

Datafication and urban (in)justice: Towards a digital spatial justice

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Abstract

In light of the challenges surrounding the conceptualization and definition of spatial justice within our increasingly data-driven society, this article commences an inquiry into the convergence of space, justice, and data within human geography literature and related disciplines, focusing notably on the urban field. The paper outlines theories concerning social justice-based rights to the city, especially emphasizing the significance of existing literature that bridges such theories with recent scholarship on data justice. It supplements these discussions by deriving a theoretical framework for digital spatial justice rooted in other space-based theories, exploring the more-than-human realms of non-human entities, affect, and information.

KEYWORDS

data justice, digital cities, more-than-human theories, right to the city, right to the smart city, spatial justice, urban geography

1 | INTRODUCTION

Smart city technologies raise a number of ethical issues concerning privacy, datafication, data-veillance and geosurveillance, profiling, social sorting, anticipatory governance, and nudging, that have significant consequence for how citizens are conceived and treated (e.g., as data points, subjects to be actively managed and policed, as consumers), and can work to reproduce and reinforce inequalities (Kitchin et al., 2019, p. 8).

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In human geography and related fields, a growing body of literature has explored spatial theories of justice, particularly in relation to urban contexts and the implementation of the right to the city (Harvey, 1993 [1973]; Lefebvre, 1968; Mitchell, 2003; Moroni, 2020; Soja, 2010). More recently, spatial justice and right to the city theories have also started including the digital space (Shaw & Graham, 2017), which is increasingly permeating both the urban fabric and the everyday lives of urbanites: 'From smartphone applications to GPS devices, Uber, Wikipedia and TripAdvisor, the code and content relating to the buildings and spaces of our cities is often as important as their bricks and mortar' (ibid.: 908). In urban spaces, technologies guide individuals to locations where they can, for example, order food, socialize, shop, or engage in leisure activities. Technologies may also ensure a pleasant and safe experience of the urban space by supposedly protecting individuals from dangers—for example, with apps mapping neighbourhoods classified as either safe or dangerous to walk across—and, more recently, from the risk of COVID-19 contagion (Brighenti & Pavoni, 2023). In so doing they seamlessly create data-doubles, digital copies of 'our physical bodies and personal identities' (Adey, 2009, p. 277), which are fed through social media, the use of geo-location information, and the fruition of services over the Internet. All this requires constant harvesting of personal—socio-economic, health, behavioural—and spatial—location, mobility—data, fuelling urbanites' digital copies and data, over which individuals ultimately lack control (Lupton, 2021). In the background lies a conceptualization of the smart, digital city derived from neoliberal urbanism 'as a model of urban growth based on marketization' (Cardullo & Kitchin, 2019, p. 816) and cybernetic urbanism as a capillary form of technocratic power and 'instance of governmentality through environmental-behavioural control' (Krivý, 2018, p. 16), wherein automatic personal data extraction is not questioned, but rather becomes a constitutive element necessary to guarantee urban control and security (Pavoni & Tulumello, 2023). Data here becomes a capital within the neoliberal 'political economic regime' (Sadowski, 2019, p. 1).

Seamless data extraction and urbanites' lack of control over it thus call for a redefinition not only of the right to data, leading to data justice, but also, and importantly in this article, of how data and the digital are affecting and intersecting with space and the right to the city—leading to spatial justice. This raises the question of how the right to data affects the right to the city, and vice versa, and how/if datafication and digitalisation bring about injustice in urban settings.

This article's objective is thus to show the importance of building a conceptualisation of spatial justice that includes the data/digital dimension. Accordingly, it addresses three research questions: how are spatial justice and the right to the city theories impacted by the increased datafication and digitalisation of urban spaces? To what extent do spatial justice and right to the city frameworks and recent theorisations centred around data justice overlap? How can a digital spatial justice be developed?

