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The politics of data visualisation and policy making

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Abstract

Data visualisation has become ubiquitous in everyday life, from seeing images in news media to tracking individual health indicators. While the effects of data visualisation on society and people have been explored within a range of literature, there has been far less attention paid to the interconnectedness of data visualisation and policy making. In this special issue, we explore how data visualisation matters for policy priorities, processes and outcomes; how it reflects the demands and constraints posed by specific policy problems; and finally, what data visualisations reveal about broader political, social, and cultural shifts and the implications for policy.

Keywords

data visualisation, datafication, policy making

We are witnessing a proliferation of data visualisation, or ‘the presentation and representation of data to facilitate understanding’ (Kirk, 2016: 19). Although the practice of transforming quantitative data into visual outputs is not new, especially in scientific contexts (e.g. Tufte, 1983; Monmonier, 1996; Bucchi and Saracino, 2016), developments in technologies and analytical tools have changed how visualisation happens, as well as widened its application and relevance. From weather maps to personal health trackers to charts circulating in mass and social media, visualisation (and the turn towards quantification more broadly) has firmly embedded itself into everyday realms—whether we are aware of its presence or not (Lupton, 2016; Engebretsen and Kennedy, 2020).

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Much like other forms of communication, visualisations and the processes involved in making them can have political aspects. A growing area of multi-disciplinary scholarship has argued that, depending on their intended uses, data visualisations can frame issues in persuasive ways (Hullman and Diakopoulos, 2011; Pandey et al., 2014), give over-confident impressions of causality (Xiong et al., 2020), and prioritise some values such as positivist ideals of scientific objectivity and neutrality over others (Kennedy et al., 2016). These qualities potentially have consequences for the ways that audiences think about and act upon important issues including abortion (Hill, 2017), human rights (Rall and Margaret, 2016) and immigration (Allen, 2021), as well as how they behave online during key moments such as election campaigns (Amit-Danhi and Shifman, 2020). They also invite questions about how visualisations may contribute to misinformation, mis-representation or even exclusion altogether as they introduce sometimes-opaque choices about how to manage increasingly complex datasets. Meanwhile, as demonstrated by recent research into the challenges and opportunities afforded by Big Data more generally (e.g. Mayer-Schönberger and Cukier, 2013; van Dijck, 2014), such concerns also apply to identifying, collecting, organising and formatting the underlying datasets that precede their visualisation. Therefore, attending to questions of power and control throughout the entire lifecycle of data is central to a fuller understanding of visualisation politics (Allen, 2020; Taylor, 2016).

Despite these valuable developments in understanding how laypeople encounter and engage with visualisations, much less work has applied a similarly critical lens to the uses of visualisation in policy making domains. One important exception argues that visualisations of countries' rankings on various global metrics can serve as 'alignment devices' (Bandola-Gill et al., 2021) that draw policymakers' attention around specific issues. Even so, this gap is surprising, given the growth of attention—and resources—directed towards visualisation for and by policy audiences, often with the express goal of influencing decisions. Fortunately, we can learn much from adjacent fields including public administration or evidence and policy making studies, which have extensively shown how policy domains display their own logics of categorisation and knowledge production. For example, concepts such as 'evidence-based policy' and 'knowledge brokerage' capture how information—often comprising quantitative datasets—matters for decision-making (Boswell and Smith, 2017; Srivinasan et al., 2017).

This special issue aims to extend what we know about data visualisation to policy making. Specifically, we address three key questions. How does data visualisation matter for policy priorities, processes and outcomes? How does it reflect the demands and constraints posted by specific policy problems? And what does its usage reveal about broader political, social and cultural shifts happening both on- and off-line that also have implications for policy? Our shared focus on visualisation grew out of a Knowledge Frontiers Symposium jointly hosted by the British Academy, the Australian Academy of the Humanities (AAH), and The Royal Society Te Aparangi in November 2019. Reflecting on the symposium's theme of 'the future', we recognised that information is central to the ways that humans and governments alike imagine, anticipate and plan for uncertain futures (Amoore and Piotukh, 2016). Data and data visualisation prominently feature in these processes as they play out in our respective fields. Kathryn Nash, coming from a career in diplomacy, is interested in the ways that academic evidence broadly impacts policy formation in international relations. Verity Trott focuses on the ways that data feature within digital feminist activism and automated cultures. William Allen examines the causes and consequences of engaging with economic and political data about migration, particularly among governments, media and voters.

