Institutions of epistemic vigilance: the case of the newspaper press

Ákos Szegőfi[[1]](#footnote-1) & Christophe Heintz[[2]](#footnote-2)

## Abstract

*Can people efficiently navigate the modern communication environment, and if yes, how? We hypothesize that in addition to psychological capacities of epistemic vigilance, which evaluate the epistemic value of communicated information, some social institutions have evolved for the same function. Certain newspapers for instance, implement processes, distributed among several experts and tools, whose function is to curate information. We analyze how information curation is done at the institutional level and what challenges it meets. We also investigate what factors favor the cultural evolution of institutions of epistemic vigilance: these include people’s preference for accurate and reliable information and their ability to assess communicated information in view of the source’s epistemic authority; but also contingent historical factors that make it worth—or not—to contribute to the maintenance of institutions of epistemic vigilance. We conclude the paper by considering the challenges and vulnerabilities of these institutions in the Digital Age.*

# Introduction

We are facing an unprecedented richness of communicated testimonies – a phenomenon called *information overload* (Eppler & Mengis, 2004; Roetzel, 2018) –, accompanied by a wide market of cheap testimonial sources (news outlets, social media, etc). This poses a processing problem for information-hungry human agents or *informavores* (Dennett, 1991), endowed only with limited information processing capacities. Which source to trust out of all the potential ones? And which testimonies to engage with? In this paper, we aim to describe what solutions societies have come up with to address this problem, while also explaining potential weak points of these solutions in our current Digital Age.

Compared to industrialized societies, hunter-gatherer groups relied mainly on direct, verbal, face-to-face communications – “all resources, including energy, materials and information, are transferred almost exclusively by direct human-to-human contact” (Hamilton et al., 2007). This had important consequences. In particular, communicating false information came with the costs of being perceived as an unreliable communicator, and thus losing one’s influence. This system, occasionally depicted by Quandt as a “simple society” in terms of its information network structure (Quandt, 2012; Quandt, 2011), has changed in major ways in the past 200 years in most societies. Has it changed for the better or for the worse? Does it render us more likely to be misinformed?

Humans possess a set of evolved capacities to assess the veracity of communicated testimonies, collectively known as capacities of *epistemic vigilance* (Sperber et al., 2010). These capacities have been documented in adults, children and infants (Bergstrom, 2012; Harris & Corriveau, 2011; Mascaro & Morin, 2014; Mascaro & Sperber, 2009; Mercier, 2020; Stengelin et al, 2018; Vanderbilt et al., 2018). The function of epistemic vigilance is fulfilled through monitoring both the source and the content of communication. Experimental evidence shows that we are, indeed, sensitive to the perceived *benevolence* - whether the source has any reason to lie (Mercier & Miton, 2019; Deljoo et al, 2018) - as well as the competence of communicators, that is, the source’s ability to faithfully transmit information (Bovens & Hartmann, 2003; Jarvastad & Hahn, 2011; Olsson, 2011; Collins et al, 2018; Pallavicini et al., 2021). Capacities of epistemic vigilance operate on the content of testimonies too: it checks the coherence of novel information with prior beliefs and assesses reasoning (Mercier, 2020; Mercier & Sperber, 2017). These empirical evidence are supplemented with an evolutionary argument: for listeners to benefit from communication, they must be able to distinguish reliable communicators from unreliable ones, and plausible content from implausible ones (see also: Dawkins & Krebs, 1978; Krebs & Dawkins, 1984; Sperber, 2001). If humans were not vigilant but inherently gullible, then they would be exploited whenever they listen to others. This would make communication evolutionary unstable.

These capacities, however, might not be adapted to the current social environment, with its multiplication of testimonies from anonymous or unknown sources. The current “post-truth era” that societies experience might result from a classic evolutionary phenomenon: the capacities that were once adaptive for updating beliefs on the basis of communicated information are no longer fit for our new environment. Simply put: our Pleistocene cognitive apparatus is not adapted to the current communication environment. Against this evolutionary mismatch hypothesis, we will argue that contemporary informational environments need not make humans completely vulnerable to misinformation. On the contrary, contemporary communication environments can empower people’s ability to deal with huge amounts of communicated information and the consequent problems of information overload, the multiplication of sources of information, the anonymity of these sources, the difficulty of verifying the content of communicated information and, eventually, misinformation. The communication environment can and does include culturally evolved institutions of epistemic vigilance that efficiently distribute the task of information curation. Thus, institutions of epistemic vigilance shape the communicative environment so that our evolved cognitive capacities of epistemic vigilance remain efficient.

The paper is built on the following structure. In section 2, we introduce our concept of institutions of epistemic vigilance. We characterize such institutions as entities (1) that fulfill the cognitive function of curating communicated information; and (2) that involve several people who are organized in systematic ways, implement procedures and possibly rely on artifacts. Following this, we show how institutions of epistemic vigilance might allow for the optimal allocation of finite cognitive resources of people in an environment characterized by communicated information overload. In section 3., we highlight recent stages of the cultural evolution of the newspaper press and its interactions with the communication environment around Western populations. Finally, in section 4., we consider the apparent challenges arising from the mismatch between our current digital communication environment and traditional institutions of epistemic vigilance. We conclude by suggesting possible solutions at the institutional level for reducing misinformation

# What are institutions of epistemic vigilance?

Institutions of epistemic vigilance are social systems whose function is to deliver audiences testimonies that are good enough to be the basis of belief-updating. They consequently involve mechanisms assessing the accuracy of communicated information. We’ll show that the mechanisms themselves integrate social practices and possibly several individuals and artifacts.

One historically important example of an institution of epistemic vigilance is the newspaper press. Obviously, not all newspapers’ purpose is to become an institution of epistemic vigilance, but some do fulfill that role, or have done so in the past. The tasks of many newspapers include:

1. Gathering information (reporting);
2. Verifying information (exercising epistemic vigilance using experts and artifacts);
3. Editing information (organizing the verified information into a public representation that is understood by the target audience);
4. Distributing information.

Tasks 2 and 3, if performed, make the newspaper an institution of epistemic vigilance. There are many other such institutions outside of the press. Academia, for instance, maintains, and relies upon, the peer review process. Scientific publication is an institution that consists, among other things, in implementing procedures where manuscripts are reviewed by experts who assess whether it is worth publishing. Arguably, Web Search Engines too implement mechanisms of epistemic vigilance (Heintz, 2006).

The existence of institutions of epistemic vigilance raises related empirical questions: “why did they evolve?” and “how do they work?”. The answer to the why question would identify the factors that made the institution culturally successful. The answer to the ‘how’ question describes the mechanism that performs the function - checking the epistemic value of communicated information. We treat the why and how questions in turn in the following subsections.

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## 2.1. Why do institutions of epistemic vigilance achieve cultural success?

Sperber et al. (2010) explain why psychological mechanisms of epistemic vigilance have evolved. It is an argument that pertains to evolutionary biology, with a focus on cognitive biological traits. In order to benefit from communicated information, the argument goes, one must be able to select the information that warrants beneficial belief updating, and select out the information that would mislead us if we were to believe it. Institutions of epistemic vigilance have the same function: enabling people to benefit from communicated information and reduce the risk of being misled. Yet, their evolution is cultural rather than biological (and their implementation is social rather than neuronal, see next subsection). Explaining biological traits as adaptive, and thus as having a function, is a well-grounded method in evolutionary biology. In the social sciences, however, ascribing a function to a social institution must be done with great care. We say that a social institution has a function *X*, if the institution causally does *X* and doing so contributes to its cultural stability (Heintz, 2007). For instance, individuals might decide to finance the institution doing *X* because they want *X* to be done. For institutions of epistemic vigilance, we thus argue that it is what happens when *X* is replaced by “exercising epistemic vigilance”. We therefore need to analyze why and in what context people would contribute to the maintenance of institutions of epistemic vigilance.

