Resisting Detached Datafication: What Toxic Prisons Teach Us about the Imperative of Restorative/Transformative Data Science for Environmental and Social Justice

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"I did like my last three years at Clemens [prison]. And Clemens has a nickname among the prison population that's been going around for probably like the last 50 or 60 years, and I call it 'burn in hell, Clemens,' because you are going to burn in there."

– Sloane, pseudonym of a man formerly incarcerated in prisons overseen by the Texas Department of Criminal Justice, discussing the experience of extreme heat

Extreme heat is one of many environmental hazards – including air pollution, poor water quality, proximity to hazardous waste, and exposure to wildfires and hurricanes – that prisons and other carceral facilities are exposed to. [1–5] Looking to document environmental hazards of these toxic prisons in quantitative terms, diverse actors have turned to geospatial technology and modeled datasets, which provide spatially-complete data at high spatial and temporal resolutions, enabling new measurements of environmental injustice in carceral landscapes. [6–11]

Much of the emerging quantitative research in this area perceives the issue of toxic prisons primarily as a data gap, needing to be filled, to prove that prisons are hazardous. In this approach, researchers may further classify prisons in binaries such as hazardous or not hazardous, environmentally

unjust or just, etc. The progression of such research frames often seeks to identify solutions that close the measured disparities of hazardous exposures. In the example of extreme heat presented in the introduction, a researcher or decision-maker may suggest that if the Clemens prison is hot, a solution would be to make heat intervention resources such as air conditioning available. However, the remainder of what Sloane shared with me adds an important dimension to consider in the design of "solutions" and their imagined efficacies:

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"They came up with this idea of 'respite areas'. If you felt too hot, you could go to respite and it was supposed to be like an air-conditioned room. But I don't know what people's fallacies are about the [prison] guards and like, what they do and what they're capable of -- But these people are like sadistic human beings... you could be on the verge of a heatstroke and [they're] not going to open your cell and escort you to respite. So they make them extremely inaccessible. It's really just the discretion of the guards and the discretion of the warden."

– Sloane

Sloane's narrative reveals a key limitation of approaches which apply data science in normative ways to study and identify solutions to toxic prisons. I argue that while the increased availability of geospatial data for making environmental harm in carceral landscapes more visible to the public is essential, the issue of toxic prisons and other environmental justice (EJ) issues are increasingly at risk of what I refer to here as detached datafication – the uptake of data applied to an issue without analysis of power and without context of those who have lived experiences on this issue, in the data collection, methodology, and presentation of results. Further, I argue that this detached datafication can lead to "solutions" that ignore dimensions of what is needed to fully address toxic prisons. In some cases, they could even create new forms of toxic prisons.

My positionality in making these claims is as a Black American woman who, like many Black Americans, has had loved ones impacted by policing and prisons. I am also a mixed-methods geospatial data scientist who has partnered with a grassroots advocacy organization, the Campaign to Fight Toxic Prisons (CFTP), for three years. In this partnered research, I have interviewed activists and formerly incarcerated people in different regions of the U.S. In this essay, I do not intend to speak for all incarcerated people or their loved ones; rather, I aim to share learnings from my dual research experiences datifying toxic prisons and interviewing directly-impacted communities. Both have led me to see some risks of datafication in this context as well as a hopeful path forward for applying data and digital tools to combat toxic prisons.

Detached datafication of toxic prisons and "solutions"

At the time of writing, the application of geospatial technology and datasets to study toxic prisons is still nascent and existing geospatial studies vary in the degree to which they present solutions to the pressing issue of carceral environmental injustice. The studies that pertain to extreme heat generally point to air-conditioning, without reservation, as an effective intervention to reduce adverse effects of heat exposure. [7, 8, 12] One study, which finds higher particulate matter 2.5 air pollution in counties that have Texas Department of Criminal Justice (TDCJ) prisons than counties without TDCJ prisons, suggests that this disparity ought to be addressed through improvements to healthcare and upgrades to air filtration systems in TDCJ facilities. [11] Another study examines the collocation of 165 prisons with multiple environmental risks as measured through the U.S. Environmental Protection Agency's (U.S. EPA) EJ screening and mapping tool. [10] The author

finds evidence of environmental injustice in 40% of the prisons and recommends that the U.S. Bureau of Prisons consider EJ in the siting, renovation, and operations of prisons. The author also specifically suggests making prisons "climate-ready" through the development of green infrastructure. These studies, and their solutions, have resonance with the field of "justice design", a branch of architecture that purports that changes in the aesthetics and amenities of our penal institutions can create spaces of more healing, rehabilitation, safety, and well-being. [13,14]

