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Structured Abstract

Purpose:

This paper argues that information containers provide valuable context clues that can help students make choices about how to engage with information content. The authors present a strategic approach to source evaluation rooted in format and authority threshold concepts.

Design:

The authors developed a source evaluation strategy with the objective of deciding whether or not to trust an information source. This strategy involves a set of cues to help readers mindfully engage with both the container and content of a given source.

Findings:

When conducting research, non-expert readers are asked to evaluate content in the absence of relevant subject expertise. The cues presented in this paper offer practical tactics informed by the concepts of authority (to help make an accessible judgment of intellectual trust) and format (to help make more informed decisions about the content they find in a browser).

Originality/Value:

While librarians have produced many evaluative models and checklists to help students evaluate information, this paper contributes a unique strategic approach grounded in two information

literacy threshold concepts—format and authority—and enacted through a series of actions drawn from website evaluation models, fact-checking, and metacognitive exercises.

Keywords:

Academic libraries, Information literacy, source evaluation, threshold concepts, cognitive authority, information formats, genre theory, affect, fact-checking, Library Instruction West

Introduction

The task of source evaluation is complicated by the way readers discover and experience digital information. The authors, referred to as the Container Conundrum Group (CC Group), started thinking of information sources according to a conceptualization of "container or content," where information is both what it intends to communicate (content), as well as the way in which it is packaged (containers) and distributed through systems. The categories of container and content overlap, but it can be useful to think of these categories separately because digital information disrupts the traditional form information sources take, altering their containers substantially. For example, a physical book's container is its physical and intellectual structure, its binding, covers, paper, font, table of contents, index, chapters, and so on. The content of the book is the ideas being communicated and the intention or purpose behind its creation. That same book in digital form is harder to recognize.

In "Talking About Information Literacy: The Mediating Role of Discourse in a College Writing Classroom," Holliday and Rogers (2013) observed classroom instruction in a college writing course and found that:

> the words used in classroom discourse tended to emphasize sources as containers, rather than the information itself. The term 'information,' rather than sources, was rarely used in classroom discussion or assignment descriptions. (Holliday and Rogers, 2013, p. 261)

Holliday and Rogers conclude that thinking and speaking about information sources as containers or objects can serve as a barrier to learning from those sources. Similarly, Margolin and Hayden developed their Research Toolkit to highlight the importance of reading and using sources, even if "the object is to skim rather than to fully read" (2015, p. 608). Yes, librarians want students to engage with the information found in sources. However, the easy online availability of all types of information has caused librarians and other educators to shift the discourse to source evaluation. In the relatively recent past, students would find most information in the controlled environment of the library, with traditional print publication processes and library selection acting as quality filters. The convenience of free-range information accessed through a web browser increased a potentially difficult step for readers—that of judging whether or not a source is good enough to learn from.

As a result, librarians and other instructors have produced a bewildering variety of evaluative models and checklists intended to help students tasked with evaluating the accuracy and credibility of information in the absence of personal expertise about its content. The CC Group argues that librarian efforts are best focused on the context surrounding the information, which includes the information need, the organizing system that delivers the information, and the container. The container communicates valuable information and can assist students with source evaluation. The Container Conundrum is this juxtaposition between librarians' intention for students to engage with the content of information sources and the reality that attention to the container and wider context is necessary when judging whether a source is trustworthy.

The CC Group proposes to address the Container Conundrum with a source evaluation strategy built on a two pronged approach: a theoretical foundation composed of two information literacy threshold concepts—format and authority—enacted through a series of evaluative tactics taken from traditional fact-checking and website evaluation models. This approach attempts to provide readers concrete, actionable guidance when deciding whether or not to trust a source enough to engage with the content.

Foundations

The CC Group explored three core foundations in the development of a source evaluation strategy. First, an environmental scan of previously developed source evaluation models provided a better understanding of how these models fall short. In the process, many specific components or evaluative tactics in existing models were found to be valuable; but for the most part, the components were not well explained or situated within a clear overarching strategy. Second, two theoretical concepts—authority (rooted in cognitive authority) and format (drawn from genre theory)—provided the grounding to develop a context-informed source evaluation strategy that engages with both the content and container of a source.

Existing Evaluative Models and Checklists

Information evaluation checklists and tools like the CRAAP test (Meriam Library, 2010) attempt to assist students with the hard work of assessing whether or not to use a piece of information. Even so:

> As students go down the list, they put their source into one of two boxes… While that kind of simplification might help [in] a one-shot [instruction session], it's not going to apply in an authentic information seeking situation.... Instead of this approach, we need to wade into the messiness. (Seeber, 2017, paragraph 7)

Many of these models have both yes or no checkboxes as well as lengthy lists of open-ended questions, which can sometimes feel impossible to answer, even for subject experts. Checklists may unintentionally compound feelings of confusion or frustration associated with research by asking questions that seem unanswerable without subject expertise.

An environmental scan of around 25 evaluative models, frameworks, and checklists (see Appendix) revealed valuable tips and techniques but their deployment is problematic. Checklists are often structured into mnemonic acronyms that are easily memorized (e.g., CRAAP, CARBS, CARDIO, RADAR, RADCAB, etc.), but an unfortunate consequence is that students are left without a sense of what is hardest, easiest, or most important to evaluate. Students move down the checklists and may expect to apply the same cognitive effort to each evaluative task, though some questions are more quickly answered than others. For example, currency is easy to answer but accuracy is very difficult. Some of the most common questions also arguably mislead students to reject sources outright. Currency can lead students to make poor judgments about an information source because whether or not a source has been published within the last ten years might not be the best determining factor for trusting it. If a student is conducting research on the use of the term "hysteria" within the field of psychology, a source from 1895 will be essential reading because that is when the term found currency within literature and practice as will a source from the 1980s when the term was intentionally discarded in favor of something else. One notable exception is the RADAR framework (Mandalios, 2013), which directs students to concrete tools as well as conceptual framings, short questions, and explanations.

Checklists can feel good upon completion; there's a sense of accomplishment. Nonetheless, the structure of most source evaluation checklists relies on prior knowledge that readers may not possess. Checklists also tend to treat information sources as worlds unto themselves, rather than recognizable formats with regular patterns connected to recurring situations that can be considered before interacting with the content of a source. Finally, it is difficult to discern how the use of such checklists develops the skills and transferable knowledge necessary for more advanced evaluative tasks.

