Journal of Visualization and Interaction

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A peer-reviewed publication in the Journal of Visualization and Interaction (JoVI).

This article is an extended version of a publication from the Information+ Conference 2023.

DOI: 10.54337/jovi.v1i1.8417 (the public peer reviews can also be found at this link)

- Submitted: 2024-04-18
- Accepted: 2025-12-25
- Published: 2026-01-15 (version 1)

Publisher

Aalborg University Open Publishing
Kroghstræde 1-3
9220 Aalborg Øst
DENMARK
ISSN: 2794-5502

Visualising in Spite of All the Data

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Abstract—The paper discusses contemporary developments in practice and theory of data visualisation. It examines dominant ideas and narratives about data and its visual representation from a media-cultural perspective. It introduces data exceptionalism and affirmative visualisation as two models that shape the visualisation practice in its data-positivist and representation-centric stance. The paper argues that these models overlook the evolving socio-technical landscape and fail to address critical questions of context, intention, and authorial responsibility. Instead, it proposes that the potential of data visualisation lies in its adaptability to changing conditions and suggests the need to rethink prevailing models that prioritise efficiency and legibility over (self-)reflection and context.

Index Terms—Data, Visualisation, Critique, Visualisation Theory, Image Theory, Media Theory

1 Introduction

Data is at the heart of the design of data visualisations. Over centuries – and, with a broadened historical view, even millennia – visualisation practices have developed different ways of viewing, negotiating, and ultimately representing data on mediated surfaces.[1] This was also the case at the beginning of this century, when humanity was confronted with exceptional social situations that were negotiated particularly via data images. For example, both the coronavirus pandemic [2] and the escalating climate crisis [3] were made accessible, discussable, and politicizable primarily through visualizations. Deep empirical measurements and scientific concepts are combined in formally flat visualisations, in these cases mostly line graphs. It seems that through data images, society gains access to complex problems that transcend individual human perception. This is their social responsibility: to find images where there are no words.

For all their promises of clarity and order, data visualisations have not resolved the challenges of both the pandemic and climate change. Despite daily updated dashboards, millions of people died from the coronavirus [4]. And despite decades of visualising climate data, for example in form of the well-known graphs of the IPCC report, measured monthly temperatures in 2024 were at their highest level yet [5]. As historians of science have argued, insights are rarely derived from the data images themselves, and often reflect the motives and framing of their authors [6]. Rather than being instruments of guidance, they visualise insecurity, fears and alienation – traces of context of such crises. In the end, they do not serve as mediators of truth but as witnesses of disorientation [7].

This suggests that new questions must be asked about data visualisations: Why do we have the data we find at hand? Whose data images are being shown, and what worldviews do they represent? What can they show and what do they obscure?

This brief assessment outlines the focus of this paper. Data visualisation, as the term suggests, exists in a tension between data structures and media representation. Describing this relationship is a long-standing concern in both theory and practice [8]. This is the recurring challenge in data visualisation design: to find appropriate ways of processing and synthesising data in context. And this challenge reveals the field's potential: not to stabilise a single representational model, but to adapt continuously, and to interrogate its own assumptions.

Yet contemporary visualisation discourse often neglects this potential. Instead of curiosity, rigid models of data and visualisation have emerged, which this paper terms data exceptionalism (DE) and affirmative visualisation (AV). At the core of these models is a representational dogma [9]: an object can be abstracted through data and rendered visibly in a way that reveals some truth about it. Context, intention, and authorship are pushed aside in favour of readability, performance, and aesthetic coherence. This paper critiques those models and offers alternatives.

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2 Critique of Data-Driven Design

The suggested critique of data-driven design discusses the status quo of data visualisation discourse. In particular, this includes an analysis of contemporary narratives and their premises. Within this framework, I'd like to take a step back and reconsider the conceptual foundation of the discipline. Both the understanding of data and that of visualisation are subject to problematic assumptions that I want to make visible and reflect upon.

2.1 Treating Data Exceptionally

Finding and visualising data is not a given. Even the idea of data as an object of analysis is not self-evident. It takes a concrete intention to develop an interest in data. Numerous, laborious, and sometimes brutal transformation processes are required to produce data: the established field of critical data studies has shown that looking at data has always been artificial [10]. This body of work, as well as related perspectives in science and technology studies (STS), has demonstrated that data is never neutral but is always situated within specific social, technical, and political contexts [11]. However, these fields also show that the concept of data is associated with a certain expectation that legitimises work with and on it. Data is generated and visualised because it is hoped that something can be gained from it.

