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Spatial Justice in the Data-Driven City: Toward a Non-representational Paradigm

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Given the challenges in theorizing and defining spatial justice in an increasingly data-driven society, this article explores the potential of framing spatial justice and the right to the digital city within non-representational geographies and posthuman theories. It turns to these frameworks as sets of theoretical tools (nonhuman agency, affect, and information moving across physical/digital, or blended, spaces) unveiling how differences for exclusion are reified in digitalized urban contexts. *Key Words:* affect, non-representational geographies, posthumanism, right to the digital city, spatial justice.

In contemporary data-driven urban landscapes, the blending of digital technologies with physical spaces has propelled an intricate interplay between online interaction spaces and the physical urban environment (Kitchin 1998; Graham and Marvin 2002; Kitchin and Dodge 2014). The infusion of software, smart objects, and data into everyday (urban) life (Greenfield 2006, 2017; Kitchin 2021) is remodulating the urban space, increasingly intertwining the realms of human and nonhuman, here, tech, entities (Brighenti and Pavoni 2022, 2023).¹ This interplay continues to present challenges regarding how (in)justice manifests in urban settings, with inequalities often exacerbated rather than mitigated by the increased use of technologies. Diversity and inclusion actions to counter spatial injustice, such as implementing accessibility standards and recognizing the multiple needs of diverse groups (poor, elderly, people with disabilities) in the making of the urban, remain at the margin, rather than at the center, of smart/digital city discussions. Technological solutions are implemented top-down and dominated by the corporate level (Reuter 2019), citizens relegated as data producers, and their bodies and everyday activities commodified (Käll 2022b).

To counter this, initiatives have been underway to integrate the long-standing spatial justice and right to the city frameworks with the more recent right to the smart, or digital, city. These efforts aim to promote equitable practices “in the middle of the

physical and the digital” within theories of social justice. Central to this integration is the emphasis on the citizens’ appropriation of the urban space as key to their right to space: “In today’s cities ... the right to appropriate urban space evolves to include the appropriation of the hybrid space, and implicitly of the digital space included in it” (Anastasiu 2019, 244).

In this context, social justice, and, within it, spatial justice and the right to the digital city scholarships (J. Shaw and Graham 2017; Kitchin, Cardullo, and Di Felicianantonio 2019; Galič and Schuilenburg 2020; Currie, Knox, and McGregor 2022; Rosol and Blue 2022) capture “representations,” detailed descriptive accounts of socio-techno-spatial inequalities. Representation is intended here as the long-standing Aristotelian, epistemological move of making and attributing properties, qualities, meanings (Roberts 2024), and categories to external realities, thus, the production of values, interpretations, and judgments attached to entities (Simpson 2021). On the other hand, so far, non-representational geographies (Simpson 2021), and especially scholarship on non-representational, affective, and non- and posthuman aspects of spatial justice (see, e.g., Philippopoulos-Mihalopoulos 2014; Pavoni 2018; or the works of feminist digital geographers on data and urban forms of (in)justice, e.g., Elwood 2021; Georgiou 2023) are less integrated into current right to the digital city debates. This article seeks to blur

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the boundaries between these scholarships and explore how non-representational, non- and posthuman, feminist approaches to spatial (in)justice may complement and support right to the digital city debates.

Yet, as Anderson and Harrison (2016) clarified, non-representational does not mean “anti-representational.” This perspective does not associate negativity with the word *representation*. Rather, it invites us to explore the potentialities of non-representational geographies and posthuman approaches for the right to the digital city. This engagement involves critically and constructively interrogating the multiple possibilities of what lies behind and beyond representations, unveiling the hidden mechanisms through which representations may be built as inclusively differencing, rather than excluding, ways to narrate spaces of (in)justice. A non-representational approach thus focuses on the differential, evolving, unstable, intangible yet material, and affective units representations of socio-techno-spatial inequalities are made of.

The article specifically explores the integration of conceptual tools—in particular nonhuman agency, affect, and information moving across physical/digital, or blended, spaces—to enhance understanding of how socio-techno-spatial inequalities are generated in the context of increasingly digitalized cities. More specifically, the article seeks to unveil the hidden mechanisms by which difference for exclusion is reified in the affective micronegotiations of the right to the digital city (Degen and Rose 2024), leading to the (re)production of “socio-spatial inequalities along lines of race, gender, class, sexuality, age, ability and more” (Elwood and Leszczynski 2018, 630). Thus, in this article, the urban is navigated as an augmented realm inhabited by affective, entangled yet differentiating human and nonhuman—importantly in this article, technological and algorithmic—entities (Brown, Flemsæter, and Rønningen 2019). Yet, as Amoore (2020) put it, algorithmic entities “contain, within their spatial arrangements, multiple potentials for cruelties, surprises, violences, joys, distillations of racism and prejudice, injustices, probabilities, discrimination, and chance” (7). These multiple algorithmic threats amplify already existing structural potentials for (in)justice (Chun 2021) and harms (Maalsen 2023), and reinforce major and minor, hard-to-regulate, segregating, and discriminatory effects.

On a broader, major scale, algorithmic decision-making, as observed in urban planning, could lead to redlining the city and increased social sorting, segregation, and marginalization of neighborhoods. For example, Safransky (2020) described the case of the Market Value Analysis (MVA), “a data-driven technology of spatial governance that has been used since 2001 to guide development in dozens of cities across the United States” (201). MVA directs decisions on investments toward certain, more profitable city neighborhoods, penalizing others. Although the political narrative claims that such decisions are based on objective data, they are in fact based on racially biased representations, differences for exclusion, reinforcing and reproducing real estate markets’ historical racial prejudices and inequalities (West, Whittaker, and Crawford 2019).

