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Data Journalism and Misinformation

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Introduction

Journalism, news publishers and journalists are often perceived as having essential roles in society and for democracy. Journalists are assumed to provide verified knowledge daily about public affairs and current events (Carlson 2017). In many countries there is a freedom of speech and a freedom of the press, with journalists and news publishers having significant autonomy and professional routines for news production. Journalism maintains a position as one of the most influential knowledge-producing institutions in society, though its role clearly varies substantially around the world. In some countries, journalism is well-resourced and able to scrutinize those in power, whereas in others, the authorities exert a substantial degree of control and censorship.

News publishers engage in various epistemologies of journalism, involving the production of written news stories, live-blogging, broadcasting as well as turning to data to identify and report on important patterns and developments. This chapter focuses on the intersection of data journalism and misinformation, by discussing research into epistemic practices for finding and working with data as well as how data is used for making claims about events and public affairs. Data journalism, computer-assisted reporting and computational journalism are various conceptualizations used to track the quantitative turns in journalism over time (Coddington 2015). Behind these terms is an epistemology of the evidential forte of data-driven journalism, with journalists as "apostles of certainty" (Anderson 2018). Data journalism draws on fields such as information visualization, computer science, and statistics to convey news through the analysis and representation of quantitative, computer-processed data. Data journalism has continuously expanded around the world, and to the Global South (Mutsvairo, Bebawi & Borges-Rey 2019).

In traditional news journalism, journalists have often relied on established networks of sources that are mainly composed of known institutions and elites (Ettema, James & Glasser 1987). While journalists have often been content as long as they select and report the opinion of seemingly reliable sources (and in contrast to each other when needed), their claims to the truth sometimes go no further than assuring "he says" vs. "she says" among seemingly reliable sources. This is obviously incredibly problematic as it means journalists offer prominent exposure to presidents and prime ministers who repeatedly articulate false claims, whether misinformation or disinformation. Fortunately, there is not only one universal form of journalism but several genres and epistemologies of (digital) journalism (Ekström & Westlund 2019), taking a more distinct form in the case of, for example, live-blogging compared to traditional news journalism (Matheson & Wahl-Jorgensen 2020; Thorsen & Jackson 2018). Ekström and Westlund (2019b) write that "epistemology is the study of knowledge: what we know, how we know, and how knowledge is justified" (p.1.) , referring to the standards, norms

and methods that journalists use when deciding what information is reliable and truthful, and when it is not.

While data journalism has been envisioned to advance solid ways of knowledge in society, it is contingent on factors such as access to datasets, reliable and representative data and individuals (journalists) with the skills to understand and analyze the data (Cairo 2015). In the best case, data journalists can employ data to reveal and visualize complex phenomena in ways that advance journalism practice and spread important knowledge. In the worst, journalists and news publishers end up publishing data journalism that skews information and spreads misinformation.

Misinformation is produced and shared by a great number of actors (Napoli 2020; Quandt 2018; Tandoc, Lim, & Ling 2018), and is published and shared across digital platforms. This connects with alternative news media that situated themselves as a counter to established news publishers gaining ground (Boberg, Quandt, Schatto-Eckrodt, & Frischlich 2020; Figenschou & Ihlebæk 2019; Holt, Ustad Figenschou & Frischlich 2019). There are outright "fake news" producers that imitate some journalistic practices and the style of news content (Robertson & Mourão 2020) and use bots to fuel programmatic advertising revenues (Braun & Eklund 2019). Moreover, to political leaders and the public, "fake news" is also a label used to delegitimize others, including, but not limited to, the institutions of journalism (Egelhofer & Lecheler 2019). "Disinformation" refers to situations where actors deliberately, driven by political and/or economic interests, produce and distribute information intended to disinform for their own ends. "Misinformation" refers to information that is inaccurate and/or false, but where there is no intention to mislead. The category of misinformation extends to the public, authorities, academics and journalists who unintentionally produce and/or spread misleading, inaccurate or false information. Journalists obviously are expected to seek out and verify important claims with different reliable sources, but that does not mean they always succeed. Scholars have long since questioned whether journalists actually can achieve fundamental levels of "accuracy" (Compton & Benedetti 2010; Shapiro, Brin, Bédard-Brûlé & Mychajlowycz 2013).

