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Data justice made tangible, spatial and actionable: An exploration of everyday data fairness through game making

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Abstract

Data justice is negotiated and performed in everyday micro-actions and spatial settings. Yet it is hard to visualise, unpack and, thus, act upon, as its spatial and actionable characteristics remain hidden: everyday actions tend to be carried out automatically, and their data dimension remains, in most cases, not tangible and seemingly not operable. This article explores how data (in)justice can be made tangible, spatial, actionable and safely experimented with through tabletop game making and prototyping. The data was collected in a class setting within the Design Games Framework (DGF), a structure where research participants, first, write daily diaries describing their everyday socio-spatial contexts and, second, prototype a tabletop game reworking existing board games through the relevant topics emerging from the diaries. Results show how the process of designing games to explore data justice discourses and ethical dilemmas, such as fairness and transparency on the use of data, or data privacy, enhances actionability over data by making it tangible and spatial.

Keywords

Game making, data justice, data agency, spatiality, critical data studies, critical datafication literacy

Justicia de datos tangible, espacial y accionable: Una exploración de la equidad de datos cotidiana a través de la creación de juegos

Resumen

La justicia de datos se negocia y se lleva a cabo en microacciones y entornos espaciales cotidianos. Sin embargo, es difícil visualizarla, analizarla y, por lo tanto, actuar en consecuencia, ya que sus características espaciales y prácticas permanecen ocultas: las acciones cotidianas tienden a realizarse automáticamente y su dimensión de datos, en la mayoría de los casos, no es tangible ni aparentemente operable. Este artículo explora cómo la (in)justicia de datos puede hacerse tangible, espacial, accionable y experimentarse de forma segura mediante la creación y el prototipado de juegos de mesa. Los datos se recopilaron en un entorno de clase dentro del Marco de Diseño de Juegos (MDJ), una estructura donde: primero, los participantes escriben diarios que describen sus contextos socioespaciales cotidianos; segundo, prototipan un juego de mesa que reelabora juegos de mesa existentes a partir de los temas relevantes que surgen de los diarios. Los resultados muestran cómo el proceso de diseño de juegos para explorar discursos sobre justicia de datos y dilemas éticos, como la equidad y la transparencia en el uso de datos o la privacidad de los mismos, mejora la capacidad de acción sobre los datos al hacerlos tangibles y espaciales.

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Introduction

Data is not an 'abstract' construction (Dencik et al., 2019); rather, in its seeming intangibility and volatility, it concretely plays an increasingly relevant role in how activities are carried out in everyday spaces. Data does not happen externally to humans. It forms 'selves' (Kitchin, 2021; Smith, 2018; Tucker, 2023) and agencies, or the capacity to act and perform daily activities (Pink et al., 2018; Kitchin, 2025). If justice itself is also understood in its practical, rather than abstract, dimension (Dencik et al., 2019), then data justice may also be made tangible and spatial and concretely (re)performed and (re)negotiated in everyday activities.

Data justice is a burgeoning field of research, moving across disciplines and encompassing, for example, issues of surveillance (Russell and De Souza, 2023), digital rights (Taylor, 2017), international development (Heeks and Renken, 2018) and criminal justice (Završnik, 2021). Within human and legal geographical scholarships, data justice connects with extensive debates regarding spatial justice and social justice-based theories on the right to the (digital) city (Currie et al., 2022; Kitchin et al., 2019; Tedeschi, 2024).

Yet bringing data justice into the concreteness of everyday life and spaces, to raise awareness of its significance and of the risks entailed by the type of data that is shared, to whom, where and with what motivations, is hard to achieve. Within critical data studies, feminist and queer approaches, for example, emphasise IT system design for social change, which only happens if the structural biases upon which data is aggregated are made visible and, thus, concretely workable. In this sense, they provide 'a lens that shows how social inequalities are interwoven in the society's socio-economic-political fabric, making threads of injustice visible' (Draude et al., 2022: 197).

A variety of methods has been explored across disciplines, in the effort of moving the seeming 'abstract' realm of data into visibility, tangibility and actionability: in citizen science, knowledge is co-produced with citizens, to acquire 'visibility, in and through public data, to remedy specific social injustices' (Christine and Thinyane, 2021: 2; see also Kitchin, 2021); in design justice, data is rethought by 'data scientists, scholars, artists, and community organizers' (Costanza-Chock, 2020: 9) via community-led design activities to unveil structural biases and inequalities; in data science, 'feminist and antiracist methods' (D'Ignazio and Klein, 2020: 13) try to resist invasive data collections, which diminish personal privacy, increase self-surveillance and impose a data-sharing culture (Kent, 2023); in human–computer interaction (HCI), data are rendered into '3D physical artefact' through 'data physicalisations' (Lupton, 2017: 1605). In the design practices, facilitation and ideation techniques have long centred on using low-fidelity 'material anchors' (Hutchins, 2005) to make data visible and tangible, such as sticky notes (Ball et al., 2021).

In geography, big data has been used to address environmental data justice issues (Walker et al., 2018); forms of co-creation of digital platforms give agency to citizens in the making of the right to the digital city (Leclercq and Rijshouwer, 2022); data activisms can counter data capitalism and colonialism and 'redistribute data power' (Kitchin, 2024: 30) in city settings; in his 'Data Stories' project, Kitchin experimented with art-based methods to build and navigate data stories (Kitchin, 2023).

Interestingly, what all these approaches have in common is an emphasis on co-creative group-, citizen- and community-led (especially marginalised communities: see Costanza-Chock, 2020) bottom-up socio-spatial practices, where hidden, structural biases are unveiled and the role of data in the making of everyday life and spaces is unearthed and made visible, tangible, and actionable.

Aim of the research

In this article, we build upon these approaches and adopt the Design Games Framework (DGF) (Gkouskos et al., 2023; Hylving et al., 2023; Resmini et al., 2024), a methodology that centres on tabletop game making as a prototyping activity. Through this methodology, we aim to bring data justice issues into visibility, tangibility, and actionability. Research participants – in this case students working with digital service innovation – were asked to keep a diary of their daily encounters with digital technology in their socio-spatio-normative contexts and then reflect on surface ethical dilemmas related to data justice emerging from the diaries. These dilemmas were then explored through the design and realisation of tabletop game prototypes using the process and methods offered by the DGF. Results from the experiment show that the DGF effectively helped the research participants make data justice dilemmas – such as (un)fairness and (lack of) transparency on the use of data, or data privacy – tangible and spatial, and, thus, easier to conceptualise, formalise, understand, and act upon. While the context in which this empirical research was carried out is spatially and temporally limited, this article aims at laying the foundations to replicate it in other spatial, more complex settings.

This article is organised as follows. Section 2, the next section, is divided into two parts: a literature review on data

justice, specifically in its connection with critical data studies and critical datafication literacy, moving towards feminist scholarships and their conceptualisation of data as a material, tangible and spatial element, a discussion of the DGF as a low-barrier 'learning-by-doing' experiential and exploratory methodology to address complexity and wicked problems (Rittel and Webber, 1973; Buchanan, 1992), in this case how to make data tangible, spatial and actionable. Section 3 introduces the materials and methods: daily diaries collected from research participants, discussions and the tabletop game prototyping activities. Sections 4 and 5 respectively present and discuss the results of the study. Section 6 draws conclusions, summarising the results and emphasising the article's theoretical and methodological contribution to the data justice debate.

Theoretical framing

From data justice and critical data studies to critical datafication literacy

While data tends to be perceived as immaterial and intangible (Lupton, 2017), it concretely and pervasively shapes human bodies and their sense of place and belonging (Hinton, 2015): indeed, it 'can have agentive capacities that shape people's embodied responses and actions, their sense of selfhood and their relationships with other people' (Lupton, 2018: 6) and their everyday spaces. Yet there are risks connected to massive datafication of bodies and spaces. Algorithmic processing of real-life data tends to give 'fixity' and apparent stability and objectivity to personal 'whereabouts, who we are, and what we might become' (Halegoua and Polson, 2021: 576). In other words, it frames humans into predefined categories and classifications – 'race, ethnicity, religion, gender, location, nationality, socio-economic status' (Taylor, 2017: 3), to name a few – which may lead to informational harms (Viljoen, 2021), algorithmic power imbalances reproducing structural inequalities (Chun, 2021; Crawford, 2021) and injustice. While it is hard to resist data aggregation and hidden, datafied biases and forms of discrimination, as well as to understand how data is influencing people's bodies in their everyday spaces, scholarships on data justice and critical data studies are advancing solutions and alternative ways of thinking with and about the data in relation to bodies and spaces.