Authority and Cognitive Authority

Students are often tasked with identifying evidence of authority in information products. Through a series of questions (e.g., who is the author? what are their credentials? is the publication reputable?), students evaluate markers of authority without having context for why they are asking the questions and what the answers really mean. Students often struggle to find answers, and even when they do, those answers don't lead to an understanding of the larger processes and communities that support the creation and use of information products. The threshold concept for authority can be defined as:

> a form of intellectual trust granted by an individual or community to an information source. It is both constructed, built through expertise and persistent reliability, and contextual, limited to certain knowledge domains or situations and shaped by community norms. (Hofer et al., 2019, p. 58)

This approach is grounded in the related concept of cognitive authority, developed by Wilson (1983), which shifts the focus from seeking out 'who is an authority' (suggesting there is always a right or wrong answer) to asking 'who are my authorities' (emphasizing individual purpose and context).

Cognitive authority recognizes that people construct knowledge in two ways: 1) based on direct first-hand experience and 2) based indirectly on information learned second-hand from other people or information sources. People learn a limited amount from their own personal experience in the world, but any time someone reads a book, listens to a podcast, or receives advice from a friend, the knowledge internalized is second-hand. When readers don't possess the subject expertise to make good judgments about a source based on the content alone, they can look to cognitive authorities. Cognitive authority approaches the evaluation of sources from the perspective of intellectual trust, informed by the competence and expertise of the creator and filtered through the context of the reader. Using this approach enables librarians to reframe the way they talk about authority with students, transforming it into a more reflective metacognitive process that centers the student and situates sources within their broader disciplinary, professional, and personal information landscapes.

In recent years, library and information science scholars have problematized the limitations of cognitive authority, including that experts and novices approach cognitive authority evaluations differently (Meszaros, 2010). The theory's success also relies on the reader's acknowledgement that some authors or creators have more authority than others (Badke, 2015), and an assessment of cognitive authority may be influenced by emotional reactions or a personal ideology that runs counter to that in academia (Bluemle, 2018). These criticisms broadly reflect the inevitable subjective qualities of source evaluation. But the CC Group proposes that librarians can still use cognitive authority to help students make an accessible judgment of intellectual trust rooted in evidence of the author or creator's authority among their disciplinary peers.

Information Format

In approaching the Container Conundrum, the threshold concept of information formats is a helpful organizing principle for evaluating sources. Formats are typified documents that librarians often organize and make accessible. Genre theory, which originates in the field of rhetoric, can inform a digital understanding of information formats. According to Miller's (1984) seminal article, genre can be said to represent "typified rhetorical action" (p. 151). Later, Yates (1992) defines it thus:

> Genres (e.g., the memo, the proposal, and the meeting) are typified communicative actions characterized by similar substance and form and taken in response to recurrent situations. (p. 299)

These definitions recast formats in a way that includes not just a physical manifestation of information, but also their purpose and content. They also confirm that digital information still has a shape (Dillon, 2008). Hofer, Lin Hanick, and Townsend (2019) offer a genre-informed definition of format:

> Each instance of a format shares a common intellectual and physical structure with others like it, and is intentionally produced to support or effect action. Intellectual structure refers to the textual and visual content of a format. Physical structure refers to the organization, design, and medium of a format. These categories are not strict and may overlap. (p. 82)

Further, individual instances of a format can be analyzed and understood through the categories of purpose, process, and product. Purpose describes why an instance of an information format exists and who made it; process describes how it gets created and distributed into the world, including quality control or review processes; and product describes the final form this information takes (Hofer et al., 2019, p. 83). For example, a visit to a restaurant will involve interaction with two common formats: the receipt and the menu. Both formats have a list of food or drink items and prices, but almost every reader can easily tell the difference between the two formats because the purpose of each format is well-known. Readers can probably even describe how each of these physical items is likely to exist in the world: how the receipt paper feels, what the machine that prints out the receipt looks like, how a large menu feels in their hands, and what it's likely to be made of. These formats are commonly found in both print and digital forms—which helps readers make sense of them across those two mediums.

While there are technical differences between definitions of genre and format, the important disciplinary distinction is one of perspective. Non-librarians are most interested in creating and using disciplinary-specific and professional formats. Librarians, approaching from the discipline of information science, organize and provide access to information that is often shaped into formats of various kinds. Librarians typically encounter information formats once they are completed and therefore help students make sense of the product when the purpose and process may be unclear (Hofer et al., 2019, p. 88). Thinking of information in terms of formats—with common patterns and structures that can be recognized—can help students make more informed decisions about the content they find in a browser.

In the context of container and content, the concept of format helps clarify the nature of digital information containers. Containers still exist in the digital realm, but the medium is often a website and the traditional indicators have morphed from title pages and table of contents to home pages and menus. The purposes and processes of creation are often more obscure with online information than with traditionally produced formats. Additionally, because the web is a recent invention, new formats have proliferated in recent years, though this process may stabilize as some new formats persist and others fade (Dillon, 2008, p. 19). The web also allows wide distribution of content without the review processes built into traditionally published information formats, whether peer-review or editorial. Thus, it may seem that the container no longer exists or has collapsed (Connaway, 2018). Even so, the container remains and is still useful in the context of information evaluation.

Practical Framework for the Source Evaluation Strategy

In addition to its theoretical foundations of authority and format, the CC Group looked to affective components of information evaluation and fact-checking tactics to help develop a source evaluation strategy. These elements provided a foundation for a range of evaluative behaviors based on a variety of conceptual prompts.

Affect, Mindfulness, and Metacognition

It is impossible to evaluate information in a perfectly neutral vacuum devoid of emotion. Sweet, Swanson, and Shermak (2019) explain that information is not neutral and that the human brain is not a logic machine; rather, information is personal, it’s emotionally charged, and the human brain relies on heuristic short cuts over logic. Therefore, considering concepts bundled into metaliteracy (Jacobson and Mackey, 2017) can be helpful, specifically: affect, mindfulness, and metacognition.

Affective learning is broadly concerned with feelings, emotions, and attitudes tied up in the learning process. Prior knowledge, including personal values and beliefs, is closely tied to affective learning because it impacts a reader's willingness to receive new ideas. New or conflicting ideas are a tough sell, and librarians have long been grappling with this phenomenon as it relates to student research. In her seminal work, Kuhlthau (1991) discusses personal construct theory, or the ways individuals process information to construct meaning, explaining, "The disruption caused by the new ideas may become so threatening that the new information is discarded and the construction abandoned" (p. 362).

