubious, questionable, altered elements of content representation on a page. But my aim is not to **just** create a final score or a Poirot standard of content in the industry, but more to present **a score card so readers** are able to see what is at play and not blindly trust everything they read.

The Challenge

"Designing is a dialogue with a user" (Moggridge 2006)**.**

Poirot wants to tell the user, "Hey listen. What you are reading, there is more to it. Look at the elements on the page closely, they will tell you a story too."
But Poirot has to be able to do this succinctly and appealingly. It has to cater to a range of users; from someone who is resistant to being told what they were reading is outright wrong, to a range of readers with differing levels of discernment.

Therefore, minimalism and universality are key.

Showing or representing all the 10 parameters listed above, in any form, would be too confusing and would overwhelm the reader. Creating such a second layer of information to help declutter what is already on the web page would drastically reduce Poirot's usability, visual appeal, and discourage people from using it.

In **journalism**, as in all writing perhaps, the cardinal rule is to follow the **5Ws and 1 H**, which clearly states what happened, why it happened, where it happened, who was involved, when it happened and how it happened.
Was there tech-equivalent of these rules that would benefit the reader, which could then be used as the building blocks of a **new kind of literacy** for our new ways of producing, distributing and reading knowledge?

In working through this question and after discussions and tests with a few other readers, I came to these six:

1. **First Published: Date and Page**
    a. This would give the reader an idea about how old the content is and discourage repurposing of articles across time. It would also look at the first instance of the content to see where the first instance of this article occurred (by scanning the web the way a plagiarism-checking software would). The contribution of this metric is that if the date is recent, the content is original, then it would add to the page-credibility. If there is no publication date, if it is just repurposed from earlier available web

content (even something like a recipe, for instance), it would take points away from the credibility score. This is already possible to do so (Agarwal n.d.),

2. **Media Score**:
    a. Depending on the degree of the photo edits, and on factors such as source credits, whether it is a stock image or no etc, the media score would be assigned to the media used within and supporting the text. This would also be applicable to videos on the page too. The higher the authenticity, the higher the score.
3. **Website Score:**
    a. Sometimes, websites which exist to make money or spread propaganda will write an occasionally good piece, and vice a versa. Also, the trushworthiness of websites is the thing readers were most worried about, according to a survey I took. Thus, the website score became a mandatory feature to have.
    b. This would start with a repository of trustworthy sites, and eventually scale up the repository as the plugin was used on more and more pages. The website score would be an aggregate of all the pages and posts on the website.
4. **Fact-checked status:**
    a. A platform like Snopes would give a reader an extensive range of myth-busters to choose from but would likely cater to one country or region. In building this plugin, data from fact-checking websites from across the world would be able to better direct the user. Why is it important? In the digital age, information knows no boundaries. It would pull from a global database of fact-checking portals, so
    that decontextualized information can be put back into context.
5. **Spam Score:**
    a. Taking into account that Poirot could be used on social media sites or discussion forums, this would help the user immensely to find if the chatter is by real human-users or by bots and/or if the comments are by spam accounts or genuine
6. **Sentiment Level:**
    a. This was a very specific category, in thinking about information bubbles
    that customization has encouraged. Having a social sentiment score also allows for best use of the “wisdom of the crowd”. An individual user may scan only what they

resonate with, but a score would give an aggregate sentiment. Though untested, I believe this would help to allow for harnessing the power of the open and democratic nature of the web

In content, the easiest way to build traffic to your website is to mix and match from across the rest of the web, deploy bots to make the page seem engaging, and make money off ads. Poirot's radar would keep a check on this.

This 6-step snapshot includes parameters which are most often manipulated to present information incorrectly, or in an unauthorized way.

Looking at more than one element at a time also elevates it from being a static piece of information that determines a binary right or wrong, and creates an environment that is at once interpretative (like the humanities) and result-driven (like computer science).

It will "encourage compelling interpretations" of information on the web by "modelling acts of interpretation so that interpretation can be taught and learnt" by revealing the techno-semantic elements of a web-page and "providing opportunities to repeat these new acts of interpretation" by way of repeated use of the plugin on every web-page. (Ruecker and Roberts-Smith 2017)

Interacting with Poirot

Wireframes: https://balsamiq.cloud/sba5o8/piax59m/r8469?f=N4IgUiBcCMA0IDkpxAYWfAMhkAhHAsjgFo4DSUA2gLoC%2BQA%3D

There are two ways someone consumes content online:

1. Mobile/Tablets
2. Desktop/PCs Browsers

Mobile Application

I will first discuss the design choices on the mobile/tablet, as that has increasingly become the more common device to read on. A reader can chose to consumer information from:

1. A social media app
2. A mobile browser
3. An app of the content portal itself (for instance, most newspapers have apps)

A user would first **download Poirot** from an app store. For maximum use, Poirot would be available on both Android and iOS. The download page would state clearly and explicitly that this app or plugin is not going to tell the reader if something is truth or not, and the copy will lay the boundaries of how much to depend on the app. It would also be marketed as a **tool of digital literacy** rather than something to fight fake news with. The expectations will be made very clear from the beginning.

