Digital Journalism and Epistemologies of News Production

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Summary

News is the result of news production, a set of epistemic processes for developing knowledge about current events or issues that draw upon a range of newsgathering techniques and formatting choices with the objective of yielding a publishable and distributable product designed to inform others. That process, however, has changed considerably over time and in parallel to broader economic, political, professional, social, and technological changes. For example, during the past two decades alone, there has been greater audience fragmentation and an emphasis on audience measurement, new forms of strategic exploitation of information channels and digital surveillance of journalists, greater aggregation of news and more avenues for professional convergence, a media environment awash in user-generated content and challenges to traditional outlets' epistemic authority, and more opportunities for interactivity and miniaturized mobilities. In concert, these and other forces have transformed news production processes that have become increasingly digital—from who the actors are to the actants that are available to them, the activities they may engage in, and the audiences they can interact with.

Such impacts have required scholars to revisit different theories that help explain how news is produced and with what consequences. Whereas the field of journalism studies draws on a rich history of multidisciplinary theorizing, epistemologies of journalism have received increased attention in recent years. There is a close link between news production and epistemology because the production of news inherently involves developing news information into one form of knowledge. As such, an epistemological lens allows scholars to examine the production, articulation, justification, and use of knowledge within the social context of digital journalism. An analytic matrix of 10 dimensions—the epistemologies of journalism matrix—helps scholars examine different forms of journalism through an epistemological lens. The matrix focuses on identifying the key (a) social actors, (b) technological actants, and (c) audiences within a space of journalism; examining their articulation or justification of (d) knowledge claims and their distinct (e) practices, norms, routines, and roles; differentiating between the (f) forms of knowledge they typically convey; and evaluating the similarities and dissimilarities in their typical (g) narrative structure, (h) temporality, (i) authorial stance, and (j) status of text.

By applying that matrix to four emerging forms of journalism (participatory journalism, live blogging, data journalism, and automated journalism), it can be seen that digital journalism and news production are becoming even more heterogeneous in terms of their implicated entities, cultures and methods, and positionality in relation to matters of knowledge and authority. First, contemporary news production is deeply influenced by myriad technological actants, which are reshaping how knowledge about current events is being created, evaluated, and disseminated. Second, professional journalists are losing epistemic authority over the news as key activities are delegated to algorithms created by non-journalists and to citizens who have become more present in news production. Third, the outputs of news production are becoming more diverse both in form and in content, further challenging long-standing norms about what is and is not "journalism." In short, history has shown that news production will continue to evolve, and an epistemological lens affords scholars a useful and adaptable approach for understanding the implications of those changes to the production of knowledge about news.

Keywords: digital journalism, news production, epistemology, data journalism, participatory journalism, live blogging, automated journalism, social media, platforms

Subjects: Journalism Studies

Introduction

News, or "public knowledge claiming to report on current events in the world" (Westlund & Ekström, 2018, p. 3), is more pervasive in citizens' lives today than ever before. It may be accessed around the clock and in a multitude of ways, including through typical reading, watching, viewing, and listening activities as well as newer "snacking" and monitorial activities such as scrolling through headlines while waiting in the elevator (Costera Meijer & Groot Kormelink, 2015). Those activities may be performed actively via acts such as searching or passively via exposure coordinated by algorithmic recommendation systems. News itself may be accessed through a wider range of media and digital platforms and from a larger multitude of sources. These include legacy news media and digital news start-ups working in and for local, regional, national, or international contexts (Ali et al., 2019; Chua & Duffy, 2019; Heft & Dogruel, 2019), as well as citizen journalists (Kim & Lowrey, 2015) and alternative news media (Figenschou & Ihlebæk, 2019; Holt et al., 2019).

News is neither a "given" nor a necessarily stable object, however. It is the result of *news production*, defined here as the epistemic processes for developing knowledge about current events or issues that draw upon a range of newsgathering techniques and formatting choices with the objective of yielding a publishable and distributable product designed to inform others. This definition highlights the intrinsic link between news and epistemology, as news can be distilled into different forms of knowledge about the world (Ekström & Westlund, 2019a; Ekström et al., 2021; Nielsen, 2017; Zelizer, 1993). It also underscores that news is necessarily shaped by activities such as sourcing and filtering information (Domingo et al., 2008), which may be produced by human actors or technological actants (Lewis & Westlund, 2015a) and further formatted with particular platforms (Hågvar, 2019; Westlund, 2013) and audiences in mind (Weischenberg & Matuschek, 2008). Finally, it recognizes the close link between news production and distribution—which, indeed, may sometimes occur simultaneously as in the case of broadcasting, live tweeting, and producing newsletters—while acknowledging that the latter is most often examined as a separate, subsequent step (for a detailed examination of news distribution, see Braun, 2019; see also Hermida, 2020; Wallace, 2018).

Adopting an epistemological lens allows scholars to recognize that news is often contested and that much of the contestation occurs implicitly—and sometimes explicitly—along epistemic lines, as with critiques about the veracity of a given news account and allegations of bias (Carlson, 2017; Compton & Benedetti, 2010). This lens also allows scholars to be mindful of the fact that news varies in substance and form between genres, across platforms, and depending on epistemic processes and formats for publishing (Ekström & Westlund, 2019b). In short, news is the result of a dynamic and heterogeneous process.

This article aims to capture that dynamism in order to illustrate the evolution of digital news production, particularly since the turn of the 21st century and mostly in relation to Western journalistic practices. The article therefore does not review the emergence and growth of some important research into news production from the mid-20th century, including the influential work produced by the likes of Herbert Gans, Gaye Tuchman, and Pamela Shoemaker and Stephen Reese. Such work is aptly reviewed by Hanusch and Maares (2021), who describe it as part of a wave of scholarship that illustrate the importance of news routines; the role of intra-, inter-, and extra-organizational relationships; and strategic rituals in shaping news production processes and, consequently, news products (see also Westlund & Ekström, 2019). However, for expediency, this article instead focuses on epistemologies of digital news production, recognizing that present ideas about journalistic knowledge production are shaped by past work.

The article begins with a synthesis of the significant economic, political, professional, social, and technological developments that have played a structuring role in the developments of news production in the field, such as the proliferation of mobile devices and organized disinformation campaigns. Then, it describes some of the key theories that have been used to study news production, centering on an epistemological lens that emphasizes its rhetorical, practical, and evaluative elements. Next, the article systematically examines four emerging forms of *journalistic* news production—which is characterized by "ambitions toward the publishing of truthful accounts of current events in the world" (Westlund & Ekström, 2018, p. 3)—through an epistemological lens. That examination focuses on participatory journalism, live blogging, data journalism, and automated journalism because they are not only marked by some novelty and represent rapidly evolving forms of journalism but also associated with a significant amount of recent scholarship that merits synthesis. The article concludes with a discussion in which it is argued that scholars can only go so far in understanding news and journalism by focusing on *who* does journalism or *what* the news materials produced are, and that the examination of *epistemic practices* proves a worthwhile addition to that endeavor.

Key Shifts in the 21st Century

The news production process has changed considerably over time and in parallel to broader economic, political, professional, social, and technological changes (Barnhurst, 2011; Braun, 2015; Bruns, 2008; Fenton, 2011; Hanusch & Maares, 2021; Napoli, 2011; Westlund & Quinn, 2018; Zelizer, 2019). Indeed, as scholars have observed, entities typically regarded as being outside the space of journalism can play a major role at particular points of its development. For example, the U.S. Postal Service played a crucial role in creating the distribution infrastructure for newspapers during the early U.S. republic and, in turn, not only helped shape U.S. news processes but also created a sense of national identity and belonging among the citizens of the emerging nation (John, 1995). Although chronicling all the changes that have impacted news production is not possible within a single article, 20 particularly consequential shifts since the turn of the century are highlighted here to illustrate how news production has been transformed alongside changing forces. These forces are grouped for illustrative purposes, recognizing that some transcend simple categories—that is, they may be simultaneously economic and technological, and so on.

Economically, today's news environment is characterized by greater *audience fragmentation*, which refers to the process through which (or the phenomenon in which) mass audiences are split into more diffuse and specialized groups in their media consumption (Neuman, 1991). That has promoted specialization in the production of news and the creation of niche outlets to satisfy new and narrower segments (Napoli, 2011). Similarly, there is now greater emphasis on *audience measurement*, or the process of quantifying, analyzing, and synthesizing information about individuals' content preferences and how they interact with that content (Napoli, 2011; Tandoc, 2019). The current emphasis on measurement is enabled largely by audience analytics, which provides more (and more detailed) data about audience behaviors and facilitates keying journalistic products to audience demands (Zamith, 2018). The nature of *commodification*, or the transformation of a good or service into a product that can be sold for profit within a market (Hamilton, 2004), has also changed since the turn of the 21st century due to the unbundling of news products, rise of non-journalistic platforms, and increase in competition from platform companies (Steensen & Westlund, 2021) as well as alternative news media (Holt et al., 2019). This has resulted in pressures for journalists to do more with less and a renewed emphasis on subscription-based and nonprofit economic models (Pickard, 2020). Economic conditions have also resulted in greater *occupational precarity*, or deteriorating professional conditions that lead to insecure labor conditions (Örnebring, 2018). This situation is characterized by a growing dependence on unpaid labor and outsourced workers, less full-time work, and a more general fear of indiscriminate layoffs, constraining journalists' ability to adhere to journalistic ideals and remain autonomous (Örnebring, 2018).