On a seemingly minor scale, yet scaling up to larger geographies fueling urban inequalities, hate crime and the reproduction of discriminatory and segregating narratives in physical/digital spaces—online abuse, online and offline stalking, street sexual harassment, and online “threats to physical harm” (Awan and Zempi 2016, 3)—target specific groups of people or neighborhoods. They lead to hard-to-detect negative affections, durable emotional reactions and grief, again difference for exclusion, and, in the end, to unregulated limitation of freedom of movement (A. Young 2023) in the everyday, and, thus, to infringement of the right to be free from discrimination in spaces.

Structural biased representations and prejudices—differences for exclusion—thus materialize not only in major segregating effects such as in the case of Safransky’s (2020) “redlining the city,” but also into practices that are harder to detect and regulate and fleeting events,² generated and embodied (Paasonen et al. 2023; Ruckenstein 2023) multiple times in individuals’ everyday lives. These practices and events could create intangible and temporary yet material and affective atmospheres of (in)justice (Degen and Rose 2024), and might be, or might be not, translated into political struggles over rights to space. We argue that a non-representational conceptualization of spatial justice in digitalized and datafied urban contexts might prove useful and complement existing social-justice-based right to the digital city accounts in two ways: first, by interrogating the mechanisms hidden behind the structural production of such “exclusionary representations,”

and second, by giving relevance to hardly detectable microdifferences for exclusion that might not always find recognition. The article seeks not to offer conclusive answers, but could hold promise for theoretical advancement. It might also provide a foundation for future qualitative investigations into how difference for exclusion is generated in the lived “blended” (Benyon 2014), affective everyday experiences of spatial (in)justice among urban dwellers.

Following the introduction, the article is organized in four main blocks. The second section explores the nexus between (urban) space, data, and spatial justice (in terms of the right to the digital city), going through some significant debates and examples centered around social-justice-based right to the digital city theories. The third section develops the theoretical foundations for a complementary, non-representational definition of spatial justice in datafied urban contexts. The fourth section introduces the concept of difference and operationalizes it as the “affective” producer of (in)justice in blended spaces. Although the article remains mainly theoretical, here examples are provided on spatial atmospheres of (in)justice. The fifth section opens up to future developments and explains how the theories unfolded here could form the basis of future empirical work.

The Right to the Digital City

In human geography and related disciplines, there is a growing body of literature focusing on spatial theories of justice (Przybylinski 2022), especially in relation to urban settings and the right to the city.³ Recently, these theories have expanded to include the digital and informational space (J. Shaw and Graham 2017), which significantly influences the daily lives of city dwellers (Tedeschi 2024).

The infiltration of the digital in every city-space obliges us to reconsider the right to the city to avoid replicating and multiplying discriminations, exclusions, and differences already existing in the “physical city” (Elwood 2021). Indeed, “digital processes are never immaterial or separate from social relations but reflect and reproduce existing or emerging power relations” (Elwood 2021; Celata and Certomà 2022, 100044). Here, pursuing a right to the digital or smart city (Kitchin, Cardullo, and Di Felicianantonio 2019) implies, in alignment with Lefebvre (1968), that citizens should have the

capacity to engage in the formulation of the “socio-technological processes” (Breuer and Pierson 2021, 797) presently modulating the urban space. In other words, there should be real citizen engagement, rather than symbolic involvement of citizens, or tokenism (Engelbert, Van Zoonen, and Hirzalla 2019; Leclercq and Rijshouwer 2022), underpinning a top-down approach to technological advancement (James et al. 2020). Urbanites thus ought to have a say on their data protection rights and, more in general, on their digital rights. Digital rights to the city should remain aligned with human rights. “Freedom of expression and the right to privacy in ... digital environments” (Calzada 2021a, 5; see also Calzada 2021b) remain an essential protection, for example, against “oppression, deprivation, and violence” (Calzada 2021a, 5), including in physical spaces.⁴

Claiming citizens’ digital rights is tied to the pursuit of possibilities and limitations of technological and data sovereignty. This would be possible only with the involvement of local governments to regain control of and power over digital services against foreign corporations, counter commodification of citizens and privatization of city spaces, while investing in free and open-source software (Ribera-Fumaz 2019). Yet, personal and spatial data harvested when navigating city-spaces remains out of control (Lupton 2021). Rather than empowering urbanites, technologies have increased the challenges to the right to the city, at times diminishing, rather than increasing, the ability of groups that are considered marginalized to have a say on their digital rights. The horizontal extraction of data, or “population-level insights” (Viljoen 2021, 578), causes informational harms that reinforce social categories’ representations and inequalities that are then re-applied to individuals based on group characteristics. As Elwood (2021) put it, urban life in rich countries remains characterized by “digitally mediated processes of exclusion, surveillance, and dispossession” (209), where structural injustice is reproduced (Wodajo 2022).

This is evident, for example, in the rise of data-veillance and surveillance apparatuses enabling facial recognition, which embed racially biased representations and enable structurally unjust exercise of power (Crawford 2021; Currie, Knox, and McGregor 2022). This results in various forms of spatial injustice. For example, to counter this, Nostikasari, Foster, and Krake (2024) stressed the need for an informational right to the city (originally from

J. Shaw and Graham 2017) to increase mobility justice. They emphasized how computer modeling used to predict future transportation needs is a black box, through which scenarios and maps of urban transports are projected and planned. This technocratic approach becomes a form of epistemic and mobility injustice, where assumptions that underpin transportation models and their measurements remain unknown to citizens and policymakers, thus creating and feeding an informational power imbalance. In the context of international development, Heeks and Shekhar (2019) showed how datafication neglects the needs of low-income populations and those informally housed in marginalized urban neighborhoods and slums in developing countries. Here, processes of datafication remain imbalanced, benefiting those able to use such data, rather than communities from which the data are extracted. Similarly, drawing on field work in India, Brazil, and the United Kingdom, Willis (2019) described two ways in which some groups of people are denied access to the digital city: through the “optimization, automation, and privatization of urban services” (28), aimed at centralizing operations and removing low-paid and informal labor force, and efforts to cleanse and expel those working from street spaces.

