P/REFERENCES OF DESIGN

FROM BIG DATA TO LOCAL DATA: AN EXPLORATION OF ALTERNATIVE APPROACHES TO DATA IN DESIGN.

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ABSTRACT | We live in datafied societies where data is collected and used to shape even the most intimate spheres. The last decade has seen the emergence of new and critical data practices as well as approaches to the study of data that have had little applications and impact on design so far. With increasing demands on designers to work with and use data in their practice, more reflection is needed to frame the relationship between design and data, and to expand the boundaries of how design should and could understand and use data. The paper begins by exploring the key changes from within design as a result of increased engagement with data (and specifically big data). Drawing on reflections from two practical design research cases, the paper then offers an invitation to rethink the boundaries of data and explore alternative approaches that focus on everyday data cultures. As a more nuanced understanding and use of data develops (including within design), a more nuanced knowledge of alternative data practices and critical ways of framing and exploring data is required. By tracing the new boundaries of emerging alternative data practices, this paper aims to make a contribution in this direction.

1. Introduction

Data are everywhere. Through digitalization and the proliferation of devices that can capture, measure, collect, store and compare data about most of our social (digital) actions and interactions, we have come to produce an incredible amount of data that we now need to understand and make use of. Increasingly, data is being collected by governments, companies and by us (e.g. by self-tracking) through a variety of tools and during most of our social interactions, whether we know it or not. When we buy tickets for a concert with our credit card, when we watch a film on one of the many movie platforms, when we go to the doctor, or simply when we switch on or off the lights in our smart homes or walk through the train station in a smart city, different actors are collecting, storing and trading our data at different times.

Scholars have dubbed this phenomenon *datafication,* as we increasingly live in *datafied* societies (Hintz et al., 2018). What this label attempts to capture – I believe – are at least four fundamental shifts that have occurred in our relationship with data, namely: i) that data is now collected continuously through and during most of our social interactions; ii) that data is increasingly used to make sense of our societies, including by shaping what is knowable and valuable; iii) that for most of us, collecting data is a largely *passive* activity, done *to* people who are represented and treated differently as a result of data collection; and iv) that data is collected and used interchangeably in different parts of the world and according to a universalizing approach, as context does not matter.

This paper aims to build an argument for design to become more attentive, take a stance and define its roles in relation to data, seeing itself not only as a practice that uses data to improve services and products, but increasingly as a practice that is critically engaged throughout the data lifecycle (including the planning, storing and reuse of data). Drawing on two practical cases, the paper presents alternative data practices as an invitation to rethink the boundaries of data in design, including dealing with the politics of datafication, and to reflect critically about new forms of inequality and injustice that can result from data-driven decision-making and profiling. The case studies present two different pieces of research, one in the field of mental health (Pierri, 2020) and one in the field of smart cities (Pierri and Wiltshire, 2021). As the presentation of the findings and methods of both research projects is the focus of the papers just referenced, this paper will mainly draw on the findings to share reflections and extrapolate some general concepts about data that might be useful for design.

As design is increasingly asked to engage, learn and produce things and meanings through data, more nuanced knowledge from within the discipline of alternative data practices and critical ways of framing and exploring data is needed. By tracing the new boundaries of emerging alternative data practices, this paper aims to make a contribution in this direction.

2. Who Is Talking About Data and Why?

The last decade has seen the emergence of new and critical approaches to the study of data at the intersections of anthropology of technology, critical and internet studies, science and technology studies, and increasingly in design and HCI, which seek to complexify and counter alternative views of data to those that are more dominant.

In an attempt to make sense of the increasing amount of data we face today, scholars (Kitchin, 2014) have started to differentiate between so-called '*captured data'*, which is intentionally collected to produce specific datasets and knowledge, and '*exhaust data',* which is the type of data that is unintentionally produced in large quantities by electronic devices and digital systems, and which is mostly a *by-product* of other activities. This typology of data, sometimes also known as *'big data'*, is considered to be the most promising for advancing science and supporting business objectives.