The article is organised as follows. The next section explores the nexus between (urban) space and justice, particularly in terms of the right to the city. The first part of the section largely builds upon the extensive review on justice theories in human geography carried out by Przybylinski (2022). It is not intended to be exhaustive, but rather aims to help the reader understand some significant debates centred around social justice-based right to the city theories. It also briefly outlines theories especially focusing on the active role of 'space' and more-than-human elements in spatial justice. Section three provides an overview of the scholarly debates around data (in)justice in relation to the city, based on established social justice-based right to the city theories. Section four builds upon the previous sections and derives an alternative and complementary proposal regarding the development of a digital spatial justice in urban settings, where 'space' and more-than-human elements such as non-human entities, affect, and information play a crucial role in the formation of (in)justices.

2 | SPATIAL JUSTICE AND THE RIGHT TO THE CITY

Broadly accepted within geographies of justice literature is the desire to expand conceptions of justice beyond re-distributive theories specifically and ideal theories more generally. Instead,

geographers have shifted to theorizing injustices, following normative political philosophy's attention to non-ideal theorising (Przybylinski, 2022, p. 8).

Since 1971, when John Rawls' *A Theory of Justice* was published, different philosophical approaches to the concept of justice, including those of Sen (1993), Young (1990), and Nussbaum (1993), have influenced scholars in various disciplines. Within geography, with *Le Droit à la Ville (The Right to the City)* by Henri Lefebvre (1968), the importance of discussing justice in spatial, urban contexts, 'with respect to spatial processes (e.g. globalization, urbanization, suburbanization, gentrification, immigration, environmental nuisances, and hazards), which can lead to social consequences, such as inequality, segregation, exclusion, and shunning' (Israel & Frenkel, 2018, p. 647), was emphasised. The discussion of justice in spatial, urban contexts largely builds upon previous conceptualisations of social justice (Ansaloni & Tedeschi, 2016; Barnett, 2010), which is about different ways of 'addressing the unfair outcomes that result from both social processes and institutional decisionmaking' (Hopkins, 2021, p. 382).¹ For example, social distributive justice aims to guarantee that the same amount of material and immaterial urban resources is equally distributed to everyone. On the other hand, Rawl's inspired procedural justice would guarantee 'equal treatment before the law for all, raising questions of due process, fair trials and so on' (Gleeson, 1997, p. 202).

Crucially, geographers have moved beyond distributive theories of social justice (Przybylinski, 2022), instead 'giving more substantive attention ... to the role of oppression and domination' (Przybylinski, 2022, p. 4) in the way in which social injustices are created in spatial settings. The distributive approach was criticised by, for example, Young (1990), who highlighted how, instead of distribution, 'the particularities of social *difference* could be simultaneously promoted through more universal values of self-determination and self-development' (Przybylinski, 2022, p. 3; italics in the original). Drawing upon Young, Harvey (1992, 1996) rather advocated for justice as a geography of difference (Przybylinski, 2022), not of territorial distribution. In his book *Social Justice and the City*, Harvey (1993 [1973]) also argued how the right to the city must go beyond simple access to urban resources: in fact, it has to do with the right and power of urban dwellers to change, impact, and affect them.

Similarly, Purcell reread Lefebvre's right to the city, arguing that, while the concept can potentially help give more power (and rights) to urban dwellers, its original contribution lies in reorienting 'decision-making away from the state and toward the production of urban space' (Purcell, 2002, p. 101). Here, Purcell continued, the focus would be on the power relations underpinning the production of space, which need to be moved toward urban inhabitants. In turn, commenting on Lefebvre's work, Mitchell (2003) highlighted the importance of Lefebvre's conception of the city as an *oeuvre* to which all its dwellers contribute. As such, the right to the city 'demands the redevelopment of the city in a manner responsive to the needs, desires, and pleasures of its inhabitants, especially its oppressed inhabitants' (Mitchell, 2003, p. 21). While agreeing with Mitchell (2003) that the right to the city remains a vague concept, Delaney importantly maintained that 'rights that matter are rights that matter—substantive enforceable claims such as rights to affordable, secure shelter; rights to a dignified employment; rights to a healthy environment, and so on' (Delaney, 2016, p. 271; see also Attoh, 2011). These rights are, in fact, sites of urban struggles and can shake and question established relationships of power.