The field of data justice is under construction (Kitchin, 2021). Yet interesting contributions are populating the field, with critical approaches towards, for example, the rise of surveillance and dataveillance in cities (Currie et al., 2022) versus the need for privacy and data protection (Dencik et al., 2016); data activism initiatives (Lehtiniemi and Ruckenstein, 2019) to counter data misuse and promote social justice; use of Geographical Information Systems (GIS) data for environmental justice, for example, 'to document evidence of disproportionate exposure to environmental burdens (such as pollution) or disproportionate access to environmental benefits (such as green space) along lines of race, ethnicity, class, and other socioeconomic characteristics' (Ovienmhada et al., 2024: 182); and problematisation of the lack of data in specific segregated contexts of the Global South, leading to increased marginalisation of urban communities and data injustice (Heeks and Shekhar, 2019).

The effort of these works goes in the direction of critically recognising the extent to which data is embedded in the socio-spatial (here, with reference to urban, socio-spatial and environmental justice, to name but a few), whereby the two – data and the 'socio-spatial' – are tightly intertwined. Such embeddedness makes data justice scholarships relevant for and within critical data studies, where, for example, the tangibility and spatiality of data are theorised (Pink et al., 2018; Sumartojo et al., 2016) and critical methods to study it explored.

In the edited volume of *New Perspectives on Critical Data Studies*, Draude et al. (2022) emphasised how the concept of data justice is complex and multifaceted, as it necessarily navigates 'the tension between having/using and not having/using certain types of data', which is crucial and a prerequisite to build 'more equitable, just, non-discriminatory futures' (p. 188). For example, invisibility or low visibility (e.g., 'underrepresentation of certain groups, people, contexts in datasets'; Draude et al., 2022), as well as missing data (Onụọha, 2016), generates power imbalance and injustice. Power imbalance connects here with design justice (Costanza-Chock, 2020) as a set of tools promoting social justice bottom-up via participation and care towards just design processes. Draude et al. (2022) emphasised that the connection between data and the socio-spatial has been the focus of intersectional theories and methods and feminist thinking for decades. As cited in D'Ignazio and Klein's (2020) work, a key concept necessary for the design of just data processes and infrastructures is *embodiment*: how is data embodied/materialised by different types of persons? What kind of effects does data extraction produce in their everyday life and spaces? And how is it possible to make it not only visible, but also tangible and, thus, concretely actionable?

Data is fed back to people in multiple ways, as online personal profiles or in aggregated forms. While being useful in carrying out daily tasks and activities, data extraction may result in hidden, or hard to identify and act upon, yet embodied harms and injustice. There may be at least four intersecting types of effects that these 'beings' (forms of data aggregation) may produce on humans, yet mainly in hard-to-grasp ways (Smith, 2018), difficult to become aware of. First, there are subtle emotional harms taking a daily toll on people: for example, distress for possible online identity thefts; uncertainty about uncontrolled data collected from children; anxiety towards an unexpected reputation damage (Redden et al., 2020). Secondly, data tends to feed online images and utopian geographies of people, spaces and times where marginalised groups and places are unjustly left out of the picture (McLean, 2020), increasing social and spatial injustice and
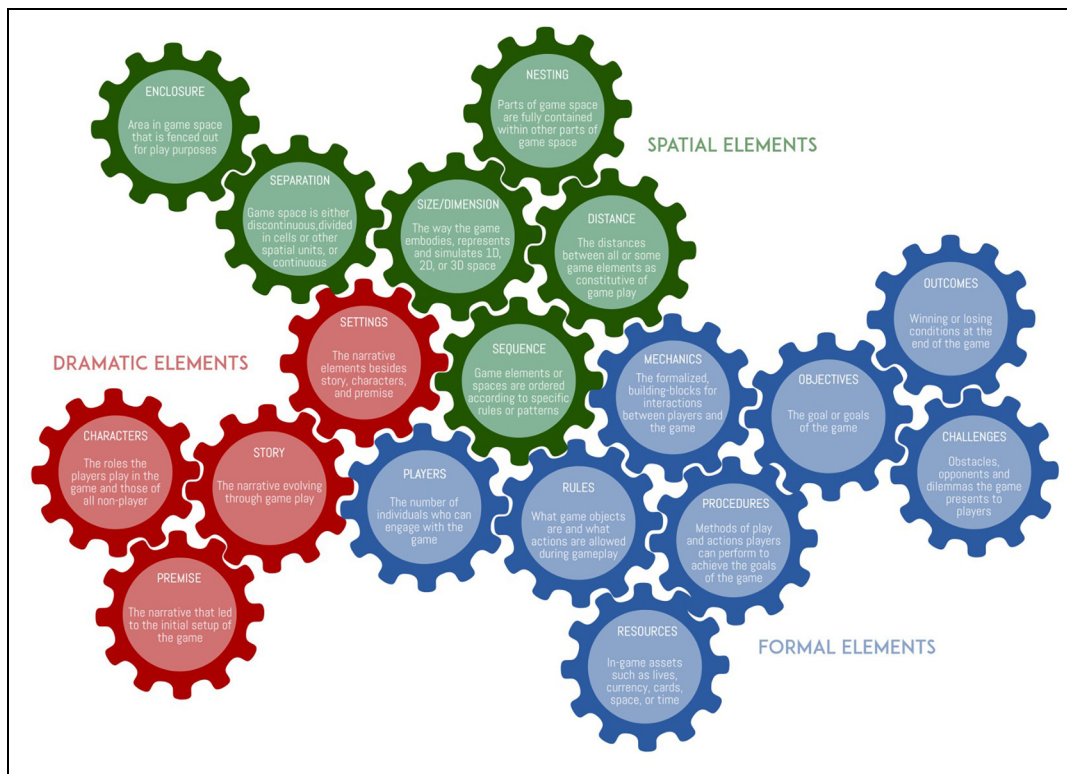
Figure 1. The DGF element sets.

thus producing socio-spatial harms. Thirdly, data tends to boost successful, overachieving online profiles, where life events such as unemployment or other disadvantaged, unplanned circumstances such as grievances, illnesses or failures are hidden, and the people and emotions related to them are oftentimes forgotten, producing psychological harm (Talvitie-Lamberg et al., 2024). Fourthly, datafication may increase risks of social isolation, producing social harm (De Ridder, 2021).

Raising awareness of the agency of data in what we may call the data-body formation (Tucker, 2023), or the ontogenetic co-construction of (human) bodies and data, is one of the key purposes of critical datafication literacy. As Sander (2024) reported, games are one way to educate people (while fostering 'critical reflection'; Sander, 2024: 102) about datafication and its material effects and harms on bodies (or how human bodies *embody* data) and, we may add, the spaces they live in.

While the majority of games promoting datafication literacy that Sander analysed were digital games, she also stated that games do not necessarily need to be digitally implemented, in line with similar positions stated in game studies and experiential learning research (Abt, 1970; Hylving et al., 2023; Plass et al., 2019; Resmini et al., 2024). As she explained, 'this experiential rather than "only" interactive approach … constitutes a significant finding considering the immateriality of issues around datafication, which often make them difficult to grasp' (Sander, 2024: 158). As one

of the tensions characterising processes of datafication is, paradoxically, the 'fully material intangibility' through which data is increasingly constituting and permeating human bodies, finding ways to make data 'analogue', thus fully material and spatial – tangible and embodied – may be key to promoting agency over data and reducing data harms and injustice. This is what the DGF, introduced below, experiments with.

The DGF

The DGF was chosen as the methodology that the research participants would use to create their prototypes for three specific reasons: first, the acknowledgment of the role played by spatiality and embodiment in sense-making, explicitly recognised via the spatial element set (see below and Figure 1); secondly, the focus on lo-fi prototyping of tabletop games and not video games as a conscious choice to lower entry barriers for non-specialists, both practically (pen and paper vs. programming languages) and conceptually, through the creation of physical props acting as material anchors (Hutchins, 2005) for the sense-making process; thirdly, because of the cultural weight that games have with the Millennial, Gen Z, and Gen Alpha generations (Tapscott, 2009; Muriel and Crawford, 2018).