While people do have psychological skills and can exercise epistemic vigilance on their own, there are nonetheless contexts where they can strongly benefit from trusting institutions with epistemic tasks. Distributing cognitive labor in this way can dramatically increase cognitive efficiency. Indeed, thoroughly assessing communicated information by oneself can be a very demanding task. Two aspects of the current environment make it especially daunting: first, many relevant communicated pieces of information are extremely difficult to assess and yet highly relevant. Think of medical information, for instance. Second, the availability of communicated testimonies have drastically increased in the 19th century and in our Digital age. In such contexts, people can strongly benefit from delegating the task of filtering out irrelevant and finding relevant information, thus decreasing the cognitive cost they would otherwise have to pay. Institutions of epistemic vigilance allow people to economize their own resources, like time and effort (Hames, 1992). Thus, by trusting institutions that exercise epistemic vigilance, people efficiently delegate assessment and curation of communicated information. In particular, reliable outlets enable information hungry people to follow a relatively effortless strategy to keep themselves safely and readily informed: they only need to stay vigilant towards the outlet they choose as a source, and need not assess the trustworthiness of the multiple sources from which the information comes from.

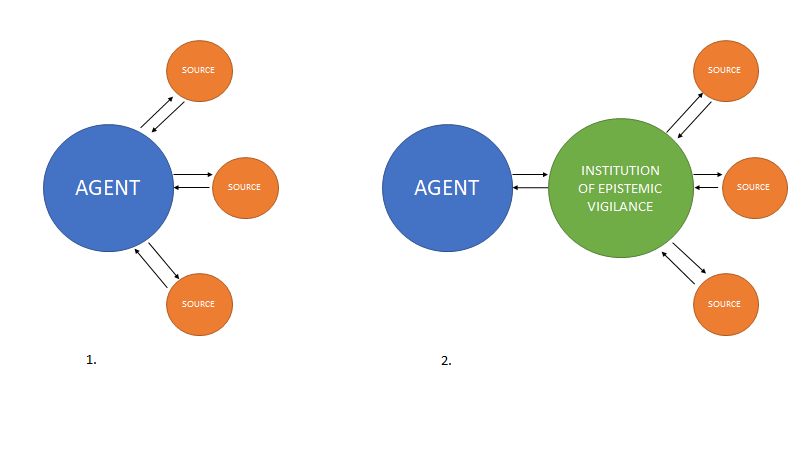


Fig. 1: *The information processing advantages of the newspaper press.* The first scenario to the left, the Agent exercises its epistemic vigilance towards a host of different testimonial Sources that provide communicated information. With the advent of the institutions of Epistemic Vigilance, the institution exercises epistemic vigilance on potential testimonial Sourcesas well as the content communicated by them**.** The institution gathers, curates, then presents a selection of information in a universal format understood by the Agent. This means (ideally) that the Agent only has to remain vigilant towards the institution, instead of a large number of potential sources.

In view of the above considerations, our hypothesis is that people are, in certain conditions, willing to delegate tasks of epistemic vigilance to reliable institutions. This willingness constitutes a factor of cultural success for institutions of epistemic vigilance, which perform a function that sufficiently many people recognise as useful. This is to say that some historical contexts, involving the multiplication of sources and other above-mentioned aspects, together with the humans’ preference for reliable information, cause cultural evolutionary processes that favor the constitution of institutions of epistemic vigilance. They are, in other words, factors of attraction towards institutions of epistemic vigilance (Sperber, 1996; Scott-Phillips et al. 2018). In particular, this led US Americans of the late 19th century to invest in journals that were epistemically vigilant. The reliability of institutions of epistemic vigilance can pay off, even though it does not always do. Institutions of epistemic vigilance face several challenges for maintaining their existence, which are, we will argue, well-illustrated with the current crisis sometimes called “post-truth era”.

## 2.2. How institutions of epistemic vigilance work

Let us look at an example of tasks of epistemic vigilance being performed inside a newspaper. Assume that a businessman, Mr. V., had been accused of murdering his business partner. How do we acquire the information that Mr. V. is a suspect, in an ideal world of institutions of epistemic vigilance? First of all, if there was a witness, he spoke to policemen. The police spokesperson communicated the details to a reporter. The reporter brings back what she got to know from the spokesperson’s already filtered account to the press office. If possible, she acquires additional evidence like pictures, interrogation excerpts or security camera footage. She also tries to gather additional witness testimonies. She then shares the draft with her editor. The editor searches for wording mistakes and inconsistencies, evaluates the evidential basis and the newsworthiness of the story. The editor decides whether the journalist had made justifiable conclusions based on available evidence, then sends it to the editor-in-chief for confirmation. The editor-in-chief makes a final decision on whether the article is living up to the standards of the news outlet, then the article is published. Based on personal preferences that were defined by a corporate algorithm, the testimony appears on our screens in a digital format: we are being informed that Mr. V. is accused of murdering his business partner. Consequently, we become averse to do business with Mr. V. in the future, despite the fact that we have *not* seen the murder, did *not* gather evidence ourselves, have *never* talked to Mr. V., the police or any of the witnesses directly.

As the above example shows, institutions of epistemic vigilance distribute the tasks associated with delivering reliable testimonies over several subcomponents. Several people are involved: witnesses, reporters, editors. Artifacts are used such as cameras, sound recorders, and open-source investigative softwares. The tasks are distributed in a systematic way, with each component doing its own share and passing over its output to another component. This systematic organization of cognitive labor forms a distributed cognitive system (Hutchins, 1995; Dror & Harnad, 2008): it is a cognitive mechanism, since it has a cognitive function, and it is decomposable into elements that implement specified subtasks, following specified procedures. Thus, institutions of epistemic vigilance can be studied as distributed cognitive systems with identifiable components that each have their role within the system. Interestingly, many of its elements will be individuals who exercise their psychological capacities of epistemic vigilance. For instance, a reporter will assess the benevolence and competence of her sources. Yet, institutions of epistemic vigilance are likely to be more than the simple sum of its agents. For instance, one property of these large distributed cognitive systems is the scope of the topics treated that is allowed by the specialization of the reporters.

In this section, we have characterized institutions of epistemic vigilance as social systems that have a cognitive function: to deliver audiences testimonies that are good enough to be the basis of belief-updating. We hypothesized that such institutions have evolved because performing their function did fulfill a need created by information overload, which was increased by social and technological innovations. by the information overload of social and technological innovations, with the World Wide Web being the last such innovation with a large impact on the informational environment (see §4). The need is a consequence of the scarcity of psychological cognitive resources facing the immense task of selecting relevant and reliable information in situations of information overload. Institutions of epistemic vigilance can take this task on because they implement social systems that distribute sub-tasks to sub-components.