The CC Group also considered mindfulness, which Langer (2016) explains:

> the concept of mindfulness revolves around certain psychological states that are really different versions of the same thing: (1) openness or novelty; (2) alertness to distinction; (3) sensitivity to contexts; (4) implicit, if not explicit, awareness of multiple perspectives; and (5) orientation in the present….[which] make us receptive to changes in an ongoing situation. (p. 22-23)

As an example, traveling abroad and experiencing culture shock ushers in acute mindfulness. Suddenly, ordering food, using public transportation, and engaging in social behavior in public, activities that a traveler might mindlessly run through back home, give way to critical awareness. Langer (2016) explains, "When we first learn a skill, we necessarily attend to each individual step. If we overlearn the drill, we essentially lose sight of the individual components and we find it hard to make small adjustments" (p. 13). How might librarians cultivate mindfulness in source evaluation where students tend to make judgments on autopilot, a behavior that staunches the benefits of uncertainty and curiosity?

Finally, metacognition, commonly described as thinking about one's thinking, refers to the processes used to plan, monitor, and assess one's own understanding and performance (Livingston, 2003). Metacognitive practices allow for mindfulness by helping students articulate working definitions and allowing room for alternatives. Wilson (1983) explains, "We pick up cognitive authorities along the way through life, not searching for them but accidentally happening on them" (p. 138). The construction of cognitive authorities is a mostly invisible process; therefore, it is beneficial for students to reflect on who their authorities are and to be able to justify how they arrived at those decisions. Because of these beneficial mindsets, many of the tactics in the proposed source evaluation strategy encourage pausing and performing a quick self-check.

Fact-Checking as an Evaluative Apparatus

The digital information environment has produced multiple and often competing perspectives of the truth, challenging historical conceptions of objectivity (Nerone, 2011). As objectivity has become more relative in contemporary life, fact-checking has emerged as a form of journalism that relies on:

> subtle judgments involved in finding reliable experts and data in assessing the intent or subtext behind a piece of partisan rhetoric, and thus in weighing claims not only for technical accuracy but also for their meaning in the context of a particular political debate. (Graves, 2016, p. 114)

Fact-checkers are not subject experts. We suggest that they are professional skeptics. Many have written about the nuanced art of verification (Borel, 2016; Buttry, 2014; Graves, 2016; Maras, 2013; Navasky and Cornog, 2012). Fact-checkers are concerned with contextual corrections, communicating degrees of accuracy, and finding multiple voices to triangulate the truth (Graves, 2017, p. 527). This type of work includes attention to factual omissions, exaggerations, cherry-picking, ignoring inconvenient aspects of information, and misappropriating sources (Amazeen, 2015, p. 15).

In the Container Conundrum, some fact-checking techniques focus on contextual clues that can help students begin to engage with the information they are evaluating. Wineburg and McGrew (2017) compared fact-checkers, historians, and college freshmen's evaluation of websites. Fact-checkers employed a standout technique: taking bearings by reading laterally, which requires leaving the source in order to verify and contextualize the information. This move allowed fact-checkers to quickly learn about the organization's political leanings, funding, and reputation. Caulfield (2017) explains another technique, "going upstream," which is used to get to the root of a claim. The idea is to work backwards to the original source. If a claim is cited in a secondary source, this requires the checker to keep working further upstream, tracing a claim back to its origins. Finally, Graves (2016, 2017) describes tracing false claims, where checkers construct the source's trajectory and observe how it traveled across the internet in order to contextualize and assess where a story has been as well as where it has not been.

Fact-checking is a quality control mechanism with enticing techniques that librarians are keen to adopt in the search for practical source evaluation guidelines. Yet fact-checking is not the ultimate solution for *student* source evaluation. Professional fact-checkers delve deep into content, pull the story apart, and put it back together, using tacit knowledge to execute moves which are not appropriate for student researchers. Nevertheless, a few fact-checking moves demonstrate that, even without subject expertise, contextual indicators can reveal a lot about content and credibility.

Cues as a Strategy for Contextual Source Evaluation

The following set of cues outlines a mindful strategy for source evaluation, considering the central question, "How much trust do I grant this source?" As defined by *Merriam Webster* (2019), a cue is "a signal… to begin a specific speech or action" and is used here to indicate a recommended evaluative action. The strategy uses the threshold concepts of authority and format, as explained by the cues, to engage with both the container and content of a given source. Each cue is accompanied by one or more actionable tactics, informed by affective and metacognitive approaches and fact-checking practices, which help execute the strategy in the moment as readers engage with the source. Successfully evaluating sources in the internet era requires forethought, planning, and nimble thinking. Not all cues will work with all sources, and sometimes one cue or tactic will not yield particularly helpful information, requiring the reader to progress to another cue or tactic.

Each cue is formatted as a question and structured with a brief introduction including the following information:

- Strength: strength of the approach
- Effort: amount of effort it will take to investigate the cue
- Explanation: why the approach works
- Tactics: basic directions for how to investigate the cue

Cue: *Why am I looking for information?*

Strength: Strong

Effort: Easy to Moderate

Explanation: This is the first cue because it usually precedes the work of source evaluation. Readers are looking for information for a variety of reasons and that context influences the kinds of information sources that qualify as appropriate evidence. Evidence needed to make a decision about purchasing a car, for instance, is different than that required to make a scholarly argument. Reviewing the context of the information need allows the reader to choose appropriate systems for discovering information and to select the best cues for source evaluation once sources are located. Additionally, reflecting on the information need allows readers to make judgments about relevance throughout the evaluative work when reviewing sources, even before engaging with the content of the source meaningfully.

Tactics: Pause and reflect; Review the requirements of the task at hand; Seek additional information about the information task if the requirements are unclear

This cue is preparation for source evaluation. It situates the work of source evaluation in the context of the information need at hand, rather than an abstract search for "quality" sources. It acknowledges that different information needs require different types of evidence and different levels of rigor. Although the approach outlined in this paper centers the container and the question of trusting a source, the CC Group acknowledges that questions of relevance and quality are heavily influenced by the wider context of the information need.

The tactics for this cue involve reflection about the information need. This reflection includes a check to make sure that the requirements of the need are understood, especially if the need arises from circumstances which are externally driven, such as an assignment for school or work, rather than internally driven, such as curiosity. This moment may reveal a lack of clarity about the information need which can be addressed before beginning the search for information and the accompanying source evaluation.