These examples of informational harms and algorithmic power imbalances reproducing structural inequalities (Chun 2021; Crawford 2021), steadily remodulating city settings, might continue. What is relevant to emphasize here, however, is the underlying theoretical framings that inform these critiques: They align with Lefebvre’s (1968) right to the city and N. Fraser’s (2008) theory of social justice. This connection is explicitly mentioned by Currie, Knox, and McGregor (2022), and Kitchin, Cardullo, and Di Felicianantonio (2019), who underscored the lack of urbanites’ involvement in city-making processes and their limited capacity to act (N. Fraser 2005; Leclercq and Rijshouwer 2022). In short, these works emphasized the crucial role of urbanites in the production of the urban and the shaping of its associated rights. Yet, they also warned against the potential risk of technologies in reproducing biased representations, structural inequalities, discrimination, lack of transparency, and fairness in the urban. Rather than mitigating these risks, datafication could amplify them by neglecting data rights and informational harms.

While acknowledging and supporting the crucial relevance of these discussions, this article proposes to complement them by integrating spatial justice

with non-representational and posthuman theories and feminist digital geographies. This combination might help expose the subtle, often hidden differential mechanisms behind the formation of the previously mentioned structural biased representations augmented by tech apparatuses. Furthermore, it could bring insights on how such mechanisms modulate the nonhuman and affective elements the micronegotiations of the right to the digital city are made of.

Toward a Non-representational Spatial Justice in Digitalized Urban Contexts: The Foundations

A shift from representational to non-representational thinking aligns with the “datological turn,” while also moving beyond the postmodern toward a posthuman paradigm (Clough et al. 2015). The posthuman paradigm (Haraway 1991; Barad 2007; Braidotti 2019) has allowed us to bring attention to the non-representational role in re-creating and reifying mechanisms of hierarchical difference for exclusion in human–nonhuman relations. Specifically, a non-representational framing of spatial justice in digitalized urban environments can draw from and rework space-based (in)justice theories. Examples include Philippopoulos-Mihalopoulos (2014) and Pavoni (2018), Simondon’s ([2005] 2020) philosophy of information, non-representational geographies (Thrift 2007; Anderson and Harrison 2016; Simpson 2021), and feminist digital geographies (Rose 2017; Elwood and Leszczynski 2018; Elwood 2021; Georgiou 2023; Maalsen 2023; Degen and Rose 2024). The latter theorized the “becoming” and processual coconstitution of human and nonhuman entities, and the affective and emotional complexities (Elwood and Leszczynski 2018) they generate.

As we have seen, existing accounts of the right to the digital city represent and reflect on structural socio-spatial inequalities reinforced by algorithmic decision-making and unjust data categorization and aggregation; however, less theorized are the nonhumanities and differencing affectivities hidden behind representations and, specifically, the ways in which they trickle down to and reify the everyday (blended) microspatial practices of (in)justice. This is where we see non-representational and feminist digital geographies and

posthuman theories theoretically complementing existing social-justice-based accounts of spatial justice and the right to the digital city.

Accordingly, the following subsections shortly reinterrogate the materials and surfaces constituting spatial justice—blended, or physicaldigital, spaces and bodies—and in so doing lay the foundations for an operationalization of a non-representational perspective.

Physicaldigital Spaces

The digital infiltration of physical spaces has been extensively theorized (Kitchin 1998; Lovink 2002; Wark 2002). The urban is a blended (Resmini 2023), physicaldigital⁵ space, where such physicaldigital is affectively embodied by individuals (Amin and Thrift 2017; Valentini, Lorusso, and Achim 2020). It also forms part of that technological unconscious (Clough 2000; Thrift 2004b) feeding the human body's ability for representation, "contemplation, intentionality, and self-reflection" (Keating 2023, 3).

Two elements of the physicaldigital "blending" deserve particular attention. First, the blend operates through *transduction*. The concept was originally developed by Simondon (1992, [2005] 2020), and expanded by Mackenzie (2002), and later by Kitchin and Dodge (2014) in their code/space. Transduction refers to "a process or an action that leads to a transformation across different domains" (Hui 2016, 191). It enables movements and changes across disparate dimensions and states. Barad (2007) offered a parallel concept—intra-action—to describe how entities coemerge through entangled agencies. Barad's intra-action and Simondon's transduction emphasize the entities' mutual constitution and how their "becoming different," while remaining coconstituted, is transferred and modulated across states: "Processes of becoming in the difference that Barad explains as intra-action, Simondon explains as transduction" (Luján Escalante 2019, 65). As we explore later, transduction is the movement through which posthuman elements such as information move, transfer difference, and modulate entities' affective micro-practices of (in)justice across spaces. Transduction is also the process by which digitalized urban settings may reproduce, transfer, reprint, reinforce, and multiply differences for exclusion.

Second, non-representational along with feminist digital geographies offer a critical reading of (blended) urban spaces, framing the city as a "production of

ongoing, self-organizing, sentient" (Rose 2017, 781), affective environments (Barns 2019), and "affective complexities of code/space" (Elwood and Leszczynski 2018, 637). In the non-representational making of the sentient city, nonhuman elements play a constitutive role in the city-space formation, and thus in the micro-negotiations of what is spatially (un)just. Nonhuman elements in fact contribute to building spatial atmospheres⁶ where "a right to the city may be affectively asserted" or denied. Degen and Rose (2024, 2182) referred to Wall's (2023) work on "affect-saturated encounters" that "can include some bodies while excluding other." Duff (2017) described the ways in which the nonhuman in terms of various objects and materials are assembled and affectively occupy and modulate public spaces in cases of homelessness, challenging and questioning an imagery of the urban and the just city as an orderly, clean, and rationally planned and engineered atmospheric space. On the other hand, tech could affectively reinforce these same imaginaries and representations through assembled digital "productive vitalities" (Rose and Willis 2019, 411), digitally mediated sensory affect (Degen and Rose 2024) that "sticks" to bodies (Amin and Thrift 2017). For instance, colorful images of city smartness shared on social media show "smart touchscreens, lamp posts, smart operation centres, and doors and so on in smart city streets" (Rose and Willis 2019, 421). Such images represent smart cities as populated by people, usually men, and white, "giving presentations at smart city workshops and expos, or talking informally in the audience or exhibition hall" (Rose and Willis 2019, 421; see also Wilmott, Fraser, and Payne 2025). Here, the engineered atmospheres affectively constructed on difference, keeping populations and neighborhoods at the margins, and trickling down to and visualized as representations of urban "smartness," set the (hidden) agenda of whom the right to the digital city is (not) for.