Theorising what the just city (Fainstein, 2010) is and how it can be achieved remains challenging.² What role does 'space' have in the formation of the just city though? What are the links between space and justice? In his seminal book *Seeking spatial justice*, Soja (2010) described in what way(s) the *spatial* dimension could contribute to theories of justice.³ At the same time, Philippopoulos-Mihalopoulos (2014) pushed forward the role of *space* within spatial justice discourses (Braverman et al., 2014) and, employing arguments drawn from, among others, more-than-human theories, philosophies of becoming, and new materialisms (Tedeschi, 2019), showed how spatial justice has to be repeatedly renegotiated in the everyday micro-activities (Massey, 2005), where more-than-human elements such as affect and non-human bodies play a central role (Robertson, 2018). According to him, ontologically, the spatial dimension is an active, material element entangled with, and inseparable from, the urban dwellers' bodies.

Similarly, the legal geographer Bennett pushed forward an alternative idea of a legal psychogeography, which, following the path opened by Philippopoulos-Mihalopoulos (2014) and Pavoni (2018), is 'an interpretive approach that would concern itself with enquiring into the role of sensation as a mediator between law and space' (2018: 11). Here a conceptualisation of spatial justice would still concern itself with mechanisms of unbalanced power, conflict, oppression, and resistance, similarly to social justice-based approaches, but while experimenting more with 'the differing spatialities of the body' (Jeffrey, 2020, p. 1005), including non-human bodies. These concepts will be resumed again and further developed in the last section.

3 | DATA (IN)JUSTICE IN THE CITY

At the same time that citizens are ceding control of their statistical representations through their online behaviour, automated data collection increasingly privatises and marketises activities in public space (Currie et al., 2022, p. 11).

As we saw in the previous section, geographers have concerned themselves with identifying how (in)justice practically occurs in urban spaces. As Przybylinski (2022) noted, critical geographers tend to be more interested in bottom-up, concrete solutions to injustices in spatial settings, rather than in abstract theorisations, as to why something is (un)just. Spatial injustice may arise if, for instance, the following rights are not respected: the right to access and change the urban space; the right to be safe in the urban space; the right to be included and not to be discriminated against in the urban space; and, in terms of what Delaney called 'substantive enforceable claims' (2016: 271): the right to decent housing; the right to a healthy environment; the right to public transportation. More in general, the right to the city aims at giving the power over space back to its inhabitants. However, how do spatial (in)justice and these rights change, when the very space where (in)justices are produced radically shifts its nature, and blends with the digital, becoming digitalised/datafied?

This question necessarily connects with discourses on the right to data and data justice. The field of data justice is still under construction (Kitchin, 2021) and overlaps with works and debates on information ethics (Florida, 2014), which, due to space limitations, cannot be covered in this article. Dencik et al. (2016) aimed to build data justice countering the effects of massive surveillance among the population. Surveillance to allegedly guarantee security of urban population⁴ is an essential element of neoliberal and cybernetic urbanism, and one of the ways in which its power hides within the urban fabric infrastructure (Monahan et al., 2010) while materialising in urbanites' everyday lives. Urbanites themselves become thus responsible for acting against threats (Koskela, 2011): as Pavoni & Tulumello put it, 'surveillance and data-gathering practices are not anomalies vis-à-vis liberal regimes: they are constitutive to them' (2023: 128).

