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How behavioural sciences can promote truth, autonomy and democratic discourse online

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Abstract: Public opinion is shaped by online content, spread via social media and curated

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algorithmically. The current online ecosystem has been designed predominantly to capture user attention rather than promote deliberate cognition and autonomous choice. The resultant

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information overload, finely tuned personalization, and distorted social cues, in turn, pave the

way for manipulation and the spread of false information. How can transparency and autonomy

be promoted instead, thus fostering the positive potential of the Web? Effective Web governance

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informed by behavioural research is critically needed to empower individuals online. We identify

technologically available yet largely untapped cues that can be harnessed to indicate the

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epistemic quality of online content, the factors underlying algorithmic decisions and the degree

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of consensus in online debates. We then map out two classes of behavioural interventions—

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nudging and boosting—that enlist these cues to redesign online environments for informed and

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autonomous choice and democratic discourse.

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40 To the extent that a “wealth of information creates a poverty of attention” (p. 41)¹, people
have never been as cognitively impoverished as they are today. Major Web platforms such as
Google and Facebook serve as hubs, distributors, and curators²; their algorithms are
indispensable for navigating the vast digital landscape, and for enabling bottom-up participation
in the production and distribution of information. Big Tech exploits this all-important role in
pursuit of the most precious resource in the online marketplace: human attention. Employing
45 algorithms that learn people's behavioural patterns^{4,5,6,7}, technology companies target their users
with advertisements and design users' information and choice environments⁸. The relationship
between platforms and people is profoundly asymmetric: Platforms have deep knowledge of
users' behaviour, whereas users know little about how their data is collected, how it is exploited
for commercial or political purposes, and how it and the data of others are used to shape their
50 online experience. These asymmetries in Big Tech's business model have created an opaque
information ecology that undermines not only user autonomy but also the transparent exchange
on which democratic societies are built^{9,10}. Several problematic social phenomena pervade the
Internet, such as the spread of false information^{11,12,13,14,15}—which includes disinformation
(intentionally fabricated falsehoods) and misinformation (falsehoods created without intent, e.g.,
55 poorly researched content or biased reporting)—or attitudinal and emotional polarization^{16,17}
(e.g., polarization of elites¹⁸, partisan sorting¹⁹, and polarization along controversial topics^{20,21}).
We argue that the behavioural sciences should play a key role in informing and designing
systematic responses to such threats. The role of behavioural science is not only to advance
active scientific debates on the causes and reach of false information^{22,23,24,25,26} or whether mass
60 polarization is increasing^{27,28,29}; it is also to find new ways to promote the Internet's potential to
bolster rather than undermine democratic societies³⁰. Many global problems—from climate

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[change to the coronavirus pandemic—require coordinated collective solutions, making a democratically interconnected world crucial](#)³¹.

Why Behavioural Sciences Are Crucial for Shaping the Online Ecosystem

More than any traditional media, online media permit and encourage active behaviours³² such as information search, interaction, and choice. These behaviours are highly contingent on environmental and social structures and cues³³. Even seemingly minor aspects of the design of digital environments can shape individual actions and scale up to notable changes in collective behaviours. For instance, curtailing the number of times a message can be forwarded on WhatsApp (thereby slowing large cascades of messages) may have been a successful response to the spread of misinformation in Brazil and India³⁴.

To a substantial degree, social media and search engines have [taken on a role](#) as [intermediary](#) gatekeepers [between readers and publishers](#): Today, more than half (55%) of global Internet users turn to either social media or search engines to access news [articles](#)³. One implication of this seismic shift is that a small number of global corporations and Silicon Valley CEOs have significant responsibility for curating the general population's information³⁵—and, [by implication](#), for interpreting and protecting civic freedoms. The flow of information depends on [corporations'](#) willingness and ability to self-regulate the industry. Facebook's recent decision to declare politicians and their ads off-limits to their third-party fact checkers illustrate how corporate decisions can affect citizens' information ecology and the interpretation of fundamental rights, such as freedom of speech. [This situation, in which political content and news diets are curated by opaque and largely unaccountable third parties, is considered unacceptable by a majority of the public](#)^{36,37}, who continue to be concerned about their ability to [discern online what is true and what is false](#)³ and [rate accuracy a very important attribute for social media sharing](#)³⁸.