After downloading and enabling it, the Poirot icon would **overlay on any screen**, like how the Facebook messenger app currently functions (unless the user disables it). This would allow them to switch from one app to Poirot with **one easy click.** Alternatively, if the user chooses to disable screen overlay, they could also use the '**Share' button** from a page to open Poirot, in much the same way you share a link to a messaging app or a social media app, **in three clicks, as shown in the screenshots below.**

Once they enter Poirot's app, they see the **final score**, with a snapshot of the six parameters, each with a drop down carot should they chose to want to learn more. They can click on any

parameter to know a little bit more about each. And read even further to get into the very depths of that topic by a '**Read More'** option.

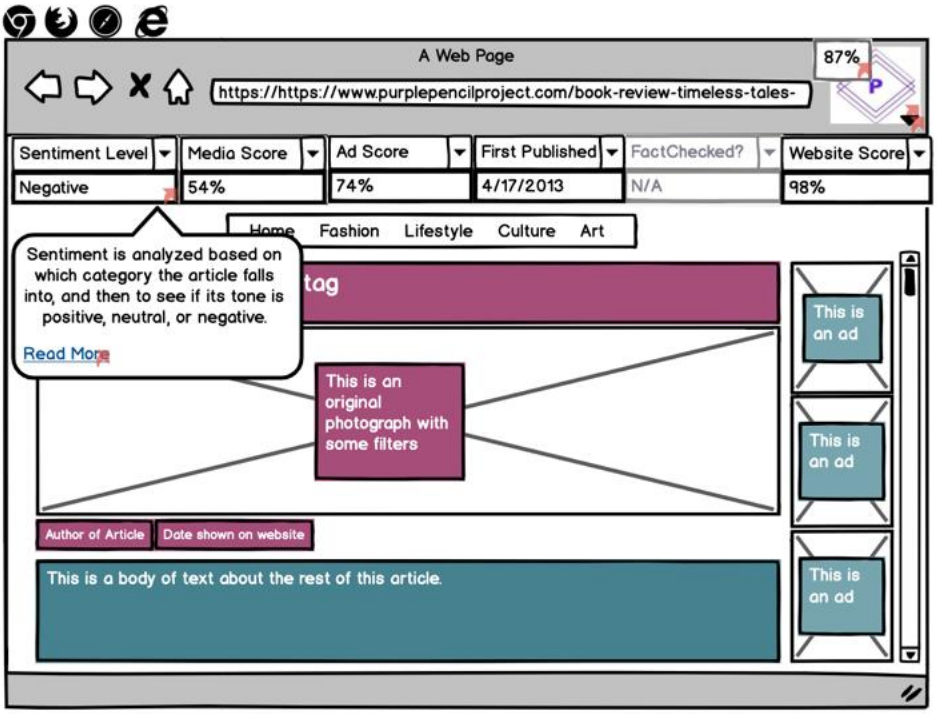
The reason for this step-by-step revealing of information is to ensure that no user is overwhelmed with everything at once and has control over how much they want to learn at a time. Like most apps, there will be a menu for interested users to learn more about licenses, privacy statement, customer service information, contact details, terms & conditions and more.

Browser View

A user can add the plugin to their browser by going to the **Add Extensions** setting of, ideally, whichever browser they are using. Through responsible adherence to web standards outlined in detail in "Designing with Web Standards" (Zeldman and Marcotte 2009), to function across browsers. For the sake of brevity, only the **look of Google Chrome** is represented in the wireframes used for this project.

On the browser, a horizontal panel of the six parameters would sit above the article, with an option to pull it up. "Users tend to focus on the task at hand than the tools" (Johnson and Johnson 2014), and positioning the bar right on top of the page would draw the attention of the user. Even when it is pulled up, a little icon on the plugin would display the final score, unless the user disables the plugin.

The Gestalt principle of visual design talks about the law of continuity. Reading from left to right and top to bottom is a continuation of that vision. In being the first item on this visual path would also bode well for Poirot.



Much like the mobile application would allow the user to read more about the plugin, what it does, how it scores etc, the web version too will have an accompanying website. Each stage of website interaction has been designed keeping the grid principles of UI, to "improve design comprehension" and "create clarity". (Babich 2017)

Some considerations of design and representation

1. The **decision to have the scores in percentage** was because of the universal affordance of the metric – the moment someone sees a number followed by %, it makes you think of score card, and the higher the score, the better a rating. There is one constraint – explaining and decoding the range of credibility. How does one decide if 75% score is bad or 80% is good? There are two ways to look at it:
    a. The **aggregate score is not a stamp of approval or disapproval** but reveals how different parts of the technical and cultural infrastructure contribute to the overall meaning of the page. So, a 75% could mean that it is an originally research article of

great quality, but the website is otherwise poor, or that the page has too many ads or that the images are edited heavily. Let's take an example. Say it is the interview of a famous celebrity, conducted by a reputable media house, and is an authentic piece of content. However, suppose the images accompanying this are heavily photoshopped, then the final score would take a beating, or if the page had a disproportionate number of ads.

b. This does not mean that it could not turn into being **perceived** as a stamp of approval or disapproval. One way to avoid this would be to **lure the reader** to find out more – for instance, the score would always be blinking, so that the **reader's attention** is drawn, and they are tempted to click on it to find out more, and engage with Poirot actively than passively receive information.

