SHAPING AI

Training the News: Coverage of Canada's AI Hype Cycle (2012–2021)

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Acknowlegments

Shaping 21st-Century AI: Controversies and Closure in Media, Policy, and Research is a multinational and multidisciplinary research project that aims to articulate a critical reflection on artificial intelligence (AI) as an emerging paradigm in contemporary society. In Canada, the project is directed by Jonathan Roberge (Centre urbanisation culture société, Institut national de la recherche scientifique) and Fenwick McKelvey (Algorithmic Media Observatory, Concordia University). Shaping AI was funded by Open Research Area (2020) for the Social Sciences, a transnational competition based on an agreement among the Agence national de la recherche in France, the Deutsche Forschungsgemeinschaft in Germany, the Economic and Social Research Council in the United Kingdom, and the Social Science and Humanities Research Council in Canada.

This report on the construction of AI in Canadian legacy media is the first of a series of three.

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Part 0:
Foreword

A Multinational and Multidisciplinary Collaboration: Shaping 21st-Century AI

This is the first Canadian report to emerge from a multinational and multidisciplinary research project called Shaping 21st-Century AI: Controversies and Closure in Media, Policy, and Research. Funded by the Open Research Area 2020 competition, this project examines the construction of artificial intelligence in four national contexts since 2012. This academic collaboration brings together four research teams from four different countries:

1. Germany (Humboldt Institute for Internet and Society and the Centre for Media, Communication and Information Research, Universität Bremen; principal investigator [PI]: Christian Katzenbach);
2. United Kingdom (University of Warwick; PI: Noortje Marres; co-PI: Michael Castelle);
3. France (medialab, SciencePo; PI: Donato Ricci); and
4. Canada (Canada Research Chair in New Digital Environments and Cultural Intermediation, Institut national de la recherche scientifique, and Algorithmic Media Observatory, Concordia University; PI: Jonathan Roberge; co-PI: Fenwick McKelvey).

Each of these four countries present exciting cultural, economic, and social peculiarities for the study of AI. In the UK, there is a strong financial technology (fintech) sector, an AI research hub, and major deep learning companies (DeepMind, acquired by Google); in France, there is a focus on "AI for Humanity" as proclaimed by President Macron (see Villani 2018); Germany is developing an economic sector based on AI while preserving high data protection and privacy standards; and Canada is home to two of the most prominent deep learning pioneers (Geoffrey Hinton [Vector Institute] and Yoshua Bengio [Mila]), provides strong governmental funding programs to AI research labs, and encourages the adoption of AI in local industries.

In turn, each national team will focus on the following layers of research:

1. policy
2. research
3. media
4. (civic) engagement

Taken as a whole, these layers constitute sociocultural frames of reference for comparative analysis. This multinational research collaboration gives us the opportunity to compare layers across countries, e.g., to compare the media layers in Canada and Germany. Additionally, working through four distinct layers in one specific national context enables us to examine the modalities of AI controversies in different layers. For instance, conducting research in both the policy and media layers enables us to analyze and compare the construction of AI in two discrete domains of activity. Finally, such an approach affords a holistic view of the broader trajectory of AI across countries that are typically not the main topic of interest for scholars who study the social entanglements of AI.

The objective of such a multinational and multidisciplinary collaboration is to tease out the more subtle and complex relations between science and technology and public and political life, rather than framing AI as a functional innovation that will, or will not, impact society. This report is the first output from the Canadians' investigation into the multidimensional and contested nature of AI in our own sociocultural contexts.

Part 00:
Executive Summary

This report explores how artificial intelligence (AI) became newsworthy in mainstream Canadian media. Building on qualitative and quantitative methods, we examine how journalists covered AI. Our analysis focuses on AI stories and debates in French and English language newspapers since 2012.

Introduction

Legacy media shape public discourse about AI. Journalists and newsrooms, as well as the experts they interview, are not neutral participants. They convey and translate AI in distinct ways, according to their own assumptions, beliefs, and politics; they are not neutral, objective, or unbiased observers. The news content that reporters, editors, and interviewed experts collectively produce contributes to what science and technology scholar Donna Haraway calls "situated knowledge"[1]: an account of reality that is grounded in the perspectives of the people who created it. This kind of knowledge is what ultimately translates AI to the reading public.

News outlets actively participate in shaping AI as a national resource capable of transforming all sectors of economic activity. "There's a general acceptance of inevitability of the continued research and deployment of artificial intelligence," explained one interviewee. Coverage follows the government of Canada's own advocacy of AI as having "potential" that must be "harnessed" for a country to tackle challenging issues (like climate change) and create "sustainable economic growth."[2] The federal government alone has invested more than $1.5 billion in AI,[3] along with public-private partnerships like Scale AI and

[1] See Donna Haraway (1988). Addressing debates over the limitations of scientific objectivity, Haraway wants to find a middle ground between reflexive skepticism of scientific claims and a belief in the transcendent neutrality of scientific knowledge production. Her solution is not to reject scientists' accounts of reality but to pay attention to how, where, and by whom scientific findings are made and ratified, i.e., *situated knowledge*. Especially in the context of science and technology reporting, we think this concept can be usefully applied to journalism as well.

[2] See the website of the Pan-Canadian AI Strategy, https://ised-isde.canada.ca/site/ai-strategy/en, last seen on December 6, 2022.

[3] See Brandusescu and Reia (2022).

Forum IA Québec. In turn, as this report suggests, Canadian AI coverage generally appears in the business section and praises the future capabilities of AI, raising concern that much legacy media coverage of AI too closely reflects business and government investments.

While promoters and some journalists laud the current and future impacts of deep learning techniques on the Canadian economy and society, AI is also a source of dispute. Since 2017, there has been a series of debates over the merits of AI. These have been sparked by Sidewalk Labs in Toronto, the sale of Element AI, and Clearview AI, to name a few. These are controversies: occasions to debate AI's significance and benefits. Controversies afford us with the opportunity to raise unanswered questions, to test each other's ideas, and to challenge dominant narratives.

These controversies often begin and end in news outlets. Newsrooms and journalists decide how they cover AI controversies and for how long. We find controversies are fleeting. Scandals about Clearview AI, for example, offer only the briefest respite from celebrations of the so-called Fourth Industrial Revolution. Reporting influences when a controversy is settled and no longer newsworthy, or what we refer to as closure.

In this report, we build on how the situated knowledges of newsrooms have shaped controversies and closures about AI. We pay particular attention to how newsrooms and journalists have come to report competing AI narratives in the name of the public interest, to give some interlocutors more visibility (and legitimacy) than others, and to invoke particular publics in their AI coverage. The three specific objectives of this project are:

1. Examine the newsmaking practices and processes through which (tech) journalists try to objectify AI as a matter of everyday concern or a sociopolitical issue;
2. Identify actors, institutions, organizations, and issues that shape discourse on AI in legacy media as a way to chart participation and influence in AI coverage; and
3. Analyze the formation of AI controversies and their rhetorical closure in legacy Canadian media.

Methodology

Analysis relied on both qualitative and quantitative methods. We interviewed 14 French- and English-speaking journalists to learn about the institution of journalism in Canada, the practices and processes of newsmaking in local newsrooms, and the controversies and elements of closure that framed AI discourses. We complemented the insights from these interviews with computer-assisted analysis of AI coverage. We sourced news articles on AI from five Canadian publications (n=7,244, from La Presse, Le Devoir, the Globe and Mail, the Toronto Star, and Maclean's) between 2012 and 2021. The computational analysis included two main techniques: (a) named entity recognition that enabled us to identify the most prevalent actors in AI coverage (individuals and organizations); and (b) topic modeling, which highlighted the most prevalent themes.

Key Findings

1. **Tech news tends to be techno-optimistic.** Generally speaking, as a reporter stated, "tech journalists tend to present emerging technologies in glorious terms. So, 90% of the time, these technologies are featured in a way that is very 'wow.'" Individuals more inclined to view science and technology in a positive light are more likely to appreciate the (future) value of their implementations in different contexts.

2. **There are no significant discrepancies in AI coverage between English and French newsrooms.** While differences exist (e.g., Geoffrey Hinton appears more often in English newspapers, while Yoshua Bengio is more popular in French newspapers), our key findings apply to both French and English legacy media.

3. **In Canada, AI is business news not science or technology.** Close to 45% of AI coverage in the French corpus was under the aegis of business reporting.[4] One interlocutor confirmed that the tech beat was done "very much through a business lens." Our topic analysis corroborated this; the larger topics in both corpora cover finance, the Canadian economy, or technological changes to the labour market.
    a. AI coverage focuses on the business, economics, and funding of AI (total: 2,526; see Appendix 5). Finance, international relations, and commerce as well as private and

[4] The English corpus did not include the necessary metadata to pursue this line of inquiry.

public investments are in fact some of the most recurrent themes in AI coverage. Potential applications of AI are a close second (total: 2,010 articles; see Appendix 4). Healthcare, communication and gadgets, transport, retail, agriculture, banking, and smart cities are some of the domains of AI application most discussed in Canadian media.

4. **Gadgets, self-driving cars, or other applications are more newsworthy to journalists than the social or technical nuances of AI.** Journalists select news stories by looking for stories that resonate with the public. These stories often focus on possible everyday impacts and less on the technology itself.

5. **AI coverage followed the hype cycle.**
   a. First, stories on AI (2012–16) simplified what AI is and what it could achieve. The time and space available in legacy media were too limited to cover deep learning in depth. These initial introductions to a mainstream audience resulted in oversimplified depictions of AI, which tends to inflate technological expectations.
   b. Second, AI coverage reached a peak in 2017–20 (see Figure 3 and 4, p. 48). Increasingly, coverage included controversies about AI (e.g., Sidewalk Labs, the sale of Element AI, Clearview AI; see Appendix 6).
   c. Finally, more recently, AI coverage has plateaued. In and of itself, AI is more taken for granted. Ethical considerations are increasingly part of news stories and provide the dominant language to frame controversies (see point 8 below).

6. **Computer scientists prevail as key experts in AI.** Computer scientists, and their research institutions, are among the most prominent actors featured in AI coverage (see Appendixes 1 and 2). These specialists are the spokespeople for AI. In turn, very few critical voices are heard in legacy media. According to Appendix 2, there is not a single AI critic with more than 40 appearances in both French and English media since 2012.

7. **There is little to no media scrutiny on AI research funding in Canada.** The close alignment of interests among academics, the industry (including Facebook, Google, and other transnational corporations), and governments is conspicuous by its absence, even as business leaders like Jim Balsillie questioned the industrial strategy built around

[5] See Jim Balsillie (2020).

AI ecosystems.[5] None of our interlocutors contested these close relationships as a democratic issue nor as a controversial funding program.

8. **Ethics dominate public discourse on AI in legacy media.** Interlocutors stressed that the "ethics" of AI occupies a vitally important place in their coverage. However, "AI ethics" has rapidly come to be the dominant source of AI critique. Expressions such as "ethical AI," "responsible AI," and the like also benefit actors and organizations with a vested interest in pledging allegiance to toothless principles rather than being regulated by a legal framework for AI research design and implementation. Normalizing "ethics" as the dominant pole of social critique does not serve the public (see Appendix 6).[6]

9. **News publishers rely on AI, but they do not discuss AI's implications for journalism.** Increasingly, AI provides tools to automate "journalistic" content creation (see Appendix 7). However, this phenomenon is also conspicuously absent from controversies raised in both our computational analysis and interviews with journalists.

Recommendations

1. **Promote and invest in technology journalism.** Most AI coverage comes from business desks, but these are too often poorly equipped to investigate the multifaceted aspects of AI. The impact of science and technology on society cannot be completely mitigated by business. We invite newsrooms and journalists to be wary of naive economic framings of AI and investigate instead the externalities that are typically left out of business reporting: social exclusions, inequalities, and injustices created by AI.

2. **Avoid treating AI as a prophecy.** Tech-driven narrative statements are not ineluctable facts. Metaphors such as "the fourth industrial revolution" or mantras like "AI will change the world" repeatedly made their way into our interviews. But such narratives need to be supported by evidence. The expected realizations of AI in the future must be distinguished from their current accomplishments. Future applications and use-cases, even imminent ones, have yet to materialize.data studies across the country, in both French and English materialize.

[6] See Luke Munn (2020). To note, articles on the pressing need for more substantial regulation exist, but very few critiques of AI are formed on the basis of disciplinary considerations other than ethics.

3. **Follow the money.** A cliché but an apt one. Canadian legacy media has given little to no coverage of the unusual proportions of gargantuan governmental funding that goes into AI research. In turn, para-public organizations created to encourage the adoption of AI often distribute that funding away from public scrutiny. We urge the journalistic community to untangle the tightly knitted networks of academics, businesspeople, consulting firms, and politicians that purposefully work together to construct and maintain AI ecosystems in the country.

4. **Diversify your sources.** Computer scientists and their research institutions are overwhelmingly present in AI coverage in Canada. Critical voices are severely lacking. When researchers discuss their work in public, they may be meticulous, rigorous, and painstakingly smart, but they are not neutral. They are spokespeople; they are opinionated and situated. Unsurprisingly, computer scientists working on AI tend to promote its social and economic benefits. In the spirit of the website Women Also Know Stuff,[7] we recommend that newsrooms and journalists diversify their sources of information when it comes to AI coverage. As a next step in our project, we will create a database of social science researchers in Canada doing important work on AI and data studies across the country, in both French and English.

5. **Encourage journalistic collaboration between journalists and newsrooms and data teams.** Cooperation with different types of expertise helps to highlight the social and technical considerations of AI. Without one or the other, AI coverage is likely to be deterministic, inaccurate, naive, or simplistic. Additionally, critical computer and social science perspectives can support and foster a greater fluency in both the social and technical aspects of AI.

[7] See womenalsoknowstuff.com.

Part 01: Introduction
AI, A Construction of "The People and the Media"

On March 14, 2022, Dr. Melanie Mitchell, an American scholar of analogical reasoning and genetic algorithms, posted a Twitter thread relating her reading of a 1983 article by computer scientist Allen Newell. She argued that the classic controversy in computer science between symbolic artificial intelligence (AI) and deep learning was still "going on. . . . And will probably still be going on 30 years from now."[8] This tweet refers to a debate central to the trajectory of computer science since the 1950s, and it deserves to be briefly explained to give AI its significance.

The expression "artificial intelligence" came from a 1956 workshop at Dartmouth College. At the time, a group of scholars and students led by Marvin Minsky, Allen Newell, and Herbert A. Simon developed a research agenda around what is now known as the symbolic approach to AI. Interested in the human process of cognition, those invested in this agenda sought to encode human systems of representation and logic–i.e., to encode the human *mind*–as the best way to create an intelligence that is "artificial." Until the early 1980s, the symbolic AI approach was dominant in computer science (Olazaran 1996; for a genealogy of AI, see Cardon, Cointet, and Mazières 2018).

Symbolic AI represented a radically different proposition from the paradigm of the time, the connectivist approach. Computer scientists had worked on neural network machines since the 1940s. But it wasn't until the late 1950s that American psychologist Frank Rosenblatt created the first device capable of learning from trial and error based on the distribution of statistical weights on a network of synapses. Known today as the father of deep learning, Rosenblatt designed a cybernetic device, the Mark 1 Perceptron, that was the first to achieve computer vision (Tappert 2019). But his success was short–lived. By the mid–1960s, the connectionist approach's progress had stalled, while researchers working

[8] The thread is available here: https://bit.ly/3RiQA0r

on the symbolic approach gained increasing attention and funding (Guice 1999; Lepage–Richer 2021; Mendon–Plasek 2020).

Since the 1950s, the scientific controversy between the symbolic and connectionist approaches has structured the study of machines apocryphally described as "intelligent." While the symbolic AI school attempted to replicate the human mind, deep learning scholars worked to reproduce the brain. These were the distinctions that Mitchell attempted to highlight in her Twitter thread, hoping to reclaim the expression "AI" for the symbolists and, thus, to substantiate the otherwise slippery concept of AI. "Continuous systems, pattern recognition, learning, neural networks were the domain of other fields (e.g., cybernetics), *not* AI... What's interesting is how the term 'AI' now mostly means this latter set of terms [associated with deep learning techniques as opposed to symbolic AI]. It's gone completely 180."

The following day, March 15, 2022, Yann LeCun reacted. The 2018 Turing award laureate, chief AI scientist at Meta, and deep learning expert replied: "I never called what I was working on AI (AI was supposed to designate 'symbolic' methods). Then around 2013, *the public and the media* became interested in deep learning & *they* called it AI" (emphasis added).[9] According to LeCun, the media did not simply report on deep learning; it had the transformative power to erase a six–decade–long scientific controversy, blur the original meaning of AI, and shape it as an object that encompasses all forms of technoscientific progress in deep learning–in other words, the people and the media have symbolically reshaped AI into a different object.

While his statement is illustrative of a common belief about the role of the media, we do not fully agree with LeCun. As the Shaping AI project shows, the "people and the media" did not single–handedly determine understandings of "AI." But news organizations, newsrooms, journalists, and their interlocutors did all play a key role in shaping public discourses and collective imaginaries about what AI is, what it does, and what it will do. Doing so has contributed, in turn, to making AI into a powerful technoscientific object that is widely believed to be a cause of major changes in our society.

[9] Interestingly, when a user asked LeCun what the problem was with calling machine learning "AI," the computer scientist replied with one word: "History." The end of the tweet is: "We could not explain that AI people didn't view DL [deep learning] as AI. Because it made no sense." LeCun did not explain why it made no sense to him, but perhaps he found the debate trivial given the progress made by the deep learning research community compared to what the symbolic AI school achieved in the last decades. In response to a tweet affirming that "deep learning works, symbolic models don't. It's that simple. . . . If you want more symbolic models, then work hard and make them work. That's what NN [neural network] people did, even when nobody believed in their research," LeCun replied: "Indeed. Put up or shut up." The tweet is available here: https://bit.ly/3dWwUBj

In this report, we investigate the controversial nature of AI and how actors, institutions, and organizations have intervened in the media to shape assumptions, expectations, and understandings of AI over the last decade. Since 2012, more than 7,000 articles were published about AI in Canada across the five newspapers targeted in our project. To understand how the saturated Canadian media environment affected AI, our guiding question is: how has Canadian legacy media[10] shaped AI and its related controversies? How has the media contributed to close, or stabilize, these controversies? In the next section, we probe these questions further and examine the general and specific objectives of this research project as well as the context within which it took place.

How Has Canadian Legacy Media Shaped AI?

There have been spikes of mainstream interest in AI before. But the current wave of AI hype seems unlike anything else: the mushrooming of scientific controversies, the massive influx of public and private funding, and the related circulation of technoscientific expectations in public discourse indicate the emergence of a new phenomenon (Whittaker et al. 2018). In 2012, Geoffrey Hinton's doctoral students demonstrated to the computer science community that the empirical results of deep learning techniques eclipsed all previous models (see Cardon, Cointet, and Mazières 2018). Since then, strongly promoted by a range of economic and political interests, the techniques and possible functions of AI have inspired both hopeful promises and dystopian fears.

Still unsettled, AI is a complex, open–ended, and multifaceted object whose significance has been publicly contested and negotiated by a broad set of actors, from academics to venture capitalists, policy makers, members of civil society, and journalists. In this context, Canadian legacy media represents a public arena wherein these actors, institutions, and organizations continually quarrel to shape discourses about what AI is and what it does–to stabilize AI in order to normalize its meanings and functions. AI is indeed an unsettled object of controversy. Yet we could already perceive local elements of closure and institutionalization–funding infrastructures, political agreements, and toothless conventions and declarations–that stifle important AI–related discussions (e.g., federal regulation of facial recognition technology). The media, as well as the actors and organizations that populate it, are not neutral participants in this process; they all

[10] Throughout the report, we use "legacy media" as an umbrella term to designate established news organizations and newsrooms in Canada.

convey and translate–i.e., problematize or not–AI in distinct ways, according to their own assumptions and positionalities.

Traversed by a plurality of interventions from all directions, journalistic coverage of AI matters; it shapes assumptions, expectations, and understandings about what AI is and what it does. Correspondingly, the general objective of this research project is to examine how, in fact, Canadian coverage has shaped debates–controversies and their rhetorical closure–about AI. The three specific objectives of the project are to:

1. Examine the newsmaking practices and processes through which (tech) journalists try to objectify AI as a matter of everyday concern or a sociopolitical issue;
2. Identify actors, institutions, organizations, and issues that shape discourse on AI in legacy media as a way to chart participation and influence in AI coverage; and
3. Analyze the formation of AI controversies and their rhetorical closure in legacy Canadian media.

In this report, we are especially interested in how newsrooms and journalists have come to simplify competing AI technicities and socialities in the name of the public interest, to give some interlocutors more visibility (and legitimacy) than others, and to invoke particular publics in their AI coverage.

The Organization of the Report

This report is divided into three subsequent parts. In the first, we examine the theoretical and methodological frameworks used throughout this report. Building on contributions from the social construction of technology tradition, controversy studies, and the sociologie de la traduction (the sociology of translation), we consider the mediation of AI–related technologies to a mainstream audience and how these representations foreground AI controversies and their closures in Canada.

In the second part, we analyze the practices and processes of newsmaking. We pay particular attention to the growing state of crisis gripping the Canadian legacy media. We also attend to the culture of newsmaking in the digital age, the newsroom's fascination with the audience's attention, and the needs of experts who act as AI translators for a perceived mainstream audience.

Finally, we build on computational methods discussed in the analytical frameworks section to identify and analyze the most prevalent deep learning controversies that have punctuated the discourse on AI in Canada since 2012. We discuss the Montréal Declaration and the use of ethics to assuage critical takes on AI, the surprisingly tame discussion of the political economy of AI in Canada, the media's manufactured confusion between what AI is expected to accomplish and what it currently achieves, and other controversies such as Sidewalk Labs, Scale AI, self–driving cars, and, last but not least, the Element AI saga.

Part 02:
Analytical Frameworks

In this part, we describe our theoretical and methodological frameworks. The analysis presented in the next section relies on literature located at the intersection of media studies and science and technology studies (STS). In the following section, we outline the mixed methods we used to collect and analyze the data.

