Queer(ed) Thought Experiments:

for Critiquing the Cissexism of Data Under Techno-Capitalism

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ABSTRACT

A rapid proliferation of near-universally accessible technologies has spurred an ubiquity of crisis discourses surrounding data and the digital. Everyone and their mother now have an opinion on algorithms and their importance. Simultaneously, the mainstreaming of anti-gender and paternalistic politicking the world over, (re-)essentializing the cissexist order, is primarily platformed and propagated in digital environments. There is limited critical engagement with the very *human* vulnerabilities that are reproduced by the cissexism underpinning socio-technical infrastructures. This paper engages thought experiments as a queer methodology for developing accessible interrogations of our relationship(s) with data and the digital under techno-capitalism. We contend that these thought experiments queer logics underpinning dominant understandings of data and the digital in the academy, which so often fall into a dichotomy between the overly technical and the overly theoretical. By drawing on the polysemous potential that *queerness* holds, we argue that queer(ed) thought experiments challenge such dichotomies, enabling grappling with logic in a way that both requires sitting with discomfort and engaging in a critically reflexive reckoning with our self-positioning. Ultimately, we propose a method for queering our understanding of data, fundamentally transforming the ways we engage with it and those who seek to procure it.

KEY WORDS

CISSEXISM, QUEER DATA, TECHNO-CAPITALISM,
THOUGHT EXPERIMENT

THE CISSEXIST PROBLEM OF DATA UNDER TECHNO-CAPITALISM

It is largely indisputable that we are experiencing a rapid proliferation of near-universally accessible technologies that have spurred crisis discourses surrounding data and datafication. Simultaneously, a surge in regressive anti-gender and paternalistic politicking has been deployed to essentialise identity in the image of cisheteropatriarchal supremacy. In today's largely inescapable mediascape, these two crises are most often articulated at the same time and place – and about the same people. Any quick scan of news headlines over the last few years will indicate that it is primarily a select few men who are credited with innovating in the technology and data sector, men who are engaged in a significant struggle to retain control over technologies and data, and men who continually exercise their power over the actions and freedoms of others via technologies and data. Within these crisis narratives, there is so often a limited critical engagement with the very human vulnerabilities that are (re)produced by the cisheteronormativity underpinning socio-technical infrastructures. Unless one is a technoligarch, we are largely unable to control and manage data –whether our own or others'– and so it becomes very easy to conclude that our agency in this realm is waning. It also becomes very easy to assume that it is the failure of *data* (i.e. to comply, conform, and produce information) and the technical infrastructures they rely upon, rather than the failure of *people*, when harms arise. In many ways, such logical arguments echo philosophical debates about civil society. That is, they follow the assumption that from appropriate infrastructures, good behaviours will emerge, and from good behaviours, peace and prosperity can flourish. What is missing from this narrative, however, is an important question: *what if civil society is not so civil*? For us, it simply isn't. It is, in fact, an oppressive system sustaining cissexist, patriarchal privileges that simultaneously demand disclosing personal information to be counted whilst requiring we risk further marginalisation from such visibility. It is in this light there is a real need to turn away from a critique of data and its subjects and begin developing methods for critiquing man-made systems that fail to acknowledge the socio-personal impact of data. As authors, our central goal in this paper is to re-situate data within the material conditions people routinely navigate and through this develop novel conceptual entanglements with data as both concept and material artifact. By drawing on the polysemous potential that *queerness* holds, we[1] argue that queer(ed) thought experiments enable a mundane and accessible critique of data cultures under techno-capitalism, a means of queering our understanding of data, and the potential for fundamentally transforming the ways we engage with it and those who seek to procure it.

Neither of us pretends to be the first to produce a queer(ed) critique of the increasingly inextricable relationship with data under techno-capitalism. Indeed, there are a fair few compelling critiques of digital technologies that explore the evolution of socio-technical narratives about culture, identity and labour (Carrigan, 2024; Hochschild, 2012; Schlombs, 2022). Many of these critiques demonstrate how established theories of labour, production and capital persist despite outward changes to our daily routines (Sarkar, 2017; Wajcman, 2020). In drawing attention to the illusion of change, it is possible to begin untangling the ways we situate data within routine engagements with 'the digital' (Ensmenger, 2022; Guyan, 2022a). Taking this critique a step further, it is possible to imagine the need to understand more about how certain technologies have become essential for engaging in culture and society, and methods for imagining alternative uses and functions (Abbate, 2017; Monea, 2023; Hicks, 2021; Ruberg, 2022; Webb, 2023). This potential to imagine technology being different, and having different functions, is important because it allows us to explore the systemic and hegemonic barriers that limit what technologies do with data, how they depend on coercive forms of data collection, and for whom they function optimally (see d'Ignazio & Klein, 2016; Guyan, 2022a; Keilty, 2024). Such imagining can help us *queer*, in the broadest sense, a range of relationships to data and technologies.