Physicaldigital Bodies

Drawing on critical posthumanism, and feminist and gender scholarships, this article reinterrogates the "human" not as a fixed unity (Tucker and Goodings 2014), or clear-cut identity, but rather as an ongoing assemblage of elements. It conceptualizes the human as an indeterminate (Braidotti and The Aberdeen Body Group 2004) entity not preexisting or separated from the "inhuman" (Herbrechter 2012), here, from inorganically organized entities

(e.g., tech; Ash 2015), or the spaces it inhabits, but rather as coimplicated and entangled (Barad 2007) with them from the outset. Examining the posthuman condition, Braidotti and Fuller (2019) argued that the construction of the human is thus left open and remains unfinished. Current technologies, such as machine learning algorithms, contribute to these expanding grounds shaping the human as “never neutral but rather structured by multiple grids, gradients, layers and locations” (Braidotti and Fuller 2019, 10). Individuals, then, evolve as “blended, physicaldigital, naturaltechnical bodies” (or cyborgs, following Haraway 1991; see also Gray 2001; Chun 2002; Hayles 2012; Rose 2017), “singular manifestations of body *and* data” (Tucker 2022, 13; italics in original), in their material and affective coimplication and intra-action/transduction with the physicaldigital urban. This also echoes feminist digital geographies’ scholarship on the embodiment of digitalities (Elwood and Leszczynski 2018).

Through transduction across different spaces, multiple, alternative blended entities are created and fed: aggregates of data from human bodies, holding power and agency (D. B. Shaw 2018) and intangibly yet materially populating city-spaces, despite being inorganically organized (Ash 2015). Some of these entities, or data-doubles (Adey 2009), are created or transduced for a variety of purposes: accessing specific online or offline services (including accessing buildings and facilities), managing social media profiles, or targeting online advertisements to users. This list is not exhaustive, but may continue to include every inorganically organized blended body (Ash 2015), which manifests some form of agency⁷ in spatial settings, and may transduce and contribute to reinforcing structurally biased representations. These data-doubles or any other horizontally aggregated data (Viljoen 2021) infiltrate organically organized bodies (humans) and change, affect, or generate differences in their process of becoming (or ontogenesis) and in the making of (un)just spaces.

A Non-representational Perspective on Spatial (In)Justice in Digitalized Urban Contexts

Drawing from posthumanism, new materialisms, and feminist scholarships, Philippopoulos-Mihalopoulos (2014) reconceptualized spatial justice not as a

representational “addition,” “insertion” of an Aristotelian quality to bodies, but as a product of entangled intra-actions between spaces and bodies (in Barad’s [2007] sense). In this view, justice is generated through affective, temporary micronegotiations between entangled yet different and differentiating (human and nonhuman) entities fighting for their right to space.

Building on this foundation, and drawing on the body of work of non-representational geographies (Simpson 2021) and feminist digital geographers (Elwood and Leszczynski 2018; Elwood 2021; Degen and Rose 2024), we aim to complement the right to the digital city scholarships with a non-representational approach to spatial (in)justice. This perspective shifts attention to non-representational and posthuman forces such as information and affect, modulating how bodies and physicaldigital spaces are formed and governed by transducing difference into practices of inclusion and exclusion, thus, (un)just practices.

As digital infrastructures increasingly mediate urban life via algorithmic policing, predictive sorting, and platformed sociality (Paasonen 2021), transduction does not appear as a neutral process of becoming. Instead, it functions as a differentiating mechanism shaping how and who can appear, move, or even be recognized in the physicaldigital urban. In this context the concept of difference is not just descriptive, but operative, as it performs “cuts” that reproduce structural inclusions and exclusions in the ongoing negotiation of the right to space.

Such an approach repositions the debate on the right to the digital city beyond human-centric claims, toward an examination of how difference works through the socio-spatio-technical entanglements. In this context, (in)justice is not a matter of achieving equality within existing representational categories, but a dynamic unfolding of nonoppositional difference. It does not discuss rights within predefined categories, but rather the ongoing possibility of differentiating without exclusion. The theories presented here will be made clearer with concrete examples derived from digital feminist geographers’ works.

Achieving Spatial Justice with Difference-in-Itself

In critical legal theory, critical posthumanism, and feminist and gender scholarship, ongoing debates explore alternative definitions of justice and the concept of difference (see, e.g., Gear et al. 2021;