Politically, journalists must contend with greater amounts of *disinformation*, or information that is deliberately false or misleading (Jack, 2017). A range of actors—including state-sponsored groups—have sought to sow disinformation by strategically exploiting trustworthy information channels and outright impersonating trusted news brands, forcing journalists to rethink how they verify information within a speed-oriented craft while also further complicating eroding trust in journalism (Marwick & Lewis, 2017). News media have been subjected to changes in *regulations*, or rules, laws, and codes prescribed by some authority, typically a government (Flew & Swift, 2013). Scholars have observed that Western countries have generally moved toward overall deregulation, resulting in greater corporate ownership and emphasis on consumer-oriented journalism (Fenton, 2011). However, they have also observed substantially different approaches taken within European countries, where journalists and news organizations sometimes have access to direct, government-sponsored grants and indirect subsidies, and where news audiences often have access to robust public service broadcasters (Murschetz, 2020). Such approaches are markedly different from those in the United States, where the primary government support mechanism is frequently just a general tax break for nonprofit entities and donors (Pickard, 2020). In addition, many countries still operate under strict information control regimes that limit what journalists can publish (Xu, 2015). There is also now greater *digital surveillance* of journalists, which enables an actor, such as a government, to use digital tools to continuously monitor the activities of another actor (Ataman & Çoban, 2018). Indeed, journalists—and investigative journalists in particular—increasingly report serious concerns about being tracked, leading to some self-censorship and increased difficulty getting confidential sources to share information (Lashmar, 2017). There have been changes in the amounts and types

of *state subsidies* for news media, or the direct aid provided by governments to support the activities of independent organizations (Kreiss & Ananny, 2013). Although public support for such media remains high, their subsidies have been repeatedly reduced or threatened in recent years (Fenton, 2011), and the lack of subsidies in some countries has resulted in the development of "news deserts" as commercial models have faltered (Pickard, 2020).

Professionally, there is now greater *aggregation* of news, or the practice of manually or algorithmically bringing together information from different products into a single one, typically based on some curation criteria (Bakker, 2012). This has resulted in the proliferation of news aggregator sites such as Google News and apps such as Apple News that do not originate news but serve as competitors and key audience brokers by virtue of their strategic position within the contemporary news landscape (Coddington, 2019). Such aggregators tend to promote freely accessible content, making shifts away from ad-supported news more challenging. Similarly, there are new forms of *convergence*, or the integration of previously distinct media components and technologies to create new organizational forms and processes (Pavlik, 2004). This has promoted internal collaboration across a news organization's departments (Nielsen, 2012) as well as external collaboration with non-media partners (e.g., Hacks/Hackers; see Usher, 2014). It has also promoted a *digital-first* ethos, where newsworkers are expected to quickly produce content for online environments and engage through social media platforms in ways that challenge traditional journalistic ethics (Singer, 2012). This shift exacerbated the *continuous deadline* pressures introduced by live broadcasts, accelerated by 24-hour news, and taken to a new level with the "death of the deadline" in online news, resulting in time-obsessed and stepped-up news cycles that emphasize temporal competition and improvisatory practice (Barnhurst, 2011). Recent research on breaking news has also shown how journalists take timing into consideration, and are mindful of when to release their stream of online news (Ekström et al., 2021).

Socially, journalists now operate in a media environment filled with *user-generated content*, or non-journalistic content created by active audience members that is typically published online and accessible at negligible cost (Jönsson & Örnebring, 2010). This has enabled outsiders to enter journalism, provided new content subsidies for news organizations, created new competitors within a competitive attention economy, and challenged news professionals' gatekeeping powers (Bruns, 2008). Similarly, there are now more opportunities for *dark participation*, or antisocial forms of online participation that include harassment, trolling, and "doxxing," which refers to the practice of publicly revealing private, and often sensitive, information about an individual or organization (Quandt, 2018). Such participation induces some journalists to self-censor, withdraw from public spaces, or quit the profession altogether—and disproportionately affects journalists from historically marginalized communities (Lewis et al., 2020; Stahel & Schoen, 2020). These developments have paralleled (and driven) challenges to traditional *epistemic authority*, or an entity's socially accepted "power to define, describe, and explain bounded domains of reality" (Gieryn, 1999, p. 1). Journalists in many areas of the world must now cope with low and/or declining levels of trust in media, as well as eroding control over information (Fletcher & Park, 2017). News production is also conditioned by *placeification*, or the shaping of an artifact by the places in which it is produced, practiced, and consumed (Gutsche & Hess, 2020). In many countries, news production now occurs primarily in large, urban centers as a result of

broader societal place-based realignments, with consequences for trust in non-urban centers and for journalists to witness certain events firsthand (Radcliffe & Ali, 2017). Indeed, as Schmitz Weiss (2015, p. 127) contends, "location plays a significant role in how communities function and how they see themselves," and scholars have argued that structural inequalities and political polarization in places such as the United States have taken on a place-based dimension as a result of broader social, economic, technological, and professional shifts (e.g., Usher, 2019).

Technologically, journalists work within an environment characterized by greater *interactivity*, which refers to the technological attributes of mediated environments that allow users to connect with and through technology (Bucy, 2004). News consumers now expect to be able to interact with news content, whether through responsive websites or dynamic products such as interactive data visualizations (Zamith, 2019b). In addition, news organizations now routinely use external hyperlinks as reference tools, which in turn can promote transparency (Sjøvaag et al., 2019) and contribute to heterogeneous news flows and inter-media connectivity (Steensen & Eide, 2019). The current environment is also marked by *miniaturized mobilities*, or information and communication technologies designed to fit a mobile lifestyle, such as smartphones and smartwatches (Elliott & Urry, 2010). These mobilities have enabled journalists to work outside the newsroom in more diverse and effective ways (see also Duffy et al., 2020; Westlund & Quinn, 2018). *Social media*, or platforms that allow users to traverse a network of contacts via contributions such as posts and tweets (boyd & Ellison, 2007), have enabled journalists to adopt new practices such as ambient journalism to find novel stories and potentially draw upon a larger range of sources (Hermida et al., 2014). They have also substantially altered how information spreads (Swart et al., 2019). More broadly, however, the space of journalism is now characterized by an immense number of *transparent intermediaries*, or actors and actants that exert a structuring role in media production and distribution yet are unseen by most media consumers (Braun, 2015). These include algorithmic recommendation tools that shape individuals' exposure to content—both in terms of what journalists see and which of their work gets seen by news consumers—and promotes practices such as search engine optimization of headlines (Gillespie, 2014). Notably, throughout the 2010s, many publishers aimed to build a presence on social media platforms (Steensen & Westlund, 2021). However, amid growing concerns about their loss of power and revenue in the long term (Nielsen & Ganter, 2018), some publishers have shifted toward platform counterbalancing (Chua & Westlund, 2019).

In concert, these economic, political, professional, social, and technological forces have transformed multiple aspects of journalism and in particular have had material impact on news production—from who the actors are to the actants that are available to them, the activities they may engage in, and the audiences they can interact with (see Lewis & Westlund, 2015a). Such impacts have required scholars to revisit different theories that help explain how news is produced and with what consequences.

Theorizing News Production

There is a long tradition of theorizing news production, much of which draws heavily on psychology, sociology, political economy, and cultural studies (see Ahva & Steensen, 2019; Hanusch & Maares, 2021; Steensen & Westlund, 2021). An early and enduring example is *gatekeeping theory*, which refers to the process through which actors or actants (gatekeepers) can include or exclude information before it reaches an audience—as with a newspaper editor who chooses which newswire stories to include and exclude (White, 1950). Theorizing from this stream has since argued that such decisions are the product of professional socialization and structural constraints, including the inculcation of news values, practices, and norms (Vos & Heinderyckx, 2015).

Similarly, scholars of journalism have drawn on *institutional theory* throughout the years to contend that institutions—typically defined as meso-level variables such as beliefs, norms, and formal rules—mediate the relationship between macrostructures such as journalism and the micro-actions of individuals or organizations (Cook, 1998). This line of thinking has proved fruitful in explaining the uniformity in certain aspects of news production and the often cautious responses to disruption and uncertainty (Lowrey, 2011). This theoretical perspective broadly shares key tenets with *field theory*, as proposed by Bourdieu (1993), which has proven particularly influential in recent scholarship (e.g., Wu et al., 2019). That perspective imagines society as being composed of multiple "fields" (with journalism being one of them) that have field-specific norms, traditions, and practices that shape behavior but are themselves shaped through their intersection with other fields as well as broader cultural, economic, and political forces (Bourdieu, 1993). Such theorizing has opened avenues for examining cultural resources that, for example, lend greater social legitimacy to certain news production actors and activities over others (Benson, 2006).