Theoretical Approaches

Our research project draws on five literatures: controversy studies in STS, media studies in Canada, the sociology of expectations (and research contributions from the *économie de la promesse*), the sociology of expertise, and the sociology of translation. Each of these approaches encompasses its own set of debates and genealogies, however, it is outside the scope of this report to address each in detail. Instead, we identify key concepts from these literatures and explain how we used them to better couch our argument and disclose the position from which we analyzed our data.

Controversy Studies

Referring to MACOSPOL (Mapping Controversies on Science for Politics) documentation, Tommaso Venturini defines controversy as "every bit of science and technology which is not yet stabilized, closed or 'black box.' . . . We use it as a general term to describe *shared uncertainty*" (MACOSPOL 2007, 6; emphasis in original; quoted in Venturini 2010, 260). For Venturini, shared uncertainty refers to a situation where a number of heterogeneous actors find themselves in a dispute, or in discord, about a state of affairs affecting society (e.g., the death of bees, climate change, or nanotechnology). Controversies are thus *inherently political*. Establishing consensus, settling disagreements, institutionalization and policy making, stabilizing meanings, hiding things in unintelligible black boxes–these are all actions meant to render controversies uncontroversial (Latour 2005). In this context, argues Venturini (2010), researchers play the active role of observers: they must be capable of producing a

methodologically sound representation that captures the complexity of how a wide range of actors work towards settling shared uncertainty in an attempt to close controversies.

Leuenberger (2006), there have been four successive approaches to controversy studies. The first approach rests on the foundational work of Robert Merton ([1949] 1968) and focuses on claims over the attribution of scientific discovery. Establishing legitimacy over and acclaim for a scientific discovery is embedded in a normative system, argue Pinch and Leuenberger, which is accompanied by cultural conventions of rewards and sanctions. These conventions have a tangible impact on science, technology, and society; research funding, financial rewards, and symbolic power are all possible outcomes of the attribution of scientific discovery.

The second approach emerged in the 1960s and focuses on the negative effects of science and technology on different social groups (see Nelkin 1995). From environmentalism to the Vietnam War and the AIDS crisis, this second approach examines the political character of scientific controversies, their multiple entanglements with public policy, how science, technology, and scientists become political, and the growing recognition that science and technology are neither neutral nor inherently beneficial for all.

The third approach emerged in the 1970s and focuses on the sociological examination of scientific practices (see Callon 1980; Latour 1987; Shapin and Schaffer 1985). This third approach epitomizes the growing sociological interest in scientific controversies and knowledge claims, and it led to an agenda that shapes research even beyond STS, like David Bloor's (1991) strong programme or Michel Callon, Bruno Latour, and John Law's actor-network theory. Finally, the fourth approach brings controversy study to spaces that are not commonly associated with scientific activities. As interest in the field of STS grew, so too did the domains of investigation for controversies involving science and technology; courtrooms, bureaucracies, and digital infrastructures are notable instances of controversy studies taking place outside laboratories (Latour 2003; Marres 2015, 2020). There, scholars examined the underlying dynamics of innovation, science, and technology and their corresponding relations with society.

We build on this fourth approach to controversy study in this report. Our site of investigation is the Canadian legacy media and our focus, the controversies that punctuated the public discourse on AI in Canada.

As mentioned in the introduction, AI is in fact born from scientific controversy. During the Dartmouth College conference in 1956, computer scientists John McCarthy and Marvin Minsky coined the term "artificial intelligence," a catchy expression that marked the beginnings of a new research agenda distinct from existing research on deep learning (Moor 2006). McCarthy and Minsky's approach to computer analysis rested on the symbolic ordering of meanings encoded in machine calculations, whereas the neural network or connectionist approach relied on algorithmic calculations that mimicked how neurons function (see Cardon, Cointet, and Mazières 2018). Known as the symbolic AI vs. connectionist debate, this controversy was characterized by multiple cycles of hype and disillusion over several subsequent decades and involved many generations of computer scientists. Further, this controversy was not limited to academic communities. For instance, Jon Guice (1999) rightly points out that the United States–and its military apparatus–had a vested interest in the development of AI in the 1960s. The US Advanced Research Projects Agency (ARPA), Guice shows, sided with, and sponsored, symbolic AI research to the detriment of neural network research. ARPA was not a mere recipient of scientific advancements in the domain of "intelligent" computing technologies; the agency shaped it purposefully. In other words, as Guice argues, scientific controversies among researchers often involve other types of participants–at times, very powerful ones.

Building on Guice (1999), Jonathan Roberge, Marius Senneville, and Kevin Morin argue that "AI . . . has always existed in a state of public controversy" (2020, 2). As the boundary between scientific and public controversies is blurred by the political character of science and technology, the legacy media has become a key democratic space where diverse interest groups engage in debate (Cefaï 1996; Habermas 1992; Joseph 1984). In such a context, the legacy media is a powerful site of discourse formation in which certain voices and tropes are authoritatively put forth while others are not, shaping the *shared uncertainty* that is AI and closing controversies (Bareis and Katzenbach 2022; Brennen, Howard, and Nielsen 2022; Dutton 2018; Hansen 2021). In the next section, we turn to the literature on Canadian media to better understand the state of the country's legacy media and its capacity to provide arenas for public debate on technology and science.

The Crisis of Legacy Media

The Canadian legacy media system is characterized by a high level of journalistic professionalization and a low level of governmental influence, which results in minimally

intrusive regulatory mechanisms (Thibault, Brin, and Trudel 2021). This liberal media system, as defined by Lisa Taylor (2014), echoes the classic function of journalism in Western liberal democracies, where journalism occupies the position of a "fourth power" or counter-power against the executive, legislative, and judiciary powers.

In such a liberal system, journalism has been institutionalized around norms of impartiality and neutrality, which is reflected in the duties of reporting facts rigorously, faithfully, quickly, and objectively (Thibault et al. 2020). The normalization of this ethos–journalistic best practices–tends to be operationalized within journalism schools and media organizations across the country and through the socialization of media professionals, various recruitment processes, networking opportunities, and personal relationships with other reporters.

The bedrock of the liberal media ethos is the belief that traditional journalism is a public service. However, the capitalization of journalistic content, media organization mergers, the precarity of the journalistic profession, and the advent of "Web 2.0" followed by the emergence of social media platforms and their interest in profitability and optimization have increasingly made legacy media organizations more vulnerable (O'Reilly 2007; Plantin et al. 2018; Van Dijck 2013). Social media has given legacy media audiences a voice, positioning citizens as a "fifth power" that can, on socio-digital networks, openly criticize nothing and everything, including the role and function of journalists and the status quo of the media system (Bernier 2016). Catalyzed by these upheavals and accentuated by the disengagement and disinvestment of the state and a drastic decrease in advertising revenue, the crisis that has characterized the Canadian media system has intensified (Winseck 2021).

During this period, some journalistic traditions and trajectories in Canada, as well as standards of objectivity that structure journalistic practices, were modulated by a logic of empowerment of employees, casualization of the content creation professions, and the flexibilization of standards of work. Increasingly, the public consumes news content from social media platforms, which contributes to changing newsmaking practices and processes (Blanchett, McKelvey, and Brin 2022; Brin and Charlton 2022; McKelvey and Hunt 2019). News organizations, newsrooms, news desks, and journalists must adapt to these new dynamics of media consumption. These transformations led to the reorganization of power relations within media organizations between journalist and editor, journalists and the public, and journalists and their own view of the profession. Technological, cultural, and

economic convergence in the media is also shaking up the otherwise strict categories of media organizations and their associated practices as well as the traditional roles of its key artisans, often for the benefit of multinational corporations (George 2015; Winseck 2010, 2021).

Later, in the Practices and Processes of Newsmaking section, we further examine the dire nature of the media crisis in Canada. For now, we turn our attention to how the media provides a space for debate on technological and scientific controversies.

AI: An Innovation for the Future

In the seminal text "The Sociology of Expectations in Science and Technology," Mads Borup and colleagues emphasize how the performativity–that is, the capacity for discourse to effectuate social change–of technoscientific narratives about technological expectations shape society. In this sense, technological expectations are "real-time representations of future technological situations and capabilities" (2006, 286). These representations are not mere descriptions; they spark attention and create anticipation, fear, and excitement; they drive participation and organize research activities; they attract funding, mobilize resources, and structure research agendas; and, ultimately, they orient us towards one technoscientific future over another (see Dandurand et al. 2022; Konrad et al 2017; Van Lente 1993; Van Lente and Rip 1998). Borup and colleagues call the performativity of technological expectations "generative" or "constitutive" (2006; 285, 289), meaning that these visions frame current technoscientific activities according to what they are expected to be or do one day.

It is important to note that there is a difference between the *emission* of a technological promise and the *realization* of that vision (Dandurand et al. 2020). When you make someone a promise, the point is to convince that individual that the future you envision will eventually arrive. As Pierre-Benoît Joly puts it, a technoscientific promise generates a "horizon of expectations" (2015, 31) for what the technological future holds. But even the most convincing expectation may not materialize.

Technoscientific expectations and promises should thus be considered for what they are: performative statements that have yet to be realized. As actors formulate technological promises, they naturally posit them as ineluctable and unquestionable. Such representations contribute to conflating the "horizon of expectations" with actualized facts. When covered

uncritically in the media, then, these promises tend to be represented as already or soon-to-be fulfilled. And too often these slippages lead to hyperbolic reporting–a trajectory particularly evident in the first few years of AI news. For instance, coverage of Element AI's launch often introduced the company as a rival for big multinational corporations like Google or Facebook (Silcoff 2019b), even though the Montréal-based start-up struggled to sell services to prospective clients (Roberge et al. 2022). This does not mean that technological promises cannot be realized. After all, AI applications exist and are an integral part of the everyday lives of most Canadians. But when reporters uncritically represent technological development as realized innovations, they conflate what is with what could eventually be.

In the public domain, where technological expectations are communicated and subjected to debate (Konrad 2006), legacy media provides a unique space for democratic discussion of the actual mobilization of resources for the uncertain realization of these promises. It is an *interpretative space* – a sort of "politics of expectations" (Borup et al. 2006, 295) in which one acts to close or stabilize a controversy. For Harro van Lente and other scholars studying the sociology of expectations, "actions, reactions and decisions are framed in images of the future that circulate . . . in the general media" (2012, 772; see also Konrad 2006), thereby conceptualizing news outlets as neutral arenas in which other actors and institutions attempt to impose a vision of the technological future.

In this report, we build on insights from the sociology of expectations, but we argue that news organizations, newsrooms, reporters, and their interlocutors are not neutral and participate in the politics of expectations just like any other actors (cf. Gingras 2009). The rapid changes in the Canadian legacy media, as described in the previous subsection, have created a climate where newsrooms and journalists must remain relevant. In covering science and technology, reporters adopt angles in relation to their own perception of the audience's interest, which often includes anticipation of the future. As Mike Ananny and Megan Finn suggest,

> journalists ground speculations both in the past and in norms about which futures they and audiences see as reasonable, significant, likely, or publicly relevant. Together, [the journalist] strays from simply reporting on past events and invites audiences to ask "what if?" . . . If audiences see these speculations as relevant, they give journalists, public officials, and advertisers permission to anticipate (Neiger, 2007). Journalists can prepare audiences for futures that *they* see as relevant to *their* vision of the public and its needs. (2020, 1603–04; italics in original)

This is not to say that all news stories reflect uncritical, naive, or overly optimistic attitudes towards the technological future and the promises of promoters. However, Ananny and Finn's analysis suggests a greater consideration of a future that does not result from deterministic outcomes of technoscientific progress, but as one possibility among many. The technicities and socialities of AI, like many other innovations, are so multifaceted that it is next to impossible to accurately predict their development and deployment, even for experts who have extensive knowledge of their object of research.

In science and technology coverage, scientific experts play a key role in *explaining* the technicity of their object of research, but also in *projecting* the future domains of application and functions of the technology. Given the significance of the symbiotic relationship between expert and reporter, in the next section, we explore the sociologies of expertise and translation to better frame how journalistic narratives and intervention from experts have co-fabricated discourse on AI in legacy media.

Journalism: A Contributory Expertise of Interactional Ability

As discussed later in the methodology section, this research project largely builds from the insights of 14 journalists who produce content in Canadian media about science and technology. These reporters were our main source of information on the current state of Canadian media and AI coverage since we considered these 14 individuals media experts.

As François Claveau and Julien Prud'homme write, "the expert is not an expert in everything" (2018, 13). Even though an individual may have developed expertise in a highly specialized field, Claveau and Prud'homme argue, they are profane, or lay, individuals in most domains outside of that field. This nuance is important. While journalists covering technology are certainly media experts, they are not necessarily specialists in the technology they cover. To conceptualize this distinction, we turn to Harry Collins and Robert Evans's (2002, 2007) studies of expertise and experience.

Expertise is a fluency in "the ways of going on and thinking" (Collins 2018, 68) in a domain (Dandurand et al. 2020). Collins and Evans have developed a typology of expertise, but here we focus on the difference between contributory and interactional expertise. Contributory expertise refers to an actor's capacity to directly contribute or innovate in a given domain (Collins and Evans 2007). Contributory expertise is socially commended because it

contributes to a domain "with competence": contributory experts "*do* things" (Collins and Evans 2007, 14; emphasis in original). For instance, computer scientists *do* computer science with a specialized degree of competence; these experts contribute to the advancement of the scientific discipline.

Interactional experts do not necessarily *do* things, but they have the capacity to *talk* about them. Interactional expertise is "the ability to master the language of a specialist domain in the absence of practical competence" (Collins and Evans 2007, 14; see also Dandurand et al. 2020). For instance, a mathematician could understand the social intricacies of AI without necessarily being capable of contributing to the advancement of STS or cognate disciplines. Similarly, an anthropologist or a sociologist can discuss the technicities of AI, without being able to contribute to the discipline of computer science.[11]

Reporters' contributory expertise lies in developing adequate fluency in the domain they are covering to engage with heterogeneous experts and to (critically) communicate their knowledge to the lay person. In other words, journalists, along with the interlocutors they interview and cite, *translate* what is newsworthy to an audience. For tech journalists who cover AI-related news in Canada more broadly, their contributory expertise is not in the domain of AI per se. Instead, these tech journalists have the ability to converse with a wide range of individuals whose own contributory expertise is just as heterogeneous: from computing techniques to the anthropology of technology, philosophy, political sociology, ethics, economics, or STS. Part of tech journalism's contributory expertise is to develop various levels of fluency relevant to several domains and to engage with them. This is no easy feat. AI is complex and elusive, and gaining interactional fluency in the technicities and socialities of AI is challenging, especially given the current imperatives of newsmaking in the digital age.

Each tech journalist develops their own set of interactive abilities to discern what is newsworthy about AI and to describe such a complex object in plain language. Over time, tech journalists come to develop their own sources of information, their own networks,

[11] Importantly for Collins and Evans (2007), a central part of the contributory expertise of anthropologists, interpretive sociologists, and journalists is the ability to interact with other experts. But this interactional ability is different from interactional expertise since, as they suggest, "interpersonal skills are generalized abilities, not an expertise in a special domain" (38–39). While productive from a theoretical perspective, such a distinction is not helpful in our context. Coverage of AI is so complex, we contend, that journalists must gain interactional expertise in deep learning to critically report on these issues.

so that they can report on AI and its controversies in a vernacular that is intelligible to the public. This process of translation is the topic of the final subsection.

Journalism and the Practices of Translation

Translation is an act of mediation. Translating is not a practice that merely circulates meanings from one cultural world to the next; it mediates a narrative, brokers it, and, in the process, shapes it, sometimes only slightly (Latour 2005). To understand how legacy media shape AI, we turn to what French STS scholars call *la sociologie de la traduction* (Akrich, Callon, and Latour 1988; Callon 1986; Latour 2005). The sociology of translation examines how actors act on one another. Framed as the analysis of (scientific) controversies, the approach enables scholars to analyze who gets to act on others and to shape narratives that take place during newsmaking practices and processes.

The sociology of translation considers how an actor convinces, coerces, disciplines, rallies, exhorts, or imposes visions on others, i.e., as Michel Callon puts it, "creating convergences and homologies by relating things that were previously different" (1980, 3). The practice of translation is operationalized in what Callon, John Law, and Arie Rip call "centres of translation" (1986, 228): spaces in which (scientific) controversies are debated and within which the public is progressively brought to converge and cooperate towards a unitary political project (Durand, Baret, and Krohmer 2018). Here, as we posited earlier in this section, legacy media plays a key role as it produces democratic spaces for debate–or sites of translation–where a promoter can promise a technological future, convince an audience, and stabilize an object.

In the specific case of AI in Canada, Roberge, Senneville, and Morin (2020) show how local computer scientists take on the role of translator for the promotion of deep learning. These actors contextualize, problematize, justify, and enroll other actors. For these spokespeople, AI is an economic force that can change Canadian society. But such promises rely on the prominence of the spokesperson who has the contributory expertise to give legitimacy to a technoscientific project like AI and the interactional expertise to convince others, including tech journalists.

A spokesperson is a translator. For STS scholars interested in the practices and processes of mediation and translation, a translator is an actor that works towards building

bridges with others–thus creating an ontological "actor-network" that is worth making and defending (Callon 1986). Under this characterization, journalists work in proximity with spokespeople, often contributory experts in their own field of research. It is the journalist's interactional ability that allows them to build relationships with translators/spokespeople and, through that relationship, frame AI as a newsworthy object. This is precisely why journalists must develop interactional expertise. On the one hand, journalists who lack interactional expertise are put in a situation where they cannot challenge the contributory expert's assertions. On the other, gaining interactional expertise enables journalists to ask far more incisive questions and extract as much knowledge as possible from their interlocutor.

In this report, building on the analysis of Anne-Marie Gingras, we seek "to deconstruct the romantic image of the courageous journalist on a quest for facts" (2009, 3; translated by the author). Instead, as we explain in the next section, we situate our analysis in the tension between the normative ideals of journalism and the mundane contingencies that make tech reporting possible in the context of the unfolding media crisis in Canada. It is in such a context, we argue, that AI became a social construct. Through translating AI to a general public, tech journalists have had to navigate newsmaking processes and practices to make sense of a complex and elusive object. Under these conditions, as we will present in the section on AI controversies, some debates have been given more prominence than others. Given the available time and space allocated to AI coverage, we suggest that translators have effortlessly monopolized AI discourse in legacy media and stabilized it as the engine driving a new revolution. This explains, we argue, why AI, controversial from its very beginnings, is nonetheless generally represented in Canadian legacy media as a largely uncontroversial technoscientific object that will have positive impacts on society. But first, we will define our methodology and explain our use of mixed methods.

Methodology

This research project employs a methodology that primarily builds on controversy analysis (Latour 2005; Marres 2015, 2020; Ricci 2019). Controversy analysis teaches us that objects that may appear at first glance to be purely technological or scientific are also eminently political. As Noortje Marres lucidly puts it, controversy analysis enables STS scholars to investigate how "the formulation of knowledge claims and the organization

of political interests tend to go hand in hand" (2015, 656). Technoscientific controversies extend to public domains and settings outside academia, which incites the participation of heterogeneous actors and institutions (Seurat and Tari 2021; Venturini 2010). In this project, we use controversy analysis to examine competing claims about AI represented in legacy media during the period 2012 to 2021, taking Geoffrey Hinton's team winning the ImageNet competition in 2012 as our starting point. It is the particularity of these claims, we argue, that has contributed to shaping AI as we know it today. To shed light on these controversies, we use "tension" as a methodological proxy through which we observe and analyze AI. In the following subsection, we delve further into this notion of tension and the fertile ground it provides for analysis.

Tension

Methodologically, we use tension as a proxy to better locate our object of analysis on overlapping levels: (a) the tensions found in newsmaking practices and processes; (b) the productive fault lines of the qualitative and quantitative methods used in this report; and (c) AI as a source of controversy.

While the field of AI research is still developing and open to academic and public debate (see Crépel and Cardon 2022), burgeoning hype for the possibilities of neural network techniques since 2012 has made AI into a new and much broader cultural phenomenon (Roberge, Morin, and Senneville 2020). AI has attracted spikes of public attention before, but controversies that were once largely limited to the field of computer science have now sprawled into other domains. In other words, machine learning techniques have taken on a cultural life of their own (Roberge and Castelle 2021).

A controversy is characterized by indeterminacy (Hoffman 2017). A sociological approach to the study of controversy focuses on deliberate attempts to settle disputes. This approach examines the tensions among protagonists as they work to transform contingencies, politics, and ambiguities into ineluctable facts, laws, and undeniable beliefs and convictions (Seurat and Tari 2021). Unfolding attempts to close controversies are thus quite political (Latour 2005), because they call for the alignment of other positions and situations with one's own perspective.

First, paying methodological attention to the media ecosystem reveals the tensions that structure the organization of the media (cultural/symbolic, organizational/ecosystemic, and in journalists' practices). These different levels are at the heart of Angèle Christin's (2017) work, in which she observes the repercussions of integrating audience measurement tools into journalistic practice. Rather than seeing the media and technology as distinct, Christin shows how both interact and participate in readjusting and updating journalistic practices. In media studies, the concept of tension is also used to examine professional control over content in journalism (Lewis 2012); it is a way of highlighting the conflicts that arise among aesthetic, economic, or moral understandings of "what matters" in journalistic work (Boltanski and Thévenot 1999). Here, "what matters" refers to expected good practices (journalistic ideals) as well as how journalists negotiate, challenge, and draw on professional standards, public representations, and their own autonomy to cover a story and choose an angle (Christin 2020).[12] Building on Christin's (2020) and Seth Lewis's (2012) work, we analyze Canadian journalists' practices as they confront a media crisis and increasingly integrate new digital instruments to reach and keep their audience. We conceptualize this relationship between the journalist and legacy media with the notion of a "system in tension." In discussing the treatment of AI in Canada, we integrate the tensions that exist in ideal journalistic practices and their re-actualization in given organizational contexts.