Käll 2022a; interestingly, see also I. M. Young 1990). Barad, in conversation with Gandorfer, reframed justice as “the lived possibility of difference/differencing without exclusion” (Barad and Gandorfer 2021, 46).⁸ As D. B. Shaw (2018) clarified, for Barad difference/differencing is an intra-active, ontogenetic process, emerging from the ongoing becoming of intersecting entities. It is not the static outcome emerging from the convergence of preformed entities. As anticipated earlier, Simondon (1992, [2005] 2020) called this transformative, nonsequential process transduction: a dynamic where entities differentiate across domains while remaining entangled. Transduction describes an affective modulation of bodies across their socio-spatio-technical entanglements, for instance through forms of algorithmic governance (Galloway 2012), biometric categorization (Amoore 2020), or even simple app interactions (Leszczynski 2020b). One example here is the technologies of quantified self (QS; Lupton 2021). Self-tracking devices are not simply externally and neutrally “used by bodies.” Bodies are affectively modulated by such devices, and vice versa, in a continuous, transductive exchange between the two. Microdifferencing across domains (Hui 2016) occurs, where bodies keep adjusting their internal structures (Simondon [2005] 2020) to the devices and the devices adjust their settings to the bodies’ microactions. In one case study (Nafus and Sherman 2014) cited by Leszczynski (2020a), QS followers “transduce” the everyday tracked data within themselves when needed. In the case of one QS follower monitoring his sleeping data, the author emphasized how “the data has moved inside him in a way, transduced (Mackenzie 2002) into a sensation of having slept well, or into a temporal habit like waking up early” (Nafus and Sherman 2014, 1788). They also observed how QS followers were not simply, passively, abiding by the categorizations (e.g., the levels of “manliness” or “healthiness”) imposed by the health tech industry, but rather, in a transductive way, developed a form of differential resistance to algorithmic governance, where they affectively deviated from what the predefined categories or standards tried to channel them into.

This view emphasizes how bodies do not precede their categorization; rather, they emerge through a process of differentiation shaped by socio-spatio-technical forces (Combes 2013). Ontogenetically, bodies emerge from a preindividual state of unity (repurposing from Simondon 1992, [2005] 2020; see also Keating 2019; Bluemink 2020). Yet, this process is

sensitive toward socio-spatio-technical and normative coding, for example implemented in facial recognition’s racial biases (Browne 2015), or app interfaces that sort users through predefined metrics. A study reported how, in the United States, “Asian and African people were found to be up to 100 times more likely to be misidentified than white men” (Gillespie 2022, 205). The exchange between the human face and the facial recognition device is, again, transductive. The device is trained to recognize standard (e.g., white men) facial features. Yet, it receives information from seemingly “non-standard ones,” and tries to adjust itself to them. The difference between the original face and the training data was transduced into a failed alignment of the face with the system, thus, into an exclusion. These systems consume and produce difference, transforming ontogenetic differentiation into rigid hierarchical categories, leading to exclusion. As feminist digital geography keeps emphasizing, such difference becomes then embodied.

This perspective allows us to rethink (in)justice beyond representational categories, and asks this question: How might bodies negotiate the right to the digital city through a nonexclusionary difference, rather than oppositional representations? Bodies emerge through open-ended, intra-active processes of difference. For bodies to negotiate the right to the digital city requires a move toward an infrastructure of thought that might allow difference to matter without exclusion. This focus on a productive, non-exclusive, remaining-in-the-process difference recalls Deleuze’s concept of difference-in-itself.

Cockayne, Ruez, and Secor (2017) unfolded the potentiality of developing Deleuze’s (1994) approach to difference within human geography. By critiquing the violence of representational categories, they pointed out how difference-in-itself is prerepresentational, precedes the “practices that ‘construct’ social” (Cockayne, Ruez, and Secor 2017, 590) and identity categories. In this way, it can be a powerful tool to resist “structures of racism, sexism, cisgenderism” (Cockayne, Ruez, and Secor 2017, 590). They justified the reason why it would be so crucial to bring such concept of difference-in-itself to the attention of human geographers: “By focusing on difference-in-itself—emphasizing difference as conceptually prior to the construction of identity categories—we can better ... cope with the often violent work that representation and identity accomplish, while also [escaping] political capture and deterritorialize hierarchies” (Cockayne, Ruez, and Secor 2017,

582). Focusing on difference-in-itself thus exposes how representation enforces binaries and hierarchies. Representational practices rely on predefined and sometimes unconscious hierarchies mainstreamed in binary thinking⁹ and augmented by tech. They reinforce difference for exclusion and reify unbalanced power relations and historical inequalities (Verdu Sanmartin 2020). This might finally engender exclusionary mechanisms in socio-techno-spatial processes.

This insight challenges human geographers to center nonoppositional difference-in-itself in debates around spatial justice, to unveil the strategies of the representational to reproduce itself, and to move toward inclusive and nonoppositional modes of differentiation. As Cockayne, Ruez, and Secor (2017) indicated, this move helps us to confront the structural harms enacted by identity categories, while also creating room for more generative and less hierarchical modes of inhabiting urban space.

How can bodies negotiating the right to the digital city be reconciled with such difference-in-itself, rather than difference for exclusion, to achieve a “just space”? Or, how can these bodies overcome oppositional, historically unequal representations, further transduced into and reinforced by biased data modulating digital spaces, and achieve (spatial) justice? Ontogenetically, every body stems from difference-in-itself. During ontogenesis, however, thus individuation and transindividuation (or the becoming of individuals within societal structures; Combes 2013), difference-in-itself might be informed by the binaries and hierarchies of the socio-techno-spatial, and transduced into and reconfigured as difference for exclusion (a difference in opposition to something else). Spatial justice might be achieved in the fleeting, “affective” spaces, in which the non-representational difference-in-itself could prevail over the hierarchized and representational difference for exclusion. Or spatial justice could be supported in spaces in which difference for exclusion is unlearned, reconfigured, and relearned as difference-in-itself. To these aims, how is difference operationalized?