# 3. The cultural evolution of the press: an overview

Here we illustrate how an institution of epistemic vigilance evolved using the case of the newspaper press. While institutions of epistemic vigilance can be found outside of the press, we also note that newspapers can function without implementing mechanisms of epistemic vigilance, as this is neither a necessary nor a sufficient condition to become successful. The press provides a good illustration for the points made above, as the traditional press sees its position challenged by the new communication environment.

3.1. Disrupting the communication environment

The disruption of the communication environment that some have come to call “post-truth” age, is not without precedence. The 19th century rise of mass media is a parallel example to understand the effects of disruption. As it was mentioned before, psychological capacities of epistemic vigilance have biologically evolved to handle verbal communication that mainly took place between people who knew each other. For the most part of human history, a relatively small number of testimonies arrived through other channels. During the Middle Ages in the West, scarce “news” was delivered by clerical networks, a few university postal services, news singers and couriers (Crombie, 2014; Menache, 1990). Due to high illiteracy rates, the messages intended for public use had to be proclaimed to audiences. The oral communication environment evolved somewhat slowly, and then changed suddenly during the 19th century (Slauter, 2015; Briggs & Burke, 2009). There were nonetheless regions that were outliers to this tendency and had higher literacy rates even before the 19th century (as well as regions where literacy remained relatively low during the same period). Other factors apart from literacy also limited the emergence of mass informing.

Although newspapers are present from the 17th century in Europe, a conjunction of factors inside the communication environment was required so they could transform into a medium that bears the main characteristics of a modern newspaper: *periodicity, universality, actuality* and *publicity* (Groth, 2011; Xavier & Pontes, 2019). The cognitive, political and technological limitations were surpassed around the late-19th century in the West.

As mentioned, in most countries the primary cognitive limitation was literacy. During the 19th century, educational acts were introduced to boost mass literacy. By the end of the century, 97.2% of the male population and 96.8% of the female population had acquired the ability of reading and writing in England, while in the 1841 census data the percentages were only 67.3% among males and 51.1% among females (Harris, 1987; Altick, 1957; Aspinall, 1946).

Next up are political limitations - censorship, monopolies and taxation - on information flow. Due to censorship, available newspapers and other, early forms of public information were often unreliable. Most of the outlets were not allowed to report on domestic politics, only foreign news, and that imposed constraints on their relevance (Pettegree, 2014). The interest in newspapers, pamphlets and broadsides increased in times characterized by the lack of centralized control over the flow of information (Raymond, 2003). During the 19th century, strict taxation had been abolished. This was particularly important, as taxation had always been a burden on circulation: it increased prices and put newspapers outside of the reach of working classes (Slauter, 2015). Decreasing prices coupled with growing literacy meant that newspapers became both cognitively comprehensible and financially available for large populations. Subsequently, the number of new outlets spiked, and the content of information grew richer. In England, the circulation skyrocketed from 39 million copies to 122 million copies between 1836 and 1854, in the period of decreasing taxes (Lake, 1984). Outlets were allowed to cover a wide range of topics, which established *universality*.

Technology also limited the distribution of information. Printing did exist, but the machinery had been operated manually. During the 19th century, the steam-powered rotary printing machine and the linotype increased production rates: from around 300 impressions/hour to 20.000 pages/hour (Ward, 2015). Locomotives and other means of transportation ensured the periodicity of papers. The telegraph appeared: it allowed newspapers to feature “breaking” news, ensuring the actuality of papers. The telegraph influenced how information was presented. The straightforward way in which information went through the wires inspired the “inverted pyramid”-structure that organizes information into a hierarchy of decreasing relevance (Ward, 2015; Stensaas, 1987). Previously, news had been listed according to the destination of the source rather than the topic or content (Pettegree, 2014).

The communication environment had changed rapidly in the West during the 19th century, in a matter of a few decades. The verbal, personal and infrequent became periodical, written and mass-distributed information, for a population that had been largely reliant on direct, face-to-face communication. Aided by the political and technological advances of the 19th century, newspapers transformed from vessels of propaganda into sources of entertainment for the masses. Subsequently, to handle the hectic communication environment and a never-before-seen overload of testimonies, a number of outlets invested in the position of reliable information curators for the public. Emerging institutions of epistemic vigilance met with success because they solved, for the consumers, the information overload that news outlets themselves have partially created. This new communication environment brought along novel challenges for listeners, new opportunities for deceivers and new tools to construct institutions of epistemic vigilance.

## 3.2. Sensational vs. true

### 3.2.1. ‘Sensationalism’ was the first school of journalism

Providing information for the masses transformed into a booming business during the 19th century. This did not automatically mean that publishers provided reliable information for readers. Reliability has always been tough work, and tough work is costly. With the circulation increasing rapidly, publishers were out making money by quick return on investments. This resulted in the “cash-and-carry*”* format (Holiday, 2018; Higdon, 2020) of newspaper distribution: issues were sold on street corners by hawkers, in direct competition with other penny papers. A common feature of these “penny newspapers” were screaming headlines, dramatized drawings and excessive amounts of advertising. Newspapers did not go great lengths to reliably inform audiences about happenings. The aim was to entertain: people bought sensationalist papers as they enjoyed stories about the race of bat people living on the Moon (Griggs, 1852) or the bald man who painted a spider on his scalp to scare away flies (MacDougall, 1958). . The 19th century Penny Press was notoriously unreliable – this is the era of the Great Moon Hoax and other, historical examples of misinformation.

Journalists of the 19th century were not yet seen as experts per se, nor had the high social status usually associated with expertise. It did not help much that the practices featured in the early journalism textbooks were often questionable (Phillips, 2019). As the ethics of mass informing were still fictile, journalists of the late 19th century were a mix of sensationalists and professionals. The era was defined by two editors: Joseph Pulitzer and William Randolph Hearst. Building on the legacy of the penny press, the coverage of their “yellow papers” consisted of overexeggarations of minor events, excessive advertising, faked interviews, pseudoscience, scaremongering and populism (Mott, 1941). Hearst himself embodied a different ideal of journalism altogether (Campbell, 2006). For him, journalism was not observation, but an active force in shaping the outcome of public incidents. In 1897, Hearst used journalism to directly interfere with another country’s domestic politics (Campbell, 2002), generating a debate regarding the function of the newspaper. Hearst named his approach “action journalism” while others condemned it as “freak journalism*.'*'

### 3.2.2. Quality information and experts appear in the market

The loud and entertaining “cash-and-carry” remained the main business approach until 1896, when businessman Adolph Ochs invested in *The* *New York Times*. In a short *Business Announcement* (Ochs, 1896), Ochs promised to deliver nonpartisan and reliable news to its reader base. “*Without fear or favor*” – he wrote. His idea was based on the assumption that if the people were given an actual choice between reliable news and unreliable entertainment, then many would choose the former: “*We believe that [...] thousands would like to buy and read a newspaper of the character and quality of The Times, in preference to [...] the papers they have been reading*” (“The New York Times: One Cent!”, 1898). Ochs made another important move: he matched the one-penny selling price of his competitors using readership subscriptions.