Second, our methodology builds on the respective strengths of qualitative and quantitative methods of data collection, combining (a) a set of semi-structured interviews with prominent Canadian journalists and media experts who reported on AI between 2012 and 2021 with (b) a computational analysis of AI controversies across four Canadian newspapers. The interviews enabled us to collect reporters' key insights into newsmaking practices and processes. This opportunity led us to analyze the discursive construction of AI in Canada or, perhaps more clearly, how journalists view and understand their own practices and newsroom processes in relation to the coverage of AI. Doing so enabled us to (a) critically document how such a multilayered domain of technoscientific inquiry and a complex (and diverse) set of deep learning techniques–that is, "AI"–made its way into public discourse and (b) probe how different controversies in relation to AI emerged, or did not, in public discourse through Canadian legacy media.

[12] In the context of audience measurement tools, Christin shows that, while they do not change journalistic practices in obvious ways, they do transform expectations and relationships within newsrooms.

The interviews illuminated how reporters have made sense of AI and its coverage over the last decade. To corroborate these accounts, we used computational techniques to analyze the key trends covered between 2012 and 2021 and to list the main actors and institutions that have most prominently shaped AI discourse in legacy media over the same period. Trying to combine a qualitative approach with computational analysis comes with a few challenges. Qualitative methods often yield dense and deeply contextualized information from a small number of sources, while quantitative analysis presents broader, albeit thinner, insights into the larger trends that traversed the shared understanding of AI, thanks to a very large quantity of data points. Another drawback is that computational methods also often lack some degree of explainability. The complexity of the AI phenomenon is too often obfuscated inside the black box of computational methods. Results from qualitative analysis can thus act as a countermeasure and help us interpret the data collected through computational analysis.

Third, AI is a complex and elusive object, making it difficult to stabilize in a precise and concise definition. The boundaries of AI are continuously being redrawn by a plurality of actors who attempt to impose their visions of what AI is and what it could accomplish. For instance, the Twitter exchange between Mitchell and LeCun mentioned in the introduction illustrates how opposing perspectives on AI redefine both symbolic and connectionist approaches. Since Canadian coverage of AI relies on heterogeneous net-works of actors, institutions, and organizations, a methodological focus on AI as a source of controversy in itself helps us to tease out how AI translators attempt, in their interventions in Canadian legacy media, to stabilize what AI is, what it currently does, and what it could eventually accomplish.

Qualitative Methods: 14 Interviews

During our initial kick-off meeting in June 2021, our full research team met online and listed about 60 potential interlocutors. The inclusion of potential interviewees in our list rested on two main considerations: that (a) each candidate had reported on AI in legacy media between 2012 and 2021; and that (b) our list be balanced between English and French speakers. According to the guidelines of our ethics certificate, acquired from INRS in June 2021, we contacted potential interlocutors and conducted interviews with 14 of them between June and September 2021 (see Table 1).

Table 1

language	gender	racial identity	professional status	format	province	domain
fr	m	w	freelancer	written	qc	tech
fr	m	w	employee	written	qc	business
fr	m	w	professor	written	qc	tech
fr	m	w	freelancer	audio/video	qc	tech
fr	m	w	employee	written	qc	business
fr/eng	m	w	employee	both	qc	tech
eng	m	w	employee/freelancer	written	bc	policy
eng	m	w	employee/freelancer	written	ont	business
eng	m	w	freelancer	written	ont	tech
eng	f	w	professor	written	ont	policy
fr	m	w	employee	audio/video	qc	tech
fr	m	poc	employee	written	qc	tech
eng/fr	m	w	freelancer	audio	qc	art
eng	m	w	employee	written	ont	business

As Table 1 illustrates,

1. Half our interlocutors work in English (n=7), while the other half work in French (n=7).
2. We interviewed only one female journalist.
3. All but one of our interlocutors were white.[13]
4. Six journalists are employed by legacy media, six are freelancers, and two are now university professors.
5. Most are more active in written (as opposed to broadcast) legacy media.
6. Nine interlocutors live in Québec, four in Ontario, and one in British Columbia.
7. Most work on business or tech beats, but two work on policy and one on art.

[13] Such a sample is congruent with the overwhelming presence of white male journalists on the AI beat in legacy media. Our methodological preoccupations centred on an equal distribution of reporters between both Canadian official languages rather than on criteria based on diversity and inclusivity.

The interviews were conducted online for a period of 60 to 120 minutes, recorded via Zoom, and transcribed in French and English through a combination of automated and manual transcription. The questionnaire used in all interviews consisted of 19 questions that spanned four broad themes: (a) the interlocutor's biography; (b) their media environment; (c) AI controversies and consensus; and (d) AI actors and institutions. To facilitate comparative analysis across interlocutors and the Shaping AI project as a whole (including in other national contexts), the interviewers followed the structure and themes of the questionnaire rigorously. The interviews were nonetheless conversational, and anecdotal discussions at the fringes of the themes were encouraged to enrich the exploration of embodied and reflexive knowledge about AI.

Once transcribed, the interviews were imported into NVivo. We then collaboratively coded the transcripts based on Shaping AI's research objectives, our own interests and positionalities, and the themes of the questionnaire. Drawing on situational analysis (Clarke, Friese, and Washburn 2015; see also Marres 2020), an analytical method that builds on grounded theory to visually represent as comprehensively as possible the complexity of the topic under study, we met twice to workshop our analyses. Our results are situated and meaningful as they enabled us to explore the interlocutors' own understandings of the media environment they inhabit.

Quantitative Methods: Topics Modeling and Named Entity Recognition

To examine how AI made its way into news stories between 2012 and 2021, we curated a list of news stories from two French-speaking (n=3,447) and three English-speaking (n=3,797) newspapers: La Presse (n=2,295), Le Devoir (n=1,152), the Globe and Mail (n=2,788), the Toronto Star (n=954), and Maclean's (n=55). To extract our corpus, we used the following search query: AI, artificial intelligence, algorithm*, machine learning, ML, and deep learning.[14] Originally, we intended to gather a more voluminous corpus built from more diverse sources. We had targeted 13 different daily, biweekly, and monthly news outlets, distributed across Canada, all characterized by their heterogeneous AI coverage, assorted political orientations, and eclectic audiences, both in French and English. However, given the prohibitive cost of computational analysis of legacy media sources in Canada, we had

[14] In French, we used the same keywords: IA, intelligence artificielle, algorithm*, apprentissage machine, apprentissage automatique, AA.

to limit our targeted news outlets to the ones that we could afford and could potentially be meaningful.

Analyzing this corpus, we used (a) unsupervised topic modeling to identify controversies, debates, and narratives that framed AI coverage and (b) named entity recognition (NER) to create lists of actors, institutions, and organizations that were prominently featured in the coverage and, thereby, participated more than others in the stabilization of AI.

Topic Modeling is a way of generating clusters of entries based on their similarity. This method relies on the assumption that similar entries, or documents, share a common topic. Through computational analysis, topic modeling allows for the inductive discovery of emerging themes across a corpus–themes that would not necessarily appear in a documentary and discourse analysis. We first compared three common methods for unsupervised topic modeling: Latent Dirichlet Allocation (LDA), Non-Negative Matrix Factorization (NMF), and Latent Semantic Allocation (LSA, which is a truncated single value decomposition method). LDA is a Bayesian model that uses variational inference, whereas LSA and NMF are two simpler dimensionality reduction methods (akin to Principal Component Analysis) used for topic extraction once applied to a bag of words.[15] However, upon further examination, we discovered that all three methods gave unsatisfactory results (imbalanced with seemingly meaningless topics). We then tried a third approach called Top2Vec (Angelov 2020). This model presents a few advantages over the others: it has no a priori assumptions about the number of topics (LDA, NMF, and LSA work with a user-defined number of topics); it calls for minimal preprocessing (other algorithms often require analysts to preprocess the text, which can be done in numerous ways that have varying, sometimes unpredictable consequences for the quality of the results); and it provides a hands-on programming interface (e.g., the researcher provides a Python 3 library, which has a few quality-of-life functionalities, such as text search in the computed model). After testing it on both the French and English corpora, Top2Vec yielded much more insightful results, leading to our decision to choose this method.

Named Entity Recognition was more straightforward. We used a pre-trained pipeline provided by spaCy, a popular natural language processing library, which afforded us

[15] A bag of words is a simplified way of representing a corpus of text often used in natural language processing models. This representation stores the occurrences (or sometimes another more synthetic computation) of each word (and often bigram/trigram) in each document. The word order and grammar are lost, but this is often more than enough for most computational analysis.

various ready-to-use pipelines for a number of languages. For the English corpus, we used the pipeline "en_core_web_sm." This model was trained on OntoNotes, a large corpus (which includes news documents, among other sources) that was annotated by humans to encode various information (such as structural information, like syntax and predicate argument structure, as well as shallow semantics, i.e., word sense linked to an ontology and coreference). The model also uses WordNet, a lexical database that structures the words of the English lexicon into various semantic hierarchies. For the French corpus, we used a similar pipeline called "fr_core_news_sm," which relies on a similar dataset called Deep-sequoia. Both these pipelines can extract named entities from a corpus.

Conducting the computational analysis was strewn with pitfalls. Primarily and most importantly, for the previously stated reasons regarding collecting news stories in Canada, we were not able to collect a very big dataset. Around 7,000 articles in two languages is already a small corpus, but ours is very noisy. Indeed, "AI" is a very broad term and is used in contexts that are not relevant to our research objectives. For instance, in the French corpus, we found articles discussing the Financial Group iA (Industriel Alliance). Moreover, several files were video game reviews, because "AI" is used extensively when discussing nonplayable characters.[16] That said, we kept these entries in our corpus since we consider them to be part of a broader discourse around AI representations in legacy media. Many of these themes were not discussed by interlocutors, but they exist in the corpus. Despite these caveats, articulating the computational analysis with our interlocutors' insights shed light on the broader trends of AI discourse in legacy media, and it enabled us to examine the tensions between our qualitative and quantitative approaches.

[16] Although what is called an "AI" in a video game is generally simpler than modern, complex AI systems.

Part 03:
Practices and Processes of Newsmaking

To understand how Canadian legacy media cover AI, we must examine the cultural milieu in which these representations take place and the practices and processes that actualize them. This section is divided into three parts. In the first, we take stock of the current state of advertising and its effects on commercial newsrooms. In the second, we examine how newsroom culture shapes newsmaking. Finally, in the third, we explore how the practices of translation shape AI into an object intelligible to the public.

Legacy Media in Crisis

Over the last 25 years, between the convergence of media conglomerates and the platformization of news, the Canadian legacy media industry continues to adapt to the new realities of newsmaking (Blanchett and Seligman 2021; Francoeur 2022; Thibault, Brin, and Trudel 2021). In this section, we examine the state of advertising and its effects on commercial newsrooms and on the coverage of AI.

Advertising and Its Effects on Commercial Newsrooms

Legacy media has entered an unprecedented state of crisis (Winseck 2010). According to Dwayne Winseck (2021), two factors explain the dire situation of media dependent on advertising.[17] First, Facebook, Google, and Amazon account for 90% of online advertising in Canada, and internet advertising has grown to 71% of the overall advertising industry in Canada. Legacy newspapers, like the ones in our study, are losing out. Canada's bilingual news media system heavily relies on advertising revenue, except for its public service media

[17] Importantly, Winseck notes, the media sector in Canada as a whole remains profitable but not the legacy media that "relied almost entirely on advertising revenue: broadcast television, radio, newspapers and magazines. These media sectors are in trouble" (2021, 33). For instance, newspaper revenue dramatically plummeted from $4.87 million in 2008 to $1.88 million in 2020. In comparison, internet advertising soared from $1.609 million in 2008 to $9.172 million in 2020 (40).

[18] Federal crown corporations are state-owned enterprises in Canada.

to a lesser degree (IAB 2018; News Media Canada 2022; Saint-Arnaud 2022).[18] According to its 2020–21 Annual Report, federal government funding for the CBC and Radio-Canada combined reached close to $1.4 billion, while advertising revenue hit close to $250 million, a fifth of which came from digital platforms (Winseck 2021, 32–33). And the competition to obtain those dollars has never been as fierce—not only among media corporations but with new players such as Facebook and Google.

Second, advertising in Canada has stagnated since the economic crisis of 2008. In relation to the size of the Canadian economy, advertising revenue has reached a historic low. As Winseck explains,

> The dire situation faced by those media sectors and firms that rely mainly on advertising revenue reflects the hard reality that they have been caught between the pincers of more than a decade of stagnating or, on some measures, declining advertising revenue, from the one side, and the rapid rise of Google and Facebook, who have been taking an ever greater share of advertising spending, on the other. Today, they [Google and Facebook] take over four-fifths of online advertising spending and just over half of advertising spending across all media in Canada. (2021, 38)

For newspapers, this translates into a loss of revenue from $4.9 billion to $1.9 billion and a reduction in the number of full-time journalists from 13,500 to 10,500 since 2008.

This dire situation has manifested in newsrooms trying to cut costs and focus on valuable customers.

Covering AI in Canada

In such a system, generating an audience is key, and assetizing that audience is at the core of any news organization's business plan (Hagar, Diakopoulos, and DeWilde 2022; see also Birch and Muniesa [2020] for a conceptual discussion of assetizing). As noted above, gaining a better understanding of digital environments and how stories circulate on platforms has become a key tactic that news organizations use to monetize their content and compete with rivals.

A second tactic is to offset the cost of news reporting with other types of content that are more attractive for advertisers. In this regard, technology occupies an interesting position. According to 2017 statistics compiled by the firm Influence Communication (2020), "technology" is the ninth major theme covered in Canada,[19] just ahead of arts and entertainment, nationwide news, automotive, health, and life/home. However, according to the interlocutors, news reporting on technology is in reality much more marginalized across Canada. Reporters create stories about technology, but very rarely is technology covered from a strict science and technology angle. Often, tech news is a subset of business coverage, according to all interlocutors. Unlike in academia, where entire fields of study were built on the conceptualization of technology as sociotechnical systems, like science and technology studies (Bloor 1991; Latour and Woolgar [1979] 1986), in Canadian legacy media, technologies are generally framed as economic contributions to society or as mere gadgets that will soon populate our households. Very few specialized outlets in Canada focus solely on tech news. In legacy media,[20] as one of the interlocutors puts it, technology has always been viewed through "business lenses." They add:

> When I first started as a technology writer and reporter, some of my earliest stories were to review tablets and phones and cameras and things like that. It was often done for gift guides. . . . You know, they didn't cover, sort of, new technology for technology's sake. It was done through the business section. And I think that holds today.[21]

An overview of our French newspaper corpus,[22] which amounts to 3,318 articles drawn from Le Devoir and La Presse over the 2012–21 period (see the Methodology section), reveals that one third (33.39%) of all AI-related stories (n=1,108) were featured in business sections. In

[19] In Québec and across the world, the theme technology ranks tenth.

[20] In the Canadian media landscape, there are very few publications that focus on tech news. As a French-speaking interlocutor succinctly puts it, "you know, there simply isn't a Québec version of Wired," a magazine known for its technology coverage in the United States and the United Kingdom. The English-language outlet the Logic does provide good coverage of technology, but the Alberta-based publication reads more like the Information, an American publication with a focus on the technology industry, than Wired.

[21] Interviews conducted in French were translated into English. For each interlocutor, we attribute the pronouns "they/them." All secondary sources written in French were also translated in English.

[22] Due to technical limitations, we were unable to extract the sections in which AI-related stories were published in the English corpus. The service we used to mine that corpus did not provide this metadata.

[23] Sections were defined based on how each news source categorizes its articles. Business sections include categories associated with the economy, finance, and coverage of companies, while tech sections include categories associated with new technologies like tech reviews. Categories that were not associated with either of these sections were put under the label "other sections."

Le Devoir alone (n=1,118), AI stories from the economy/business section account for 22.5% (n=252), while those featured in the tech/science section account for only 13.7% (n=154).

Figure 1 shows that AI stories began to be prominently featured in 2017. Right away, about a third of all AI news coverage took place in the business pages of *La Presse* or *Le Devoir*. Figure 2 shows that, in relative numbers, AI-related stories appear more prominently in business sections than they do in tech or any other section.[23] However interesting, these numbers should be viewed cautiously, as we extrapolated from a single newspaper's category typology, but they tend to support the claim made by most interlocutors that AI is more consistently covered from a business angle.

Figure 1: Volume of Business vs. Tech Articles in the French Corpus

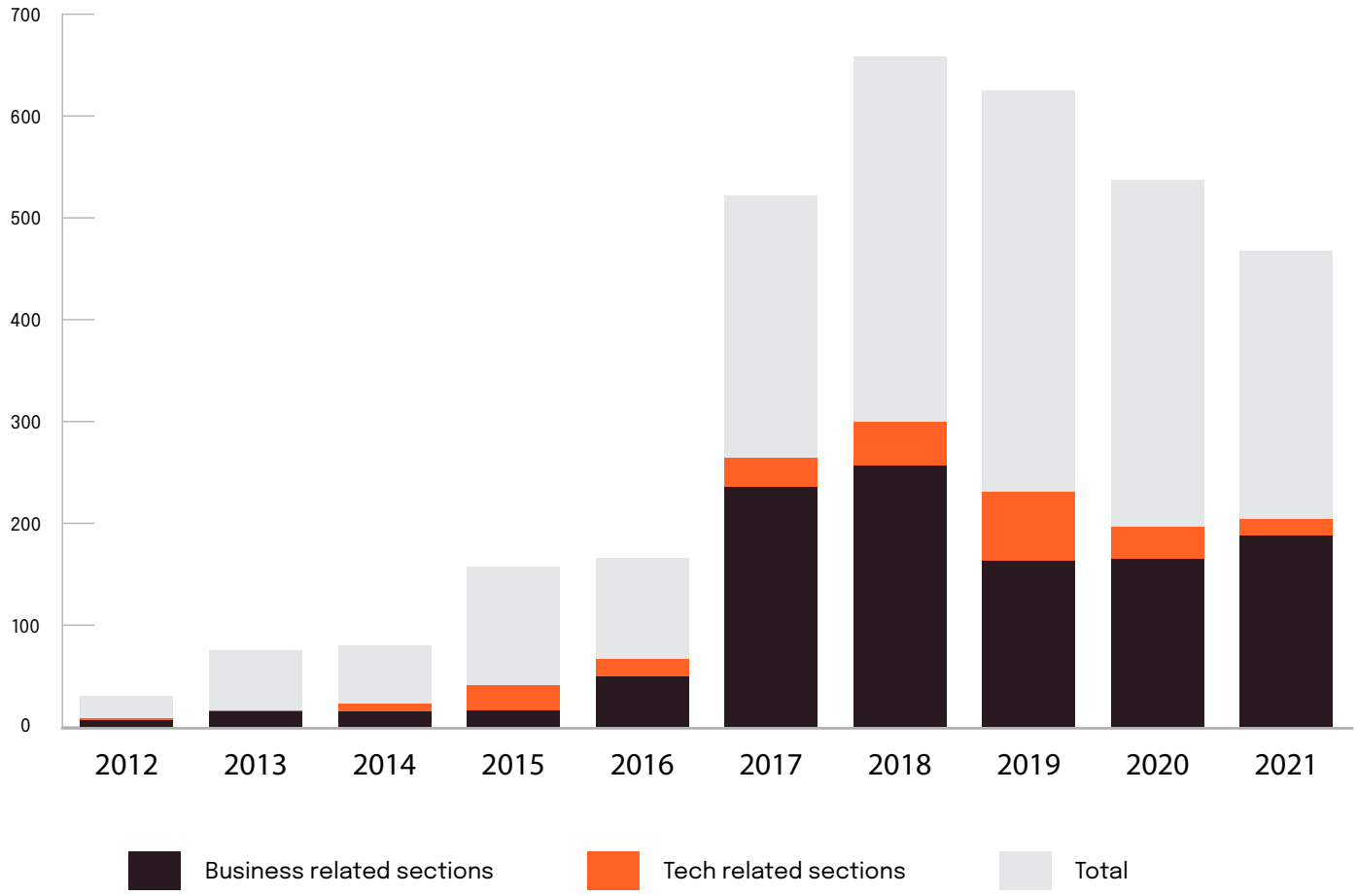
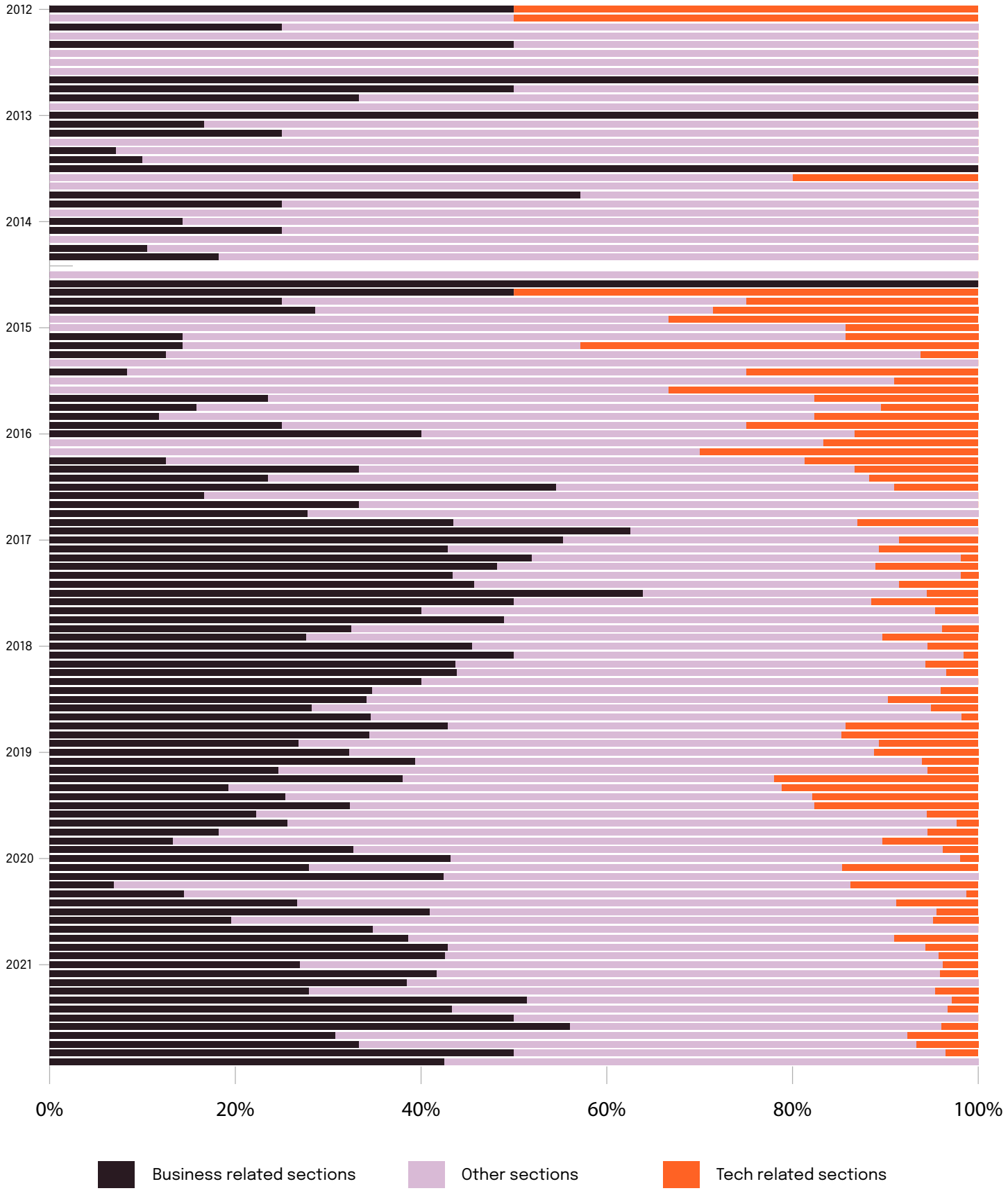


Figure 2: Ratio of Business vs. Tech Articles in the French Corpus



Our topic modeling analysis confirms these findings. Some of the larger topics, in both the English and French corpora, are "investment/finance," "commercial war with Huawei," and "robotization of labour-power." These topics situate technology as an economic object that could create economic growth. Topics such as "retail," "self-driving cars," "smartphones and virtual assistants," and "governmental investments" are also economic in nature. These results substantiate that the social or political aspects of science and technology are seemingly not as newsworthy as its economic impacts.