The DGF offers tools to analyse, describe and explain a game experience in terms of sets of well-defined formal, dramatic and spatial elements and of their relationships and a process in three phases to transform these reflections (game
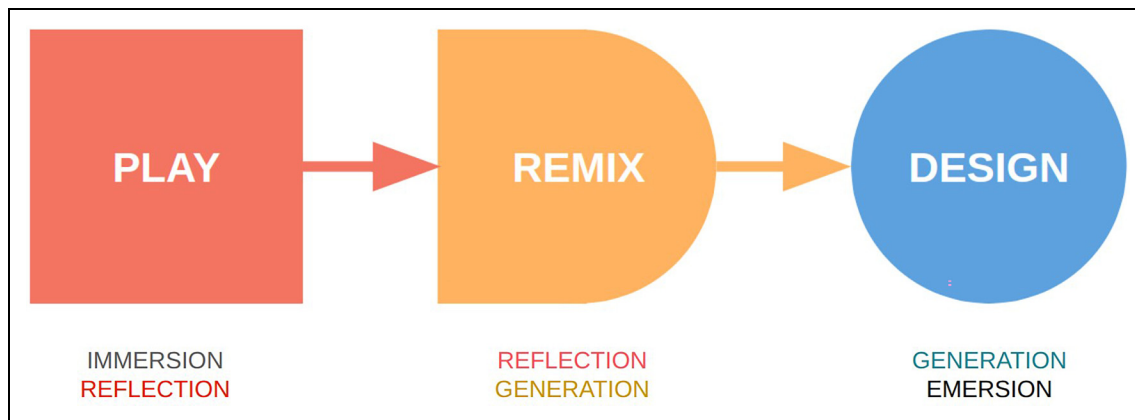
Figure 2. The immersion-to-emersion *Play–Remix–Design* process of the DGF.

knowledge) into generation (design knowledge) through the creation of a prototype – in the form of a tabletop game – that formalises, simulates, and directly engages with a specific wicked problem and the way it develops and behaves. In the case of this research, the wicked problem posed to students concerned the ethical issues related to data (in)justice they chose to investigate.

With the DGF, the game-making process is the centre of what is an experiential learning activity (Kolb, 1984; Moon, 2004) carried out by the people who design and realise the prototype. The primary outcome is the exploration of the problem at hand made possible by having to create a 'game that works', a closed system that supports agency and interactions within the game space and produces uneven, complex outcomes (Salen Tekinbaş and Zimmerman, 2003; Fullerton, 2008). This makes the DGF a fairly unique middle ground between the more conceptual approaches of formal methodologies – such as research through design (Zimmerman et al., 2010) – that focus on knowledge production and the hands-on approaches of speculative practices that focus on 'problem finding within (the) disciplinary and societal discourse' of design (Malpass, 2017: 17).

It also strongly distances DGF games (created by people who need to figure out a problem and that engage in a learning-by-doing journey via the creation of the game itself) from traditional serious games (Abt, 1970; Michael and Chen, 2006) (created by domain experts and professionals for specific third-party audiences who need to learn about a problem through playing). Both DGF games and serious games embody problem-specific knowledge in an artefact – the game – which can be later used to transfer knowledge to third parties which will only play the game, but only the former specifically cast the game-making process as the primary generator of designer knowledge that can be used to understand and possibly contribute to the resolution of a complex, wicked problem.

A typical DGF game-making process consists of three consecutive phases or stages (Figure 2). The first phase is *play*, in which selected games are played and then systematically analysed in their dramatic, spatial and formal elements. This phase is meant to immerse players in the world of the game and to help them produce reflections on how the game achieves its goals and how effective it is at doing that. The second phase is *remix*, in which existing games are purposefully modified by recasting selected elements to achieve different outcomes. This phase develops the reflections of the *play* phase into generative actions that result in a playable iteration of the existing game with its own distinct gameplay and novel outcomes. The third phase is *design*, in which entirely novel games that explore a specific problem at hand are designed (Hylving et al., 2023; Resmini, 2022). This phase expands the generative moments of the *remix* phase to produce a completely new low-fidelity prototype of a game, with the explicit goal of understanding and formalising the systemic entanglement presented by the wicked problem being investigated (Hylving et al., 2022). While none of the phases is necessary – people familiar with games may skip *play*, people unfamiliar with games may stop at *remix* and not attempt a complete *design* nbsp;the process provides participants with an explicit pedagogical flow that supports structured exploration at increasing levels of depth (Resmini et al., 2024) and the creation of opportunities for subverting current approaches and ways of thinking about the problem at hand because of the 'safe' nature of the game thirdspace (Flanagan, 2009).

As guidelines or markers across the three phases of the process, the three element sets – dramatic, spatial, formal – provide a structure to conceptualise the game as a system built on the interplay of diegetic parts (premise, story, characters, settings), spatial primitives (proximity, separation, sequence, nesting, etc.) and ludological building blocks (rules, mechanics, resources, challenges, outcomes, etc.), respectively. Individual elements in the sets were identified from game studies and from spatiality and embodiment literature (Fullerton, 2008; Crawford, 1984; Norberg-Schulz, 1971; Tuan, 1977; Tversky, 2019) and iterated through design

activities, workshops, and seminars (Resmini, 2014). The addition of the spatial set is a prominent characteristic of the DGF that accounts for the importance of embodied components in the experiential learning process and as a constitutive element of the game as a thirdspace for action.

The interplay of the two dialectical parts of a DGF exploration – analytical breaking down of a game/problem into components during the *play* and *remix* phases and systemic designing and prototyping in the *remix* and *design* phases – helps people make sense of the game they are creating and use it as a 'thirdspace' (Soja, 2009; Flanagan, 2009) that they can understand and act in, a closed system that is explicitly regulated, is devoid of external influences and produces no real-world consequences (Crawford, 1984). This exploratory thirdspace also engages the 'system space' (Lindenfalk and Resmini, 2022) that surrounds and influences both the problem being investigated and the solution being designed, as it continuously requires those prototyping to explicitly situate the game in a specific space–time context and in well-defined social and cultural settings.

Materials and methods

Phases of the data collection

The qualitative data collection was conducted as part of an 'Ethics in Digital Service Innovation' master-level curricular course delivered in 2024 at Halmstad University (Sweden). It was carried out in three stages: first, the research participants kept a daily diary for a 14-day period ($n = 24$); secondly, they were asked to discuss and summarise their findings together; thirdly, in groups, they chose one topic they deemed relevant and, based on that, prototyped a tabletop game using the DGF as their methodological scaffolding.

Research participants were young adults studying design at the university. They were informed of the research project carried out within the course and its aims. While they were already familiar with games and game design, and they knew it was part of the process, they did not have any prior knowledge of data (in)justice.

No personal or sensitive details and information are used in this article. The game prototypes were created using pen and paper and then finalized in Figma, a collaborative online tool that allows co-creation of visuals and interfaces using simple-to-use, pre-made shapes and templates. The assignments for the course are classified as public documents. The study complies with the ethical guidelines at Halmstad University.

First phase – daily diaries

The daily diaries were used to gain preliminary insights into the research participants' daily relationships with four elements: private and public spaces of everyday life; daily use of tech devices; laws and social norms; and bodily affections

(e.g., emotions) arising from the combined experience of space/tech/laws. These topics were not preliminarily introduced or explored in class but only given as a prompt of observation of the research participants' everyday life. Research participants had instructions for the daily diary, with guiding questions. Some of the guiding questions related to aspects of 'data lives' (Kitchin, 2021) and how they affect their daily activities and spaces. Examples of guiding questions were as follows: can you separate the technological devices you are using from your own body? Think about, for example, the data generated via geo-location information through Google Maps; activity-tracking devices; interactions in social media such as Instagram, TikTok, and Facebook; or the use of services via the internet, apps such as Foodora or local bus apps. What are they doing? Or are you aware of what they are doing and if/how they collect information about you and your surroundings? How do they affect you? How do they affect your movements in space? Do they affect the way in which you think about and are in space, as well as your social relations? How?

Research participants were invited to devote a few minutes per day to the task and reflect on concrete examples, the daily micro-actions where the four elements come together in multiple ways. The task could be carried out by writing notes, taking photographs, making drawings and using other types of mixed-media material. The students' journals were an obligatory deliverable but were not graded. There was no word limit and no template. In general, the students seemed curious about and engaged with the journal exercise. It was something unusual for them, and some of them were genuinely eager to carry it out. Many students shared pictures accompanied by explanatory texts.