Taylor (2017) defined data justice as 'fairness in the way people are made visible, represented and treated as a result of their production of digital data ... necessary to determine ethical paths through a datafying world' (2017: 1). Additionally, Taylor (2017) highlighted that more attention should be paid to data justice's connections with the social and, I would add, with the spatial. The exploration of the spatial interwoven with data and justice is needed, in that urbanites' data aggregated as, for example, data-doubles, or data shadows, digital footprints, increasingly intersect with and impact on discriminatory and unjust practices taking place in the urban space. They may be made up of the material that a user consciously posts about themselves online, and others post about them in turn (Williams et al., 2010)—or of aggregated data that users oftentimes unwillingly share while surfing the Internet. For instance, they may be associated with a marginalized or stigmatized physical location or neighbourhood, or with a certain race or socio-economic status, and the person associated with them may inadvertently attract unwanted attention in both social media and the physical environment they frequent (in terms of e.g. hate crime; Awan & Zempi, 2016). Thus, for example, their right to be included and not to be discriminated against may be violated, resulting in injustice in an urban space that has blended itself with the digital. Geographies of algorithmic violence

(Safransky, 2020) have already showed the inherent injustice in these operations when data willingly or unwillingly produced by the urbanites, the means used to collect them, and the categories shaping their collection guide decisions and predictions on urban planning, individual movements, or the levels of criminality in certain neighbourhoods, which have material effects on urban dwellers' everyday lives, and their right to access and move freely in the urban space. Apps classifying a neighbourhood as dangerous may lead to marginalising and stigmatising effects not only on the neighbourhood itself, but also on its inhabitants. In fact, 'suspicion is shed upon you not for anything you've done, or even for anything you might do, but simply because you happen to occupy an area of interest' (Greenfield, 2017, p. 192).⁵ Unjust practices in the urban may also concern biopolitical operations of bodies and spaces homogenization through data ('dividualisation'; Deleuze, 1992), with a consequent removal of (or discrimination against) troublesome differences (such as sex, religion, or skin colour), leading to further closure and injustice in the form of more subtle and hard-to-detect socio-spatial exclusion: 'To the extent that urban politics is turned into a matter of crafting user-friendly atmospheres wherein navigation may smoothly, efficiently and leisurely occur, questions of class, race, gender and social inequality are made invisible, bypassed and discarded' (Brighenti & Pavoni, 2023, p. 52).

Along with the growing interest of scholars in the algorithmic society and spaces and the risks they entail in terms of equitable and just practices, recent works have also started explicitly combining social justice-based right to the city theories and data justice into a common framework, to build a different, less technocratic and less market oriented smart city (Cardullo & Kitchin, 2019), moving away from neoliberal and cybernetic urbanisms. Within geography, these works go in the direction of building a 'right to the smart city' (or digital city; Galič & Schuilenburg, 2020; Kitchin et al., 2019), where this right is intended as technological sovereignty: 'Technological sovereignty is the notion that technology should be orientated to and serve local residents, and be owned as a commons, rather than applying a universal, market-orientated, proprietary technology' (ibid.: 17). Here technology is thus intended as a form of commons (urban digital commons; Heitlinger & Comber, 2018), moving away from capitalism-led privatisation and commodification of (urban) spaces, their inhabitants, and their data (Käll, 2022), towards 'the collection, sharing and use of data to tackle issues of ... [disadvantaged communities'] own concern, including noise pollution, housing conditions, or social isolation' (Balestrini et al., 2017, p. 2282). Cardullo and Kitchin (2019) introduced the case of Barcelona's smart city programme, and highlighted how the city is pushing a form of technological sovereignty leading to a different form of smart citizenship, which sees citizens not as consumers and passive data producers in a neoliberal perspective, but rather as social collective:

Here, there is a commitment to using open source technologies and to retaining ownership and control of data infrastructure whilst guaranteeing access for citizens (Galdon, 2017). A new set of experiments with open data, control of personal data, civic apps, and crowdsourced sensors are connecting citizens (some more than others) to technology without curtailing their rights and entitlements (Cardullo & Kitchin, 2019, p. 826).

