From automata to algorithms:
A jobs-to-be-done approach to AI in journalism

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ᴱᴺᴳ **Abstract.** This exploration of AI's impact on journalism draws parallels with 18th-century automata, tracing a historical fascination with artificial life to today's generative AI technologies. It discusses how AI is reshaping journalistic practices, challenging traditional notions of the profession. Rather than take a binary position that pits humans against machines, it proposing a "jobs-to-be-done" framework to understand AI's role in journalism. This approach highlights how AI can best serve the needs of communities and media organizations, moving away from a focus on which journalistic tasks can and cannot be replaced by AI. It suggests a hybrid future where humans and AI collaborate in journalism, with roles and responsibilities evolving based on the job-to-be-done for the industry, the profession and the public.
Keywords: AI, digital journalism, generative AI, jobs-to-done, innovation.

ᴱˢ De los autómatas a los algoritmos:
un enfoque de tareas pendientes para la IA en el periodismo

Resumen. Esta exploración del impacto de la inteligencia artificial (IA) en el periodismo establece paralelismos con los autómatas del siglo XVIII, rastreando una fascinación histórica por la vida artificial hasta las tecnologías de IA generativa actuales. Se discute cómo la IA está transformando las prácticas periodísticas, desafiando las nociones tradicionales de la profesión. En lugar de adoptar una posición binaria que enfrenta a humanos contra máquinas, se propone un marco de «tareas pendientes» para entender el papel de la IA en el periodismo. Este enfoque destaca cómo la IA puede servir mejor a las necesidades de las comunidades y las organizaciones mediáticas, alejándose de un enfoque centrado en qué tareas periodísticas pueden o no ser reemplazadas por la IA. Se sugiere un futuro híbrido en el que humanos e IA colaboren en el periodismo, con roles y responsabilidades que evolucionan según el trabajo a realizar para la industria, la profesión y el público.
Palabras clave: Inteligencia artificial, periodismo digital, IA generativa, innovación.

Introduction

The 18th century might seem an odd place to start a discussion on the impact of AI on journalism. Yet, like today, it was a time of fascination in Europe with what seemed to be artificial life (Bedini, 1964), capable of recreating human activities. At least 10 mechanical, human-like machines were built between 1735 and 1810 that could write, draw or play music (Voskuhl, 2013). These included the 1760 *Allesschreibende Wundermaschine* (the Miracle Writing Machine) by German engineer Friedrich von Knauss and the 1774 automaton, The Writer, by Swiss clockmaker Jacques Jaquet-Droz, made up of 6,000 moving parts with a mechanical hand with limited writing ability (Örnebring & Karlsson, 2022).

The fascination with replicating life is perhaps encapsulated best by the defecating duck that went on display to the public in Paris in 1738 (Örnebring & Karlsson, 2022; Riskin, 2003). The simulacrum was the creation of Jacques Vaucanson. It wowed visitors to the Hôtel de Longueville with its ability to seemingly eat corn and grain, and then, a short time afterwards, excrete the waste. Of course, Vaucanson's duck was no living being but an advanced mechanical machine with separate systems to ingest and eject food (Landes, 2011).

The 18th century automata that could replicate writing or defecating set in motion what Riskin argues was "a continual redrawing of the boundary between human and machine and redefinition of the essence of life and intelligence" (2003, p. 633). Negotiating and evaluating the boundaries of life and intelligence continues to this day with the emergence of artificial intelligence (AI), and, specifically, generative artificial intelligence (Gen AI). For journalism, the equivalent of von Knauss's Miracle Writing Machine today are the algorithms writing news stories. AI introduces a non-human actor into the newsroom that simulates acts of journalism usually associated with a human, such as news writing or content moderation. In some cases, AI has already replaced the human journalist, as Microsoft did in 2020 when it fired the editorial team managing the news homepages on its MSN portal (Waterson, 2020).