Ochs’ reasoning behind his approach revolved around two interdependent concepts: *factuality* and *impartiality*. Without impartiality – ensured by financial independence from political parties and companies –, there was no guarantee of factuality (Ward, 2015). These concepts do show a degree of similarity with the two dimensions (see Petty & Brinol, 2008; Landrum et al., 2015) on which sources are said to be evaluated by epistemic vigilance capacities: *competence* (with factuality), and *benevolence* (with impartiality). Essentially, Ochs thought of the audience as consisting of rational agents interested in the state of the world, but trapped in a communication environment that was insensitive to these epistemic preferences. Satisfying other preferences – by scaremongering or entertainment – offered a quicker return on investment for sensationalist papers. The lack of alternative to this type of journalism, however, did not mean that there was no demand for reliability. Ochs was proven right: his sales and circulation increased and other outlets quickly copied his approach (Campbell, 2006). Some papers – as their track record of reliable communicators had been established – earned a status that was akin to celebrated brands, like Tiffany’s Jewelry or FordAutomobiles. The model introduced by Ochs can be understood as a long-term economic relationship between the reader and the outlet. It allows publishers to build a reputation for themselves as benevolent and competent communicators transmitting quality information, while subscribers have means to give feedback in reader’s letters or to outright punish the outlet by terminating subscriptions. The *Times* often published reader’s letters that criticized the editor and the paper itself, which was highly unusual (O’Shea, 2008).

To live up to the promises of the Ochsian-model, late 19th century outlets had to implement novel epistemic practices and signal their reliability and expertise. Publishers needed to make sure that the reporters employed were both *competent* and *benevolent*: a demand appeared for experts. Schools were founded to teach journalist competencies. Meanwhile, outlets enacted policies to keep their experts benevolent. *Reuters* prohibited reporters to be members of a political party. Newsrooms and the organs of fiscal policy became separated; at some news outlets, reporters and managers were not even allowed to travel in the same elevator (Ward, 2015). Factual reporting entailed that journalists must leave the newsrooms, interview multiple sources and if possible, provide the names of sources as well as their own. *The New York Times* itself pioneered technological inventions for news coverage, like photographs and on-the-spot telegram accounts of historic events (Campbell, 2006). Institutions of epistemic vigilance that were created around this period slowly became more than the simple aggregation of individual epistemic vigilance capacities. Institutions write down, codify, teach and openly communicate the rules and principles of good epistemic practices in editorial guidelines and newspaper policies. The advantage of the “manuals” in which institutions describe their epistemically vigilant methods is that they may be updated whenever the changing communication environment requires it. There are also feedback loops, editorial evaluations and other considerations feeding into epistemic practices. Information-curation may evolve quicker than epistemic vigilance, as the psychological capacities are subject to biological, while institutional practices to cultural evolution.

Yellow papers and political propaganda did not vanish after the appearance of the Ochsian-model, of course, and different means to achieve cultural success coexist. What we see as important is that around the late 19th century, parts of the press realized that in a turbulent communication environment there was a demand for institutions fulfilling a function analogous to the psychological capacities of epistemic vigilance. The press thus began to develop distributed systems of epistemic vigilance. From a cognitive perspective, this historical process involves groups of the population outsourcing some of the tasks of epistemic vigilance to institutions. This act of delegation – which originates in individuals’ epistemic vigilance (the psychological capacities) – contributed to the maintenance of the institutions of epistemic vigilance. Individuals were willing to pay for services provided by institutions of epistemic vigilance; their willingness arised from them being epistemically vigilant, yet confronted with a communication environment they could no longer efficiently curate.

# 4. Institutions of Epistemic Vigilance and Digitization

The online version of the “cash and carry”-type business model is living its renaissance in the Digital Age. Instead of selling copies on street corners, the goal of the employers of this model is to gather as many clicks as possible, for each click and each second spent on a webpage can be monetized. “Individual messages” (Bak-Coleman et al., 2021) are competing for attention on digital street corners. While some outlets are desperate in pushing towards the subscription-model using Ochs’s rationale about impartiality and factuality, these institutions are facing new challenges. It is, with digitization, easier to write any type of information and distribute it widely. It is also possible to communicate anonymously, and thus to get away with lying without having to pay the reputational costs (Acerbi, 2020). In this section we highlight four problems that institutions of epistemic vigilance face in the Digital Age.

## 4.1. A further increase in the number of sources

Digital communication technologies allow virtually anyone to maintain an outlet. The costs of maintaining outlets were cut as printing and manual distribution are no longer necessary. This led to a second explosion of the number of sources of information. The audience, again, has to make a difficult choice regarding which source to believe out of dozens of new ones competing for attention. On the other hand, novel sources entering the market are in competition for a finite number of reputational labels and thus are motivated to attack and to destroy each other’s reputation. The attacks manifest in accusations regarding benevolence and competence. Since the traditional cues of reliability and expertise became hackable (see for example, Donovan & Freidberg, 2019), it is less evident what strategy should audiences follow to select sources in the digital environment. A conservative information foraging approach that seems reasonable, but often yields suboptimal results, is an increased preference for user generated content, or UGC. UGCs are sometimes perceived as being more benevolent than official sources, since they do not appear to have any vested interests (Liu et al., 2015; Napoli, 2016). In reality, UGCs are sometimes created by sources with extreme political views, who are more active in expressing their opinions than moderates, resulting in an overall more polarizing environment (Yldrim et al., 2013).

## 4.2. Growing costs of epistemic vigilance

News circulation and content curation are no longer simply periodical, like in the 19th and most of the 20th century, when there was a *Morning Post*, an *Evening Standard* and a *Weekend Special* available to get informed. The flow of information from sources is continuous (the so-called 24/7 news cycle), which has unfortunate consequences for journalistic practices. Publication frenzy and time pressures negatively impact journalists and their epistemic practices, as noted by the periodical *Worlds of Journalism Study 2012-2016*. The mechanisms of information-curation are diluted as journalists face high daily word-counts and grueling publication requirements (for overviews, see Harro-Loit & Josephi, 2020; Nikki, 2018; Holiday, 2018). This opens up the way for misinformation. Apart from not having time to check sources properly, the publication pressure may push reporters into deliberately faking stories, as several infamous cases illustrate (see Phillips, 2019).

The opportunity costs of exercising epistemic vigilance are high in a communication environment that demands new content every minute. In comparison, deceivers are facing reduced financial and social costs for their actions and at the same time, higher benefits. It is less effort to create deceptive or downright fake information than to curate credible one. The writers of fakes do not have to venture out and talk to witnesses, nor do they have to abide by journalism ethics. Because of this, deceivers work faster. International news agencies sometimes use the expression “digital gold rush” to refer to the business opportunities of spreading bogus information (Subramanian, 2017; Kirby, 2016). It would seem that the lack of accountability coupled with the promise of income opportunity favors the creation of cheap and dubious content.

## 4.3. Diminishing economic benefits of epistemic vigilance

Convincing people to pay for subscriptions is one of the hard problems of Digital Age journalism (Rosenstiel et al., 2012). When outlets make money through advertising instead of relying on readership subscriptions, they become dependent on actors that may use them as – once again – vehicles of propaganda. Reasoning about the epistemic benefits of paying for credible information does not seem to be enough. Ochs himself became successful not only because his paper implemented epistemically sound practices: he also matched the *price* of his sensationalist competitors. Before the internet, readers had to pay for all types of published information: unreliable or reliable. The contemporary situation is different in that regard. The internet is famous for its norm of freely available information (Moore, 2018; Chyi & Lee, 2013; Anderson, 2009; Himanen, 2001; Levy, 1986). Meanwhile, good epistemic practices are costly, and the expectation of *gratis* information forces the institutions of epistemic vigilance to seek funds by monetizing the attention of the reader through advertising or by receiving financial aid from political parties, which in turn damages their impartiality and subsequently, factuality.