2. The reason to have the **bar display first** with the **option to hide it**, is to encourage the reader to discern what they may want to focus on and not rely on the score alone.
3. Fact-checking is a selective process, as I have mentioned earlier. Thus, where there is no fact to be checked or one that does not exist in the database, the option will be faded out. The reason to have it appear, even as a faded icon, is to **maintain consistency.** There is some merit in allowing only for those metrics to show which are applicable, but this would not create the kind of uniformity required for mass acceptance.
    1. Similarly, if the page does not have images or video, its media/score would appear as faded and N/A
    2. In thinking about this, I had two options. Either I not have that category appear on the little bar that sits on top, or fade it out. The decision to keep it but show it as faded out was to reinforce the importance of these parameters in the users mind.

Accessibility considerations

In keeping with a commitment to accessibility, the app and the website will follow "logical page structures", "provide for keyboard access" and be friendly to screen readers, by following the web standards strictly (Zeldman and Marcotte 2009).

The **black and white appearance of the bar** on the browser web-page was chosen deliberately.

1. Most websites have elements of color, and a bar that clashes with any color would render a web-page unaesthetic, creating an unnecessary distraction, which could potentially cause the reader to disable Poirot
2. Colors hold meaning in cultures, specific or universal. I wanted to make sure that the number and the value of the metric represented by that that number was the only consideration in the mind of the user.
3. A black and white scheme would be accessible without loss of meaning to color blind people as well (CRAVIT 2019)

Black and white thus became the choice combination. It would harmonize as far as possible with all webpages, assume nothing of the color conventions of readers' cultures as well as ensure as distraction free a reading experience as possible, and an equally meaningful experience for color-blind people.

Since black & white made sense for the browser, I decided to give the mobile application the same interface to maintain a design continuity for the brand. The splash of purple was chosen to break this monotony on non-essential elements such as borders, so that it enhanced aesthetics where color did not make meaning.

This is also why I chose not to show percent numbers in green or red.

Usability Tests and lessons

In testing Poirot, I conducted a survey after the wireframes were made, and held three in-person interviews through the development process of the idea itself.

The first interview was when the app was still at the design brief stage and I wanted to 'fight fake news'. They were an engineer, and helped me understand whether, given a sound company structure, this was possible. The second interview was conducted with Srijon Sil, who helped me with the verbiage required to put the concept together. The third interview, with Andrew French, helped think through questions like "Why should a percentage assignment be used?"

Also, up until that point, the parameter now called ‘Website score’ was called the ‘credibility score’. Andrew pointed out that the term ’credible’ could be mistaken to be a stamp of approval or disapproval by itself, undermining the effort towards a looking at the multiple factors Poirot was trying to present.

For the survey, I asked users to interact with the wireframes, to tell me what their concerns were while browsing online and to ask if they would use such a tool.

Over 60% said that they are not sure if websites are trustworthy, which validated the presence of the **Website Score metric**. 70% said they would use this tool if it was available. And while everyone said it was easy to use, 50% of the users had concerns about how the score was arrived at, which is a concern beyond the scope of this project, but nevertheless a pertinent one.

Privacy and Data Handling

With any kind of technological intervention, the question of privacy is bound to come up; as it should. Ethical innovation puts privacy of user data and user identity at its center.

To that end, Poirot would not track or collect data of the users, on any of their devices. Besides to monetize by potential advertising, Poirot would not really benefit from doing so either, as none of the aims of the application are looking at customer-centric personalization at any level, collecting this data would become only a liability.

The one window of opportunity is to have the functionality where a user can track the history of their own site visits and all the Poirot-analyzed pages – either for research or as a personal archive. In this iteration, it has not been included.

Having said that, for the duration that Poirot would be active on the user’s device, the system might have the ability to track phone usage. But it would not store it.

What it would store is the websites visited and the scores assigned itself, to be able to build the database more and more as the tool is used, and to also replace a web-page should it upgrade or

downgrade in quality. Having such a database would make score retrieval also faster and smoother.

Conclusion

Poirot is an app that is purely aimed at intervening in content culture that drives the knowledge economy today, and in correcting by way of revealing some of the elements most often manipulated.

But what is the need for all the six parameters? Have six different plugins for this is one option. But it is the plate of six that really targets all the factors that go into easy content creation, and having them shown to the reader in one go has the kind of impact that would force a reader to stop reading the page should the score be too low.

Studies in emotions tell us that telling someone they are wrong just makes them believe in the thing more. But Poirot does not do that. It does not label anything as right or wrong, it just tells you what you cannot see. It's "material level of infrastructure can articulate deep conceptual foundations" (Svensson 2016) of information dissemination in an easy to recognize and analyze way.

