

Posthuman agency in the digitally mediated city: exteriorisation, individuation, reinvention

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abstract

Accounts by geographers of the ways in which urban spaces are digitally mediated have proliferated in the last few years. This significant body of work pays particular attention to the production of urban space by software and digital hardware, and geographers have drawn on various kinds of posthumanist philosophies in order to theorise the agency of the technological nonhuman. The agency of the human, however, has been left undertheorised in this work, often appearing in the form of excessive resistance to the agency granted to the digital. This article contributes to understanding the digital mediation of cities by theorising a specifically posthuman agency: that is, a human agency both mediated through technics and diverse. Drawing on the philosophy of Bernard Stiegler as well as a range of feminist digital scholarship, the article conceptualises posthuman agency as always already co-constituted with technologies. Posthumans are simultaneously individuated and exteriorised in that co-constitution, and this permits agency understood as reinvention. The article also insists that such sociotechnical agency is differentiated, particularly in terms of the spatialities and temporalities through which it is organised. It concludes by arguing that geographers must reconfigure their understanding of

digitally mediated cities and acknowledge the inventiveness and diversity of urban posthuman agency.

posthuman, digital, difference, feminist, Stiegler

Introduction

In recent years, geographical scholarship has created a substantial body of work on "geographies produced through, produced by and of the digital" (Ash, Kitchin, and Leszczynski 2016, 1). This article pays particular attention to work that examines the ways in which many cities across the world are being reconfigured by the deployment of digital technologies. There are now substantial accounts of the softwares that manage urban environments which demonstrate how data is harvested and analysed to conduct diverse forms of city management and control (Graham and Marvin 2001; Amin and Thrift 2002; Kitchin and Dodge 2011; Kitchin and Perng 2016a; Leszczynski 2016). Analyses are also emerging of the latest version of digitally-augmented cities – the so-called 'smart city' (Hollands 2008; Marvin, Luque-Ayala, and McFarlane 2016)¹ – showing how digital data is gathered, integrated and utilised in smart city management (Batty 2013; Kitchin 2014; Klauser, Paasche, and Söderström 2014; Shelton, Zook, and Wiig 2014; Rabari and Storper 2015), often via 'urban dashboards' (Kitchin, Lauriault, and McArdle 2015; Mattern 2015), and interrogating the specific forms of governance, security and citizenship that result (Klauser, Paasche, and Söderström 2014; Kitchin, Lauriault, and McArdle 2015). Geographers have also explored how the everyday experiencing of urban space is altered through digital devices such as large public screens and smartphone apps

(Silva 2006; Boulton and Zook 2013; Crewe 2013; Graham, Zook, and Boulton 2013; Papastergiadis et al. 2013; Krajina 2014; Leszczynski and Elwood 2015).

Cumulatively, this body of work concludes that digital technologies are creating new forms of urban space: sentient, circulatory and splintering (Graham and Marvin 2001; Crang and Graham 2007; Klauser, Paasche, and Söderström 2014; Thrift 2014b; Luque-Ayala and Marvin 2016).

And indeed, in this work, the emphasis is the agency of technologies: hence the widespread use of Kitchin and Dodge's (2011) notion of the transduction of space, that is, the transformation of space by code. The focus of this article is different however. I am interested in the agency of the 'human' in digitally mediated cities. If software code "operate[s] to directly shape the practices and possibilities of life in ever-extending ways" (Graham 2005, 523), how can distinctively human forms of agency be theorised? As the following section will elaborate, geographers have not addressed that question directly. Nonetheless, references to human agency as creative, unpredictable and resistant often appear in their work as an excess to the transductions of urban space by code. Instead of this supplemental account of human agency, this article theorises a form of posthuman agency which is co-produced with the digitally mediated city.

It does so by drawing on the work of Bernard Stiegler. Stiegler is a useful resource for this article because he is a philosopher indebted to Heidegger and Simondon for his interest in the co-constitution of the human with the technological, and also to Freud and Lacan for his theorisation of what is specifically human about certain forms of agency. His work is also useful because spatiality and temporality are central to its account of posthuman agency. And he is interested in – indeed, deeply concerned about – the differential capacities to exercise agency emerging

among humans. His theoretical interest in different forms of posthuman agency is central to this article's arguments because posthuman agency in the digitally mediated city must be understood as differentiated. It takes diverse forms, not all of which are familiar. This point has been demonstrated by feminist geographical scholarship on digital technologies, which early on showed how the use of computers can be heavily gendered (Holloway, Valentine, and Bingham 2000) and is now examining how gendered and other forms of personhood are (re)constituted through contemporary social media and big data (Amoore 2009, 2011; Mclean and Maalsen 2013; Leszczynski and Elwood 2015). This article also argues that much more sustained attention must be given to such diverse forms of posthuman agency as they emerge in digitally mediated cities. Not only are extant social inequalities evident in the digital mediation of urban spaces (as many geographers have pointed out), new forms of social differentiation are also emergent both actually and potentially (Ruppert, Law, and Savage 2013; Withers 2015), and all of these require critical attention.

Given its interest in differentiation and its alignment with feminist geographers's discussions of technology, it may seem odd that this article uses the work of Stiegler rather than, say, Barad (2007), Braidotti (2013), Hayles (1999, 2005, 2012) or Haraway (1997), all of whom have made immense contributions to feminist theorisations of the technologically mediated human. (Their absence from most of the geographical literature cited thus far is also puzzling.) However, I remain convinced that that the posthuman can enact a distinctive form of agency (Rose 2016), and I find the specificity of posthuman agency difficult to locate in the radical redistributions of vitality in that feminist work; Stiegler in contrast addresses the constitution of posthuman agency directly. Moreover, Stiegler's work focusses on (a

specific form of) difference among posthumans and can therefore be appropriated to feminist ends (as demonstrated by Withers [2015]). Hence I find Stiegler useful to think with in addressing this article's central problematic. This is not to imply that he is the only theorist through which the urban posthuman could be approached, however, nor that his work requires no flexing if it is to be used for critical ends, as the article's conclusion will discuss.