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100 How can citizens and democratic governments be empowered³⁹ to create an ecosystem
 that “values and promotes truth” (p. 1096)¹⁵? The answers must be informed by independent
 behavioural research, which can then form the basis both for improved self-regulation by the
 relevant companies and for government regulation^{40,41}. Regulators in particular face three serious
 problems in the online domain, that underscore the importance of enlisting the behavioural
 sciences. The first problem is that online platforms can leverage their proprietary knowledge of
 105 user behaviour to defang regulations. An example comes from most of the current consent forms
 under the EU General Data Protection Regulation: Instead of obtaining genuinely informed
 consent, the current dialogue boxes influence people’s decision-making through self-serving
 forms of choice architecture (e.g., consent is assumed from pre-ticked boxes or inactivity)^{42,43}.
 This example highlights the need for industry-independent behavioural research in order to
 110 ensure transparency for the user and to avoid opportunistic responses by those who are regulated.
 The second problem is that the speed and adaptability of technology and its users exceed that of
 regulation directly targeting online content. If uninformed by behavioural science, any regulation
 that focuses only on the symptoms and not on the actual human-platform interaction could be
 quickly circumvented by users and platforms. The third problem is the risk of censorship
 115 inherent in regulations that target content; behavioural sciences can reduce that risk as well.
 Rather than deleting or flagging posts based on judgements about their content, we focus here on
 how to redesign digital environments so as to provide a better sense of context and to encourage
 and empower people to make critical decisions for themselves^{44,45,46}.

120 Our aim is to enlist two streams of research that illustrate the promise of behavioural
 sciences. The first examines the informational cues that are available online³² and asks which can
 help users gauge the epistemic quality of content or the trustworthiness of the social context from
 which it originated. The second stream concerns the use of meaningful and predictive cues in

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behavioural interventions. Interventions can take the form of nudging⁴⁷, which alters the environment or choice architecture so as to draw users' attention to these cues, or boosting⁴⁸, which teaches users to search for them on their own, thereby helping them become more resistant to false information and manipulation in the long run.

Digital Cues and Behavioural Interventions for Human-Centred Online Environments

The online world has the potential to provide digital cues that can help people assess the epistemic quality of content^{49,50,51}—the potential of self-contained units of information (here we focus on online articles and social media posts) to contribute to true beliefs, knowledge, and understanding—and the public's attitudes to societal issues^{52,53}. We classify those cues as *endogenous* or *exogenous*⁵⁴.

Endogenous cues refer to the content itself, like the plot or the actors and their relations. Modern search engines use natural language-processing tools that analyse content⁵⁵. They have considerable virtues and promise, but current results rarely afford nuanced interpretations⁵⁶. For example, these methods cannot reliably distinguish between facts and opinions, nor can they detect irony, humour, or sarcasm⁵⁷. They also have difficulty differentiating between extremist content and counterextremist messages⁵⁸ because both types of messages tend to be tagged with similar keywords. A more general shortcoming of current endogenous cues of epistemic quality is that their evaluation requires background knowledge of the issue in question, which often makes them non-transparent and potentially prone to abuse for censorship purposes.

By contrast, exogenous cues are easier to harness as indicators of epistemic quality: They refer to the context of information rather than the content, are relatively easy to quantify, and can be interpreted intuitively. A famous example of the use of exogenous cues is Google's PageRank algorithm⁸¹, which takes centrality as a key indicator of quality: Well-connected websites appear

higher up in search results, irrespective of their content. Exogenous cues can indicate how well a piece of information is embedded in existing knowledge or the public discourse.

From here on we focus on exogenous cues and how they can be enlisted by nudging⁴⁷ and boosting⁴⁸. Let us emphasize that a single measure will not reach everyone in a heterogeneous population with diverse motives and behaviours. We therefore propose a range of measures that differ in their scope and in the level of user engagement required. Nudging interventions shape behaviour primarily through the design of choice architectures and typically require little active user engagement. Boosting interventions, in contrast, focus on creating and promoting cognitive and motivational competences, either by directly targeting competences as external tools or indirectly by enlisting the choice environment. They require some level of user engagement and motivation. Both nudging and boosting have been shown to be effective in various domains, including health^{59,60} and finances⁶¹. Recent empirical results from research on people's ability to detect false news indicate that informational literacy can also be boosted⁶². Initial results on the effectiveness of simple nudging interventions that remind people to think about accuracy before sharing content³⁸ also suggest that interventions based on behavioural sciences could be effective in the online domain⁶⁴. While empirical tests and evidence are urgently needed, the first step is to outline the conceptual space of possible interventions and make specific proposals.