What are the reasons for data? What happens when data becomes an end in itself? To address these questions, I introduce the concept of data exceptionalism (DE). Exceptionalism refers to the narrative of the exception and the extraordinary phenomenon. In relation to data, DE refers to the idea of the special presence of data, even to the point of data superiority. In it, data is understood as a central and natural phenomenon of an increasingly technologised society [12]. The notion of DE channels what critical data studies have long warned against: a tendency to mystify or fetishise data, treating it as a self-evident good or inevitable foundation for knowledge production. Data exceptionalists give data such relevance that the main focus of various

[1] When considered beyond a strictly quantitative framework of statistical and numerical data, early diagrammatic mappings can be read as forms of data visualization, as cataloged, for example, in Michael Benson's Cosmigraphics [1].

fields of knowledge and society is on enriching and synthesising data. Data is seen as such an exceptional phenomenon that any capacity, especially imaging capacity, is used to utilise an apparently changed data situation.

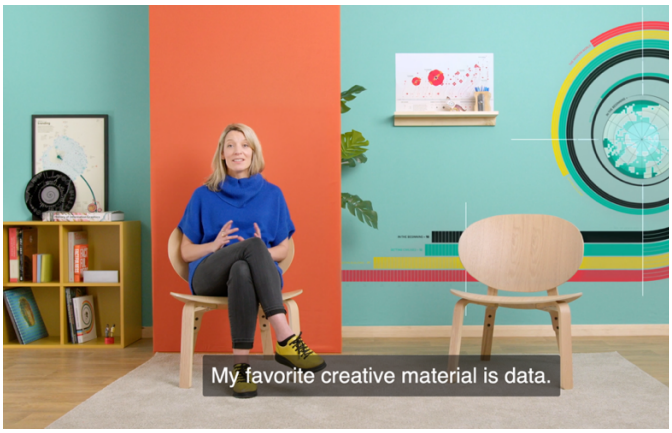

Fig. 1 Valentina D'Efilippo. 2021. "Information Design: Storytelling with Data in Illustrator".

The figure above illustrates how such narratives are used in design discourses. It shows a data designer describing their practice through the metaphor of data as material, which aligns with how data exceptionalism naturalises data as a neutral resource. However, as critical data studies have stressed, such metaphors can obscure the situated, political, and constructed nature of data. This is especially relevant for data designers, who must be aware that their visual and narrative practices do not merely shape form but also reproduce assumptions about data's origin, meaning, and legitimacy. In this sense, how we as data visualisers speak about our practice – how we frame data as part of the design process – matters deeply, because it can either reproduce or challenge the power structures embedded in data collection and representation. In essence, the notion of DE comprises three aspects: data narratives, data affinity, and data critique.

2.1.1 Data Narratives

First, DE is a phenomenon primarily characterised by narratives. The language with and around data also defines the practice with it. In the relevant vocabulary, data always comes in bulk. Data exceptionalists use rhetoric such as big data, data as material, data cleaning, data deluge, data exhaust, data flooding, data mining, or data smog not only to naturalise data phenomena but also to reflect the expectation that there is ultimately always something meaningful in working with data [13]. DE narratives formulate dreams and aspirations in dealing with data that can only be managed through (automated) calibration. The focus is less on questions of what data is, where it comes from, and why it is actually needed, and more on the hope of doing something useful and innovative with the resulting volumes of data.

2.1.2 Data Affinity

Second, it is an affinity for data that underpins this sense of entitlement. It favours a specific context: data as numerical and computational structures. Whether as empirical measurement, statistical observation, or digital file, data are seen as numbers [14]. Of course, data can exist in numerical form, but DE becomes visible when a concept of data is primarily or even exclusively characterised by numerical structures. This reduction of the concept of data to statistical and computational categories follows a long historical tradition [15]. The consequence of this affinity is that data is seen purely as a result of digital technology. Only technical solutions can be applied to a technical problem: data becomes a computer-centric concern. This attitude ignores humanity's non-numerical data cultures, in which qualitative data (e.g., textual, visual, or auditory) are also central, as Dietmar Offenhuber's research has shown [16].