Cue: *How did this come into my life?*

Strength: Medium to strong

Effort: Easy to challenging

Explanation: Building a habit of using this strategy is useful because information doesn't usually zip into a reader's life by accident. Using this cue, readers reflect on the steps they took to access the information and consider where a source is from as well as where it has been. Readers should note that this cue will vary greatly depending on the context of each information need. For instance, it's easy to accept a recommendation from a trusted expert, while it takes more effort to develop a new search strategy or verification technique. Additionally, an understanding of how information flows through organizing systems requires concerted effort but can lead to powerful evaluation skills.

Tactics: Pause to acknowledge and check gut feelings about the initial appeal of a source; Develop or reflect on a search strategy; Go upstream; Consider credible recommendations

If the cue *How did this come into my life?* sounds like it's out of an advice column or a love song, it's because the strategy involves reflection about notions of serendipity and intent during the information seeking process. If a source looks hopeful at first glance, take a pause. This small tactic helps readers acknowledge and check gut feelings about the appeal. Is it simply that it's the first result in a search and seems relevant enough? Was it recommended by a trusted friend, family member, or professor?

Recommendations are wonderful if they come from relevant cognitive authorities. Scholars regularly use the citations from scholarly journal articles and books as recommendations. Even a sketchy-seeming website recommended to a student by their professor is probably a good source—it may document something illegal where information is hard to find. The key to using this tactic is ensuring that the recommender is someone who can be trusted to give good information in the specific context of an information need.

Additionally, readers can benefit from being mindful of the actions they took to get to the information at hand. There is overlap between this tactic and the ACRL Frame[1] "Searching as Strategic Exploration," which considers scope, identifies major players in a conversation, and matches information needs to appropriate search tools, all while maintaining a flexible attitude during the search process (American Library Association, 2015). These knowledge practices and dispositions may be considered as part of a quick mental retracing of a search strategy. Readers might consider: Why is it different to search in an academic library database compared to Google? What keywords were used to perform a search? Reflecting on a search strategy may also reveal how organizing systems collect and distribute information.

Readers can also adopt tactics from fact-checking, such as tracing a source's trajectory back to its origin to make inferences about credibility. The spread of information is useful in contextualizing and assessing the value of where it has been as well as noticing where it hasn't been. In other words, has the information passed through a cognitive authority whose expertise and persistent reliability have previously established intellectual trust? For example, a story has circulated in partisan, personal blogs but a mainstream news outlet like CNN hasn't reported on it at all. However, fact-checking can be difficult to do because there are many variables involved in each case. For example, an attribution that isn't hyperlinked can be verified with a normal web search while an orphan image will be better suited with a reverse image search. Additionally, it's easy to unwittingly shift from fact-checking context to fact-checking content claims, which falls outside the scope of this strategy. Professionals easily spend many hours and use a variety of tools, like Google translate or advanced search filtering tools, to retrace the spread of information and find the original source of a claim (Graves 2017, p. 525). Therefore, in the

[1] The ACRL Board adopted the Framework for Information Literacy for Higher Education on January 11, 2016. The Framework supports librarians in teaching information literacy concepts. It is comprised of six interrelated big ideas in information literacy conceptualized as frames.

short-term, readers might hone their awareness of primary versus secondary sources. Ultimately, readers should be aware that nuanced fact-checking skills take time to develop, and in the absence of those skills, readers should move on to another cue.

Cue*: Is it easy to investigate?*

Strength: Medium to strong

Effort: Easy to challenging

Explanation: Transparency is the quality of being clear and easily perceivable, and the *Is it easy to investigate?* cue leverages that quality to establish trust between a reader and a source. When a source is transparent, a reader can use the container (along with some specific content) to look into its purpose and process without having been on the creation side of the information's production. Transparency manifests in a variety of ways, including the organization and clear labeling expected from particular formats. Additionally, enough details about sources referenced are clearly available, such as with a bibliography or hyperlinks. A quick trip to the About page should clearly indicate intentions for putting the information out into the world, perhaps explaining goals (e.g., through a mission statement or personal narrative), datasets, funding, or a code of ethics (common in journalism). The more that other sources corroborate purpose and process claims, the more readers will be able to trust the source.

Tactics: Note whether it's easy to identify the format; Check the About page for purpose and process information; Check a few referenced sources; Perform a few web searches to verify accuracy.

Schnackenberg and Tomlinson (2016) define transparency as "the perceived quality of intentionally shared information from a sender" (p. 1788). Applied to source evaluation, transparency depends on the disclosure, clarity, and accuracy of a source's purpose and process via the product. Disclosure requires that purpose and process information are visible or accessible from within the product itself. Clarity requires that the disclosed information is coherent and may manifest as content (such as with language) or through format (such as with labels and menus). Finally, accuracy requires verification of purpose and process claims. Summing up the strength of transparency, a professional fact-checker noted, “when you publish links to the original report, when someone else can follow your reporting and really take it apart, it’s more scientific. It’s not perfectly scientific, but anyone can verify it” (Graves, 2016a, p. 125).

Transparency is best achieved when information comes packaged in an established information format. Patterns within the physical structure of a source visually cue a reader to recognize a format (see: *Do I know what this is?*). If readers cannot recognize a stripped-down digital format, it is difficult to have expectations about the content and purpose, and that raises skepticism and anxiety about the workload or skills required to make a decision about trustworthiness. Therefore, a dump of intentionally shared information with poor organization does not allow for transparency, whereas a source that follows established format conventions enables the reader to easily locate purpose and process information and verify claims.

If an organization is not upfront about their purpose, or if they strongly emphasize neutrality on a topic, readers should take notice and dig deeper with some lateral reading. In the case of the website for the Center for Immigration (CIS), which claims to be a neutral nonprofit devoted to research, a Google search quickly exposes the political leanings and agenda of the organization. Within the first few Google results, the Southern Poverty Law Center and Politico weigh in with regards to classifying the CIS as a hate group. The CIS made a claim about their neutrality, but further investigation reveals that claim to be false. Using this cue, readers aren’t judging CIS content, but they are likely recalculating the level of trust initially extended to the source due to the fact that the CIS hasn't been transparent about their bias.

This cue's limitation is that it favors sources with widespread reputations and will overlook credible sources if the creator has not amassed enough cognitive authority for a quick Google search to turn up other sources connected to or discussing the merits of the source in question.