I think that is its biggest strength and is a crucial step towards the **realization of a semantic web.** As the world prepares for the rise of deep fakes (Wiltz 2020), I think Poirot, if deployed successfully, could aid in inculcating a culture of digital literacy and be considered as a piece of infrastructure which could be an "enabler" (Svensson 2016) of education.

As envisioned presently, it caters only to the English web, which is a huge constraint. It is likely that the rise of machine-driven translation may make it easy to include other languages, but I don't have the technical ability to know how, so I have not included it as part of this iteration.

Without a doubt, this was the easiest part. The real challenge is building it, and a monumental one at that. This is a project far larger in scale for any one individual to build, and I certainly

don't have the skills required to even begin to attempt it. Its scope is in theory alone right now, and over the next year, I want to build a sound business and technical model to pitch this at a commercial level and find collaborators to help realize it.

If I did choose to work on building the actual plugin or app, it would only target one of the six basic parameters I outlined.

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Bibliography

Agarwal, Amit. n.d. "Find the Date When a Web Page Was First Published on the Internet." Digital Inspiration. Accessed April 22, 2020. https://www.labnol.org/internet/search/find-publishing-date-of-web-pages/8410/.

Babich, Nick. 2017. "Building Better UI Designs With Layout Grids — Smashing Magazine." Smashing Magazine. 2017. https://www.smashingmagazine.com/2017/12/building-better-ui-designs-layout-grids/.

Flanders, Julia. 2017. "'CHAPTER 16' in 'Bodies of Information' on Manifold." Debates in the Digital Humanities. 2017. https://dhdebates.gc.cuny.edu/read/untitled-4e08b137-aec5-49a4-83c0-38258425f145/section/f627035f-5fd0-4bd6-ad74-361374ed9a2a#ch16.

Goering, Christian Z., and P. L. Thomas, eds. 2018. *Critical Media Literacy and Fake News in Post-Truth America*. Critical Media Literacies Series, volume 2. Leiden ; Boston: Brill Sense.

CRAVIT, Rachel. 2019. "How to Use Color Blind Friendly Palettes to Make Your Charts Accessible." *Venngage* (blog). August 21, 2019. https://venngage.com/blog/color-blind-friendly-palette/.

Johnson, Jeff, and Jeff Johnson. 2014. *Designing with the Mind in Mind: Simple Guide to Understanding User Interface Design Guidelines*. San Francisco, UNITED STATES: Elsevier Science & Technology. http://ebookcentral.proquest.com/lib/luc/detail.action?docID=1584420.

Moggridge, Bill. 2006. *Designing Interactions*. Cambridge, UNITED STATES: MIT Press. http://ebookcentral.proquest.com/lib/luc/detail.action?docID=3338581.

Napoli, Philip M. 2018. “What If More Speech Is No Longer the Solution? First Amendment Theory Meets Fake News and the Filter Bubble.” *Federal Communications Law Journal; Washington* 70 (1): 0_6,0_7.

Park, Han Woo. 2012. “How Do Social Scientists Use Link Data from Search Engines to Understand Internet-Based Political and Electoral Communication?” *Quality and Quantity* 46 (2): 679–93. http://dx.doi.org.flagship.luc.edu/10.1007/s11135-010-9421-x.

Ruecker, Stan, and Jennifer Roberts-Smith. 2017. “‘Chapter 31’ in ‘Making Things and Drawing Boundaries’ on Manifold.” Debates in the Digital Humanities. 2017. https://dhdebates.gc.cuny.edu/read/untitled-aa1769f2-6c55-485a-81af-ea82cce86966/section/fc008ab5-502a-4073-8624-fb24ba243dbc#ch31.

Shein, Esther. 2018. “The State of Fakery.” *Communications of the ACM* 61 (3): 21–23. https://doi.org/10.1145/3178125.

Svensson, Patrik. 2016. “Humanities Infrastructure.” In *Big Digital Humanities*, 131–71. Imagining a Meeting Place for the Humanities and the Digital. University of Michigan Press. https://doi.org/10.2307/j.ctv65sx0t.8.

“Transparency.” n.d. Snopes.Com. Accessed March 27, 2020. https://www.snopes.com/transparency/.

Wenger, Deb Halpern, Lynn C. Owens, and Jason Cain. 2018. “Help Wanted: Realigning Journalism Education to Meet the Needs of Top U.S. News Companies.” *Journalism & Mass Communication Educator* 73 (1): 18–36. https://doi.org/10.1177/1077695817745464.

Wiltz, Chris. 2020. “Deepfakes: The Looming Threat Of 2020.” Design News. January 6, 2020. https://www.designnews.com/artificial-intelligence/deepfakes-looming-threat-2020/109800999062105.

Zeldman, Jeffrey, and Ethan Marcotte. 2009. “Chapter Eleven: Working with Browsers I: DOCTYPE Switching and Standards Mode - Designing with Web Standards, Third Edition.” 2009. https://learning.oreilly.com/library/view/designing-with-web/9780321679765/ch01.html.