Gen AI has brought up practical and philosophical questions about the normative ideals of journalism and the identity of the journalist, given that "journalistic labor has traditionally been defined on the basis of the people who do the work and the skills they possess" (Van Dalen, 2012, p. 649). Since gen AI can replicate many of the processes associated with content creation, production and dissemination, "the idea that journalistic tasks can be completely automated clashes with our general understanding of the nature of journalism" (ibid, 2012, p. 649).

This framing harks back to the history of automata, in which "the two categories, human and artificial intelligence, natural and synthetic life, continually redefined one another by opposition" (Riskin, 2003, p. 630-631). Arguably, human and artificial intelligence work are less in opposition to and more in conversation with each other, continually shaping and redefining the other. As Moran and Shaikh have noted, "AI in the newsroom appears to be less directly about the technology itself and more a trigger for journalists to contend with the normative ideals and boundaries of their profession" (2022, p. 1769). The use of AI in journalism, as in other industries, serves to redraw the boundaries between human and machine, and consequently redefine the nature of journalistic labour and identity.

Journalism's relationship with technology

Gen AI is the latest development in more than 30 years of digitalization that has contested ways of being and doing in journalism, with scholars noting the impact on notions of the profession (Deuze, 2005). Take social media as an example. In 2009, only just over half of journalists saw social media as important to their work. Fifteen years later, virtually all journalists (97%) reported using social media in some way in their work (Cision, 2024). The shift reflects how journalists integrated social media into their work as platforms such as Facebook, Instagram and X (formerly Twitter) grew to become part of the media infrastructure for the dissemination, circulation and consumption of news and information, for better or worse (Lewis & Molyneux, 2019).

Arguably, the journalistic profession is facing another, and perhaps more critical, juncture with the advent of gen AI. The use of gen AI is outpacing the adoption of social media (Hu, 2023). By March 2024, ChatGPT alone had 180 million users and 1.8 billion monthly visits (Duarte, 2024). Yet AI does not appear to be making inroads into journalistic practices at the same pace. More than half (53%) of the 3,000 journalists worldwide surveyed in 2024 said they were not using gen AI tools like ChatGPT in their work (Cision, 2024). Only 17% were using these tools often or moderately to help with tasks such as researching topics or creating outlines and early drafts of content.

History has a habit of repeating itself and the reaction of journalists to AI is no different. The journalism profession has tended to react defensively when "an established way of communication is disrupted by the arrival of a new medium" (Jackaway, 1994, p. 299). New forms of communication, from radio to television to the internet, challenge the institutional authority and identity of journalists and so tend to be resisted. A growing body of research has found ambivalence in the newsroom towards the use of AI in journalism. While AI is seen as helping journalists be more productive and efficient, there are also anxieties about job losses, accuracy and ethical concerns (Munoriyarwa *et al.*, 2023; Noain-Sánchez, 2022; Thurman *et al.*, 2017).

The irony with gen AI is that it shares some of the same qualities of the printing press, which Örnebring and Karlsson describe as "the original technology of journalism" (2022, p. 231). The printing press vastly increased the speed, quantity and spread of the written word, together with concerns about the quality and value of this new supply of printed materials (Eisenstein, 2002). Similarly, AI systems have vastly increased the production and distribution of automated text reports by national news agencies from the Associated Press in the US to the Press Association in the UK, as well as by news groups such as the NDC Mediagroep in the Netherlands (United Robots, n.d.). And as in the case of the printing press, there are similar questions about the calibre and quality of automated text. Concerns from journalists are reflected in these comments by a UK journalist: "AI summarization can be wobbly.

Depending on the length, it is really actually not very good, I find. I tried it a lot and, well, checking sometimes takes longer than writing a summary myself" (quoted in Simon, 2024, p. 19).

Beyond binary thinking

The challenge from AI technologies goes beyond simply automated content production. Modern AI technologies stand out for their ability to perform a wide range of cognitive tasks at near-human levels. In journalism, these technologies are used to carry out journalistic activities, from access and observation to selection and filtering to processing and editing, and to publishing and distribution (Simon, 2024). Gen AI is no simple Miracle Writing Machine. Rather, for journalists, "work processes that traditionally relied on human intuition are increasingly becoming suffused with or replaced by a technology that is imbued with ideas of rationality, efficiency, and speed" (Simon, 2024, p. 20).