Since the emergence of big data, scholars have warned of a quasi-religious process and new forms of *faith* in data, referred to as *dataism* (van Dijck, 2014) or *data fundamentalism* (Crawford, 2013). Both terms point to a pervasive and unwavering belief in data as the primary and only source of knowledge: if we have the right data, there is nothing we cannot do, know or decide. Early questioners of this mantra of *'big data'* as the solution to all problems have also emerged (Boyd & Crawford, 2011), who questioned the objectivity and accuracy of this type of data. Thanks to these critical stances, big data has been framed as not neutral and as deeply political instead (Coté et al., 2016), and therefore a site of struggle over meaning, power, interpretation, inclusion and exclusion in the production and use of data.

What most of these narratives have in common is a set of assumptions about data: What is it? Why is it useful and valuable? What is its power? As the field of critical data studies has developed, it has been pointed out that "[a] potentially serious problem with some of these forms of critique is that they risk echoing, mirroring or amplifying – rather than debunking – the dominant myths about the power of technology" (Burgess et al., 2022, p. 12). Indeed, some of these critical approaches lack engagement with the lived experience of those affected by new data practices and risk becoming as abstract and universalist as the theories and practices they seek to critique. As an alternative to these framings, "everyday data cultures" approaches (Burgess et al., 2022) have been put forward, reminding us that people are not only and always *passive* subjects of data (or data objects). These approaches underpin the research presented in this paper.

'Everyday data cultures' is an emerging framework for studying the impact of data and digitalization, paying attention to the datafication of everyday life, the ways in which people develop intimate relationships with and through data and digital tools, as well as the mechanisms they develop to cope with, resist and better control the digital technologies used in their lives. These research methodologies – so-called "from below" (Miller et al., 2021) – focus on how ordinary people live with technology (and data) and develop their own creative and ingenious ways of using the data to address issues they face (e.g. from ageing to health care or maintaining social relationships). Through an everyday lens, people's experiences in the use of technology (for instance, in everyday routines in the home) become central as sites for demystifying technological determinism, that sees technology as being introduced and used in the same way everywhere.

3. Design and Data: What Are the Boundaries?

Design research and practice are increasingly paying attention to the ways in which they can capture and understand data, particularly in the cases where design deals with digital platforms and services as well as machine learning. In the following pages, the paper attempts to provide a brief overview of the main literature on the topic. In the last 10 years the number of articles on the topic has been gradually increasing, also due to the influence of conferences and special tracks dedicated to this issue. Overall, from the literature analyzed it emerges that design seems to follow the path that other disciplines have also taken, showing an increasingly critical view on the topic of data.

Unsurprisingly, many studies in design still fall into the mainstream field of *'big data'*, which focuses primarily on the role of data in innovation and in corporate settings (Urbinati et al., 2019), highlighting the challenges and opportunities that big data offers to companies, and mostly focusing on the tools and methods that are needed in order to create and fully capture the value of *'big data'*.[1] Other studies (Mortati et al., 2023) question the value of (big) data used in design projects and explore how big data can be combined with the qualitative 'thick data' that design also produces, or for creative purposes (Quiñones-Gómez, 2021).

[1] Mortati et al. (2023) provide a good review of the literature on data and innovation, where data is used at different stages of innovation to generate new knowledge to support business processes and develop products and services.

A useful definition for capturing how designers work with data and how data is used differently to support their practice, distinguishes three types of value associated with data in design (Speed and Oberlander, 2016): i) raw measurements; ii) commercial and social; and iii) moral and ethical (which mostly relate to the management of personal data). Looking at changes in computing and communication technologies, Chris Speed and Jon Oberlander have provided a robust reflection of the key developments in design as data moves from being a source to design '*from'* to something more complex and fluid that designers need to design '*with',* if not to a state where design is produced '*by*' data (2016). In the first mode of design '*from',* data is collected and used in more classical ways, for instance to allow design to improve its services and products and enhance innovation. Designing '*with'* data includes the possibility of designing with the live streams of data generated through digital interactions and captured live. In this case, data operates as a *flow* rather than an object, which raises new challenges for design to use it and requires new knowledge and tools. Design *by* data illustrates the case where design happens autonomously, as systems design other systems. At the time of writing their article (2016), the latter mode was generating a lot of interest as well as anxiety about the "[…] emerging prospect that data itself, supported by an algorithm, will become a designer" (p. 9).

While the last scenario has not materialized (at least not yet), we could say that there is still a risk that design will lose its roles if designers (especially those working on digital platforms and services) do not expand their boundaries for how they look at and consider data in their work. While many approaches, especially in corporate design practice, still reproduce an understanding of data (and specifically *big* data) as "the new oil" (Porciuncula & de La Chapelle, 2021) that needs to be accumulated and used to gain business and scientific advantages, interesting research is emerging within the design field, that aims to expand the boundaries of data and of what design could do for shaping the data infrastructures.