These examples illustrate but one, primarily sociological, stream of theories that have been applied to the study of news production (for a broader collection, see Ahva & Steensen, 2019; Hanusch & Maares, 2021; Steensen & Westlund, 2021). However, they are also illustrative in that they have all been developed and occasionally recast in some manner in response to the aforementioned economic, political, professional, social, and technological developments. Indeed, as Wallace (2018) wrote while aiming to remodel gatekeeping theory, sociotechnical developments have "changed gatekeeping selection processes and news flow patterns. Accordingly, gatekeeping theory must also change" (p. 275).

This article is centered on a lens that has garnered increased attention in recent years: *epistemologies of journalism* (Ekström & Westlund, 2019a). There is a close link between news production and epistemology because the production of news inherently involves developing news information into *one* form of knowledge. Indeed, the very existence of journalistic authority is largely dependent on a public's perception that journalism—or some entities within it—offers valuable and unique public knowledge (Carlson, 2017). Moreover, scholars have long contended that journalists are members of *interpretive communities* that are united by shared meanings about news production and the practice of collectively interpreting key events (Zelizer, 1993).

An epistemological lens focuses on understanding the production, articulation, justification, and use of knowledge within the social context of journalism (Ekström, 2002). In other words, it helps scholars examine what newsworkers know, how they know it, and how they justify their accounts—"the news"—as a form of knowledge (Ekström & Westlund, 2019a). This has required scholars to revisit who produces journalism, what epistemic values and activities are accepted as being journalistic, and how those constellations produce distinct forms of journalism—each with sufficiently different epistemological processes and claims.

As Lewis and Westlund (2015a) argue, digital journalism involves a larger and more heterogeneous set of social actors, technological actants, and audiences than ever before. The boundaries that help establish who is a journalist have blurred considerably, with individuals previously at journalism's periphery now considered central to its enactment (Belair-Gagnon & Holton, 2018). Some news production is already automated, raising questions about the nonhuman and nonjournalistic epistemic logics and processes imbued in the associated algorithms (Diakopoulos, 2019). Audiences have also changed in terms of how they are imagined, constituted, distributed, and measured, complicating how journalists come to understand (and aim to service) what they perceive to be needs of diverse audiences (Napoli, 2011; Tandoc, 2019; Zamith, 2018).

Ekström and Westlund (2019a) observe that research on epistemic values and activities within journalism have centered on three interrelated aspects. The first focuses on how journalistic knowledge claims and epistemic authority are articulated in discourse and through texts. The second draws on journalists' narrated reflections of their practices, norms, and routines to examine how they think about and enact different epistemic notions. The third evaluates how journalistic knowledge claims are justified in news products and the extent to which they are accepted, rejected, or remixed by those who consume them.

Although news is sometimes treated as homogeneous—especially in statistical modeling that reduces it to a single endogenous or exogenous variable—the scholarship clearly observes that it is instead quite heterogeneous as a result of distinct news production practices, objectives, and constellations. Nielsen (2017) helps illustrate one degree of epistemological divergence in outlining three different forms of knowledge that can be conveyed through digital journalism: news-as-impression, or decontextualized snippets of information as with brief news alerts; news-as-item, or typical-length news articles and video news reports about news episodes; and news-about-relations, or in-depth, explanatory, and durable news products that aim to show the bigger picture. Matheson and Wahl-Jorgensen (2020) also point to five key aspects for distinguishing between types of journalism: narrative structure, or the way in which information is organized; temporality, or how time is accounted for; journalistic role, or the responsibilities, values, and objectives of the news product; authorial stance, or the journalist's perspective on conventions such as objectivity and balance; and status of text, or whether the product is treated as a finished or evolving product.

Drawing on this literature, this article attempts to explicate the epistemologies of news production through a matrix of 10 dimensions referred to as *the epistemologies of journalism matrix*. This matrix focuses on identifying the key (a) *social actors*, (b) *technological actants*, and (c) *audiences* within a space of journalism; examining their articulation or justification of (d)

knowledge claims and their distinct (e) *practices*, *norms*, *routines*, and *roles*; differentiating between the (f) *forms of knowledge* they typically convey; and evaluating the similarities and dissimilarities in their typical (g) *narrative structure*, (h) *temporality*, (i) *authorial stance*, and (j) *status of text*.

Epistemologies of News Production

To illustrate the heterogeneity of news production and the value of evaluating its epistemologies through the 10 aforementioned dimensions, the dimensions are applied to four emerging forms of journalism: participatory journalism, live blogging, data journalism, and automated journalism (Table 1; see also Ekström & Westlund, 2019a). Scholars are encouraged to build upon the epistemologies of journalism matrix by incorporating additional forms of journalism.

Table 1. Epistemologies and Different Forms of Journalism

	Traditional Journalism	Participatory Journalism	Live Blogging	Data Journalism	Automated Journalism
Social actors	Journalists	Journalists, social media editors, citizens	Journalists, citizens	Journalists with cross-field backgrounds	Highly technical journalists and technologists
Technological actants	Customized content management systems	Social media platforms, commenting affordances	Blogging and microblogging platforms, smartphones	Open-source statistical analysis and data visualization software	Proprietary algorithms for natural language processing and generation
Audience approach	Passive audiences	Active participants	Mostly passive audiences	Mostly passive audiences but with interactive affordances	Passive audiences that may receive personalized content
Practices, norms, roles, and routines	Journalists in control and strive to adhere to values embedded in occupational ideology	Journalists in control but motivated to curate and invite collaboration at multiple stages of news production	Journalists in control and motivated by immediacy, but also engage in curation and invite some co-presence	Journalists in control but emphasis is on central tendencies, and the ideals of transparency and sharing	Humans delegate control to actants, with emphasis on increased production that appears human-made
Knowledge claims	Claims based on established authority as arbiters of truth in news	Claims reinforced by references to collaborative knowledge production	Claims diminished due to immediacy and challenges of real-time verification	Claims reinforced by references to authority of science and quantification	Claims reinforced by references to mechanical objectivity and impartiality

	Traditional Journalism	Participatory Journalism	Live Blogging	Data Journalism	Automated Journalism
Forms of knowledge	News-as-items and news-about-relations	News-as-items with contributions from active participants	News-as-impressions that may eventually become news-as-items	News-as-items and news-about-relations	News-as-items and news-as-impressions
Narrative structure	Coherent and traditional structures, such as the inverted pyramid	Coherent and traditional structures, such as the inverted pyramid	Fragmented and usually following a reverse chronological order as its main organizational structure	Coherent and traditional structures, but with more interactive and modular elements	Coherent but highly structured and usually based on limited range of templates
Temporality	Ordered, interpretive framework shaped by eventization and elite voices	Ordered, interpretive framework featuring more diverse set of sources	Overlapping moments in time with an interpretive framework interspersing multiple voices	Ordered, interpretive framework relying on structured data sources	Ordered, systematically interpreted framework relying on semistructured documents and structured data sets
Authorial stance	Objective as a result of following a journalistic process	More subjective and informed by networked balance and co-presence	More subjective and informed by networked balance and co-presence	Objective, but implicitly conveyed as incomplete by virtue of exploratory visualizations	Objective as a result of its mechanical production
Status of text	Finished product	Finished product	Incomplete, temporary product that is being frequently updated	Finished product, or semi-finished as a result of automated updates	Finished product that may be dynamic as a result of personalization

Note: The epistemologies of journalism matrix outlines the most dominant news production patterns for each of 10 dimensions. In this table, it is applied to distinct forms of predominantly digital journalism, as per the authors' knowledge of the sectors and existing scholarly work. Exceptions to the dominant patterns can exist in different geographical contexts and among different sorts of news publishers.

Participatory Journalism

Participatory journalism is known as a form of digital journalism that promotes active and intentional engagement between newsworkers and individuals previously thought of as mostly passive audiences (Singer et al., 2011). Although journalism has long offered audiences an opportunity to have a voice, whether through purposive sourcing or dedicated sections for letters to the editor, this more recent form aims to center citizens' contributions in multiple stages of the news production process (Lawrence et al., 2018). It may manifest itself both in perception (beliefs about the role of audiences) and in practice (affordances and efforts to involve audiences) and entail direct, indirect, and sustained exchanges designed to empower audiences (Coddington et al., 2018). As Westlund and Ekström (2018) argue, scholarship on participatory journalism must now consider both proprietary and nonproprietary platforms. Importantly, proprietary platforms are those that belong to and are controlled by a specific company (with the inner workings often black-boxed) and which may be used by others through the purchase of a license or their participation in a monetization scheme. Some news organizations are proprietors of platforms and algorithms of their own. However, news companies also rely on platforms (e.g., Facebook and Chartbeat) that are not proprietary to them. Such third-party platforms, which include the likes of Twitter (Hermida et al., 2014) and WhatsApp (Kligler-Vilenchik & Tenenboim, 2020), are now deeply embedded in journalistic practice. That, in turn, has structured the affordances, possibilities, and expectations for acts of participatory journalism. Publishers are increasingly focusing on reducing their dependency on third parties and developing their own proprietary solutions, both for economic purposes and to introduce new affordances for participation. Moreover, as scholars have observed, not all participation is prosocial; a considerable amount involves harassment, bullying, and hate speech (Lewis et al., 2020; Quandt, 2018).

