Technology and Journalism

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Technology has played an important role in the historical development of journalism. For example, the telegraph helped foster the development of newswire services and a terse, standardized style of news writing. Similarly, the proliferation of the typewriter and, later, the telephone fostered an inward movement of labor as more news gathering and reporting was performed within the newsroom.

Today, the linkage between technology and journalism is as deep and complex as ever. Technologies that were in early development just two decades ago—if they existed at all—have transformed key aspects of contemporary news production, distribution, and consumption and challenged foundational theories of mass communication, from gatekeeping to information flows. They have led to the development of new forms of journalistic labor that are "technologically specific," or defined by and dependent upon technology. They have also changed how scholars approach the study of journalism, evidenced by Lewis and Westlund's (2015) "Four A's" model that highlights the role of technological *actants* (which they define as nonhuman, material objects that interface with humans and human endeavors) within an assemblage that also includes journalistic *actors*, *activities*, and *audiences*.

In assessing the intersection of journalism and technology, it is important to note that contemporary scholarship within journalism studies—this entry included—generally observes that technology is shaped as much by the social as it is by the material. This view, rooted in social constructivism and particularly influenced by science and technology studies, rejects the notion that technology is solely responsible for the development of social structures and cultural values, a perspective called *technological determinism*. Scholars have thus found that while some technologies have the potential to disrupt and transform news work, they are developed and deployed by social actors and their impacts are often moderated if not mediated by the contexts within which they appear (Fenton, 2010). The *normalization hypothesis*, for example, contends that a technology will be adapted by news workers to fit existing routines and values (Singer, 2005).

Technology has played a key role in the development of new *logics* and *forms*, which has impacted *arrangements* within news production, or the process of taking something perceived as newsworthy (e.g., a news tip or observed event) and translating it into journalistic content (e.g., a news story). As such, it has not only helped shape how journalism is done but also impacted the power accorded to particular actors, actants, and activities.

The concept of *logic* refers to the codes and rules that define the production routines of media content. Contemporary news logics generally place greater emphasis than in

the past on *quantification* (making the measurable more prominent) and *immediacy* (increasing the speed of production and accessibility), made possible by technological developments and broader cultural developments like the "big data" phenomenon. For example, the development of *audience analytics* (systems that automatically capture a range of audience behaviors) helped usher in a new wave of practices tilted toward the use of empirical, typically quantitative techniques to describe, model, and predict audience preferences (Zamith, 2018). That, in turn, has demanded the refinement of gatekeeping theory, with audiences now granted a prominent role in that process. The digitization of news, in combination with the more *liquid* (mutable and ephemeral) nature of online journalism, has elevated the focus on immediacy and resulted in the adoption of a more monitorial logic among journalists. That, in turn, has led to greater homogenization of news content due to increased imitation. It is important to note that technological actants are not neutral objects; they are human creations imbued with their own logics and values. They also impact existing human logics and values as the human and machine interact, leading to cycles of mutual shaping.

Additionally, journalism can take on different *forms*, or configurations made distinct by their activities or dominant aesthetic qualities. Lewis and Westlund's (2016) typology of technological dependence within journalism, which includes four dimensions, highlights the growing role of *computation* and technology more broadly. The first two dimensions of their typology are *human-centric* journalism (wherein technological actants have limited impact on journalistic activities) and *technology-supported* journalism (wherein human actors are largely autonomous relative to technological actants), and generally comprise historical and contemporary forms. *Technology-infused* journalism, which highlights the institutionalization of technology for news production and distribution, has become more prominent in recent years. An example of that is *ambient journalism*, a form of journalism that focuses on gathering and communicating news information drawn from streams of collective intelligence made available through social media platforms. *Technology-oriented* journalism, wherein human actors and technological actants become interdependent, is also gaining prominence. An example of that is *automated journalism*, a form of journalism that is governed by human-created algorithms that automate some, if not most, stages of news production in order to rapidly produce thousands of journalistic products. It should be noted that a combination of technological and cultural developments can result in the evolution of a form—such as the shift from technology-supported *computer-assisted reporting* to technology-infused *data journalism* (see Coddington, 2015).