Operationalizing Difference beyond Representation: Affect and Information

As discussed earlier, bodies configure as physicaldigital and open, unfinished “forms of fleshy information” (Tucker 2013, 33) from the outset. They emerge through intra-active information exchanges. Following

Simondon (2009), information is not a static input, but the “tension between two disparate realities ... a demand for individuation ... never a given thing” (9–10). Every body is made of information that, from a pre-individual state of unity, or being, becomes individualized: fixed, stratified (yet open), and differentiated as individual. Information expresses the ontogenetic movement that continuously bridges difference and dephasing (Simondon 1992) of any body’s becoming and their encounters. Human bodies, in particular, are “peculiar” informational beings (Canguilhem [1966] 1991) “whose existence depends on the ability to interpret the information present in their surroundings” (Salingaros 1999, 32). These surroundings include blended, physicaldigital spaces, in which information does not pass neutrally, but cuts (“affects”) physicaldigital assemblages of bodies¹⁰ and spaces modulating their composition via affective intensities.¹¹

Informational exchanges do not only concern human bodies. They generate (and could themselves emerge from) affect, “an intensive force that all bodies ... exert upon one another by continuously colliding and diverging” (Bueno and Schettini 2022, 123). Affect, like information, is not human exclusive, but part of the bodies—organic, inorganic, human, algorithmic—continuous differentiating intra-actions: “The difference between organically organised, inorganically organised and any other kind of affect that you may wish to mention is ... a difference in degree, rather than in kind” (Ash 2015, 87). Indeed, “affect refers ... to the ways in which intensities that come before any cognition or emotion are corporeally registered in the spectator” (A. Young 2023, 216). All in all, affect expresses and reifies difference in power (Deleuze 1988), in relation to other entities, rather than being a quality attached to bodies from the outside (Tedeschi 2019).

Differences (relations and (dis)connections) between entities are thus affective (Keating 2019). Affect is how the informative exchange materializes itself, makes itself corporeal, and it is the individualized body link to the preindividual state where difference-in-itself originates: “It concerns processes occurring at the limit of an individualised subject and pre-individual reality” (Keating 2019, 219). A body can be defined as the affect it is “capable of at a given power or degree of potential” (Deleuze and Guattari 1987, 260). Rather than representing information transducing across human activities, affect silently yet materially carves it into bodies and

spaces, and shapes and delivers “forms of movement with potential to increase and constrain individual action” (Tucker 2013, 36).

Reworking and repurposing Simondon’s (1992, [2005] 2020; Tedeschi and Viljanen 2024) scholarship, and drawing on Mackenzie (2002), we argue that information and affect are thus posthuman elements (Tedeschi 2022) that transduce difference(s) across domains (physicaldigital spaces). In other words, they serve as (re)producers of difference, or “differentiators,” of any physicaldigital formation: “Affect is one way to understand the ontogenetic production of difference that ... tends to be shaped by an impersonal and unanticipated arrival of thought and experience” (Keating 2019, 221). In this sense, difference becomes operationalized as transduction. When transduced into exclusive, divisive, segregating, and hierarchized spaces, augmented by techs’ biased data aggregates, affect is attuned accordingly, and difference-in-itself reconfigured as difference for exclusion. This creates, structures, reproduces, and reinforces temporary yet fully material spaces of (in)justice.

Being aware of these hidden mechanisms assumes crucial importance for any right to the digital city theory. In fact, they navigate the realm of intangibility and invisibility; yet this does not mean that such realm is not material, or cannot be used to exercise power. Indeed, as Pavoni and Tulumello (2020) emphasized, affect is a powerful tool that is being exploited by neoliberal urbanisms and smart city projects, reproducing unequal and discriminatory spaces as a “physical and affective aesthetic of the urban” (63). Thus, focusing on affect and how it attunes to bodies and spaces does not reduce the urban to an apolitical, “ahistorical and undifferentiated surface. ... In fact, it allows for fine-tuning this very investigation ... “... while also remaining attentive to how these processes and relations are potentially sensed in moving bodies’ (McCormack 2008, 414)” (Pavoni and Tulumello 2020, 61).

One example of this can be A. Fraser and Matthews’s (2021) concept of criminology of atmospheres, the streetscape, where “legal regulation, technology and architecture combine to form complex networks which shape the capacity for human agency in unique ways” (456). According to the authors, the streetscape is an atmospheric, affective formation, made of human and nonhuman elements seamlessly combining and disassembling. It operates

“at a level of experience that is affective and infra-conscious, with the capacity to act on individuals in a quasi-agentic manner.” In this setting, difference emerges as soon as human bodies infraconsciously navigate and experience the space. Similarly, nonhuman entities, such as data bodies and algorithms, produce and respond to affective inputs in different degrees and intensities. Accordingly, we could say that streetscapes are populated by humans as well as intangible and invisible, yet fully acting and material data formations, data bodies, and these formations transduce into humans (Tucker and Goodings 2017), and vice versa. If we were to theoretically describe the ontogenetic process of transduction here, beyond representation, we would say that there is an information exchange, a transduction occurring between differencing entities (e.g., the human and the nonhuman, in this example data formations). Such exchange moves, replicates, and inscribes multiple microdifferences into bodies. Such differences attach to bodies as affect. In so doing, information transducing inclusive data formations might materialize into and multiply positive affections. Information transducing oppositional, discriminatory, or historically biased data formations, which reinforce and perpetuate structural prejudices and excluding binaries, might reconfigure and reify difference as difference for exclusion. They are most likely then experienced and reproduced as negative affections on the person’s body: “Data are increasingly part of processes of individuation, including both the relations one has with oneself and simultaneously the relations one has with others” (Tucker 2024, 8). If these affections are powerful or intense enough, they could thus further transduce and expand, propagate into harmful spatial atmospheres and, finally, lead to segregating and excluding representations, as well as concrete effects such as a congealing of action and movement in the streetscape.

People being affected by difference for exclusion might feel that their power over space is reduced and hampered, for example “because of the possibility of online threats materializing in the ‘real world’” (Awan and Zempi 2016, 1). The opposite is also possible, where physical threats are resisted against, reported, and mapped online, and possibly thus avoided, and power over space is increased. As described by Leszczynski and Elwood (2015), for example, the platform Harrassmap “allows users to report instances of sexual harassment and assault

aimed at or experienced by women in Egypt” (15). It is a crowdsourcing mapping, where places in which harassment occurred are visualized, verified, and can thus be strategically avoided when navigating the urban space. This information flow across blended, physicaldigital streetscapes thus affects and modulates women’s movements. From a space differentiated and transduced for exclusion on the basis of gender (places of harassment), a tool is here effectively empowering women to move toward alternative, safer streetscapes. In other words, it is transducing a difference for exclusion, and operationalizing it into a difference for inclusion and empowerment.