2.1.3 Data Critique

The third aspect, data critique, reveals that even in discourses that position themselves critically toward data, the assumption of data exceptionalism persists. For some authors in critical data studies, the focus is less on the foundations of data itself and more on the socio-political consequences of digital technology in relation to data [17]. These are essential contributions to a more comprehensive understanding of digital infrastructures and parallel data-positivist narratives. However, in these instances, data itself is not critically examined, but assumed – folded into critiques of technology. The result is a kind of impact-driven critique (critical data impact studies), rather than a deeper engagement with the epistemological conditions of data as such.

This triad – data narratives, affinity, and critique – ultimately defines DE as a particular model for thinking about data. The central impulse of this model is instrumental: to find a solution with and in data at any cost. DE disguises this intention by appearing apolitical, technical, or inevitable. Although data is placed at the centre of this intention, the model avoids asking why data exists in the first place, whether it is given or taken [18]. DE concerns itself with the consequences of data, not with its premises. There is no fundamental engagement with the concept of data. For a critical understanding of data phenomena, however, the prefix "data" must generally be viewed with particular caution [19][20]. The aim should not be to conceptualise data as passive material, but to understand it as an actively projected and situated motif. This is especially true for data designers: data is not simply raw material for visualization. It brings with it conceptual, political, and thematic assumptions that must be handled with care.

The added value of data does not lie in its capacity for automated pattern recognition, but in the reflection it enables on the models it produces. Data is both a mirror and a producer of social reality [21]. It is not the cause of social asymmetries but rather an effect of certain epistemological decisions about what data should do. DE, in this sense, is less a theory than a working model – a logic of action rooted in positivist assumptions [22]. Questioning this model – asking why, for whom, and under what assumptions data is used – may yield more insight than analysing the data itself. According to this view, what is needed are not more algorithmic, computational, or digital solutions, but a return to the ideas, notions, and concepts that underpin data. If data are abstractions of reality, they can never fully represent it. As speculative projections, they produce their own forms of reality. The issue with data is not that it is structurally incomplete, but that we have come to treat it as structurally complete, as if it could stand in for reality itself [23].

To move beyond data exceptionalism, we must reframe data not as inevitable material to be optimised, but as a socially contingent artefact. For data designers, this entails cultivating reflexivity: questioning the assumptions baked into data sources, design choices, and communicative goals. Instead of rushing toward the cleanest visualisation, we might pause to ask what remains unseen, uncounted, or unvisualised. Only by foregrounding the why and for whom of data can we begin to visualise otherwise.

2.2 Wanting Images of Data

If data exceptionalism (DE) implies a compulsion to collect, process, and instrumentalise data, then the visual mediation of this data is an equally critical part of that dynamic. As data is not directly perceptible to the human eye, it must be made visible to become thinkable, speakable, and actionable. In this sense, data visualisation functions as a central epistemic operation: a way of making data addressable and, ultimately, governable. Image theory, especially recent non-representational perspectives, reminds us that such visuals are not neutral reflections of a pre-existing reality but are productive – they bring forth a way of seeing and knowing [24].

It is within this context that I introduce the concept of affirmative visualisation (AV): a specific attitude toward the data image that prioritises visualisation as an inevitable and unquestioned endpoint of data practice. AV is both a social and aesthetic formation, it frames the production of data images as a normative, often desirable, process and understands visualisation primarily in terms of success, optimisation, clarity, and impact. AV, as I define it, shifts focus inward, toward solving problems internal to the image (legibility, graphical coherence, form) and away from critical reflection on the

sociotechnical and political processes that make the data and the image possible in the first place [25].