The next section focuses on two main epistemological dimensions at the intersection of data journalism and misinformation. First, what and how do (data) journalists know what they know, in the context of their norms, practices and routines? Second, how are knowledge claims made in, and in relation to, data journalism materials? This chapter will draw on examples of data journalism and misinformation related to the COVID-19 pandemic.

The epistemology of data journalism amid challenges of misinformation

There is a significant body of literature in (digital) journalism studies focusing on the developments in data journalism over time as well as current practices, challenges, and outcomes (Appelgren, Lindén, & van Dalen 2019; Hermida & Young 2019; Lewis 2015). Data journalism is associated with computer science and statistics, involving the use of computers and software programs to process and analyze quantitative data to build new knowledge, and the publication of the results through information visualization. The term "data journalism" is used to capture the multiple and fluid forms of data-driven journalism (Fink and Anderson 2015; Hermida and Young 2019; Mutsvairo 2019).

In the best of worlds, data journalists and other social actors can employ data to examine, reveal and visualize complex phenomena in ways that advance journalism practice and offer important, accurate and verified knowledge. In the worst case scenario, journalists

and news publishers end up publishing data journalism that skews information and ends up misinforming the public (Coddington 2015; Lewis & Westlund 2015). Raw, objective and completely unbiased data is a fantasy rather than a reality. Even in countries where public authorities have ambitious intentions for collecting and compiling reliable datasets, analyses of such data can result in drawing inappropriate data visualizations and conclusions, resulting in readily available misinformation that can be shared by the public.

In the course of writing this chapter, the COVID-19 pandemic has changed society and life as we know it. Many nations enforced lockdown measures in an attempt to prevent the virus spreading, with unprecedented consequences for macroeconomics and climate, as well as daily life. COVID-19 has resulted in packed hospitals and depleted stocks of medical equipment, panic buying by citizens, armed demonstrations against lockdown measures and everyday acts of kindness such as coordinated live music performances across balconies. Napoli (2020) points out that amid COVID-19, a convergence is taking place between health misinformation and political misinformation.

COVID-19 has resulted in millions of news articles and news broadcasts by journalists. Then there have been the countless pictures, videos and observations by the public. There is a sort of mechanical objectivity in the nature of pictures (Carlson 2019a), showing the world "as it is". Nevertheless, photos of empty shelves in grocery stores can misinform, and even more so when it comes to the status of the supply chains. Data journalists can identify and report on the supply chains to grocery stores, such as from toilet paper factories, in order to debunk misinformation about perceived shortages. During such a pandemic, data journalists can play a significant role in gathering, analyzing and publishing data journalism of crucial importance, alongside other journalists, authorities, the public and various stakeholders. In the next two sections we explore two key aspects integral to the epistemology of data journalism, and problematize these in relation to misinformation and COVID-19.

What and how (data) journalists know what they know

Producing reliable information and knowledge through data journalism depends on a range of conditioning factors, including but not limited to: 1) access, 2) expertise, and 3) coordinating practices.

First, news publishers and journalists must have *access* to relevant and reliable datasets, which is not the case for several areas of inquiry, and varies in different countries (Lewis & Nashmi 2019; Porlezza & Splendore 2019a; 2019b). Journalists can also turn to international and accessible sources to extract data and reveal patterns in specific countries, for example by using satellite images and data to track a multitude of aspects relating to climate change. In relation to this, journalists have been developing online sourcing to include satellite images to detect and analyze activities relating to news events that may contrast with misleading official accounts (Seo 2020).