This approach to the study of toxic prisons utilizes data to propose solutions that are fundamentally detached from analysis of power dynamics and context in the carceral system. This oversight is apparent in the example I outlined earlier, which identifies heat exposure as a problem in prisons and proposes a solution of mandating air conditioning in prisons. This solution makes a series of assumptions: first, it assumes that there is an optimal temperature for hundreds of caged people with a variety of ages, abilities, and medical conditions. While other types of infrastructure, such as schools and hospitals, must optimize for similar population scales, prisons are distinct from these other institutions because incarcerated people do not have the same level of agency to perform adaptive behaviors. They cannot don additional clothing or change location etc. to avoid uncomfortable temperatures in communal spaces. This relates to a second, and much more tenuous, assumption: that prisons even aim to create comfortable environments. A narrative from

a formerly incarcerated activist in New Mexico illustrates the frailty of this second assumption:

The narratives of Jack and Sloane reflect the inadequacy of a technical solution–air conditioning–to a problem that is structural in nature: incarcerated people live in inhumane (and deadly) temperatures, not because of a lack of resources, but because a primary objective of modern incarceration in the U.S. is to deprive people of resources as punishment.[15] The problematic nature of these technical solutions are well described by Cunningham et al 2023 in their critique of "solutionism" – a tendency for technologists and researchers to put forth singular solutions to unruly problems that are complex and structural in nature.[16] They write that solutions "decide what's at stake," by making decisions about "what matters, who matters, and how they should matter." They also describe that to offer a solution is to "take a position" that "persists with the idea of an objective or neutral gaze." Proponents of AC as a solution often present it as an objectively positive resource, overlooking the ways a source of thermal relief for one may be used as thermal violence on another. This detached datafication can thus be used to create a new form of toxic prison.

Other "solutions" to the problem of toxic prisons also enforce a logic of solutionism. In response to the vulnerability of carceral facilities to disasters such as wildfires and hurricanes, and years of advocacy from community orgs like CFTP, some correctional facilities are implementing evacuation policies and procedures. However, this solution

"I know [it] happens in Santa Fe a lot where they use air conditioning to punish people by sticking them in solitary confinement where it's really cold cells... They were putting people in solitary confinement without any types of books or radios and it was extremely cold. People actually died in those conditions."

– Jack, pseudonym of activist who was formerly incarcerated in the New Mexico Corrections Department

minimizes the fact that personal capacity and agency, alongside planning, are among the most important factors in determining one's ability to cope with disasters.[17-18] Incarceration, which depends on (and exacerbates) mass surveillance, maintenance of poverty, restriction of movement, and limits on communication [19-20], inherently does not promote personal capacity or agency. An evacuation plan alone does not address this.[22, 23] Another strand of solutions suggests using data to inform new prison siting in less environmentally hazardous locations.[10] But this is more solutionism: it takes a neutral stance towards the inevitable manufacture of crime and racist criminalization that will be used to populate the new prison, which have been contemporaneous processes with prison-building throughout the era of mass incarceration.[20, 24]

These solutions are not wholly without merit as implementing them may reduce immediate harm for some incarcerated people. However, the connective tissue between them is that researchers and decision-makers are assessing the issue of the toxic prison through detached data-centric, state-centric, technological lenses that yield solutions detached from lived experience and detached from analysis of larger mechanisms of power that determine who a solution would reach and affect. The gap between the desired transformational change to structural inequalities and the true effect of solutions proposed through normative methodologies is a longstanding problem in the data sciences [25, 26], and similarly in environmental justice studies. [27, 28] Geographer Laura Pulido describes this problem in the EJ movement by arguing that while the EJ movement has been successful by certain measures, there is insufficient evidence that it has succeeded in actually improving the environments of vulnerable communities.[28] She further contends that by relying on agencies like the U.S. EPA to develop and enforce regulations to protect communities from pollution burdens, we ignore the fact of environmental justice as state-sanctioned violence

and lose sight of the U.S. EPA as an arm of a capitalist and racist government. Pulido concludes with a call to action for researchers and activists aiming to work on complex problems produced and maintained by the state: rather than viewing the state simply as an ally or neutral force, we must also view the state as an adversary that must be confronted. This declaration helps to inform what types of methodological frameworks should be considered in the datafication of environmental justice struggles such as the toxic prison.