These new logics and forms underscore the proposition that important aspects of news production are becoming defined by and dependent upon new technological actants. They have also altered—even as they were shaped by—*arrangements* within journalistic spaces. Arrangements refer to the fluid positions of actors, actants, activities, and audiences within a system. While *actor-network theory*, the *social construction of technology* paradigm, and the *social worlds* framework adopt very different lenses and traditions, they have in common an overarching understanding that journalism is made up of a complex network (or networks) that includes human and nonhuman constituents. Those constituents are regularly interacting and, consequently, the

arrangements therein are not only dynamic but constantly changing. This leads to shifting allocations of symbolic and material resources as some constituents gain—and others lose—power. Those theoretical strands have been used to show that technical actors once seen as support staff or not-quite-journalists are increasingly viewed as legitimate *journalistic* actors—and in some cases, as models for the "journalist of the future"—even as they are constrained by existing cognitive structures and institutionalized norms. Similarly, technological actants and technologically specific activities have been accorded privileged status within certain contemporary journalistic spaces, granting them more power than they had before.

While technology plays an important role in news distribution, the two cannot be treated synonymously. News distribution is a sociotechnical enterprise wherein political economy and strategic organizational practices distinctly shape the influence of technology on the distribution patterns of news. For example, the advent of broadcast journalism brought with it predictions of the economic demise of American newspapers. However, the ingenuity of circulation managers allowed the print industry to not only curb many of the strategic advantages enjoyed by radio news but ultimately reach *more* subscribers in the age of broadcasting. Although an exploration of media technologies is insufficient to understand news distribution, any account of distribution—particularly at the current moment—must necessarily account for the influence of technological actors and actants. Issues and concepts like *platform dependency*, the *materiality of networks*, *transparent intermediaries*, and *social distribution* all play a role in the contemporary news environment.

To consider distribution networks as complex sociotechnical systems is to recognize that the technologies involved are imbricated in social and organizational relationships between stakeholders who hold varying degrees of resources and influence. Much attention has been paid in recent years to *platform dependency*—news organizations' reliance on the platforms created by technology companies. In dictating the terms of news organizations' access to massive distribution platforms—and thus vast numbers of consumers—actors like Google and Facebook have taken on structuring roles in journalism that are enacted through real and perceived asymmetric relationships. Such issues are not unprecedented. For instance, wire services were once enormously reliant on Western Union's telegraph monopoly—an arrangement the latter exploited to extract favorable and politically advantageous coverage.

The technological underpinnings of different distribution solutions have important and distinctive effects. Physical and digital networks have *materiality.* For example, the costs associated with growing *many-to-many* distribution networks—from the telegraph and telephone to Internet service and database-driven social media applications—scale exponentially. This is because the additional infrastructure required to manifest links between all the users in such a system increases geometrically as new customers are connected. By contrast, the costs associated with centralized *one-to-many* distribution networks run by broadcasters and print distributors are initially high but arguably exhibit more traditional economies of scale. Different distribution technologies also make different use of public resources, entering them into distinctive relationships with government. This includes things like obtaining *rights of way* to trench up streets and lay cables or securing permission to utilize a

particular broadcast frequency. These factors help shape the relationship between publishers and distribution networks: whether a news provider operates its own means of circulation, what sorts of subsidies and permissions are required to do so, and/or whether it relies on outside vendors to reach audiences.

The social media platforms and search engines that contemporary news organizations rely upon for their online distribution are highly visible to audiences and therefore much discussed. But online news organizations in particular also deal extensively with *transparent intermediaries* to deliver their content to audiences (Braun, 2015). Transparent intermediaries refer to actors that are invisible to users but nonetheless play essential and at times structuring roles in the delivery of content. For instance, an online video platform like Ooyala, used to manage and distribute an organization's inventory of video clips, comes with particular business-model options like advertising and paywall creation built into the interface, along with preset options for defining geographic markets.