## 4.4. Mixing fake and truth

Another novel feature of our era is that we use social media platforms to familiarize ourselves with the news, meaning we meet fake and truth in the same epistemic space (Gottfried & Shearer, 2016). This epistemic space so far has shown only menial interest to indicate which sources were reliable and which testimony is accurate. Before social media, deceivers had to pay serious costs whenever they aimed to appear on similar platforms as reliable information. Simultaneous presentation with fakes puts reliable information into an uneven competition: truth is insensitive to our preferences, while fakes are doctored to fit them. Since the same epistemic space includes both reliable and unreliable information, the psychological mechanisms of epistemic vigilance - that tend to modulate trust in light of the message source - are decreased in their efficiency.

There are tentative countermeasures by the owners of social platforms that are aiming to regulate the content that appears for users. These often include some kind of a signal that indicates information quality for the customers (Zhang et al., 2018). There are also political pressures pushing for the evolution of institutions of epistemic vigilance within these influential epistemic spaces.

The growing awareness that the communication environment matters raises important moral (and practical) questions regarding, to name the two most important, responsibility of the major actors who shape our communication environment, and exercising freedom of speech on these platforms. Lately, the European Parliament received a proposal known as the Digital Services Act, which would push the legal responsibility of the appearance of illegal content on the platform owner. It would also allow researchers to access the algorithms (which are still mostly opaque), so they could estimate the harm they may or may not generate (Single Market for Digital Services, Proposal 2020/0361).

# 5. The value and vulnerabilities of Institutions of Epistemic Vigilance

## 5.1. Arms race between communicators and audiences

Mechanisms of epistemic vigilance align the interests of the communicators and the interests of the audience: the audience is interested in paying attention to the communicators because they are less likely to be misled by irrelevant or false information, and communicators are interested in communicating relevant and true information, because otherwise they risk losing the attention of the epistemically vigilant audience (Heintz & Scott-Phillips, 2021). We have shown that changes in the communication environment can lead to mechanisms of epistemic vigilance losing their efficiency. Communicators, in turn, are less constrained to provide only relevant and true information. The solution for communication not to collapse, is to update mechanisms of epistemic vigilance so that they ‘catch up’ in an arms-race between communicators and their audience. “Post-truth era” can be considered as the latest chapter in the cultural history of this arms-race. As the 21st century communication environment is disrupted by digitization, communicators are again given new opportunities to deceive and misdirect listeners, and to game institutions of epistemic vigilance in multiple ways. This stage of the arms-race, as we have shown, bears similarities to previous disruptions - as well as features that can be counted as novelties. However, there is no warranty that new institutions of mechanisms of epistemic vigilance will evolve. The audience might actively seek ways to avoid being deceived and misdirected without social institutions answering this need.

## 5.2. Epistemic norms for designing institutions of epistemic vigilance

Mechanisms of epistemic vigilance have evolved so that they perform their function efficiently, which is to assess the epistemic value of communicated information. Efficient mechanisms of epistemic vigilance accurately assess true information as true and false information as false; they do that reliably and at reasonable costs (in terms of cognitive effort, time, money, etc.). In section 2, we characterized institutions of epistemic vigilance as such functional institutions and we provided an illustration of how such an institution evolved in the history of the press, and what procedures they implemented. To answer to the challenges specified in the fourth section, however, it would be useful to have criteria about what makes a satisfactory institution of epistemic vigilance that are more detailed than “it should perform its function.”

### 5.2.1. Reducing reliance on testimonies

Epistemic vigilance crucially deals with testimonies. One philosophical trend has argued that trust in testimonies is ‘rational’ only if it is grounded in evidence that is acquired without relying on testimony. For instance, I am rational to trust what Thom said to me because I have independent evidence that Thom is trustworthy, and this evidence is devoid of any testimonies. It would be irrational, for instance, to trust Thom on the basis of testimonial evidence from Thom saying he is trustworthy. The structure of this simple example can be found in much more complex forms. For instance, I could trust Thom because Julia tells me he is trustworthy, and trust Julia on that point because Thom told me she is trustworthy. A real-life example is as follows: a Wikipedia article makes the statement that *p.* This statement is then made in a news outlet on the basis of the Wikipedia article. At the same time, Wikipedia editors request that the statement *p* be linked to some reference that would provide a guarantee that the statement is not made up. (Wikipedia does implement practices of epistemic vigilance). The Wikipedia article finds a statement that *p* in a newspaper and makes reference to it. However, this is the newspaper that made the statement that *p* just because it was written in Wikipedia. The testimony that *p* is thus validated on faulty grounds. In order to avoid such mistakes, the reductionist view of testimonies argues that a rational process for updating beliefs on the basis of testimonies is such that all trust in testimonies is justified on the basis of testimony-free evidence. The mission of mechanisms of epistemic vigilance would then include finding and compiling this testimony-free evidence so as to adequately adjust trust in testimonies (e.g. Hardwig, 1991). (The testimony-free evidence can be about the trustworthiness of the testifier, it need not be on the content of what is testified). By contrast, anti-reductionists have argued that processes that fully reduce reliance on testimony are de facto impossible and, in many cases, not desirable (Coady, 1992). For instance, children trust things that they do not understand, which turns out to be an important way to acquire complex yet useful information (Gergely & Csibra, 2020; Heintz, 2011). In our analysis, we develop a somewhat anti-reductionist view: it is good and efficient for individuals to trust more rather than less; individuals gain from putting their trust in reliable sources of information; possibly, people cannot and should not assess sources and content following some stringent rationalist criteria. Yet reductionist attempts–attempts to form beliefs that are eventually grounded on the basis of testimony-free observations–do have epistemic value. Paradoxically, these attempts are best pursued, in our current environment, collectively. These attempts are best pursued by institutions which distribute cognitive tasks and are maintained by a sufficiently big community of users.

The reductionist/anti-reductionist debate has been focusing on the individual agent faced with the challenge of rationally updating beliefs while drawn in testimonies. In that matter, gullibility has been shown to often be the most rational process, as opposed to always remaining skeptical or to attempting an impossible search for non-testimonial evidence. How does this analysis apply to social institutions of epistemic vigilance? Should such institutions attempt, or not, to find all non-testimonial evidence for or against each testimonies? The practice of the press, when it exercises epistemic vigilance, is to use a hierarchy of direct and indirect evidence ranging from photographs (non-testimonial direct) to spokesperson accounts (testimonial indirect). When two pieces of evidence are in conflict - say, the citizen observer’s testimony and a video footage - then non-testimonial evidence is given more weight in the verification process.

Checking the validity of testimonies becomes quite daunting when testimonial chains are long, involve many agents, often criss cross each other, sometimes include contradictions. Institutions of epistemic vigilance, however, need not shy away from the task. Institutions are indeed much better endowed than individuals: they can dedicate more resources to the task, develop expertise, and distribute tasks. In the end, the institutional system might have epistemic skills and competence that completely change the analysis that makes a reductionist program irrational at the individual level.