Table 1 examines three online contexts: articles from newspapers or blogs, algorithmic curation systems that automatically suggest products or information (e.g., search engines or algorithmic curation of news feeds), and social media that display information about the behaviour of others (e.g., shared posts or social reactions such as comments or "likes"). Each is associated with a unique set of challenges, cues, and potential interventions. Next, we review the challenges and cues in Table 1, and detail some interventions in the subsequent sections.

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| Context | Challenges | Cues | Nudging | Boosting |
|----------------------|--|--|---|---|
| Online articles | Information overload and fragmentation of sources | Cues to epistemic quality, like references | ...to pay attention to epistemic cues and external evidence. | ...routines to systematically check epistemic cues. |
| Algorithmic curation | Asymmetry of knowledge and opaque manipulation | Transparent recommendation and sorting criteria | ...awareness of factors that shape recommendations and the news feed. | ...self-nudging towards quality information. |
| Social media | Lack of global network information false consensus effects | Global social cues that include base rates and passive behaviour | ...to consider global social cues and accuracy before sharing. | ...to infer credibility from social context and history of content. |

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Table 1. Overview of challenges, cues, and potential targets of nudging and boosting interventions in three online contexts.

Online Articles: Information Overload and Epistemic Cues. The capacity to transfer information online continues to increase exponentially (average annual growth rate: 28%)⁶⁵. Content can be distributed more rapidly and reaches an audience faster⁶⁶. This increasing pace has consequences. In 2013, a hashtag on Twitter remained in the top 50 most popular hashtags worldwide for an average of 17.5 hours; by 2016, a hashtag's time in the limelight had dropped to 11.9 hours. The same declining half-life has been observed for Google queries and movie ticket sales⁶⁷. This acceleration, arguably driven by the [finite](#) limits of attention available for the ever increasing quantity of topics and content⁶⁸ combined with an apparent thirst for novelty has significant but underappreciated psychological consequences. Information overload makes it harder for people to make good decisions about what to look at, spend time on, believe, and share^{69,70}. For instance, longer-term offline decisions such as choosing a newspaper subscription (that then constrains one's information diet) have evolved into a multitude of online micro-decisions about which individual articles to read from a scattered array of sources. The more

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210 sources crowd the market, the less attention can be allocated to each piece of content, and the
more difficult it becomes to assess their trustworthiness— even more so given the demise [and](#)
[erosion](#) of classic indicators of quality⁷¹ (e.g., name recognition, reputation, print quality, price).
[Going beyond them, new](#) cues for epistemic quality that are readily accessible even under
information overload are necessary. Exogenous cues can highlight the epistemic quality of
215 individual articles, in particular by showing how an article is embedded in the existing corpus of
knowledge and public discourse. These cues include, for instance, a newspaper article’s sources
and citation network (i.e., sources that cite the article or are cited by it), references to established
concepts and topical empirical evidence, and even the objectivity of the language.

Algorithmic Curation: Asymmetry of Knowledge and Transparency. To help users
220 navigate the overabundance of information, search engines automatically order results^{72,73} and
recommender systems⁷⁴ guide users to content they are likely to prefer⁷⁵. But this convenience
[exacts](#) a price. Because user satisfaction is not necessarily in line with the goals of algorithms—
to maximize user engagement and screen time⁷⁶—algorithmic curation often deprives users of
autonomy. For instance, feedback loops are created that can artificially [re-enforce](#) preferences
225 ^{77,78,79,80}, and recommender systems can eliminate context in order to avoid overburdening users.

[To stay up to date and engaging](#), algorithms can trade recency for importance⁸¹ [and, by](#)
[optimizing on click rates, trade](#) “clickbait” for quality.