The article's argument proceeds in four parts. The next section reviews work produced by geographers on the digital mediation of urban space. Although this work strongly emphasises the agency of digital technologies, the section will show that, nonetheless, a version of the human as an agent of change persists: a version that may implicitly evoke a notion of the human that cannot acknowledge adequately the diversity of human agencies. The second section uses the work of Stiegler to posit a different version of posthuman agency, as the site of technologically mediated exteriorisation, individuation and reinvention. The third section elaborates the differentiation inherent in these processes and therefore emphasises the diversity of forms of posthuman agency as they are co-constituted with digital technologies. The fourth section puts these arguments to work in relation to digitally mediated urban spaces. The article concludes by arguing that, just as digital technologies in cities are radically reconfiguring agency both technological and not, so too geographers must reconfigure their understanding of those agencies to acknowledge the inventiveness and diversity of urban posthuman agency.

Human remains in digitally mediated cities

This section examines the rich body of geographical work on digitally mediated cities, which it divides into three intertwined strands: work that draws on nonrepresentationalist philosophies; work that draws on Actor Network Theory (ANT); and work that draws on Science and Technology Studies (STS). All of these are part of a wider turn to various posthumanist philosophies that has been evident for some time across the human sciences, including geography (Castree and Nash 2006). Posthumanist theories share a commitment to giving agency to the nonhuman as a necessary corrective to centuries of Western philosophising that attributes agency only to a specific kind of human: the male, white, heterosexual sovereign subject, capable of rational thought unencumbered by material objects be they tools or his body (Braidotti 2013). While this section cannot offer a fully comprehensive review of the posthumanisms cited in work on digitally mediated cities, it will indicate that they take up the posthumanist challenge by both emphasising the agency of digital technologies and by substituting the agency of the sovereign subject with other concepts. Nonetheless, as the section will also show, the human also remains in this work.

Nonrepresentationalist understandings of the digital mediation of cities as the production of ongoing, self-organising, sentient environments have been developed over the past fifteen years by Thrift in particular, drawing on Guattari and Sloterdijk. This approach emphasises agency of software and its "automatic production of space" (Thrift and French 2002). Agency here lies in the way software collects, shares and analyses data. Dense webs of sensors, algorithms, protocols and databases produce "the world of 'local intelligence' in which everyday spaces become saturated with computational capacities, thereby transforming more and more spaces into computationally active environments able to communicate within

and with each other" (Thrift and French 2002, 315). Software thus forms "a new set of effectivities" (310), a "generative alterity" (311) which gathers most intensely in cities and works without human intervention to transduct urban space. This space is a continuously mobile, resonant, coded, circuitous and emotive envelopment (Thrift 2011). To be human now, according to Thrift, in Euro-American West, is to be constituted through such "*suggestible environments*, environments which are able to catch and amplify mood... allowing us to bathe in an affective ether of signs and thus produce an intensified everyday" (Thrift 2009, 123). In this nonrepresentationalist work, human agency is dissolved into *affect*: the automatic production of "expressive infrastructure" (Thrift 2012, 143), peopled only by "inhuman figures" (Thrift and French 2002, 312; and see Halpern et al. 2013; Thrift 2014a).

A second body of work on the digitally mediated city draws on the Actor Network Theory (ANT) of Latour. In one of the earliest statements of this position, Bingham (1996) drew on Latour to elaborate the term 'sociotechnical' as a means of insisting that 'the social' and the technological are always bound together; each enables the other (Crang, Crang, and May 1999; Leszczynski 2015). The sociotechnical is an encounter between humans and objects (or between objects and objects), in which both the object and the human become performed in specific ways (Rose 2016). *Practice* is thus the conceptual site at which the sociotechnical is enacted into which 'human agency' is translated in STS work. However, following Latour (2007), geographers drawing on ANT emphasise the agency and materiality of technologies in the constitution of networks of interrelations rather than that of humans (a criticism repeatedly made of Latour's own work, of course [Jöns 2006]). Leszczynski (2015, 741), for example, argues that "the enrollment of these technologies and information artifacts in entirely vernacular ways is actively

engendering new social and cultural norms and practices, as well as reworking existing ones".

STS is the third body of work inspiring geographical scholarship on the digital mediation of urban spaces. Like ANT, STS understands the human and the technological as co-constituted; but that co-constitution happens through a range of modalities less compatible with ANT-like thinking, including, in Jasonoff's (2004) account, identities (individual or collective), institutions, discourse (or language) and representation. A few scholars have taken a more strictly Foucauldian approach and examined the construction of specific forms of human subjectivity as things are done with discursively-mediated technologies (for example the 'smart citizen' [Gabrys 2014; Vanolo 2014], the 'app developer' [Dalton 2015] and "the geocoding subject" [Wilson 2011]), emphasising how discursive regimes condition both a device's design, its use and its users (Boulton and Zook 2013; Wilson 2014, 541). More often, though, a more capacious understanding of discourse generates a methodology of thick description, exemplified in many accounts of digitally mediated urban spaces, including Kitchin's (2014) book on big data and Carvalho's (2015, 46) analysis of two smart cities which approaches them in part via "a largely stable set of interacting artefacts, technologies, infrastructures, every day practices, policies, values and institutions". In Wilson's work, technologies are understood through the discourses of which they are a part, and discourse is understood as "techniques, technologies, practices, experiences, fictions, fantasies, ideologies, language, and metaphors" (Wilson 2014, 537; and see Crang, Crang, and May 1999; Wilson 2015). In this STS work, then, *discourse* is the conceptual term that allows the co-production of the human with the technological.