Cue: *Do I know what this is?*

Strength: Strong; Weak if asking "How does it look?" instead

Effort: Moderate

Explanation: The crux of this cue is recognizing that a great deal of information is delivered as an instance of a particular format. This recognition shifts the initial visual evaluation of a source from "How does it look?" to "Do I know what this is?" If readers are already familiar with a given format, they will quickly recognize a number of indicators that help them identify the format of an information source. For example, a scientific research article in a scholarly journal usually has an Introduction, Methods, Results, and Discussion section as well as other elements. When readers make a quick visual evaluation and recognize an information format, they can judge the information the source is communicating more effectively. For instance, readers may recognize a forum thread, like *Reddit*, or an advice column, like *Ask-A-Manager*, and adjust their expectations accordingly. However, this quick visual evaluation can mislead readers if they focus on subjective judgments of a source's appearance, as in "this website looks professional," rather than concrete indicators of known formats.

Tactics: Pause; Look for obvious labels to indicate format; Look for other indications of a known format; Avoid judgments based on visual features that do not connect to format; If no format can be discerned, move on to another cue.

Everyone uses a form of this strategy: a quick visual evaluation of surface indicators. It's often deployed before conscious thought begins. When an information source provokes an immediate feeling or a snap judgment, readers are often relying on the overall appearance of a source. This cue is the origin of commonly heard reasoning about online information such as "it looks professional." In many cases, a quick visual evaluation is all the reader requires before deciding to use the content. In the absence of knowledge about formats, this can be a weak strategy resulting in poor outcomes. When deployed properly, however, it can help situate the information found in a website by identifying the purpose and process. For example, when confronted with a web page titled "The 35 Greatest Speeches in History," librarians take a quick glance around before engaging with content beyond the title. They notice what kind of information format it is—a personal blog, a newspaper, an advocacy organization, or something else. They also notice if the format is difficult to identify and become a bit suspicious. Suspicion then provokes a closer examination. These visual indicators are powerful because readers often don't process them consciously and may only become aware of doing so if something seems wrong.

Given the relatively automatic nature of this cue, what matters is not developing the habit of using it, but becoming aware of it, noticing when such automatic judgments are made, and developing knowledge of formats to strengthen those judgments. Learning to pause and recognize when the decision has already been made is the first tactic. Secondary tactics, after the initial pause, might start with looking for obvious labels indicating format—such as "Research Article," "Review," "Opinion," or "Commentary." Format indicators beyond obvious labels might also help the reader discern a purpose for a given piece of information, through conducting what might be termed a brief format analysis. These indicators could include dates, lists of references or sources cited, volume/number information, About pages, layout, author credentials or affiliations—anything that lets the reader know how they might categorize this source or that gives concrete information about the purpose and process of the source. Classifying a source as a known format is a more advanced tactic and becomes easier with practice and experience.

The limitations of this cue include its weakness when deployed without an awareness of format and the reality that some information found online doesn't conform to the standards of any one format. Though recognizing that a piece of online information isn't a recognizable format is potentially a meaningful clue.

Cue: *Is this reviewed?*

Strength: Medium to strong

Effort: Easy to challenging

Explanation: Review is a quality control process through which a creator's work is vetted by a group of experts prior to dissemination. Some common examples include academic peer review (e.g., scholarly journals) and editorial review (e.g., books, newspapers, magazines). With more information transitioning online, determining whether a work has undergone review can be difficult. In these instances, evaluative effort is shifted onto readers. Over time, readers will develop familiarity with certain formats and publishers, recognizing when the content they encounter is the product of a probable review process (e.g., an original research article).

Tactics: Look for labels, such as "peer-reviewed"; Look up a source in a search engine, library catalog, or in reference sources; Check for an About page.

Traditionally, certain types of information sources were reviewed through publishing standards and editorial processes prior to dissemination. One means to recognize authors as authorities in their fields is through sustained, discursive practices in reviewed publications whereby a group of experts review their peers' work and acknowledge that they have disciplinary expertise, competence, and credibility. Review processes are not foolproof methods for quality assurance, however, as they do not necessarily resolve issues of bias, transparency, or representation within communities (Badke, 2015; Meola, 2004).

Determining which information is reviewed has become more difficult with the online dissemination of non-reviewed and reviewed content appearing alongside sources that are in some review stage or process but not readily apparent. Some information sources unique to a digital format are typically non-reviewed (e.g., personal web pages or blogs). Some online information falls in between reviewed/non-reviewed, such as government documents, grey literature, law reviews, or pre-published items in some stage of the review process (Badke, 2015; Connaway, 2012; Harrington et al., 2019; Raven, 2012). Crowdsourced projects also confound this evaluative binary because they leverage the expertise of many authors and editors, sparking arguments over quality control processes. *Wikipedia* is one such project, which has aroused debate since its inception (Badke, 2015; Goldman, 2010; Kittur and Kraut, 2008; Niederer and Dijck, 2010; Schwartz, 2006; Stvilia et al., 2005). While it is commonly asserted that *Wikipedia* cannot be trusted because it can change overnight due to its lack of quality control, in actuality the oversight of software and editors (Niederer and Dijck, 2010), and a cadre of insiders (Schwartz, 2006) keep it from "degenerating into chaos" (Badke, 2015, p. 195). This wisdom of the crowd has been demonstrated as being comparable to the findings of a singular expert (Badke, 2015; Giles, 2005; Surowiecki, 2004). While crowdsourced information proliferates online, however, traditionally produced expert information is still seen as more credible when compared to information produced collaboratively online (Badke, 2015; Goldman, 2010).

Evaluating review processes becomes easier with time, practice, and exposure to multiple and varied formats. By becoming aware of where to look for publisher, author, and editorial information, readers develop familiarity with online formats, review processes, or contributor guidelines which may exist for certain publishers. Readers might also search for clues or leave a source to find external information about it in order to ascertain whether it has undergone review. For example, some websites will list a contact author or moderator in their About page, which indicates some quality control process, but in order to verify the extent of the review process, or the procedures behind the website's quality control, a reader should contact the author/moderator of the website. Some online sources act as hosting services instead, in which case there are probably no real review processes in place. Other websites may have review processes, but they are not transparent to readers (e.g., websites like *Happify* or *erowid.org*). In such cases, readers should seek a second opinion via a search engine query, reference sources such as *Wikipedia*, or by asking a trusted expert.

Cue*: Does the creator know what they're talking about?*

Strength: Medium to strong

Effort: Easy to moderate

Explanation: As an alternative to directly evaluating a source, a reader may shift their focus to the author or creator. If evidence suggests that they know what they're talking about, the source is more likely to be a good one. A reader may consider if the author has some credential, affiliation, or evidence of a reputation that suggests they are an expert: has a PhD, is a medical doctor, is affiliated with a well-known organization or institution, has won a prestigious award, etc. This type of judgment is limited by domain—don't ask a chef for political advice or an astronomer about crime. Sometimes credentials can hide incompetence or bias, but they are a starting place. Additionally, a reader can look for information about the creator outside of the source itself and evaluate any information found to determine if the author is a cognitive authority; that is, whether they are accepted as a trustworthy expert by their disciplinary community.