As such, much of the discourse around Gen AI is often framed as how far AI technologies complement, enhance or take over activities that were once the domain of a specialist occupational group, in this case, journalists (Boyles & Meisinger, 2020; Wu *et al*., 2019). As Graefe points out, much of the initial discourse followed two competing narratives —either "machine liberates man" or "machine versus man" (2016, p. 29). Such narratives are reductive as they ignore the human labour that has gone into AI technologies, from the training to the maintenance of such systems (Fox *et al*., 2023).

In journalism, this binary framework suggests that AI will either free up journalists from routine tasks and enhance their reporting or it will replace them with cheaper and more efficient robo-journalists. The AI promise of lower costs and greater efficiencies seems particularly attractive for media owners (Kim & Kim, 2018; Moran & Shaikh, 2022). The result is what Simon calls "a precarious balance within news organizations between top-down wishes and bottom-up interests as far as the adoption and use of AI is concerned" (2024, p. 32). In the context of a machine vs human narrative, journalists tend to emphasize the need for the human element in journalism, arguing that AI technologies cannot replicate the news judgement needed to see the big picture and craft a comprehensive story (Moran & Shaikh, 2022).

Such a binary framework simplifies the impact of AI on journalism. Rather, any future scenarios need to account for hybrid combinations, where humans remain in the loop in some way or other (Milosavljević & Vobič, 2019). These scenarios lean towards a "post-human future" for digital news (Carlson, 2017, p. 226), where the boundaries between human and machine are blurred in such a way that it becomes hard to distinguish where one begins and the other ends. In such cases, it is less about considering which human journalistic activities can be done by AI. Instead, a more fruitful avenue of research is into what are jobs to be done by journalism, and how can these be best accomplished through the optimal hybrid mix of human and machine.

AI, journalism and the jobs to be done

History suggests that new technologies do not necessarily result in fewer jobs but instead in new and different jobs in affected sectors (Ben-Ishai *et al*., 2024). For example, the spread of the automobile between 1910 and 1950 led to the loss of over half a million jobs in the US as the wagon and carriage industry went out of business. But the automobile also created new jobs to be done. Over the same period, 7.5 million jobs were created in the auto manufacturing sector, with more in ancillary industries such as gas stations and auto dealers (Manyika *et al*., 2017).

New technologies may disrupt existing jobs and deepen income equalities, but they do not automatically lead to mass job losses (for an overview, see Ben-Ishai *et al*., 2024). Rather, they create new tasks, changing existing occupations and/or creating new ones. Consider the advent of the computer. It created thousands of new jobs, while making some existing jobs obsolete, such as typesetters (Bessen, 2016; Leontief & Duchin, 1986). The use of AI to automate tasks is expected to follow a similar pattern, as "it will also create new occupations that do not exist today, much as technologies of the past have done" (Manyika *et al*., 2017, p. 8).

There is no doubt that AI automation and generative AI is disrupting the occupation of journalist, and will continue to do so. The "jobs to be done" (JTBD) framework developed by the late Clayton Christensen (Christensen *et al*., 2016) may prove valuable to understand which tasks are being disrupted by AI, and help go beyond a binary framing of human versus machine. The framework argues that "when people find themselves needing to get a job done, they essentially hire products to do that job for them" (Christensen *et al*., 2005, p. 76). It shifts the focus away from the features of a product or service towards the underlying reasons and goals behind consumer behaviour.

The idea gained some traction in the discourse on journalism innovation in the early 2000s in the US as a blueprint for the transformation of print and a response to the jobs to be done for readers (American Press Institute, 2006). More recently, there have been suggestions that the JTBD framework could be valuable to help news outlets better identify the needs of their communities, and so be better equipped to address them (Lewis *et al*., 2024). For example, specialized newsletters such as Axios AM are aimed at addressing the need of readers to stay on top of the news in a timely and succinct way by making "busy mornings simpler" (Axios, n.d.).