Thus geographical scholarship on digitally mediated cities has drawn on various theoretical traditions in its attempt to displace the sovereign human subject. These traditions intersect but are not entirely compatible, so each substitutes the sovereign human subject with a different concept: *affect* (in nonrepresentationalist work), *practice* (in ANT work) and *discourse* (in STS scholarship). Despite these various substitutions, though, this body of work shares a commitment to emphasising the agency of nonhuman digital technologies.

This work also shares another, somewhat more surprising characteristic: the persistent return of the sovereign human subject. For, once the agency of digital devices and processes has been elaborated at length – even when it has been argued explicitly that human activity is directly shaped by the digital – almost all posthumanist scholars of the urban gesture towards some form of human creativity that exceeds and often resists that agency. Some examples: with the right devices, humans can "rework the world" (Thrift 2011, 19); code is "a new medium through which fresh ideas can be expressed" (Kitchin and Dodge 2011, 112); "if the state is mapping and performing surveillance, we citizens are counter-mapping" (Crampton 2013, 429); or are "self-selecting" data generators (Leszczynski 2016, 1703); "we must consider the individual... as an acting subject" (Klauser and Albrechtslund 2014, 284); digital technologies can be "recast in acts of resistance and transgression by citizens" (Kitchin and Perng 2016b, 11); there is always the possibility of "critical consumption" (Boulton and Zook 2013, 441); "it is not as though humans move about as automatons" (Amin 2015, 255). References are made to the fact that "human concerns echo through software" (Thrift and French 2002, 330); there are consistent nods to the fact that people do not always do what's expected with digital devices (Thrift and French 2002, 320; Ash 2012, 22; Leszczynski 2015;

Rossi 2015); there are stray references to how software-saturated domestic spaces remain sites of "important lived experiences" and "psychological wellbeing" (Dodge and Kitchin 2009, 1352); and there are persistent references to the work of fantasy, imagination and desire (Crang and Graham 2007; Kinsley 2010; Boulton and Zook 2013; Wilson 2014). It seems then, that it is not only digitally mediated cities that are sentient: so too are its human inhabitants, irreducible to affect, practice or discourse, their "subjectivism and decisionism" untrammelled by technics (Thrift 2014b, 2). That is, "a dash of humanism" remains in these otherwise resolutely posthuman accounts of digitally mediated cities (Thrift 2011, 19).

Human agency thus stubbornly refuses to disappear from this work. But it appears as a *supplement* to its accounts of digitally mediated cities, often feeling like an addendum or postscript after sustained discussions of transduced space. Herein lies a significant issue for geographical understandings of such cities. For without further elaboration, these persistent invocations of human agency as excessive to – that is, distinct from – the agency of digital technologies run the risk of reviving the humanist figure that posthumanist work of whatever stripe has correctly sought to challenge. Without more discussion, this human becomes an apparently unmarked cipher: the site of undifferentiated ideas, experience and resistance. But, as decades of feminist, postcolonial and queer scholarship has demonstrated, such ciphers of the human are very rarely unmarked. Instead, they are most often coded as masculine, white and straight. Leaving such agency untheorised thus risks reviving precisely that sovereign human subject that posthuman theory aims to unseat.

Indeed, I would suggest that we can see exactly that version of being human in geographers' persistent celebration of artists and artworks as able to rework and resist the digitally mediated spheres of urban code/space. Artists and their outputs

are consistently allocated some sort of special insight into the digital mediations of cities by scholars of all the varieties discussed here, from Thrift (2002; 2014a) and Amin (2008) to Dodge and Kitchin (2013, 31). Crang and Graham (2007) point to a range of activist art projects aiming to render the commercialisation and militarisation of digitally mediated cities visible, while Krajina (2014, 7-8) characterises public art using digital screens as an attempt "to interrogate the orthodoxies of contemporary urban space such as gentrification, control, difference and inequality" (for further examples see Boulton and Zook 2013; Lange and Waal 2013; Pinder 2013; Shepard 2013; Dalton 2015). This celebration of artistic insight lacks any sustained account of art as itself a highly specialised sociotechnical practice (for an exception, see Verhoeff and Wilmott 2016). It thus exemplifies the dangers in undertheorising human agency because it repeats the sexualised, racialised and gendered myth of the artist as universal genius, uniquely insightful and unfettered by material concerns: one of the most regressive incarnations of the sovereign human subject (Pollock 1992).²

So, while geographers have successfully taken up the posthumanist challenge to theorise the agency of the (technological) nonhuman, they have neglected the other, crucial challenge posed by critical posthumanist theory: to rethink the human. For if "the concept of the human has exploded... we need to learn to think differently about ourselves" (Braidotti 2013, 1). Without such a rethinking, the sovereign human subject will not be displaced. The undertheorisation of posthuman agency in work on the digitally mediated city must therefore be addressed. How can the *distinctiveness* of different forms of posthuman agency be conceptualised, without implicitly falling back into humanistic accounts of the sovereign subject?