These attempts include for instance new reflections around the role of designers in the process of *data transformation* (Prendiville et al., 2017), as a key moment where design can contribute practically to make data available, accessible and comprehensible to communities and the general public. Other studies have put forward innovative models for rethinking data visualization (as another key area for design), either to put people's senses and experience of data at the center (Hogan, 2018) or to expand new data imaginaries (Benabdallah et al., 2023) through participatory engagement with different actors and as a way to increase people's data literacy. Tools and methods have also been identified for designers to make the most of *open data* that is accessible in new and generative ways for research (Kun et al., 2018).

Within HCI studies, nuanced ways of reflecting and using data have also been proposed, where data is clearly no longer a simple input or output of design activities, but is more fully understood as an *object* of design (Feinberg, 2017). Melanie Feinberg draws on Redström's concept of "design after design" to frame digital processes as those in which the product of one design activity becomes the material for subsequent design activities. In doing so, she foregrounds new roles for digital designers in dealing with data, including the design of data infrastructures, collection and aggregation. From within HCI we can therefore observe alternative narratives emerging where the nature and essence of data are questioned, and data is no longer a simple means to an end, but a material that can be shaped by design to create a diverse range of experiences (Lee-Smith et al., 2023).

This brief overview of the modes of interaction between design and data illustrates a growing and moving field, where we are shifting away from acritical practices fueled by big data enthusiasm (still mostly happening in corporate design), towards building the right tools and methods to sharpen design understanding and use of data, as well as questioning the role and essence of data overall.

In the next section of this paper, two alternative approaches to the understanding of data will be discussed, drawing on reflections from two projects. These aim to put forward practical ways in which the boundaries of data could be extended within design, namely by extending *data as plural* as well as by introducing questions of *justice* in relation to data.

4. Alternative Framing of Data

The previous sessions aimed to present the context in which alternative framing of data in design could (and should) happen, as well as to highlight the reasons why this is an important issue for design to address. Summarizing, the paper presented the following arguments: i) that data is becoming a complex and central new object for design in *datafied* societies; ii) that critical data studies are increasingly complemented by new and interesting approaches that pay attention to everyday data practices; iii) that current reflections within design on its mode of use and relationship with data are still taking place within narrow boundaries; and iv) that design could benefit from expanding its boundaries and understanding of data through alternative data practices.

These alternative approaches draw on principles of "data feminism" (D'Ignazio & Klein, 2023), which pay particular attention to the political and power dynamics in the collection, use and reuse of data, and (most importantly) question whether and how the *'datasets'* compare with the lived experience of those who are the object of the data collection. Following these accounts, when attempting to design a digital service or product, designers should critically explore what data is available, what the data means from the everyday point of view of the lived experience of those represented by the data, its politics and meaning as well as paying attention to the data that is *not* there. This last point was perfectly illustrated during the COVID-19 pandemic, where data were used to define the problem, design solutions and prioritize groups or areas for care interventions. In these number-based policies and narratives, certain groups – whose data was *not* collected – were deliberately made to disappear by design. Scholars who paid attention to what was not in the data during the pandemic were able to identify what they called instances of "data poverty" (Milan & Treré, 2020), which constitutes a new form of invisibility that perpetuates and creates new forms of inequality. Interestingly, these scholars also mapped the ways in which these so-called *'marginalised communities'* still succeeded in creating forms of solidarity from below to mitigate the negative effects of their (data) invisibility.

Through these accounts, data is not simply something that is *done to* people, as we can see how people become *subjects* of their data, or how data itself becomes the terrain for new struggles and the object of new forms of action that aim to produce new narratives (not captured by data), through alternative ways of documenting and making visible.

This next session draws on two design research projects I was involved in that aimed to explore data not as a neutral or objective thing, but as something produced through social relations and in context. Both projects had a clear stance on valuing and eliciting the *'lived experience'* of data in order to focus on the concerns and priorities of those most affected, their views, fears or wishes for how data could be used differently by design.