Restorative/transformative data science for toxic prisons

In the book Counting Feminicide, Catherine D'Ignazio introduces the idea of "restorative/transformative data science" (RT data science) to encompass the motivations, process, and impacts of undertaking data activism about domains characterized by durable structural inequalities. In this section, I briefly describe and apply D'Ignazio's 4-stage framework for restorative/transformative data science to chart out a path for how we might use data and digital tools to address the issue of toxic prisons. I also reflect on the ways in which my collaborative data science work with the Campaign to Fight Toxic Prisons resonates with D'Ignazio's RT framework.

In the first stage, restorative/transformative data scientists resolve to act on an issue and develop a theory of change that includes data. A normative data science approach might engage this stage by identifying an issue and a theory that data collection and analysis will support just outcomes. As I demonstrated in the previous section, this normative approach can fall short on advancing researchers' hypothesized justice. Instead, an RT data scientist uses the resolving stage to analyze power, which refines the expectations of what outcomes are worth leveraging data towards. In the domain of toxic prisons, a power analysis would reveal the interplay between policy makers, prison

"Restorative/transformative data science means mounting an explicit, and usually collective, effort to systematize and circulate data in the service of addressing inequality, oppression, and violence. It seeks to restore life, living, vitality, rights, and dignity to the people and publics harmed by structural violence. And it places that work in service of social and political transformation to eradicate the conditions that produce structural violence in the first place."

– Catherine D'Ignazio, *Counting Feminicide* [1]

guards, construction companies, incarcerated people, their loved ones, and more. Importantly, this power analysis would reveal what certain solutions could and could not do within systems of extreme hierarchy and marginalization. In my own work, I develop an analysis of power by interviewing formerly incarcerated people and community organizers close to the issue. These efforts help me understand how data is currently used in prison EJ organizing and what new data and digital tool developments can do to advance transformative organizing goals. [6]

The second stage involves researching various information sources and triangulating information across sources. In this stage, restorative/transformative data scientists use their analysis of power to evaluate and address the quality and comprehensiveness of their data collection and communicate what the limitations of their data mean for what can and cannot be known. Academics are, of course, already familiar with performing research and the concept of sharing limitations of research at the end of a study. However, in RT data science, this stage requires a deeper familiarity with the cause of limitations in the data, effort to address limitations, and humility in the proposal of "solutions." When researching toxic prisons, this stage might look like more transparent reporting about the sources of error. It might also include identifying the decision-makers who should be held accountable for missing or incomplete data. In my own work,

I describe specific limits of geospatial data collection about toxic prisons and the role of state power in disincentivizing data collection or making data inaccessible. [6]

In the third stage, restorative/transformative data scientists record data through information extraction and categorization. Counter to normative approaches, which optimize for standardization and generalizability, RT data scientists engage in iterative processes of defining and redefining how data is organized, with an underlying ethic of care that rejects unnecessary binaries. [29] One way this can take shape is by exhibiting flexibility in how data is labeled. In Counting Feminicide, D'Ignazio describes how an activist organization went from a data schema that considered 4 variables about their subject matter of interest to collecting over 80 variables that tell a more complete story. In the context of toxic prisons, we can engage this stage of the framework by deconstructing the "toxic/non-toxic" and "hazardous/non-hazardous" binary that hyperfocus on physical environmental conditions. When I asked Justice, an activist and formerly incarcerated person, about examples of environmental hazards incarcerated people are exposed to, Justice explained this well: Researchers have a unique positionality to shape the interpretation of data. We must take care in the representation of the data we produce and report so as to not share conclusions (or solutions) that reduce people's experience of harm. This connects to the fourth and last stage of RT data