Theorising posthuman agency with Stiegler

In the three approaches to understanding digitally mediated cities just discussed, digital technologies are given agency and 'the human' is replaced with another term: affect, practice or discourse. It is clear though that none of those approaches have managed to fully erase the figure of the sovereign human agent from digitally mediated cities. Humans – imagined as citizens, 'us' and artists – still appear to resist the transductions of urban space by code. This section begins to theorise a posthuman form of agency by pulling it through – rather than leaving it as a supplement to – an account of digital mediation.

It does so by elaborating the posthumanism of Bernard Stiegler. Stiegler is one of many posthumanist philosophers insisting on the co-constitution of the human with the technological, and his work has been introduced to geographers as another take on the sociotechnical, for example (Kinsley 2014, 366). And indeed, for Stiegler as for many other posthumanist theorists, humans have co-evolved with technics, and thus humans and technics co-constitute one another. So far, so familiar, and some geographers using Stiegler's work have done so precisely in order to emphasise the importance of specific technologies in creating human experiences of, for example, urban memory (Kinsley 2015) and play (Ash 2015b).

For feminist geographers Mitchell and Elwood (2013), however, Stiegler's work has important points to make about "what it means to be human" (37),³ and elsewhere Stiegler's oeuvre has been described as a "sophisticated re-examination of both humanism and subjectivity" (Howells 2013, 138). Stiegler is profoundly concerned with what is happening to the human in an era of ubiquitous digital connectivity: "this technology allows each and every one of us to be at a distance

always and everywhere – the question being that of knowing what ‘being’ can mean here" (Stiegler 2009, 35). His answer to that question starts with the notions of 'technics' and 'retention'. 'Technics' refers to both technology and the techniques which put technologies to use. 'Retention' is what structures human attentiveness to the world, and Stiegler (1998) argues that there are three forms of 'retention'. Primary retention is the perception of "apparent (present) objects" (Stiegler 2010, 18), which is then conditioned by secondary retention as the recollection of such perceptions. The third form of retention is "memory that has been externalized from human beings and inscribed into specific material forms that carry the potential for the transmission of knowledge and affect across time and space within them" (Ash 2012, 10): examples might include text messages (Kinsley 2014) and the digital databases of the kind described in many accounts of the digitally mediated city (Kinsley 2015). These tertiary retentions extend beyond the individual both spatially and temporally; they form a "reserve" to be encountered both elsewhere and in the future (Stiegler 2012, 3).

This 'reserve' is organised both spatially and temporally. As Ieven (2013, 79) points out, Stiegler "understands technology as a framework for the organisation of space and time, which is to say that technology plays an instrumental role in arranging and organising the sensations that come upon us [as primary and secondary retentions] and which we make sense of by placing them into space and time". Stiegler is particularly interested in the different temporalities enabled by both the techno-symbolic content of tertiary retentions and in the temporal rhythms through which they are encountered. He is especially concerned with memory, which he understands as structured through a temporality of generations: it requires thinking about the past and the future from the present. He sometimes describes

generations as a 'long circuit', in that memory passes from generation to generation (see in particular Stiegler 2010). Tertiary retentions are also spatialised (Stiegler 2012, 3–4; Ieven 2013). Although this is less fully elaborated in Stiegler's work, spatialities are symbolically materialised in tertiary retentions, to be repeated and/or reinvented by desiring posthumans whose individuations are thus themselves spatialised in particular ways. Exteriorised tertiary retentions are also encountered through specific geometries that organise the reserve.⁴

Tertiary retentions are thus forms of exteriorisation which, when encountered, give temporality and shape to primary and secondary retentions (Roberts 2013, 15). Stiegler however argues that what happens in this process is not only externalisation – the projection of memory across time and space – but also interiorisation, or individuation – the creation of a distinctively human form of interiority. "The mental interior is only recognized as such with the advent of the technical exterior: our conscious self-knowledge is only possible with the ability to exteriorize thought as a trace, commonly as language and gesture" (Kinsley 2014, 372).

For Stiegler, posthuman agency has two characteristics, both driven by the relation between exteriorisation and individuation. The first is a fundamental urge to seek out tertiary retentions. Stiegler turns to a (somewhat non-) psychoanalytic account of 'desire' to explain this posthuman orientation to exteriorisation (Howells 2013). He understands the human as fundamentally lacking (in his work, "technics is what supplements a lack of origin or essence" [Roberts 2013, 15]). The human therefore always turns elsewhere for means of individuating.

The second characteristic of the posthuman is the ability to copy tertiary retentions, but to copy them differently. "Each of us is making an effort to adjust to the pre-existing symbolic frameworks that allow us to communicate with each other;

yet each of us does so in a slightly different way, and that generates a singular understanding" (Ieven 2013, 80). Posthumans inflect some retentions with others, assemble things that accumulate in ways familiar or odd, and organise them in spatialities and temporalities both repetitive and singular: "one's own time [and space] is the result of negotiation between the symbolic and technological frameworks which already exist within the community and one's own idiosyncratic take on these frameworks" (Ieven 2013, 80). Many of those singular mediations will be routinised and unreflexive; many will reproduce established templates of selfhood and experience; many will generate unremarkable everyday practices, affects, meanings, values and perceptions. But many mediations will repeat or combine things in slightly more unusual forms, or even in very new ways, which may "open up other spatial and temporal orientations, and harbour potential to communicate alternative forms of... experience" (Withers 2015, 22). Stiegler is not therefore interested in *resistance* to tertiary retentions (which is impossible, since everything is always already mediated through them) but with their *reinvention* (Moore 2013, 18).