4.1 Data as Plural

Data is usually used as a singular noun (we say that data *is*, or that data *does,* etc.). The idea of data as singular has profound consequences in shaping the unspoken ways in which we understand data. Data as singular evokes the idea that data is one thing, that it has no differences, and no relationships. Data used as singular reinforces universalizing conceptions of data (Chan, 2014; Douglas-Jones et al., 2021) that seem to imply that data is the same everywhere and has the same meaning that cannot be questioned or contextualized.

In the first case study presented in this paper (Pierri and Calderón Lüning, 2023 and Pierri and Wiltshire, 2021), participatory design research aimed to engage citizens in four European cities to reflect and learn more about digital technologies and data collection at the city level. The whole project was based on the premise of understanding data (and the digital technologies used to collect it) as *contextual*. General data on the impact of digitalization in smart cities or local data from the four participating cities were already

collected and available through national and local statistical portals. However, by adopting a more contextual understanding of data, the project did not start by simply using the data that already existed, even if it was presented as objective and reliable data. Instead, the team was interested in capturing the local understanding of data, the data that was not being collected, as well as how different people in different parts of the city were affected by and used the data differently. Therefore, at the beginning of the project, the team brought together local residents and digital rights experts to map the local context and provide insights into the local priorities around data and digital technologies. The local maps of data and digital knowledge that were collectively created in each city immediately revealed a more diverse data landscape. Each city then took a bespoke approach to designing engagement around the data, and several workshops were held with citizens, all of which were tailored and varied in terms of topics and focus. All workshops and events were conducted in the local language and facilitated by local researchers and professional facilitators.

This approach assumed data (from now on in the plural) and allowed them to emerge as deeply local objects. Which data were collected during the project and to which data citizens paid attention to, depended on the different local sensitivities and approaches to data and digitalization more broadly. This mode of engaging with data draws on recent studies in anthropology and design (Douglas-Jones et al., 2021; Loukissas, 2019) that frame data as cultural and locally embedded objects and practices. In these accounts, data *settings* (rather than data*sets*) are most relevant for describing data that make sense and produce knowledge in context. The *'settings'* of the first case study were the different maps and priorities that were identified locally, that spoke the local language (problematizing the use of English as the most common language in mainstream and universalized narratives of *'smart cities'*), and that framed data as being used and understood differently in each of the cities. These contextualized and different approaches gave cultural flavor to our *data conversations,* as the tone and content changed, sometimes significantly, in different cities. We learned through contextual research that data are no agnostic to places (Loukissas, 2019) and additionally we learned how data can have histories as well. In fact, even before digitalization data have for long time been collected and used and may evoke different emotions and attitudes in different places based on their histories. As one of the cities involved in the project was part of a former communist country, questions about local sensitivities to data collection and use based on past history could not be ignored. In this way, data start to be framed beyond the universal data of machine-readable information, but through the cultural, historical and lived experiences of those who produce and make sense of data locally through their practices.

4.2 Data and Justice

Linnet Taylor (2017) is the scholar who originally introduced the concept of data justice, understood as the ambition to achieve "fairness in the way people are made visible, represented and treated as a result of their production of digital data […]" (p. 1). Particularly when used in public services (as well as for political purposes), data effectively become the way in which citizens are grouped according to identity traits or behaviors and are made visible, represented and treated differently as a result of their digital profiles.

As data tracking and automated decision-making through data are currently being designed into most of our public services, with the aim of increasing efficiency and evidence-based decisions, issues of social justice come to the fore for all those designing these platforms. This is particularly true in what Virginia Eubanks calls "low rights environments" (2018, p. 12), which are the social and health service sectors:

> "Those designing AI systems in general, as well as those focused on the welfare state are overwhelmingly white, male, well-off, and from the Global North. No matter how committed they might be to certain values, the assumptions and choices made in shaping the digital welfare state will reflect certain perspectives and life experiences." (Alston 2019, p.4)

The second example this paper is putting forward is based on research into community mental health in the UK (Pierri, 2020), where digitalization of public services was introduced on a massive scale (and to the

enthusiasm of many) in the early 2000 (HM Government 2012). Community mental health includes health care services (not just medical ones) that are designed to be delivered closer to the people who need them, and that involve local communities in various ways, with the aims of both: building joint collaborations to provide a caring local environment for those in need, as well helping to raise awareness of mental health issues and thereby reduce stigma for those affected by poor mental health.