Imagining how technologies could be different helps us question why certain modes of data collection, management and use are prioritised and, in many cases, presented as normal (Adler, 2016; Benjamin, 2016; d'Ignazio & Klein, 2023). In turn, this helps us question the ways we are coerced into using technologies –and *generating data*– to be productive and visible (Benjamin, 2023; Monea, 2023; Noble, 2018). Further, imagining how technologies could be different helps us think about the ways we formulate and articulate successful engagements with digital tools, platforms, and media as essential features of our everyday lives (Gouldi, 2023; Hayles, 2012; Paasonen & Sunden, 2024). Challenging the very notion of success under techno-capitalism gives us scope and time to think about the expected (and possibly *required*) uses of technology across a spectrum of activities. Such challenge also entails critiquing the infrastructures that shape social, cultural and political understandings of digital tools and data. In these acts of imagining, we are not rejecting or avoiding data or technologies *outright*. Instead, we are actively re-positioning ourselves vis-à-vis complex social, cultural and political systems that influence the (perceived) validity and value of our identities, thereby shaping how we come to know and be known. In this article, we question who has the authority to make decisions about what technology can do, what data are needed for that doing, and how people (come to) understand those processes. Imagining alternatives outwith normative deployments is a queer process of unpicking and resisting coercive logics that depend on perpetuating the need to *conform* –as people and data points– to be considered valid and/or functional. We imagine and conceptualise this failure using thought experiments that make use of the impossible, or that *require failure* insofar as they have no solution, to enable a different kind of access to our understanding of data and to embrace the affective potential of failure in generating new understanding(s). We contend then, that the affective potential of failure can facilitate creative re-imaginings of how we engage with data, creating new possibilities to use queer theories and praxis to re-orient ourselves in relation to data under techno-capitalism.

EMBRACING FAILURE, RESISTING OPTIMISM

We propose a theoretical framing that brings together different perspectives on queerness as failure, and failure as a form of creative imagining – that is, thinking beyond binaries, acknowledging or embracing precarity, and understanding the risks of rejecting heteronormativity. In so doing, we draw on the contributions of Jack Halberstam and Lauren Berlant's approaches to failure as a queer act of resistance and critique. Both, in their own way, challenge normative (or hegemonic) standards for success. Halberstam's *Queer Art of Failure* and Berlant's *Cruel Optimism* challenge how we think of success, and through their critiques identify the hegemonic and insidious toll of heteronormativity as the *frame* for success. While Halberstam is a media and cultural theorist, and Berlant was a textual scholar, their provocations that failure is a queer form of resistance challenges and resists normative impositions of success. We use their complementary conceptualisations of queerness to re-imagine the possibilities of data in resisting normative modes of description and prediction. Indeed, Berlant's cruel optimism has been deployed in feminist critiques of AI technologies for their inevitable disappointment, discursively constructed simultaneously as vehicle and barrier to happiness (e.g. Bassett, 2023). In one sense, our paper acts as a response to Basset's (2023) final provocation, where she reminds us of the need for feminist engagements to critique and radically reimagine the attachments that AI promotes and requires of us. Instead of critiquing a specific technology, platform or socio-technical practice, we take a broader view of technology and data. In taking such a broad view of technology and data as culturally constructed and socially situated subjects (Balsamo, 2011; Mackenzie & Wajcman, 1999; Noble & Tynes, 2016), we contend that it is possible to consider the tensions between what we imagine (or are *led* to imagine) data do and the material systems and infrastructures required to engage with them.

Berlant's use of affect theory to propose queer

critiques of feeling(s) opens important avenues of analysis for challenging neoliberal myths of success and creating conceptual space for failure as a form of resistance to systems of dominance (Berlant, 2007; Berlant, 2011a; Berlant, 2016). Berlant's analyses evolved through critiques of how narratives become meaningful based on extractive processes of sense making (Berlant, 2011b). Why then, would anyone *want* to be intelligible and valued? Berlant explicitly articulates the Pyrrhic victory of intelligibility. Within contemporary narratives of success, we are encouraged to be optimistic about what intelligibility will afford us and thereby contort ourselves into forms, symbolic or otherwise, that are intelligible to the reductive hegemonic order. There is, therefore, both cruelty and violence in this optimism because to become intelligible is the result of coercive processes of extraction. It is in exactly this frame that we draw on Berlant's cruel optimism to articulate the substantive cruelty and symbolic violence of the inherently cissexist order of data under techno-capitalism, which thereby *demands* a queer critique and conceptual de(con)struction.

And while Berlant articulates failure as a meaningful mode for critiquing oppressive systems, we build on it further by fusing it with Jack Halberstam's conceptualisation of queerness *as* failure, wherein failure is itself treated not in its most pejorative sense as it is within the dominant cis-heteronormative worldview (Halberstam, 2011, 2022). Halberstam uses the absurd and the mundane to formulate a critique of failure through engagements with popular culture (Halberstam, 2011a, 2013). Such engagements and critique do not, in his formulation, require finding solutions or improving understandings of subject(s). Instead, they are processes of self-consciously *undoing* expectations of intelligibility (Halberstam, 2011b, 2022). Queerness, then, becomes something rather mundane – a glitchy animation, a skipping track on an album, a misheard or misremembered phrase from a movie, or an over-the-top and only momentarily intelligible meme. In being mundane, queerness does not call for answers, explanations, or expectations of exceptionalism but instead becomes a framework for reflexively considering why and when we want something to be good (or, successful) and how we cope with and use imperfection or unintelligibility to resist dominant narratives of success and value (Halberstam, 2020a, 2020b). Queerness, as a failure to be intelligible within a given mould, offers space not only for resistance but for *creativity in resistance* and existence beyond the trappings of dominant narratives.