This, for the purposes of this article, is Stiegler's first crucial contribution. His work offers a definition of posthuman agency as the enactment of difference-in-repetition – as reinvention – through technics. His second contribution is to argue that such enactments are organised through specific spatialities and temporalities. This Stieglerian understanding of agency as co-constituted through the technologies of tertiary retentions, including the digital technologies that are increasingly part of urban life, means that scholars of digitally mediated cities do not need to supplement their accounts of nonhuman agency with an undertheorised form of human agency. It is not necessary to add 'dashes of humanism' to the rigorous posthumanism of either nonrepresentationalism, ANT or STS. Rather, a Stieglerian posthumanism

approaches technics precisely as an enabler of both interiorised and exteriorised posthuman agency, an agency enacted in the form of reinvention.

Stiegler's third contribution to this article is his argument that reinvention is not evenly distributed. The next section explores differentiated posthuman agency.

Theorising posthuman agency in digitally mediated cities differentially

Stiegler theorises one specific form of difference among posthumans at some length, and this provides a suggestive example of how his work may enable a more sustained consideration of posthuman diversity. He is particularly concerned with the difference between generations. In his book *Taking Care of Youth and the Generations*, Stiegler draws on Freud to argue that the capacity to individuate is passed from adults to children:

the adult transmits to the child being educated the capacity to internalize, the familiar name of which is 'the law' [ie exteriorised retentions]: in identifying with the adult, the child identifies with what that adult identified with while being educated, and this is repeated from generation to generation; this repeated identification is what both distinguishes and links the generations. (Stiegler 2010, 4)

Adults show children how to individuate in relation to exteriorisations, as they were shown in their turn. Doing this educational work differentiates adults from children.

This is why 'generations' is a key term for Stiegler which identifies difference within the posthuman. He is convinced, however, that this difference is under threat in the current moment, which he characterises as a 'hyperindustrial society'.

Hyperindustrial society is saturated with exteriorisations calculated to satisfy desire in

the shortest possible time, through technologies – digital technologies specifically – that disallow the long circuit needed for posthumans to individuate. He argues that ubiquitous digital media in particular have the technical capacity to 'short-circuit' the careful attention required for individuation; and in the context of consumer capitalism, this is the use to which they are put (see also Mitchell and Elwood 2013; Kinsley 2015). This immediate and ubiquitous satiation of desire removes the ability to individuate and reinvent through differentiated repetition, according to Stiegler. It erases the difference between generations because it infantilises everyone (Stiegler 2010).⁵

I take this account of posthuman differentiation – and its disappearance – as suggestive rather than programmatic. Following Stiegler faithfully, it would be necessary to argue that long circuits of attention – invited by feminist digital archives, for example (Withers 2015; Ferris and Allard 2016) – are good in that they allow individuation to occur, and that the immediacy and speed through which everyday social media use is practised is bad in that such attention is short-circuited (Doorn 2011; Mitchell and Elwood 2013; Kinsley 2015). However, this valuation of one form of temporality over another is questionable. Perhaps the "hyper-reading" invited by social media is, simply, another moment of sociotechnical production, not worse but only different from that invited by, say, movies or novels (a case made by Hayles [2012] and Withers [2015]). What this article takes from this aspect of Stiegler's work, then, is simply that the co-constitution of posthuman agency through technics takes diverse forms, not all of which replicate familiar categories of social difference.

What is also productive, though, I would argue, is Stiegler's use of particular temporalities to describe differences in forms of posthuman agency between

generations – the long circuit of generational transmission versus the short circuit of contemporary digital (dis)satisfactions – because it suggests that organisations of temporality and spatiality could be operationalised as a means of differentiating between diverse kinds of posthumans. This would be to enquire into what forms of reinvention arise from particular configurations of form, shape, extension and durability. Through what rhythms and geographies are the reserve of tertiary retentions enacted by various digital practices? What reinventions occur in the temporal organisation of a digitally-mediated situation, in its specific framings of the past, present and future, for example? Similar questions could be asked about spatialities: what capacity for reinvention exists in the spatial organisation of a digitally-mediated practice? How is that situation itself spatially framed, and what reinventions does that allow? That is, what kinds of reinventiveness (or not) do specific spatial and temporal forms (dis)allow?

The next section returns to the digitally mediated city, and briefly indicates what a Stieglerian approach to its posthuman agency might offer.

Examining differences in the digitally mediated city: some examples

Geographical scholarship has been consistently concerned with social difference in digitally mediated cities. Specifically, attention has been given to the ways in which digital mediations of urban space often both assume and enact particular and all-too-familiar forms of gendered, racialised and classed posthumans. It has been established that social media use by neighbourhood activists reflects and reproduces class and gender relations, for example (Morrow, Hawkins, and Kern 2015); that new forms of urban spatial media "presuppose and reify normative gendered and sexual

subjectivities" (Leszczynski and Elwood 2015, 13); that community mapping using Google Earth reiterates existing racialised urban landscapes (Crutcher and Zook 2009); and that data derivatives culled from urban big datasets "cannot divest themselves of urban inequalities" (Leszczynski 2016, 1691). Much geographical scholarship on digital cities has also frequently critiqued the deployment of digital technologies as serving the interests of governments and corporations (Williams, Marcello, and Klopp 2014; Datta 2015). Kinsley (2015, 158), explicitly following Stiegler, discusses "an emerging system of industrialised memory", owned by just a few social media corporations, which is shaping how "we address and perform activities" (166) (and see Gilbert 2010; Graham, Zook, and Boulton 2013). Many argue therefore that the digital mediation of cities "continues to reflect the contours and divisions of the offline world in which its creators live" (Crutcher and Zook 2009, 524).