A JTBD framework may prove useful to explore the intersection of AI and humans in journalism. Applying the JTBD framework in journalism means going beyond a granular focus on which tasks can be undertaken by AI and which cannot (for an overview, see Simon, 2024). Instead, it calls for a broader lens that shifts the focus from a specific journalistic task to the overall journalistic purpose and its link to the needs of communities.

Given the potential applications of AI technologies, the core question then becomes how can they be best deployed to address the needs of a community and improve the lives of those whom journalists are seeking to serve. This framing moves away from the discourse of whether journalists will be replaced by robots. Inherent in a JTBD approach is that AI may take on some or many journalistic tasks, if this is the most appropriate way to meet the needs of a

media organization. For some time, AI technologies have been extensively used in key areas of journalism, from access and observation to processing and editing, to publishing and distribution (Simon, 2024). The need behind these uses shapes how effectively AI is adopted.

A JTBD approach has already influenced the development and implementation of AI in some newsrooms. *The Globe and Mail* in Canada developed its own algorithmic automation, prediction and optimization system called Sophi. The system ran almost all its digital properties, with a dynamic paywall designed to increase subscriber engagement, acquisition, and retention (Parratt-Fernández & Hermida, 2024). In this case, the JTBD was to maintain and boost revenue by growing its subscriber base. For the business leaders of commercial media organizations feeling a squeeze on revenues, the JTBD may be sustaining profit margins by using AI to increase efficiencies and reduce costs (Moran & Shaikh 2022).

The nature of the job to be done may differ when seen from the perspective of the journalist. Consider the JTBD by investigative journalists. The need from the perspective of the consumer is to avoid being ripped off. A journalistic investigation into corrupt practices can help consumers fulfil this need. AI tools can not only help investigative journalists save time and effort in analyzing large datasets, but potentially also surface patterns of malfeasance. As one German investigative journalist put it, "Even people who have worked with AI on big datasets still say there are stories in there that we haven't found" (quoted in Simon, 2024, p. 21).

The use of AI in the context of a public service broadcaster provides another example of how a JTDB framework can guide the development and implementation of AI tools. In Canada, the mandate of the public broadcaster, the Canadian Broadcasting Corporation, is "to inform, enlighten and entertain" (CBC/Radio Canada, n.d.). The AI chatbot created by its French-language arm, Radio-Canada, addresses this need by helping Canadians understand and detect fake news and other forms of disinformation (Decrypteurs, n.d.). All these examples illustrate how a JTBD approach can guide the use of AI in a manner that aligns with the needs and priorities of specific groups and communities.

Conclusion

The 18th century fascination with the seemingly artificial life of automata, from writing machines to defecating ducks, mirrors the lure of AI in the 21st century. Similar to past narratives around novel technologies, discourses can veer from hyperbolic grand visions to gloomy predictions. As Cave at al. noted, "popular portrayals of AI in the English-speaking West tend to be either exaggeratedly optimistic about what the technology might achieve, or melodramatically pessimistic" (2018, p. 9).

In journalism, such discourses often focus on humans vs robots or the potential loss of jobs. Such concerns are understandable, particularly given the rapid development of gen AI systems that can generate content. The idea that humans cannot be replaced are based on arguments such as that journalistic work "rests upon a large repertoire of embodied experiences and knowledge," (Simon, 2024, p. 21) or more broadly that "existing generative models need to rely on the first-hand content created by humans to generate second-hand information" (Li, 2023, p. 17).

Given the speed of the development of AI technologies, it is uncertain whether such frictions will continue to hold in the future. A scenario when generative AIs take in and learn first-hand from the physical world is not beyond the realm of possibility. What seems more certain is a hybrid future in which human and machine both play a role in journalism, with the interplay shaped by the job to be done as defined by news executives, journalists and audiences. And as some jobs are replaced by AI, as they have with past technological advancements, new roles and responsibilities will be created. The core question is how these novel jobs in journalism harness AI to address the needs of the industry, the profession, and perhaps most importantly, of the public.