Second, news publishers and related social actors must have relevant *expertise* to process, analyze, interpret and present the data. Specifically, social actors must have fundamental or advanced knowledge in statistics, and handling statistics software, to process the data in appropriate ways (Coddington 2015; Lewis & Westlund 2015). In analyzing and interpreting datasets, they should be sensitive to the strengths and weaknesses in the data, and ideally be transparent about these. Data journalism may require expertise in how to develop algorithms to automatically collect large amounts of data from authorities and international organizations such as the World Health Organization and the United Nations, and from social

media platforms such as Twitter. There is the additional step of presenting the data to the public, often through data visualizations that may offer some interactivity (Young, Hermida & Fulda 2018).

Third, data journalism is a specialized expertise that not all journalists have, and thus *coordinating practices* can be critical for advancing and integrating tacit and explicit knowledge amongst members of the news organization (Westlund & Ekström 2019). Inside some news organizations, journalists collaborate with technologists towards shared goals, by building on each other's tacit and explicit knowledge (Hermida & Young 2019.; Lewis & Westlund 2015; Usher 2016). Some of the most well-known data journalism efforts, such as the Panama Papers, resulted from cross-cultural coordination among journalists who shared resources and efforts during the investigation. Data journalists may also have to coordinate their practices with actors outside of journalism, such as civic technologists (Cheruiyot, Baack & Ferrer-Conill 2019).

Now let's turn to what and how data journalists know what they know in the salient case of COVID-19. In their reporting, news publishers can follow updates and *access* data collected and assembled by entities such as the WHO, Johns Hopkins University, national governments etc. Data from the WHO about new cases, active cases, recovered cases, deaths, total cases, and so forth allows comparison across countries and over time. However, such comparisons depend on individual countries reporting accurately and regularly, let alone using the same methods to count the number of cases and fatalities. Despite many inconsistencies, such figures have become a feature of daily reporting. Take *The Guardian* as an example, and its daily "Coronavirus latest: at a glance" report. On April 6th 2020 it reported: "Italy registered 525 new coronavirus deaths on Sunday, the lowest daily rate since 19 March, while Spain recorded 674 deaths in the past 24 hours – the lowest daily death toll reported since 26 March. In France, 357 people died from COVID-19 in hospitals." Does *The Guardian*, and other news publishers producing similar news materials, inform or misinform when reporting this data? The reporting on figures and developments depends on the reliability of the databases. For each country to produce reliable and comparable data, there must be systematic procedures of reporting of diagnosed cases, of the number of patients in treatment, recoveries and deaths. There is good reason to assume the actual number of infected is far higher than the number of reported diagnosed cases, which depend on the scale of testing conducted in each country. Researchers reported that already in its early stages of spreading, the number of undiagnosed coronavirus cases was high (Li et al. 2020).

Journalists, authorities and publics are acting upon publicly accessible data, despite such data being problematic and seemingly unstandardized. How some countries track infections and deaths has changed over time. For example, at the end of April 2020, the UK government changed how it reported deaths related to COVID-19 to include fatalities outside hospitals. The result was news stories about the UK being the "worst-hit European country", outstripping Italy to have the highest number of coronavirus deaths in Europe (Campbell, Perraudin, Davis and Weaver 2020). Whether this was true is hard to ascertain, as Italy used a different method to count cases, and the actual figures in both countries may by higher due to missed cases or delays in reporting. Some countries report all deaths and not only COVID-19 related deaths, which results in a higher number. Other countries only report deaths as being caused by COVID-19 when there has been a confirmed test. Thus, official figures are open to manipulation and/or misrepresentation.

At the end of April 2020, as COVID-19 deaths were rising in the UK, the government added a new graph to its news briefing. The slide offered a comparison of global deaths per million

population, suggesting that the death rate in the UK was below Belgium, Italy and Spain (Doyle 2020). The visuals told a politically convenient story, even if the small print acknowledged differences in fatalities attributed to COVID-19. Politicians and authorities elsewhere have adopted similar approaches to shape the communication of COVID-19 data. Moreover, a shortage of testing kits has meant testing the dead has been a low priority (Dupree, Hauslohner, Dalton & Sun 2020). Not only are there problems with testing accuracy and availability of testing equipment, in some countries political leaders have questioned and/or seemingly downplayed the prevalence of the virus altogether.