By joining forces in this endeavour, we wanted to include multiple perspectives so that we could explore deeper questions about datafication and the consequences of data and data visualisation (and

their fetishization) for communities around the world. Hearteningly, the response to our call for papers generated broad interest across career stages, geographic locations and disciplinary backgrounds of which we were conscious as we curated this special issue. We wanted to feature contributions that critically interrogate data visualisation as well as demonstrate its use in conveying messages to and among policymakers. As such, this collection aims to connect academic scholarship with the constraints—and needs—of visualisation practice and real-world policy.

To contextualise the pieces in this collection, we cover three main themes in this introductory essay. First, we outline the scope of data visualisation in policy domains to identify what and who is missing from current discussions. Second, we conceptualise data visualisations as brokered outputs located in complex networks that involve states, policymakers, and (governed) populations. Third, we consider the outcomes arising from using data visualisation in policy fields, the ethical consequences of doing so, and alternative futures of visualisation done differently.

Data visualisation in policy making: what is it, and how does it matter?

One of the key challenges many of the contributions within this special issue grapple with is a definitional problem: what counts as data visualisation particularly within policy making environments? This challenge is not unique to the body of work presented here but remains an undercurrent in much of the scholarship on data visualisation in general. Data visualisation has often been associated with numeric data, operating as an intermediary between raw data and information by transposing data through a process of visual encoding (Engebretsen and Kennedy, 2020). Data visualisation has been made distinct from information visualisation in that it ‘has data in its heart’ (Kennedy et al., 2016, 309) while information visualisation has conventionally been seen as more artistic and persuasive, used for visual storytelling or persuasive purposes with illustrations as opposed to more ‘objective’ data. These conventional definitions stem from positivist approaches to epistemology and have very real consequences in perpetuating what is considered to be data, what is made knowable, and what is valued at a policy level.

One aspect of this debate is how to visualise lived experiences and whether to understand lived experiences as data points or individual stories. Fileborn and Trott (2022) engage with this debate through the topic of street harassment. While it may be possible to quantify the instances of street harassment, this data will not capture the experience of street harassment or its impact on women’s safety. There is also quantifiable data available on provisions relating to women in peace agreements (see Political Settlements Research Programme, 2019; Bell and McNicholl 2019). This information provides an important metric of how women are included in peace agreements. However, it would not capture the full picture. It may, for example, be necessary to hear from mediators engaged in the peace process to understand the extent to which women’s representative groups are being consulted or if women participating in a peace process are tokenised.

Beyond understanding what is knowable and valued in data visualisations, it is also important to understand what exactly is captured. Gomis (2022) explores the use of migration maps by policymakers and the media to show displacement and migration routes, typically depicting the movement of displaced populations in conflict-affected countries coming to Europe. What maps may not show is the direction of displaced populations to neighbouring states or the conditions that drove people to flee from conflicts. Yet these visualisations contribute to a public narrative and policy decisions on European immigration policies.

The proliferation of data visualisations in relation to the COVID-19 pandemic, such as the ‘flatten the curve’ line chart, has also brought increased attention to the role of visualisation in communicating important health information to the public and how they are used to evidence and

support public health decisions. Helen Kennedy (2020) argues that the language of data visualisation has become commonplace amidst the pandemic but emphasises the ideological work that data visualisations do. As such, it remains important to critically view data practices as contested sites in which politics is undertaken. While much can be said about the reception of these data visualisations, the data literacies of the public and the role these visualisations played in the communication of key health information, what is particularly interesting is the negotiation of relationships and data practices within governments, and between policymakers and external actors.