Acknowledgements

Bibliography

American Press Institute (2006). *Newspaper Next: Blueprint for transformation*. American Press Institute. https://www.scribd.com/document/54228662/Newspaper-Next-Bluprint-for-Transformation

Axios (n.d.). Start and end your day with the stories that matter in your inbox. https://www.axios.com/signup/am-pm

Bedini, S. A. (1964). The role of automata in the history of technology. *Technology and Culture*, *5*(1), 24-42.

Ben-Ishai, G., Dean, J., Manyika, J., Porat, R., Varian, H. & Walker, K. (2024). AI and the opportunity for shared prosperity: Lessons from the history of technology and the economy. arXiv preprint arXiv:2401.09718.

Boyles, J. L. & Meisinger, J. (2020). Automation and adaptation: Reshaping journalistic labor in the newsroom library. *Convergence*, *26*(1), 178-192.

Cave, S., Craig, C., Dihal, K., Dillon, S., Montgomery, J., Singler, B. & Taylor, L. (2018). *Portrayals and perceptions of AI and why they matter*. The Royal Society. https://doi.org/10.17863/CAM.34502

Carlson, M. (2017). Automated journalism. In *The Routledge Companion to Digital Journalism Studies*, edited by Bob Franklin and Scott A. Eldridge II, 226-234. Routledge.

CBC/Radio-Canada (n.d.). *Mandate*. CBC/Radio Canada. https://cbc.radio-canada.ca/en/vision/mandate

Christensen, C.M., Cook, S. & Hall, T. (2005.) Marketing malpractice: The cause and the cure. *Harvard Business Review*, 83(12), 74-83.

Christensen, C. M., Hall, T., Dillon, K. & Duncan, D. S. (2016). Know your customers' jobs to be done. *Harvard Business Review*, *94*(9), 54-62.

Cision, 2024. State of the media report. Cision. https://www.cision.com/resources/guides-and-reports/2024-state-of-the-media-report/

Decrypteurs. (n.d.) *Comment combattre la désinformation*, CBC Radio-Canada. https://ici.ra-

dio-canada.ca/info/decrypteurs/robot-conversationnel-combattre-desinformation/epreuve/

Deuze, M. (2005). What is journalism? Professional identity and ideology of journalists reconsidered. *Journalism, 6*(4), 442-464. https://doi.org/10.1177/1464884905056815

Duarte, F. (2024). Number of ChatGPT users (May 2024). Exploding Topics. April 30. https://explodingtopics.com/blog/chatgpt-users

Eisenstein, E. L. (2002). An unacknowledged revolution revisited. *American Historical Review, 107*(1), 87-105.

Fox, S. E., Shorey, S., Kang, E. Y., Montiel Valle, D. & Rodriguez, E. (2023). Patchwork: The hidden, human labor of AI integration within essential work. *Proceedings of the ACM on Human-Computer Interaction, 7*(CSCW1), 1-20. https://doi.org/10.1145/3579514

Graefe, A. (2016). Guide to automated journalism. *Tow Center for Digital Journalism Report.* https://academiccommons.columbia.edu/doi/10.7916/D80G3XDJ

Hu, K. (2023). ChatGPT sets record for fastest-growing user base - analyst note. Reuters, February 2. https://www.reuters.com/technology/chatgpt-sets-record-fastest-growing-user-base-analyst-note-2023-02-01/

Jackaway, G. (1994). America's press-radio war of the 1930s: A case study in battles between old and new media. *Historical Journal of Film, Radio and Television, 14*(3), 299-314.

Landes, J. B. (2011). Vaucanson's automata as devices of Enlightenment. *1700-tal: Nordic Journal for Eighteenth-Century Studies, 8*, 50-59.

Lewis, S. & Molyneux, L. (2019). Social media and journalism: 10 years later, untangling key assumptions.

Leontief, W. & Duchin, F. (1986). *The future impact of automation on workers.* Oxford University Press.

Lewis, S. C., Hermida, A. & Lorenzo, S. (2024). Jobs-to-Be-Done and journalism innovation: Making news more responsive to community needs. *Media and Communication, 12*.