The problems with accessing and reporting on reliable data for COVID-19 also extend to hospital beds, ventilators, masks and so forth. Alternative news media and citizens across the globe have published and shared materials for digital media, some with videos, discussing immediate shortages at grocery stores and hospitals. This has fueled fear, panic buying, hoarding, demonstrations and violence. Journalists, authorities and fact-checkers, as well as platform companies and citizens, play important roles in critically examining information and disinformation. Platform companies continuously moderate illegal content as well as misinformation (Gillespie 2018), and companies such as Facebook have ramped up these efforts during COVID-19.

Since institutions of journalism play an authoritative role in pursuing truthfulness and typically verifying information with different and reliable sources (Carlson 2017), professional fact-checkers have been working on debunking misinformation in most countries. However, fact-checkers in Austria, Germany, the UK and the US demonstrate substantially different approaches to transparency (Humprecht 2020), despite arguments about the need for transparent practices to gain trust. A study from Brazil found that people are not very receptive to debunking misinformation relating to new and unfamiliar diseases such as Zika compared to more familiar diseases such as yellow fever (Carey, Chi, Flynn, Nyhan & Zeitzoff 2020).

Journalists can, of course, interview and quote reliable sources discussing inventory, while data journalists would seek to access datasets and visualize developments in real time, as well as over time. Data journalists reporting about COVID-19 should have *expertise* in examining the strengths and weaknesses in such data, and do their best to report in transparent ways as the pandemic evolves. In the rush to cover all aspects of the coronavirus pandemic, many news outlets have reassigned reporters and editors with no background or expertise in science or health communication to the story. Aside from getting to grips with the terminology, methodologies, and research on viruses and pandemics, there is the additional challenge of interpreting data such as national fatalities. Given the limitations of daily death rates, a more reliable approach advocated by health experts is to compare the number of deaths with the expected numbers – the excess mortality. To their credit, some news publishers such as the BBC, *Economist*, *Financial Times*, and *New York Times* have been reporting excess mortality rates. Integrating information from different datasets can produce more reliable information and help debunk misinformation. *Expertise* as well as *coordinating practices* are important for achieving this.

Knowledge claims associated with data journalism

The allure of "big data" is that "it is unencumbered by the conventional thinking and inherent biases implicit in the theories of a specific field," (Mayer-Schönberger & Cukier 2013, 71). Despite critical questions (boyd & Crawford 2012), the news industry has been optimistic

about new possibilities for producing information with a strong knowledge claim as it aligns with journalism's assumed authoritative role in society to provide verified facts (Carlson 2017; Karlsson, Clerwall, & Nord 2017). In traditional news reporting, journalists articulate knowledge claims in their text and the language of news, in the way they present sources, the subject and themselves in text, talk and visual representations. Visuals create a feeling of "out-there-ness" (Montgomery 2007), resulting in a sort of mechanical objectivity associated with visuals and other forms of photojournalism. While there is a long history of data being visually represented, there has been renewed interest in the digital possibilities of data visualization and interactivity (Young, Hermida & Fulda 2018). Data visualizations present a visible argument for a story, and can be more persuasive than words and figures alone, as they "look and feel objective, precise, and, as a consequence, seductive and convincing," (Cairo 2015, p. 7). Yet choices of scale, form, colour and hue all shape the narrative and impact of a visualization (Munzner 2014).