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Similarly, aggregated previous user selections make targeted commercial nudging—and even manipulation—possible^{83,84}. For example, given just 300 Facebook “likes” from one person, a regression model can better predict that person’s personality traits than friends and family⁸⁵. There are at least three dimensions of knowledge where platforms can far exceed individual human capabilities (Figure 1a): Data that reaches further back in time (e.g., years of location history on Google Maps), information about behaviour on a collective rather than an individual level (e.g., millions of Amazon customers with similar interests [as an individual can be utilized to recommend further products to that person](#)), and knowledge that is inferred from existing data using machine-learning methods ([e.g. food preferences from movement patterns between restaurants](#)).

Moving further along these dimensions, it becomes more difficult for a user to comprehend the wealth and predictive potential of this knowledge. Automatic customization of online environments that is based on this knowledge can therefore be opaque and manipulative (Figure 1a). [Recent surveys in the USA and Germany found that a majority of respondents consider such data-driven personalization of political content \(61%\), social media feeds \(57%\) and news diets \(51%\) unacceptable, whereas they are much more accepting of it when it pertains](#)

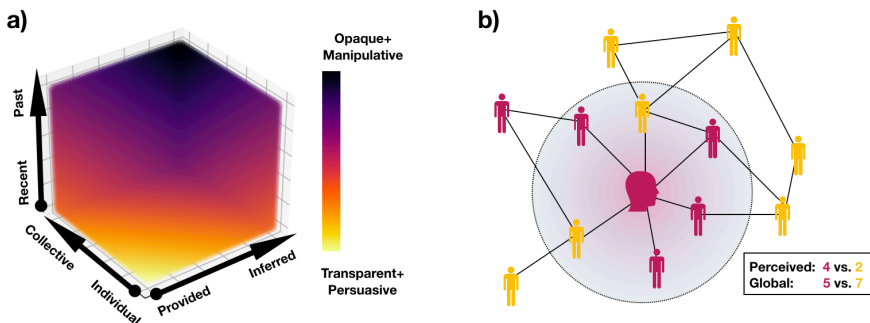


Figure 1. Challenges in automatically curated environments and on social media platforms. (a) Dimensions of knowledge that platforms can acquire with information technology, which make their recommendations continuously opaque and manipulative. (b) perceived group sizes versus the actual global sizes, from the viewpoint of one user (head icon in the center) in a homophilic social network.

[to commercial content](#). To rebalance the relationship between algorithmic and human decision making [and to allow for heterogeneous preferences across different domains](#), a two-step process is required. First, steps should be taken toward [the design and implementation of](#) more transparent algorithms. They should offer cues that clearly represent the data types and the weighting that led to a system's suggestion as well as offer information about the target audience. Second, users should be able to adapt these factors to their personal preferences in order to regain autonomy.

Social Media: Network Effects and Social Cues. More than two thirds of all Internet users, around 3 billion people, actively use social media⁸⁶. These platforms offer information about the behaviour of others (e.g., “likes” and emoticons)⁸⁷ and new opportunities for interaction (e.g., follower relationships and comment sections). However, these signals and interactions are often one-dimensional, represent only a user's immediate online neighbourhood, and do not distinguish between different types of connections⁸⁸. These limitations can have drastic effects, such as dramatically changing a user's perception of group sizes^{89,90} and giving rise to false-consensus effects (i.e., the majority opinion in an individual's neighbourhood leads them to falsely believe it reflects the actual majority opinion; Figure 1b). When people associate with like-minded others from a globally dispersed online community, their self-selected social surroundings (known as a homophilic social network) and the low visibility of the global state of the network^{91,92} can create the illusion of broad support⁹³ and reinforce opinions or even make them more extreme^{94,95}. For instance, even if only a tiny fraction (e.g., one in a million) of the more than two billion Facebook users believe that the Earth is flat, they could still form an online community of thousands, thereby creating a shield of like-minded people against corrective efforts^{96,97,98,99}. Although large social media platforms routinely aggregate information that would foster a realistic assessment of societal attitudes, they currently do not provide a well-calibrated impression of the degree of public consensus¹⁰⁰. Instead, they show reactions from

275 others as asymmetrically positive—there typically is no “dislike” button—or biased toward
narrow groups or highly active users¹⁰¹ in order to maximize user engagement. This need not be
the case: The interactive nature of social media could be harnessed to promote diverse
democratic dialogue and foster collective intelligence. In order to achieve this goal, social media
needs to offer more meaningful, higher-dimensional cues that carry information about the
280 broader state of the network rather than just the user’s direct neighbourhood, which can mitigate
biased perceptions caused by the network structure¹⁰². For instance, social media platforms could
provide a transparent crowd-sourced voting system¹⁰³ or display informative metrics about the
behaviour and reactions of others (e.g., including passive behaviour, like the total number of
people who scrolled over a post), which might counter false-consensus effects.