Tactics: Look for information about the creator via the source itself; Look for information about the creator using an outside reference source or search engine (lateral reading).

If readers can assess the expertise of a creator—including authors, organizations, and publishers that make information available—and build trust in their knowledge, they can often extend that trust to a source itself. Without being a subject expert, readers cannot easily evaluate the truthfulness or integrity of source content, but they can pursue a strategic evaluation to see if they trust the creator, based on the creator's position as a trusted expert in a discipline or peer community.

A source may include some information about a creator that lends evidence of expertise (e.g., credentials, professional affiliation, brief biography, About page, links to other articles). Sometimes, trusting this information is enough—a reader may decide to trust an investigative news article when the author is identified as a Pulitzer Prize winner. But looking to the information provided about an author or creator via a source itself may be limiting in its perspective.

The practice of looking to outside sources to investigate a creator's credentials, additional work, and external evidence of professional reputation is a form of parallel reading, common to the work of fact-checkers (Wineburg and McGrew, 2017). In its most convenient form, parallel reading is facilitated through a web search. For example, consider the author of an article about climate change on the Heartland Institute website. The author's biography on the Heartland Institute's website describes the individual as an accomplished PhD scientist and prolific published writer. However, looking *outside* this website via a quick Google search identifies a number of other established sources describing the author as a notorious climate change skeptic who no longer engages in the mainstream scientific community—in other words, not a cognitive authority among a majority of disciplinary peers. A Google search of the

"Heartland Institute" brings up other sources identifying it as a highly partisan think tank. Parallel reading can also take the form of consulting traditional reference sources (e.g., *Who's Who, Contemporary Authors Online*, *GuideStar*). Ideally, if using unfamiliar sources, this exercise also incorporates cross-checking to best gauge the consensus of popular opinion across multiple outside sources.

Seeking information about a creator outside of a source itself isn't without its shortcomings, one of which may be the difficulty in deciding which outside sources to trust. Available information will vary depending on the situation and field, but readers may be advised to consider specific types of sources, such as news media, academic or professional websites with biographical information, Google Scholar author profiles, social media pages, *Wikipedia* pages, or traditional library reference resources. Using multiple sources, a reader can investigate the general consensus on the creator's position as a cognitive authority. Another potential shortfall is in the context of an affective or emotional reaction, whereby a reader's assessment of cognitive authority is informed by their own perspective and ideology.

Cue: *Does the information make sense?*

Strength: Weak, except for subject experts

Effort: Often automatic; when mindfully considering, easy to challenging depending on the level of subject expertise

Explanation: When something "makes sense," a judgment is based on the content—usually after a brief skim or read of a short snippet. This judgment is often something readers don't even think about; it happens naturally, instinctively. But humans aren't all that good at making this kind of assessment in the absence of some serious expertise in the matter at hand, and readers need to be particularly careful with inflammatory or emotional content. Over time, readers can build expertise in specific areas and critical thinking skills through the study of logic and reasoning, math and statistics, language and rhetoric, and information studies, but the *Does the information make sense?* cue is not particularly effective for student readers.

Tactics: Pause and consider instinctive judgments; If an expert, evaluate content; If a non-expert, discard source if of obvious poor quality or try another cue if not sure.

When initially approaching an information source, readers are often prone to focus on the content to determine credibility and relevance. This evaluation may simply be based on an initial read of a handful of sentences—a tactic readers often use instinctively. However, this sort of instinctive judgment of the quality and trustworthiness of content is not strategic and is often ineffective. It is important for readers to develop a habit of self-reflection, to pause and recognize when they make instinctive judgments about source content, and proactively take steps to consider more critical evaluative practices or cues.

Seeking to answer the cue *Does the information make sense?* is a process by which readers determine a baseline level of the content's "intrinsic plausibility," a means of conferring cognitive authority to a source on the basis that it generally sounds truthful and is therefore worthy of trust (Wilson, 1983, p. 24-25). Even with a closer read, however, most readers don't have the ability to judge if the content actually *is* truthful. Rather, the content-immersed evaluation is based on the hedging of an non-expert reader. For example, a librarian may read a magazine article on human genome editing that seems detailed, well-written, and objective. Her impression after reading may be that the article makes sense, but she probably doesn't possess the scientific subject expertise to know that it is accurate or thorough. She relies on other means to determine whether the article is worthwhile.

This cue can be effective when readers build expertise in specific subject areas or knowledge domains to an extent that makes critical reading a feasible tactic. Building critical thinking, logic, reasoning, and fact-checking skills is another way to give readers a leg up on analyzing the plausibility of information content, arguments, and evidence, but without subject expertise, these processes also remain difficult.

Further complicating content-based evaluations, a decision about whether or not information makes sense is often based on an affective response triggered by the reader's perspective, assumptions, and emotions (Bluemle, 2018; Cooke, 2018; Sullivan, 2018). In this context, a reader's ability to evaluate an argument or claim is particularly problematic because a decision may be based more on motivated reasoning or confirmation bias than on logical considerations of the reliability and accuracy of the information itself.

Readers will benefit from developing a metacognitive awareness for when they base their judgments on an instinctive assessment of information—which is one way to mindfully consider the role that emotions and perspectives play in source evaluation. Assessing whether or not information makes sense is often most effective in the context of weeding out overtly poor sources—it can be much easier to identify what *doesn't* make sense or is illogical, even without subject expertise (e.g., clearly false statements, poor grammar, etc.). All this is not to say that reading sources isn't important. Rather, while reading is critical to the research and learning process, reading sources as a primary step in evaluating their own validity is limiting in its effectiveness.

Conclusion

Evaluating information sources is a common activity that encompasses a range of everyday behaviors. People encounter sources of information all the time—increasingly in a digital form—and must decide which sources to trust. Without expertise in the topic at hand or critical evaluative experience, the source evaluation process remains difficult, and no single existing strategy or checklist is a magic bullet to getting source evaluation right.