Although these microevents might not be officially voiced in political struggles pertaining the right to the digital city, or, more in general, as Delaney (2016, 271) would say, in the rights that matter (“substantive enforceable claims such as rights to affordable, secure shelter; rights to a dignified employment; rights to a healthy environment”), yet, they still inscribe themselves into bodies and shape spaces and atmospheres. They redirect processes of becoming, and thus influence urban everyday life’s movements and actions, representations, and microdecisions; fuel feelings of griefs and sadness; or trigger resistance. The digital city becomes a space in which affective differentiation plays a central role shaping both the individual becoming and the collective urban atmospheres. It is here that the potential for spatial justice lies: in the ongoing, affective production of difference-in-itself. The microaffective inscriptions can be harmful or empowering, highlighting that spatial (in)justice does not preexist but is made through differential, affective transduction in the physicaldigital. It is within this relational process that we now reframe (in)justice from a non-representational perspective and explore its workings in the digital urban.

Spatial (In)Justice, the Non-representational, and the Digital City: How They Come Together

Cities are articulations of affective, engineered atmospheres (Philippopoulos-Mihalopoulos 2014), where individuals might feel (un)welcomed.¹² Atmospheres are intangible yet material physicaldigital (spatial) settings where space is configured in a way that some groups are affectively called and included in, and others are rejected and excluded

from. They are spatial formations often (in)visibilizing difference for exclusion, manifesting as neoliberal urban interventions, such as privatizations of public spaces, or increased surveillance in public spaces (Adey et al. 2013), or, as digital feminist geographers keep emphasizing, biased representations of smart city spaces excluding population that possesses certain unwelcome features, intersectionally related to gender, race, ethnicity, religion, or other categories. Non-representationally, they are complex affective configurations where information is transduced, between multiple physicaldigital entities. This exchange (transduction) ontogenetically generates a difference, which materializes as affect. Depending on how the transduction unfolds, it could be productive and empowering, nonexclusive, actualizing a just space—an assemblage of person-urban space-tech where the information exchange has generated positive affections, and an inclusive atmosphere—or, an unjust space where difference is transduced as exclusion and generated negative affections, an excluding atmosphere, leading to discrimination in urban space, slowed-down or arrested mobility (A. Young 2023), and reinforcement of inequalities. This process summarizes the materialization of differences and simplifies in few words or steps a process where many entities could be at play, and more differences (and affections) generated, and stratified into atmospheres of (in)justice.

In the digital city, both architectural and algorithmic elements coproduce affective atmospheres. In these affectively charged physicaldigital spaces, spatial (in)justice manifests in microaffective bodily modulations that shape how difference is felt and enacted. Akin to humans, data formations exchange information and have a capacity to affect and be affected whose intensity varies. These exchanges could occur between different (in)organically organized bodies (Ash 2015), for example: between human entities and artificial intelligence (AI)-generated entities; different AI-generated entities; human entities and other types of data formations, such as their data-doubles; and so on. Whatever the combination or type of entities, information coming from them propagates differences from one body to the other, affecting them, and creating and differentiating spaces of (in)justice. For instance, AI-generated entities such as conversational agents, image generators, or emotional skills measurement do not “feel” the same as the humans (the affect is different

in degree, not in kind; Ash 2015), but they are designed to register, amplify, and modulate affective inputs such as facial expression (microexpressions) and speech patterns as data (Bani 2025). In this human–nonhuman exchange, microdifferences do not emerge through cognition, but through micro-variations of information flows that shape and transduce affect. These variations are often imperceptible for the humans, but they can still be the origin of meaningful distinctions that make AI “learn to feel” about different individuals (bodies). These microdifferences can be then transduced into patterns of inclusion and exclusion. Affect not only shapes human “fleshy bodies,” but also informs how the digital, such as AI systems, registers and operationalizes difference. Similarly, and as already emphasized with the example of facial recognition in immigration contexts, facial geographies show how deviations from norms could lead to spatial exclusion (Gillespie 2022). Social media reinforce this need to follow certain aesthetic standards to “feel included” in physicaldigital spaces. Thus, for example, they promote “filters, which can allow users to alter their appearances in either subtle or substantial ways ... can provide smooth and even skin tones, larger eyes, fuller lips, more angled jawlines, whiter teeth, and thinner faces” (Wang et al. 2020, 1129). People might affectively adjust to these filters, which, via information, are thus transduced into their bodies, operationalizing a difference for exclusion. As a consequence, medical interventions could be sought to finally match the online filtered image (Wang et al. 2020). Here, interestingly, the excluded body might be the original, unfiltered, deviating-from-the-norm face. The digital thus becomes a site where microdifferences are also materialized as part of the spatial atmospheres shaping how bodies feel and function. As Tucker (2013) emphasized, “it is literally a piece of, rather than *about*, us that is recorded” (33, italics in original).

As social-justice-based right to the digital cities theories already emphasized, tech apparatuses are reinforcing existing structural inequalities. Rights are thus increasingly (re)negotiated not only with human bodies, but also with nonhuman entities (Fisher 2022). A non-representational perspective explores the affective mechanisms beyond representation and studies how they, for example, manifest in spatial micropractices of (in)justice. In a space saturated with tech apparatuses and data formations,

difference is constantly produced, transduced, and attached to bodies through affect—either empowering or harmful. Spatial (in)justice can be thus redefined as the temporary solidification and congealing of such multiple differences that physicaldigital bodies generate in their affective struggles over a just space. Building on the work of Cockayne, Ruez, and Secor (2017), in turn drawing from Deleuze (1994), the aim would be to cultivate the difference-in-itself, differencing without opposing. This reframing aims to avoid the (re)production of historically divisive representations across physicaldigital spaces: “If we understand a life as a multiplicity of micro-differences that cannot be subordinated to identity, then we come to see how we are affected and affecting one another ... through connections that do not require ... identification or opposition” (Cockayne, Ruez, and Secor 2017, 590).