This article shares the critique articulated by this critical scholarship. State and corporate ownership of digital devices and data is indeed a vital matter of concern, as are the reproduction of unequal social relations and the differentiations produced automatically by software code.⁶ The article has also emphasised that it is important not to ignore the digital mediation of the posthuman by assuming a clear but untenable distinction between online technologies and offline social relations; posthuman agency must be theorised as co-constituted with urban technologies (of all kinds, not only digital).

Such agency must also be understood as diverse and complex, as Gilbert (2010) has emphasised. This is especially the case in cities, which are particularly concentrated sites of the deployment of digital technologies, digitally mediated retentions and thus for the production of posthuman differentiation. A posthuman,

remember, is greedy for those external signs without which they cannot exist, and cities are sites in which those signs are produced, circulated and encountered most intensively. Posthumans in cities are sociotechnically co-produced digitally with many different digital devices while doing many different things – communicating via Snapchat; travelling with Uber, Google Earth and Google Maps (Graham, Zook, and Boulton 2013; Laforest 2016); being recorded by surveillance cameras and body heat sensors; playing PokemonGo; glancing at algorithm-generated advertisements on smartphone email apps; writing #blacklivesmatter in tweets; tagging and posting photos on Instagram; liking on FourSquare or Facebook; working on a computer generated image of an urban redevelopment project (Melhuish, Degen, and Rose 2016); viewing crowd-sourced i-documentaries, maps, witnessing platforms and GIScience efforts to map marginalised urban lives (Elwood and Leszczynski 2013; Favero 2013; Graham, Zook, and Boulton 2013; Bagheri 2014; Quiquívix 2014; Ferreira and Salvador 2015, 2015); as well as the many things done with the platforms and databases that now insist that they are 'the social' (Couldry and Dijck 2015) – to name just a few, all of which generate data which is processed to generate innumerable tertiary retentions of many kinds, numeric, textual and visual.⁷ Cities thus host and are mediated by dense gatherings of retentions (both digital and not) – critical, hegemonic, banal, silly (Kingsbury and Jones III 2009; Goriunova 2013) – which accumulate into a vast "stratified constellation of technical memory matter, composed of resources that shape political and cultural imaginaries... with depth, height, scale, extensiveness and duration... moving in different directions... Its forms may change and its content migrate, accruing or shedding textures in the process" (Withers 2015, 17; and see McFarlane 2016). This is a reserve not only of retentions but of embodied practices, through which posthumans watch, touch, learn,

think, hear, move and gesture, in streets, squares, parks and workplaces, mimicking, recombining, reinventing. It is from this urban "media manifold" (Couldry 2011, 215) that multiple forms of digital posthuman agencies emerge, as myriad retentions are encountered and reinvented.

As the previous section noted, Stiegler's work suggests that the temporal and spatial organisation of practices and meanings are particularly significant markers of different forms of posthuman reinvention. This means that, while not abandoning critical understandings of the enactments of classed, racialised, gendered and other differentiations, scholars of the digitally mediated city should be alert to the ways in which digitally mediated reinventions by agential posthumans can reiterate, modulate and translate those differences, as well as create new forms of differentiation.

There are already examples of geographers studying specific examples of digitally mediated social difference in cities which could be read in these Stieglerian terms. A decade ago, for example, Crang, Crosbie and Graham (2006) paid particular attention to how different temporal rhythms distinguished different practices of ICT use in a city in the north of the UK. They argued that "first... affluent and professional groups now use new media technologies pervasively and continuously as the 'background' infrastructure to sustain privileged and intensely distanced, but time-stressed, lifestyles. Secondly, more marginalised neighbourhoods tend to be characterised by instrumental and episodic ICT usage patterns which are often collectively organised through strong neighbourhood ties". Rather than interpret these findings as the latter 'lagging' behind the former due to their lack of access to ICT, they suggested that these distinct rhythms might be better understood as *constitutive* of two different social groups, created by "the ways [digital technologies] configure users and users configure them" (2553). They go on towards the end of

their discussion to consider the implications of their analysis, suggesting that aligning two distinct rhythms of ICT use with two pre-defined social groups may obscure other temporally-organised mediations of urban space with different sociotechnical outcomes. Their notion of a "multispeed city" of "uneven accelerations" (2556) is particularly suggestive of the way in which diverse forms of temporality – constant and episodic – may differentiate between diverse co-productions of the digital and the posthuman in cities.

Examining specific modes of spatial organisation can also differentiate between various enactments of posthumans. Recent work on circulation in digitally mediated cities is suggestive here. A particular type of circulation – the seamless flow of both data and people – is central to corporate discourse about the smart city (Klauser, Paasche, and Söderström 2014; Luque-Ayala and Marvin 2016).