Second phase – group discussion

Upon completion, the diaries were discussed with the research participants, to summarise the findings together. The spatial setting was that of a traditional physical higher education classroom, set up for group work, where the discussion took place. The discussions regarding the diaries did not follow a predefined pattern but rather supported their interest to deepen a certain topic, rather than another. While discussing, the topics were organised on a white board into four groups: space–tech–law–body. These four elements clearly overlapped in the reported everyday experiences, but the purpose of visually organising them into groups was to highlight whether one or more elements were more present than others and how they would overlap (Figure 3).

Third phase – tabletop game prototyping

After the second phase, on the same day, the research participants were divided into seven groups, and each group chose one topic among those emerging from their discussion. The spatial setting was still the university, but the groups were
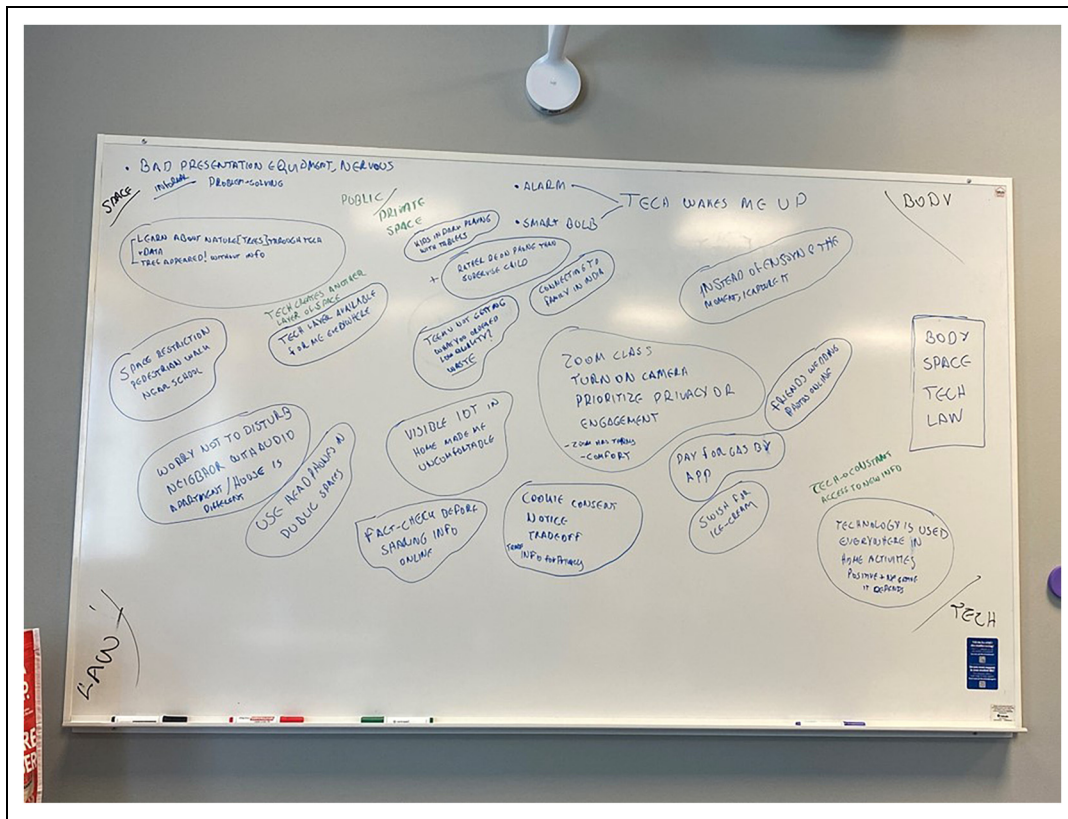
Figure 3. Discussion.

distributed in different spaces and classrooms for the initial brainstorming. They then continued their group work independently in the following weeks, to complete and submit the game prototype. They engaged with the *play* phase of the DGF to familiarise themselves with tabletop games and with identifying their dramatic, spatial, and formal elements and then with the *remix* phase as they started prototyping a tabletop game based on one of two existing researcher-selected card games – *Werewolf* and *Fluxx* (see below) – to explore the topic they chose.

The groups were tasked with remixing one of the two games into a prototype that addressed their chosen topic. Based on the data gathered in the first two phases – including the diaries – each group then collectively decided which game they would use as the starting point for their own remix.

Groups were also given the option to design an entirely new game, drawing on insights from the daily diaries and group discussions, but reaching the *design* phase was not a course requirement. As Resmini et al. (2024) noted, reflection, critical thinking and knowledge production also occur during the act of remixing, and within the time constraints of an academic curriculum, an extended *remix* proved pedagogically more valuable than a rushed *design* phase.

The next sections, *Results* and *Discussion*, are focused on the *remix* phase.

The card games *Werewolf* and *Fluxx* were selected as the initial seeds for the prototyping process because they offer interesting, appropriate, and different enough element sets to comfortably experiment with the intersecting concepts of 'data lives' (Kitchin, 2021) and data (in)justice so that they can be made visible, tangible, and actionable through simple remixes. *Werewolf* is a game in which players are secretly assigned to one of two rival factions: a small group of werewolves who are aware of each other's identities and a larger group of villagers who have no knowledge about any other players. Nights and days alternate, and each faction aims to eliminate members of the opposing side. The villagers win by removing all the werewolves, while the werewolves win once they equal the villagers in number (Gkouskos et al., 2023). *Werewolf* was chosen because the game is centred around information asymmetry and is particularly effective at revealing (data) bias, prejudice, and behavior in the absence of factual information, as players possess none to minimal data to guide their actions and decisions. *Werewolf* is a game of social interactions primarily driven and constrained by its dramatic and spatial elements.

Fluxx is instead a game in which the fundamental rules – draw one card and then play one card – and the winning conditions are continuously changed as players play their cards. Formal elements such as rules and procedures drive gameplay. The lack of an initial winning condition and the ability

for any player to change, add, or remove game rules, goals, and mechanics through card play make it a game where embracing chaos often offers better leverage than strategy (Gkouskos et al., 2023). *Fluxx* was selected because the game serves as a prime example of how complexity and unpredictability can arise from a relatively small set of elements and how sometimes opaque data practices can generate unexpected effects and different types of harms in everyday lives and spaces.

Content analysis

The collected material – thus, the diaries, notes from the class discussion, and the game prototypes – were analysed qualitatively by creating and iterating codes and then themes that describe patterns in the diaries, notes and game prototypes (Miles et al., 2018). From the data, issues pertaining to the (un)just use of data in everyday lives and spaces were largely prevalent. 'Data lives' emerging from the diaries and safely formalised, made visible, and 're-codified' through the game-making exercise were a complex intersection of bodily and datafied elements dynamically forming one's identity and behaviour in socio-spatial settings, largely influenced by, for example, information asymmetry, (un)awareness of data rights, unclear and sudden changes of rules, (lack of) responsibility and need to share versus need to preserve one's own privacy. 'Missing data' (Onụọha, 2016) was also present: parts of lives that are not datafied or need to be 'protected' from datafication. In the section that follows, citations are mainly extracted from the remix or prototyped games. Not all research participants and prototypes are cited or details shared, for example, about how the rules or winning conditions of specific games were redesigned by each group, because of space limitations and of their being out of the scope of this paper. However, the citations chosen represent the most recurring topics emerging from the content analysis of the prototyped games.

Limitations of the study

The study has at least two limitations. First, the prompts provided in the first phase (daily diaries) may have influenced the way in which the students engaged with the journalling exercise. For example, they were asked to pay attention to certain issues, such as to what extent technological devices and, through them, data collection/extraction had an impact on their everyday life. On the other hand, the prompts were provided only as general guidance and instructions, and the students were left free to choose what would have been more relevant for them to note down.