News can be produced via participatory journalism by an extensive range of individual social actors that is typically led by journalists, social media editors, and audience engagement editors but may involve a range of previously passive actors such as citizen journalists (Wall, 2017). Its production processes are still human-centric, although they draw upon proprietary and third-party technological actants such as social media platforms to facilitate participation at different stages of news production (Westlund & Ekström, 2018). The *audiences* are not only diverse but also active, as nearly any member is theoretically able to engage in participatory journalism due to the low barrier to entry (Coddington et al., 2018).

Participatory journalism involves practices, norms, routines, and roles oriented toward curation and requiring an openness to collaboration that has historically been a source of professional tension (Lewis, 2012). It is driven by a logic that may be normatively characterized as democratically oriented and critically characterized as communicative capitalism (Vujnovic et al., 2010; see also Zamith, 2018). The knowledge claims made within participatory journalism differ from traditional claims in that they assert themselves to be enhanced by public engagement—they are presumed to be actively vetted and informed by others' observed and lived experiences—and thus purport to represent a collaborative form of knowledge production

(Anderson & Revers, 2018). As a form of knowledge, participatory journalism may take different shapes but is most commonly seen as typical news-as-items, wherein participants inform but do not revolutionize traditional journalistic products (Borger et al., 2019).

The narrative structure of the products of participatory journalism are typically coherent and adhere to traditional structures, like the inverted pyramid for texts (Engelke, 2020). Regarding temporality, products tend to adhere to an interpretive framework that draws upon more diverse sets of sources in an ordered manner (Borger et al., 2019). The authorial stance differs in that it is more subjective and involves weaker professional control resulting from efforts to promote networked balance and co-presence (Lawrence et al., 2018). The status of the text is typically implicitly conveyed as static and presumed to be finished, lest it involve a live or rapidly evolving news event (Ekström & Westlund, 2019b).

More generally, the tension between professional control and open participation (Lewis, 2012) is associated with the epistemological authority of journalists in producing and defining news. Studies find that journalists remain in control of those processes or cede only a portion of their control (e.g., Engelke, 2019). Although scholars continue to see potential for greater participation in the news, the degree of "dark participation" has proven to be a significant barrier (Quandt, 2018)—evidenced, for instance, by the removal of user-commenting affordances on many leading news websites. Nevertheless, participatory journalism has in some cases substantively reshaped sourcing practices, yielding less elite and more diverse source networks (Hermida et al., 2014) and ultimately producing more cautious knowledge claims. Moreover, whereas citizens' *direct* participation in news production may be more limited than some scholars envisioned at the turn of the century, their *indirect* participation—by privately sharing news materials on tracked social media platforms, posting firsthand videos through semi-public accounts, and publicly discussing news and news coverage—has further reshaped journalism beyond this specific form (Engelke, 2019).

Live Blogging

Live blogging is a form of digital journalism that focuses on ongoing, near real-time reporting of both planned and unexpected news events through brief and sequential posts on digital websites and platforms (Matheson & Wahl-Jorgensen, 2020). This approach to journalism, which major news organizations have employed as far back as the early 2000s (Thurman & Walters, 2013), is routinely used to cover sporting events, political speeches, and breaking news such as terror attacks (Thorsen & Jackson, 2018). Although it is sometimes considered to be a text-based parallel to live broadcast news, it differs in the extent to which it typically engages with audiences and how it conveys its narrative. It is closely associated, and thus frequently interchanged, with the notion of live tweeting.

News can be produced through live blogging by an extensive range of individual social actors that include both staff journalists and citizens acting as journalists (Thurman & Rodgers, 2014). This is made possible through the use of technological actants that are often not proprietary to news organizations, such as content management systems and blogging platforms, as well as through

social media platforms (Thorsen, 2013). Live blogging may be performed as one-way communication with general (and specialized) audiences, but it sometimes includes affordances for audience engagement—as in directly soliciting and answering questions during unfolding events or incorporating contextual information provided by members of the audience (Bennett, 2016).

Its practices, norms, routines, and roles are characterized primarily by speed and curation, as actors must not only observe real-time events and break them as news but also quickly make sense of those events in order to distinguish their products from competitors' while incorporating content created by other members of a social network (Thurman & Walters, 2013). As such, its practitioners seemingly are more cautious with their knowledge claims because they explicitly recognize that emerging events can be confusing, even when observed firsthand, and the immediacy of their posts makes fact-checking difficult, if not unfeasible. They may, however, draw on the public to verify information for knowledge claims, such as by asking other users to confirm the physical address where a news event is taking place. As a form of knowledge, it is typically composed of a series of individual products (i.e., bullets or tweets) best characterized as news-as-impression but that add up to (and can be consumed as) news-as-item once the event is over.

The narrative structure of live blogging is fragmented and not organized by textual coherence but, rather, by reverse chronology, with the latest observation usually on top (Matheson & Wahl-Jorgensen, 2020). Its temporality is characterized by overlapping moments in time, as previously reported developments are contextualized while new developments are reported, and new voices are occasionally interspersed via affordances such as retweets (Matheson & Wahl-Jorgensen, 2020). The authorial stance is marked by networked balance and co-presence, rather than objectivity, because authors typically adopt a mix of their observations and opinions while inviting and including discrete moments shared by fellow journalists, sources, and audience members (Matheson & Wahl-Jorgensen, 2020). The status of the text is explicitly conveyed as dynamic and temporary, with an understanding that updates are often open, incomplete, and unfinished (Matheson & Wahl-Jorgensen, 2020).

The consequence of these attributes is that live blogging is more willing to cede some of its epistemological authority in defining news in large part because of how it produces news. Although journalism is often described as "a first draft of history," live blogging is more accommodating of partial accounts, forgiving of corrections, and willing to include unverified claims. In other words, it recognizes itself as being particularly temporary within the ecosystem of journalism—a moment in time that will be replaced by fuller accounts. Moreover, live blogging is more distanced from objectivity norms and open to audiences, making knowledge production about "news" a more distributed endeavor. As Matheson and Wahl-Jorgensen (2020, p. 313) state, "the live blog can be understood as a journalistic response to the logics of social media"—although, it is contended in this article, to a lesser degree than participatory journalism.

Data Journalism

Data journalism may be conceptualized as a hybrid form that is grounded in "data analysis and the presentation of such analysis" (Coddington, 2015, p. 334). It may also be delineated by its content, which

> has a central thesis (or purpose) that is primarily attributed to (or fleshed out by) quantified information (e.g., statistics or raw sensor data); involves at least *some* original data analysis by the item's author(s); and includes a visual representation of data (Zamith, 2019b, p. 478).

The form is not itself new—it is an outgrowth of a longer tradition of precision journalism and computer-assisted reporting (Houston, 1996; Splendore, 2016)—but data journalism distinguishes itself by decoupling from investigative journalism and calling greater attention to best practices in data sharing and visualization (Cairo, 2019; Coddington, 2015). It has also developed during a period when journalists have greater access to digital data and accessible tools, is now produced by major news organizations, and now has its own award bodies (Zamith, 2019b). However, journalists do struggle to get access to worthwhile and reliable data in many geographical contexts (Lewis & Nashmi, 2019; Porlezza & Splendore, 2019).

The social actors involved in the production of data journalism typically have backgrounds in statistics, computer science, design, and/or journalism—and a new professional class has emerged that reflects a "cross-field hybridity" (Coddington, 2015, p. 337) by incorporating multiple of those backgrounds (Hermida & Young, 2017). It is defined in part by the technological actants that enable it, including statistical analysis software and data visualization tools, as well as the premium that is placed on open-source solutions (Splendore, 2016). Its audiences are typically passive but may take an active role in shaping news production—high-profile data journalism projects have involved audience participation, although participatory affordances are typically limited (Zamith, 2019b)—and are usually given opportunities to interact with content.

The practices, norms, routines, and roles of this form focus on central tendencies rather than outliers (Young & Hermida, 2015) and emphasize the ideals of transparency and sharing (Coddington, 2015), yet they still legitimate themselves through the lens of some key traditional journalism principles (Borges-Rey, 2020). Its knowledge claims are rooted in science and quantification, and further benefit from a mythology around the objectivity of quantified claims (Lewis & Westlund, 2015b). Its forms of knowledge involve news-as-item for many of its "everyday" variants (Zamith, 2019b) as well as the deeper analyses better characterized as news-about-relations (Young & Hermida, 2015).

