

The data context gap in cartography textbooks and handbooks

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Keywords: critical data studies, ethics, thematic cartography, content analysis

Abstract:

If “The Numbers Don’t Speak for Themselves” (D’Ignazio & Klein, 2020, p. 149), as Catherine D’Ignazio and Lauren Klein state in their book *Data Feminism*, then what is needed to fully understand data? Do cartographers pay enough attention to the data’s background when making a thematic map? And what do cartography textbooks and handbooks say about how to use data for maps?

Maps are products of conscious and unconscious decisions made by the mapmaker. So are datasets – shaped by their context: legal, social, and technological conditions, as well as the intent, methods and possibilities of data production. Critical data studies argue that data is never neutral or objective and must be interpreted within its context (Kitchin, 2025). To address this in cartography, I argue for responsible data practices and define them as an intentional way of working with data that

- takes into account the fact that data is never neutral or objective and therefore considers the context in which the data was produced.
- acts with responsibility for affected communities and considers possible (negative) consequences, aiming for an accurate, fair and equitable representation of communities and topics.

As is evident in a variety of cartographic works, the same dataset can be used to produce multiple maps that convey different messages (e.g. Adams et al., 2024; Field, 2021). Similarly, data on the same topic can vary significantly. This doesn’t necessarily mean the data is wrong; the transformation from geographical environment to information (Robinson et al., 1995) involves simplifications, which can be approached from different perspectives, leading to diverse datasets. Given that data constitutes the foundation of any map and exerts a significant influence on the final product, the context-dependency of data must be seen as a key aspect of cartography.

Frameworks from Critical Data Studies and Ethical AI Research (examined by Scheck (2025)) offer insights into what constitutes data production context. This includes researching aspects like the motivation and purpose of data collection, financing, publication dates, survey periods, involved parties, how sensitive data was collected, data representativeness, tools and technologies used, and preprocessing and cleaning steps. Answers may raise follow-up questions: what exactly do the applied categories mean? What narratives do they communicate? Who/what is included in the dataset? And what is important to the topic and use case but not represented (suitably)? Examining the background of data production may involve reading documentation or legal agreements, looking at other data uses, or consulting domain experts and data producers.

In the context of data production, this awareness can facilitate more responsible and critical cartography by enabling mapmakers to identify limitations and gaps in the dataset, comprehend the origins and meaning of outliers, and inform mapmaking decisions. This may encompass modifications to the questions posed, choosing classifications accordingly, the formulation of the legend or title, the adaptation of symbols, the adoption of approaches to recontextualize data points, or the determination to refrain from mapping a particular dataset due to anticipated negative consequences or low data quality.

Despite the potential for more ethical and responsible map making, the context-dependency of data is often overlooked in cartography, as evidenced by the absence of this critical element in cartography textbooks and handbooks. An ongoing qualitative content analysis of several cartography textbooks and handbooks (e.g. Field (2018), Slocum et al. (2023), Dent et al. (2009)) points to a significant gap: the overwhelming prioritization of technocratic perspectives on data use in these texts, with a focus on technical handling of (e.g. data formats, data classification, statistical exploration

and distribution of data values, levels of data measurement and corresponding symbolization types). When potential issues of data sources are mentioned, they are often discussed as technical hurdles, rather than as opportunities to reflect on the situatedness of data. Additionally, the books frequently employ the term ‘raw’ data, a concept that is subject to substantial criticism in critical data studies for concealing that all data has been processed (Gitelman, 2013).

Some contextual reflections on data can be found in the analysed books, albeit in a concise and general manner. For instance, the notion that datasets “are human designed and contain errors, bias, risk, and uncertainty” (Field, 2018, p. 120) is noted, and the distinction between geographic phenomena and the data is mentioned (Dent et al., 2009; Slocum et al., 2023). Nevertheless, there is an absence of explicit calls for investigating data context and advice on the methodology.

Thus, the current cartographic body of knowledge has a significant gap in providing critical guidance on using data for maps – particularly quantitative data for thematic maps. As a next step in my doctoral research, I will develop approaches to critically examine data production context and conduct more comprehensive fitness-for-use analyses, with the goal of addressing this gap. This will also open up opportunities to explore how the call for responsible data practices can be translated into map design.

Acknowledgements

I would like to thank my supervisor, Georg Gartner, and my friend and fellow Ph.D. student, Jakob Listabarth, for their feedback. I acknowledge that I used some AI-supported tools for ideation and linguistic refinement of this abstract.

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