Secondly, the students were given constraints to help them move through the DGF game-making process in the timeframe of the course. While the *play* stage would be usually used to play, discuss and critically assess a number of different games that either formally, spatially, or dramatically offer

entries into the problem in a collaborative manner, the students were told to choose either *Fluxx* or *Werewolf* as the starting point of their game-making activities. The elements of each of the two games placed intentional limitations on the materials that students worked with in their remixes. These limitations were necessary to further lower the barriers to entry and make sure academic deadlines were met, but inevitably also directed the work towards designs that leveraged or countered the specific existing elements of these games. Future work should provide a larger pool of initial games and a more collaborative transition from *play* to *remix* so that other games that align with different characteristics related to data justice practices may be identified.

Results

As mentioned, topics emerged from the content analysis, emphasising at least three interconnected tensions and imbalances in the everyday 'data lives' (Kitchin, 2021) and their unresolved 'fully material intangibility' (Sander, 2024), leading to forms of data (in)justice: asymmetry of information versus need to be in control; causality versus non-linearity (rhizome); and privacy versus data-sharing culture (Kent, 2023). As we will see in the *Discussion* section, data injustice is emerging as a form of tension, or power imbalance, where the characteristics of (in)tangibility and (in)visibility of data are playing a key role in allowing for or hindering acts of resistance towards injustices, in so doing shaping humans' capacity to act (agency) over and with data. In what follows, these tensions and imbalances will be unpacked, showing how data (in)justice is made spatial, tangible, and material (Draude et al., 2022) and, thus, actionable, in the prototyped tabletop games.

Asymmetry of information versus need to be in control

From critical data and data literacy perspectives, possessing more information (e.g., knowing how data is used, by whom, and for what reasons) gives bodies more power, thus more capacity to act and, for example, protect themselves from and resist harm and injustice. This bodily, or embodied, expression of power imbalance – in exercising agency, due, here, to information asymmetry and lack of control – may not reach the threshold of awareness/consciousness in everyday lives, remaining thus most of the time hidden. However, (re)constructing the power imbalance's elements through a physical game pushes, or forces, it towards the surface, giving it a tangibility (in the form of cards, markers, tokens, colours, shapes, and character descriptions, as well as the actual bodies of the players, performing specific movements/actions) and spatiality (in the form of, e.g. positionalities of cards and players) and, thus, making it material and actionable. In the act of re-designing a physical board game to model asymmetries of information, research participants iteratively consider and
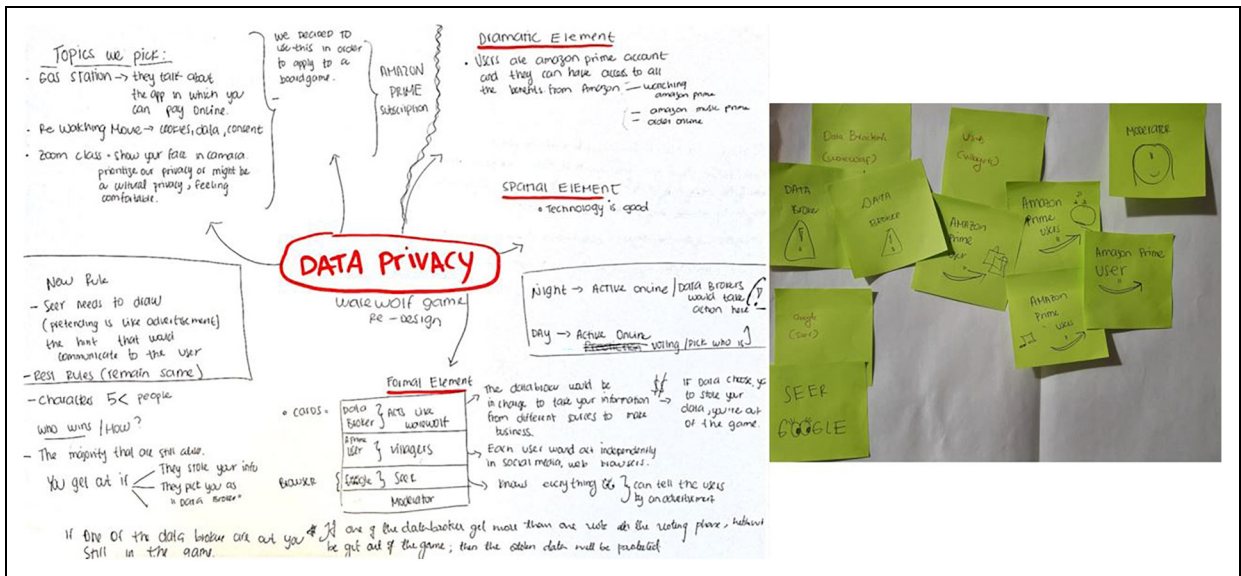
Figure 4. Initial prototyping of werewolf and cards (group 1).

design game elements that explain who are the ones with and without information.

This clearly emerges from most prototyped games. Five out of seven groups chose to experiment with a form of data collection/violation implying an information asymmetry and lack of control. Group 1 (Figure 4) redesigned *Werewolf* and its dramatic elements (premise, story, characters, settings): 'villagers' became 'Amazon Prime users' who are victims of data theft, and 'werewolves' became 'data brokers' who are stealing data from those 'users'. The information asymmetry and (in)visibility expressing the power imbalance is embodied in the game through the simple yet literal gesture of alternatively closing and opening eyes: during the night, data brokers keep their eyes open and choose an Amazon Prime user as their next victim; during the day, all the players keep their eyes open and discussion is carried out, so that the data brokers are hopefully found, eliminated from the game and one's data made 'safe'. The spatiality is materialised here by the identification of an actual closed group space where the cards attribute each body the role of either data broker or (potential) victim and unevenly and randomly 'distribute the power', giving a spatial organisation to the information imbalance that leads to data (in)justice. A temporal element is also present: through a simpler management of time than in real life, where parallel actions (stealing and trying to keep data safe) are instead organised asynchronously to be actionable and playable.