The narrative structure of data journalism is ordered and, in many ways, adheres to traditional structures (Borges-Rey, 2020), but it is more interactive and modular to accommodate visualizations, which are inherent to the storytelling (Cairo, 2019; Young & Hermida, 2015). Regarding temporality, it follows an ordered, interpretive framework that incorporates human sources but is most dependent on data sources (Porlezza & Splendore, 2019; Zamith, 2019b). Its authorial stance is objective, with some recognition that the author's account is incomplete and

thus open to further interpretation via the interactive features of data visualizations. The status of text is typically presumed to be finished or semi-finished, although texts may include visuals, models, and modules that automatically update as new data are entered.

Data journalism ultimately redefines epistemological authority as the result of data and scientific analyses that are further illustrated through anecdotal lived experience (Young & Hermida, 2015). Indeed, as Cairo (2019) contends, "Numbers and charts look and feel objective, precise, and, as a consequence, seductive and convincing" (p. xi). Data journalism has mainstreamed hypothesis-testing and data-driven logics within journalism, although epistemological tensions still emerge when traditional journalists work alongside their more data-oriented counterparts (Borges-Rey, 2020). However, although the production of data journalism marks an epistemological shift from traditional journalism, it is not a break. As Borges-Rey (2020) notes, data journalists routinely oscillate between "newshound" and "techie" approaches to news production. Furthermore, data journalists often legitimize their work as news production by referencing journalistic ideals and adopting its language (Coddington, 2015).

Automated Journalism

Automated journalism refers to "algorithmic processes that convert data into narrative news texts with limited to no human intervention beyond the initial programming" (Carlson, 2015, p. 417). It is a more advanced form of computational journalism (Coddington, 2015) that uses algorithms to largely automate the collection, writing, publication, and/or the distribution of news (Diakopoulos, 2019). Although machine-driven forms of journalism also trace many of their roots to precision journalism and computer-assisted reporting—and similarly require some form of data to be executed—they rapidly gained social capital within journalistic spaces starting in the mid-2000s (Zamith, 2019a). There are now companies such as Automated Insights that are advancing the technical capabilities and professional use of algorithms for automating news production, and they count major news organizations such as the Associated Press as their clients (Carlson, 2018). Perhaps most important, automated journalism has changed the scale at which journalism can be produced (Diakopoulos, 2019). It has also introduced new ways of communicating journalism, as with chatbots (Jones & Jones, 2019).

The social actors involved in automated journalism are mostly highly technical and include technologically oriented journalists, computational linguists, and vendors of proprietary algorithms (Carlson, 2018; Diakopoulos, 2019). Its technological actants include mostly proprietary algorithms for natural language processing and natural language generation that give humans some degree of structured control (e.g., creating templates) but aim to require minimal human involvement (Dörr, 2016). The audiences in automated journalism generally remain passive, although content may be personalized based on predictions from historical data and their active choices (Zamith, 2019a). Those recommendation systems can be designed to fit commercial purposes as well as distinct democratic models (Helberger, 2019).

The practices, norms, routines, and roles of automated journalism are oriented toward abstraction, structuration, quantification, and personalization, with the objective of simultaneously breaking news down to granular, discrete elements while using those elements to create news products that are indistinguishable from their human-generated counterparts (Coddington, 2015; Graefe et al., 2018). Its knowledge claims are derived from mechanical analyses of data that give them "algorithmic authority" by virtue of their presumed impartiality—even as those algorithms are themselves biased by the humans who create them (Carlson, 2015). Its forms of knowledge include both news-as-item (e.g., automated news stories) and bite-size "structured information" (Splendore, 2016, p. 349) that can be used to power news-as-impression (e.g., chatbots and automated notifications).

The narrative structure of automated journalism is highly structured—indeed, its most common products are based on templates—and may be both coherent (as in the case of news stories; see Diakopoulos, 2019) and fragmented (as in the case of chatbots; see Jones & Jones, 2019). Regarding temporality, it typically follows an ordered, systematically interpreted framework that draws chiefly upon semistructured documents and structured data sets (Dörr, 2016). Its authorial stance is objective, again drawing upon the purported impartiality of the algorithms that produced the news (Broussard, 2018; Carlson, 2018). The status of text is typically presumed to be finished, although there is greater presumption of dynamism in response to the automated personalization of those texts (Zamith, 2019a).

As Carlson (2018) argues, automated journalism "represents a core departure from how journalism has been understood and cannot be contained as an extension of journalism's professional logic" (p. 1765). Under this form, human judgment should play a limited (or unchanging) role in the production of knowledge about the news; instead, production should be guided by abstracted principles and enacted by algorithms (Coddington, 2015). Furthermore, it shifts the idea of news as public, shared knowledge toward individual, personalized knowledge (Splendore, 2016). It thus challenges traditional notions of journalistic epistemology even as it arguably serves as the apotheosis of one its key production values: objectivity (Carlson, 2018). However, although this stream of journalism emphasizes the technical by its very nature, scholars have argued that the technological actants and activities involved in this space remain deeply influenced by human actors (Broussard, 2018; Diakopoulos, 2019). Consequently, and in large part due to the current state of technology, the epistemological break in contemporary practice is more limited than theory would suggest—and this phenomenon is unlikely to change in the near future.

Discussion and Research Directions

Until recently, scholars have studied and described news production as a set of human-oriented activities that largely share a universal set of characteristics (see review in Westlund & Ekström, 2019). The authors of this article have deliberately sought to do otherwise, and instead called attention to recent arguments underscoring the growing role of technological actants in journalism and the heterogeneous nature of news production—which, in turn, have implications for how people come to understand "news." This position primarily draws on three streams of

research: the epistemologies of journalism (e.g., Ekström & Westlund, 2019a, 2019b), sociotechnical approaches to understanding news work (e.g., Lewis & Westlund, 2015a; Zamith, 2019a), and systematic comparisons of diverging news production processes (e.g., Matheson & Wahl-Jorgensen, 2020). The authors contribute to those streams by proposing the epistemologies of journalism matrix, which provides scholars with an analytic framework for examining the heterogeneity of news production in terms of its implicated entities, its cultures and methods, and its positionality in relation to matters of knowledge and authority.

The utility of the matrix is illustrated through an examination of four forms of journalism: participatory journalism, live blogging, data journalism, and automated journalism. The analysis highlights three points. First, contemporary news production is deeply influenced by myriad technological actants, which are reshaping how knowledge about current events is being created, evaluated, and disseminated. Second, professional journalists are losing epistemic authority over the news as key activities are delegated to algorithms created by non-journalists and to citizens who have become more present in news production. Third, the outputs of news production are becoming more diverse both in form and in content, further challenging long-standing norms about what is and is not "journalism." However, those are but four forms and hardly capture all of what journalism encompasses. The authors thus invite scholars to expand on the matrix by applying it to other forms of journalism—and, in the process, refine the matrix itself and advance its theoretical implications.

In addition, the authors believe it is important for any scholar studying news production to be mindful of three key developments in their future work. First, it is apparent that what is "news" to different people is quite different today from times past. The history of journalism has been marked by many significant changes as to what is considered news, how it is shaped, and who distributes it. However, digital devices and platforms have made news available 24/7, and the ease of producing and disseminating content these days has contributed to an explosion of news produced by a large and diverse array of actors. Moreover, that news is increasingly sought on just a few platforms (e.g., Google and Facebook) that often flatten traditional media hierarchies by placing news produced by professional journalistic outlets alongside content created by nonprofessionals. The consequence is that there are now more interlopers seeking to pass their content off as "news"—from individual trolls seeking to get a rise out of people (Quandt, 2018) to actors hoping to monetize their content (Braun & Eklund, 2019) and states seeking to gain political advantage (Marwick & Lewis, 2017)—which has further complicated a historically contested term. Moreover, the past decade has been marked by low or declining levels of trust in news media in many areas of the world (Fletcher & Park, 2017), as well as sustained attacks on news media (Carlson et al., 2021; Waisbord, 2020).

Second, the heterogeneity of "news" and "news production" requires scholars to think carefully about how they operationalize those variables in their work (Mast et al., 2017; Waisbord, 2018). For example, there is a substantive and growing body of literature on news consumption and news avoidance that builds on quantitative data and analyses of media effects (Skovsgaard & Andersen, 2020). Such studies often conceptualize and operationalize news and news production processes in ways that make them appear more homogeneous than they are in practice (Mast et al., 2017). As such, differences in research findings may be due, in part, to distinct understandings

of those concepts, in light of their heterogeneity. It is imperative, therefore, for scholars to both examine the evolution of these understandings and account for them in research by either offering more granular options or detailing their operationalizations.

Third, the power dependencies in news production have changed markedly in recent years (Ekström & Westlund, 2019b). It is now much more difficult for practitioners to adhere to the values typically associated with their occupational ideology or to resist changes instituted by superiors and consolidating ownership (Coddington, 2019; Vos & Heinderyckx, 2015). News producers, once seen as gatekeepers, are now themselves gatekept by algorithms employed by platform companies (Gillespie, 2014; Wallace, 2018)—algorithms that producers often believe they must adjust to even as they recognize such actions only make them more dependent (Nielsen & Ganter, 2018; Pickard, 2020). Their future is sometimes tied to technologies developed far from newsrooms (Braun & Eklund, 2019; Diakopoulos, 2019; Tandoc, 2019). Thus, contemporary analyses of news production should account for power differences among institutional actors—recognizing that journalistic actors are now less likely to exert dominance.