### 5.2.4. De-biasing at the institutional level

Institutions include individual human minds. Upon processing information, these minds naturally display various preferences and biases. It would be logical to assume that institutions do not merely mimic some selected capacities of the mind (like epistemic vigilance), but may be prone to mirror the biases that accompany them. Because of this, institutions of epistemic vigilance include de-biasing procedures, for instance by involving several individuals who check each other in an argumentative context (Mercier & Sperber, 2017). In addition, the codified editorial guidelines detailing the means of testing information that employees of an institution of epistemic vigilance follow, lead to displaying a level of factuality and impartiality that transcends individual biases. “The method is objective, not the journalist,” as it was famously put by Kovach and Rosenstiel (2007). Evidence shows that “forces on the routine level of analysis” – e.g. regulated evaluations of newsworthiness – may be primarily responsible for the quantity of information published on a story about congressional bills (Shoemaker et al., 2001). The personal “characteristics” of journalists, such as their political ideology, voting preferences or education did *not* significantly correlate with the quantity of coverage given. Although this evidence can by no means be completely generalized (the original study concentrated on one specific topic), it nonetheless shows that institutions of epistemic vigilance have the potential to attain a better level of impartiality as they operate with multiple individual agents *and* a codified system of information curation. As for the assessment of testimonies, the fact that institutions of epistemic vigilance are distributed cognitive systems give them desirable epistemic properties that might not be achievable at the individual level.

### 5.2.5. Using cognitive tools of epistemic vigilance

The efficiency of distributed cognitive systems can be enhanced with the use of cognitive tools. In the case of epistemic vigilance, weighting algorithms such as PageRank, bots and other programs can be programmed and used for information curation. A more beneficial approach to the threat of misinformation would not be to combat it, but to make reliable information more salient (Acerbi et al., 2022). In theory, algorithms can be programmed to give space to different opinions and views based on some concept of fairness. If algorithms are responsible for creating and/or fostering opinion-bubbles, then they could also be programmed to burst them (Savage, 2019). Scholars and journalists fear that in the near future, AI may be used to produce an endless supply of disinformation (DiResta, 2020). If this is true, then a similar AI could be programmed to tirelessly curate reliable information based on the principles of epistemic vigilance. The institutions of epistemic vigilance are challenged due to digitization (see §4). Perhaps the solution lies in digitization too: by giving more weight to non-human artifacts inside institutions of epistemic vigilance.

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### 6. Conclusion: the epistemic power of institutions of epistemic vigilance

Trusting is recognisably at the basis of humans’ cultural achievements. It figures as a key element of models of cultural evolution (e.g., Henrich and Gil-White, 2001). Yet, there are good reasons to think that humans are not simply gullible: they modulate their trust in what is communicated to them taking into account the trustworthiness of the source (itself dependent on assessments of competence and benevolence), the plausibility of the claim and the reasons in its favor (Sperber et al. 2010; Mercier, 2020). We have argued, however, that the evolved psychological mechanisms that modulate trust–the psychological mechanisms of epistemic vigilance–cannot fully account for how people deal with the overwhelming flow of communicated information of our current social environment. A full account of human trusting behavior therefore needs to take into account the ways the communication environment is itself shaped: we have argued that it can include institutions that create powerful affordances for psychological mechanisms of epistemic vigilance. These affordances take the form of reputation labels that reliably signal expertise, or simply involve aligning ease of access to the information with relevance and plausibility.

The case of the newspaper press illustrates how the communication environment evolves. There is technology, of course, but also a set of psychological factors that influence what tends to be communicated and how. The study of these psychological factors is at the heart of quite a few researches on misinformation (see Mercier et al., 2018; Mercier & Miton, 2019; Altay et al., 2020; Boyer, 2018; Mercier, 2017). In the case of the press, these psychological factors strongly influence the content of the sensationalist news paper, but not only. We focused on one set of psychological factors: psychological capacities of epistemic vigilance. These capacities, we argued, constitute factors of attraction for the cultural evolution of institutions of epistemic vigilance.

In spite of its unintuitive aspect, trusting institutions of epistemic vigilance is – we suggest – the most rational way to deal with the wealth of available communicated information. This is because such institutions can be designed so as to perform their function in communication environments where individual psychological capacities are limited, and sometimes outwitted. Institutions of epistemic vigilance have properties that are different from the properties of any individual that participates in it. Therefore, social epistemologists should expand their analysis of trust in other individuals, experts or not, to trust in institutions. If anti-vax are not making the best choice for themselves, it is because they fail to trust those institutions who do, in fact, implement the best mechanisms of epistemic vigilance (in this case, the newspapers that trust medical institutions after checking that they have good reasons to do so, which is that medical institutions have implemented adequate procedures of epistemic vigilance towards scientists). Trusting communicated information that is hard or impossible to check on one’s own is an incredible achievement of our societies. It results from the cultural evolution of complex social institutions of epistemic vigilance--the press being a central one, especially for the good functioning of political systems that rely on the assessment of informed citizens.

# References

Acerbi, A. (2020). *Cultural evolution in the Digital Age*. Oxford: Oxford University Press.

Acerbi, A., Altay, S., Mercier, H. (2022). Fighting misinformation or fighting for information? *HKS Misinformation*

*Review, 3(1).* <https://misinforeview.hks.harvard.edu/article/research-note-fighting-misinformation-or-fighting-for-information/>

Altay, S., Hacquin, A-S., Mercier, H. (2020). Why do so few people share fake news? It hurts their reputation.

*New Media & Society.*

Altick, R. D. (1957). *The English Common Reader. A Social History of Mass Reading Public 1800-1900*. Second

Edition. Columbus: Ohio State University Press.

Anderson, C. (2009). *Free: the future of a radical price*. New York: Hyperion.

Aspinall, A. (1946). The Circulation of Newspapers in the Early Nineteenth Century. *The Review of English*

*Studies, 22 (85)*, 29-43.

Bak-Coleman, J. B., Alfano, M., Barfuss, W., Bergstrom, C. T., Centeno, M. A., Couzin, I. D., Donges, J. F., Galesic,

M., Gersick, A. S., Jacquet, J., Kao, A. B., Moran, R. E., Romanczuk, P., Rubenstein, D. I., Tombak, K. J., van Bavel, J. J., Weber, E. U. (2021). Stewardship of global collective behavior. *PNAS, 118 (27)*.

Bergstrom, B. (2012). Epistemic vigilance: The error management of source memory and belief. 74(5-B(E)).

*Washington University in St. Louis.*

Bovens, L., and Hartmann, S. (2003). *Bayesian Epistemology* (OUP Catalogue). Oxford: Oxford University Press.

Boyer, P. (2018). *Minds Make Societies. How cognition explains the world humans create.* New Haven &

London: Yale University Press. 66-92.

Briggs, A. & Burke, P. (2009). A social history of the media. From Gutenberg to the Internet. Cambridge: Polity

Press. 91-120.

Campbell, W. J. (2002). Not a hoax: New evidence in the New York Journal’s rescue of Evangelina Cisneros.

*American Journalism, 19(4)*.

Campbell, W. J. (2006). *The Year that Defined American Journalism*. New York & London: Routledge.

Chyi, H. I., Lee, A. M. (2013). Online news consumption. *Digital Journalism, 1(2)*, 194-211.

Coady, J. (1992) *Testimony: A Philosophical Study*, Oxford: Clarendon Press.

Collins, P. J., Hahn, U., von Gerber, Y., Olsson, E. J. (2018). The Bi-Directional Relationship Between Source

Characteristics and Message Content. *Frontiers in Psychology, 9 (18)*.