Similarly, Group 2 (Figure 5) also redesigned *Werewolf*, remixing the villagers as 'tech novices' who have to visit a website during the day and the werewolves as 'scammers' who install a honeypot in one specific website during the night. For the tech novices, visiting a website with a honeypot installed means that they get coins (i.e. their data) stolen, a remix that introduces a new formal element – coins, a resource – and a new mechanic, stealing, also a formal element, in place of the *player elimination* mechanic of the original *Werewolf*. The community of tech novices needs to be aware of scammers and potential data theft practices and learn to be wary and report websites with unlawful and invasive data collection practices. New cards representing the websites were added to more clearly embody in the space of the game the additional data required by the remix (Figure 5). Both scammers and tech novices are allowed to lie and mislead to hide their identity – an important mechanic carried over as is from *Werewolf* – but only scammers have an actual in-game incentive to do so. This differs from the original game where both villagers – the seer role more specifically – and werewolves can bend information asymmetry to their advantage by lying. In this remix, the winning conditions – objectives and outcomes, formal elements – were also consequently changed: scammers win if they steal data from all the tech novices; tech novices win if they successfully identify and report the scammers to the European data protection supervisor. Premise and setting – dramatic elements – were also radically altered to situate the game in the context of today's European Union, its data protection regulations and the necessity of basic digital literacy. As in the case of Group 1, the original mechanics (night/day) used by *Werewolf* to create friction via power imbalance and information asymmetry were not challenged but preserved as is and given a narrative redress via dramatic elements – scammers opening their eyes and choosing a website to infect, in place of werewolves opening their eyes to choose a victim. This is common in the early stages of DGF explorations where the recasting of dramatic elements allows for 'simple' and time-efficient remixes that leave the inner loops of the game untouched
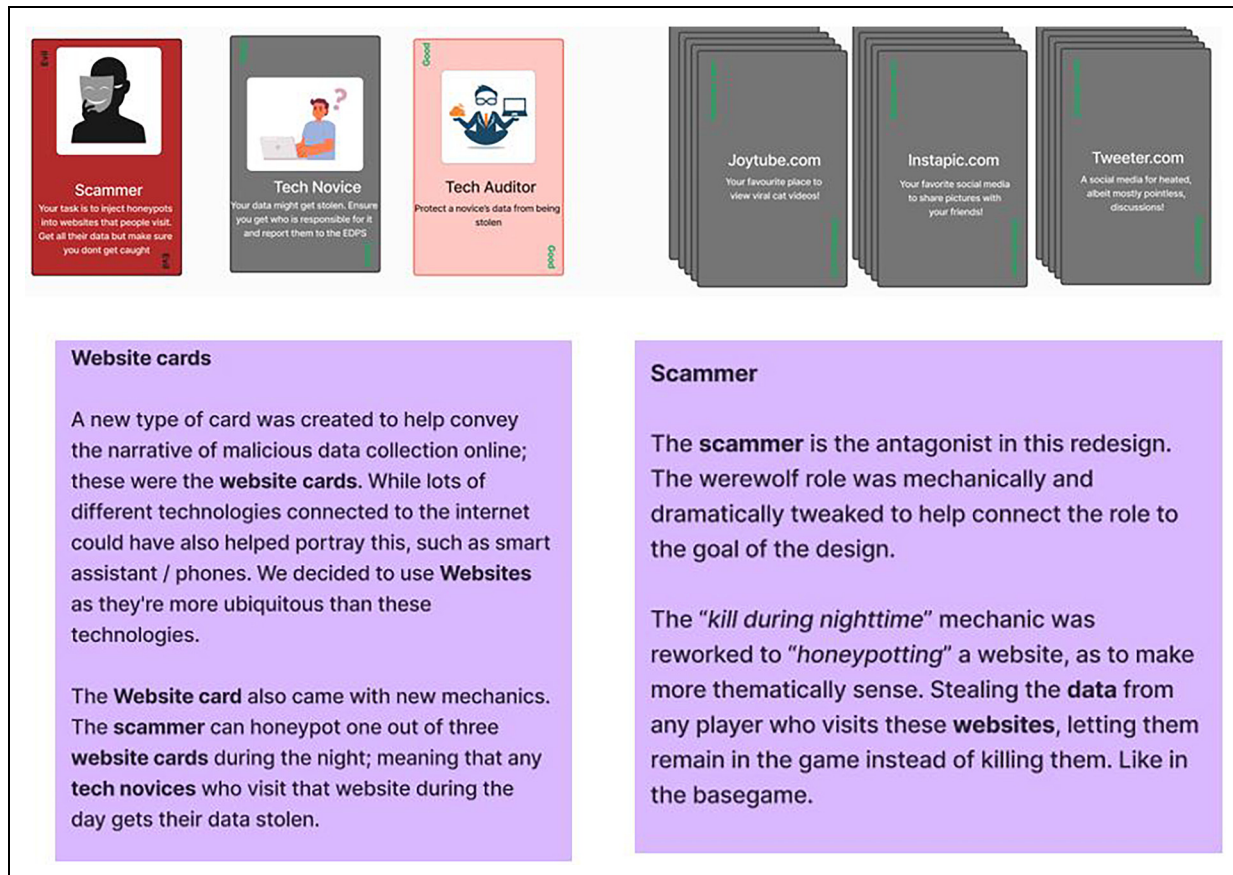
Figure 5. Example of redesigned cards (roles and websites) and game explanation from group 2's remix of *Werewolf*.

(Resmini et al., 2024). More complex game situations naturally emerge as remixing progresses because of the systemic entanglement of game elements that rapidly leads to cascading effects requiring adjustments to formal and spatial elements. In the case of Group 2, this is visible in the addition of website cards and the consequent adjustments this would require if the remix process were to be continued.

The research participants explained that the purpose of their game was to make everyone experience how easy it is to have one's own data stolen, how websites and apps are not being transparent about their use of someone's data and therefore how hard it is to be in control. Identifying and locating the entities (persons or organisations) misusing or plain stealing data is a task in and of itself. Interestingly, the participants here imagined being in a community completely unaware of existing data protection laws and of the possibility of having their data stolen from them when visiting websites. The game's new premise posits that the scammers somehow had the knowledge and ability to locate this community, take advantage of it and sell high-quality data to a third party – an imaginary company – in need of them. Through the progression of rounds in the game – nights when the scammers plant their malicious software, days when tech novices try to avoid suspicious websites – tech novices slowly start to

realise that they are not in control of their data: money is deducted from their account without authorisation, and spam calls or phishing calls multiply. As they become aware of their lack of understanding and control, they begin to worry and try to counteract. This strategical building up of the tension and playing with the emotional side of the players and their lack of control – as well as the act of spatialising otherwise seemingly aspatial and intangible entities misusing data – become here effective ways to increase the research participants' critical datafication literacy and capacity to act against potential data injustice.

Causality versus non-linearity

The simple action of giving consent to retain or share personal data is, at times, needed to reach the goal of buying a product or having access to a service online. Yet this (apparently) causal relationship (giving consent → reaching the goal) may activate a series of parallel unknown and sometimes harmful consequences, which people remain unaware of. The seeming linearity of the causal relationship moves towards a rhizome, a structure made instead of multiple elements assembling and decomposing in non-linear, unpredictable ways (Tedeschi, 2019). Simulating such interrelated yet
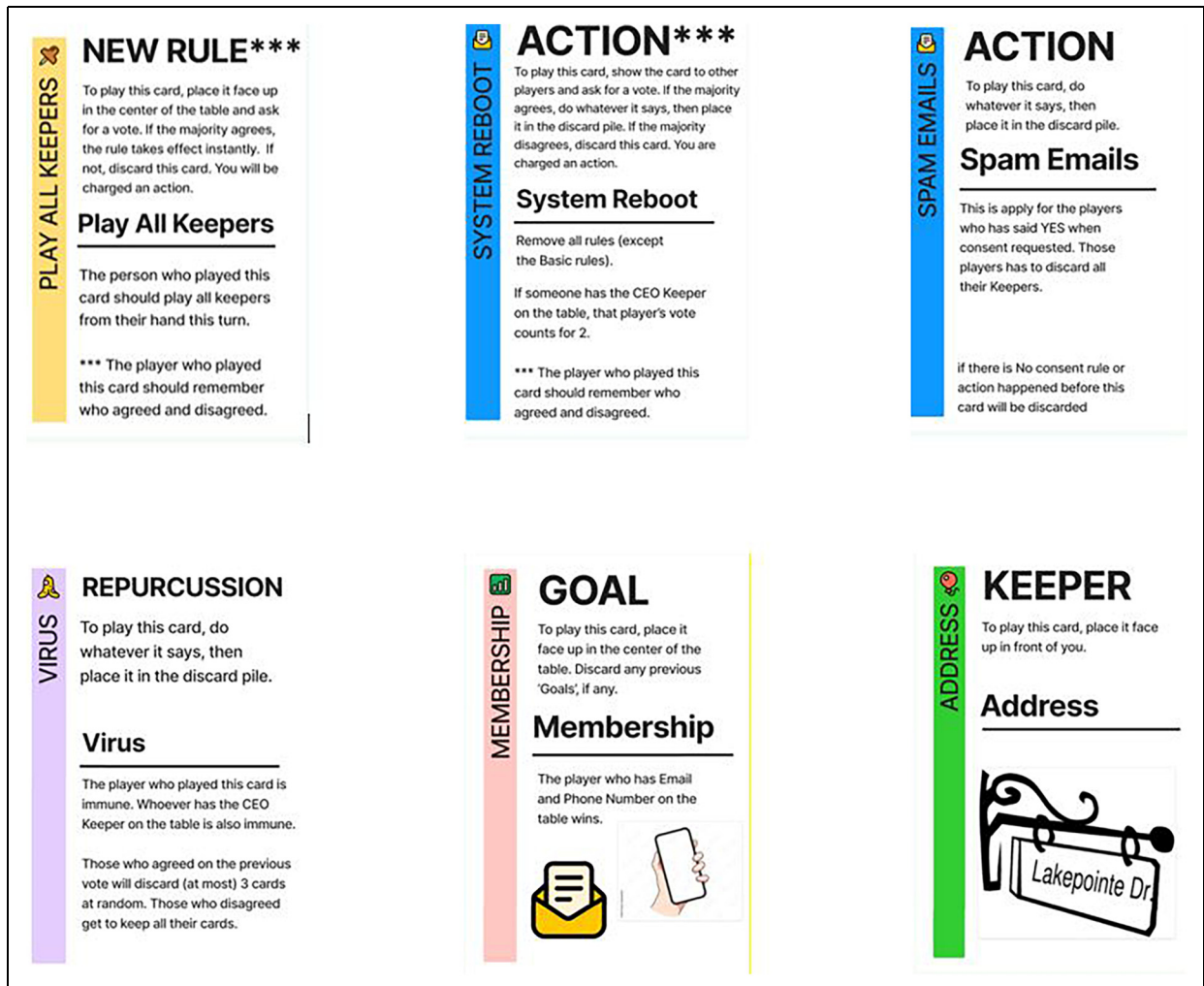
Figure 6. Examples of redesigned cards from *Fluxx* (group 3).

unexpected consequences in a tabletop game temporarily rebalances the power imbalance: as a complex system, the game changes states in accordance with the players' actions, allowing for multiple explorations of its ever-changing third-space and its consequences through their embodiment and spatialisation in a safe environment (Crawford, 1984; Flanagan, 2009; Resmini et al., 2024). Contrary to what happens with traditional prototypes developed in the design space, the tabletop games produced with the DGF do not simulate an artefact but rather a non-linear space for action in which players can 'try out' strategies and learn about their short- and long-term implications and offer therefore a better way to test for unintended consequences or the numerous ways data can be used for different users in different contexts (Yang et al., 2020).