At the same time, although this article has focused on change and on digital journalism, it is important to recognize that a non-negligible amount of what is commonly referred to as "journalism" has remained reasonably stable—and that much of the change is rooted in pre-digital expectations, practices, and capabilities (Zelizer, 2019). Moreover, this article has focused on the mainstream applications of journalism in Western contexts, and it is important to recognize that the histories and legacies of other places impact the developmental trajectories—and epistemological notions—of digital journalism differently in those contexts (Mellado, 2021).

Nevertheless, history has shown that news production will continue to evolve alongside broader economic, political, professional, social, and technological shifts—and in doing so spring new forms and assemblages. An epistemological lens affords scholars a useful and adaptable approach for understanding the implications of those changes to the production of knowledge about news. Nevertheless, it is apparent that future scholarship will demand further theoretical and methodological development in order to keep up with a rapidly changing ecosystem and information regime.

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Further Reading

Ekström, M., & Westlund, O. (2019). Epistemology and journalism *<https://oxfordre.com/communication/view/10.1093/acrefore/9780190228613.001.0001/acrefore-9780190228613-e-806>*. In *Oxford research encyclopedia of communication*. Oxford University Press.

Pressman, M. (2018). *On press: The liberal values that shaped the news*. Harvard University Press.

Ryfe, D. M. (2019). *Journalism and the public*. Polity.

Steensen, S., & Westlund, O. (2021). *What is digital journalism studies?* Routledge.

Tandoc, E. C. (2019). *Analyzing analytics: Disrupting journalism one click at a time*. Routledge.

Usher, N. (2021). *News for the rich, white, and blue: How place and power distort American journalism*. Columbia University Press.

References

Ahva, L., & Steensen, S. (2019). Journalism theory. In K. Wahl-Jorgensen & T. Hanitzsch (Eds.), *The handbook of journalism studies* (pp. 38–54). Routledge.

Ali, C., Schmidt, T. R., Radcliffe, D., & Donald, R. (2019). The digital life of small market newspapers <https://doi.org/10.1080/21670811.2018.1513810>. *Digital Journalism*, *7*(7), 886–909.

Anderson, C. W., & Revers, M. (2018). From counter-power to counter-pepe: The vagaries of participatory epistemology in a digital age <https://doi.org/10.17645/mac.v6i4.1492>. *Media and Communication*, *6*(4), 24.

Ataman, B., & Çoban, B. (2018). Counter-surveillance and alternative new media in Turkey <https://doi.org/10.1080/1369118X.2018.1451908>. *Information, Communication and Society*, *21*(7), 1014–1029.

Bakker, P. (2012). Aggregation, content farms, and Huffinization <https://doi.org/10.1080/17512786.2012.667266>. *Journalism Practice*, *6*(5–6), 627–637.

Barnhurst, K. G. (2011). The problem of modern time in American journalism <https://doi.org/10.1163/156852411X595297>. *KronoScope*, *11*(1/2), 98–123.

Belair-Gagnon, V., & Holton, A. E. (2018). Boundary work, interloper media, and analytics in newsrooms <https://doi.org/10.1080/21670811.2018.1445001>. *Digital Journalism*, *6*(4), 492–508.

Bennett, D. (2016). Sourcing the BBC's live online coverage of terror attacks <https://doi.org/10.1080/21670811.2016.1163233>. *Digital Journalism*, *4*(7), 861–874.

Benson, R. (2006). News media as a "journalistic field": What Bourdieu adds to new institutionalism, and vice versa <https://doi.org/10.1080/10584600600629802>. *Political Communication*, *23*(2), 187–202.

Borger, M., van Hoof, A., & Sanders, J. (2019). Exploring participatory journalistic content: Objectivity and diversity in five examples of participatory journalism <https://doi.org/10.1177/1464884916675633>. *Journalism*, *20*(3), 444–466.

Borges-Rey, E. (2020). Towards an epistemology of data journalism in the devolved nations of the United Kingdom: Changes and continuities in materiality, performativity and reflexivity <https://doi.org/10.1177/1464884917693864>. *Journalism*, *21*(7), 915–932.

Bourdieu, P. (1993). *The field of cultural production: Essays on art and literature*. Columbia University Press.

boyd, d., & Ellison, N. B. (2007). Social network sites: Definition, history, and scholarship <https://doi.org/10.1111/j.1083-6101.2007.00393.x>. *Journal of Computer-Mediated Communication*, *13*(1), 210–230.

Braun, J. A. (2015). *This program is brought to you by . . .* . Yale University Press.

Braun, J. A. (2019). News distribution <https://doi.org/10.1093/acrefore/9780190228613.013.846>. In *Oxford research encyclopedia of communication*. Oxford University Press.

Braun, J. A., & Eklund, J. L. (2019). Fake news, real money: Ad tech platforms, profit-driven hoaxes, and the business of journalism <https://doi.org/10.1080/21670811.2018.1556314>. *Digital Journalism*, *7*, 1–21.

Broussard, M. (2018). *Artificial unintelligence: How computers misunderstand the world*. MIT Press.

Bruns, A. (2008). The active audience: Transforming journalism from gatekeeping to gatewatching. In C. A. Paterson & D. Domingo (Eds.), *Making online news* (pp. 171–184). Lang.

Bucy, E. P. (2004). Interactivity in society: Locating an elusive concept <https://doi.org/10.1080/01972240490508063>. *The Information Society*, *20*(5), 373–383.

Cairo, A. (2019). *How charts lie: Getting smarter about visual information*. Norton.

Carlson, M. (2015). The robotic reporter <https://doi.org/10.1080/21670811.2014.976412>. *Digital Journalism*, *3*(3), 416–431.

Carlson, M. (2017). *Journalistic authority: Legitimating news in the digital era*. Columbia University Press.

Carlson, M. (2018). *Automating judgment? Algorithmic judgment, news knowledge, and journalistic professionalism[https://doi.org/10.1177/1461444817706684].* *New Media & Society*, *20*(5), 1755–1772.

Carlson, M., Robinson, S., & Lewis, S. C. (2021). *Digital press criticism: The symbolic dimensions of Donald Trump's assault on U.S. journalists as the "enemy of the people"[https://doi.org/10.1080/21670811.2020.1836981].* *Digital Journalism*, *9*(6), 737–754.

Chua, S., & Duffy, A. (2019). Friend, foe or frenemy? Traditional journalism actors' changing attitudes towards peripheral players and their innovations <https://doi.org/10.17645/mac.v7i4.2275>. *Media and Communication*, *7*(4), 112–122.

Chua, S., & Westlund, O. (2019). Audience-centric engagement, collaboration culture and platform counterbalancing: A longitudinal study of ongoing sensemaking of emerging technologies <https://www.cogitatiopress.com/mediaandcommunication/article/view/1760>. *Media and Communication*, *7*(1), 153–165.

Coddington, M. (2015). Clarifying journalism's quantitative turn <https://doi.org/10.1080/21670811.2014.976400>. *Digital Journalism*, *3*(3), 331–348.

Coddington, M. (2019). *Aggregating the news: Secondhand knowledge and the erosion of journalistic authority*. Columbia University Press.

Coddington, M., Lewis, S. C., & Holton, A. E. (2018). Measuring and evaluating reciprocal journalism as a concept <https://doi.org/10.1080/17512786.2018.1493948>. *Journalism Practice*, *12*(8), 1039–1050.

Compton, J. R., & Benedetti, P. (2010). Labour, new media and the institutional restructuring of journalism <https://doi.org/10.1080/14616701003638350>. *Journalism Studies*, *11*(4), 487–499.

Cook, T. E. (1998). *Governing with the news: The news media as a political institution*. University of Chicago Press.

Costera Meijer, I., & Groot Kormelink, T. (2015). Checking, sharing, clicking and linking <https://doi.org/10.1080/21670811.2014.937149>. *Digital Journalism*, *3*(5), 664–679.

Diakopoulos, N. (2019). *Automating the news: How algorithms are rewriting the media*. Harvard University Press.

Domingo, D., Quandt, T., Heinonen, A., Paulussen, S., Singer, J. B., & Vujnovic, M. (2008). Participatory journalism practices in the media and beyond <https://doi.org/10.1080/17512780802281065>. *Journalism Practice*, *2*(3), 326–342.

Dörr, K. N. (2016). Mapping the field of algorithmic journalism <https://doi.org/10.1080/21670811.2015.1096748>. *Digital Journalism*, *4*(6), 700–722.

Duffy, A., Ling, R., Kim, N., Tandoc, E., & Westlund, O. (2020). News: Mobiles, mobilities and their meeting points <https://doi.org/10.1080/21670811.2020.1712220>. *Digital Journalism*, *8*(1), 1–14.

Ekström, M. (2002). Epistemologies of TV journalism: A theoretical framework <https://doi.org/10.1177/146488490200300301>. *Journalism*, *3*(3), 259–282.