References used but not directly cited

"A Nuclear Cyberia: Interfacing Science, Culture and 'e-Thnography' of an Indian Township's Social Media - Raminder Kaur, 2017." n.d. Accessed March 18, 2020. https://journals-sagepub-com.flagship.luc.edu/doi/full/10.1177/0163443716643156.

"A Return to Audience Engagement - ProQuest." n.d. Accessed February 2, 2020. https://search.proquest.com/docview/2015382124?accountid=12163&rfr_id=info%3Axri%2Fsid%3Aprimo.

"Algorithmic Media Need Democratic Methods: Why Publics Matter - ProQuest." n.d. Accessed March 18, 2020. http://search.proquest.com/docview/1636357651?accountid=12163&rfr_id=info%3Axri%2Fsid%3Aprimo.

"All the News That's (Un)Fit - ProQuest." n.d. Accessed February 2, 2020. https://search.proquest.com/docview/1861789495?accountid=12163&rfr_id=info%3Axri%2Fsid%3Aprimo.

"AllSides | Balanced News via Media Bias Ratings for an Unbiased News Perspective." 2019. AllSides. May 27, 2019. https://www.allsides.com/unbiased-balanced-news.

Al-Rawi, Ahmed. 2019. "Gatekeeping Fake News Discourses on Mainstream Media Versus Social Media." *Social Science Computer Review* 37 (6): 687–704. https://doi.org/10.1177/0894439318795849.

Asr, Fatemeh Torabi. n.d. "The Language Gives It Away: How an Algorithm Can Help Us Detect Fake News." The Conversation. Accessed January 31, 2020. http://theconversation.com/the-language-gives-it-away-how-an-algorithm-can-help-us-detect-fake-news-120199.

Bandeli, Kiran Kumar, and Nitin Agarwal. 2018. "Analyzing the Role of Media Orchestration in Conducting Disinformation Campaigns on Blogs." *Computational and Mathematical Organization Theory; Dordrecht*, December, 1–27. http://dx.doi.org/10.1007/s10588-018-09288-9.

Benezra, Sam. 2018. "Detecting Fake News With The Help Of An Algorithm | The University Network." September 5, 2018. https://www.tun.com/blog/detect-fake-news-with-algorithm/.

Berners-Lee, Tim, and Mark Fischetti. 1999. *Weaving the Web: The Original Design and Ultimate Destiny of the World Wide Web by Its Inventor*. 1st ed. San Francisco: HarperSanFrancisco.

Besiou, Maria, Mark Lee Hunter, and Luk N. Van Wassenhove. 2013. "A Web of Watchdogs: Stakeholder Media Networks and Agenda-Setting in Response to Corporate Initiatives." *Journal of Business Ethics* 118 (4): 709–29.

Bodó, Balázs, Natali Helberger, Sarah Eskens, and Judith Möller. 2019. "Interested in Diversity: The Role of User Attitudes, Algorithmic Feedback Loops, and Policy in News Personalization." *Digital Journalism* 7 (2): 206–29. https://doi.org/10.1080/21670811.2018.1521292.

"Bot Sentinel Dashboard ‹ Bot Sentinel." n.d. Accessed April 6, 2020. https://botsentinel.com/.

Boyer, Dominic. 2010. "Digital Expertise in Online Journalism (And Anthropology)." *Anthropological Quarterly* 83 (1): 73–95.

Buchanan, Tom, and Vladlena Benson. 2019. “Spreading Disinformation on Facebook: Do Trust in Message Source, Risk Propensity, or Personality Affect the Organic Reach of ‘Fake News’?” *Social Media + Society* 5 (4): 2056305119888654. https://doi.org/10.1177/2056305119888654.

“Can Machine Learning Help Fight Fake News? - ProQuest.” n.d. Accessed February 2, 2020. https://search.proquest.com/docview/1941252264?accountid=12163&rfr_id=info%3Axri%2Fsid%3Aprimo.

Carey, Ellen. n.d. “Research Guides: Real vs. Fake News: How To Avoid Lies, Hoaxes, and Clickbait and Find the Truth: Finding Reliable News.” Accessed March 10, 2020. //libguides.sbcc.edu/c.php?g=840892&p=6008168.

“Celebrity Deepfake Videos Made Easy with New IPhone App.” 2020. *Metro* (blog). April 7, 2020. https://metro.co.uk/2020/04/07/celebrity-deepfake-videos-12520788/.

Cheruiyot, David, and Raul Ferrer-Conill. 2018. “‘Fact-Checking Africa.’” *Digital Journalism* 6 (8): 964–75. https://doi.org/10.1080/21670811.2018.1493940.

“Combating Fake News With a Human Touch - ProQuest.” n.d. Accessed February 2, 2020. https://search.proquest.com/docview/1973343229?accountid=12163&rfr_id=info%3Axri%2Fsid%3Aprimo.

“Designing Interactions (The MIT Press): 9780262134743: Reference Books @ Amazon.Com.” n.d. Accessed April 28, 2020. https://www.amazon.com/Designing-Interactions-Press-Bill-Moggridge/dp/0262134748.