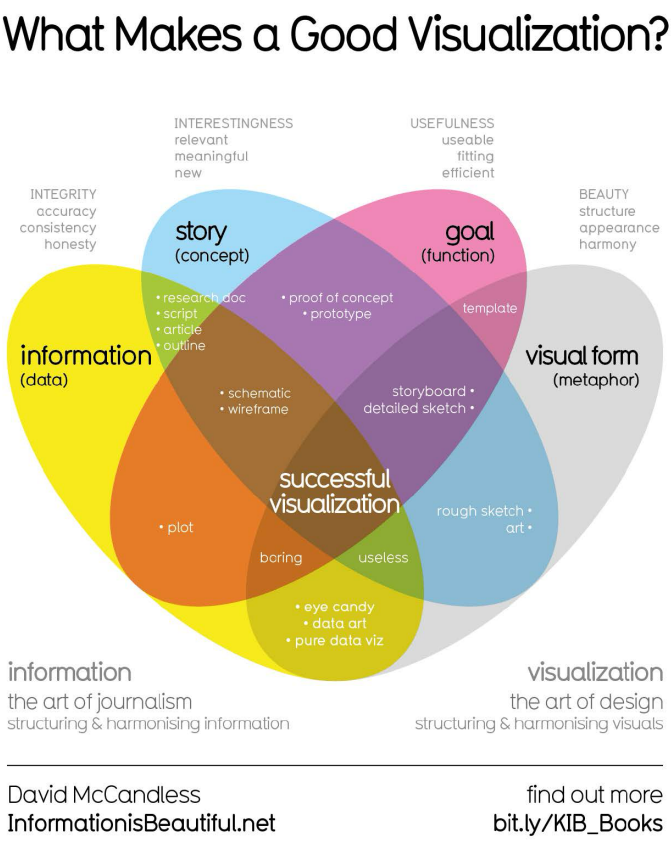

Fig. 2 McCandless, David. 2014. „What Makes A Good Visualization?“.

The visualisation discourse is saturated with guidelines that define what counts as "good" visualisation. In many popular and professional contexts, such as the work of McCandless, such rules privilege aesthetic clarity and effective communication – criteria that seem neutral but are embedded in broader epistemological assumptions about what data is and what it should do [26]. As the field increasingly seeks universal design principles, AV reflects a deeper belief: that data images are not just helpful, they are necessary, inevitable, and ultimately trustworthy.

This belief is historically rooted. Data visualisation, as a field, traces its lineage to Enlightenment rationalism and the desire to 'see' truth through measurement. The graphic presentation of numbers (tables, bar charts, line graphs) emerged as powerful instruments to objectify the world [27]. Visualisation thus became an epistemic device deeply entangled with ideas of order, control, and neutrality. What continues today in AV is this legacy of visual truth-making, but now reframed in aesthetic and efficiency-oriented terms.

AV can be understood through several interrelated aspects, three of which are particularly salient here: exclusion, trivialisation, and idealisation. These facets illustrate some of the consequences of approaching visualisation as a primarily affirmative practice – one that reinforces existing assumptions about data and their images rather than interrogating them.

2.2.1 Exclusion

AV often manifests as a policing of visualisation norms. Certain visualisations are marked as correct or acceptable, while others are dismissed as wrong, bad, or unprofessional. This exclusion is not just aesthetic but ideological: it defines the boundaries of acceptable data practice, often without acknowledging the sociopolitical assumptions behind those boundaries.

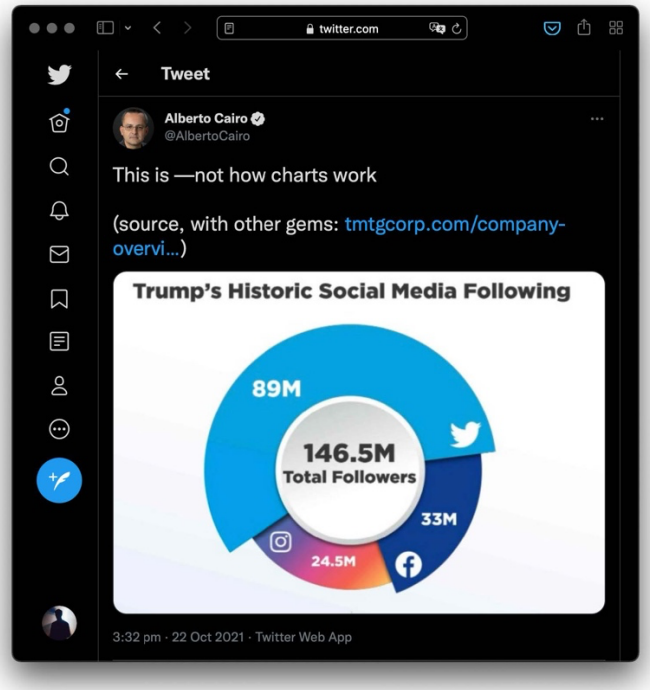

Fig. 3 Cairo, Alberto. 2021. „This is not how charts work“.

For example, Professor of Visual Journalism Alberto Cairo has regularly published criteria for evaluating visualisations, often emphasising clarity and correctness [28]. Although Cairo has recently acknowledged more pluralistic perspectives [29], much of the field still operates within an implicit binary: correct vs. incorrect. Similarly, The Chart Doctor column in the Financial Times "treats" visualisations deemed ineffective, prescribing "cures" that typically align with formalist standards of communication efficiency [30]. Finally, blogs like Datawrapper's "Do's and Don'ts" offer design prescriptions that are well-intentioned but also reveal how visualisation culture can marginalise alternative or experimental approaches [31].