We use Berlant and Halberstam's critiques of normativity here to (re)think queerly about *failing with* and *failing through* data and technology. We articulate that to be unintelligible –whether unintentionally or purposefully– is a means to reject the cruel and violent optimism of data cultures under techno-capitalism, and to explore and consider alternative methods, practices and formulations of identity that enable flourishing otherwise. Current narratives about technology reproduce cissexist and heteronormative hegemonies not only because of their wilful ignorance of the plurality of users, but also because they rely on certain discourses about the essential role(s) of technology and data in users' lives. A reproduction of cissexist and heteronormative hegemony in data cultures under techno-capitalism relies on particular kinds of (il)logic, which many might call *common sense* within the frame of our late neoliberal age. In this article we seek to destabilise the notion that this common sense is inherently logical using well-known thought experiments. We contend that thought experiments have the queer potential to act as narrative tropes that facilitate thinking about how data are created and used to structure information about identities, their intelligibility, and their value. In doing so, we develop a critical lens through which to enable the consideration of alternative imaginings of how we use technologies to navigate our increasingly datafied lives.

Dominant narratives about 'the [so-called] information society' attempt to persuade us that the ways data are formatted, stored and used is essential for life as we have come to know it (Dame Griff, 2023; Monea, 2023). But we align ourselves with the notion that

there being a necessity to how data looks and functions obfuscates the coercive and extractive nature of the categories used to collect, aggregate and normalise data so that it can be used as evidence (d'Ignazio & Klein, 2023; Guyan, 2022a). Some might question these claims – there is, after all, a growing abundance of options for *how* we describe ourselves, and many of these options are reflected in the forms, interfaces and channels we use to communicate (Bivens, 2017). However, in most cases, the underlying information architectures that validate data will likely transform what you selected into something completely unrecognisable (Dame Griff, 2023; Fosch-Villaronga et al., 2021). This means that the characteristics we use to describe ourselves are often not reflected in the digital systems that we increasingly depend on to navigate the modern world. And that's the case when we are *enabled* to render ourselves intelligible – but it is so often not the case that we are given that capacity.

Reading the preceding narrative, one might assume that a critique of the infrastructures and ideologies that reproduce cissexist and heteronormative hegemonic logics will make it possible for queer identities to be visible and findable. However, we argue that this assumption requires careful scrutiny, because it relies on narratives of queer identities requiring visibility to be valid. At a time when regressive narratives about gender and sex have gained political traction, conflating visibility with validity only serves to reproduce normative discourses that engender hypervulnerability, exploitation, and the threat of violence. In short, finding solutions that *only* makes queerness visible would itself reproduce the cruel optimism(s) of extant cis-sexist and heteronormative infrastructures. We propose, instead, to reject the need for visibility through a critique of the logic(s) that have demanded visibility and conflated visibility with success. This means also acknowledging and finding ways to express the value of *not being counted and not being visible* as a form of failure that allows us to better engage with queer identities and develop more holistic and sustainable conceptualisations of our relationship(s) with technology and data. Using thought experiments, we seek to establish a critical framework for re-evaluating data, technologies, and their extant cissexist logics, queering dominant logics and resisting the need for visibility and findability.

THOUGHT EXPERIMENTS: QUEER(ED) LOGICS FOR ACCESSIBLE CRITIQUE?

Philosophy, maths, and varying social science disciplines all have different approaches to and reasons for using thought experiments to engage in debates and critiques of cultural norms and assumptions (Kuhn, 1970; Norton, 1996). Thought experiments destabilise assumptions about how we perceive and solve problems (Olmos, 2017). Some are not meant to be solved but are simply meant to help us look at the ways the world works (Chomsky, 1995). Others are meant to provide a context for putting forward new types of logic in a manner that proves the ingenuity of new ways of thinking (De Mey & Weber, 2017). In both instances, thought experiments are reflective of concerns and interests from particular moments in the history of disciplinary debates. This provides a context for analysing how we have come to rely on certain methods and practices for generalising data and generating theories. Perhaps more importantly for this paper, though, we argue that thought experiments –whether intentionally or otherwise, though we might venture a guess at the latter– invoke Halberstam's conceptualisation of failure as a queer(ed) process.

We have chosen two thought experiments as an initial *way in* to frame our critique of the cultural politics of data under techno-capitalism. Through this critique, we reflect on the ways the cultural politics of data marginalise and forcibly misrepresent queer identities, in particular. In one sense, we consider the affective possibilities of queerness for critiquing the cultural politics of data and for destabilising the logics used to impose the cissexist and heteronormative of current dominant readings of data and technology. It is as important, though, to determine what we *do not* intend with this paper. We do not intend that these analogies and allegories are a perfect fit for the problems with the cultural politics of data under

techno-capitalism, instead using them as heuristics for a queer (re)imagining of our relationships with data without the constraints of requisite solutionist thinking. That is, by engaging with thought experiments oriented towards the im/possible, we allow for philosophical and logical failure as a process of creative and generative critique.