One reason that could explain this situation is the state of the country's tech industry. According to an experienced tech journalist, most tech corporations in Canada solely offer services to or develop applications for other corporations. In other words, the tech industry in Canada is not oriented towards mainstream consumers[24]—who make up the audience for most legacy media organizations. According to the interlocutor, newsrooms thus tend to cover technology contextually, focusing on its contribution to other industries or to the Canadian "economy." "It's very much through a business lens," the interlocutor insists, "through who's raised what funding, what executive shakes up here and there, who's turning around X company, etc. So when you do see coverage of a new technology . . . it tends to be either as a sort of subset of that business coverage or like a general interest kind of approach."

In a context where news organizations strive to optimize the impact of their content on social media, such a media system certainly colours how decisions are made when it comes to adopting an angle to cover AI. When business applications are emphasized, it shapes the collective understanding of AI in economic terms. For instance, some of the top articles closer to our larger topic "investment/finance" frame AI as an economic innovation, including "Element AI accueille la Caisse parmi ses investisseurs" (La Presse Canadienne 2019),[25] "FINTECH Nouveau fonds montréalais de 75 millions"[26] (Benessaieh 2018), and "Georgian Partners Seeks to Raise Canada's First $1-billion Private Venture Fund" (Silcoff 2019a). Of course, critical or more nuanced articles exist, like "Will AI Destroy More Jobs Than It Creates Over the Next Decade?" (Atkinson and Frey 2019).[27] However, an overwhelming number of stories portray an AI-oriented future as ineluctable and inevitably good for society, like "Self-driving Cars Will Drastically Change Our World, so When Does the

[24] With the exception of Shopify, there are few Canadian tech start-ups that directly target Canadian consumers.
[25] The English translation is: "Element AI Welcomes the CDPQ among Its Investors."
[26] The English translation is: "FINTECH, New $75 Million Montréal-based Fund."
[27] That said, the article was originally published in the Wall Street Journal, not in Canada.

Revolution Begin?" (Samad 2016). These representations of the technicity of AI are at times approximative or overly optimistic, but they tend to present AI as a range of innovative deep learning techniques that will radically change our way of life for the better. Such a framing sheds light on, and hypes up, the significance of AI for Canadians and, in turn, it tends to obscure other social issues that underpin the development and deployment of deep learning techniques (Roberge and Castelle 2021), such as the amplification of governmental or corporate power over the population or the reproduction of bias and (structural) inequalities.[28]

This is not to say that tech reporters focus solely on how AI gets assetized. After all, tech journalism is still journalism. However, covering science and technology comes with a lot of challenges. During our interviews, several interlocutors brought to our attention the difficulty of reporting on a subject like AI, which often results from a complex navigation of news organization culture, newsroom processes, journalistic norms, professional autonomy, and individual interests. This is the topic of the next section.

Newsroom Culture

In the previous section, we explored how the rapidly changing environment of newsmaking has amplified the media crisis. Increasingly, consumers access news from social media and the available advertising dollar has shifted to Facebook and Google (see Winseck 2021). News organizations, newsroom, news desks, and journalists use social media to reach, and grow, their public. In such a context, there is a growing trend that what is newsworthy corresponds to a changing audience's interests. According to both our qualitative and quantitative data, a compelling representation of AI for Canadians tends to present it as an object that has economic value.

In this section, we build on the previous one to examine how tech journalists report on AI. We explore some of the everyday dynamics that underpin newsmaking in Canadian legacy media.

[28] Over the last decade, STS scholars have pioneered the field of critical algorithmic and AI studies, many of which help us to make sense of the complicated relation between AI and society (Burrel 2016; Buolamwini and Gebru 2018; Cardon, Cointet, and Mazières 2018; McKelvey 2018; Roberge, Morin, and Senneville 2020; Roberge and Castelle 2021; and Stark 2019, among others).

Paying Attention to the Audience

For most of the reporters interviewed, when it came to covering AI, their guiding question was: "will this interest the public? And if so, how?" The answer to that question is complicated. First, as one interlocutor puts it, this is a "chicken and egg" conundrum. As discussed in the previous section, the growing consumption of news on social media is transforming the circulation of news to the audience, which in turn emphasizes the importance of awareness of the audience's rapidly evolving interests. Conversely, according to the same journalist, if legacy newsrooms were creating space for more tech reporting, they could better inform the public about complex topics, such as AI. In turn, this could generate more enthusiasm and engagement–from both the public and advertisers. However, resources are scarce in journalism and producing more tech news would come at the expense of other types of content. Since space and resources are limited, the coverage must have an immediate impact. Cultivating interest in tech news may necessitate time that newsrooms do not have. As one interlocutor pointed out, *La Presse* once devoted space and reporting staff to a new section called Technology. But advertisers did not follow. As a result, the editorial desk had to terminate the section a few months later and integrate tech reporting into the business pages.

Second, but relatedly, according to most interlocutors, editors rarely dictate an angle to reporters. News organizations and newsroom desks may certainly have particular perspectives in mind when they decide to cover AI, but so do journalists and freelancers on that beat. "I never talk about my articles or columns before I send them in. I write what I want, and I believe this is how it is done in Québec's newsrooms," a French-speaking freelancer says. Most interlocutors agree with them. "For a lot of my career as a freelancer, I had an [allocated] space I was supposed to fill," one recalls. "It was generally up to me to come up with the topics. The one story I can recall that was assigned [was] about big data. They wanted someone to write about big data [and] I had written some kind of similar piece before." Others concur and are adamant: journalists and freelancers are autonomous professionals, and they decide how a subject gets covered on their own. However, they also recognize that informal discussions between editors and reporters are common and inform how newsmaking is conducted.

This unstructured approach to editorial decisions about stories is characteristic of legacy media. "The boss will come and tell me 'Hey, there is this aspect that is interesting,

what do you think?'" a newspaper employee explains. "And then, I'll say 'well, it does not interest me' or 'ok, I'll do it.'" Other interlocutors described such an editorial process as "chaotic," "artisanal," and "informal." If professional autonomy is seemingly a cardinal aspect of journalism, a collection of both minor and major contributions from several individuals appears to be central to how newspapers manufacture news. While most interlocutors consider themselves autonomous in the newsmaking process, they also recognize that their work is part of an editorial processes that is fraught with contingencies.

At the core of this editorial process is the perceived audience's interest. "The challenge is to make it interesting to my readers," an employee from a news organization puts it. In such a context, reporting on technology in abstract, technical, or scientific terms may indeed be challenging, especially for a topic that is as complex and elusive as AI. The unstructured editorial process may well give enough leeway to cover news according to tech reporters' own experience and expertise, but through this process, journalists tend to structure their content according to their own perception of what may interest the audience (Brandel 2018).[29] Albeit important, such concern for what the audience wants to consume may lead some freelancers and journalists to prefer covering certain themes over others. The journalist may perceive that an audience is not particularly interested in a given angle, like the growing use of facial recognition technology by the Canadian state (cf. Brandusescu and Reia 2022), even though such coverage is critically important to the democratic engagement of the population on issues like AI regulation.

Paying close attention to the audience influenced tech journalists' choice of angles in their coverage, according to their expertise, experience, and perception of what is and what is not newsworthy. In turn, as we examine in the next subsection, this contributes to stultifying critique and standardizing the coverage of technology.

Choosing the Angle: The Social Dynamics of Journalistic Autonomy

One interlocutor compares his work on AI to hockey coverage:

> I often draw parallels with hockey when I am being told that my angle is too *pointu* [sharp]. I say "look, look at hockey, look at the open lines [on the radio]: people talk

[29] Jennifer Brandel argues that the central question around how coverage should be selected is: "What does our community not know that we could help them find out and understand?" (2018).

> about advanced statistics, they analyze who was on the second line in training camp, exchanges, the pool of prospects in the American Hockey League. Hockey reaches a lot of people; the public reads, it inquires. . . . And the discourse on hockey is super sharp, you know. People are able to have a discussion on advanced statistics! . . . In tech journalism, this isn't that. It would be fun to do that with the tech beat. But it will not happen if we keep doing just superficial news. We must get into details and make it interesting.
>
> There is a grey zone of course, but it isn't true that in each paper, I try to reach as many people as possible. There are reporters that are a lot more mainstream that I am. . . . Yes, it is true that we try to write a lead that will hook people's interest, but ultimately we do so because we feel like writing about these things.

As the journalist suggests, there are different approaches to reporting on technology. Tech journalism is indeed a heterogeneous field: some reporters have degrees in economics and a vested interest in the political economy of technologies; many have developed a passion for computing devices and participate in annual tech shows across the world to report on upcoming technologies from a consumer perspective; others cover technology like any other domain, such as sports or politics. There is a plurality of expertise and interests in the relatively small tech journalism milieu, each of which enable these tech reporters to develop a distinctive voice in the media job market. When they cover science and technology, it is their expertise and interests, constructed over practice and time, that enable these reporters to claim the required authority and legitimacy to discuss these innovations.

Despite these differences, coverage of science and technology is rarely disparate. "We all have our own autonomy," explains a journalist with more than twenty years of experience, "but up to a certain point . . . *we end up looking a lot alike between colleagues*. . . . We're pretty much from the same mould. We end up knowing exactly what is news, which angle is relevant, what people want to read." In technology, as in other domains, this situation often leads to a homogenization of news, somewhat modulated by the variations in interest and experience of each journalist on the same beat.

What's more, the curiosity about technology that reporters need to have to do their job tends to standardize coverage as well. "Generally speaking, we are mostly supportive of technology," an interlocutor affirms in French. He continues:

> We tend to present emerging technologies in glorious terms. So, 90% of the time, these technologies are featured in a way that is very "wow." . . . We are apostles for technology [apôtres de la technologie] in general. And the 10% [of coverage] where it's more negative, it can be related to the business section, the general section, or abusive uses of technology, like facial recognition in China or the indiscretions of vocal assistants.[30]

As this interlocutor suggests, this shared a priori interest in technology, or in AI, positions tech reporters as media experts more likely to appreciate the (future) value of a technology. Journalists who have a personal interest and expertise in technological development may represent it as a de facto benefit, conflating technological progress with general social progress. In other words, all tech reporters develop their own individual expertise, but the general interest they share in technology colours their take on the beat they pursue as professional journalists.

This is not to say that, at the individual level, all tech reporters represent technology with naive positivity or that they lack the critical perspective necessary to cover their beat.[31] After all, tech reporters are still journalists, and instances of insightful, meaningful, and substantive coverage of technological development in Canada abound. However, as a group of actors who play a key role in shaping public discourse on technology, tech journalists have tended to put technology in a positive light, especially when it comes to AI and its purported role in making Canada into a "promising [world-]leader" (Attard-Frost 2022). The controversy around start-up Element AI's sale to an American firm illustrates this well. According to Roberge and colleagues (2022), coverage of Element AI, during its lifespan, was divided into two moments that were distinct but internally homogeneous. In the first, the start-up benefited from favourable coverage, even though several journalists knew "that Element AI had no functional products despite what [people from Element AI] said publicly and the millions received in funding," according to one interlocutor. In the second, when Element AI was sold for a pittance, journalistic coverage was more critical. Indeed, until November 2020, Element was represented as a pioneer of a new industrial revolution in Canada, called revolution 4.0 (Bengio 2018), a claim that was uncritically circulated in

[30] Many interlocutors shared this perspective, though some believed coverage to be somewhat balanced between negative and positive (or naive) narratives about technology.

[31] For instance, as we write these lines, Alain McKenna (2022) published a column on data altruism in contrast to the power of the multinational corporations known as the GAFAM (Google, Apple, Facebook, Amazon, Microsoft)—all of which have subsidized computer scientists' research on AI for commercial purposes.

the media (Mougeot 2017). It took being acquired by American corporation ServiceNow (Silcoff 2019b, 2020a, 2020b)[32] for local coverage to take a still modest critical turn and for unquestioning faith in AI as a boon to the Canadian economy to erode ever so slightly (Robitaille 2020). And even then, the symbolic power of AI, as an economic force in Canada, remains overtly present in the local press, despite the snake-oil-like experience that was Element AI (Décarie 2022a; Mercure 2020).

While each journalist has a certain degree of autonomy, they are nonetheless situated in an entanglement of relationships, shared values, personal interests, and other conventions that structure their work (Haraway 1988). In such a context, especially given how much attention is paid to the audience's perceived interests, it is not surprising that coverage of AI tends to present deep learning, on the whole, as a functional instrument that will impact the Canadian economy. In the next subsection, we build on this tension between journalistic autonomy and the homogenization of tech reporting to better examine how legacy media provides a specific arena for debate on AI in Canada.

The Newsworthiness of AI

As discussed in the Analytical Framework, the sociology of expectations posits that representations of a technological future follow a hype cycle (Borup et al. 2006; Fenn and Raskino 2008). Promoters hype up technologies until they are tested and fail to realize these initial visions. Levels of hype and expectation then plummet before they are recalibrated to match the real-world results of tested innovations.

Promises about what technologies can eventually accomplish are not mere descriptive statements. They are performative; they create something (Joly 2010; Dandurand et al. 2022): they convince and rally a wide range of actors, including policy makers, journalists, venture capitalists, researchers, and many others; steer (current and future) debates; form the basis of policy making; attract funding and coordinate research activities; and organize technoscientific communities (Lussier-Lejeune 2022). For example, reports that Bengio envisioned his start-up, Element AI, to become the "next [Canadian] Google"[33] (Silcoff 2019b) or that AI will bring about the next industrial revolution are not neutral descriptions.

[32] One could cynically argue that the sole purpose of founding a start-up, even one as promising as Element AI, is to get bought out by an American unicorn.

[33] While each of these phases may overlap, they are indicative of the changing character of newsworthiness over time.

These representations are discursive devices that conjure AI into something it is not: a catch-all and unitary solution that can effortlessly be implemented in all contexts and against any problems without any specialized expertise required to support it (Dandurand et al. 2020).

Most interlocutors have identified 2014 to 2015 as the beginning of AI hype in Canadian legacy media. However, as our data show (see Figures 3 and 4), considering the increased volume of coverage on the subject, AI became substantially more newsworthy from roughly just before the year 2017 until 2020 when it plateaued. Since then, AI has appeared in legacy media with regularity.

Figure 3: Volume of Articles per Month in the French Corpus

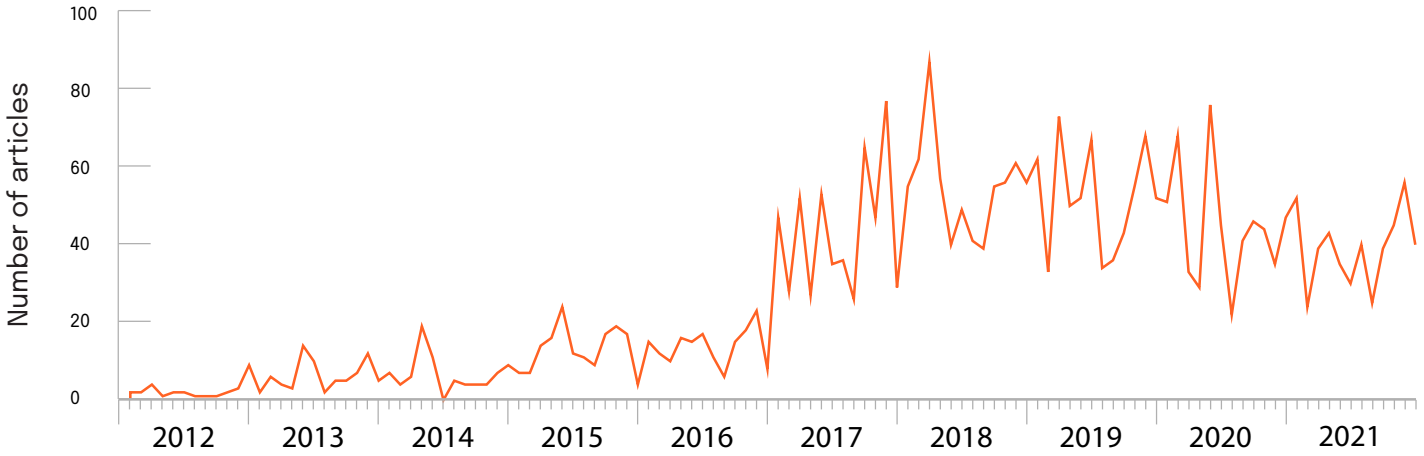
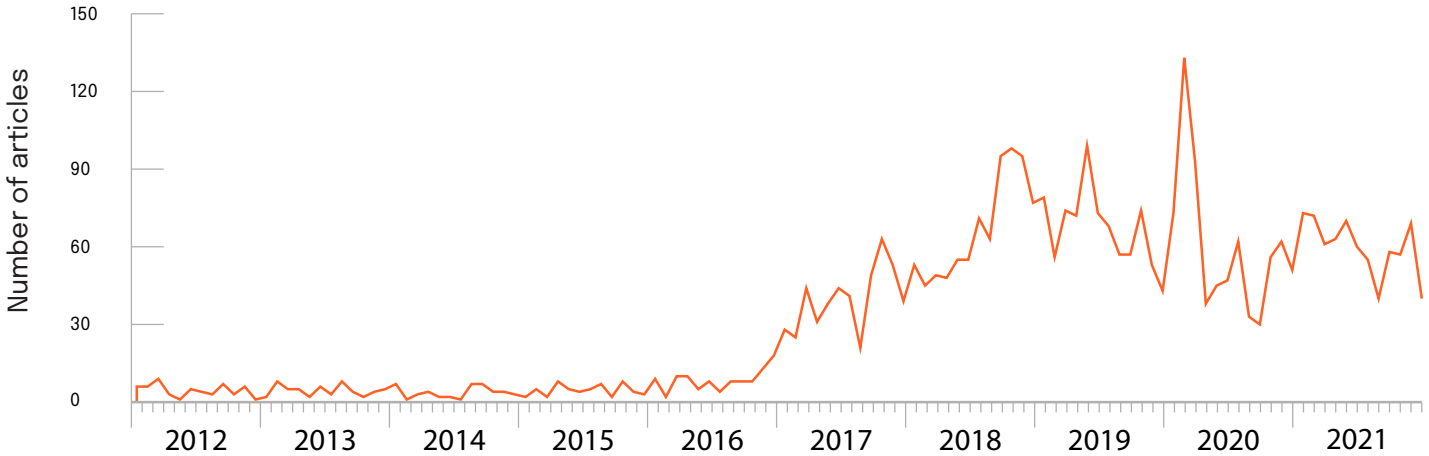


Figure 4: Volume of Articles per Month in the English Corpus



When discussing the trajectory of AI coverage over the last decade, a few interlocutors divided it into phases, just like the hype cycle.[34] This does not mean that every phase followed and built on the previous ones in a teleological manner. As one journalist recalls, "with AI, we always have to restart the conversation in each article. This prevents us from engaging with more in-depth or complex topics relating to AI." Based on the perception that the public is not properly equipped to comprehend complex techniques, science, and technology, such a situation certainly contributed to making AI into an elusive object. That said, since 2012, discourse on AI has shifted; increasingly, it has permeated everyday life and news cycles, becoming known and recognized by the public.

Just like many interlocutors suggested, dividing AI coverage into phases helps us to make sense of the multivalent discourse–the complex and elusive nature–of AI. The first phase is the introduction of AI to the audience. These early journalistic accounts are foundational, explains an interlocutor. "In the beginning," they elaborate, "people were asking: 'What is AI?' . . . So you would lose three minutes of your report to explain AI. Now, it has changed a little bit. People . . . don't know what AI is exactly, but they know the wording [the expression] of AI." In this introductory phase, AI makes a tentative entry into public discourse. This phase is also the honeymoon period, where AI is represented favourably and news reports are typically framed as "isn't this technology cool?" as another interlocutor puts it. "This was the time," a third journalist explains, "when a lot of companies were telling us about the little miracles that AI could achieve, [that] AI was the key to the industrial revolution 4.0."

Shortly after, coverage turned more to the "dark side" of AI, as an interlocutor put it, when social and ethical issues were raised with more urgency. In that phase expectations and hype about AI typically plummet. In this phase, controversies about AI tend to be covered with more regularity, as we examine in the next part.