Inspired by Barcelona and (the failure of) Waterfront Toronto smart city experiment (Filion et al., 2023), Foth et al. (2021) proposed *DataCare*, a citizen-oriented, mobile Living Lab, resulted from co-design workshops in Australia. The *DataCare* space would be 'hosted and maintained by a local government or municipal authority to offer a range of smart city services to the public. Rather than a one-way service provision, *DataCare* establishes an ongoing dialogue between the city and its citizens' (ibid.: 331).

On the other hand, concepts such as technological and data sovereignty have their own pitfalls (Bauer & Erixon, 2020). Technological sovereignty should also acknowledge that 'technology-led solutions are not autonomous of broader relations of production' (Ribera-Fumaz, 2019, p. 188), and thus questions regarding control and power over the data remain open, such as: 'How can a city council retain control over data in the epoch of Google, Facebook, and other global corporations? Will local alternative platforms actually successfully compete with global actors such as Airbnb and Uber?' (ibid.: 189). Nature of data sovereignty also remains unclear, in terms of who is the data sovereign, who should take precedence (e.g. individuals vs. population), who is responsible for it (state, private sectors, other entities), which leads to uncertainty, as to what the mechanisms necessary to implement it are

(Hummel et al., 2021). Furthermore, the co-construction of urban digital commons may pose challenges, in terms of, for example, citizens' skills and ability to negotiate and govern their data ownership (Heitlinger & Comber, 2018).

The right to the smart city is also a right to information, as Shaw and Graham, drawing upon Lefebvre, recognised when writing that nowadays 'the city is increasingly reproduced through digital information' (2017: 908); it is 'a densely digitally layered urban environment' (ibid.). The authors continued showing how Google dominates the informational (re)production of urban space for the vast majority of cities. Thus, Google not only offers digital services on top of the physical ones—but, by dominating information, it has also acquired power as an actual producer of the (physical) urban space, and 'decision-maker' as to where, in the end, the right to the city goes (e.g. what places and individuals are included in vs. excluded from). The authors concluded by offering perspectives as to how a 'Google-free city' (ibid.: 918) and an informational right to the city may be achieved through an operation of technology re-appropriation.

In the same direction goes the edited book *Data Justice and the Right to the City* (Currie et al., 2022), where the authors warned against 'technocratic and privatised "data for good" initiatives' (2022: 1). Drawing upon Shaw and Graham (2017), they argued that datafication 'is increasingly indistinguishable from the privatisation of the city, where civic use value is subordinated to profit-seeking behaviour of a technology sector increasingly controlled by a small group of dominant corporations' (Currie et al., 2022, p. 7; see also Käll, 2022). Instead, they took a social justice approach to the topic and to the right to the city, where they focused on injustice occurring to those groups who find themselves more disadvantaged and oppressed by the combination of datafication and urbanisation:

Comprehending the (in)justice of datafied societies comes from examining the struggle between the ways people form their own identities and social groupings, and the pervasive sorting, ordering and categorisation undertaken by often concealed technologies (Terranova, 2004), producing automated affinity groups (Gillespie, 2014) to which citizens are unknowingly assigned, and with which they are appraised (Currie et al., 2022, p. 14).

At the same time, and in line with the right to the city literature drawing upon Lefebvre (1968) (see previous section), they supported a 'return to community-driven goals and technological designs that promote shared experiences and action' (Currie et al., 2022, p. 11), thus giving the power over the data and the digital space associated to it back to the urbanites. A social justice approach to the datafication of urban spaces can also be found in Rosol and Blue (2022), where the authors, in turn incorporating contributions from Fraser (2013), advocated for a transformative approach to justice, involving its distributive, recognition (who is included), and representation dimension ('how do we decide who gets what' (Rosol & Blue, 2022, p. 685)).

