The Significance and Applicability of Feminist Data Visualization

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PSYC 6135: Psychology of Data Visualization

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June 25, 2021

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Data feminism aims to enact change by investigating standard research practices that reinforce existing inequalities that marginalize women and underserved populations (d'Ignazio & Klein, 2020). The field focuses on analyzing issues like power differentials and intersectionality to challenge the current distribution of power and diversify the field. Data feminism involves thinking about collected data, data analysis, and data visualizations in a way that is informed by feminist activism and critical thought (d'Ignazio & Klein, 2020). For the purposes of this research proposal, we are particularly interested in feminist data visualization and its applicability to the course content. The goal of the following research proposal is to highlight the importance of feminist data visualization and propose ways in which feminist data visualization principles should be applied to all research.

A central theme in feminism-informed data visualization is "situated knowledge", defined as: by acknowledging and understanding our own position in the world and the contestable nature of our claims to knowledge, we can produce knowledge with greater objectivity than if we claimed to be neutral observers of the data (Haraway, 1998). This idea challenges the notion of "letting the numbers speak for themselves", because data can be misleading when considering context or intersectionality (Bertini & Stefaner, 2017). Two prominent examples that will be discussed to illustrate this point are the Allegheny County Office of Children, Youth and Families, and the Clery Report (d'Ignazio & Klein, 2016).

The Allegheny County Office in Western Pennsylvania uses an algorithmic model to predict risk of child abuse in a particular home with the aim of removing children from potentially abusive households before it happens. At the surface this may seem to have benevolent outcomes but unfortunately, for poorer parents who rely on public resources, the

algorithm can access records from child welfare services or drug/alcohol treatment programs, leading them to be oversampled in the model and thus their children are over-targeted as being at risk for child abuse. Wealthier parents who have access to private health and mental health care do not have publicly available data for the algorithm to detect (d'Ignazio & Klein, 2016). Consequently, the results obtained from this algorithm must be critically examined as taking them at face value would lead to unjust and inaccurate conclusions.

The Clery Act was enacted in 1990 and requires all American colleges and universities to make on-campus crime statistics available to the public. A group of students examined the data and after inspecting anonymous campus climate surveys, consulting with experts, and interviewing survivors, they discovered that colleges with higher rates of sexual assault were in fact places where more institutional resources are devoted to supporting survivors. Once more, this example demonstrates how examining numbers alone does not adequately or correctly explicate the phenomena (d'Ignazio & Klein, 2016). Thus, by treating data as situated rather than neutral or objective, there can be greater clarity in data and data presentation.

Given the importance of feminist data visualization, we propose that future research should critically consider the following six principles to ensure that the produced visualization promotes ideas of equality, inclusivity, and transparency. These principles propose clear ways in which the design of future data visualization can be made more equitable (d'Ignazio & Klein, 2016). While the feminist approach to data visualization is centered on design, the following principles also account for a variety of social forces that impact the design process given that data, design, and application are intertwined (d'Ignazio & Klein, 2016).

The first principle encourages data visualizers to rethink binaries. Feminist theory rejects the idea of binary distinctions in various situations. These not only include the distinction

between the categories of male and female, but also between other categories like nature and culture, subject and object, and reason and emotion (d'Ignazio & Klein, 2016). Thus, a feminist approach to data visualization should emphasize data visualizations that are represented on a variety of different levels rather than binaries and should highlight the limits of any view that is binary. For example, gender is typically recorded as a binary and discrete variable, either male or female, though gender might be better represented as a continuous and multidimensional variable (d'Ignazio & Klein, 2016). Rethinking the representation of gender, or other variables such as culture and ethnicity, challenges researchers to investigate the process associated with data collection and classification and their visual display. Making such changes would better account for a range of multiple and fluid categories in the data visualization process. As such, researchers must consider if their data is being measured adequately, if there are any categories they have taken for granted, and how they can account for responses in their data that do not fit into the categories they have provided (d'Ignazio & Klein, 2016).

The second principle encourages researchers to embrace pluralism. Feminist theory emphasizes how data is always collected within the context of a specific subjective position, and cannot be completely objective, neutral, or universal (d'Ignazio & Klein, 2016). As a result, a designer's own subjective position will influence the creation of a visual display. Feminist data visualization aims to acknowledge the designer's own subjective position because it can help expose the decisions, both implicit and explicit, that went into visually representing data (d'Ignazio & Klein, 2016). Self-disclosure and an emphasis on pluralism more generally, can help visualization research move away from its current focus on "objective" presentation of findings to designs that facilitate pathways to multiple truths (d'Ignazio & Klein, 2016). One example would be for researchers to include "narrative" elements to datasets similar to the Anti-

Eviction Mapping Project (AEMP, n.d.). This map displays locations of evictions, but also oral histories and interviews of individuals who are evicted. Researchers should therefore reflect on who they envision as being the ideal user of their data visualizations, how additional perspectives can be included, and how the visualization can communicate missing voices (d'Ignazio & Klein, 2016).