“Detecting Fake News at Its Source.” n.d. MIT News. Accessed January 31, 2020. http://news.mit.edu/2018/mit-csail-machine-learning-system-detects-fake-news-from-source-1004.

“Discourse Processing Lab - Simon Fraser University.” n.d. Accessed January 31, 2020. http://www.sfu.ca/discourse-lab.html.

“DISINFORMATION AND DEMOCRACY: THE INTERNET TRANSFORMED PROTEST BUT DID NOT IMPROVE DEMOCRACY - ProQuest.” n.d. Accessed February 4, 2020. https://search.proquest.com/docview/2054916939?accountid=12163&rfr_id=info%3Axri%2Fsid%3Aprimo.

“Fact- Checking.” n.d. Duke Reporters’ Lab. Accessed March 30, 2020. https://reporterslab.org/fact-checking/.

“Fake News Detection.” n.d. Accessed January 31, 2020. http://fake-news.research.sfu.ca/.

“Fake Photo Or Real? Check If An Image Is Morphed Or Edited.” 2019. *E L E C T R O N S* (blog). December 27, 2019. https://electrons.co/fake-photo-real-check-image-morphed-edited/.

“Find the Date When a Web Page Was First Published on the Internet - Digital Inspiration.” n.d. Accessed April 28, 2020. https://www.labnol.org/internet/search/find-publishing-date-of-web-pages/8410/.

Flintham, Martin, Christian Karner, Khaled Bachour, Helen Creswick, Neha Gupta, and Stuart Moran. 2018. “Falling for Fake News: Investigating the Consumption of News via Social Media.” In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*, 1–10. CHI ’18. Montreal QC, Canada: Association for Computing Machinery. https://doi.org/10.1145/3173574.3173950.

Fogg, B. J., and Jim Euchner. 2019. “Designing for Behavior Change—New Models and Moral Issues.” *Research-Technology Management* 62 (5): 14–19. https://doi.org/10.1080/08956308.2019.1638490.

Goering, Christian Z., and P. L. Thomas, eds. 2018. *Critical Media Literacy and Fake News in Post-Truth America*. Critical Media Literacies Series, volume 2. Leiden ; Boston: Brill Sense.

Goldfarb, Avi, and Catherine Tucker. 2019. “Digital Economics.” *Journal of Economic Literature* 57 (1): 3–43. https://doi.org/10.1257/jel.20171452.

Guess, Andrew, Jonathan Nagler, and Joshua Tucker. 2019. “Less than You Think: Prevalence and Predictors of Fake News Dissemination on Facebook.” *Science Advances* 5 (1): eaau4586. https://doi.org/10.1126/sciadv.aau4586.

Hornik, Richard, and Masato Kajimoto. 2014. “‘De-Americanizing’ News Literacy: Using Local Media Examples to Teach Critical Thinking to Students in Different Socio-Cultural Environments.” *Asia Pacific Media Educator* 24 (2): 175–85. https://doi.org/10.1177/1326365X14555280.

“How Digital Humanities Can Help in a Pandemic.” n.d. Accessed March 27, 2020. https://phys.org/news/2020-03-digital-humanities-pandemic.html.

“How To Detect Bias In News Media.” 2012. *FAIR* (blog). August 30, 2012. https://fair.org/take-action-now/media-activism-kit/how-to-detect-bias-in-news-media/.

“How to Fact-Check the Internet.” n.d. Accessed April 6, 2020. https://choices.scholastic.com/issues/2019-20/120119/howt-to-fact-check-the-internet.html.

Hu, Yingjie, Xinyue Ye, and Shih-Lung Shaw. 2017. “Extracting and Analyzing Semantic Relatedness between Cities Using News Articles.” *International Journal of Geographical Information Science* 31 (12): 2427–51. https://doi.org/10.1080/13658816.2017.1367797.

“INTERNATIONAL: Fake News May Survive Facebook Changes - ProQuest.” n.d. Accessed February 2, 2020. https://search.proquest.com/docview/1988971365?accountid=12163&rfr_id=info%3Axri%2Fsid%3Aprimo.

Jang, Yonghun, Chang-Hyeon Park, and Yeong-Seok Seo. 2019. “Fake News Analysis Modeling Using Quote Retweet.” *Electronics* 8 (12): 1377. https://doi.org/10.3390/electronics8121377.

Johnson, Jeff, and Jeff Johnson. 2014a. *Designing with the Mind in Mind: Simple Guide to Understanding User Interface Design Guidelines*. San Francisco, UNITED STATES: Elsevier Science & Technology. http://ebookcentral.proquest.com/lib/luc/detail.action?docID=1584420.

———. 2014b. *Designing with the Mind in Mind: Simple Guide to Understanding User Interface Design Guidelines*. San Francisco, UNITED STATES: Elsevier Science & Technology. http://ebookcentral.proquest.com/lib/luc/detail.action?docID=1584420.

“Journalism, Media, and Technology Trends and Predictions 2020.” n.d. Digital News Report. Accessed January 31, 2020. http://www.digitalnewsreport.org.

