DATA REPRESENTATION AS EPISTEMOLOGICAL RESISTANCE

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Over the last two decades quantitative data representation has moved from a specialization of the sciences, economics, and statistics (Gould, 2017), to becoming commonplace in settings of democratic governance and community decision making (Williams, 2020). Yet the dominant methods and media of data production and visualization echo some of the tenets of those fields of origin – extractive data production, computational storage and retrieval, 3rd party expert analysis, professionalized visual design, the rhetorical power of science. These norms are not connected to the governance and activism settings data is now used in, where practices emphasize empowerment, efficacy, and engagement (Tygel & Kirsch, 2016; Bravo et al, 2022). This disconnect has led to well-documented personal, community-level, and societal harms in what is often described as our "datafied" society. The media we use for data representation require rethinking to be in alignment with data-related work in settings of resistance and revolution.

The current toolbox for representing data is limited, privileging a single style of approach to representing data. This is first and foremost visual, dominated by computational design tools that produce paper or screen-based 2d visualizations based on a shared encoding language (Bertin, 1967). Data visualization and storytelling privilege formalized ways of knowing, built on the rhetorical trick of perceived objectivity of numbers and shapes used to represent them (D'Ignazio & Klein, 2016). Stated more clearly, there is a small set of "standard charts and graphs" that make up the default toolbox. Graphs are not the only way data could be represented visually, nor are tables the only way data can be ordered and stored. This narrow set of norms has created a privileged practice of data visualization that excludes alternate approaches and uncritically embeds a strong set of epistemological defaults. This approach of data visualization embeds the ways of knowing that are most common in the sciences and related domains, and thus imports them into the pro-social settings where data is now commonly used.

We can derive inspirations for other possible epistemologies of data representation by drawing from approaches in other domains of study. First, the idea of open data (Baack,

2015), critical data studies (Tygel, 2015), and data literacy (Raffaghelli, 2020) have all approached the questions of social justice and power in a datafied society. The field of participatory action research offers a particularly useful framework to draw on when considering alternatives; "extended epistemology" (Heron & Reason, 2008) introduces four ways of knowing: experiential, presentational, propositional, and practical. Current data visualization practice centers just one of those – propositional knowledge (the knowing of a thing via ideas and theories that attempt to represent it). Another approach to alternatives comes from the field of computer science education – "epistemological pluralism" (Turkle & Paper, 1990). Applied to this domain, this idea suggests that focusing on a single epistemological approach to data representation excludes potential participants in data-centered community deliberation and sense-making. To support spaces where data is now commonly used that focus on goals of community empowerment and engagement, the field must engage this pluralism, exploring experiential, presentational, and practical ways of representing data.

To concretize this call, I introduce three case studies that showcase alternative epistemologies of data representation, pushing back on the current dominant computationally encoded and digitally mediated norms. These examples are focused on representing data in social justice movements. From Mexico City I summarize the feminicide memorial created in the main square to mark International Women's Day in 2021. Activists memorialized and honored the thousands of victims of gender-related violence by writing their names on the barrier erected around the palace. From Chicago I introduce a street data sculpture created by activists in 2020 at a rally in support of the Black Lives Matter movement. The painted bar chart depicted how much more the city spent on policing than any other department, supporting activist arguments to re-allocate those funds towards social supports. From Los Angeles I describe a 2017 theatrical performance and mini-golf course, both showcasing data about the unhoused and arguing against new governmental policies seeking to further marginalize their communities. The performance was driven by analysis of data trends, and the playable mini golf course served as a data physicalization; all created by artists, activists, and members of the unhoused community themselves. Learning from activists offers a model of creative data representation as epistemological resistance necessary to avoid perpetuating further harms associated with the embedded media and methods of our current data practices.

To support community empowerment, efficacy, and engagement in a datafied society we need to develop a larger toolbox for data representation built on alternative epistemologies. The existing norms of data visualization emerged from fields (sciences, statistics, etc.). disconnected from the current types of uses of data in democratic settings (community planning, civic engagement, etc.). The embedded methods and media have barriers at odds with the goals of social justice movements (Raffaghelli, 2020). Ongoing work in data sculptures, data murals, data theatre, and related representations offer manifestations of epistemological resistance to this historical default. The path forward lies in engaging a pluralistic toolbox, one that embraces many ways of knowing to support a larger set of participants in the creation of data representations.

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