Long before the Internet, news publications were recommended by word of mouth and passed along socially, hand to hand. As news organizations have increasingly relied on the Internet for distribution, however, the rise of search engines and social media have intensified journalists' reliance on *social distribution*—the sharing of links and media by users—in what Tufekci (2013) calls the *attention economy*. The need to package news content in ways that will incentivize sharing online has resulted in the rise of search- and social media-optimized content management systems and journalistic routines. It has also led to the integration of news organizations' infrastructure with social media services (e.g., whitelisting video player technologies on Facebook). Distribution has thus become an increasingly central part of news work, with journalists expending substantial effort on selecting metadata, posting links, curating playlists, and building personal brands to increase the visibility of their output across digital distribution platforms.

Technology has also played a major role in the reconceptualization of *audience*, with recent scholarship observing an "audience turn" that recognizes audiences as being more active and individualized. In particular, recent technologies have offered powerful affordances for *personalization* and *participation* and helped change the *spatiotemporality* of news consumption. That, in turn, has opened new avenues for individuals to engage with news and the world around them.

News media are often viewed as important agents in the formation of publics and development of public opinion. Their ability to fulfill those roles has been called into question as a result of an increasing shift toward *personalization*, or the individualization of content and experiences. While news has long been personalized to some extent (e.g., rewriting national wire stories for a local community), new technologies permit a shift in journalism from groups (i.e., communities) to individuals. Thorson and Wells (2016) call attention to *curated flows* in contending that each member of the public now sits at the epicenter of multiple, intertwined content flows. Individuals' incoming flows are highly personalized and may be shaped by *self-selection* (e.g., the person chooses to subscribe to a topic). Additionally, algorithmic actants may—and increasingly do—sort users into *calculated publics*, grouping the recipients for particular messages and topics based on their existing consumption—and that of

their social contacts (Gillespie, 2014). Consequently, journalism's focus has in some ways shifted from shared importance to personal preferences and news media's impacts have become even more individualized. These flows and the broader shift toward personalization have also raised concerns about the emergence of *echo chambers* (self-sorting) and *filter bubbles* (being sorted), where individuals end up in spaces where information perceived as agreeable is privileged. That may further fragment and polarize publics as individuals congregate in spaces that strengthen preexisting beliefs—though the empirical evidence regarding these phenomena is so far uneven.

Technology has also provided audiences with more affordances for *participation*, or the opportunity for audiences to engage and collaborate with journalistic actors. Platforms like Facebook and functionality like user comments on websites have lowered barriers for interactions between journalists and their audiences. Moreover, there has been a cultural shift over the past decade among journalistic actors from suspicion of to interest in audience participation as non-journalists demonstrated their ability to coproduce and amplify news content during emergencies and other fluid situations (e.g., the so-called Arab Spring) and as news organizations' resource limitations became increasingly pressing. There has thus been a transformation toward a more participatory, audience-centric philosophy—manifesting itself most clearly in the notions of *reciprocal journalism* and *participatory journalism*—that challenges the professional logic of journalism, which has until recently emphasized control over "news," and consequently the assertions of authority and jurisdictional claims journalists are able to make (Lewis, Holton, & Coddington, 2014). However, most journalists still struggle to incorporate audience participation into their values, roles, and routines, making meaningful participation the exception rather than the rule and typically realized only when citizens conform to journalistic expectations.

Finally, technology has changed the *spatiotemporality* of journalism by making it possible for audiences to engage with news through new configurations of space (e.g., mobile) and time (e.g., shiftable). For example, the smartphone and news apps changed consumption patterns to include checking news during a short elevator ride and permitted individuals to livestream scenes from campus shootings and later aggregate archived streams to show different vantage points. The implications of these new configurations go beyond the descriptive context of consumption: they offer the potential to transform *interrelations* between environment and place, movement and practice, and perception and sensory experience as well as the *mobility* of journalism, or how news media are produced and consumed within the flow of everyday life (Peters, 2017). Moreover, they permit news products to become more *liquid*, or mutable and ephemeral. Spatiotemporal shifts can change the associative practices that forge connections between people, places, and things and further transform the ways in which news is effectively and affectively experienced. Technology thus impacts—as it has in the past but more intricately so today—key aspects of news production, distribution, and consumption.

SEE ALSO: Actor-Network Theory; Computational Journalism; Data Journalism; Digital Journalism; News-Gathering Technologies; Robot Journalism

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