4 | TOWARDS A DIGITAL SPATIAL JUSTICE

Not only do such technologies entail an expansion of publicness beyond traditional public places – as in online interaction spaces – but they also perform a veritable infusion of software, platforms and data into everyday urban life, through the scattering of smart objects in space and the parallel spreading of smart devices carried around by urbanites (Brighenti & Pavoni, 2022, p. 97).

At least two endeavours seem to be required to build a spatial justice framework including the digital dimension and the datafication of the urban space. The first is the effort to add a new layer of attention (the data and the digital) to theories of spatial justice and the right to the city. As I outlined in the previous section, this is the direction that social justice-based approaches to the right to the smart city and data justice are already taking—with concerns regarding, for example, rights to data privacy and data security (Fu et al., 2019) of more vulnerable groups, stigmatising and segregating effects of redlining cities through data (Safransky, 2020), invisibilisation

of differences (of 'asymmetries of class, gender, race, age and ability ... built into the algorithmic infrastructure of the urban' (Brighenti & Pavoni, 2022, pp. 107–108)), or again the pervasive commodification and privatisation of the urban space, and its transformation into a marketplace (Käll, 2022).

A second effort, which does not exclude this first, but rather completes it, and is currently being developed, is to draw upon more-than-human and space-based conceptualisations of spatial justice and retheorise the ontology and ontogenesis (i.e. 'the becoming') of (urban) space⁶ in relation to justice. As critical geographers have broadly shown, from Lefebvre (1968) onwards, space is not fixed and objective, but is always socially constructed, and constantly renegotiated (Massey, 2005). As space becomes increasingly intertwined with data and the digital realm, where data and digital elements permeate and transduce into the physical environment, merging with the latter and concurrently reshaping the ways in which urban dwellers interact with it, the modalities through which space is (re)produced and (re)negotiated have undergone radical transformations in recent decades. Software has made itself increasingly agentic and spatial (Dodge et al., 2009: 2), and the very urban fabric can be said to be made of software. Space has been itself socio-digitally constructed. In fact, Casilli noted how 'ubiquitous computing pervades reality by saturating the actual space of the cities and by infusing physical bodies' (2010: 2; see also Greenfield, 2006, 2017 and Tedeschi, 2022).

As Brighenti & Pavoni put it, data, the digital and 'the new media are not simply *inserted* in situations, they also actively *shape* those situations in multiple terms' (2022: 100; italics in the original). Consequently, processes of digitalization and datafication call for an acknowledgement of the agency of non-human elements in the production of just spaces. Notably, Fisher (2022) asked whether non-human entities such as algorithms may have a right to the city themselves. They do, the article showed, as they constantly produce new information about (and epistemologies of) space, and such information is affecting (disrupting or reinforcing) current ways of accessing and experiencing space by its inhabitants. Thus, residents, municipalities, and other stakeholders find themselves in a situation where they have to negotiate their social struggles and power over space with such non-human entities. Fisher used the example of the traffic app Waze, which, in Israel, diverted 'heavy traffic through side-roads ... often cutting through small villages. Residents of these locales ... contest the legitimacy of this new spatial practice' (2022: 75). Thus, the characterisation of urban space as 'blended'—physical/digital (Benyon, 2014; Resmini & Rosati, 2011; Tedeschi et al., 2023); or natural/technical (Haraway, 1991)—implies a growing and complex agency displayed by both human and non-human/digital entities. Social justice-based right to the city theories may be thus complemented with other spatial justice theories encompassing a more-than-human dimension.

In these more-than-human theories, space itself plays a central role. Pavoni (2018) noted how talking about *spatial* justice means to finally give *justice* to space and its *materiality*. The materiality of urban space and of inhabiting it always implies 'displacement, inequality and conflict, and it is only by accepting, addressing and traversing such a dense complexity that justice may be conceived' (ibid.: 220), beyond the human. Philippopoulos-Mihalopoulos (2014) defined spatial justice as a temporary result of a negotiation, a power struggle over space where both human and non-human entities may be involved: 'Humans and farmed animals, a pack of wolves and an unarmed human, global warming and low-lying islands, drought and bamboos, capitalist finance and the urban poor: encounters between unequal bodies in terms of power' (ibid.: 11).