285 **Nudging Interventions to Shape Online Environments**

Nudging interventions can alter choice architectures to promote the epistemic quality of
information and its spread. One type of nudge, educative nudging, integrates epistemic cues into
the choice environment primarily to inform behaviour (as opposed to actively steering it). For
instance, highlighting when content stems from few or anonymous sources (as used by

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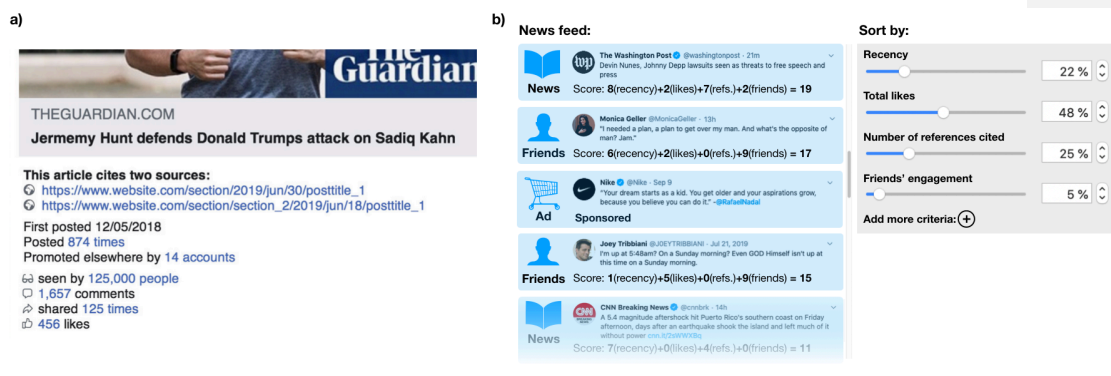


Figure 2 Nudging interventions that modify online environments. (a) Examples of exogenous cues and how they could appear alongside a social media post. (b) Example of a transparently organized news feed on social media. Types of content are clearly distinguished, sorting criteria and their values are shown with every post, and users can adjust weightings.

Wikipedia) can remind people to scrutinize content more thoroughly^{104,105} and simultaneously create an incentive structure for content producers to meet the required criteria. Such outlets can be made more transparent, for example by disclosing the identity of their confirmed owners.

295 Similarly, pages that are run by state-controlled media might be labelled as such¹⁰⁶. Going a step further, adding prominent hyperlinks to vetted reference sources for important concepts in a text could encourage a reader to gain context by perusing multiple sources—a strategy used by professional fact checkers¹⁰⁷.

300 Nudges can also communicate additional information about what others are doing, thereby invoking the steering power of descriptive social norms¹⁰⁸: For instance, contextualizing the number of likes [by expressing them against the absolute frequency of total readers](#) (e.g., “4,287 [out of 1.5 million](#) readers liked this article”) might counteract false-consensus effects that a number presented without context (“4,287 people liked this article”) may otherwise engender. Transparent numerical formats have already been shown to successfully improve statistical

305 literacy in the medical domain¹⁰⁹. Similarly, displaying the total number of readers and their average reading time in relation to the potential total readership could help users evaluate [the](#) content’s epistemic quality: If only a tiny portion of the potential readership has actually read an article, [whereas the majority spent less than a second on it](#), it might be clickbait. The presentation of many other cues, including ones that reach into the history of a piece of content, could be used

310 to promote epistemic value on social media. Figure 2a shows a nudging intervention that integrates several exogenous cues into a social media news feed.

Similarly, users can be discouraged from sharing low-quality information without resorting to censorship by introducing “friction”—for instance, by making the act of sharing slightly more effortful¹¹⁰. In this case, sharing low-quality content may require a further mouse

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click [in a pop-up warning message](#), alongside additional information [about which of the above](#)
cues [are missing or have critical values](#).