For example, Group 3 (Figure 6) decided to remix *Fluxx* by giving agency and responsibility for the introduction of a rule or action in the current game to all the players. In *Fluxx*, keeper cards representing a variety of objects and concepts are what players need to play in order to win; goal cards indicate which specific keeper cards one needs to win; action cards are used one time and mandate immediate consequences – for example, all players discard one card – and then are discarded. Rule cards change the way the game works and – once played – stay in play until positively eliminated using other rule or action cards. A rule card may for example require players to draw five cards on each turn instead of one.

To accomplish their goal, the students in Group 3 added two new cards – a consent rule and a consent action – and modified existing rules and actions so that, when these new cards were in play, a player could use them only with the consent of the majority. This helps the player embody the fact that the simple action of 'giving consent' does not simply generate one predictable, apparently linear consequence, but rather there are multiple assembled agents at work, intangible, yet fully material and able to exercise 'power over' and redirect consent in unforeseen fashions. Moreover, giving these intangible yet material agents a spatiality in the game contributes to reinforce the ability of the players to materialise the complexities and non-linearities of
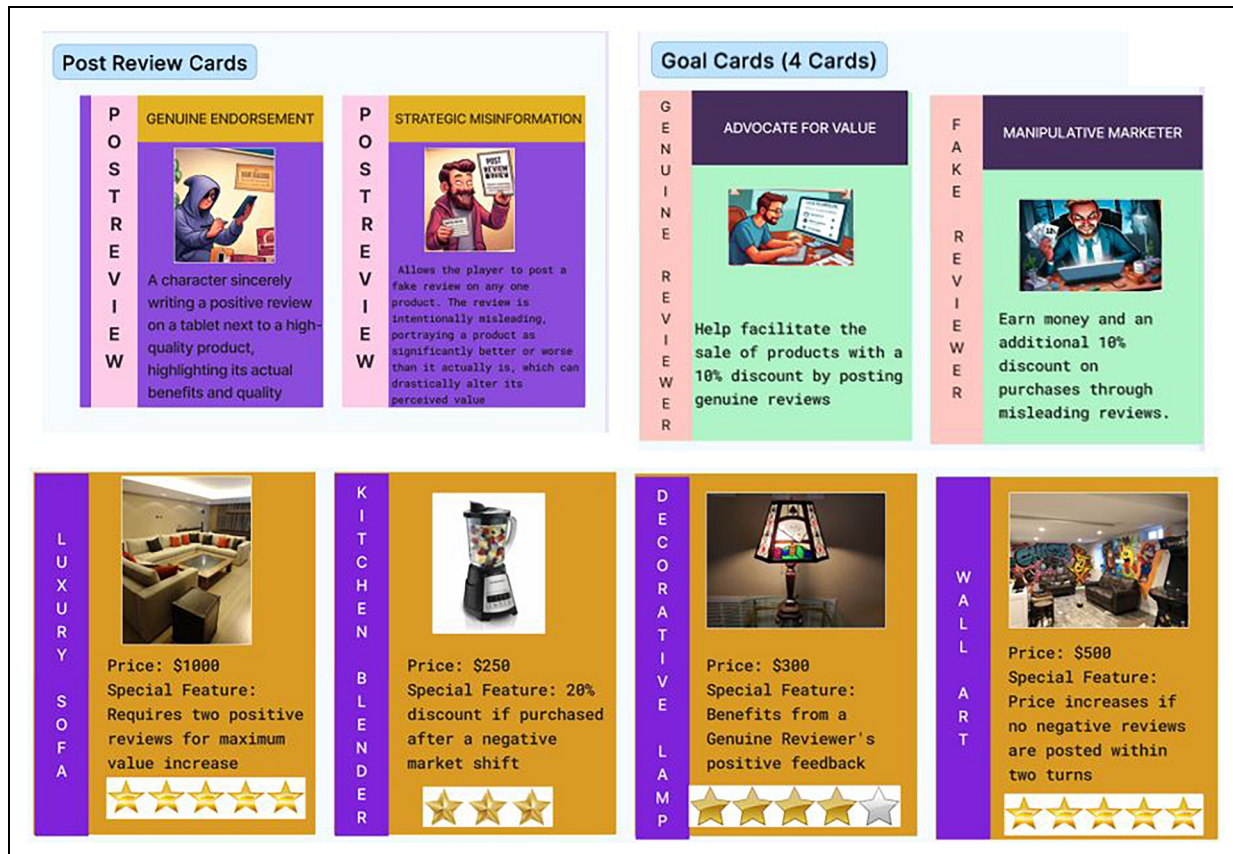
Figure 7. Examples of redesigned cards from *Fluxx* (group 4).

the power imbalances and data injustice potentially hidden within the simple act of 'consent'.

Focusing on the idea of consent, Group 3 intended to emphasise how companies highlight the positive sides and benefits of data sharing and hide any possible discomfort derived from it. The lengthy consent forms or terms of service documents that people are required to agree with to use a service and share data are usually not read in the first place. The length and language used in these texts make reading them nearly impossible, as, for example, artist Dima Yarovinsky shows in an artwork that visualises the absurdity of these texts, by printing out terms of service of popular platforms and hanging them from the wall of the museum (Yarov, 2018). The role of the consent rule and consent action cards in the group's remix is precisely that of highlighting how crucial this lack of control is in the process.

Similarly, Group 4 (Figure 7) chose to remix *Fluxx* to simulate an online shopping experience: with players playing customers, sellers, good reviewers, and fake reviewers. A variety of new action cards (such as buy, sell, post reviews), keeper cards (representing products that can be influenced by reviews), goal cards (setting the winning conditions) and rule cards (market dynamics, review verification) were introduced. New review cards – two positive and two negative –

directly impacting the trustworthiness and market value of products were added.

When playing the game, a player/customer assumes that by buying a product from a seller with a positive review, they would receive a quality item (cause → effect). Yet the review turns out to be written by a fake reviewer, and the customer receives a product of inferior quality. They become aware of the imbalance generated by power held in the hands of other unknown entities, and in the safe space created by the game, they can 'embody' the disappointment for trusting misleading data (description of the product not corresponding to reality; fake review depicting a non-existing product). In a simplified but personally engaging way, players can directly experience the non-linearity and rhizomatic complexity of processes leading to data (in)justice and experiment their outcomes.