Kleppe, Martijn, and Marco Otte. 2017. “Analysing and Understanding News Consumption Patterns by Tracking Online User Behaviour with a Multimodal Research Design.” *Digital Scholarship in the Humanities* 32 (suppl_2): ii158–70. https://doi.org/10.1093/llc/fqx030.

Larson, Jeff, Al Shaw, ProPublica Launched July 17, 2012, Data updated Feb. 15, and 2014. n.d. “Message Machine.” ProPublica. Accessed April 8, 2020. http://projects.propublica.org/emails/.

Mourão, Rachel R., and Craig T. Robertson. 2019. “Fake News as Discursive Integration: An Analysis of Sites That Publish False, Misleading, Hyperpartisan and Sensational Information.” *Journalism Studies* 20 (14): 2077–95. https://doi.org/10.1080/1461670X.2019.1566871.

“My Library Brytewave EReader.” n.d. Accessed March 31, 2020. https://brytewave.redshelf.com/library/.

Nee, Rebecca C. 2019. “Youthquakes in a Post-Truth Era: Exploring Social Media News Use and Information Verification Actions Among Global Teens and Young Adults.” *Journalism & Mass Communication Educator* 74 (2): 171–84. https://doi.org/10.1177/1077695818825215.

Park, Chang Sup, and Barbara K. Kaye. 2019. "Mediating Roles of News Curation and News Elaboration in the Relationship between Social Media Use for News and Political Knowledge." *Journal of Broadcasting & Electronic Media* 63 (3): 455–73. https://doi.org/10.1080/08838151.2019.1653070.

Park, Han Woo. 2012. "How Do Social Scientists Use Link Data from Search Engines to Understand Internet-Based Political and Electoral Communication?" *Quality and Quantity* 46 (2): 679–93. http://dx.doi.org.flagship.luc.edu/10.1007/s11135-010-9421-x.

Pennycook, Gordon, and David G. Rand. 2019. "Lazy, Not Biased: Susceptibility to Partisan Fake News Is Better Explained by Lack of Reasoning than by Motivated Reasoning." *Cognition*, The Cognitive Science of Political Thought, 188 (July): 39–50. https://doi.org/10.1016/j.cognition.2018.06.011.

Pérez-Rosas, Verónica, Bennett Kleinberg, Alexandra Lefevre, and Rada Mihalcea. 2017. "Automatic Detection of Fake News." *ArXiv:1708.07104 [Cs]*, August. http://arxiv.org/abs/1708.07104.

"Preserving Authenticity in the Digital Age - ProQuest." n.d. Accessed March 19, 2020. http://search.proquest.com/docview/1671253373?accountid=12163&rfr_id=info%3Axri%2Fsid%3Aprimo.

Puschmann, Cornelius, and Alison Powell. 2018. "Turning Words Into Consumer Preferences: How Sentiment Analysis Is Framed in Research and the News Media." *Social Media + Society* 4 (3): 2056305118797724. https://doi.org/10.1177/2056305118797724.

"Q. Can an Algorithm Match What a Human Editor Does? - ProQuest." n.d. Accessed February 2, 2020. https://search.proquest.com/docview/1836998868?accountid=12163&rfr_id=info%3Axri%2Fsid%3Aprimo.

Rasouli, Elham, Sajjad Zarifzadeh, and Amir Jahangard Rafsanjani. 2019. "WebKey: A Graph-Based Method for Event Detection in Web News." *Journal of Intelligent Information Systems*, September. https://doi.org/10.1007/s10844-019-00576-7.

"Research Challenges of Digital Misinformation: Toward a Trustworthy Web - ProQuest." n.d. Accessed February 4, 2020. https://search.proquest.com/docview/2058267177?accountid=12163&rfr_id=info%3Axri%2Fsid%3Aprimo.

Robinson, Sue, Seth C. Lewis, and Matt Carlson. 2019. "Locating the 'Digital' in Digital Journalism Studies: Transformations in Research." *Digital Journalism* 7 (3): 368–77. https://doi.org/10.1080/21670811.2018.1557537.

Rout, Jitendra Kumar, Raymond Choo Kim-Kwang, Amiya Kumar Dash, Sambit Bakshi, Sanjay Kumar Jena, and Karen L. Williams. 2018. "A Model for Sentiment and Emotion Analysis of Unstructured Social Media Text." *Electronic Commerce Research; New York* 18 (1): 181–99. http://dx.doi.org/10.1007/s10660-017-9257-8.

Sample, Ian. 2020. "What Are Deepfakes – and How Can You Spot Them?" *The Guardian*, January 13, 2020, sec. News. https://www.theguardian.com/technology/2020/jan/13/what-are-deepfakes-and-how-can-you-spot-them.

Shein, Esther. 2018. "The State of Fakery." *Communications of the ACM* 61 (3): 21–23. https://doi.org/10.1145/3178125.

Shu, Kai, Deepak Mahudeswaran, and Huan Liu. 2019. "FakeNewsTracker: A Tool for Fake News Collection, Detection, and Visualization." *Computational and Mathematical Organization Theory* 25 (1): 60–71. https://doi.org/10.1007/s10588-018-09280-3.