These examples invite questions about why and how visualisations are made for policymakers to help them determine policy, as well as how they are used by policymakers to communicate information or policy decisions. In an era of datafication, governments and policymakers around the world have expressed great interest in the potential of big data for driving decision-making in many policy areas. This has coincided with and informed trends toward automated decision-making. Security and policing, commerce, health care, criminal justice, refugee integration, social services and further: automated systems are increasingly being developed and relied upon to help inform decision-making. The role of visualisation within this datafied and technologised approach to decision-making is crucial for making sense of big data. Visualisation plays a crucial intermediary role in the collection of big data; the access, streamlining and curation of big data through digital dashboards; and the presentation of big data for both policymakers and citizen audiences in polished visualisations and infographics.

Data visualisation is one of the most efficient means we have for processing, interpreting and communicating results from large and complex datasets. In many cases, visualisation is typically used during post-processing by policymakers (Kohlammer, Nazemi, Ruppert, Burkhardt, 2012). Kohlammer et al. (2012) provide an overview of the role of visualisation within policy modelling, suggesting different forms and visualisation techniques are required at different stages and for different purposes. These forms include information design, information visualisation and semantics visualisation. While this analysis and modelling can be useful for understanding the different requirements of working with data visualisation at different stages of policy making and by different actors involved in policy making processes, it highlights the complexity of the 'ecosystems' (Lanza, 2021) involved in the creation, generation, distribution and use of data visualisation within the policy sector. It also makes clear the definitional struggles of conceptualising what constitutes data visualisation: whether it comes down to practices, purposes, design or data. We return to this point later.

Several scholars have examined the potential for visualisation to enable effective collaborations in the policy making process. In their work on visual decision support and policy analysis, Ruppert et al. (2015: p. 322) propose a science-policy interface that is realised through the use of information visualisation. They argue that visualisation plays a key role in communicating expertise from external actors, such as scientists, to policymakers and politicians. Moreover, visualisation techniques can cultivate and enhance greater collaboration among these actors. They propose visualisation techniques and analytics as ways to bridge knowledge gaps between stakeholders and enable a wide array of actors to participate in the policy making process despite differences in expertise and technical competency (Ruppert et al., 2015: p. 322). Other studies suggest using data visualisation enhances comprehension while offering compelling tools to engage both the public and policymakers (Isett and Hicks, 2018: p. 479–80). Some of the benefits of data visualisation include reducing knowledge gaps particularly around quantitative data, facilitating users to digest large amounts of data, and being able to organise data in ways that show relationships or patterns (Gatto, 2015: p. 5). There are also arguments that data visualisation allows for faster analysis while facilitating evidence-based decision-making (Ibid: p. 7–8).

However, these values and outcomes of data visualisations are not uncontested. Interestingly, [Lee et al. \(2021\)](#) advance different conclusions to [Ruppert et al.](#) in their recent analysis of the use of data visualisation by COVID-19 ‘skeptics’. [Lee et al. \(2021\)](#) found that anti-establishment scientific skeptics deployed data visualisations along with the same data-driven decision-making rhetoric used by experts to advocate for radical policy changes in a bid to persuade the public that the government response to the pandemic was excessive. While [Ruppert et al. \(2015\)](#) argue visualisation can work to ‘bridge’ knowledge gaps, [Lee et al. \(2021: p. 1\)](#) found that visualisations could obscure these gaps. What is more, the deployment of COVID-19 related data visualisations may reflect ‘a deeper sociopolitical rift regarding the place of science in public life’.

[Lee et al. \(2021\)](#) discuss the use of what they call ‘counter-visualisations’, in which anti-maskers and scientific skeptics engage deeply with public datasets and draw on orthodox visualisation tactics to promote different conclusions to that of scientific experts. [Lee et al. \(2021\)](#) identify the posturing by these COVID-19 skeptics to ‘follow the data’, a claim we see reflected in contemporary conspiracy rhetoric such as QAnon, in which followers were asked to just ‘do your own research’ to determine the real ‘truth about Q and the conspiracies Q promoted’ ([Amarasingam and Argentino, 2020](#)). Concerningly, the phenomenon of counter-visualisation [Lee et al. \(2021\)](#) discuss challenges claims about the need for data and media literacy to combat misinformation. Instead, such anti-mask groups actually demonstrate sophisticated data literacy practices, and that this literacy is a means of ‘consolidating and promulgating views that fly in the face of scientific orthodoxy’.