The material and more-than-human turn in socio-spatial sciences is not new. This turn has changed the study of the social and the body (see e.g. Clough, 2007; Gregg & Seigworth, 2010; Tucker, 2018; Tucker & Goodings, 2014; and, originally, Deleuze & Guattari, 1987) and has reached various disciplines, including geography: 'In pursuit of an understanding of the material–affective realm of place, some UK cultural geographers have in recent years attempted to move beyond a fixation with analysing discourse and representation' (Bennett & Layard, 2015, p. 417)—here specifically referring to non-representational geographies (Anderson & Harrison, 2016; Simpson, 2021; Thrift, 2008). It is within this turn that an alternative conceptualisation of spatial justice may finally place itself. It would consider more-than-human elements, importantly in this article digital and datafied bodies, or beings, entities, as key to move towards an urban space that is just (Tedeschi, 2024), and to negotiate the right to the city. The right to access and move within urban spaces, as well as the right not to face discrimination, would emerge as temporary outcomes of power

negotiations over space between various entities. These negotiations could occur between human and digitally-generated entities, or even among different digitally-generated entities themselves.

How would this happen? Within more-than-human perspectives, Bryant (2011) explicitly attributed agency to objects. Mackenzie (2002) elaborated on the ontology behind the entanglement between digital entities and space, and referred to bordering, touching, and a contamination that occurs between them. Drawing upon these strands of thoughts, it is thus possible to rethink an ontology of the urban, where digital entities would actualize and materialise themselves; express their unexpressed potentialities; and these potentialities would overflow and reach out to other objects and, ultimately, human bodies and (urban) space.

Here, the negotiations of the right to the city would not be constructed (solely) through representations or discourses. Instead, they would be importantly modulated by connecting components transcending the human. These elements may be identified as information and affect. Information is here defined as the material element crossing (human and non-human) bodies' boundaries. In fact, we ourselves may be considered informational entities.⁷ Information is the agentic element entangled with and overflowing from bodies, forming a material bridge between them, and even modulating them (D'Amato, 2019), through affect. Affect is what emerges out of exchanges (or intra-actions; from Barad, 2007) between bodies, whereby such bodies imprint forces on each other.

Thus, expanding upon the works of these authors, particularly Bryant (2011) and Philippopoulos-Mihalopoulos (2014), it is conceivable to speculatively assert that information and affect, in their flowing between human and non-human bodies, create, structure, and solidify/congeal temporary spaces of (in)justice across urban blended (physical/digital) domains. Spatial (in)justice would be thus seen as manifesting in intricate and overlapping layers of blended micro-events. It may materialise in the information exchanged and affections generated on bodies by, for example, brief glances and hushed remarks from pedestrians (Young, 2023), almost imperceptible acts of exclusion, unexpected encounters with surveillance cameras in public spaces, expressions of hatred and prejudice from automated bots, particularly on platforms like social media (Awan & Zempi, 2016), negatively influencing spatial micro-movements and actions, or even by simply belonging to a neighbourhood that algorithms classify as segregated.

What is the more-than-human right to the city that can be derived from these theories remains to be seen. Brighenti and Pavoni (2023) have offered a potential direction in this regard. As the specific atmospheres emerging in increasingly datafied and digitalised urban environments tend to include the homogenization and securitization of spaces, the normalization of social life challenges, and the suppression of the unpredictable aspects of urbanity, they advocated for a resurgence of a '*right to the problem*, namely, a right to participate in the *creation of new problems*' (ibid.: 54; italics in the original) as one possible way to give the right to the city back to its inhabitants.