Crombie, L. (2014). A Brief History of How People Communicated in The Middle Ages. *BBC History Extra*.

<https://www.historyextra.com/period/medieval/a-brief-history-of-how-people-communicated-in-the-middle-ages/>

Dawkins, R., Krebs, J.R. (1978). Animal signals: information or manipulation. In.: *Behavioral ecology: an*

*evolutionary approach*. 282-309.

Deljoo, A., van Engers, T., Gommans, L., de Laat, C. (2018). The impact of competence and benevolence in a

computational model of trust. *IFIP International Congress of Trust Management.*

<https://www.delaat.net/sarnet/2018-07-13-trustmanagement.pdf>

Dennett, D.C. (1991). *Consciousness explained*. Boston: Little Brown.

DiResta, R. (2020, September 20). The supply of disinformation will soon be infinite. *The Atlantic*.

<https://www.theatlantic.com/ideas/archive/2020/09/future-propaganda-will-be-computer-generated/616400/?fbclid=IwAR1HLkUk1E-rl51Un5avCoCFVoE5Uf_s3Ld_RHCy4rkRdlJ1OjyefrpgYKg>

Donovan, J., Freidberg, B. (2019). Source Hacking. Media Manipulation in Practice. *Media & Society*.

<https://datasociety.net/wp-content/uploads/2019/09/Source-Hacking_Hi-res.pdf>

Dror, I.E., Harnad, S. (2008). *Cognition Distributed. How cognitive technology extends our minds*.

Amsterdam/Philadelphia: John Benjamins Publishing House. 25-43.

Eppler, M.J. & Mengis, J. (2004). The Concept of Information Overload: A Review of Literature from

Organization Science, Accounting, Marketing, MIS, and Related Disciplines. *The Information Society, 20(5),* 325-344.

Gergely, G., & Csibra, G. (2020). Sylvia's recipe: The role of imitation and pedagogy in the transmission of

cultural knowledge. In.: Enfield, N. J. and Levenson, S. C. (Eds.). *Roots of human sociality: Culture, Cognition and Human Interaction*. London: Routledge. 229-255.

Gottfried, J. & Shearer, E. (2016). News Use Across Social Media Platforms. *Pew Research Center*.

<https://www.journalism.org/wp-content/uploads/sites/8/2016/05/PJ_2016.05.26_social-media-and-news_FINAL-1.pdf>

Griggs, W. N. (1852). *The Celebrated Moon Story. Its Origin and Incidents; With a Memoir of the Author, and an*

*Appendix.* New York: Bunnel & Price.

Groth, O. (2011). *O poder cultural desconhecido: Fundamento da Ciência dos Jornais*. Petrópolis: Vozes.

Hames, R. (1992). Time allocation. In.: E.A. Smith & B. Winterhalder (Eds.), *Evolutionary Ecology and human*

*behavior.* New York: Aldine de Gruyter. 203-235.

Hamilton, M. J., Milne, B. T., Walker, R. S., Burger, O., & Brown, J. H. (2007). The complex structure of hunter-

gatherer social networks. *Proceedings. Biological sciences*, *274*(1622), pp. 2200.

<https://doi.org/10.1098/rspb.2007.0564>

Harris, M. (1987). *London Newspapers in the Age of Walpole: A Study of the Origins of the Modern English*

*Press*. Cranbury: Associated University Presses. 136-147.

Harris, P. L. & Corriveau, K. H. (2011). Young children’s selective trust in informants. *Philosophical Transactions*

*of the Royal Society B, 366(1567),* 1179–1187.

Harro-Loit, H., Josephi, B. (2020). Journalists’ perception of time pressure: a global perspective. *Journalism*

*Practice, 14(4)*, 395-411.

Heintz, C. (2006). Web Search Engines as Distributed Assessment Systems. Pragmatics and Cognition, 14(2),

387-409.

Heintz, C. (2007). Institutions as mechanisms of cultural evolution: Prospects of the epidemiological approach.

*Biological Theory*, *2*(3), 244-249.

Heintz, C. (2011). Presuming placeholders are relevant enables conceptual change. *Behavioral and Brain*

*Sciences, 34(3),* 131.

Heintz, C. & Scott-Phillips, T. (2021). *Expression Unleashed*. PsyArXiv. [10.31234/osf.io/mcv5b](https://doi.org/10.31234/osf.io/mcv5b)

Higdon, N. (2020). The Anatomy of Fake News. Oakland: University of California Press. 34-40.

Himanen, P. (2001). *The hacker ethic and the spirit of the information age*. New York: Random House.

Henrich, J., & Gil-White, F. J. (2001). The evolution of prestige: Freely conferred deference as a mechanism for

enhancing the benefits of cultural transmission. Evolution and human behavior, 22(3), 165-196.

Holiday, R. (2017). Trust me, I’m lying. confessions of a media manipulator. London: Profile Books. pp. 47;

67-76; 105-108.

Hutchins, E. (1995). Cultural Cognition. In.: *Cognition In the Wild*. Boston: MIT Press.

Jarvstad, A., Hahn, U. (2011). Source reliability and the conjunction fallacy. *Cognitive Science 35*, 682-711.

Kirby, E. J. (2016, december 5). The city getting rich from fake news. *BBC*.

<https://www.bbc.com/news/magazine-38168281>

Kovach, B., Rosenstiel, T. (2007). *The elements of journalism: what newspeople should know, and the public*

*should expect.* New York: Three Rivers Press.

Krebs, J.R., Dawkins, R. (1984). Animal signals: mind-reading and manipulation. In.: *Behavioral ecology: an*

*evolutionary approach. (2nd edition)*, 380-402.

Lake, B. (1984). *British Newspapers: A History and Guide for Collectors*. U.S. Sheppard Press.

Landrum, A. R., Eaves Jr., B.S. & Shafto, P. (2015). Learning to trust and trusting to learn: a theoretical

framework. *Trends in Cognitive Sciences, 19(3)*, 109-111.

Levy, S. (1986). *Hackers: heroes of the computer revolution*. New York: Doubleday.

Liu, F., Xiao, B., Lim, E.T.K. & Tan, C-W. (2015). Deciphering Individuals’ Preference for User Generated Content:

An Empirical Test of the Impact of Personality on Users’ Processing of Online Review Information. *Thirty Sixth International Conference on Information Systems, Fort Worth*.

MacDougall, C. D. (1958). *Hoaxes*. New York: Macmillan.

Mascaro, O., Morin O. (2014). Gullible’s travel: How Honest and Trustful children become vigilant

communicators. In.: Robinson, L., Einav, S. (Eds.). *Trust and Skepticism: Children’s Selective Learning from Testimony*. London: Psychology Press.

Mascaro, O., & Sperber, D. (2009). The moral, epistemic, and mindreading components of children’s vigilance

towards deception. *Cognition*, *112*(3), 367–380.<https://doi.org/10.1016/j.cognition.2009.05.012>

Menache, S. (1990). *Vox Dei. Communication in the Middle Ages*. New York & Oxford: Oxford University Press.

9-41.

Mercier, H. (2020). *Not Born Yesterday. The Science of Who We Trust and What We Believe*. Princeton:

Princeton University Press.

Mercier, H., & Miton, H. (2019). Utilizing simple cues to informational dependency. *Evolution and Human*

*Behavior*, *40*(3), 301–314.