While this is indeed concerning, it raises epistemological concerns about the reliance on orthodox data practices including visualisation techniques – concerns that feminist scholars and activists have raised for decades as they challenge positivist epistemological approaches to policy making ([Haraway, 1988](#); [Kennedy and Hill, 2016](#)).

Visualisations as brokered policy outputs

Much of the work in this special issue begins to untangle some of the complex ecosystems surrounding the generation of data visualisation at different levels in policy making processes. The cultures and networks from which data visualisations emerge are important sites for us to interrogate because they can shed light on factors that influence the transposition of data into visualisations and the values (un)intentionally embedded throughout the production process. However, recent research interrogates the different relationships that are emerging within this context, as well as the contemporary cultures that surround the production of data visualisation in policy domains.

For example, [Lanza \(2021\)](#) sheds light on the complexity of data-related ecosystems that develop around data-supported policy making. Through their work analysing the PoliVisu project, [Lanza \(2021\)](#) attempts to untangle the web of actors involved by demonstrating the multiplicity of factors that shape the decision-making process in the use of data in public policy making. Data innovation has led to new and more complex relationships between actors that affect decision-making processes. There are several stages and relationships [Lanza](#) identifies that are brokered within the production of data visualisation. These also highlight the power dynamics imbued within data-driven policy making processes.

To summarise [Lanza’s \(2021\)](#) discussion around data-related ecosystems: the first concern revolves around the data exchange process, in which data is transferred internally and externally amongst actors. The second is the relationship between actors with different expertise to manage, analyse and visualise data, and the increasing responsibility for technical and advanced storage, analysis and visualisation. The third stage in the exchange of knowledge, which is the process in which actors share their know-how and adopt a best practice approach to using data. This informs

and shapes how different forms of knowledge can be transmitted by local actors and who plays an important consultancy role. It is also the stage in which citizens can be linked back into the decision-making process.

Another key relationship Lanza identifies is the power dynamic that emerges between politicians and public servants, and how political guidelines can shape decision-making processes. These political guidelines can come in the form of legal frameworks to regulate the use of data for policy making, and as a result guide the practices available for public administrators. Internally, there is also the stage that involves the transmission of information and visualisation to facilitate interaction between actors within the sector. This can inform and enhance internal cooperation for policy making and the exchange of resources to facilitate the sharing of data, information and knowledge. Finally, Lanza identifies the stage in which public administrations must disclose the data and communicate results to the public and recipients of the policy decisions, which provides a valuable opportunity to bring in and strengthen the relationship with citizens by adopting open data policies and increasing transparency around policy making.

What Lanza's work here helps uncover are the complex ecosystems and range of relationships between different stakeholders and actors that shape the creation of data visualisation at different stages in the policy making process. Each of these relationships between different actors reveals increasing tensions, sites for contestation, and also an increasing requirement for data competency and literacy. Indeed, Lanza draws on Batini's (2018) conceptualisation of "datacy"; defined as a measurement of the decision makers' capability to collect different data, evaluate its quality, interrogate and use it to analyse reality and solve complex problems (as cited in [Lanza, 2021](#): p. 92).

Outcomes and consequences of using data visualization in policy making: towards alternative practices and futures?

Cultivating productive cultures of data literacy in policy making contexts is crucial not just to enable effective and informed data-driven policy making processes but also for the range of actors involved in the process. In their work developing feminist data visualisation, [D' Ignazio and Klein \(2016, 2020\)](#) provide a framework for interrogating the power of data and data visualisation. What their work emphasises is the importance of co-creation strategies and collaboration in the creation of data visualisation, as well as data practices more broadly. It is important to continue critiquing and interrogating the power flows among those collecting data, designing visualisations, advocacy groups, the wider community whom the policy will affect, external experts, and policymakers. The process of generating data visualisation and who produces and designs visualisations can play an important role in translating and encoding data in ways that influence the communication of particular results from the communities the data is collected from, and the policymakers who are to leverage the data in their decision-making processes.