Ekström, M., Ramsälv, A., & Westlund, O. (2021). The epistemologies of breaking news <https://doi.org/10.1080/1461670X.2020.1831398>. *Journalism Studies*, *22*(2), 174–192.

Ekström, M., & Westlund, O. (2019a). Epistemology and journalism <https://oxfordre.com/communication/view/10.1093/acrefore/9780190228613.001.0001/acrefore-9780190228613-e-806>. In *Oxford research encyclopedia of communication*. Oxford University Press.

Ekström, M., & Westlund, O. (2019b). The dislocation of news journalism: A conceptual framework for the study of epistemologies of digital journalism <https://doi.org/10.17645/mac.v7i1.1763>. *Media and Communication*, *7*(1), 259–270.

Elliott, A., & Urry, J. (2010). *Mobile lives*. Routledge.

Engelke, K. M. (2019). Online participatory journalism: A systematic literature review <https://doi.org/10.17645/mac.v7i4.2250>. *Media and Communication*, *7*(4), 31–44.

Engelke, K. M. (2020). Enriching the conversation: Audience perspectives on the deliberative nature and potential of user comments for news media <https://doi.org/10.1080/21670811.2019.1680567>. *Digital Journalism*, *8*(4), 447–466.

Fenton, N. (2011). Deregulation or democracy? New media, news, neoliberalism and the public interest <https://doi.org/10.1080/10304312.2011.539159>. *Continuum*, *25*(1), 63–72.

Figenschou, T. U., & Ihlebæk, K. A. (2019). Challenging journalistic authority <https://doi.org/10.1080/1461670X.2018.1500868>. *Journalism Studies*, *20*(9), 1221–1237.

Fletcher, R., & Park, S. (2017). The impact of trust in the news media on online news consumption and participation <https://doi.org/10.1080/21670811.2017.1279979>. *Digital Journalism*, *5*(10), 1281–1299.

Flew, T., & Swift, A. (2013). Regulating journalists? The Finkelstein review, the convergence review and news media regulation in Australia <https://doi.org/10.1386/ajms.2.1.181_1>. *Journal of Applied Journalism & Media Studies*, *2*(1), 181–199.

Gieryn, T. F. (1999). *Cultural boundaries of science: Credibility on the line*. University of Chicago Press.

Gillespie, T. (2014). The relevance of algorithms. In T. Gillespie, P. Boczkowski, & K. Foot (Eds.), *Media technologies: Essays on communication, materiality, and society* (pp. 167–194). MIT Press.

Graefe, A., Haim, M., Haarmann, B., & Brosius, H.-B. (2018). Readers' perception of computer-generated news: Credibility, expertise, and readability <https://doi.org/10.1177/1464884916641269>. *Journalism*, *19*(5), 595–610.

Gutsche, R. E., Jr., & Hess, K. (2020). Placeification: The transformation of digital news spaces into "places" of meaning <https://doi.org/10.1080/21670811.2020.1737557>. *Digital Journalism*, *8*(5), 586–595.

Hågvar, Y. B. (2019). News media's rhetoric on Facebook <https://doi.org/10.1080/17512786.2019.1577163>. *Journalism Practice*, *13*(7), 853–872.

Hamilton, J. (2004). *All the news that's fit to sell: How the market transforms information into news*. Princeton University Press.

Hanusch, F., & Maares, P. (2021). News production. In K. B. Jensen (Ed.), *A handbook of media and communication research* (3rd ed., pp. 93–111). Routledge.

Heft, A., & Dogruel, L. (2019). Searching for autonomy in digital news entrepreneurism projects <https://doi.org/10.1080/21670811.2019.1581070>. *Digital Journalism*, *7*(5), 678–697.

Helberger, N. (2019). On the democratic role of news recommenders <https://doi.org/10.1080/21670811.2019.1623700>. *Digital Journalism*, *7*(8), 993–1012.

Hermida, A. (2020). Post-publication gatekeeping: The interplay of publics, platforms, paraphernalia, and practices in the circulation of news <https://doi.org/10.1177/1077699020911882>. *Journalism & Mass Communication Quarterly*, *97*(2), 469–491.

Hermida, A., Lewis, S. C., & Zamith, R. (2014). Sourcing the Arab spring: A case study of Andy Carvin's sources on Twitter during the Tunisian and Egyptian revolutions <https://doi.org/10.1111/jcc4.12074>. *Journal of Computer-Mediated Communication*, *19*(3), 479–499.

Hermida, A., & Young, M. L. (2017). Finding the data unicorn <https://doi.org/10.1080/21670811.2016.1162663>. *Digital Journalism*, *5*(2), 159–176.

Holt, K., Ustad Figenschou, T., & Frischlich, L. (2019). *Key dimensions of alternative news media[https://doi.org/10.1080/21670811.2019.1625715]. *Digital Journalism*, *7*(7), 860–869.

Houston, B. (1996). *Computer-assisted reporting: A practical guide*. St. Martin's.

Jack, C. (2017). *Lexicon of lies* <https://datasociety.net/library/lexicon-of-lies>. Data & Society.

John, R. R. (1995). *Spreading the news: The American postal system from Franklin to Morse*. Harvard University Press.

Jones, B., & Jones, R. (2019). Public service chatbots: Automating conversation with BBC news <https://doi.org/10.1080/21670811.2019.1609371>. *Digital Journalism*, *7*(8), 1032–1053.

Jönsson, A. M., & Örnebring, H. (2010). User-generated content and the news: Empowerment of citizens or interactive illusion? <https://doi.org/10.1080/17512786.2010.501155>*Journalism Practice*, *5*(2), 127–144.

Kim, Y., & Lowrey, W. (2015). Who are citizen journalists in the social media environment? <https://doi.org/10.1080/21670811.2014.930245>*Digital Journalism*, *3*(2), 298–314.

Kligler-Vilenchik, N., & Tenenboim, O. (2020). Sustained journalist–audience reciprocity in a meso news-space: The case of a journalistic WhatsApp group <https://doi.org/10.1177/1461444819856917>. *New Media & Society*, *22*(2), 264–282.

Kreiss, D., & Ananny, M. (2013). Responsibilities of the state: Rethinking the case and possibilities for public support of journalism <https://doi.org/10.5210/fm.v18i4.4323>. *First Monday*, *18*(4).

Lashmar, P. (2017). No more sources? <https://doi.org/10.1080/17512786.2016.1179587>*Journalism Practice*, *11*(6), 665–688.

Lawrence, R. G., Radcliffe, D., & Schmidt, T. R. (2018). Practicing engagement <https://doi.org/10.1080/17512786.2017.1391712>. *Journalism Practice*, *12*(10), 1220–1240.

Lewis, N. P., & Nashmi, E. A. (2019). Data journalism in the Arab region: Role conflict exposed <https://doi.org/10.1080/21670811.2019.1617041>. *Digital Journalism*, *7*(9), 1200–1214.

Lewis, S. C. (2012). The tension between professional control and open participation <https://doi.org/10.1080/1369118X.2012.674150>. *Information, Communication and Society*, *15*(6), 836–866.

Lewis, S. C., & Westlund, O. (2015a). Actors, actants, audiences, and activities in cross-media news work <https://doi.org/10.1080/21670811.2014.927986>. *Digital Journalism*, *3*(1), 19–37.

Lewis, S. C., & Westlund, O. (2015b). Big data and journalism <https://doi.org/10.1080/21670811.2014.976418>. *Digital Journalism*, *3*(3), 447–466.

Lewis, S. C., Zamith, R., & Coddington, M. (2020). Online harassment and its implications for the journalist–audience relationship <https://doi.org/10.1080/21670811.2020.1811743>. *Digital Journalism*, *8*(8), 1047–1067.

Lowrey, W. (2011). Institutionalism, news organizations and innovation <https://doi.org/10.1080/1461670X.2010.511954>. *Journalism Studies*, *12*(1), 64–79.

Marwick, A., & Lewis, R. (2017). *Manipulation and disinformation online* <https://datasociety.net/output/media-manipulation-and-disinfo-online>. Data & Society.

Mast, J., Coesemans, R., & Temmerman, M. (2017). Hybridity and the news: Blending genres and interaction patterns in new forms of journalism <https://doi.org/10.1177/1464884916657520>. *Journalism*, *18*(1), 3–10.

Matheson, D., & Wahl-Jorgensen, K. (2020). The epistemology of live blogging <https://doi.org/10.1177/1461444819856926>. *New Media & Society*, *22*(2), 300–316.

Mellado, C. (2021). *Beyond journalistic norms: Role performance and news in comparative perspective*. Routledge.

Murschetz, P. C. (2020). State aid for independent news journalism in the public interest? A critical debate of government funding models and principles, the market failure paradigm, and policy efficacy <https://doi.org/10.1080/21670811.2020.1732227>. *Digital Journalism*, *8*(6), 720–739.

Napoli, P. M. (2011). *Audience evolution: New technologies and the transformation of media audiences*. Columbia University Press.

Neuman, W. R. (1991). *The future of the mass audience*. Cambridge University Press.