Li, J. (2023). Is generative AI an existential threat to human creatives? Insights from financial economics. Donald G. Costello College of Business at George Mason University Research Paper. https://ssrn.com/abstract=4666860 or http://dx.doi.org/10.2139/ssrn.4666860

Makwambeni, B., Matsilele, T. & Bulani, J.G. (2023). Between utopia and dystopia: Investigating journalistic perceptions of AI deployment in community media newsrooms in South Africa. In C. Azungi Dralega (Ed.). *Digitisation, AI and Algorithms in African Journalism and Media Contexts: Practice, Policy and Critical Literacies* (pp. 17-32). Emerald Publishing Limited.

Manyika, J., Lund, S., Chui, M., Bughin, J., Woetzel, J., Batra, P., Ko, R. & Sanghvi, S. (2017). Jobs lost, jobs gained: Workforce transitions in a time of automation. McKinsey Global Institute, *150*(1), 1-148. https://www.mckinsey.com/featured-insights/future-of-work/jobs-lost-jobs-gained-what-the-future-of-work-will-mean-for-jobs-skills-and-wages

Milosavljević, M. & Vobič, I. (2019). Human still in the loop, *Digital Journalism, 7*(8), 1098-1116. https://doi.org/10.1080/21670811.2019.1601576

Moran, R. E. & Shaikh, S. J. (2022). Robots in the news and newsrooms: Unpacking Meta-journalistic discourse on the use of artificial intelligence in journalism. *Digital Journalism*, 1-19. https://doi.org/10.1080/21670811.2022.2085129

Munoriyarwa, A., Chiumbu, S. & Motsaathebe, G. (2023). Artificial intelligence practices in everyday news production: The case of South Africa's mainstream newsrooms. *Journalism Practice, 17*(7), 1374-1392.

Örnebring, H. & Karlsson, M. (2022). *Journalistic autonomy: The genealogy of a concept.* University of Missouri Press.

Parratt-Fernández, S. & Hermida, A. (2024). Inteligencia artificial para la relación con las audiencias: el sistema de recomendación Sophi (Artificial intelligence uses for audiences: The Sophi recommendation system). In S. Parratt-Fernández, J. Mayoral-Sánchez, and M. Á. Chaparro-Domínguez (Eds.), *Periodismo e inteligencia artificial. Aplicaciones y desafíos profesionales, (Journalism and artificial intelligence: Uses and Professional Challenges)* (pp. 165-185). Comunicación Social Ediciones y Publicaciones. https://doi.org/10.52495/c7.emcs.25.p108

Naoaín-Sánchez, A. (2022). Addressing the impact of artificial intelligence on journalism: The perception of experts, journalists and academics. *Communication & Society, 35*(3), 105-121.

Riskin, J. (2003). The defecating duck, or, the ambiguous origins of artificial life. *Critical Inquiry, 29*(4), 599-633.

Simon, F. M. (2024). Artificial intelligence in the news: How AI retools, rationalizes, and reshapes journalism and the public arena. Tow Center for Digital Journalism, Columbia University.

Thurman, N., Dörr, K. N. & Kunert, J. (2017). When reporters get hands-on with robo-writing: Professionals consider automated journalism's capabilities and consequences. *Digital Journalism, 5*(10), 1240–1259.

United Robots. (n.d.). Best practice for content automation in local media. *United Robots.* https://www.unitedrobots.ai/whitepaper-download-local-media

Van Dalen, A. (2012). The algorithms behind the headlines: How machine-written news redefines the core skills of human journalists. *Journalism Practice, 6*(5-6), 648-658.

Voskuhl, A. (2013). *Androids in the enlightenment: Mechanics, artisans, and cultures of the self.* University of Chicago Press.

Waterson, J. (2020, May 30). Microsoft sacks journalists to replace them with robots. *The Guardian.* http://www.theguardian.com/technology/2020/may/30/microsoft-sacks-journalists-to-replace-them-with-robots

Wu, S., Tandoc Jr., E. C. & Salmon, C. T. (2019). Journalism reconfigured: Assessing human-machine relations and the autonomous power of automation in news production. *Journalism Studies, 20*(10), 1440-1457.