Thus, there are several stages in the production of data visualisation where it remains important to collaborate with the communities and peoples who the data is about. One such stage is the importance in recognising that data do not necessarily belong to the policymakers or governing authority but is *borrowed* from the communities it is collected from. This acknowledges historical and political contexts in which marginalised communities are made hypervisible through over-surveillance. It also affords communities greater rights to self-determination by controlling how their data are used. The recognition of data ownership by communities also places a higher value on consent around the use of data and enables them to withdraw consent, a significant characteristic of ethical processes.

There are a number of ethical concerns we need to consider and reflect upon in the move toward data-driven policy making and the use of data visualisation in these processes. The first is regulatory and legal compliance, particularly attention to data collection processes and the challenges of enforcing geographical related data practice policies (such as the European General Data Protection Regulation [GDPR]). Protective regulatory efforts like the GDPR are a useful first step but they collide with, and are often in direct contradiction to, platform specific Terms of Service (ToS) where much data is harvested for a number of purposes. Further still is the awareness raised by a number of scholars about how digital platforms struggle to enforce their data privacy and ToS policies. The vast majority of data collected by Facebook, for example, violates Australia's Privacy Principles and yet there are no effective, or only very limited, initiatives to curb these practices. While the tools available for collecting digital data at scale now offer the promise of high-quality datasets, they nevertheless raise new concerns around privacy and particularly the potential reidentification of personal information—not just of individuals, but of businesses and other actors in ways that previous data sources were regulated and subject to more established and conventional non-disclosure and privacy constraints. Finally, transparency and explainability of data visualisation are also important elements that need attention. Explainability is essential for enhancing citizen and policymaker literacy in terms of interpreting and understanding data visualisation and the evidence being put forward. But it is also important to be transparent about the choices made in the production of a visualisation.

Outline of the contributions to the special issue

The special issue is structured around several overlapping themes that cut across policy domains and geographic cases. It begins with a timely piece examining data visualisation practices related to the *health* sector. Zhao and Ye (2022) analyse the geographic visualisation practices by the Shenzhen health administration during the COVID-19 pandemic. Falisse and McAteer (2022) also examine visualising policy responses during public health emergencies with special focus on the responses to COVID-19. We then turn broadly to *international politics* by looking at how cartographies are used to map migration (Gomis, 2022) and a theorisation of data visualisation as a form of soft power (Grincheva, 2022).

Shifting to focus on examples of *domestic politics*, the collection will explore the use of data visualisation within public debate in the lead up to the 2015 Israeli election and foregrounds concerns of misinformation (Amit-Danhi, 2022). Similar concerns are raised in an analysis of privacy-related bills and the gap between policy goals and implementation (McNealy et al., 2022).

The special issue concludes by focusing on *data challenges and future practices*. This section includes theorisation of how feminist epistemologies disrupt normative constructions of what constitutes data visualisation and a critique of the use of cartographies for mapping street harassment (Fileborn and Trott, 2022). The final contribution reflects on the relationship between data visualisation and 'seeing' places and spaces by considering how data visualisation can suggest new political imaginaries for understanding contemporary peace processes (Bell et al., 2022).

Despite their varied theoretical approaches and methods, each of these contributions deal with common challenges associated with epistemological issues surrounding data visualisation and their implications for diverse communities. Many of them also identify and highlight how some of the issues that emerge surrounding data visualisation practices are rooted in our past, while several speak to how they can help us imagine and shape our futures by re-considering what data can be visualised, the ethical implications of the uses of data, and the impact that data visualisation can have on many facets of life. In this introduction, we contextualise the relationship between data

visualisation and policy making to establish a shared foundation from which we can understand each of the contributions presented within this special issue and to highlight what is at stake for many communities and peoples in an era of datafication. We have also discussed several key entanglements that emerge as common within each of the papers and we attempt here to reconcile and draw further attention to some of these ongoing problems.

The field of data evidenced policy making is interdisciplinary, collaborative and dynamic. This special issue provides an array of perspectives that begin to foreground some of the complex entanglements and collaborative networks that emerge around the generation of data visualisation within policy making processes. Collectively, we aim to provide a more nuanced view on how data visualisation practices are adopted in a range of contexts and at a range of levels in the policy making process.

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