One limiting factor of this evaluative strategy is that it only guides readers so far in deciding whether or not to use a source. The set of cues is intended to answer a single overarching question: “How much trust do I grant this source?”—a first step in choosing sources to meet an information need. This question centers the credibility, quality, and authority of information rather than the context in which students may use a source—their scope and purpose. A source may be deemed trustworthy, but at the same time irrelevant in a given context. The question of relevance may be considered briefly when reflecting on the information need and deciding whether to review a source. But the issue of relevance is more thoroughly addressed as a second step in the evaluative process when direct, in-depth engagement with the content or information in a source is critical to deciding whether or not to actually use it. This evaluative strategy was developed through the study of theoretical and practical concepts as well as anecdotal experience; it has not yet been studied in an applied research context.

The proposed evaluative strategy draws from existing models and concepts common to information literacy and remixes many of these ideas. It provides substantive context for what each evaluative cue means in the larger information landscape, which differentiates it from other models intended for quick consumption. The CC Group aims to provide an accessible contextual framework for source evaluation, taking into account the container as well as the content. It is rooted in theoretical strategies and carried out through a series of practical tactics informed by concrete fact-checking moves and metacognitive awareness. Because of the significant contextual discussion, this strategy is not brief; it intentionally does not take the form of a checklist. For this reason, it may best be used as a conceptual tool for librarians as they work with students rather than as a tool meant for direct student use. In the future, the CC Group plans to study student decision-making practices in the context of online source evaluations as mapped to the new strategy.

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Acronyms/Checklists	Read More	Criteria						
CRAAP	https://tinyurl.com/y6ztmdj6	Currency	Relevancy	Accuracy	Authority	Purpose		
RADCAB	https://www.radcab.com/	Relevancy	Appropriateness	Detail	Currency	Authority	Bias	
CARS	https://tinyurl.com/y9klsl8w	Credibility	Accuracy	Reasonableness	Support	Also: design/style	Also: electronic sources	
CARRDSS	https://tinyurl.com/z54vkql	Credibility	Accuracy	Reliability	Relevance	Date	Sources	Scope
CARDIO	https://tinyurl.com/y26vy97p	Currency	Authority	Relevance	Documentation	Information Type	Objectivity	
CRITIC	https://tinyurl.com/y564j9br	Claim	Role of claimant	Information backing the claim	Testing	Independent verification	Conclusion	
5 Ws	https://tinyurl.com/ahzbjos	Who	What	Where	When	Why		
RADAR	https://tinyurl.com/ycfrdoeq	Rationale	Authority	Date	Accuracy	Relevance		
BEAM	https://tinyurl.com/y2obfw4p	Background	Exhibit	Argument	Method			
IFIAPPLY-CRAAP	https://tinyurl.com/yybv7zfu	Identify emotions	Find unbiased sources	Intellectual courage to seek other sources that challenge my views	Authority	Purpose	Publisher	Year of publication
#VALUE!	https://tinyurl.com/y5x4mrrs	Presentation (is the information clear)	Relevance	Objective	Method	Provenance (who authored this information, where did it come from)	Timeliness	
AAOCC	https://tinyurl.com/y9x5bbo7	Authority	Accuracy	Objectivity	Currency	Coverage		
IMVAIN	https://tinyurl.com/imvain	Independent	Multiple sources quoted	Verified with evidence	Authoritative	Informed	Named sources	
CARBS	https://tinyurl.com/yxg4vah3	Currency	Authority	Relevancy	Bias or factual	Scholarly or Popular		
DUPED	https://tinyurl.com/yxg4vah3	Date	Unambiguous	Purpose	Expertise	Determine (Source)		
PROVEN	https://tinyurl.com/y65pbr9u	Purpose	Relevance	Objectivity	Verifiability	Expertise	Newness	
SCAAN	https://tinyurl.com/yxg4vah3	Source type	Currency	Accuracy	Authority	Neutrality		

Acronyms/Checklists	Read More	Criteria						
CRAAP	https://tinyurl.com/y6ztmdj6	Currency	Relevancy	Accuracy	Authority	Purpose		
RADCAB	https://www.radcab.com/	Relevancy	Appropriateness	Detail	Currency	Authority	Bias	
CARS	https://tinyurl.com/y9klsl8w	Credibility	Accuracy	Reasonableness	Support	Also: design/style	Also: electronic sources	
CARRDSS	https://tinyurl.com/z54vkql	Credibility	Accuracy	Reliability	Relevance	Date	Sources	Scope
CARDIO	https://tinyurl.com/y26vy97p	Currency	Authority	Relevance	Documentation	Information Type	Objectivity	
CRITIC	https://tinyurl.com/y564j9br	Claim	Role of claimant	Information backing the claim	Testing	Independent verification	Conclusion	
5 Ws	https://tinyurl.com/ahzbjos	Who	What	Where	When	Why		
RADAR	https://tinyurl.com/ycfrdoeq	Rationale	Authority	Date	Accuracy	Relevance		
BEAM	https://tinyurl.com/y2obfw4p	Background	Exhibit	Argument	Method			
IFIAPPLY-CRAAP	https://tinyurl.com/yybv7zfu	Identify emotions	Find unbiased sources	Intellectual courage to seek other sources that challenge my views	Authority	Purpose	Publisher	Year of publication
PROMPT	https://tinyurl.com/y5x4mrrs	Presentation (is the information clear)	Relevance	Objective	Method	Provenance (who authored this information, where did it come from)	Timeliness	
AAOCC	https://tinyurl.com/y9x5bbo7	Authority	Accuracy	Objectivity	Currency	Coverage		
IMVAIN	https://tinyurl.com/imvain	Independent	Multiple sources quoted	Verified with evidence	Authoritative	Informed	Named sources	
CARBS	https://tinyurl.com/yxg4vah3	Currency	Authority	Relevancy	Bias or factual	Scholarly or Popular		
DUPED	https://tinyurl.com/yxg4vah3	Date	Unambiguous	Purpose	Expertise	Determine (Source)		
PROVEN	https://tinyurl.com/y65pbr9u	Purpose	Relevance	Objectivity	Verifiability	Expertise	Newness	
SCAAN	https://tinyurl.com/yxg4vah3	Source type	Currency	Accuracy	Authority	Neutrality		