In practice, the digitalization of mental health services in the UK meant that services were de-materialized as health and social care assessments were increasingly carried out online using purpose-built platforms. According to the government narrative, these digital platforms were designed to be *'neutral'* as they operated in a data-driven mode, collecting and using all available data to make the best decisions in each individual case. The aims were to drive cost savings and provide the best support based on the data available. The data points in these cases were generated by triangulating a wide range of data: including people's biographies, their work experiences, previous episodes and encounters with the National Health Service (NHS), and *potentially* other available datasets about the neighborhood in which people lived, the schools they attended and the behavior and interactions of the extended network of friends and family members. This is a *potential* list (albeit a very realistic one) because at the time of their introduction – and in some cases this is still true today – it was neither transparent, nor even understood as problematic, what data these platforms were fed and how the algorithm processed them to learn and adapt (Alston 2019).

Data in this project were revealed as a terrain of power struggles over visibility and justice: what data were being collected and *not* collected, what knowledge the data were supposed to hold about people's fluctuating mental health and how the data were being used was not clear to anyone involved in the process. Using what we now refer to as *design justice* (Costanza-Chock, 2020), the project engaged advocacy and campaigning mental health organizations to call for more participation of those involved and affected (especially those potentially harmed) in deciding what data should be collected and how the practice of data collection should be designed in advance to create more transparent, alternative and inclusive data infrastructures. If faced with similar design briefs, designers asked to design digital platforms for public services might even consider the option of not designing with the available data, as this can be opaque and biased.

5. Pushing the Boundaries: What Are the Implications for Design?

In the preceding pages, this paper has explored the current ways in which design practice engages with data, both as an input to the design process and as an output or object of design. Drawing on practical cases, the paper has developed alternative understandings of data (as plural and as a terrain of struggles for justice). The aims are to trace new boundaries for what data are and what design can do with/for/by data and to make a further contribution towards new approaches to design and data.

The main argument of the paper is for design – especially when used to design digital services or platforms, or increasingly in machine-learning – to take a stance and define its roles not just as a practice that uses data to improve services and products, but increasingly as a practice and mode of research that is critically engaged throughout the data lifecycles. This would include, for instance, rethinking the roles of design in the *planning*, *collection*, *storage* and *use* phases as well as in thinking creatively about opportunities for *data re*use (which, for example, should be fostered and facilitated by design and for the public good).

As Feinberg writes:

> "[…] the development of data infrastructure is not commonly considered as a design activity, perhaps because such decisions often seem banal and obvious, or because they seem more associated with subject-matter expertise and scientific methods than with a design perspective. The use of temperature to understand weather, and the means in which temperature is

> measured, seem a matter for meteorologists to specify, not for designers to interrogate or imagine differently." (2017, p.2954)

Echoing Feinberg, this paper asks designers to question whether and why this should actually be the case and suggests that re-imagining data infrastructure and data practices across the whole lifecycle is precisely a role for designers. As Crawford reminds us: "Data and datasets are not objective; they are creations of human design" (2013). And therefore attention from design to how these data infrastructures are currently made, or could be made differently, would be a fruitful question for design to address.

The main objective of this paper has been to raise the need for design to expand its boundaries and understanding of data. It has attempted to do this by drawing on recent critical literature on data and on two practical projects where design has been confronted with the complexities of dealing with data. While both projects foreground critical questions and ways of dealing with data, and perhaps even imagine cases where designers choose not to work with the available data, more work and cases are needed to expand the methods we have available to deal with data critically, as well as thinking of ways to bring these questions and alternative data practice straight into the design education for the future designers. Interesting examples that have been developed on the methodology level, include "data journeys" (Bates & Goodal, 2016) as qualitative ways of experiencing the geographical and temporal scale of data and capturing the 'life of data' from its initial phases to modes of reuse in different contexts; or "data walks" (Murray et al., 2015), which are creative ways of analyzing data and their meaning with different actors, including those affected by the shared data. Expanding tools and methods to engage with data differently, including in design education (de Götzen et al., 2018), is the next terrain for design to explore further. For while more design researchers are becoming aware of the complexities of engaging with data, I believe the discipline still suffers from what has been defined as a form of conceptual dissonance "[…] where one knows conceptually that data is interpretively fluid and yet acts as if it were, might be, or should be objective and universal […]" (Feinberg 2017, p. 2).

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