"There has been an evolution of the ethical considerations of AI" a freelancer suggests. "Now, no one systematically rejects these considerations, but it does not mean that every reporter covering AI has the same level of reflections or asks questions that are [socially] relevant." That level of maturity in AI coverage, where ethical and social considerations are part of the journalist's toolkit, unfolds in a third phase, when reporters tend to cover AI's social and technical characteristics. "We have reached a point when AI is taken for

[34] While each of these phases may overlap, they are indicative of the changing character of newsworthiness over time.

granted," the freelancer concludes. "So, if [a start-up] tells me 'Hey, AI is enabling me to do this thing with my app,' I now assume that this is trivial. This isn't news anymore." As hype and expectations are recalibrated, so is perceived interest in the technology. When interest in something fades, its newsworthiness diminishes as well.

Indeed, as a technology develops and evolves, so too does its coverage in legacy media, as an interlocutor explains. In later phases, reporters gain greater fluency in the technology and so does the audience, who have now been exposed to the technicities and socialities of the technology for a longer time. As the news cycle evolves, perceptions of the audience's interest change. "Like the information highway, no one uses that term anymore, fortunately. And there is not a lot of people [journalists] that wrote on the internet in 2010. Today, I could probably write something on "how does the internet work." But who would be interested in such a paper?" the interlocutor asks rhetorically, presuming the audience's lack of interest.

Part of a tech reporter's contributory expertise consists of assessing when an event or a situation is newsworthy, often according to modulations in the audience's perceived interest. In other words, competence in journalism consists in developing knowledge about what constitutes news and how to properly cover it. For instance, in 2018, when Bengio, Hinton, and LeCun received the Turing Prize, journalists perceived that the audience's understanding of AI had improved by then. "When Yoshua Bengio was awarded the Turing Prize . . . I asked the infographic team to make a representation of a deep learning neural network. At the time [late 2018], I told myself that we had to do it not only because it was the nature of his research [not AI, but neural networks], but also because we were ready to put that in a newspaper" an interlocutor explains. Just a few years before, the mere mention of AI would have been sufficient. Over time, the audience and the newsrooms were increasingly ready, according to this interlocutor, to engage with more detailed technoscientific terminology that better describes deep learning.[35]

Early on, then, when a technology becomes newsworthy, it is challenging to discuss it with nuance. The time and space allocated for tech news is limited. Further, when the development of a technology is in its early phase, critical research on it may not be advanced, or it may be

[35] To note, such an expertise in reporting tech news does not always equate with a firm understanding of the technology and is unequally distributed across tech reporters, newsrooms, and news organizations. For instance, in the United States, after several years of critical research on AI (e.g., Whittaker et al. 2018; Buolamwini and Gebru 2018), the Economist, of all places, published an article entitled "An Understanding of AI's Limitations Is Starting to Sink In" (Cross 2020) to temper some of the early expectations linked to machine learning techniques. While the story was welcome, it was a bit late to the party.

challenging to make it intelligible to an audience with no prior knowledge. In such a context, reporters must invest more time and space to vernacularize the technology, which in turn exacerbates how news stories on deep learning have conflated the promise of AI with what it actually achieves today. Too often, the boundary between the vision of AI's functional role in society and the realization of that vision has been blurred, which contributes to the overhyping of AI. For instance, in 2016, *Le Devoir* published the piece "*Que serons-nous quand les robots feront tout le travail?*" ["What Will We Be When Robots Do All the Work?"], in which the journalist describes robots as decision-making units that will replace humans by 2020 (Dessibourg 2016). While "anthropomorphizing AI" or "the use of robots" are legitimate controversies to raise, coverage of these issues would benefit from a clear distinction between the current technicities of AI and its future prospects. Erasing that difference fosters hyperbolic representations and the sterilization of a much-needed debate on AI projections.

In retrospect, such slippages have occasioned misleading coverage of deep learning, such as "AI prevents dropping out of school, it's magical," as one of the interlocutors characterized it. The notion that deep learning techniques are "magical" or that algorithms, solid state drives, and servers have sentience, misinform the public and mischaracterize the nature and functions of AI. And yet, these initial and at times dystopian, romanticized, or simply false representations of a technological future play a role in legitimizing assumptions, expectations, and understandings of AI in public discourse (Roberge, Senneville, and Morin 2020; Roberge and Seyfert 2016).

Inflated hype for, or even misrepresentations of, AI have a tangible impact on Canadian society. As an interlocutor explains, in 2016, AI hype had not yet reached its peak. But the buzz around it was quickly intensifying. "Several companies began to talk to us about the miracles of AI, starting with Element AI. According to them, AI was about to be the key to a [shift towards] a [local] 4.0 industry. We had to follow up," an experienced tech journalist recalls. AI became newsworthy and had to be covered, which in turn contributed to exaggerating projections about AI. They go on:

> These companies working on AI, they had partnerships, money, and customers. At some point, my boss put three journalists, including himself, on the project. The challenge was to find examples of good industrial or commercial applications of AI in Québec. And this is when we realized: we had been fooled for two years! . . .

> There were partnerships and projects, but there was not a damn [company] that could come up with a concrete project. In the end, *on trouvait juste des peanuts* [we only found peanuts]: some little ridiculous ventures with weak AI. . . .
>
> I had found a company . . . and they told me "Yes, yes, for a year now, we have trained a machine, an AI that manages all parameters [of our chain of production]. It's deep learning, it is the real thing, and it is just a question of days before [the AI is functional]." I went to see the company, and it was not ready. . . . I did the article anyway and kept it [on the backburner]. I called them recently [in 2021], and [the AI] is still not active.

Similarly, many interlocutors have described AI as having a "wow factor" or a "buzz." Several individuals and companies share a similar understanding of AI and have employed it as a marketing ploy, as the interlocutor reminded us. In Canada, the hype for AI applications was particularly salient and made its way into tech reporting, as the previous subsection suggests. However, what is striking here is what the reporter did with what he learned about the company. Instead of writing about the actual failures of AI, the journalist shelved the story for a time, waiting for the company to eventually implement AI, until they realize it would never happen. "Our balloon deflated. We did not write a lot of articles [on AI implementation in local companies]. We saw the results, and we told ourselves 'now we [just] want concrete examples. We will stop glorifying [AI] because we are done with the bullshit.'" This interlocutor changed their perspective on AI coverage; upon learning more, they became increasingly critical of the performativity of AI promises. However, writing about the failures to implement AI applications was still not newsworthy in and of itself. At the time, challenging the dominant techno-optimist narrative about AI did not make the news because actors involved in the newsmaking process, including the journalist, did not consider such an angle newsworthy.[36]

To note, tech journalists, and newsrooms more generally, are not neutral participants in newsmaking processes. At every step, tech journalists and news editors make a series of decisions that impact tech coverage: they elect to cover or not a particular issue or event, they adopt a specific angle to a story, they reach out to certain experts over others. Every editorial choice that journalists and editors make when covering these issues builds public discourse and the public's related assumptions, expectations, and understandings

[36] To be clear, the shelved article described in this paragraph was eventually published after the interview with the interlocutor, and it included a section on the failures of AI implementation. However, these failures were not the paper's story and were described in an ad hoc fashion in the last section of the article.

of how science and technology shape society. This is especially the case for hyped technologies whose development is not fully complete or when the techniques in question, like deep learning, cover so many varied use cases and applications. Translating highly technical promises that have yet to be actualized in a way that is intelligible (and interesting) to an audience is a challenging task, but it is also a significant one since it frames the arena of political deliberation about the future role of science and technology in society–what Pierre-Benoit Joly calls the "horizon of expectations" (2010, 31).

Of course, over the last decade, there has been critical coverage of AI–but little to none that has questioned its necessity or raison d'être. "There's only room for so much depth about a bit of a technical issue. But, yeah, I think that's a little bit lacking at times. There's a general acceptance of inevitability, I think, of the continued research and deployment of artificial intelligence," argues one reporter. This "general acceptance of inevitability" contributes to making AI appear to be an ineluctable and incontestable fruit of technological progress. Instead of framing it as an overhyped object that is not fully ready to be deployed and whose development can be steered in a different direction, AI is too often stabilized in the media as a set of innovations "that are here to stay," as an interlocutor says. In the next section, we examine how deep learning has been framed in the media as a powerful technology. Building on the sociology of translation (Callon 1986), we turn towards journalistic practices and focus on the tactics employed by freelancers and employees of news organizations to make sense of a complex and elusive topic like AI.

The Practices of Translation

Since AI is an object whose technicity is difficult to grasp, several interlocutors highlighted how long it took them before they felt confident in covering it. "Our work is to make complicated things simple," one freelancer mentioned. Ideally, the practice of journalism is to convey contextualized, intricate, at times indigestible controversies and ideas into an engaging and structured narrative that is intelligible to the layperson. "That's what I like to do, anyway," explains the interlocutor who mentions in passing that a good grasp of the topic in question is necessary in order to translate it intelligibly to an audience. "If you do not know AI, if you haven't read on that specific topic, it's certain that you will not have the reflexes to ask some questions," the freelancer added as we discussed some problematic AI coverage. "It requires a certain comprehension [of the technology's technicity]. You have to be informed to have these reflections [to ask the right questions]. You know, it

is not the kind of reflection that will necessarily come to you naturally." To communicate news effectively to an audience, part of the journalist's expertise is to gain knowledge–interactional expertise–in the technoscientific object to report about it appropriately and critically. Without a proper grasp, reporters run the risk of becoming mere intermediaries that parrot actors, organizations, or institutions that may benefit from uncritical media publicity.

Obviously, not all technologies are equally easy to understand and cover. "At the time [late 2000s/early 2010s], I attended Yoshua Bengio's conferences at the Université de Montréal," remembers one reporter.

> There was a buzz in the room when Bengio was explaining what AI was. It was very technical, but that's the trick: for us, we have to translate (*vulgariser*) [AI] to the public. But Bengio, he was zooming on the screen to the scale of the pixels in his images to explain how the computer differentiated between a dot that was nothing and, say, a dog's hair. It was extremely technical. Students in the room loved it [*trippaient*], and that was a bit weird because it was really too geeky [for me].

Most likely, it was too *geeky* for everyone except for computer scientists. But gaining such a level of technical fluency enables tech reporters to be better equipped to critically report on hyperbolic promises about AI and on related issues of privacy, surveillance, (automated) decision making, governance, institutional and private funding, injustice and discrimination caused by automated processes, as well as any other important controversy stemming from the development or deployment of AI. Conversely, technical fluency, often acquired due to a journalist's personal interest, colours AI coverage. As mentioned previously, tech journalists tend to appreciate the value of technologies and their impact on society, which tends to be publsihed in newspapers' business pages.

To effectively make AI accessible to their audience,[37] reporters rely heavily on the expertise of computer scientists. As one journalist put it, "who is the best person to talk

[37] AI is a complex object, but it is also an elusive one; it is a boundary object that, once represented in legacy media, is "plastic enough to adapt to local needs and the constraints of the several parties employing them, yet robust enough to maintain a common identity across sites" (Star and Griesemer 1989, 393). For computer scientists–people who have contributory expertise in the domain–AI is akin to a scientific discipline that recently gained popularity following the technical successes of contemporary machine learning. For social scientists, twenty-first-century AI is better conceptualized as a range of heterogeneous computational techniques that are shaping society (Roberge and Castelle 2021). Their modalities vary, and the social and technical context in which they are implemented matter. In light of the multifaceted applications, characters, and meanings appended to "AI," reporting on such a range of techniques under a single label is challenging.

about AI, other than the one who is actually making it?" Computer scientists have indeed been well represented in the media over the last decade. Even the specific term "Yoshua Bengio"[38] is strongly represented in our corpus (see Appendixes 1 and 2). Coming shortly after the names of politicians who marked the political landscape over the last decade (Justin Trudeau, François Legault, Doug Ford, Donald Trump), Yoshua Bengio appeared 491 times in 344 distinct articles across the corpus.[39] In a prior study based on documentary research, Roberge, Morin, and Senneville (2020) found that Bengio appeared in 93% of all articles on AI published in La Presse.

Other computer scientists and related actors are also prominently featured in our corpus.[40]

- Geoffrey Hinton appears 190 times in 117 articles
- Jean-François Gagné appears 65 times in 32 articles
- Joëlle Pineau appears 48 times in 30 articles
- Yann LeCun appears 24 times in 15 articles

The dominant presence of computer science experts in legacy media is meaningful. The only other individuals whose names are recognized more than computer scientists are politicians and world-renowned tech industrialists, such as Marx Zuckerberg, Jeff Bezos, and Elon Musk (See Appendix 2).

Since tech reporters often resort to their contributory expertise to report on AI, computer scientists have become the key spokespeople for AI; they have come to shape the representation of deep learning techniques in public discourse (Akrich, Callon, and Latour 1988; Callon 1980, 1986). Like all scientists, computer scientists are not free from bias. They *believe* in the potential of their object of study; deep learning (and many other) specialists have great expectations for what AI can and will eventually be capable of accomplishing. Used as a source of information, computer scientists become passionate advocates and promoters for a technology whose success matters to them. Based on their knowledge of the technicity of AI, these scientists bring into legacy media spaces the legitimacy that empowers them to intervene, shape, and close AI controversies–to create a horizon of expectations–even when

[38] We included the terms "Bengio" and "Mr. Bengio" in "Yoshua Bengio."

[39] The numbers presented are a compilation from all entities named in both the French and English corpuses that appeared more than 40 times and were consolidated with all their variants (see footnote 36). See Appendixes 1 and 2 for more details.

[40] Included in the mentions are the last name, full name, and their variations. For instance, for "Geoffrey Hinton," we included "Geoffrey Hinton," "Geoff Hinton," "Hinton," and "Mr. Hinton."

the angle pursued by the journalist falls outside of the computer scientist's area of specialization.[41]

To critically report on AI, then, tech journalists must be able to confront these interlocutors on their own turf of expertise, a task that is challenging given the complexity and elusiveness of AI and the time and space allocated for tech reporting. However, given the contingencies of newsmaking processes described earlier, too often tech journalists rely on the expertise of particular computer scientists who end up framing local coverage of AI–these experts thus become an "obligatory passage point" (Callon 1986) through which the meanings and possible applications of AI are stabilized and conveyed to a larger public. "Even a reporter that is really, really good in math or in data science," explains a freelancer, will find it difficult to be critical

> when you face Yoshua Bengio or other similar personalities [that are] good communicators. [AI] remains a domain of specialists, and I think that not everyone can understand it. I think I have a good understanding of what AI is, but I don't pretend to understand it like the specialists. So yeah, it is difficult to explain something that is very complex when we don't grasp it ourselves.

As the interlocutor suggests, it is not only difficult to explain something as complex as AI, but it is also challenging to be critical when confronted with experts who possess highly specialized knowledge.

While their contributions to academic and public debates about AI are certainly welcome, deep learning experts also have vested academic and financial interests in the success of AI. Experts do not stay in their laboratories anymore; they are also "entrepreneurial techno-scientists" (Brown and Michael 2003, 13). Like other scientists, computer science experts are intricately embedded in a network of other actors as well as private and public institutions and organizations (Colleret and Gingras 2020, 2022; Roberge, Morin, and Senneville 2020; Roberge et al. 2022). For instance, Bengio is a computer scientist who is a professor at Université de Montréal and scientific director at Mila and IVADO (Institut de valorisation des données). He cofounded Element AI with Jean-François Gagné in 2016 and is now a consultant for ServiceNow, the American company that bought Element AI in 2020. Geoffrey Hinton is

[41] In Part 04, we discuss the role of ethics in the promotion of AI in Canada and the unabated symbolic power given computer scientists in these debates.

a professor in the department of computer science at the University of Toronto and chief scientific advisor for the Vector Institute and Google. As for associate professor Joëlle Pineau, she "shares her time," according to her website, between McGill University and the Facebook AI Lab in Montréal, where she is a managing director.[42] Bengio, Hinton, and Pineau hold, or have held, decision-making positions at CIFAR (the Canadian Institute for Advanced Research), an organization that has distributed funding to labs and research centres–including ones run by Bengio, Hinton, and Pineau–through the federal government's Pan-Canadian AI Strategy.

Over the last decade, there has been a concerted effort to stabilize AI controversies and make deep learning as profitable as possible. As one journalist mentioned:

> So there has been a definite *rapprochement* of these different parts of the chain and we see it in the technology sector. I don't know if it's a coincidence or if one inspired the other but . . . the conversation is easier to have between the private and the public, and the academic, all of that. It definitely improved a lot . . . I'm not saying it is perfect, but it's a lot more harmonized that it was.

> I know that this is the reaction to a problem that has often been raised and that studies have pointed out to say "one of the flaws in the development of these things in Canada and in Québec and in Montréal, especially in Montréal, is that there was no marriage between the start-ups, the big companies, the government, the investors" . . . all that. Now, we see that it lines up. You realize it when you talk to everyone: they all say the same thing. They speak to each other. Clearly, there is a channel of communication that has opened up that was not there before.

When computer scientists, then, intervene in legacy media as experts to comment on, or explain, the complex and elusive technology that is AI, they do so as spokespeople for their techno-scientific object of study, but also as representative of a large network of actors and institutions that all have vested interests in the success of AI (and its implementation in as many sectors as possible).[43]

[42] Available here: https://www.cs.mcgill.ca/~jpineau/

[43] According to our computational analysis, these are the most popular entries of actors, organizations, and institutions that populate our corpus (for more details, please see Appendixes 1 and 2): political (Canada, Ottawa, Trudeau, François Legault, CIFAR); academic (Université de Montréal, University of Toronto, Mila); tech corporations (Google, Facebook, Amazon, Apple, Microsoft, Silicon Valley); financial (Desjardins, Caisse de dépôt, RBC, CIBC); municipal/local (Ford, Sidewalk, Coveo, Chambre de commerce de Montréal); global (China, Zuckerberg, Deloitte, YouTube).

Put differently, when these actors intervene in public discourse as AI experts, they tend to hype up expectations for the future possibilities of AI in an attempt to close controversies, but they also, implicitly or explicitly, campaign for the construction or maintenance of the economic and political structures necessary for an "AI ecosystem" in our society. They may critique AI–Bengio is a well-known critical voice against the development of automated weapons (2019)–but they do so in such a way as to frame AI as an ineluctable outcome of technoscientific progress that must be "responsibly" exploited for our benefit. In such a light, AI may be represented as a technoscientific object that may at times be problematic for society,[44] but promoters of AI either (a) ignore the instances of systemic violence that technology exacerbates or (b) frame them as "ethical" issues that will be resolved through self-regulative initiatives, such as the Montréal Declaration (Roberge, Senneville, and Morin 2020). Such interventions in legacy media heighten the significance of AI for our economy and society (Bengio 2022), while the social issues associated with the development and implementation of deep learning techniques are often not even raised.

There is a conspicuous lack of critical voices in the coverage of AI in Canada, according to our entity named recognition analysis. Only Stephen Hawking, who died in 2018, appears regularly (71 times in 63 distinct articles). Social science experts trained to investigate the multifaceted aspects of technology, including AI, are notably fewer compared to computer scientists. For instance, Yves Gingras–chevalier de l'Ordre national du Québec, professor at Université du Québec à Montréal, and an author with acute expertise on the history of science and technology–appears in our corpus only eight times in seven distinct articles. In comparison, the Terminator appears 79 times.

When they (overly) rely on contributory expertise grounded in computer science to frame debates on AI, journalists are put in a position to translate AI based on the technological expectations they collect from computer scientists or other industrialists and politicians with whom they are connected. What's more, when interviewed, computer scientists rarely only discuss their domain of contributory expertise. For instance, at the beginning of the pandemic, just a few weeks before ServiceNow acquired Element AI, Bengio did a media tour to promote Mila's AI-based solution to public health governance issues (Deschamps 2020; Marquis 2020). Here is an excerpt of an interview with Bengio in the *Montreal Gazette*:

[44] See Joy Buolamwini and Timnit Gebru (2018) for a lucid study of how algorithms discriminate based on skin colour.

> "People are ready to share information, but they need to be taken by the hand," Bengio said. "You need political leaders to get involved. We saw this play out with masks. How often did we talk about masks? A lot. So if we want people to acquire certain habits, make certain changes, we have to convince them. People have to have confidence. If there's no strategy to ensure that half the people download the app–which would be good–you won't get very far."
>
> . . .
>
> "If the government wants to help tracing, there's an entire infrastructure that needs to be put in place. It's not just about the technology. You need to people [sic] to answer users' questions. If there's a bug, you need to fix it. You need to reassure people. It takes an entire organization."
>
> Bengio sounded pessimistic when asked about the chances of Quebec choosing Mila's COVID-19 application. . . . "It's out of my hands," he said. (Tomesco 2020)

What is striking in this excerpt, and in many others, is that Bengio's intervention in the media is not related to AI or his own contributory expertise. He uses his fame to normalize the use of AI as an instrument of governance and to share his expectations about what AI could accomplish–let alone what his own AI-based application could do if only it was used by the governments in power. He is aware of the risks but considers them acceptable.[45] And yet, none of these claims are related to the technical aspects of AI for which he gained credibility, legitimacy, and prominence across the world.

As mentioned by one journalist, the reality is that, as the current legacy media crisis reaches unparalleled levels in Canada, most tech reporters simply do not have enough resources to gain adequate fluency to challenge experts. They said:

> Then, you know, AI ethicists will be contacted on articles on ethics. . . . A journalist isn't going to contact an ethicist if there's a new AI app that speeds up commutes. For a new AI Google Map, let's say, the journalist isn't going to talk to an ethicist to say, what

[45] The reporter writes, "While COVID Alert has drawn criticism for preventing some Canadians from accessing and using the app, Bengio prefers to focus on another feature – the decision to prioritize privacy over public health. As far as he's concerned, that's the wrong choice" (Tomesco 2020).

> would the repercussions of that be? Perhaps they could be present more often. . . . But you have to fight to talk to them. Sometimes you have a newspaper article that is due the next day. Who are you going to talk to? You will talk to someone that you will be able to talk to the same day, that you already have in your contacts. So you know there's a kind of . . . a circle, I don't know if it's vicious or virtuous. It's a snowball: the world you have in your contact book is the world with whom you have a relationship; these are the people that answer your call and to whom you can talk easily, so you go back to them.