Mercier, H., Majima, Y., Miton, H. (2018). *Willingness to transmit and the spread of pseudoscientific beliefs.*

*Applied Cognitive Psychology, 32(4)*, 499-505.

Mercier, H., Sperber, D. (2017). *The Enigma of Reason*. Cambridge (MA): Harvard University Press.

Mercier, H. (2017). How gullible are we? A review of the evidence from psychology and social science. *Review*

*of General Psychology*, *21*(2). <https://doi.org/10.1037/gpr0000111>

Moore, M. (2018). *Democracy Hacked. How technology is destabilizing global politics.* London: Oneworld.

Mott, F. L. (1941). *American Journalism*. New York: Macmillan. pp. 539.

Napoli, P. (2016). The Audience as Product, Consumer and Producer in the Contemporary Media Marketplace.

In.: G.F. Lowe, C. Brown (eds.), *Managing Media Firms and Industries. What’s so Special about Media Management?* New York: Springer International Publishing. 261-275.

Nikki, U. (2018). Breaking news production processes in US Metropolitan Newspapers: Immediacy and

Journalistic Authority. *Journalism, 19(1)*, 21-36.

Ochs, A. S. (1896, August 19). Business Announcement. *The New York Times.*

<https://www.documentcloud.org/documents/2271357-business-announcement.html>

Olsson, E. J. (2011). A Simulation Approach to Veritistic Social Epistemology. *Episteme 8*, 127-143.

O’Shea, M. (2008). New York Times Company Records: Adolph S. Ochs Papers. The New York Public Library,

Manuscripts and Archives Division.

Pallavicini, J., Hallsson, B., Kappel, K. (2021). Polarization in groups of Bayesian agents. *Synthese, 198*, 1-55.

Pettegree, A. (2014). *The Invention of News. How the World Came to Know About Itself*. London: Yale University

Press. 182-207.

Petty, R. E., Brinol, P. (2008). Persuasion. From Single to Multiple Metacognitive Processes. *Perspectives on*

*Psychological Science 3(2)*, 137-147.

Phillips, T. (2019). *Truth:* *A Brief History of Total Bullsh\*t*. London: Wildfire. 76-83; 93.

Proposal 2020/361. *Single Market for Digital Services (Digital Services Act) and amending directive 2000/31/EC.*

European Commission. <https://eur-lex.europa.eu/legal-content/en/TXT/?uri=COM%3A2020%3A825%3AFIN>

Quandt, T. (2011). Understanding a new phenomenon: The significance of participatory journalism. In: Singer J, Hermida A, Domingo D. et al. (eds) *Participatory Journalism: Guarding Open Gates at Online Newspapers*.

Malden, MA, Oxford and Chichester: Wiley-Blackwell, 155-176.

Quandt, T. (2012). What’s left of trust in a network society? An evolutionary model and critical discussion of

trust and societal communication. *European Journal of Communication 27(1)*, 7-21.

Raymond, J. (2003). *Pamphlets and Pamphleteering in Early Modern Britain*. Cambridge: Cambridge University

Press. pp. 12.

Roetzel, P.G. (2018). Information overload in the information age: a review of the literature from business

administration, business psychology, and related disciplines with a bibliometric approach and framework development. *Business Research* *12*, 479–522.

Rosenstiel, T., Jurkowitz, M., Ji, H. (2012). The search for a new business model: how newspapers are faring

trying to build a digital revenue. *Journalism.org*. <https://www.journalism.org/2012/03/05/search-new-business-model/>

Savage, M. (2019). BBC building public service algorithm. *BBC*.

<https://www.bbc.com/news/entertainment-arts-48252226>

Scott‐Phillips, T., Blancke, S., & Heintz, C. (2018). Four misunderstandings about cultural attraction. *Evolutionary*

*Anthropology: Issues, News, and Reviews, 27(4)*, 162-173.

Shoemaker, P., Eichholz, M., Kim, E., Wrigley, B. (2001). Individual and Routine Forces in Gatekeeping.

*Journalism & Mass Communication Quarterly 78(2)*, 233-246.

Slauter, W. (2015). The Rise of the Newspaper. In.: John, R. R., Silberstein-Loeb, J. (eds.), *Making News: The*

*Political Economy of Journalism in Britain and America from the Glorious Revolution to the Internet*. Oxford: Oxford University Press. 19-46.

Sperber, D. (1996). Explaining culture: A naturalistic approach. Cambridge, MA: Cambridge, 1101.

Sperber, D. (2001). An Evolutionary Perspective on Testimony and Argumentation. *Philosophical Topics*, *29*.

Sperber, D., Clement, F., Heintz, C., Mascaro, O., Mercier, H., Origgi, G. & Wilson, D. (2010). Epistemic vigilance.

*Mind & Language, 25(4),* 359-393.

Stengelin, R., Grueneisen, S., & Tomasello, M. (2018). Why should I trust you? Investigating young children’s

spontaneous mistrust in potential deceivers. *Cognitive Development*, *48*(December 2016), 146–154.<https://doi.org/10.1016/j.cogdev.2018.08.006>

Stensaas, H. S. (1987). *The Objective News Report: A Content Analysis of Selected U.S. Daily Newspapers for*

*1865 to 1954.* (Publication No.: 2946) [Doctoral dissertation, University of Southern Mississippi.] Dissertation Archive.

Subramanian, S. (2017, February 15). Inside the Macedonian fake news complex. *Wired*.

<https://www.wired.com/2017/02/veles-macedonia-fake-news/>

The New York Times: One Cent! (1898, October 10). *The New York Times.*

<https://timesmachine.nytimes.com/timesmachine/1898/10/10/102568592.html?pageNumber=1>

Vanderbilt, K. E., Heyman, G. D., & Liu, D. (2018). Young children show more vigilance against individuals with

poor knowledge than those with antisocial motives. *Infant and Child Development*, *27*(3), 1–13.<https://doi.org/10.1002/icd.2078>

Ward, S. J. A. (2015). *The Invention of Journalism Ethics. The Path to Objectivity and Beyond (Second Edition)*.

Montreal & Kingston, London and Chicago: McGill-Queen’s University Press.

Xavier, C. & Pontes, F. S. (2019). The characteristics of newspapers as cultural power: reinterpretations of

journalism theory proposed by Otto Groth. *Intercom, 42(2)*, 35-48.

Yldrim, P., Gal-Or, E., Geylani, T. (2013). User-Generated Content and Bias in News Media. *Management*

*Science, 59(12)*, 2655-2666.

Zhang, A. X., Appling, S., Ranganathan, A., Metz, S. E., Sehat, C. M., Gilmore, N., Adams, N. B., Vincent, E., Lee,

J., Robbins, M., Bice, E., Hawke, S., Karger, D., Mina, A. X. (2018). A structured response to misinformation: defining and annotating credibility indicators in news articles. *Companion Proc. Web Conference 2018*, 603-612. <https://homes.cs.washington.edu/~axz/papers/webconf_credco.pdf>

1. Department of Cognitive Science, Central European University, Vienna. Contact: [szegofi\_akos@phd.ceu.edu](mailto:szegofi_akos@phd.ceu.edu) [↑](#footnote-ref-1)
2. Department of Cognitive Science, Central European University, Vienna. [↑](#footnote-ref-2)