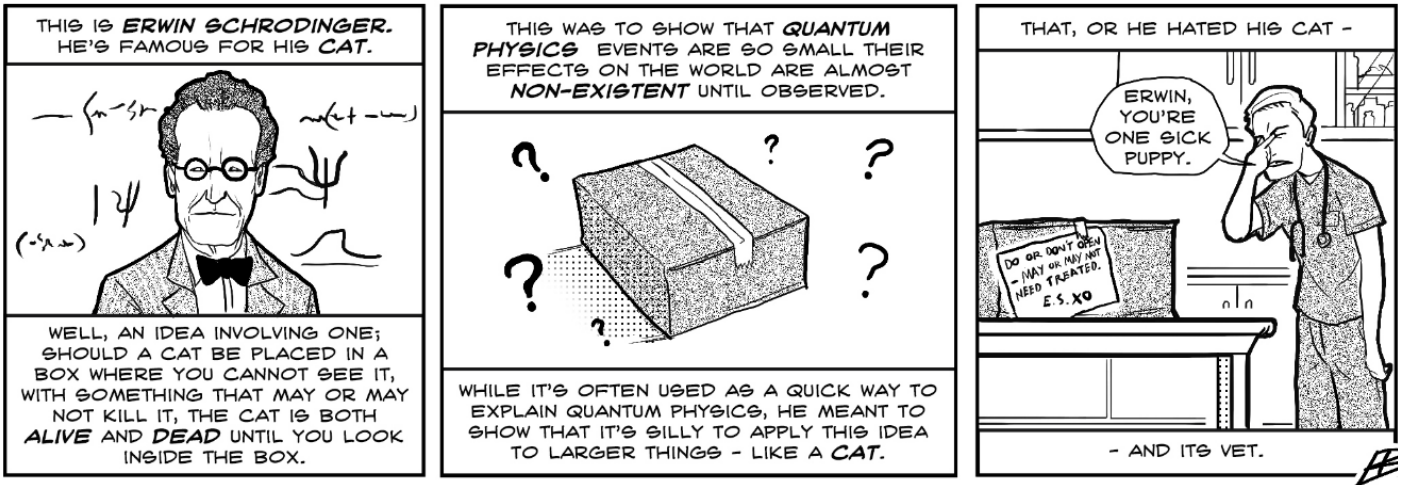
We have chosen two thought experiments that exist broadly in the lay imagination as something akin to memes. *Schrödinger's Cat* and *The Seven Bridges of Königsberg* both laid the groundwork for radical disciplinary shifts and represent nuanced theories that support rigorous methodological work. But their popularity and distillation of complex ideas into simple scenarios belies their theoretical rigour and makes the answer to each thought experiment –once exposed– seem like common sense. Here, we engage with this logical illusion of common sense to explore how each thought experiment has the potential to provoke new modes of thinking. In both cases, there is something uniquely *queer* in their deployment as tools for re-imagining popular understandings of data.

SCHRÖDINGER'S CAT: KNOWING AND KNOWABILITY

A cat is shut in a box with a vial of poison, a radioactive substance and a Geiger counter. Any changes to the radioactive substance detected by the Geiger counter will cause the poison to release. If the poison is released, the cat will die. You cannot see into or open the box to check on the cat. Is the cat dead or alive?

In 1935, Erwin Schrödinger posed this scenario as a thought experiment to help articulate the complexity of observation and measurement in quantum physics (see Figure 1). While neither of us is by any stretch of the imagination a physicist or mathematician, the popularity of Schrödinger's thought experiment provides a context for asking how and why we measure what is known and use these measurements to hypothesise and assert understandings of what is *yet to be* known. Now, quantum physics may not seem like the most obvious place to start a discussion about the potential for queer theories to disrupt our conceptualisations of how data dominates our understandings of gender. However, if we consider what the original thought experiment requires we grapple with, a few possibilities for critique and creativity emerge. Schrödinger was not necessarily poking fun at the demands placed on physicists to measure and quantify what we cannot see (i.e. radiation and subatomic particles), but he was rather cheekily demanding that his contemporaries acknowledge the limitations of their own perspective and the fruitlessness of universalising one application of imagination –or *consequentiality*– onto other, incomparable contexts of scale. Ultimately, though, Schrödinger's little thought experiment speaks to the perceived need for

Figure 1
Schrödinger's Cat by Elliot Balson, published in Dundee Comics (https://dundeecomicscreatives-pace.com/2017/02/22/schrodingers-cat/)



observing, measuring, quantifying and extracting information about, and its effects on, the material world. This, we contend, is where Schrödinger's cat provides an entry point for critiquing cultures of data under techno-capitalism.