Nielsen, R. K. (2012). How newspapers began to blog <https://doi.org/10.1080/1369118X.2012.694898>. *Information, Communication and Society*, *15*(6), 959–978.

Nielsen, R. K. (2017). Digital news as forms of knowledge: A new chapter in the sociology of knowledge. In P. Boczkowski & C. W. Anderson (Eds.), *Remaking the news: Essays on the future of journalism scholarship in the digital age* (pp. 1–27). MIT Press.

Nielsen, R. K., & Ganter, S. A. (2018). Dealing with digital intermediaries: A case study of the relations between publishers and platforms <https://doi.org/10.1177/1461444817701318>. *New Media & Society*, *20*(4), 1600–1617.

Örnebring, H. (2018). Journalists thinking about precarity: Making sense of the "new normal." *International Symposium on Online Journalism*, *8*(1), 109–126.

Pavlik, J. V. (2004). A sea-change in journalism: Convergence, journalists, their audiences and sources <https://doi.org/10.1177/135485650401000404>. *Convergence*, *10*(4), 21–29.

Pickard, V. (2020). *Restructuring democratic infrastructures: A policy approach to the journalism crisis[https://doi.org/10.1080/21670811.2020.1733433]. *Digital Journalism*, *8*(6), 704–719.

Porlezza, C., & Splendore, S. (2019). From open journalism to closed data: Data journalism in Italy <https://doi.org/10.1080/21670811.2019.1657778>. *Digital Journalism*, *7*(9), 1230–1252.

Quandt, T. (2018). Dark participation <https://doi.org/10.17645/mac.v6i4.1519>. *Media and Communication*, *6*(4), 36.

Radcliffe, D., & Ali, C. (2017). *Small-market newspapers in the digital age* <https://doi.org/10.7916/D8WS95VQ>. Tow Center for Digital Journalism.

Schmitz Weiss, A. (2015). Place-based knowledge in the twenty-first century <https://doi.org/10.1080/21670811.2014.928107>. *Digital Journalism*, *3*(1), 116–131.

Singer, J. B. (2012). The ethics of social journalism. *Australian Journalism Review*, *34*(1), 3–16.

Singer, J. B., Domingo, D., Heinonen, A., Hermida, A., Paulussen, S., Quandt, T., Reich, Z., & Vujnovic, M. (2011). *Participatory journalism: Guarding open gates at online newspapers*. Wiley-Blackwell.

Sjøvaag, H., Stavelin, E., Karlsson, M., & Kammer, A. (2019). The hyperlinked Scandinavian news ecology <https://doi.org/10.1080/21670811.2018.1454335>. *Digital Journalism*, *7*(4), 507–531.

Skovsgaard, M., & Andersen, K. (2020). Conceptualizing news avoidance: Towards a shared understanding of different causes and potential solutions <https://doi.org/10.1080/1461670X.2019.1686410>. *Journalism Studies*, *21*(4), 459–476.

Splendore, S. (2016). Quantitatively oriented forms of journalism and their epistemology <https://doi.org/10.1111/soc4.12366>. *Sociology Compass*, *10*(5), 343–352.

Stahel, L., & Schoen, C. (2020). Female journalists under attack? Explaining gender differences in reactions to audiences' attacks <https://doi.org/10.1177/1461444819885333>. *New Media & Society*, *22*(10), 1849–1867.

Steensen, S., & Eide, T. (2019). News flows, inter-media connectivity and societal resilience in times of crisis <https://doi.org/10.1080/21670811.2018.1520607>. *Digital Journalism*, *7*(7), 932–951.

Steensen, S., & Westlund, O. (2021). *What is digital journalism studies?* Routledge.

Swart, J., Peters, C., & Broersma, M. (2019). Sharing and discussing news in private social media groups <https://doi.org/10.1080/21670811.2018.1465351>. *Digital Journalism*, *7*(2), 187–205.

Tandoc, E. C. (2019). *Analyzing analytics: Disrupting journalism one click at a time*. Routledge.

Thorsen, E. (2013). Live blogging and social media curation: Challenges and opportunities for journalism. In K. Fowler-Watt & S. Allan (Eds.), *Journalism: New challenges* (pp. 123–145). Centre for Journalism & Communication Research.

Thorsen, E., & Jackson, D. (2018). Seven characteristics defining online news formats <https://doi.org/10.1080/21670811.2018.1468722>. *Digital Journalism*, *6*(7), 847–868.

Thurman, N., & Rodgers, J. (2014). Citizen journalism in real time: Live blogging and crisis events. In E. Thorsen & S. Allan (Eds.), *Citizen journalism: Global perspectives* (pp. 81–95). Lang.

Thurman, N., & Walters, A. (2013). Live blogging: Digital journalism's pivotal platform? <https://doi.org/10.1080/21670811.2012.714935>*Digital Journalism*, *1*(1), 82–101.

Usher, N. (2014). *Making news at The New York Times*. University of Michigan Press.

Usher, N. (2019). Putting "place" in the center of journalism research: A way forward to understand challenges to trust and knowledge in news <https://doi.org/10.1177/1522637919848362>. *Journalism & Communication Monographs*, *21*(2), 84–146.

Vos, T., & Heinderyckx, F. (2015). *Gatekeeping in transition*. Routledge.

Vujnovic, M., Singer, J. B., Paulussen, S., Heinonen, A., Reich, Z., Quandt, T., Hermida, A., & Domingo, D. (2010). Exploring the political–economic factors of participatory journalism <https://doi.org/10.1080/17512781003640588>. *Journalism Practice*, *4*(3), 285–296.

Waisbord, S. (2018). Truth is what happens to news <https://doi.org/10.1080/1461670X.2018.1492881>. *Journalism Studies*, *19*(13), 1866–1878.

Waisbord, S. (2020). Mob censorship: Online harassment of US journalists in times of digital hate and populism <https://doi.org/10.1080/21670811.2020.1818111>. *Digital Journalism*, *8*(8), 1030–1046.

Wall, M. (2017). Mapping citizen and participatory journalism <https://doi.org/10.1080/17512786.2016.1245890>. *Journalism Practice*, *11*(2–3), 134–141.

Wallace, J. (2018). Modelling contemporary gatekeeping <https://doi.org/10.1080/21670811.2017.1343648>. *Digital Journalism*, *6*(3), 274–293.

Weischenberg, S., & Matuschek, C. (2008). News production and technology <https://doi.org/10.1002/9781405186407.wbiecn027>. In W. Donsbach (Ed.), *The international encyclopedia of communication*. Wiley.

Westlund, O. (2013). Mobile news: A review and model of journalism in an age of mobile media <https://doi.org/10.1080/21670811.2012.740273>. *Digital Journalism*, *1*(1), 6–26.

Westlund, O., & Ekström, M. (2018). News and participation through and beyond proprietary platforms in an age of social media <https://doi.org/10.17645/mac.v6i4.1775>. *Media and Communication*, *6*(4), 1.

Westlund, O., & Ekström, M. (2019). News organizations and routines. In K. Wahl-Jorgensen & T. Hanitzsch (Eds.), *The handbook of journalism studies* (2nd ed., pp. 73–88). Routledge.

Westlund, O., & Quinn, S. (2018). Mobile journalism and mojos <https://doi.org/10.1093/acrefore/9780190228613.013.841>. In *Oxford research encyclopedia of communication*. Oxford University Press.

White, D. M. (1950). The “gate keeper”: A case study in the selection of news. *The Journalism Quarterly*, *27*(4), 383–391.

Wu, S., Tandoc, E. C., & Salmon, C. T. (2019). A field analysis of journalism in the automation age: Understanding journalistic transformations and struggles through structure and agency <https://doi.org/10.1080/21670811.2019.1620112>. *Digital Journalism*, *7*(4), 428–446.

Xu, D. (2015). Online censorship and journalists’ tactics <https://doi.org/10.1080/17512786.2014.982968>. *Journalism Practice*, *9*(5), 704–720.

Young, M. L., & Hermida, A. (2015). From Mr. and Mrs. Outlier to central tendencies <https://doi.org/10.1080/21670811.2014.976409>. *Digital Journalism*, *3*(3), 381–397.

Zamith, R. (2018). Quantified audiences in news production <https://doi.org/10.1080/21670811.2018.1444999>. *Digital Journalism*, *6*(4), 418–435.

Zamith, R. (2019a). Algorithms and journalism <https://doi.org/10.1093/acrefore/9780190228613.013.779>. In *Oxford research encyclopedia of communication*. Oxford University Press.

Zamith, R. (2019b). Transparency, interactivity, diversity, and information provenance in everyday data journalism <https://doi.org/10.1080/21670811.2018.1554409>. *Digital Journalism*, *7*(4), 470–489.

Zelizer, B. (1993). Journalists as interpretive communities <https://doi.org/10.1080/15295039309366865>. *Critical Studies in Mass Communication*, *10*(3), 219–237.

Zelizer, B. (2019). Why journalism is about more than digital technology <https://doi.org/10.1080/21670811.2019.1571932>. *Digital Journalism*, *7*(3), 343–350.

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