"Snapshot." n.d. Accessed April 28, 2020. https://learning.oreilly.com/library/view/designing-with-web/9780321679765/ch12.html.
"Stanford Senior Creates App to Target Misinformation in the Media." 2019. *The Stanford Daily* (blog). October 30, 2019. https://www.stanforddaily.com/2019/10/30/stanford-senior-creates-app-to-target-misinformation-in-the-media/.
Stecula, Dominik. n.d. "The Real Consequences of Fake News." The Conversation. Accessed January 31, 2020. http://theconversation.com/the-real-consequences-of-fake-news-81179.
Stengel, Richard. 2019. *Information Wars: How We Lost the Global Battle against Disinformation & What We Can Do about It*. First edition. New York: Atlantic Monthly Press.
Subramanian, Samanth. 2017. "Meet the Macedonian Teens Who Mastered Fake News and Corrupted the US Election." *Wired*, February 15, 2017. https://www.wired.com/2017/02/veles-macedonia-fake-news/.
"Supply and Demand of Fake News: Review and Implications for Business Research - ProQuest." n.d. Accessed February 2, 2020. https://search.proquest.com/docview/2271749028?accountid=12163&rfr_id=info%3Axri%2Fsid%3Aprimo.
"The Language Gives It Away: How an Algorithm Can Help Us Detect Fake News." 2019. PBS NewsHour. August 25, 2019. https://www.pbs.org/newshour/science/the-language-gives-it-away-how-an-algorithm-can-help-us-detect-fake-news.
Thelwall, Mike. 2012. "A History of Webometrics." *Bulletin of the American Society for Information Science and Technology (Online); Silver Spring* 38 (6): 18–23.
Thorell, Maria, Peter Kindt Fridorff-Jens, Pia Lassen, Theis Lange, and Lars Kayser. 2015. "Transforming Students into Digital Academics: A Challenge at Both the Individual and the Institutional Level." *BMC Medical Education* 15 (1): 48. https://doi.org/10.1186/s12909-015-0330-5.
Thurman, Neil, Steve Schifferes, Richard Fletcher, Nic Newman, Stephen Hunt, and Aljosha Karim Schapals. 2016. "Giving Computers a Nose for News: Exploring the Limits of Story Detection and Verification." *Digital Journalism* 4 (7): 838–48. https://doi.org/10.1080/21670811.2016.1149436.
Tuchkov, Ivan. 2019. "Color Blindness: How to Design an Accessible User Interface." Medium. March 1, 2019. https://uxdesign.cc/color-blindness-in-user-interfaces-66c27331b858.
Uyheng, Joshua, Thomas Magelinski, Ramon Villa-Cox, Christine Sowa, and Kathleen M. Carley. 2019. "Interoperable Pipelines for Social Cyber-Security: Assessing Twitter Information Operations during NATO Trident Juncture 2018." *Computational and Mathematical Organization Theory*, September. https://doi.org/10.1007/s10588-019-09298-1.
Vargo, Chris J, Lei Guo, and Michelle A Amazeen. 2018. "The Agenda-Setting Power of Fake News: A Big Data Analysis of the Online Media Landscape from 2014 to 2016." *New Media & Society* 20 (5): 2028–49. https://doi.org/10.1177/1461444817712086.
Wagner, Kurt. 2017. "Facebook Found a New Way to Identify Spam and False News Articles in Your News Feed." Vox. June 30, 2017. https://www.vox.com/2017/6/30/15896544/facebook-fake-news-feed-algorithm-update-spam.
"What Is Motivated Reasoning? How Does It Work? Dan Kahan Answers." n.d. Discover Magazine. Accessed January 31, 2020. https://www.discovermagazine.com/the-sciences/what-is-motivated-reasoning-how-does-it-work-dan-kahan-answers.

"What Universities Can Do About Digital Literacy in the Age of Fake News." 2017. MediaShift. May 30, 2017. http://mediashift.org/2017/05/what-universities-can-do-about-digital-literacy-in-the-age-of-fake-news/.

Wu, Shangyuan, Edson C. Tandoc, and Charles T. Salmon. 2019. "Journalism Reconfigured: Assessing Human–Machine Relations and the Autonomous Power of Automation in News Production." *Journalism Studies* 20 (10): 1440–57. https://doi.org/10.1080/1461670X.2018.1521299.

"You Get What You Give: Sharing as a New Radical Challenge for Journalism - ProQuest." n.d. Accessed March 18, 2020. http://search.proquest.com/docview/2148638504?accountid=12163&rfr_id=info%3Axri%2Fsid%3Aprimo.

Young, Lori, and Stuart Soroka. 2012. "Affective News: The Automated Coding of Sentiment in Political Texts." *Political Communication* 29 (2): 205–31. https://doi.org/10.1080/10584609.2012.671234.

Zhang, Shixin Ivy. 2019. "The Business Model of Journalism Start-Ups in China." *Digital Journalism* 7 (5): 614–34. https://doi.org/10.1080/21670811.2018.1496025.

N.d.