Beyond the historical contexts of Schrödinger's thought experiment, the dead/alive cat in a box scenario has become something of a meme. That is, it has become a way of allowing, or forcing, us to consider what it means for something (or some*one*) to be two things –and *neither*– at once. In questioning how and why we need to quantify, identify and articulate states of being, we can think about failure from different points of view. Quantification gives us one kind of data about identities but necessarily represents it in problematic ways. Intersectional feminist critiques of power and queer critiques of identity politics have called into question the ways we formulate identities as constellations of separate components within data and technical systems (Guyan, 2022b; Hicks, 2019). As a blunt comparison, the idea that a person can tick a series of boxes to articulate their identity is an all too familiar experience, but one that is often forced upon us in order to be rendered intelligible in everyday practices. We fill in demographic information forms on a routine basis, and in this sense, we are known by the categories we tick (title, age, gender, sex, race, disability, allergies, address etc.), but we are simultaneously *not* known in our entirety because this information is inherently reductive. We are represented by pre-determined categories considered relevant to the organisations (corporations or governments) whose infrastructures, goods, services, etc. we want (or need) to access. Beyond being relegated to 'other', we are rendered intelligible only within a cissexist order that marginalises us to a category outwith socially- and culturally-bound expectations. Of course, though, this problem of not being entirely *knowable* is contrasted with the problem of not being known *at all* if we choose to disengage from the systems that seek to reductively define us. Do we even *want* agencies collecting data about us to know who we are? There is, in this critical context, a peril to synthesising these components of data-ready self-definition into whole entities because it sublimates some elements and, by extension, privileges others as more visible, valuable or productive. There is, one might say, a lack of descriptive creativity because the systems used to identify and articulate identities are bound to a dominant logic of intelligibility. Thus, we *become* a very real, and sometimes very queer, cat suspended in quantum superposition vis-à-vis a potentially poisonous data category and a (radioactive?) data vacuum.

Knowing and knowability are, of course, important dimensions to most feminist and queer critiques of cissexist and heteronormative data cultures under techno-capitalism, with which we are broadly aligned. Intersectional and queer feminist theorists have begun to destabilise logics rooted in Enlightenment debates about knowledge and consciousness (Benjamin, 2023; Cipolla et al., 2017; d'Ignazio & Klein, 2023; Noble, 2018). Queer-feminist science and technology studies thinking has shifted towards affective and embodied critical frameworks that help us think about how and when we acknowledge and validate identities in relation to subjects. To fail to be quantifiable by attending to the plurality of a subject then, shifts our focus away from knowing whether a cat is dead or alive, and towards the infrastructures that have allowed us to impose our need to know (or prove that we can't know) on others who have less agency than us (in this case, a cat). In asking if the cat is alive or dead, we have an opportunity to call into question why we *must* know what something is when knowing is rooted in pre-determined categories we do not agree with. Destabilising our right to know, the need to be knowable, and the capacity to be known in specific forms provides a lens through which we can critique the politics of data, including the systems (technological and social) that work to extract and profit from data collection, categorisation and aggregation.

The technical aspects of data are often articulated as systems of organisation that allow us to name entities so we can find them (Adler, 2014, 2017). This act of naming requires conformity to certain mental and

linguistic models that reflect shared understandings of subjects and objects (Bowker & Star, 2000a, 2000b; Svenonius, 2000). While there are efforts to queer critiques of data structures, they often oversell the practices that obscure naming conventions (Gaboury, 2018). In overselling technical workarounds that 'solve' issues of representation, scholarship about data and culture often overlooks the need to question how and why language –both the terms we use to communicate, and the structural requirements for information retrieval– imposes limitations on the description and representation of subjects. In essence, the humanities and social sciences do not routinely go far enough in critiquing of the infrastructures that collect, organise and represent information because it does not imagine or even consider the possibility of failure.

A recent shift towards overt signalling of data collection through cookie notices offers a glimmer of hope ... at least superficially. On the one hand, it can be argued that *knowingly* relinquishing information about your location, browsing habits, and in many cases (elements of) your identity gives us agency over our choices to share data. On the other hand, it can be seen to perpetuate hegemonic neoliberal ideologies of individual responsibility and choice, displacing the blame from unscrupulous actors and practices when things go wrong (e.g. data are leaked, or otherwise used for purposes beyond the stated contract). We think it's likely clear on which side we fall between the two. Indeed, we'd argue that even *opting out* of cookies does not prevent such violent data practices, as many would presume, despite the implication of making agentive choices not to share. Rather, opting out likely serves only to further simplify what is collected to the point of compounding harms associated with (un)knowing and (un)knowability. Likewise, opting out of using technologies, more broadly, is not a simple or equitably accessible act. We're not necessarily talking of 'living off the grid' here, which is unquestionably precarious. In our datafied and ubiquitously digital age, the phenomenon of 'switching off' becomes an act of intense privilege, so much so that luxury brands rely on 'switching off' to sell products (e.g. Coach handbag adverts) and celebrities-turned-moguls outsource conventionally *personalised* fan-oriented social media activities. There is, evidently, an awareness in the public consciousness that datafication and over-reliance on technology is a net negative. But not everyone is equally able to *fail to engage* with these techno-capitalist systems that demand our engagement for successful living – which, in this case, means being able to read the news, pay our taxes, or buy groceries. There are other ways to fail, of course, and consequences for all of those failures are rarely controllable.