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Another type of nudge targets how content is arranged in browsers. The way a social
media news feed sorts content is crucial in shaping how much attention is devoted to particular
posts. Indeed, news feeds have become one of the most sophisticated algorithmically driven
choice architectures of online platforms^{8,111}. Transparent sorting algorithms for news feeds (such
as the algorithm used by Reddit) that show the factors that determine how posts are sorted can
help people understand why they see certain content; at the very least this nudging intervention
would make the design of the feed's architecture more transparent. Relatedly, platforms that
clearly differentiate between types of content (e.g., ads, news, or posts by friends) can make
news feeds more transparent and clearer (Figure 2b).

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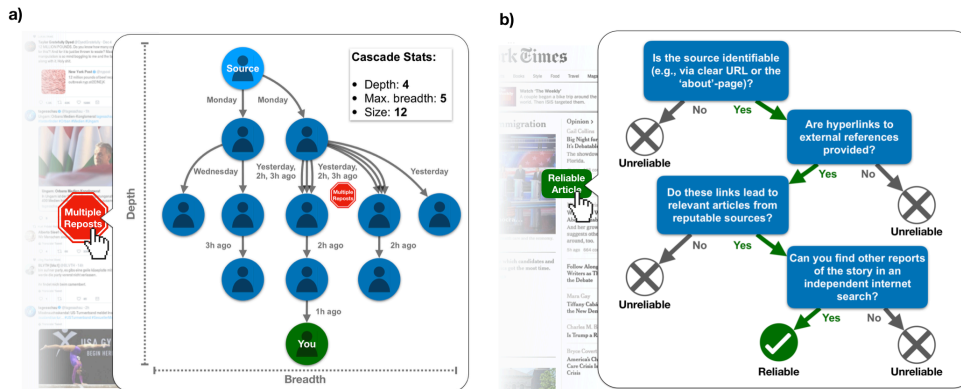


Figure 3 Illustrations of boosting interventions as they could appear within an online environment or as external tools. (a) Visualization of a sharing cascade. Alongside metrics, like the depth or the breadth of a cascades, a pop-up window on social media can provide a simple visualization of a sharing cascade that shows who (if the profile is public) and when others have shared content before it reached the user. (b) A fast-and-frugal decision tree as an example of a boosting intervention. A pop-up or an external tool can show a fast-and-frugal decision tree alongside an online article, that helps to check criteria to evaluate its reliability, where the criteria were adapted from professional fact checkers and primarily point to checking external information⁹⁰.

Boosting interventions to foster user competences

Boosting seeks to empower people in the longer term by helping them build the competences they need to navigate situations autonomously (for a conceptual map of boosting interventions online, see also¹¹²). These interventions can be integrated directly into the environment itself or be available in an app or browser add-on. Unlike many nudging interventions, boosting interventions will ideally remain effective even when they are no longer present in the environment because they have become routinized and have instilled a lasting competence in the user.

The competence of acting as one's own choice architect, or self-nudging, can be boosted¹¹³. For instance, when users can customize how their news feed is designed and sorted (Figure 2b), they can become their own choice architects and regain some informational autonomy. For instance, users could be enabled or encouraged to design information ecologies for themselves that are tailored toward high epistemic quality, making sources of low epistemic quality less accessible. Such boosting interventions would require changes to the online environment (e.g., transparent sorting algorithms or clear layouts; see previous section and Figure 2b) and the provision of epistemic cues.

Another competence that could be boosted to help users deal more expertly with information they encounter online is the ability to make inferences about the reliability of information based on the social context from which it originates¹¹⁴. The structure and details of the entire cascade of individuals who have previously shared an article on social media has been shown to serve as proxies for epistemic quality¹¹⁵. [Namely, the](#) sharing cascade contains metrics such as the depth and breadth of dissemination by others, with deep and narrow cascades indicating extreme or niche topics and breadth indicating widely discussed issues¹¹⁶. A boosting intervention could provide this information (Figure 3a) to show the full history of a post, including the original source, the friends and public users who disseminated it, and the timing of

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the process (showing, e.g., if the information is old news that has been repeatedly and artificially amplified).