Promotional videos for smart city technologies made by large soft- and hardware companies consistently picture city inhabitants as a mobile mass, for example: video after video shows trains, buses, cars and planes (and even the occasional bicycle, pushchair and wheelchair), crowded with passengers (Rose 2017). In these visions of and for the smart city, posthumans are constantly on the move with many others, their mobility pictured as made more efficient (that is, faster) by digital technologies ranging from traffic management infrastructure to smartphone apps. This kind of constant, uninterrupted mobility is perhaps most aptly visualised by the luminescent data trails generated by hundreds of smartphones and visible on the screens of smart city control centres (Luque-Ayala and Marvin 2016). But it may also be enacted by all those bodies carrying those phones; Verhoeff (2012) argues that the spatialities of frictionless data circulation are collapsing into those through which city streets are experienced by posthumans. Work on urban screens is relevant here,

which suggests that screens of all sizes are constantly bringing other locations into view (McQuire, Martin, and Neiderer 2009; Berry, Harbord, and Moore 2013; Straw 2013; Krajina 2014), enacting an urban space strung out between a built environment and a screened environment that could be described as a "hypertopia" in which "a 'here' [is] full of 'elsewheres'" (Casetti 2015, 131, 151). Thus one kind of urban posthuman may be enacted navigationally, constantly "keeping an eye out for where to move or what do to next" (Verhoeff 2012, 13; and see November, Camacho-Hübner, and Latour 2010; Casetti 2013), scrolling and swiping, smartphone in hand and a public screen in the corner of their eye.

This mobile, navigational body, seeing and being seen through screens as well as smartphone signals and sensors, can take different forms. It may perhaps be another sighting of the kind of posthuman identified by Crang et al (2006): affluent, time-stressed and constantly checking their digital devices precisely in order to check what to do next or to peer at other distant people and places (and see Wilson 2014). Other mobilities gazing at digital devices in urban spaces may be reinventing rather different kinds of posthuman, however. If they are holding a mobile gaming device, for example, and playing a proximity-sensitive game, their mobilities will be shaped by a complex mix of digital infrastructure (the game's affordances and the availability of wifi in city spaces, for example) and the reinvention of social practices of encountering others in both the gaming environment and in those city spaces (Licoppe and Inada 2016). This may involve choosing specific times and locations to meet (more or less explicitly and more or less visibly) as well as inventing specific forms of walking towards and engaging with others in urban spaces who may or may not be playing the same game: encounters that may be either "brave" or "timid" (Licoppe and Inada 2016, 277). Another form reinvention is described in Krajina's

(2014) exploration of the complex work done by posthumans with large public screens in city spaces, which shows how they may eventually become indifferent to the hypertopic offer. These posthumans, drawing on their understanding of other screen media, ignore the pull to move (visually) into other places; the large urban screen is reinvented as disregardable and their mobility takes place elsewhere. Different spatialisations of mobile encounters, then, also register different kinds of urban posthuman.

Through these few examples, this section indicates that thinking about *different forms* of posthuman agency *through* technics is possible in the digitally mediated city. The very intensity of tertiary retentions that accumulate in and about urban spaces allows various kinds of *reinventions*, which can be differentiated by their enactments of particular forms of spatial and temporal organisation. Some enactments do seem best understood in terms of their relation to forms of social difference produced in a range of situations (Gilbert 2010). Class clearly still matters, enacted (in part) by specific forms of digital ongoingness and reach (Crang, Crosbie, and Graham 2006) – though such reach may now also be shared by young male urban slumdweller in southern India and their future-oriented sense of aspiration, as demonstrated by their "wild" experiments on Facebook (Rangaswamy and Arora 2016). It may be coincidence that Licoppe and Inada (2016, 280) illustrate their example of a 'brave' gaming encounter with images of male gamers and a 'timid' encounter with a story about "a lady... who had gone to do some shopping with her husband and young son"; but it may also speak to the intersection of gaming reinvention with the density of gendered relations in urban spaces. Many dating apps that organise urban sociality repeat conventional gendered identities too (Doorn 2011; Chen 2016), even if some recalibrate the straight male gaze at women in

public spaces by making her location rather than her body what is visible (Leszczynski and Elwood 2015). Other forms of posthuman inhabitants in the digitally mediated city are less recognisable, though. The smartphone owner becomes a mobile geolocated data point on a 'realtime' datastreaming screen, for example, stripped of any visible markers of social difference other than location; the pedestrian may no longer be a flaneur or flaneuse but a glancing eye that's learnt not to pay attention to the hypertopias visible on large screens.

I would argue that this attentiveness to the temporalities and spatialities enacted in digitally mediated cities points to a much richer understanding of how specific, diverse differences come to matter than only asking who owns big data, how existing social differences are replicated, or who has access to technology (as Crang, Crosbie, and Graham [2006] also argued) – important as all those questions also are. While some forms of posthuman clearly reiterate existing understandings of social difference, other forms are less familiar. The posthumans that materialise in the digitally mediated cities are diverse reinventions, and theorisations of those cities must generate that diversity rather than ignore it.

Conclusions

This article has argued that much current work examining the digitally mediated city is dominated by an approach that emphasises "the unfolding or evolutive power of technology to make things happen" (Kitchin and Dodge 2011, 42). Without doubt, this emphasis on the agency of digital technologies in shaping urban spaces and experiences has important things to say about the "automated management" of urban space (Kitchin and Dodge 2011, x). However, its lack of attention to other

forms of agency, especially to what this article has called the posthuman, is striking, given that "the ever-increasing amount of technological mediators that surround us have radically expanded our experience of what it means to be human" (Doorn 2011, 536). Other work in digital studies has been criticised for just such a neglect. While this article has merely suggested that this undertheorisation risks implicitly reinstating the sovereign human subject, other feminist scholars are less circumspect. In feminist games studies it is now obvious that the "fetishizing of tools, code... and 'massive' or 'big' data" is an indication of a masculinist form of scholarship (Losh 2015, np), and elsewhere, feminist digital scholars warn that "to adopt absolutely non-human priorities [implies] all questions of sex and gender are irrelevant" (Bassett 2015, 141).