This kind of "visual border control" enforces normative standards for what visualisations should look like and how they should function – policing the boundaries of legibility and legitimacy. It follows the logic of what Johanna Drucker has described as the aesthetic ideology of the "graphical display"[18], where representations claim authority through form while obscuring their constructed nature. The result is a narrowing of visual culture: a space in which data images must always conform to functionalist aesthetics and hide the messiness of knowledge-making. This exclusionary stance aligns with what scholars in Science and Technology Studies (STS) describe as boundary work, and echoes Pierre Bourdieu's notion of symbolic violence: the imposition of dominant aesthetic standards under the guise of neutrality [32].

2.2.2 Trivialisation

AV also tends to trivialise the complexity of visualisation as a process. Visualisation becomes not a site of struggle or negotiation, but a reassuring end-state. For instance, Michele Mauri of the DensityDesign Lab describes visualisation as a "relaxing" activity, a personal reprieve rather than a space of critical tension [33]. While this sentiment is understandable, especially from a position of technical expertise and institutional privilege, it risks minimising the ethical, political, and epistemological stakes of data design.

When interpreted generously, Mauri's quote may reflect a deep familiarity with the medium, or an appreciation for the contemplative aspects of rendering complexity. But it also exemplifies a broader AV tendency: to assume that once data is visualised, the hard work of sensemaking is done. As Viégas and Wattenberg put it, "visualisation is ready to be a mass medium"[34]. This claim exemplifies how deeply AV is embedded in contemporary design and media discourse. The proliferation of tools has increased access, but also

fostered a culture in which visualisation becomes self-evident: a normative gesture requiring little justification.

In this sense, AV echoes what media theorist Jonathan Crary has described as the "normative image"[35] – an image that embeds itself so thoroughly into everyday experience that it no longer appears constructed at all. Visualisation, under AV, becomes invisible as a practice and self-evident as a solution.

Moreover, the trivialisation of visualisation is connected to the increasing routinisation of data work. As tools for data visualisation become more accessible and automated, the practice risks being understood as merely aesthetic output rather than a complex engagement with knowledge, representation, and authority. This is where non-representational image theory becomes crucial: it asks not only what an image shows but also what it does, how it acts in the world, and what it occludes [36].

2.2.3 Idealisation

AV also idealises the act of visualising data. One of the most celebrated projects in the field, Dear Data by Stefanie Posavec and Giorgia Lupi, illustrates this dynamic [37]. The project, which consists of hand-drawn visualisations exchanged weekly by post, is often lauded for its human-centred and analogue approach to data. Its charm lies in its deviation from "big data" norms, focusing instead on personal, small-scale data sets and illustrative methods.

While the project's framing of "Dear Data" as a personal, analogue correspondence with data offers a welcome shift from large-scale algorithmic processing, it also participates, perhaps unintentionally, in the broader aesthetic of AV. The visualisation process is presented as inherently enriching and self-revealing, without necessarily examining how the act of continual self-tracking might shape subjectivity or interpersonal dynamics. This is not to say that "Dear Data" fails at its stated goals – indeed, the project succeeds in cultivating an intimate and reflective practice – but rather that its popularity and reception can be read as symptomatic of a visual culture that idealises the act of visualisation itself. Other readings are certainly possible, including interpretations of the project as a counter-narrative to big data extraction. But it is precisely this interpretive ambiguity that reveals the need for more explicit critical framing around practices of visualisation, even in projects that consciously foreground care, craft, and slowness.

This resonates with Galloway's question: *are some things unrepresentable?*[38] In AV, even the most ambiguous or personal aspects of life are rendered as clean, contained graphics – removing interpretive tension in favour of visual coherence. In visual culture studies, this aligns with W.J.T. Mitchell's notion of the "pictorial turn"[39], where images shift from passive reflections to active participants in constructing knowledge. In AV, visualisations are granted a similar agency: they speak for data, and by extension, for reality.