The freelancer continued, pointing at our pictures on the Zoom call:

> There is a little bit of laziness, a little bit of efficiency, a little bit because you. . . . There, you are four researchers plus all the others [eight researchers have regularly participated in this research project], for something that I do on my own. . . . Let's say I have to write something on the representations of AI in the media. I will have to write a column of 1,000 words, and I'll probably do it in two days. I'll get $200 for it. There are four of you, you will spend months of research, . . ., you will talk to several people. Only me, I'm being paid by the piece. So you know it's not the same level of reflection. There are shortcuts that have to be taken. And that's a shame. But it's also a little bit our reality as well. So the reason why others are not contacted that much is often because it's more efficient to contact people you know and. . . . It's something we should not be doing, but we do it anyway: we contact people because we know [in advance] what they are going to tell us and we [need] what they have to say for our piece.

This is the mundane reality for many journalists, especially freelancers, who labour to maintain a livelihood in our current media crisis. Who qualifies as an expert in a story is also fuelled by the constraints of time and space faced by reporters. But such a reality also explains how many journalists give time and space to the same contributory experts–spokespeople, translators, or obligatory passage points–that get the chance to close controversies and stabilize the meaning and potential uses of AI in legacy media. Firmly embedded in networks with other industrialists and politicians, these experts populate legacy media, framing AI as a technoscientific object that has economic virtues. In turn, this technological promise has contributed to making AI into something that is "here to stay," as a few interlocutors suggested.

In the last part of this report, we take up a much-needed discussion of the AI controversies that have populated legacy media to explore which public debates were salient and, perhaps more importantly, which ones were notably absent from public scrutiny.

Part 04:
AI Controversies

In all our interviews, we asked questions about the debates that have steered the trajectory of discourse on AI in Canada since 2012. When we asked which controversies were well represented in the media and which were not, this answer epitomized the posture of objectivity that many journalists aspire to:

> I think there has been some caricature, in fact. I think that there have been people who have pushed for AI a lot, saying "AI will revolutionize the world" without really looking into it. On the other side, [there are people like] Yves Gingras, from UQAM, you know, [who] is extremely critical about this domain. He says, "everyone got carried away, including the media. We have been naive." And me, I'm trying to position myself between these two positions . . . voilà.

As a follow-up, one of us pushed further: "OK! Great! Retrospectively, is... would certain questions benefit from greater space [or attention] in the media? Whether they came from each side, critical or not critical enough?" The interlocutor answered: "Yes, absolutely. For sure we could have been . . . I think we could have been more critical towards the discourses that were pitched to us [*par rapport aux discours qu'on nous servait*]."

In 2021, after ten years of AI coverage, most interlocutors agreed: legacy media covered the main debates, but some of the coverage could have been more critical, detailed, or engaging. When asked what the most important controversies reported in legacy media were, interlocutors remained generic. Instead of targeting a particular controversy, such as the sale of Element AI or the involvement of CIFAR-funded computer scientists in CIFAR decision making, most journalists identify broader debates that are not solely related to AI, like personal information privacy or technological bias. We coded them in three tiers, according to the relative frequency with which interlocutors brought up these controversies during our interviews. For instance, when an interlocutor mentioned that the implementation of AI in Canadian industries would result in job losses from a macroeconomic point of view, we coded the statement as a "jobs" controversy. Since our interlocutors raised the jobs controversy with more frequency than the environmental impacts of AI (and computing power), the controversy "jobs" was placed in a higher tier than the controversy "climate change." The coded controversies are:

1. (data) privacy; automated cars; (technological) bias; surveillance (through facial recognition technology)
2. military (automated weapons); deepfake; jobs; power;
3. Turing Test (Strong AI or Artificial General Intelligence [AGI]); COVID; robots; elections; climate change

In contrast, we asked what was, according to the interlocutors, noncontroversial about AI. Our aim was to collect information about the Canadian dimensions of AI that are not subjects of debate–areas where there appears to be consensus. Three distinct answers stood out:

1. AI is beneficial, especially for healthcare;
2. AI is here to stay; and
3. AI has ethical and privacy issues.

For the interlocutors, AI is making a positive impact on Canadian society, especially in healthcare. Deep learning techniques will continue to be developed and implemented. Further, as the interlocutors suggest, there are problems with unbridled AI development and implementation that are ethical in nature, which implies that ethical considerations may alleviate them.

These areas of controversy and consensus are telling. According to the interlocutors, AI is an object of technological progress that is affecting and will continue to affect the world, especially in sectors like healthcare where it can improve and save lives. However, they also maintain, if AI's development and deployment is left unchecked, it could lead to serious human rights infringements, as the second and third tiers of controversy show. What's more, the first tier of controversies indicates that debate about AI cannot be considered in a vacuum. Issues of surveillance, technological bias, privacy, and automation–e.g., the trolley dilemma–reveal the situated nature of technologies and the dire need to attend to the contexts in which they are used. For instance, the controversy over surveillance via facial recognition technology raises questions that are far larger than AI, such as: Who benefits from the use of facial recognition technology (FRT)? Who does not? What structural injustices does it exacerbate? What are the inner mechanisms of FRT as implemented by governments? Does it reshape individual and collective freedoms? What are the relations constructed between state institutions and private corporations when the state develops its own FRT mechanisms?

But what is more revealing about these answers is what is missing. First, there is tremendous political will "to drive the adoption of artificial intelligence across Canada's economy and society," according to the Pan-Canadian AI Strategy, hosted on the government of Canada's website. This Pan-Canadian AI Strategy comes with substantial funding (Colleret and Gingras 2022) and contributes to the increasingly close entanglement of the state, academia, start-ups, and multinational corporations (Roberge, Morin, and Senneville 2020). Such an alignment of positions and interests is unusual, but it remains largely unquestioned in legacy media, which contributes to making AI an uncontroversial object.

Second, as evoked in a previous section, the many failures of AI rarely make the news or are treated as mere hiccups in the unstoppable technological progress of deep learning. In the *Globe and Mail*'s opinion section, an article suggests that "not unlike today's electrical grid, AI will soon power nearly every human interaction with technology" (Brindle and Morris 2021). These "predictions" are meant to be convincing statements that shape visions of what the technological future may look like. However, these propositions have seemingly no correspondence to reality; the authors do not present evidence that most human interactions are mediated by technology. Such creation of technological expectations contribute to establishing AI as an irresistible economic object from which everyone will eventually benefit despite some ethical, social, and technical drawbacks (Whalen 2022; Witzel 2022). With the exception of the case of Element AI, the many difficulties of implementing AI in local industry are absent from Canadian coverage, until recently (see Lomazzi, Lavoie-Moore, and Gélinas 2019; Rettino-Parazelli 2019).

To get, perhaps, a less situated and broader picture of the controversies that have steered the trajectory of AI in Canadian legacy media since 2012, we conducted a topic modeling analysis of our corpus. This inductive analysis helped us to examine clusters of news stories organized around certain keywords related to AI and deep learning and the controversies connected to them (see the methodology section for more detail).

Since our corpus is bilingual, we analyzed our collections of articles in French and in English separately. In our French corpus, we had a total of 39 different topics. In the English one, we had a total of 55. Then, we regrouped similar topics in both languages under what we called meta-topics: labels that are sufficiently broad to encompasses several types of similar topics. There are six of them (see Appendix 3):

- Application/Use Cases of Automation: 31 topics (13 in French, 18 in English)
- Political Economy of AI: 27 topics (12 in French, 15 in English)

- Ethics and Social Debates: 10 topics (5 in each language)
- AI-Generated Stories: 1 topic (in English)
- Arts and Popular Culture: 14 topics (8 in French, 6 in English)
- Not Applicable/Not Related: 13 topics (2 in French, 11 in English)

These six meta-topics are as mutually exclusive as possible. However, given the multifaceted nature of AI controversies, on a few occasions certain topics appear in more than one meta-topic. In the rest of this section, we will explain and examine these meta-topics with a special focus on: (a) Application/Use Cases of Automation, (b) Political Economy of AI, and (c) Ethics and Social Debates.

The Application and Use Cases of Automation

Application and Use Cases of Automation is the largest meta-topic and most common or popular angle for journalists covering AI. This meta-topic includes 31 topics and encompasses all reports on AI that discuss the possible contexts and domains in which AI is, or could be, practically implemented. These include (see Appendix 4):

- healthcare
- communication and gadgets
- transport
- retail and robotization
- agriculture
- aerospatial
- smart cities and real estate
- banking and business intelligence
- tourism
- biotechnology
- justice
- public health (COVID-19)

One of the most uncontroversial use cases of AI in this list is healthcare. When a journalist chooses a technology angle to cover healthcare, it is generally to highlight how the application of a new practice or instrument, or in this case AI, can improve or augment existing practices. In this context, AI is generally represented as a tool that will enhance the expertise of a medical doctor or researcher. Due to its technicity–AI's capacity to

compute and compare large amounts of (audio, visual, or textual) data–AI promises to be an effective medical diagnostic tool (Guesgen 2018; Marin 2020). In legacy media, these AI-based innovations are represented as the future of medicine–a future in which more lives can be saved thanks to these new practices.

When such a life-saving technique is introduced, there is little to no debate to feed the coverage. "The most positive aspect of AI on which I write," an interlocutor said, "are all the questions that are linked to prevention in healthcare. . . . What I can see, and what appears to be very solid information, is that, more and more, algorithms will be capable of identifying tumours in the very early stages of development, well before very experienced human eyes." As the journalist suggests, these news reports on the possibilities of future medical practices are as uncontroversial as they come. When an object such as AI creates expectations in the medical field, it appears to be solving "real problems," as an interlocutor says, and presents an optimistic perspective on the future of medicine. Such deep learning techniques are thus represented as beneficial and uncontroversial,[46] even though, after consideration, they may be problematic (the rapid introduction of promising biomedical innovations could be disturbing ethical norms; see Alary and Gagné 2022; Besle and Vallier 2022; Lafontaine 2010; Schultz, Carof, and Boaventura 2022).

Notably, coverage of future possibilities in the medical field often compares AI to the limits of the human body, depicting a technology that can achieve tasks that were until now impossible for humans. For instance, describing how AI could eventually assist neuroscientists in diagnosing brain cancer, one article mentions "computer machine learning systems" with algorithms that "can find patterns in millions of images that might be missed by the human eye" (Guesgen 2018). By illustrating the future capabilities of AI through comparison to human ones, such rhetorical devices normalize the benefits of AI by situating it as an instrument so powerful that its benefits far outweigh ethical or social considerations. These interventions in public discourse shape AI as an object that should be deployed in applied contexts because it can achieve things that humans cannot–which may well be true since it may save lives, but such representations do not always address other contentious concerns (e.g., privacy, surveillance, lapsing ethical practices). In turn, evacuating these questions from public debate helps to render AI applications in the medical field as uncontroversial and teleological.

[46] To note, claims made in relation to the multiple benefits of AI for healthcare are also subject to hyperbole and exaggeration (Nagendran et al. 2020).

As discussed in the previous section, another topic included in this list is communication and gadgets, which encompasses the cyclic coverage of new devices (e.g., phones, tablets, computers, graphics cards, video game consoles) and the commercial, and at times legal, war between big tech corporations: Google, Amazon, Facebook, Apple, Microsoft, and others (Codère 2015; Benessaieh 2017; Mudhar 2017). Articles such as "Why It's No Longer Strange to Talk to Your Home Appliances" (Nowak 2017) or "Is It Time to Buy a Smart Speaker for Your Home?" (Wicks 2019) are geared towards "early adopters:" segments of the audience who consume tech journalism to be informed about upcoming trends in the sector. In the devices featured in these articles, AI is mundanely deployed for multiple purposes: in video games, AI is used to create the nonplayable characters that human players interact with; in GPUs, AI enhances the processing power of real-time video; in smart home devices, AI is used to recognize speech and automate domestic environments.

Routinely introduced as technological innovations, these applications of AI are rarely depicted as controversial, with the exception of how some, such as personal assistants and facial recognition technology (FRT), mine personal information from users. "People tend to . . . you tend to hear the negatives a lot more with facial recognition but, I mean, people use it every day to unlock their Apple phone, and that's pretty convenient." It is convenient, but research also shows that FRT can lead to privacy infringements since it entails a multinational corporation storing user information on its servers (Stark 2019). This convenience not only normalizes the use of extractive technologies in everyday life, it also softens public debate over its use by the government or other public agencies. As another interlocutor suggests,

> I think [covering bias in AI] has been a struggle, especially where it's been stuff that doesn't affect people as broadly. . . . I'm thinking of like facial recognition, for example, right, and how a lot of people say that now that iPhones have this, it's really kind of normalizing facial recognition. It's a slippery slope, et cetera. I think [for these debates,] it's harder to get into some of the nuances [and] it hasn't been well represented. Sort of: why should facial recognition on an iPhone be good, but facial recognition in a surveillance camera be bad? Like, I think that's just you start to get the sort of levels of thinking that I don't think has been portrayed well.

As the interlocutor illustrates, the technology is not in itself good or bad. But its uses are contextual, and such considerations help to ground debates on the uses and applications

of automation. If not, controversies around the deployment of AI in consumer goods could be pushed aside in favour of other angles: the device's performance, conflicts between tech giants, or other personable, feature-like, stories, such as "Three Women Are the Wits behind Google Assistant's Personality" (Chayes 2018).

As our interlocutor points out, controversies are not only about AI, but about the contexts in which deep learning techniques are designed and deployed. Of course, some coverage within AI Application and Use Cases of Automation is more controversial than "healthcare" and "communication and gadgets." For instance, debates about the automation of transport, especially self-driving cars, have been particularly salient in Canadian legacy media. These will be examined in the next subsections.

The Political Economy of AI

Political economy is the study of how political actors, institutions, and objects shape, and are shaped by, economic ones (Birch 2013; McNally 1988; Polanyi [1944] 1967; Schwarz and Nordmann 2011; Thompson [1972] 2022). It brings into focus the relationships between the state, the market, and society. Here, we turn to the political economy of AI, which leads us to investigate the power dynamics that shape what AI promoters have called, on the government of Canada's website and elsewhere, "the fourth industrial revolution" (Walker and Alonso 2016). In turn, analyzing the political economy of AI also enables us to critically document the formation of networks of actors and organizations that lobby the state to create favourable and stable conditions for local research on AI and the creation of economic (and financial) opportunities for stakeholders.

We included in the Political Economy of AI meta-topic all topics that relate to business, governance, public and private funding, economics, and the effects of AI on Canadian industries. In total, this meta-topic includes 26 topics, in French and English (see Appendix 5):

- finance/banking/venture capital
- international commerce and relations
- robotization of labour power/the future of work
- federal investments and superclusters
- funding and research
- municipal development (in both Montréal and Toronto)
- multinationals, start-ups, and incubators

Over the last decade, as with nanotechnologies over two decades ago (Colleret and Khelfaoui 2020), AI has been so hyped and its economic projections so positive, both in Canadian legacy media and in public discourse, that an "ecosystem" has been instituted to implement AI in as many sectors as possible–what AI promoters refer to as the "fourth industrial revolution." As previously mentioned by an interlocutor, there is an "*alignment*" of academic, political, and industrial actors, institutions, and organizations that work together to make AI into a successful technoscientific project (Etzioni 1968; Etzkowitz 2003; Etzkowitz and Leydesdorff 2000; Roberge, Senneville, and Morin 2020).

There is an apparent consensus among most stakeholders prominently featured in the media that AI will live up to its hype in the near future.[47] Many expect AI to fulfill its technological promises–to profoundly transform the structures of our society and economy. "One thing that is obvious is that I don't hear anyone saying that AI will disappear," explains a journalist. "[AI] is not something that will disappear in the next few years, there is no question about that. And it has a transformational effect to it . . . when it works, it works. Let's put it simply, most people agree that when we see a functionality that works, it will be adopted very quickly."

Many actors, institutions, and organizations share the same expectations. Articles from the topics "finance/banking/venture capital," "federal investments and superclusters," and "funding and research" illustrate this consensus well. In 2017, when the Canadian government announced $400 million in venture capital to fund research on AI, it was seen as the "kind of leadership and foresight needed to ensure that our businesses and citizens will thrive in the 21st century," as cofounder of Element AI Jean-François Gagné put it (quoted in Silcoff 2017). Similar sentiments were conveyed in the media in 2018, especially in Québec newsrooms, when the federal government invested close to $1 billion in five superclusters, including one (opaquely) managed in Montréal by Scale AI, a consortium of private corporations, research centres, academic actors, and start-ups (Balingall 2018; Bellavance 2018a, 2018b; La Presse Canadienne 2018). All these articles framed the government's announcement through a citation from Navdeep Bains, then Canadian minister of innovation, science, and industry, who compared the idea of superclusters to Silicon Valley's conglomeration of big tech companies. The objective of the AI superclusters was clear: to make Canada into a global leader in AI, to create highly qualified local jobs, and to stimulate economic growth, according to Scale AI's website.

[47] Since the sale of Element AI, there is an argument to be made that the hype for AI as the engine of the "fourth industrial revolution" is deflating (see Roberge et al. 2022).

Public investment in the superclusters generally received good press. However, some op-eds were more critical. In an article entitled "Ottawa's 'superclusters' strategy looks headed for failure," columnist Konrad Yakabuski highlighted how $1 billion of funding in a $2 trillion national economy "was never going to generate transformational change" (2020). Given that the government does not have the metrics to evaluate the impact of such a federal investment, Yakabuski adds, there is little to no evidence to support Bains's promise–a horizon of expectations–that the creation of superclusters will create jobs and generate economic growth.

Furthermore, the implementation of AI in local industry has been challenging. Out of the five superclusters, the one managed by Scale AI is "by far the slowest," according to the Logic (Hemmadi 2021). Most notably in Québec, especially after the sale of Element AI (cf. Roberge et al. 2022), local newsrooms have recently paid somewhat more attention to how local businesses struggle with the implementation of AI (Benessaieh 2021b; Desrosiers 2020). But these more critical takes on the introduction of AI pale in comparison to those that laud them. Many continue to argue in legacy media and elsewhere that AI is increasingly integrated in concrete chains of production (Gagnon 2021), including the government of Québec which asserts that AI's uses and potential "no longer have to be proven."[48] However, statistics on this so-called integration into the economy tell another story. In 2022, five years after the allocation of governmental funding to Scale AI to realize its mandate, *La Presse* reported that only 6% of Québec-based businesses use AI applications (Décarie 2022b). Yet again, such facts do not hinder AI promoters in spreading the myth of the "fourth industrial revolution." In an article called "*Redynamiser l'écosystème de l'IA*" ("Revitalize the AI Ecosystem"), columnist Jean Philippe Décarie argues for broader adoption of AI across Québec industries. Décarie interprets the 6% figure as a missed opportunity or a lack of entrepreneurship from local businesses rather than an indication that deep learning techniques are challenging to implement. "Despite an ecosystem that is teeming with advanced technological solutions, created and developed at home [read: in Montréal, notably around Bengio's Mila]," Décarie states,

> this underutilized expertise must make itself better known in order to quickly promote better penetration of AI to ensure real optimization of its impact on the entire economy.

[48] Available here: https://www.quebec.ca/gouvernement/politiques-orientations/vitrine-numeriqc/strategie-integration-ia-administration-publique-2021-2026/enjeux-ethiques-ia-administration-publique

. . .

> We already know that since 2017, more than $1.5 billion in private funding has been achieved in the AI ecosystem, but Quebec must not slow down if it wants to maintain its competitive position. (2022b)

The lack of tangible results from Scale AI could have sparked public debate on the political economy of AI in Canada and Québec. But that has not come to pass. As STS scholar Harro van Lente reminds us, even "a project that fails now may promise to deliver something in the future and thus be granted support" (2012, 774).

Décarie's column was based on a favourable interview with Marie-Paule Jeansonne, CEO of the nonprofit organization Forum IA Québec, which was set up in 2020 by the Québec government to promote the adoption of AI in the province. In the article, Jeansonne reflects on the economic potential of AI and states that a new study will soon be released on the socioeconomic potential of AI in Québec in comparison to the rest of the world, thanks notably to the massive governmental investments via Scale AI. Just a few weeks later, a study commissioned by Forum IA Québec made its way into the news cycle. The report conducted by Tortoise Media–a subscription-based news organization–revealed that Québec ranked as a global leader in AI and gave a good grade to the local government's AI strategy (Benessaieh 2022).[49] In other words, a study commissioned by Forum IA Québec, itself set up by the Legault government to promote AI, suggests that the substantial investment made by federal and provincial governments "confirms that we have succeeded in building a very strong, world-class ecosystem" (Jeansonne in Benessaieh 2022).

Commissioned studies such as this one shape assumptions, expectations, and understandings of AI and contribute to stabilizing AI into an economic object that merits development and broader implementation. Importantly, when these studies are critically scrutinized, such reports contribute to public debates and legitimize interrogations of the current state of the political economy of AI in Canada. Scientometrics expert and Université du Québec à Trois-Rivières professor Mahdi Khelfaoui debunked the study in an op-ed and revealed that the indicators used to globally rank countries on AI development were either invalid or nonsensical. On the impact of governmental funding on the AI "ecosystem," Khelfaoui writes:

[49] The report is available here: https://www.tortoisemedia.com/intelligence/global-ai/.

> Let's take another indicator, that of "government strategy," for which Québec also receives a high score. It depends in part on public investments made in AI and we know that both provincial and federal governments have invested nearly $1.2 billion in it since 2017. However, making money flow in a given sector does not in any way mean that we act as a "strategist." Just think of the federal government's "Innovation Superclusters Initiative," one of which was dedicated to AI for an investment of $230 million over five years. According to a report published at the end of 2020 by the Office of the Parliamentary Budget Officer (PBO), the government has apparently not established any quantifiable indicator to measure the real effect of these "superclusters" on the increase in productivity of companies or on the creation of products or processes. The PBO concludes that it is unable to "say whether the innovation superclusters initiative does or will really accelerate innovation." We have seen better in terms of "strategy!" (2022)

Later, Khelfaoui suggests that these "pseudo-scientific" rankings serve the sole function of creating media buzz. While true, these reports also demonstrate to the public that the current state of the political economy of AI shows probative results. They serve as a means to silence debates over the close relationships between different levels of government, funding agencies, computer scientists who directly collaborate with influential multinational corporations, venture capitalists, start-ups (which are often founded by or otherwise closely involve members of the academic community), and nonprofit organizations created to maintain and grow the so-called AI ecosystem (see Colleret and Gingras 2022).