"Some of the most prominent environmental hazards that incarcerated people are exposed to are, in older jails, you still have lead paint. You have rusted piping, rusted sinks, toilets... You have bad water. And several prisons here in the Commonwealth of Pennsylvania, are dealing with these sorts of things. You have, as a consequence, rodent infestations, bugs, roaches, water bugs, cockroaches... You have toxins within the soil that's in the yards and thus in the air, flowing around... But [it's] not just environmental toxins. So you have those pieces of toxin, but you also have the toxicity of the incarcerated world that exists within relationships. So you have toxins between– there's like this us and them idea between inmates and staff that creates a posture in an environment of hostility. Fear, retribution, anger. And so that's one of the toxins that exists."

– Justice, activist formerly incarcerated at State Correctional Institution Fayette in Pennsylvania

science: refusing and using data to communicate and reach diverse audiences. Refusing refers to the act of "withholding knowledge, withholding data, and withholding consent" which communities and researchers may want to do for safety or sovereignty, among other reasons.[30–33] I believe researchers have an obligation to refuse to produce and present research about toxic prisons that might endanger marginalized populations or entrench harmful narratives. In my partnership with CFTP, we regularly discuss and implement this idea by restricting certain knowledge we produce to be for the eyes of CFTP only. Using – researchers increasingly share data through a variety of platforms beyond journal papers, such as social media and news organizations. Where normative data science can learn from RT data science is to connect the use of data to their power-informed theory of change developed in stage one. We can ask questions like: how can we circulate data in a way that works to restore life and dignity? One way CFTP and I do this is through our interview and consent process. We interview directly impacted people to elevate lived experience alongside quantitative data. Further, as suggested by CFTP, we developed an informed consent process that allows participants to choose from a range of

options, from anonymity to full identification and usage of their names and affiliations; this affirms the agency of individuals to make choices that best suit their preferences. Another question we might ask is how we can circulate data in a way that works to transform the conditions that enabled the stripping of life and dignity in the first place. This stage requires engaging with how we can put data to use outside of state-centric reforms and towards the dismantling of violent structures and construction of new life-affirming institutions. We see just a few examples of this in existing peer-reviewed analyses of toxic prisons, in which researchers suggest data-driven modes of selecting prisons with elevated environmental risk as prime candidates for decarceration and prison closure.[9, 23] An advocacy organization in California called California United for a Responsible Budget already uses a data-centered approach that considers environmental risk factors to advocate for prison closure. These efforts begin to lay a foundation for how we can employ data science in resistance to detached datafication and towards restorative/transformative outcomes that combat toxic prisons at their deepest roots.

Conclusion

This essay opened with a caution for researchers to resist detached datafication, a concept I invoke to describe the use of data, isolated from power analysis and context of people with lived experience of environmental harm, to study toxic prisons. Through examining the problem of toxic prisons, I illustrate how detached datafication can lead to the presentation of "solutions" that do not holistically address the harm that some researchers or decision-makers aim to address, and can enable toxic prisons to take on new forms. This essay is not a call to halt interventions that would reduce the harm and death produced by toxic prisons; rather, I aim to encourage researchers to employ and present data with more awareness and transparency about its limits and the limits of solutions that do not shift power imbalances. I align myself with the call from Colucci et. al to "mitigate immediate risk associated with environmental hazards and address systemic vulnerability in carceral conditions" through transformational changes such as decarceration and prison closure.[34] Reflecting Colucci's call for an "intersectional" approach to the study of prisons and environmental injustice, D'Ignazio's restorative/transformative data science is one such approach that promotes a mode of datafication fundamentally attached to considerations of power and context, which can strengthen our ability to identify actions that restore life to those impacted by toxic prisons and transform the systems that enable toxic prisons to exist.

I hope that the concept of detached datafication encourages a reflective posture for researchers, technologists, and decision-makers working across various environmental and social justice struggles. From housing justice to climate innovation to police violence etc., data and digital tools are well poised to support knowledge production and organizing but employing them in ways detached from context can perpetuate incomplete narratives and harmful solutions to issues characterized by histories of systemic inequality. This essay joins other essays in this series to call for more situated methodologies, such as RT data science, of engaging with data and digital tools that bring us closer to environmental and climate justice for all.

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