Models/Frameworks	Read More	Criteria										
RUSA evaluating primary sources	https://tinyurl.com/y5cvm9nb	Author	Biases/ Influences	Intended audience	Origin	Significance when it was created	Edited/ Translated	Time period it was created	Limitations of source	How does your interpretation fit with others'?		
6 Cs of primary source analysis	https://tinyurl.com/yy56l9qd	Content	Context	Citation	Connections	Communica-tions	Conclusions					
Purdue OWL Evaluating Sources	https://tinyurl.com/y7egea5p	Authorship/ Affiliations	Sources/ Quotations	Bias/Special interests	Author qualifications	Publication information	Also: evaluating while reading					
USC Social Sciences: Evaluating Sources	https://tinyurl.com/y9nhtzx3	Author	Date	Edition/ Revision	Publisher	Title of source	Intended audience	Objectivity	Coverage	Writing style	Evaluative reviews	
Berkeley Guide on Evaluating Sources	https://tinyurl.com/z9qq2z4	Authority	Purpose	Publication and format	Relevance	Date	Documenta-tion					
Georgetown Tutorial on Evaluating Internet Sources	https://tinyurl.com/y7qqzk95	Authority	Purpose	Objectivity	Accuracy	Reliability/ Credibility	Currency					
Big 6	https://thebig6.org/	Task definition	Information seeking strategies	Location and access of sources	Use of information	Synthesis	Evalutation					
Kuhlthau Guided Inquiry Design	https://tinyurl.com/hkxnalx	Open	Immerse	Explore	Identify	Gather	Create and share	Evaluate				
Posttruth, Truthiness, and Alternative Facts: Information Behavior and Critical Information Consumption for a New Age (Nicole Cooke)	https://tinyurl.com/y2xdu6s2	Recency/Date (Currency)	Examine the URL	Language	Plausibility/ Credibility	Reputation/ Bias	Reported elsewhere? Triangulation of sources	Evaluate	Sort	Effectively use	Seek	Find
4 Types of Credibility, Web Credibility Models (B.J. Fogg)	https://tinyurl.com/y452vl2g	Presumed	Reputed	Surface	Earned							
Meltzoff & Cooper; Teaching trustworthiness of online information to students	https://tinyurl.com/y5m9uhl9	Habit/tenacity	Authority	Democratic judgment	Reasoning	Sensory information	Empirical/ Experimental methods					
ACRL Framework	https://tinyurl.com/oohrwzw	Authority is contstructed and contextual	Information creation as a process	Information has value	Research as inquiry	Scholarship as conversation	Searching as strategic exploration					
New Yorker article on data literacy	https://tinyurl.com/y39xkajk	Who is telling me this? How does he or she know it? What is he or she trying to sell me?	Conclusions that dramatically confirm your personal opinions or experiences should be especially suspect.	Language	Evidence	Guesstimation techniques to check the plausibility of data-based claims.	Watch out for unfair comparisons	Remember that correlation doesn't imply causation.	Machines are as fallible as the people who program them—and they can't be shamed into better behavior.	Like all data-based claims, if an algorithm's abilities sound too good to be true, they probably are.		
Research Toolkit (Margolin and Hayden)	https://tinyurl.com/yxrojgwr	What is my research question?	How do I find sources?	How do I read this stuff?	How do I use sources in my paper?	Faculty guide						
Four Moves and a Habit (Mike Caulfield)	https://tinyurl.com/mjt82gv	Check for previous work	Go upstream to the source	Read laterally	Circle back	Check your emotions						

Models/Frameworks	Read More	Criteria										
RUSA evaluating primary sources	https://tinyurl.com/y5cvm9nb	Author	Biases/ Influences	Intended audience	Origin	Significance when it was created	Edited/ Translated	Time period it was created	Limitations of source	How does your interpretation fit with others'?		
6 Cs of primary source analysis	https://tinyurl.com/yy56l9qd	Content	Context	Citation	Connections	Communica-tions	Conclusions					
Purdue OWL Evaluating Sources	https://tinyurl.com/y7egea5p	Authorship/ Affiliations	Sources/ Quotations	Bias/Special interests	Author qualifications	Publication information	Also: evaluating while reading					
USC Social Sciences: Evaluating Sources	https://tinyurl.com/y9nhtzx3	Author	Date	Edition/ Revision	Publisher	Title of source	Intended audience	Objectivity	Coverage	Writing style	Evaluative reviews	
Berkeley Guide on Evaluating Sources	https://tinyurl.com/z9qq2z4	Authority	Purpose	Publication and format	Relevance	Date	Documenta-tion					
Georgetown Tutorial on Evaluating Internet Sources	https://tinyurl.com/y7qqzk95	Authority	Purpose	Objectivity	Accuracy	Reliability/ Credibility	Currency					
Big 6	https://thebig6.org/	Task definition	Information seeking strategies	Location and access of sources	Use of information	Synthesis	Evalutation					
Kuhlthau Guided Inquiry Design	https://tinyurl.com/hkxnalx	Open	Immerse	Explore	Identify	Gather	Create and share	Evaluate				
Posttruth, Truthiness, and Alternative Facts: Information Behavior and Critical Information Consumption for a New Age (Nicole Cooke)	https://tinyurl.com/y2xdu6s2	Recency/Date (Currency)	Examine the URL	Language	Plausibility/ Credibility	Reputation/ Bias	Reported elsewhere? Triangulation of sources	Evaluate	Sort	Effectively use	Seek	Find
4 Types of Credibility, Web Credibility Models (B.J. Fogg)	https://tinyurl.com/y452vl2g	Presumed	Reputed	Surface	Earned							
Meltzoff & Cooper; Teaching trustworthiness of online information to students	https://tinyurl.com/y5m9uhl9	Habit/tenacity	Authority	Democratic judgment	Reasoning	Sensory information	Empirical/ Experimental methods					
ACRL Framework	https://tinyurl.com/oohrwzw	Authority is contstructed and contextual	Information creation as a process	Information has value	Research as inquiry	Scholarship as conversation	Searching as strategic exploration					
New Yorker article on data literacy	https://tinyurl.com/y39xkajk	Who is telling me this? How does he or she know it? What is he or she trying to sell me?	Conclusions that dramatically confirm your personal opinions or experiences should be especially suspect.	Language	Evidence	Guesstimation techniques to check the plausibility of data-based claims.	Watch out for unfair comparisons	Remember that correlation doesn't imply causation.	Machines are as fallible as the people who program them—and they can't be shamed into better behavior.	Like all data-based claims, if an algorithm's abilities sound too good to be true, they probably are.		
Research Toolkit (Margolin and Hayden)	https://tinyurl.com/yxrojgwr	What is my research question?	How do I find sources?	How do I read this stuff?	How do I use sources in my paper?	Faculty guide						
Four Moves and a Habit (Mike Caulfield)	https://tinyurl.com/mjt82gv	Check for previous work	Go upstream to the source	Read laterally	Circle back	Check your emotions						