In fact, the existence of these networks is seldom questioned, even though they are solidified in part through governmental funding. As an interlocutor remarks, the activities and influence of these networks rarely makes the news:

> There is a supercluster that is managed by a company that is called Scale AI, based in Montreal. We don't talk about it as much because it is very p2p in the world of inter-business [supply chain], so it's pretty foggy, but it exists and they have a lot of money. . . . But what is newsworthy is not so much those who invest, but in what they invest. So often, we report on the final product, the business that receives funding. . . . We don't talk much to those who have a handle on the purse strings.

Journalistic interest in what AI could eventually achieve, rather than its current political economy in Canada, certainly contributes to constraining or hampering public debate. The existence, economic function, and/or symbolic power of Scale AI, which managed more than $280 million of governmental investment in 2020–21, was mentioned only sporadically across our 14 interviews.

By encouraging the adoption of AI in local industries, organizations such as Forum IA Québec or Scale AI work towards greater implementation of AI in local industries. Across both our corpora and the interviews, the impact of such a "fourth industrial revolution" on the local job market was another controversy that has been covered fairly well in Canadian legacy media. Just like the automation of the manufacturing and service industries (during which bank tellers, cashiers, and warehouse workers lost their jobs) in the last decades of the twentieth century, AI holds the promise to change capitalism and displace labour power, especially in recent years as the COVID-19 pandemic has normalized hybrid, remote, and asynchronous work. "The controversy, I guess, with respect to job loss, is always an ongoing thing," says one interlocutor,

> I saw on Facebook the other day, someone posted: "don't shop at that place, don't use the self checkout kiosks at supermarkets because you're robbing jobs from deserving people." This notion that technology can throw people out of work is a controversy for some people, but I don't personally tend to see it as a huge issue.

Many interlocutors identified the robotization of labour power and the future of jobs as an AI controversy, but not one that is very new or interesting. These debates–the replacement of labour by machines, have existed for a long time, and are not necessarily specific to the introduction of deep learning. However, what is new is the technicity of AI that has brought to the fore debates on the anthropomorphization of machines and technological sentience or transhumanism, which for tech enthusiasts are much more fascinating topics. "The microchip in the head, it comes from [Elon Musk]. We would effectively have access to a research engine directly connected to our brain," explains an interlocutor,

> What is interesting is to see Elon Musk's work after that. . . . I've done a column on it [on transhumanism], and it created a feeling of uneasiness [and a debate] between [two positions]: "he's crazy. This is a fantasy" and "Well if it's true, what do we do?" . . . We should be careful to take an interest in [these questions] because [AI] will

> transform human beings, the army . . . these are real subjects. The fact that [AI] will replace humans in a factory, that, I remain convinced that it is an outdated debate.

Job displacement is indeed a recurring political economic debate–and perhaps one that seems tired and not as edgy as transhumanism. And yet, as machines and robots have taken on human jobs, people have over the years had to find new ways to pay for rent, food, gas, and childcare. The perceived audience's interest in the local economy perhaps explains why the robotization of jobs appears more newsworthy than philosophical questions such as transhumanism.

Our corpus tends to support this. Transhumanism and related questions have not been sufficiently prominent in legacy media over the last decade to generate a topic. However, job displacement has, in both our French and English sets of articles. Several articles discuss the acceleration of a transition in the market where repetitive jobs will be replaced by robots, during which close to 3.5 million people would lose their jobs, according to the Conference Board of Canada (Bérubé 2022; see also Bérubé 2018, 2020; Jackson 2015; Li 2018). Other more nuanced approaches suggest that "robots won't steal your job but they could shrink your pay" (B. McKenna 2018); automation will create new jobs, according to this article, but the economic growth created by the labour power of these robots will not be reflected in workers' wages. "The concern should not be about the number of jobs, but whether those are jobs that can support a reasonable standard of living and what set of people can access them," argues David Autor, professor at Massachusetts Institute of Technology (quoted in Jackson 2015).

These articles tackle the controversy over the future of the workforce, notably through economic projections. But they all take the inevitability of job displacement for granted. The premise that AI *will* be the engine of the "fourth industrial revolution" that in turn *will generate* a transition in the job market is left unquestioned. For instance, an article on fully automated grocery stores in the United States describes how these stores stir debates about privacy and surveillance, but it leaves the narrative of technological progress undisputed:

> The arrival of artificial intelligence in the retail trade will disrupt the sector, especially in food distribution. In order to adapt, the sector will have to train its staff differently or hire human capital who master the art of managing data and understanding the

> analytical sciences. These positions will certainly be better paid. As for cashier positions, they have always been difficult to fill and manage. Talk to any supermarket manager. Illnesses, holidays, injuries, intransigent employees, in short, hiring staff for these positions is a nightmare. (Charlebois 2020)

While important, these controversial questions about the future of work are presented through a deterministic view of technological progress. The use of future tense suggests that the author has intimate knowledge about the future. However, as the COVID-19 pandemic showed, projections are nothing but educated guesses that may be modified at any point.

Ethics and Social Debates

This meta-topic encompasses the ethical and social debates that have been prominent in Canadian legacy media over the last decade. Ethics and Social Debates includes news reports and stories that could also be covered in the two previous meta-topics, Application and Use-Cases of Automation and Political Economy of AI. However, we grouped these topics under Ethical and Social Debates because they were particularly salient according to our interviews. In total, this meta-topic has five topics in the French corpus and five in the English one; they are (see Appendix 6):

- Social Media/Fake News/Disinformation
- Automated Weapons/Robots Taking Over the World
- Ethics
- Privacy/Surveillance
- Facial Recognition Technology/Clearview AI
- Self-Driving Cars
- Sidewalk Labs

In what follows, we will examine one topic in particular, “Ethics,” which serves as the foundation to discuss other controversies, like Clearview AI and Sidewalk Labs. But first, let’s begin with a controversy that greatly marked assumptions, expectations, and understandings of AI: the self-driving car.

Would you let a trolley follow its course and kill five victims, or would you rather make the decision to pull a lever that would divert the trolley to another track and kill one person? What is the right thing to do? This ethical dilemma, raised in 1967 by Philippa Foot and dubbed

"the trolley problem" a few years later in 1976 by Judith Jarvis Thomson, laid the foundation for debates on self-driving cars and has featured in broader debates about the ethical nature of AI (Stilgoe 2018).

There are two ways of applying the trolley dilemma to the self-driving cars controversy. The first is to cast the car as the trolley and, in practical terms, focus on training the algorithm driving the vehicle to make appropriate decisions in situations where an accident is inevitable. For instance, if a jogger jumps in front of the car, should the car veer into traffic and risk the life of the driver? Should it hit the jogger? Should it swerve to the left, towards the sidewalk or the bike lane, and risk the lives of other people? (Larousserie 2016; Nowak 2018). "These debates are still ongoing, but there is never any finality to them," one interlocutor comments. "And since there are no decisions taken yet and self-driving cars are still in development, I am under the impression that we bring these examples to the forefront of the discussion to say, 'we will have to think about these issues,' but it just stops there." What's more, these debates have cooled since 2016–18, when they took place in Canadian legacy media, perhaps because the overenthusiastic expectation that self-driving cars would be on the road by 2018 have been heavily recalibrated.[50]

The second approach is to consider the trolley dilemma as inherently human—meaning only humans can be subjected to the questions raised by the dilemma. In the grand scheme of things, AI promoters argue, 90% of all accidents could be avoided if only the driver was not human. "Too slow reflexes, moments of inattention or impaired faculties are cited in these reports as accident-prone factors. In this logic, removing the human being from behind the wheel to replace it with advanced technology could drastically reduce the number of accidents recorded," writes Florence Sara G. Ferraris (2017) in *Le Devoir*. In this controversy, the trope of an efficient technology replacing the fallible human is particularly salient. Not only would it save thousands of lives, but it could also generate economic growth in the country, according to a report that computes data from McKinsey & Company and the World Bank ($26 billion; Ferraris 2017; see also Rettino-Parazelli 2018a). This idea situates self-driving cars as "the future of mobility" (Samad 2016), reflecting a commitment to a vision of the future where autonomous vehicles will resolutely change

[50] During an interview in 2016, Elon Musk affirmed that self-driving cars would be on roads by 2018 (see https://youtu.be/wsixsRI-Sz4?t=1497; see Samad [2016] for a breakdown of projections by manufacturers). Since then, the self-driving car has "hit a wall" (Benessaieh 2021a).

transportation and, importantly, the presence of self-driving cars is unquestioned (Crête 2018; Rettino-Parazelli 2018c, 2018d; A. McKenna 2018).

This is not to say that the debate over self-driving cars in Canada is only taking place among promoters. Our corpus shows that tech reporting on the robotization of transport interrogates a number of institutional and organizational practices that have formed around cars and their infrastructures in society, such as individualized car insurance, public transit, drivers' legal responsibilities, the automobile industry in Canada, and transcontinental shipping (Chartrand 2018; Desjardins 2018; Rettino-Parazelli 2017; Trudel 2018b).

And yet, these questions are anchored in debates that take the imminent arrival of self-driving cars as fact. Representing the technological future with such a level of ineluctability is political because it contributes to the promotion of certain interests over others, as one journalist suggests:

> There's a lot of people in the tech industry who at least publicly believe that we are going to be able to solve self-driving cars. That self-driving cars [simply need more time, that] we just need more data, we just need more time on roads, more training. The sensors are getting better. We will be able to crack self-driving. And I think that's also a really interesting example of [how] a lot of people see that as hubris. And I think from the outside, it's really hard to know for sure, right, whether these are businesses and they want to, you know, they want to sell a vision and they want to sell a dream to potential customers and the shareholders. But I think there's a lot of people who still believe that [the vision of self-driving cars is] possible.

Current research activities in the auto industry rely on the shared belief that car manufacturers like Tesla will eventually realize this technological promise. In a tweet shared by user Taylor Ogan showing a video of Elon Musk with a group of unidentifiable individuals, the CEO of Tesla said, "But the overwhelming focus is solving self-driving so, yeah, mmhh, and that's essential, and that's really the difference between Tesla being worth a lot of money and being worth basically zero."[51] This financially vested perspective on the self-driving car project has not always been at the forefront of debate. AI promoters like Musk have a stake in the commercial success of their ventures. When legacy and

[51] The tweet is available here: https://bit.ly/3QGpell.

specialized newsrooms uncritically report these technological promises and describe them as if they were simply reality waiting to happen, it serves the promoters' financial interests. The interlocutor continues:

> I would say like self-driving cars, I don't think have been presented as critically in a lot of mainstream media as they could be. . . . It's easy to jump on the [story] like, a couple of big technology companies that push this type of [trope], like, imagine, your car can drive itself and then you kind of cloak it in, [and there are], sort of, less cars on the road, less accidents. It presents a very cheery picture that . . . that's the easy stuff to focus on.

For several interlocutors, self-driving cars was the most generously covered controversy in legacy Canadian media, especially shortly after big tech and automobile corporations began to share their technological visions of autonomous vehicles. The issue also epitomizes the qualities of AI controversies: they often feature in ethical and philosophical debates that lack consequences and are ignored by corporations (Jobin, Ienca, and Vayena 2019; Munn 2022; Scharenberg 2021); they do not question–to some extent they defend–the technological visions of AI promoters; and they take for granted the alignment of interests in the political economy of AI.

During interviews, some interlocutors mentioned that a point of consensus in the coverage of deep learning techniques in legacy media is that the "ethics" of AI is important. "I think that the ethics question was very well addressed, and sometimes perhaps over-addressed," an interlocutor noted. "That said, I think that it brought these [ethical] issues to the audience. There has been this popularization of [ethics] that has been done through the media for the public. It worked well." Another interlocutor agrees: "I think that the ethical risks were present [in the coverage of AI]. It is now something taken for granted that there is some ethical work to be done [in order to deploy AI], informed people now know that." The coverage of AI-related ethics issues was indeed rather informative, especially around 2018 when *La Déclaration de Montréal IA responsable* (the Montréal Declaration for Responsible AI) was first ratified. For instance, a journalist from *La Presse* interviewed ethicist Martin Gilbert, coordinator of the scientific committee for the declaration, who briefly explained the dangers of AI (e.g., the extractive power of big tech, the monopoly of GAFAM over online communication, job displacements) and the benefits of a declaration about responsible AI (Gagnon 2018).

To say the least, apart from informing the public about the "ethics" of AI, the benefits of such a declaration remain unclear. The Montréal Declaration relies on ten principles: well-being, privacy and intimacy, respect for autonomy, responsibility, democratic participation, equity, solidarity, diversity and inclusion, and prudence. These principles are points on a "moral compass," the declaration stipulates, that in practice results in toothless guidelines for corporations, research institutions, and governments to follow in the development and deployment of AI. The declaration and the values it promotes are certainly rallying–no one has issued a declaration for the promotion of irresponsible AI–but in the Canadian context, voluntary commitments to vague principles have obscured public debate on the utter lack of regulation of these powerful techniques, supposedly designed and deployed to "revolutionize" our society and economy (Roberge, Senneville, and Morin et al. 2020).

In legacy media, debate over the raison d'être of these toothless guidelines and the lack of regulatory frameworks has been poorly represented. Instead, the focus was on the declaration's ratification process and potential local impacts (Rettino-Parazelli 2018d; Valiante 2017). The media did report on ethical questions raised in the making of the declaration, which sparked an important dialogue among stakeholders and, to some extent, the population (e.g., the place of AI in individual, political, and social decision-making, the salience of AI, the concept of bias; Plamondon Emond 2018). Nonetheless, the two-year-long consultation process that led to ratification was conducted among friends–social scientists who adopt agonistic and critical postures towards AI were not part of the discussion (Roberge, Senneville, and Morin 2020). Ultimately, the declaration helped redefine discourse on the structural inequalities exacerbated by the complex distribution of power that underlies AI in the vague terms of a simplistic understanding of "ethics." Perhaps more importantly, the declaration sublimated the pressing need to form regulatory frameworks in Canada (such as the European Union's General Data Protection Regulation), and it was put in operation to stabilize the formation of networks among academia, the state, research institutions, start-ups, and multinational corporations[52] to create conditions for the rapid economic, political, and social adoption of AI across Canada.

The call for stronger regulation of AI did make its way into Canadian legacy media, but in the context of surveillance, privacy, and personal data extracted by multinational corporations.

[52] The declaration "nourished" the International Observatory on the Societal Impacts of AI and Digital Technology (OBVIA; Rettino-Parazelli 2018b). OBVIA is a research centre created by the provincial research funding agency Fonds de recherche du Québec. OBVIA's executive director Lyse Langlois, who has contributory expertise on ethics and industrial relations but only interactional expertise on the social issues of AI, has also signed the declaration.

Personal data is the foundation for the success of multiple AI applications, including facial (and other body parts) recognition technologies. Université de Montréal law professor Pierre Trudel wrote in *Le Devoir* that "Québec wants to be a leader in artificial intelligence; we would expect proactive policies governing the conditions under which we collect and use data. Rather, there is a disturbing lack of interest on the part of Québec authorities in a legal framework capable of providing real guarantees against abuses" (2018c; see also Boutilier 2020; Trudel 2017, 2018a, 2020a). As many interlocutors highlighted during our interviews, the extraction of personal data takes place without our explicit agreement:

> Devices are listening to us when they shouldn't. . . . The agreement with [multinational corporations is that] you buy a device [with a virtual assistant] that listens passively and does not send anything. That's the deal with them [the multinational corporations]. But we learned that . . . those devices, even though we did not trigger them, share our info. . . . That freaks people out.

This may freak people out, but until now the state has been lax about the unbridled commerce of these devices in Canada, opting not to pass legislation regulating how corporations collect private information from people who find themselves in the vicinity of a thing they own.

Buying connected devices and using them in our everyday lives has given multinational corporations free access to an inexhaustible supply of private information—a valuable resource that big tech capitalizes on—a situation that exacerbates the existing power inequalities between state and society as well as multinational corporations and users. "We are all [or almost all] obsessed with [new technologies] at first and then after a few years later, we realize the ethical issues," explains a journalist,

> So in short, it took us some time to think seriously about these issues. Then . . . the development of technology has been done in private companies . . . but the political, and the legislative power lags behind [them], in terms of [passing a] legal framework . . . to limit the scope of these new technologies in our lives.

By engineering an "ecosystem" in which collaborations between computer science research and capitalist interests could thrive, the state has fostered an economic climate in which big-tech companies self-regulate the collection of personal data according to

norms of accountability and responsibility, which has, in turn, left the citizenry without legal recourse against these extractive practices that are challenging to navigate (Pasquale 2015; O'Neil 2016; Zuboff 2019). But as an interlocutor insightfully remarked, one cause for this situation is that governmental regulations are often reactive to technological development and innovations.

Clearview AI/Facial Recognition Technology is one of those instances. Clearview AI is an American company that provided facial recognition tools to state agencies and private corporations; these tools were designed by scraping data from different social media platforms (without the consent of the users or the big tech companies). During an ongoing investigation by Canadian privacy regulators, Clearview AI voluntarily ceased all operations in Canada, including collaborations with the Royal Canadian Mounted Police (RCMP), close to twenty police services across the country, the Department of National Defence, and Via Rail among others (Boutilier, Gillis, and Allen 2020). Facial recognition can be marketed as a very efficient instrument or a surveillance tool, but the use of these technologies poses important and unmitigated risks for Canadian democracy. Usage of these surveillance technologies creates asymmetries of power between corporations and users and between the government and the population that are not yet fully grasped. "Most of the world just started to use these technologies," says one interlocutor, "and there aren't a lot of oversight mechanisms in place." In fact, for many years there was little to no public debate on the acceptable uses of this technology. What finally prompted public debate was the "secrecy of its usage in government," our interlocutor suggests. They continue:

> I would say that the privacy commissioner, the whole institution [an office in Ottawa that enforces federal privacy laws] is very ineffective. It's typical of a lot of these commissioner type roles that are ostensibly independent, but when they are appointed, they often respond to ministries that are in complete conflict of interests.

During the Clearview AI investigation, many tech reporters called for a stronger legal and judicial framework that could better address the uses of facial recognition in Canada (see Boutilier 2020; Gibson, Hadfield, and Bodkin 2021; Malboeuf 2020; Trudel 2020b). While engaged on these questions, the legislative process has been slow to follow through.

Another controversy that made the news was the Sidewalk Labs project in Toronto. A self-described "start-up" owned by Google (now Alphabet), Sidewalk Labs, according to

its website, strives to solve "real-world challenges" by bringing together "urbanists and technologists." In 2017, Sidewalk Labs won a competitive bid to be "Waterfront Toronto's innovation funding partner for a 12-acre former industrial site" by the harbourfront, which came with $1.25 billion in governmental funding (Rider 2018). Representatives from all levels of government were present for the announcement, including Justin Trudeau who said, "Eric [Schmidt, former CEO of Google and technical advisor at Alphabet until 2020] and I have been talking about collaborating on this for a few years now," as Josh O'Kane (2019) reported. According to the reporter, Trudeau quickly retracted this statement since it left the impression that the competitive bidding process was fixed in advance.

Sidewalk Labs promised to make Toronto a "world renowned innovation hub" by experimenting with and developing technological innovations that would "improve the quality of urban life" (Harris 2018). Google's child start-up committed to building a city of the future, with

> intersections that could be laced with sensors to recognize pedestrians with disabilities and extend crossing times. Buildings could be powered by artificial-intelligence software to heat and cool only when necessary, reducing energy costs across the community. Freight and waste could be transported underground, freeing up city streets. (O'Kane 2019)

This vision was met with skepticism, criticism, and questions about how Alphabet would use the data collected in its "smart-city," handed away by Canada's largest metropolis. Certainly, apart from becoming the owners of prime urban real estate, Alphabet would profit from any products created and based on information about citizens who would live on, or in proximity, to Sidewalk Labs' estate (O'Kane 2019). As senior research fellow at Monash University Jathan Sadowski argued, "Google isn't going to be creating these urban innovations for the public good or the common welfare. . . . They'll be doing things–as we should expect them to–that will benefit their own interests as a private company, as one of the most profitable, most wealthy companies in the world" (in Rider 2018). For two years, Sidewalk Labs worked towards making its Toronto real-estate a site for new forms of surveillance capitalism (Zuboff 2019).

In its marketing campaign, Sidewalk Labs made attempts to distance itself from Alphabet as well as Google's appetite for data and the general perception that Sidewalk Labs would

mobilize technologies to extract private information on Toronto's Quayside for profit. Sidewalk Labs went as far as to hire privacy consultant Ann Cavoukian, who is known for her "privacy by design" framework, a practice that proactively embeds privacy protections in the design of information technologies, network infrastructures, and business practices (see Cavoukian 2011). Cavoukian's recruitment as a privacy consultant granted legitimacy to the project and neutralized debates on data extraction. However, when Sidewalk Labs developed software in Illinois designed to map commuting patterns using people's phone data–an initiative that Google's start-up promised to bring to Toronto–debates on data ownership, privacy, and surveillance capitalism resurfaced (Chown Oved 2018; Wylie 2018a, 2018b).

In an effort to stabilize the controversy, Sidewalk Labs developed the concepts of "urban data," meaning aggregated and de-identified data collected on the Quayside, and the Civic Data Trust, an independent data trust that would manage urban data in the public interest. In a press release, Sidewalk Labs stated that "no one should own urban data–it should be made freely and publicly available" and that it "should be open to all . . . [after] a Responsible Data Impact Assessment [is] submitted to the Data Trust" (Harvey Dawson 2018). Echoing Cavoukian's framework, Sidewalk Labs' proposals would secure its access to data captured by sensors positioned in urban spaces. This proposal was met with public outcry and resulted in growing distrust among the population and resignations, including Cavoukian's. Civic discontent united under the banner of the #BlockSidewalk movement. Doug Ford's newly elected provincial government (which was less enthusiastic about Sidewalk Labs than the previous administration) forced a restructuring of the Waterfront agency (O'Kane 2022). On the legal front, the Canadian Civil Liberties Association filed a lawsuit against all three levels of government involved in the Sidewalk Labs project, claiming that it set a terrible precedent for the extraction of private data in Canadian cities (Canadian Press, 2019). These events fuelled the ongoing controversy, curtailing Sidewalk Labs' activities until early 2020 when the COVID-19 pandemic hit, during which Sidewalk Labs announced it was abandoning its smart city project in Toronto (O'Kane 2022).