A queer(ed) critique of data cultures provides a framework for analysing systems that force us to make choices about how we make ourselves known (or knowable) and for examining how data collection infrastructures are in/compatible with these practices. Our critique calls into question an individual's ability to resist datafication but, simultaneously, imagines how failing to resist datafication catalyses certain forms of failure that are personally meaningful but perhaps not socially universal. Queerness becomes a mode of consciously and *conscientiously* engaging with the politics of data and the infrastructures that use data. One might even say that queer approaches to critiquing data allow us to fail in formulating an answer, and instead creates space to discuss, debate and consider *why* data has become such an important facet of our lives.

To start, we argue that the current extractive nature of data under techno-capitalism is *cruel*. The systems used to collect data about us require we divulge information that puts us at risk or reduces us to a marginalised subject. To be counted requires being visible, and that visibility comes with a price. We are subject to regulations of many different sorts. But to not disclose any data about ourselves at all is equally risky. To not be counted is to be unacknowledged as a valid (intelligible) subject. To not be counted allows us to remain invisible, but there is a risk of losing access to essential services. So, is visibility the risk and invisibility the privilege? Or is the inverse true? This only begs more consideration of our quantum

superposition as cats trapped in boxes by some more powerful being for a purpose far removed from our immediate benefit. In recognising what we can't know or make known, we gain the space to critique the systems that impose the need for data sharing and collection. This critique generates opportunities to formulate new modes of understanding, and new ways of articulating the scope and effect of claiming to know or for something to *become known*.

SEVEN BRIDGES OF KÖNIGSBERG: VALUE(S) AND VALIDITY

A river runs through a city. The river is disrupted by an island. There are seven bridges at various points along the rivers that connect the two sides of the city, and the island to the city. Is it possible to cross each of the seven bridges only once?

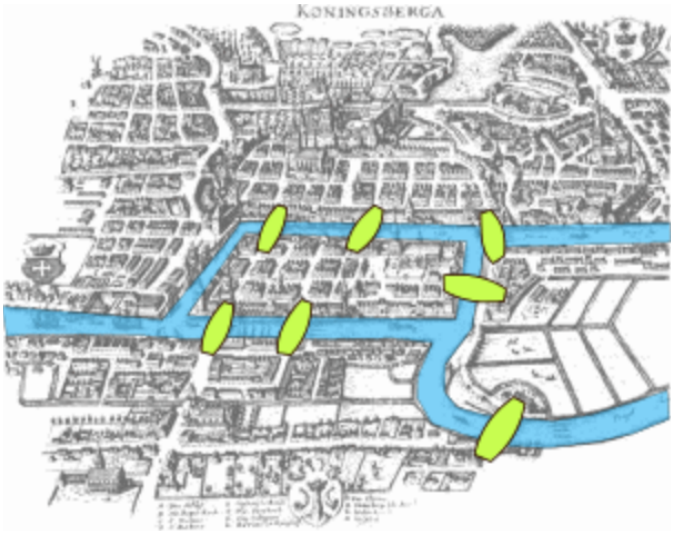


Figure 2
Illustration of Euler's Seven Bridges of Königsberg Thought Experiment by Bogdan Giușcă (https://en.wikipedia.org/wiki/Seven_Bridges_of_K%C3%B6nigsberg#/media/File:Konigsberg_bridges.png)

Figure 2 illustrates the narrative of the 'seven bridges' thought experiment. And, from this, an answer to the question posed by the experiment might immediately be: *Certainly!* It's possible to swim, take a boat, glide, fly, or even *catapult across à la Wile E Coyote* to bypass some bridges and access the other(s). When the Seven Bridges of Königsberg problem was originally proposed by Leonhard Euler in 1736, these rather glaringly obvious solutions resulted in a few additional stipulations: you must determine a *walking* route; you can *only* use the bridges to cross the river; and you must *fully* cross each bridge. So – *can you still traverse the river using each bridge only once?* And while mathematicians have worked within these additional stipulations to 'solve' the Seven Bridges problem, there are still various provocations that their logic and proposed solutions leave open to critique.

Conversely to Schrödinger's attempt at teaching physicists about the *context-specificity* of quantum superposition and the observation of particles, Euler's puzzle was an attempt to define the geometry of position by *abstracting away all context* and retaining only general rules. Ultimately, the Seven Bridges thought experiment is about mapping out the one (because there is always ever only *one*) complete –and valid– set of connections between entities. Of course, any 'solution' also presupposes a set of parameters that determine both validity and completeness. Euler's experiment was intended for explaining the need for thinking *topographically* when analysing sets of variables and their relationships, or a collection of nodes (islands) and edges (connections, or bridges), which ultimately resulted in the development of graph theory (König, 1936, cf. Barnes and Harary, 1983). Based on the topography of a graph, we are supposed to be able to analyse and make decisions about the meaning (e.g. significance) of relationships between nodes (Acosta, 2020). Connections made between nodes in a graph can be thick (strong), thin (weak) or invalid based on their length, frequency, and/or (in) completeness (Priest, 2017). With the 'solution' to Seven Bridges presented by mathematicians, bridges are crossed (nodes connected), the space (topography) between these nodes is represented, and a graph (visualisation) of the network is produced.