5 | CONCLUSIONS

This article has delved into the convergence of space, justice, and data within human geography and related disciplines, notably focusing on urban settings. As urban spaces increasingly integrate data and the digital, there is a crucial need to bridge the gap between theories of spatial justice and the right to the city and recent advancements in data justice and the right to the smart, digital city.

The theoretical frameworks reviewed here highlight two distinct yet interconnected efforts essential for the development of a digital spatial justice. The first endeavour highlights the significance of existing literature that links social justice-based right to the city theories with contemporary discussions on data justice (Currie et al., 2022). It emphasizes the need to incorporate considerations of datafication, digitalization, and the rights pertaining to these domains (Shaw & Graham, 2017) into established spatial justice frameworks. This effort aligns with ongoing discussions surrounding the right to the smart city and data justice (Kitchin et al., 2019).

The second effort, which complements the first, delves into space-based theories of spatial justice based upon more-than-human framings. It acknowledges and seeks to integrate the agency of non-human entities, such as

digital entities and data, within the discourse of spatial justice. This effort, still in progress, may examine how more-than-human connecting components, such as information and affect, flowing through both human and non-human entities, contribute to the creation, structure, and solidification of spaces of (in)justice across physical and digital domains.

Together, these two endeavours may form a comprehensive approach to digital spatial justice. They both strive to redefine and expand the understanding of spatial justice by acknowledging the intricate interplay between physical and digital realms, emphasizing the need to address the multifaceted complexities arising from the fusion of these domains within urban settings. However, while social justice-based right to the city theories have already given concrete directions as to how the right to the city is changing in the data-driven society, addressing concerns such as data privacy and security of vulnerable groups, risks of redlining the city through data, or the privatisation and commodification of the urban space, a clearer understanding of how a more-than-human right to the city is realised is still under development and would require additional theoretical effort and focused empirical research.

On the other hand, such theoretical and empirical effort is necessary, as non-human entities, such as algorithms, and their connecting components, such as affect and information, increasingly play a central role in modulating (in)justices in urban settings. Another important point of attention is the way in which this framing would need to investigate issues of (in)justice as results of spatial power (in)balances in seamless data extraction and surveillance. A more-than-human right to the city could push hidden mechanisms of data-gathering and surveillance into visibility by theorising and empirically investigating how they produce (un)just spaces beyond discourses and representations. It may investigate the role of *affect* in the daily seamless interactions with the new entities/beings (data-doubles) pervasively populating the urban (Thrift, 2004); how power is exercised by modulating (D'Amato, 2019) and redirecting *information* exchanged between human and non-human bodies (Tucker, 2013); and how *non-human entities* shape emotions (Koskela, 2000) that induce micro-changes in bodies' daily fights for their right to space.

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CONFLICT OF INTEREST STATEMENT

The author reports no conflicts of interest.

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ENDNOTES

¹ For a complete overview and review of theories of social justice, see, for instance, Kitchin et al. (2019) and Rosol and Blue (2022); see also Marcuse (2012) and the right to the city as, fundamentally, a right to social justice.

- ² See also Blomley (2013) and his definition of the city as a legal space.
- ³ For a similar purpose, how space contributes to theories of justice, see also Dikeç (2001).
- ⁴ For a discussion on the tight connection between data-gatherings, predictive policing, and urban security in neoliberal cities see for example, Tulumello (2018) and Pavoni and Tulumello (2023).
- ⁵ See also the non-neutrality of crime data in Scassa (2018); potential violation of the rights to data privacy and data security through urban surveillance in Fu et al. (2019); ethical challenges in smart city applications in Clever et al. (2018).
- ⁶ See also Keating's (2023) effort to theorise geography's technology's ontogenesis.
- ⁷ For informational entities, see Canguilhem (1991 [1966]), whom Simondon (2020 [2005]) drew from; and Floridi's (2014) infosphere.

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