The third principle asks data visualizers to examine power and promote empowerment. Historically, women and other marginalized groups have experienced the negative effects of hierarchical structures of power. For this reason, feminism aims to overturn these hierarchies by promoting horizontal systems of knowledge transmission (d'Ignazio & Klein, 2016). When applied to data visualization, the user is seen as a source of knowledge in the design as well as the receptor of any visual information (d'Ignazio & Klein, 2016). Moreover, the design and evaluation of success of a visualization are determined at the scale of the community rather than the individual user (d'Ignazio & Klein, 2016). This will help researchers listen to community concerns and co-design visualizations to advance their goals, while building the capacity to achieve them within the community. An example of empowering users could be making visualizations interactive, like the Oakland Crimespotting map that allows community members to examine crime in their area (Dork et al., 2013). The map can be sorted according to several variables (date, time, place etc.), empowering users to interact with data in a way that is most meaningful to them. The map is also regularly updated by the police department, specifies where the data comes from, and describes the intent behind the project. Researchers should therefore consider power and empowerment within their own data by reflecting on how power is distributed across the design team, how the end users' voices can be more fully integrated into the design process, and if the visualization can empower marginalized individuals or

communities (d'Ignazio & Klein, 2016).

The fourth principle encourages researchers to consider context. Feminist theory deems all knowledge is situated, meaning that all knowledge is produced in a particular social, cultural, and material context (d'Ignazio & Klein, 2016). A feminist approach to data visualization must therefore consider how diverse contexts can influence the production of a visualization and think through the various ways in which any particular visualization output might be received (d'Ignazio & Klein, 2016). An example of this is data cleaning, where the data is likely being homogenized and the trace of unique narratives are removed. An awareness of what we can learn from local context may yield richer and more informative visualization designs (d'Ignazio & Klein, 2016). As such, researchers must consider how the data visualizations can be more human centered to help viewers better understand people's cultures, histories, and worldviews, how cultural artifacts, terminology, and symbols can be integrated into the research, and how context can be taken into account in the assessment of visualizations (d'Ignazio & Klein, 2016).

The fifth principle proposes that researchers legitimize embodiment and affect in data visualizations. All data visualizations have embodied and affective impact in that we derive some sensation or emotion from the information, even if it is just to communicate the utility, economy, and purposefulness of something via visual data (d'Ignazio & Klein, 2016). Nevertheless, with the rise of popular forms of visualization, like data journalism, designers have begun to intentionally leverage affect to create an emotional bond with a story or issue or to engage and impress readers with beauty and complexity (d'Ignazio & Klein, 2016). These affective dimensions have been under-explored in visualization research. We must acknowledge the importance of embodiment and affect so that it can be considered when evaluating the effectiveness of data visualizations (d'Ignazio & Klein, 2016). To do so, researchers must

consider how we can leverage embodied and affective experience to enhance the data visualization and engage our audience, the kinds of expertise our design team needs to do that, and the kinds of embodied and affective experiences that have meaning to our audience (d'Ignazio & Klein, 2016).

The last feminist data visualization principle suggests that researchers should make labour visible. Information design processes often start with data, but feminist approaches work backwards to make visible the individuals that shape and care for data at every stage of the process like collecting the data, cleaning the data, and visualizing the data (d'Ignazio & Klein, 2016). Authors of visualizations must cite data sources and methods which may help build credibility with the audience (d'Ignazio & Klein, 2016). Making labor visible also has implications for fair attribution and credit for the resulting visualization, especially since women and other underrepresented groups have been notoriously excluded from sharing in credit for scientific work (d'Ignazio & Klein, 2016). Thus, as researchers we must ensure that the research team discusses the roles, responsibilities, and credit in advance of a given publication, and we must include: the source of the data and who was involved in each step of the process (d'Ignazio & Klein, 2016).

Considering feminist theory and thought when conducting data science or creating data visualizations only furthers our understanding of statistics. In this proposal, we illustrated the importance of feminist data visualization through two thought provoking examples. In addition, we outlined six feminist principles to consider when creating data visualizations as described by d'Ignazio & Klein (2016): rethink binaries, embrace pluralism, examine power and promote empowerment, consider context, legitimize embodiment and affect, and make labour visible. We believe the described principles can and should be applied to all research moving forward.

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