In data journalism, descriptions of sources and epistemic truth claims made on the basis of the data are important. Following processes of computer-supported analyses of quantitative datasets, data journalists publish findings in the form of data visualizations, interactive representations and/or textual storytelling (possibly with accessible datasets). The data journalist extracts or simply shares findings from the dataset used for the visualizations and/or interactives, based on an epistemic process of producing knowledge about a phenomenon. Statistics are repeatedly presented and interpreted as objective "facts". However, any statistician knows data is not objective as its characteristics and shortcomings can lead to misinformation, or even be manipulated for disinformation. Gitelman (2013) problematizes this in discussions of raw data being an oxymoron. Ultimately it is important to ask if data journalism and the findings produced are presented as "facts", or with descriptions of biases and limitations of the data.

In terms of knowledge claims, there are multiple questions that data journalists can ask and provide answers to if they access and analyze reliable datasets. *The New York Times* addressed the fundamental question "How the virus got out", using data to show how hundreds of millions of people travelled out of Wuhan in China in the early days of the virus (Wu, Cai, Watkins & Glanz 2020). In the analysis, not only did the journalists use reported data about confirmed cases, but also rough estimates of total cases at the time provided by scholars from two US universities. They also accessed data from technology giant Baidu and telecom operators, reporting that a million citizens left Wuhan for other cities on January 1st 2020, with another seven million travelling in the following three weeks. The storytelling also combines data from the airline industry, reports on diagnosed cases from China, and diverse estimates by US scholars. The headline of the story authoritatively states, "How the virus go out". The overarching narrative is marked by robust knowledge claims on how Wuhan citizens travelled and spread the coronavirus across China and elsewhere in the world for multiple weeks before travel restrictions came into force. The piece concludes; "But by then, the virus had a secure foothold. It continued to spread locally throughout parts of Seattle, New York City and across the country, once again outpacing efforts to stop it." In the weeks that followed, the number of cases and deaths in the US grew exponentially. While data journalists were clear and transparent about sourcing, the only cues about uncertainty in the data and findings are phrases such as "estimates of". Ultimately, the news piece takes an authoritative voice, masking uncertainties about the data. Other sources have reported on COVID-19 emerging from elsewhere than China, with the UN launching a well-resourced investigation into its origin and spread in May 2020.

Concluding discussion

This chapter has focused on the epistemology and practice of data journalism. While there is significant potential for uncovering important and valuable information and news, making authoritative knowledge claims based on data is inexorably imperfect. Clearly, the notion of letting the data speak for itself (cf Benzecri 1973) is deeply flawed. Data is political, affecting what is collected, who is included and excluded, how it is processed and analyzed, let alone how it is presented. Access to, availability of, and restrictions on data shape the agenda for data journalists, with major implications for what the journalists know. Despite inherent shortcomings in the data itself, journalists are repeatedly making authoritative and definitive knowledge claims, whereas they could well be more transparent and include linguistic markers to indicate levels of certainty and uncertainty. It is challenging for the public to develop adequate media literacy, and more specifically, data literacy, to interrogate the work of data journalists. Discourse on media literacy tends to urge citizens to generally adopt a more critical lens, which may result in overly skeptical attitudes and approaches, and contribute to the ongoing decline in trust in the news media.

Using examples related to COVID-19, which unarguably is an important topic to report on, we have discussed how divergent standards for data across countries and over time have resulted in many data journalists and news publishers not only informing, but also misinforming, the public. Together with misinformation produced and shared by other actors readily and efficiently via social media, it has become increasingly difficult for the public to assess the evolution of the pandemic.

On February 15th 2020, World Health Organization (WHO) Director-General Tedros Adhanom Ghebreyesus warned "we're not just fighting an epidemic; we're fighting an infodemic. Fake news spreads faster and more easily than this virus, and is just as dangerous," (Tedros 2020). COVID-19 has highlighted an acute issue in data journalism, and more generally in the profession, as the complexity of the pandemic demands disciplinary expertise, resources and time. However, this comes at a time when news publishers are struggling to survive amid substantial losses in advertising revenues not compensated by gains in reader revenues. Addressing an issue on the magnitude of the pandemic necessitates so-called communal news work, an approach where diverse stakeholders in news as a public good do their part in contributing to its survival (Olsen, Pickard & Westlund 2020).

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