There is no inherent hierarchy in this mode of representation, and the totality of all connections are rendered intelligible in a novel way. *Right?* Perhaps, but what is missing is the *context* from which nodes are created or determined, and the basis on which

edges are rendered. Space is therefore taken for granted. The way space is produced is not fully and explicitly explained to render intelligible the complexities of the data making up what is represented, or the plurality and directionalities with which those data are connected (Hall, 1980; Harvey, 2008; Lefebvre, 2009). We might, then, critique networks as a space because of their affective qualities. That is, despite their intangibility, they still hold value because of *what* they represent and *how* their mode of representation interpolates meaning. From such critique, it becomes possible to resist the need to quantify and validate subjects through their connections and to start thinking queerly about the ways data are used to generate networks and the value(s) imposed on these networks before and after they are represented visually. This is particularly important because it is not really possible to fully understand the scale and scope of the networks that sustain current data infrastructures (d'Ignazio & Klein, 2016, 2020) – and this is by no means an accident. While networks and network analyses have made it possible to see (quite literally) the complexities of connections, relationships and dependencies, they abstract away from and obscure *how* some of these connections and dependencies affect the wider topography of a graph (d'Ignazio, 2015, 2016). The amount of data that exists is overwhelming and thus, it is impossible to untangle and identify *what* data do or mean outside of their very immediate impact on our own practices. On the one hand, this impossibility sustains hegemonic technical systems because they are too big to fail, and the people in charge of them are immune to disapprobation. On the other hand, there is potential for failure to engender queerness. Instead, resisting datafication using data to imagine new connections and express alternative meanings could result in more diverse, diffuse and complex connections. In other words, we might simply refuse to cross all seven bridges in Königsberg and instead go for a leisurely swim.

Let's further take the lesson from this thought experiment's history as a departure point for critique. Despite, or perhaps *because*, solutions to the problem posed popped up rather quickly, additional parameters were deemed necessary and therefore imposed to make Euler's own proposed solution necessary. This shifting of goalposts is akin to the ways data are collected and used in everyday practice insofar as solutions –in the form of answers or datapoints submitted– are not always accepted, regardless of their interpreted appropriateness in each context. In fact, they might even be rejected because they do not conform to an underlying, and often entirely opaque, logic. An everyday example of this rejection in action is when we don't enter data into an online form correctly and receive an error message. Formatting dates in a specific way may seem like a low stakes example (mm/dd/yyyy versus dd/mm/yyyy), but it alludes to much larger issues around how we learn to format information so that it is valid and useful. In other words, we are conditioned to provide information that conforms to technological systems that collect information about us. So, when we are confronted with barriers to submitting data, we feel pressured to use what categories are available.

So, what can one do if they are *inter alia*– nonbinary, genderqueer or have otherwise not jumped through the ever-changing and often hazardous legal processes of gender recognition or name changes? While there have been slow changes to the variety of pronouns and titles to choose from when completing forms, these changes are by no means universal, or structurally sound. That is, they do not speak across systems or contexts. In fact, at the time of writing this article, one of us was retrieving quotes for motor insurance through a popular UK-based insurance comparison site. And it explicitly signalled this lack of connectivity across systems, including the economically salient trade-off between accurate self-representation or conformity with the cissexist order of data culture. Using gender-neutral or specifically gender-non-indexical titles –whether earned or avowed– like *Dr* and *Mx*, whilst accepted by the data capture mechanism of the comparison site, will result in fewer quotes being retrieved from insurance providers due to the latter's systems not treating those titles as valid entries. As a result, a connection cannot

be made with those providers and the resulting output prevents equitable engagement with price comparators, likely leading to *a direct economic disbenefit of gender-neutrality*. However mundane, this is but one example of the very real problem of abstracting away from context and assuming universality in the connections between entities.

Acknowledging how the *appearance* of inclusion indicates –sometimes explicitly– the extractive and coercive nature of data infrastructures may not seem very queer, but it is (we promise!). It calls into question who is responsible for the development of infrastructures that require names and that naming practices follow particular hegemonic, inherently exclusionary, conventions. Now, the Seven Bridges problem has helped mathematicians and social scientists develop methods for describing and representing data as networks. And graph data are meant to help us visualise relationships. But, for these visualisations to be intelligible, there is a need for completeness, which in turn demands *normalised data*. What, though, is normal, normalised, or even normalisable? *Normal*, in data and information science, is largely synonymous to *standardised* and *useable*, which is to say that they are free from errors that prevent data processing. So, even when there is a wealth of seemingly disparate and diverse actors, terms, etc., in a dataset, they are mapped onto pre-conceived definitions or categories. Ultimately, this means that a logic of hierarchies found in classification schemes persists, impacting the use and usefulness of data, confining its usefulness to contexts or conditions wherein those pre-conceived definitions are *normal* (or, in this sense, hegemonic). The technical demands of information retrieval and the logical demands of network analyses require normalcy, which we argue should really be read as *cishetero*-normal. And while we do not propose an overt solution, we do argue here for a context of questioning and discussing how we use networks to visualise and interpret data. *Personal failure is an option, though your mileage may vary (perhaps literally!)*. Outwith its dominant pejorative sense, failure enables reimagining what acceptance and validation require, look like and provide. The impossibility of entering data and strategic refusals to make do or find a technical fix presents opportunities to queer what data are collected, and how it is used to abstract and represent networks of associations, locations, affinities and relationships. A queer critique then, requires analysing and disrupting –but not necessarily *reinventing*– the systems of cisheteronormative logic underpinning information systems. In this light, we ask: *what if validity were not the point of data, but instead a kind of failure to grapple with what is left out, left over or in some way not 'normal?* Because to normalise data is to make them –and those they represent– conform to a decontextualised and pre-determined set of conditions that are inherently reductive, inequitable, and potentially harmful, symbolically and literally.