The rise of AV reflects a broader instrumentalisation of visualisation in society. Visualisation becomes a tool of persuasion, justification, or even aesthetic delight, but rarely of hesitation or doubt. And yet, as scholars in critical data studies and humanities computing have shown, data is not discovered but made, through methodological decisions, absences, and interpretive frameworks [40]. AV is thus not merely a technical or stylistic tendency – it is a worldview. It enshrines functionality, transparency, and legibility as core values while marginalising ambiguity, friction, and reflexivity. To critique AV is not to reject effective communication, but to ask: what does this efficiency cost us? What kinds of questions, perspectives, or publics does it exclude? A non-affirmative approach to visualisation would begin with these questions. It would treat the image not as an endpoint but as a site of negotiation, where designers, users, and data co-produce meaning. It would resist the pressure to always make data visual, and instead linger in moments of uncertainty, partiality, or resistance. It would see visualisation not just as a tool but as a responsibility.

3 Beyond data in Images

This paper has aimed to normalise critique in the context of data and visualisation practices, as has already been established in other disciplines such as science and technology studies, visual culture, and media theory [41][42][43][44]. Central to this project is the idea that formal or technical evaluations alone are insufficient. Visualisations must be examined through ethical, political, and cultural lenses. This is not simply a call to critique from the outside – but to embed critical and (self-)reflective practices into the design process itself. Reflection should not come after the design, nor be treated as optional, but should be embedded within it from the outset.

The dominance of data exceptionalism (DE) and affirmative visualisation (AV) often obscures alternative ways of thinking. These models encourage efficiency, clarity, and representational fidelity but tend to underplay ambiguity, subjectivity, and speculation. To move beyond them, we must reframe the goal of data visualisation. If visualisations are always interpretive constructs, not transparent reflections, then their critical potential lies in how they are made and why. Visualisation should provoke, not just inform.

We must also question the belief that visualisations inherently yield truth. Insights emerge not from data images themselves, but from interpretation, context, and theoretical framing [45]. To "visualise otherwise" is to accept the incompleteness and instability of all data images – and to see their fallibility as a strength. Every visualisation is a distortion of reality, and that is precisely its potential [46].

Rather than polishing these distortions into neutrality or objectivity, ideals inherited from scientific visual culture, we should embrace the speculative dimensions of visualisation. Johanna Drucker has shown that such ideals obscure the perspectival and constructed nature of knowledge [47]. Instead of aspiring to a false objectivity, we should welcome uncertainty, failure, and contradiction. Visualisations can act more like arguments than answers.

This shift entails a move from product to process. What matters is not just what a visualisation shows, but also the assumptions, negotiations, and values that shaped its design. Data visualisation is a multi-part, culturally embedded sequence of ordering processes [48]. These shaping forces (technical, institutional, personal) are often invisible but crucial.

From this perspective, a self-reflective visualisation approach becomes essential. It asks: Who designed it? With what tools? Under what constraints? And to what end? This reframing has deep consequences. Visualisations are not passive containers of truth – they are active participants in meaning-making. They shape understanding, construct authority, and mediate power.

To adopt this stance is to recognise that visualisations are always embedded in negotiation. They create and dissolve orders simultaneously. Every choice reflects intentions and assumptions – whether conscious or not. Looking at a data visualisation, then, does not mean interpreting data abstraction alone. It means tracing the human and cultural forces that made it possible. The attempt to discover the world through data visualisations often ends in the discovery of the data designer herself [49]. What, then, are the alternatives? I propose several imperatives for "visualising otherwise":

Prioritise context over clarity: Make visible the assumptions and uncertainties in the data and its representation.

Design for reflection, not just transmission: Use visualisation as a prompt for thought, not merely comprehension.

Show the seams: Include metadata, process, and backstory within the design, not as an appendix.

Engage plurality: Accept that multiple representations and interpretations can coexist.

Value the invisible: Consider what or who is excluded from datasets and frames.

Think relationally: Foreground human relationships over abstract quantities.

In this view, critique is not an endpoint but a beginning. It enables richer, more responsible visual practices. A data visualisation is never just an image – it is a situated act of knowledge production. Making this visible is the responsibility of data design.

Information+ Presentation

This article was presented at the Information+ 2023 conference titled "Visualising otherwise".

The author declares that there are no competing interests.

Figure Credits

Figure 1: Valentina D'Efilippo. 2021. "Information Design: Storytelling with Data in Illustrator". https://www.domestika.org/en/courses/3601-information-design-storytelling-with-data-in-illustrator.
Figure 2: McCandless, David. 2014. „What Makes A Good Visualization?". In: Information is beautiful. https://www.informationisbeautiful.net/visualizations/what-makes-a-good-data-visualization.
Figure 3: Cairo, Alberto. 2021. „This is not how charts work". https://twitter.com/AlbertoCairo/status/1451542088290557956.

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