Yet another competence required for discerning between sources of high and low quality is the ability to read laterally.¹⁰⁷ Lateral reading is a skill developed by professional fact checkers that entails looking for information on sites other than the information source in order to evaluate its credibility (e.g., “who is behind this website?” and “what is the evidence for its claims?”)

rather than evaluating a website’s credibility by using the information provided there. This competence can be boosted with simple decision aids such as fast-and-frugal decision trees^{117,118}.

Employed in a wide range of areas (e.g., medicine, finance, law, management), fast-and-frugal decision trees can guide the user to scrutinize relevant cues. For example, users can respond to prompts in a pop-up window (e.g., “Are references provided?”), with each answer leading either to an immediate decision (e.g., “unreliable”) or to the next cue until a final judgment about content reliability is reached (e.g., “reliable”; Figure 3b)¹¹⁹. Decision trees can also enhance the

transparency of third-party decisions. If reliability is judged by third-party fact checkers or via an automated process, users could opt to see the decision tree and follow the path that led to the decision, thereby gaining insight that will be useful in the long-term. Eventually, fast-and-frugal decision trees may help people establish a habit of checking epistemic cues when reading content even in the absence of a pop-up window suggesting they do so.⁴⁸

Finally, the competence of understanding what makes intentionally false information so alluring (e.g., novelty and the element of surprise) can be boosted by mental inoculation techniques: Being informed about manipulative methods before encountering them online enables an individual to detect parasitic imitations of trustworthy sources and other sinister tactics^{120,121}. Making people aware of such strategies or of their own personal vulnerabilities leaves them better able to identify and resist manipulation. For instance, having people take on

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385 the role of a malicious influencer in a computer game has been demonstrated to improve their
ability to spot and resist misinformation^{62,122}. This inoculation technique can be used in a range
of contexts online; for example, learning about the target group of an advertisement can increase
people's ability to detect advertising strategies.

Conclusion

390 Any attempt to regulate or manage the digital world must begin with the understanding
that online communication is already regulated— to some extent by public policy or laws, but
primarily by search engines and recommender systems whose goals and parameters may not be
publicly known, let alone be subject to public scrutiny. The current online environment has given
rise to opaque and asymmetric relationships between users and platforms, and it is reasonable to
395 question whether the industry will independently take action to foster an ecosystem that values
and promotes truth. The interventions we propose are aimed primarily at empowering individuals
to make informed and autonomous decisions in the online ecosystem—and, through their own
behaviour, to foster and reinforce truth. The interventions are partly conceptualized on the basis
of existing results. However, not all interventions have been tested in the specific context in
400 which they may be deployed. Undoubtedly, therefore, these and other interventions are subject to
further empirical test. The first results are promising, identifying some interventions as
effective^{63,121} whereas others appear less promising¹²³. Both set of results will inform the design
of more effective interventions.

In our view, the future task for scientists is to design interventions that meet at least three
405 selection criteria: They must be transparent and trustworthy to the public, standardisable within
certain categories of content, and, importantly, hard to game by bad-faith actors or vested
interests. We also suggest that there is a need to examine a wide spectrum of interventions, from
nudges to boosts, in order to reach different types of people, who have heterogeneous

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415 [preferences, motivations and online behaviours. These interventions will not completely](#) prevent
manipulation or active dissemination of false information, but they will help users recognise
when these malicious tactics are at work. They will also permit producers of quality information
to differentiate themselves from less trustworthy sources. Behavioural interventions in the online
ecology can not only inform government regulations, but also signal a platform's commitment to
420 truth, epistemic quality, and trustworthiness: Platforms can indicate their commitment to these
values by providing their users with exogenous cues and boosting and nudging interventions, and
users can choose to avoid platforms that do not offer them these features.

For this dynamic to gain momentum it is not necessary that all or even the majority of
users engage with nudging or boosting interventions; as the first Wikipedia contributors have
425 proven, a critical mass may suffice to allow positive effects to scale up to major improvements.
[Such a dynamic may counteract a possible drawback of the proposed interventions; namely,
widening information gaps between users if only empowered consumers are able to recognise
quality information. Furthermore, it can help to mitigate gaps currently arising from the ability to
pay for quality content. In the trade-off between offering interventions that not everybody will
430 engage with and leaving citizen without any interventions that could cause differential
competences and knowledge, we err on the side of empowerment.](#)

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Author contributions: P.L.S., S.L. and R.H. conceptualized the project, all authors wrote the manuscript.

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