THE QUEER POTENTIAL OF (EXPERIMENTALLY) RE-THINKING OUR RELATIONSHIP(S) WITH DATA

We contend that this paper demonstrates the profoundly *queer* potential in thought experiments and their orientation towards failure. In this paper, we deployed two thought experiments to critique the cultural politics of data under techno-capitalism as a means of embracing the queer art of failure and deconstructing the cruel optimism of extant socio-technical data infrastructures. The logics underpinning these thought puzzles, whilst not directly analogous to the world of data, allow us to interrogate hegemonic ways of conceptualising success in data-land through knowing, knowability, value, and validity. In short, the two experiments we engaged with allow us to interrogate *how* systems demand intelligibility and acquiescence through the *a priori* normalisation of cissexist and heteronormative expectation. In one way, we are but cats, forcibly placed by some powerful *other* in a box that might –at any moment– become filled with toxic gas. We argue that this is a form of resistance because it recontextualises how we are observed, and how we engage with the politics of visibility and intelligibility. In acknowledging that those observing us do not know (or, largely, care) whether

we are alive or dead, only that we are one or the other we are able to fail spectacularly on our own terms… and perhaps facilitate wider discussions about failure as a queer critique of heteronormativity.

While there are ways to *resist* observation-via-datafication, we cannot really render ourselves entirely unintelligible within the social, economic and political systems governing our daily lives. Furthermore, we cats must cross all bridges in a certain way, lest we suffer some detrimental consequence. That is, we are offering a framework for contemplating what data to enter or share, to an extent, in order that we are intelligible (known or knowable) in ways that allow us to resist the cruel optimism of successfully becoming complicit with cis-normative categories/identities. Because the infrastructures that normalise or demand we share data about ourselves in specific ways so often have failsafe mechanisms that prevent us from deviating without –often substantive– consequence. The extent of our choice is largely illusory insofar as choice to disengage from these systems has become a privilege so few of us have direct access to. Whilst it is impossible to be fully invisible or fully unintelligible within the current cissexist order of data under techno-capitalism, a queer(ed) critique of *why* and *how* this impossibility exists and persists is important. We did not purport here to provide any kind of solution to this problem; rather, we proposed the very opposite. By orienting ourselves towards thinking and imagining through failure, our queer critique sought to embrace its generative potential. And by *re-orienting* our consideration of failure and success to being a systemic and infrastructural problem of data under techno-capitalism, as opposed to being a human- or user-driven phenomenon, we contend that this critique has the potential to generate new discursive entanglements with data as both concept and material artifact.

Despite our fundamentally *queer* critique, we have deliberately avoided definitions of queer(ness) in this article, for the most part. *Queer* comprises many meanings, not least of all its rejection of and resistance to dominant systems of power and visions of normativity. It is this polysemous potential that creates space for more robust, inclusive and creative discussions about data. To queer data, and our understanding thereof, is to question how information is collected and structured, how these processes affect (and *effect*) our understanding of subjects and the world around us, and why these processes serve to reproduce an inherently violent hegemonic order. We would like to re-articulate here that there is always the possibility of failing to engage with data, whether by intention or ignorance. It is possible to fail by dissociating the politics of technology from the actors, corporations, and governing bodies that define what data are. It is possible to fail by prioritising technological solutions that perpetuate hegemonic, cissexist and techno-capitalist infrastructures. It is possible to fail data by not being queer enough. There is a queer art to failure and in our critique, we recognise that we might, as authors, have failed here. Perhaps that is exactly the (queer) point we were trying to make, after all?

NOTES

[1] This is a co-authored interdisciplinary paper, written by a trans linguist and a non-binary information scientist. We overtly engage in this paper with the politics of authorship and critique by not feigning neutrality or objectivity. Instead, we write explicitly from the standpoint(s) that emerge from the entanglement of our personal and disciplinary identities. As such, we have opted here to make use of the personal plural, *we*. For the most part, the we in this paper is oriented towards this negotiated co-authorial standpoint – but we invite other readers to include or dissociate themselves from a more expansive reading as they see fit, whether in entirety or only in part(s).

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