Privacy versus data-sharing culture

Current data-sharing culture is pervasive and may be hard to escape from. While Group 1's remix (Figure 4) accepted the fact that Amazon Prime customers have to share their data to access the service's benefit and therefore run the risk that their data may be misused or even stolen without the person
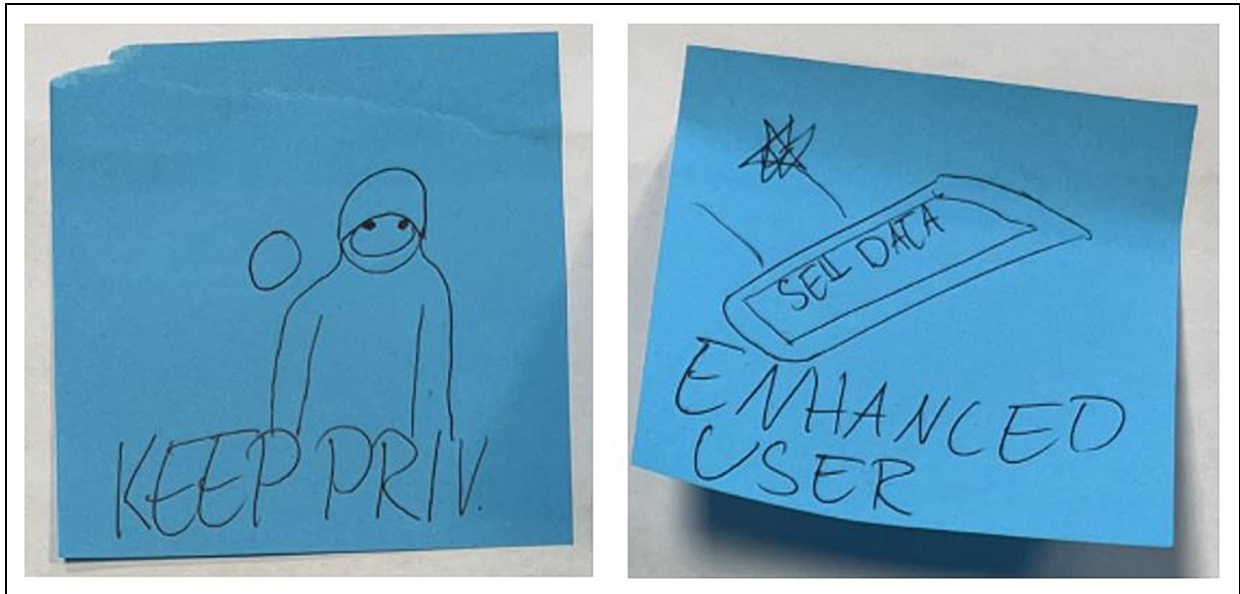
Figure 8. Keeping private vs being an enhanced user by selling data in the redesign of *Werewolf* (group 5).

knowing, Group 5 expressed their concerns in a paradoxical way, simulating how it is impossible not to sell your data: in their remix of *Werewolf*, the tension is experienced between a group of people who keep their data private, are less manipulable, but do not receive rewards, and another group which sells their data, are more manipulable, but receive rewards for selling their data.

As did Group 2, Group 5 got rid of the player elimination mechanic and added instead a new resource – credit cards – to reinforce their statement. If one of the players belonging to the 'keeping data private' group is voted during the day, they do not drop out of the game, but are instead forced to use their credit card, to exemplify the impossibility to avoid sharing one's data in today's society (Figure 8).

Discussion

On the basis of the thematic content analysis, the results have been thus clustered into three overlapping groups (asymmetry of information vs. need to be in control; causality vs. non-linearity; privacy vs. data-sharing culture), which have emphasised some of the unresolved imbalances and tensions in everyday experiences of data, leading to embodied forms of data (in)justice. What these clusters clearly have in common is the need for the research participants to rebalance the imbalance generated by them largely not knowing about how their data is being used, by whom, and for what purposes, and the (unpredictable) consequences thereof, in order to increase their capacity to act (agency) on and with the data. Giving a spatial orientation to the data and making them playable and embodied through DGF have been a simple yet effective way of forcing data into visibility and tangibility and, thus, into concrete forms of actionability. It is also clear that improving actionability from classroom material and journalling (first and second phases of the data collection) versus improving actionability through tabletop game-making prototyping (third phase of the data collection) are in fact very different activities. Journalling and classroom discussions may help improve one's awareness of topics – in this case, data (in)justice. Prototyping tabletop games with the help of a supportive framework in place that can be used to clarify how structural elements can be changed, substituted, and reassembled into new game forms – either as entirely new designs or as remixes, as in this case – translates that awareness into concrete, physical, visible, interactive, and actionable artefacts.

There are at least two issues emerging from the results that are worth connecting with existing literature. First, data (in) justice does not happen externally to us, but it is an everyday experience, of which we may be unaware of, but that we are requested to (re)negotiate (resist or agree with) in our everyday lives and spaces. Data forms our own 'selves' (Kitchin, 2021; Smith, 2018; Tucker, 2023), is embodied (data-bodies; Tucker, 2023) and affects our capacity to act and perform daily activities, or agency (Pink et al., 2018; Kitchin, 2025). This agency is not human only but is negotiated and co-constructed with the data: as we have seen, there is a number of tensions and imbalances generated between us and everyday data (Ruckenstein, 2022) that may lead to the formation of (un)just daily data practices. Efforts to rebalance such human–data imbalances and regain control (such as through DGF) are necessary to resist everyday data injustices and enhance datafication literacy. In media studies literature, there are examples of resistance (Talvitie-Lamberg, Lehtinen and Valtonen, 2024) against unjust data practices (Chun, 2021), such as social sorting or redlining (Kitchin, 2025), for example,

through data activism (Lehtiniemi and Ruckenstein, 2019), explicitly countering data capitalism (Sadowski, 2019). There are case studies of humans 'tricking' algorithms (Klug et al., 2021) with creative and unexpected (non-linear) inputs to redirect and change the online content and advertisement tailored on predetermined data profiles (Bucher, 2017). Finally, there are also examples of non-datafied spaces (Ọnụọha, 2016) against data-sharing culture: intimate thoughts, memories and emotions, which at times we may avoid sharing with machines, but we rather prefer to keep safe and private.

Secondly, data is part of complex, relational assemblages (Lupton, 2017) connecting our 'selves' to multiple spaces (Tedeschi, 2024, 2025), temporal scales, and bodies and physiologies (Ruckenstein, 2023; Sumartojo et al., 2016). Current debates traversing digital feminist geographies and beyond show how we rely on geo-location data when walking across public spaces and share mundane data with smart devices in private spaces (Maalsen, 2019). Our online profiles and social interactions on social media (e.g. Instagram, TikTok, Bluesky, LinkedIn) track our past, present, and future lives through data timelines. We monitor our bodily activities with digital wristbands visualising data charts of our daily movements (Lupton, 2016). Data may be aggregated on the basis of unknown, yet influential, algorithmic classifications of our racial, ethnic, gendered, religious, socio-economic, linguistic, emotional, and physical identities. This may result in data injustice: algorithmic discrimination against, for example, minorities or vulnerable groups, on the basis of pre-formed and biased social categories (Cheney-Lippold, 2017; Crawford, 2021; Viljoen, 2021). All these aspects (spatial and temporal scales, bodies and (in)justice) remain oftentimes hidden, yet their importance has emerged from the results, as ways to force data into visibility and tangibility and, thus, actionability.

Conclusions

This article contributes to existing debates and literature on critical perspectives on data justice in two ways. Theoretically, it emphasises the relevance of embodied engagements with data (Lupton, 2017), of increasingly crucial importance as data-generating practices and data (in)justices become pervasive and literally part of our own 'selves' and everyday lives and spaces. This emphasis on data embodiment increases awareness of the multiple aspects (e.g. spaces and times) of our everyday life that the data affects and connects and, ultimately, of data effects and harm on human beings. It also pushes data into tangibility and actionability, supporting human agency over data. In this way, the article also contributes to critical datafication literacy scholarships, where physical, tangible, and embodied datafication literacy approaches to data remain still under-scrutinised (Sander, 2024). This is thus the article's theoretical significance: to move data from intangibility to tangibility and increased operability through an embodied critical datafication literacy approach and, thus, to increase our capacity to act over data.

Within critical datafication literacy scholarship, digital approaches such as digital games are being used to visualise and play with data, which helps individuals gain awareness of what everyday data is collected from them and how to protect themselves from data misuse. However, digital games ultimately remain perceived as immaterial, intangible, and external to us (Sander, 2024). Limited studies focus on the physicalities of data produced through, for example, tabletop game making, where players design their own physical datafication games, make the rules of these games 'tangible' and prototype paradoxical situations derived from personal contexts (own spaces, times, bodies, and data harm). This is the article's methodological significance: instead of (digital) game playing, to use (physical) game making to unveil data agencies' physicalities and tangibilities shaping individuals' socialities and spatialities. With an ad hoc justice-oriented design approach to game making, the article furthermore explores data harms hidden within data agencies.

While this experiment remains limited in time and space, it may be replicated and tested in other, real-life spatial contexts, where discriminations, exclusions, and differences may be multiplied and reinforced by the massive datafication of everyday spaces. There, people should have the possibility to meaningfully engage in the formulation of those 'socio-technological processes' (Breuer and Pierson, 2021: 797) that are intangibly yet materially modulating their data lives and everyday spaces.

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This research does not require approval by an ethical committee.

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