As this article remains mainly theoretical, what remains to be seen, and calls for more in-depth, qualitative, empirical studies, is how, in physicaldigital spaces, spatial justice can be thus differently negotiated, difference-in-itself experienced in a way that remains productive, while still differencing, and difference for exclusion resisted or reconfigured toward difference-in-itself.

Concluding Remarks and Future Developments

This article delves into the potential for constructing a framework that incorporates non-representationality and posthuman concepts into spatial justice and the right to the digital city. It is important to note that the theoretical journey presented in this article is not intended as a definitive solution, but rather as a thought-provoking catalyst for further theoretical and empirical investigations into non-representational, digital feminist geographies, and posthumanism in connection with spatial justice and the right to the digital city.

This approach offers four advantages. First, it gives relevance to non-representational geographies in connection to spatial justice, whereby non-representational concepts such as information and affect moving across physicaldigital spaces, difference, transduction, and assemblage (composition of human and nonhuman bodies) are operationalized in a novel, fruitful, theoretical context. Second, it tries to keep the difference-in-itself as a new departure

point to reconfigure spatial justice. Such justice is made of physicaldigital spaces where entities interact and negotiate their rights to be(ing) there. In their ontogenesis, the entities negotiate and fight for their right to be different; in the preindividual, (un)differentiated state, the difference without exclusion sets the foundation for an alternative configuration of spatial justice within human geography (Cockayne, Ruez, and Secor 2017). Third, this position makes spaces of (in)justice a posthuman field of experimentation. They emerge as a layering of information and multiple affections coming together from a multiplicity of physicaldigital bodies through the operation of transduction. Here, information and affect emerge as posthuman elements (Philippopoulos-Mihalopoulos 2019; Tedeschi 2022) playing a central role in how spatial justice manifests itself in digitalized urban settings. This is very close to Barad's (2007) and Philippopoulos-Mihalopoulos's (2014) theorizations, from which it is also possible to foresee a future narrowing down of the distance between non-representational concepts within geography and posthuman discourses on justice derived from critical legal theories and critical posthumanism. Fourth, operationalizing non-representational geographies as complementing right to the digital city scholarship theoretically connects the latter with existing literature on feminist digital geographies and (spatial) politics of affect (Thrift 2004a), and specifically with a politics of belonging and caring versus a divisive politics of identity (Massumi 2015) and difference for exclusion. It also connects right to the digital city scholarship with feminist theories and critically reinterrogates the roots of spatial, structural inequalities occurring within political reconfigurations and representations of affective registers in neoliberal affective economies (Freeman 2020), modulating engineered atmospheres of inclusion and exclusion (Philippopoulos-Mihalopoulos 2014), reinforced rather than weakened in smart and digital city technocratic narratives.

Importantly, when transferred to and tested in the empirical field, this approach would become a theoretical basis for in-depth qualitative investigations of blended experiences of spatial (in)justice in the everyday of urban dwellers. The focus of this empirical research could be on how urbanites' physicaldigital micropractices might be reifications of differences for exclusion, leading to the creation of invisible, yet material spaces of (in)justice. Research participants

could be encouraged to become aware and reflect on their "digital skin," or their existence as physicaldigital bodies, and to construct narratives of how such micropractices of (in)justice occur and can be resisted within their urban lives.

Overall, this article paves the way for an investigation that seeks to advance our understanding of how spatial (in)justice occurs in the digitalized urban settings, with the aim of experimenting with other tools to support more diverse—based on difference-in-itself rather than difference for exclusion—urban environments.

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Notes

1. In this article *body* and *entity* are used interchangeably.
2. As it has been addressed by several feminist scholars on the relation between microviolences, space, and women in the physical realm. See, for example, Acarón (2016) and Sweet and Escalante (2015).
3. The list is far from complete, but see, for instance, Harvey ([1973] 1993), Lefebvre (1968), Mitchell (2003), Moroni (2020), and Soja (2010).
4. For human rights implemented in digital cities, see Reuter (2019).
5. Repurposed from Haraway's (1991) effort to overcome the binaries and dualisms with the concept of "naturaltechnical." The two dimensions are "entangled" (repurposed from Barad's [2007] agential realism).

6. This article cannot cover the vast literature on spatial atmospheres. For reference, see, for example, Brennan (2004), Anderson (2014), Philippopoulos-Mihalopoulos (2014), and Pavoni (2018).
 7. For the concept of distributed agency in geography, see, for example, McFarlane (2011) and the city as assemblage combining multiple agencies.
 8. Therefore, the definition of justice is closely linked to the understanding of the concept of difference as already exposed by feminist and gender scholars when exploring the exclusion of bodies, sexualities, and identities, for example, in the public-private space. See, for example, O'Reilly (2017) and I. M. Young (1986).
 9. For example, physical-digital, human-nonhuman, mind-body, and rational-irrational; see Benyon and Resmini (2017), Braidotti (2019), Hayles (1999), and Kwan (2004).
 10. Here a body is never a unity, but an assemblage of human and nonhuman elements.
 11. In non-representational geographies, see, for example, Anderson and Harrison (2016) and Thrift (2007).
 12. Empirical research capturing the affective dimension prior to representation already exists in literature on (spatial) atmospheres and affect theory. Within psychology, for an empirical exploration (i.e., analysis of online posts and comments in an online community) of affective experiences emerging through digital spaces, see, for example, Tucker and Goodings (2017); in urban (and legal) geography, see Pavoni's (2018, 253) ethnographic exploration of Johannesburg and its "spatiolegal architecture of control," Adey's (2009) work on airports' affective atmospheres of (in)security, and Repo, Kymäläinen, and Humalisto's (2022) qualitative study on affect and atmospheres in a psychiatric hospital for prisoners. Qualitative methods such as ethnographic techniques seem the most adequate to capture how affectivities coconstruct spaces of (in)justice.
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