Fortunately, geographical scholarship, from the beginning of its interest in digital technologies, has been concerned with both human agency and with the intersection of digital technologies with existing forms of social difference. Often, though, both human agency and social difference have been placed theoretically outwith the digital, as its supplement. This article noted in its first section how the sovereign subject recurs as a form of resistance to digital mediations and its third section noted how it is often suggested that digital technologies simply reflect social differences that exist already in the 'offline world'. This article, in contrast, has attempted to theorise (digital) posthuman agency by thinking it as always already (digitally) sociotechnical. In so doing, it has asserted the importance of the posthuman to the digitally mediated city (as well as suggesting that the digitally mediated city, as a particularly rich site of tertiary retentions and reinventions, is crucial to the digital posthuman).

To make this case, the article has used some of the arguments of Bernard Stiegler. Stiegler argues that posthuman being is only possible through the devices and practices of technics. His arguments thus suggest that the posthuman is a crucial site which both emerges through and reconfigures digitally mediated cities. Posthuman agency is therefore not a supplement to how those cities should be thought; rather, it is necessarily co-produced with digital technics (and indeed in tertiary retentions of all kinds: life is not yet entirely digital). Stiegler's work also suggests that attention should be given to the precise and diverse configurations of the posthuman that are emerging as cities become saturated with software and screens. The article has argued that one way to do that is to consider what forms of posthuman invention are articulated through different temporalities and spatialities. Speed, rhythm, historicity, location, flow, friction, extension, futurity, splintering, distribution, fracturing, orientation: this is the grammar through which different forms of digitally mediated posthumans can be parsed. The identities, relations, hierarchies, connections, folds and exclusions that are thus articulated may have diverse effects, and this poses a rich empirical research agenda for geographers to pursue.

Thinking with Stiegler can be productive, then. His work also has limitations, of course. For example, if technicity is "imminently gendered" (Leszczynski and Elwood 2015, 22) – and also classed, racialised, sexualised and otherwise differentiated – it is a shame that Stiegler's only category that gestures towards such differences is 'generation', and that his version of generations smacks a little too much of the patriarchal senior and deferential junior (Withers 2015, 21-22). He has also been criticised for focussing too much on memory and not enough on other forms of interiorised forces such as emotion or affect (Hansen 2013). His arguments

depend on an account of social media which massively underestimates the reinventiveness of its users. Moreover, many accounts of social media emphasise its diversity in ways Stiegler does not: social media (and other) platforms carry all kinds of retentions, from the amateur, the silly and the "shit" (Douglas 2014) to the professional, slick and glamorous (Degen, Melhuish, and Rose 2015), and these enable different kinds of reinvention.

Despite all these difficulties in his work, though, Stiegler provides some productive conceptual tools for a new approach to geographical scholarship on digitally mediated cities. If urban "digital mapping technologies and the digital landscapes they produce guide and code subjects towards specific experiences" (Boulton and Zook 2013, 439), then their geographical analysis must be *properly* posthumanist. Geographers need to grasp not only that digital technologies have the "power to produce real, lived spaces and places through digital means" (Dalton 2015, 1032) but also that, while the *human* as its supplement is no longer, the *posthuman* is very much alive. Geographers must therefore reconfigure their understanding of digitally mediated cities and acknowledge both the reinventiveness and the diversity of urban posthuman agency. Stiegler may only be a partial guide for this task, but in his emphasis on technicity and spatial and temporal differentiations among posthumans, he is surely pointing geographical scholarship in the right direction.

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notes

- ¹ 'Smart cities' are those in which digital technologies are deployed in order to achieve economic growth (through innovating new products and markets), environmental sustainability (by encouraging more efficient use of resources) and openness (by enabling greater citizen participation in city governance). At least, these are the claims made on behalf of the smart city by its advocates.
- ² For Stiegler's scathing critique of contemporary art practice, see Crowley (2013).
- ³ Kinsley (2014) does acknowledge this aspect of Stiegler's work.
- ⁴ It is interesting to note here a connection to the work of Rancière: unsurprisingly, since both Stiegler and Rancière are deeply influenced by Foucault (Crowley 2013). For Rancière, framings of time and space dictate who (and what) is visible and audible, where and when. Power, he argues, resides in the hierarchies embedded in such framing; and 'politics', for him, "is made possible by subjects transfiguring, transforming, appropriating space for the manifestation of dissensus" (Dikec 2015, 98). Rancière locates the agency of that transfiguring anywhere, with anyone because, as he insists in his book *The Emancipated Spectator* (2009, 10), everyone is always constantly learning about the world, and becoming human through that learning: "the human animal learns everything in the same way... as it learnt to venture into the forest of things and signs that surrounding it, so as to take its place among human beings: by observing and comparing one thing with another, a sign with a fact, a sign with another sign". In an approach similar to Stiegler's, this is not learning in the sense of gaining more and more knowledge; it is learning as an orientation in the world. "We also learn and teach, act and know,

as spectators who all the time link what we see to what we have seen and said, done and dreamed" (Rancière 2009, 17).

- ⁵ Stiegler's account does not therefore assume that all human bodies always have similar kinds of posthuman agency (Moore 2013). Nor, in his logic, is such agency exclusive to them: other, entirely nonhuman entities may also be capable of invention, though as Jöns (2006) suggests, posthumans perform it most intensely.
- ⁶ I would also emphasise that there are multiple forms of power in the digitally mediated city, in contrast to the somewhat binary accounts of corporations/governments and citizens that appear in some geographical accounts (see also Buscher et al. 2016).
- ⁷ Which suggests that geographers interested in the mediation of cities should study the practices in which all of these are embedded, not just the 'resistant' (Rodgers, Barnett, and Cochrane 2014)

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