Canada has no meaningful regulations for the development and deployment of AI. The Clearview AI and Sidewalk Labs controversies make clear that not only are public institutions unequipped to govern AI and its related stakeholders, the governments in power typically encourage the current political economy of AI and support a framework of self-regulation. In our corpus, this situation has been decried contextually, as both controversies above

illustrate, but not as a whole, except perhaps in Trudel's columns in *Le Devoir*, which repeatedly argue for the modernization of privacy rights legislature in Canada.

False Positives, Arts, and AI-Generated Content

In closing, we briefly describe three topics extracted from our computational analysis. The first brings together all false positives, i.e., topics unrelated to AI: French words in the English corpus (le, est, une, ce); a few topics on investment, insurance, and finance that formed around mentions of the iA Financial Group; and others that built on similar news formats that produce content unrelated to AI, like a particular column or a podcast (see Appendix 9). These topics have played little to no importance in our analysis, but they are worth mentioning given the considerable high level of noise in our topic modeling.

Another important meta-topic includes the many references to Arts and Culture (see Appendix 8): movies, documentaries, visual art, theatre, music, and so on. Many articles from this meta-topic discuss science fiction, but also how AI facilitates the exploration of new modes of artistic creation. These topics are important because they contribute to shaping assumptions, expectations, and understandings of AI, but they fall outside of the scope of our project.

The last meta-topic caught our attention. It contains only one topic: a selection of articles from the Toronto Star on the Québec Major Junior Hockey League (QMJHL) (see Appendix 7). This topic gathered articles automatically generated by an AI. And they all have the same format. The headline is always the game's score ("Rimouski Oceanic Defeat Shawinigan Cataractes 4-2;" "Québec Remparts Top Halifax Mooseheads 3-1"). No author is attributed to the article. The location is always the sports centre in which the game took place ("Centre Air Creebec, Val-D'Or, QC;" "Centre Gervais Auto, Shawinigan, QC") and is followed by an em dash (—) and the game's main highlights in two or three paragraphs. The article's content presents the main stats (if a player had more than one point) and, the course of the game after the first, second, and third periods.

The final paragraph of the article almost always begins with the words "stars of the game" in bold capital letters. This paragraph simply lists the three stars of the game and their team. At the end, each article has the following remark, in italics: "This article was automatically generated by the AI tool Wordsmith. Data was provided by the QMJHL via HockeyTech and

no human has reviewed this before publication. To provide feedback on this article email: communities@metroland.com." Most likely, it is this concluding paragraph that has provided the information for our topic modeling tool to generate this topic. The most prominent keywords associated with this topic are: metroland, publication, wordsmith, provided, reviewed, article, and automatically.

These QMJHL articles are generated with a proprietary natural language generation tool called Wordsmith, from the Chicago-based company Automated Insights, based on hockey statistics compiled by HockeyTech, a company incorporated in Florida. Wordsmith is an AI tool capable of automatically creating a narrative solely based on statistics–in other words, as the American corporation claims, it can "turn your data into clear natural language."[53]

These journalistic accounts are formulaic and dry, but they appear as if they had been written by a human professional. To our knowledge, apart from the Canadian Press agency, this is a first for legacy media in Canada, but the corporation that owns the Toronto Star, TorStar, did not publicize this initiative. It is worth noting that the *Toronto Star*–which has an English-speaking readership more inclined to follow hockey in Ontario instead of Québec–opted to use its AI tool for the QMJHL games rather than those of the Ontario Hockey League (OHL).

The automation of reporting has certainly raised eyebrows in the journalism community (Christin 2017; Lewis and Westlund 2015). But according to Patrick White, professor of journalism studies at Université du Québec à Montréal, AI will not replace journalists, except for perhaps 8–12% of them, according to his own estimation:

> AI can also save reporters a lot of time by transcribing audio and video interviews. AFP has a tool for that. The same is true for major reports on pollution or violence, which rely on vast databases. The machines can analyze complex data in no time at all.
>
> Afterwards, the journalist does his or her essential work of fact-checking, analyzing, contextualizing and gathering information. AI can hardly replace this. In this sense, humans must remain central to the entire journalistic process. (White 2020; see also St-Germain and White 2021)

[53] Automated Insights' website is http://automatedinsights.com. However, the certificate for the website's address has expired; the connection to this site is thus not secure.

One of our interlocutors agrees. With legacy media in crisis, news automation will help journalists better process information and be more efficient:

> Having myself worked in news agencies for several years, for eleven years . . . I told myself that news automation was going to catch up with us. The media crisis is permanent. So if we are able to have robots that write certain articles that can lead journalists to do only added-value material, like in-depth journalism, major interviews, investigative journalists, data journalism, solution journalism, doing major reports, then major issues, then long podcasts, then video documentaries.
>
> . . .
>
> The most negative side is the lack of transparency of these algorithms. That's clear. And there is the possibility of job losses because we saw all the same that at MSN UK, MSN Québec, last year, in 2020, all the editors and journalists were replaced by an artificial intelligence program. Of course, this kind of job loss scares a lot of people. It is also a reality.

In Canada, controversy over the introduction of AI as a tool of content creation in legacy media is emerging slowly, and follows other global media, such as the *Guardian* and the *New York Times* as well as press agencies across the globe, that are all experimenting with AI. Automating some journalistic practices could augment the quality of coverage (perhaps even of AI itself!), but it also raises important questions: What kind of AI is it? What kind of content should it create? Which databases should it have access to? What are the human infrastructures of expertise needed to develop and maintain such an emerging application? And what kind of political economy does such an application involve? Only stirring up controversy on the place of AI in journalistic practices, instead of quelling it, will give us the space to probe these questions together.

Part 05:
Conclusion

Earlier in the analytical framework, we introduced the concept of "tension" as an analytic device that enables us to better understand representations of AI in legacy media. This concept of tension helped us in three distinct ways by centering our attention on:

- the productive fault lines of qualitative and quantitative methods;
- the frictions in newsmaking practices and processes, located somewhere between journalistic expertise and the daily practices of newsmaking; and
- AI as an object of public debate–i.e., a source of academic, political, and social tensions that are covered by newsrooms across Canada.

In the concluding section of this report, we return to these three spaces of tension to reiterate our main arguments and findings.

At the Fault Lines of Qualitative and Quantitative Research

Interviews with professional journalists and reporters gave us rich insights into the state of tech journalism in Canada. Our interlocutors' situated awareness and discernment regarding contemporary journalism have certainly coloured our analysis of the means employed to cover an object as complex and elusive as AI and the many hurdles faced by tech journalists. The interviews provided contextualized information about the personal motivations and social dynamics of newsmaking, as experienced by each interlocutor, and provided material to better understand how and why legacy media represented AI controversies the way it did over the past decade.

However, no matter how insightful each interlocutor was, interviews were individual recollections and lacked the perspective that would otherwise enable us to draw a broader picture of the controversies that steered the trajectory of AI in the media. We thus turned to computational analysis. Entity recognition and topic modeling analysis are two inductive methods that give us an opportunity to (a) examine the prominence of a given term (i.e., actors, institutions, organizations) in the corpus; and (b) compile each article around a topic or a domain. These two methods enabled us to trace AI's trajectory. They gave us an indication as to which actors, institutions, and organizations were most cited or mentioned

across our corpus; and by reading the articles that were closer to the topics, they gave us a sense of which issues were debated in the media and which were not. For instance, named entity recognition gave us an indication that promoters made their way into AI coverage much more often than critical voices. As for topic modeling, it provided evidence that "AI ethics" was covered more than the alignment of interests among actors from academic, industrial, and political domains.

By locating our analysis at the fault lines of qualitative and quantitative approaches, we leverage the strengths of semi-structured interviews against the findings from our computational analysis and vice versa. Generally speaking, different methods helped answer different kinds of questions (qualitative: how and why; quantitative: who and which). As mentioned above, our computational analysis led us to identify the main elements, factors, and trends of AI-related controversies in Canada. As for the interviews, they helped explain newsmaking processes and provided an angle–a perspective from people with contributory expertise in how news is made–to better scrutinize the inductive findings from our computational analysis.

Friction in Newsmaking Processes

With very few exceptions, Canadian news organizations are in crisis. According to Winseck (2021), the available pool of advertising revenue has been relatively stable over the last decade, but Facebook and Google are now hogging most of these sources of income. Such a situation impacts the newsmaking process. Increasingly, news organizations deploy strategies to survive and grow online, including on social media. Some of these strategies involve developing creative ways to acquire funding, like making agreements with the corporations that control social media platforms–commitments whose financial terms are not disclosed. For example, Facebook pays news organizations to "showcase" links to articles (Saba 2021).

Such a rapidly changing environment is shaping the everyday work of journalists. All interlocutors stressed that their own perception of the audience's interests guides how they cover their beat. News desks rarely dictate articles or angles, but there is a tacit understanding in newsrooms that the content produced by reporters must be of interest and attract attention. Plus, given the media crisis, there is limited time and space allocated to tech coverage. Funding in news organizations is so limited (and increasingly so) that

resources made available to freelancers, journalists, and newsrooms must not be wasted on content that is too abstruse and unintelligible to the public. Generally speaking, tech is not covered for technology's stake, but for its (future) applications and uses or how it will impact the Canadian economy or society. Most coverage takes place in the business pages, where AI is discussed according to its potential economic and social impacts.

Since it is their beat, tech reporters generally develop an a priori interest in science and technology, which pushes them to learn about the objects they cover. In turn, this interest positions them as individuals who tend to value the benefits of technological development, which certainly influences ever so slightly the angle they take to cover tech news.

When journalists first introduced AI to their audience, between 2012 and 2017, the reporting was particularly generic given the complexity of deep learning and the time and space allotted to such coverage. During these years, reporters could only briefly introduce what AI was, and to do so, they often illustrated the technology in relation to what it could eventually accomplish. They represented the technological future of AI. In doing so, journalists contributed to shaping and inflating technological expectations. The coverage that quickly followed, presented the "wow factor of AI," as many interlocutors put it. This stressed its technological promises, and it contributed to conflating representations of the future of AI with its current realizations.

Of course, over time, as the hype cycle for AI developed and evolved, so did the reporters and the audience's understanding of these techniques. Later, in 2018–21, coverage increasingly included sporadic news reports on the technical failures or ethical glitches of AI. But even these more nuanced stories had little to no impact on the economistic discourse that AI implementations are inevitable or beneficial for the Canadian economy, shaping AI into an ineluctable and incontestable fruit of technological progress (cf. Roberge et al. 2022).

Covering AI is thus a challenging task. Journalists navigate the media crisis, their perceived audience's interest, newsroom culture with regards to tech reporting, the hype and news cycle, and their own positions as news specialists. Given these contingencies, to discuss an object that is as complex and elusive as AI, reporters have little to no choice but to rely on information from computer science experts. Just like the newsrooms and the workers that populate them, these experts are not neutral participants in the formation of public

discourse on AI. They are spokespeople for AI. They have vested interests in the success of their research. Understandably, when these experts are offered a chance to intervene in public discourse, they laud their technology through the modulation of expectations of what AI does and could eventually achieve. These interventions in legacy media also tend to shape AI as an object whose development and impact on society is seemingly ineluctable.

Close to twenty years ago, media scholar Anne-Marie Gingras wrote that we should "deconstruct the romantic image of the courageous journalist on a quest for facts" (2009, 3). The normative ideals of the esteemed journalist do not always fit well with the mundane realities of the job. The "fourth pillar of democracy" moniker is increasingly becoming a difficult burden to bear for freelancers and employed journalists who have fewer resources and less time and space to fulfill these aspirations. In this report, we built on Gingras's insights to analyze the coverage of AI. We framed representations of AI in legacy media as work generated through the tension between the democratic ideals that many journalists aspire to embody and the mundane practices and processes that structure newsmaking.

To locate our analysis within the friction of newsmaking processes means paying due respect to journalism's standards as well as appreciating how reporters negotiate, challenge, and leverage these standards to produce interesting content for a perceived audience. In this way, we conducted our analysis while taking into account changes in newsmaking, always keeping in mind the realistic possibilities of tech journalism during this unfolding media crisis.

The Elusive and Complex Object That Is AI: Stabilizing Controversies

Throughout this report we have repeatedly referred to AI as an elusive and complex object. To many experts in AI, the term "artificial intelligence" signifies a scientific research program that encompasses different computational techniques. To the interlocutors who participated in our project, AI is an innovation that could be implemented in different contexts. In the end, these multifaceted representations have contributed to making AI a broad technoscientific category that encompasses many different applications and uses, from self-driving cars to imagery analysis in healthcare to natural language processing. Generally speaking, in news reports, AI was an emerging and complex innovation that stems

from a long series of scientific controversies in statistics, cognitive science, and computer science, while its technical aspects remained elusive since there was no space or time to discuss them in depth.

We have made no attempt to stabilize AI as a simplified, unambiguous, and neatly defined object. The general objective of this research project is to analyze how Canadian legacy media has come to represent AI, to identify local AI controversies, and to examine how Canadians have developed, via legacy media, assumptions, expectations, and understandings of AI–what is known as the "social construction" of AI. Such an epistemological move afforded us the opportunity to critically probe AI discourse as conveyed in the media, to analyze newsmaking processes through which these representations are fabricated, and to scrutinize how different actors, institutions, and organizations intervene in these representations to stabilize what AI is and could do through the journalistic process of translation.

When a technoscientific object is as auspicious as AI is in legacy media, allusions to its (future) socioeconomic impacts, no matter how hyperbolic or vague, are often very convincing, especially if its technological future is framed as a certainty. Promises as to what an innovation will achieve are not neutral statements; when promoters evoke their expectations about scientific or technological progress, their intent is to convince. A promoter is invested in the success of their innovation, financial or otherwise. In such a context, science and technology become newsworthy not in and of themselves, but because they are construed as functional objects that will eventually accomplish particular objectives of economic growth and social progress, specifically geared to accomplish the apparently unachievable. In the case of AI, the promise of a technological future that appeared until then unattainable took many forms: detecting cancer better than the human eye, driving automobiles without any human input, or conjuring the next industrial revolution. However, these characterizations of AI's impacts on society, and science and technology's in general, tend to obscure the social practices and processes that underlie the development and deployment of any innovations. For instance, no matter how groundbreaking the steam engine was at the time, the industrial revolution of the nineteenth century in Great Britain would not have happened without a massive influx of resources violently extracted through slavery and colonialism. To cite an example closer to home, the techno-national project of hydroelectricity is a source of pride in Québec, but Hydro-Québec did not build this source of collective wealth in empty

spaces. To provide access to hydroelectricity, the province displaced Indigenous people (especially Cree and Innu) and destroyed flora and fauna ecosystems.

Similarly, a plethora of considerations may be ignored to foster a public discourse on AI that supports dominant or hyperbolic visions of what AI is achieving and could eventually accomplish, like deep learning being energy-intensive and relying on cheap labour (Casilli 2017; Johnson 2019). For instance, on its website, the Montréal-based transnational consulting agency Sama promotes the development of AI through "an ethical AI supply chain" for a long list of known multinational corporations. In May 2022, Global AI executive at Sama, Alex Shee, took the stage during the Time World International Congress on AI in Montréal to suggest that Sama was, in fact, lifting people out of poverty in Kenya. Sama's business model is based on hiring the most marginalized Kenyans–slum-dwellers–and paying them a marginally higher salary than what they would otherwise receive. However, at the time of his presentation, Shee forgot to mention that Sama and Facebook were both facing a lawsuit over alleged unsafe and unfair working conditions in Kenya (Njanja 2022). A report from *Time* states that "the testimonies of Sama employees [in Nairobi] reveal a workplace culture characterized by mental trauma, intimidation, and alleged suppression of the right to unionize" (Perrigo 2022). If these alleged illegal activities in Kenya turn out to be true, it is based on such a workplace culture that Sama sells "ethical AI" packages to multinational corporations in Canada and elsewhere.

From the industrial revolution to hydroelectricity and the manufacture of ethical AI, these examples show that science and technology are multifaceted; just like any other artifact, technoscientific objects have their own qualities, but they are also byproducts of a particular political economy and are integral to their sociocultural context. Canada offers a particular context for both coverage of and research on AI. Two of the most prominent computer scientists in the world reside and work in the country, and, due in part to them, the academic community in computer science is loud and vibrant in Montréal and Toronto. Such vibrancy finds an echo in the business sector. But the hype around AI in Canada does not solely result from the great ingenuity of Bengio or Hinton alone. Both public institutions as well as private organizations have constructed a political economy of AI that is structured to channel money to AI research and incentivize industries to adopt AI-based techniques (Roberge et al. 2019). Academic researchers receive funding from private corporations; professors working in publicly funded universities split their time between their publicly funded labs and

Google's or Facebook's; research centres now serve as conduits between academia and the industry.

The state plays a key role in making this tightly knitted network (Colleret and Gingras 2020, 2022; Etzioni 1986; Etzkowitz 2003; Etzkowitz and Leydesdorff 2000; Hoffman 2017). Across the country, the Pan-Canadian AI Strategy, set up in 2017, funds research and promotes the commercialization of AI. Different levels of government have created organizations, like Scale AI or Forum Québec IA, specifically to entice local industries to adopt deep learning techniques. In turn, these same researchers, professors, and industrialists occupy key positions of power within these para-public planning committees and organizations that channel public funding to AI. What's more, these same experts have created a language to discuss AI controversies under the nomenclature of ethics–ethical AI, responsible AI, AI for good, etc.–that short-circuits public debate on the pressing need to regulate the deployment of AI, the inequalities it exacerbates, and the balance of power between the state, the small number of multinational corporations that control AI instruments, and citizens.

The "AI ecosystem" is a well-oiled machine in Canada. The interests of heterogeneous actors, institutions, and organizations–from both the public and private sectors–are rarely this aligned in the development of a technology. And while the impacts of such a political economy of AI may appear beneficial for the Canadian economy, they are also fraught with controversies that, as this report shows, deserve to be interrogated.

There are a large number of AI controversies in Canada that made their way into the news cycle: the sale of Element AI to ServiceNow in 2020, social concerns about self-driving cars, the implementation of AI in local industries and the related job market, the making of a smart city by Sidewalk Labs, the use of facial recognition technologies by private organizations and public agencies and institutions (and often designed by foreign companies like Clearview AI), and debates on the ethical nature of AI. Other controversies were hardly or scarcely discussed in legacy media, such as the automated creation of journalistic content by local newspapers, the confusing amalgam of expected future realizations and current AI achievements, and the Canadian political economy of AI as discussed above. Each of these controversies, and the extent to which Canadian legacy media has covered and discussed them, contributed to shaping assumptions, expectations, and understandings of AI.

In this spirit, we conclude this report with five recommendations for tech journalism in Canada. To be reflexive and critical of AI does not mean to be against the development and deployment of AI. It is a way of thinking about the discourse on artificial intelligence. As we noted above, the normative ideals of journalism may be challenging to uphold. But it is these ideals, embedded in the practices of journalism, that help erect one of the last lines of defence against the mere promotion of unmitigated interests or against hyperbolic technological promises. Reflexive and critical technological journalism could shape assumptions, expectations, and understandings in two key ways. First, it would help us to question the underlying cultural, political, and social dynamics that make AI possible; it puts technology in context and examines the broader impact that science and technology may have on society and vice versa. Second, this kind of journalism would cultivate self-awareness.

After more than a year of qualitative and quantitative research into the coverage of AI in Canadian media, we thus present the following five recommendations. While acknowledging the inherent challenges of an era when resources for (tech) journalists are increasingly lacking, we propose these recommendations to encourage reflexive, critical, and investigative journalism in science and technology and pursue local stories on the controversies of artificial intelligence.

1. **Promote and invest in technology journalism.** Most AI coverage comes from business desks, but these are too often poorly equipped to investigate the multifaceted aspects of AI. The impact of science and technology on society cannot be completely mitigated by business. We invite newsrooms and journalists to be wary of naive economic framings of AI and investigate instead the externalities that are typically left out of business reporting: social exclusions, inequalities, and injustices created by AI.

2. **Avoid treating AI as a prophecy.** Tech-driven narrative statements are not ineluctable facts. Metaphors such as “the fourth industrial revolution” or mantras like “AI will change the world” repeatedly made their way into our interviews. But such narratives need to be supported by evidence. The expected realizations of AI in the future must be distinguished from their current accomplishments. Future applications and use-cases, even imminent ones, have yet to materialize.

3. **Follow the money.** A cliché but an apt one. Canadian legacy media has given little to no coverage of the unusual proportions of gargantuan governmental funding that goes into AI research. In turn, para-public organizations created to encourage the adoption of AI often distribute that funding away from public scrutiny. We urge the journalistic community to untangle the tightly knitted networks of academics, businesspeople, consulting firms, and politicians that purposefully work together to construct and maintain AI ecosystems in the country.

4. **Diversify your sources.** Computer scientists and their research institutions are overwhelmingly present in AI coverage in Canada. Critical voices are severely lacking. When researchers discuss their work in public, they may be meticulous, rigorous, and painstakingly smart, but they are not neutral. They are spokespeople; they are opinionated and situated. Unsurprisingly, computer scientists working on AI tend to promote its social and economic benefits. In the spirit of the website Women Also Know Stuff,[54] we recommend that newsrooms and journalists diversify their sources of information when it comes to AI coverage. As a next step in our project, we will create a database of social science researchers in Canada doing important work on AI and data studies across the country, in both French and English.

5. **Encourage journalistic collaboration between journalists and newsrooms and data teams.** Cooperation with different types of expertise helps to highlight the social and technical considerations of AI. Without one or the other, AI coverage is likely to be deterministic, inaccurate, naive, or simplistic. Additionally, critical computer and social science perspectives can support and foster a greater fluency in both the social and technical aspects of AI.

[54] See womenalsoknowstuff.com.

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