Society and Space

Seeing the smart city on Twitter: Colour and the affective territories of becoming smart

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Abstract
This paper pays attention to the immense and febrile field of digital image files which picture the smart city as they circulate on the social media platform Twitter. The paper considers tweeted images as an affective field in which flow and colour are especially generative. This luminescent field is territorialised into different, emergent forms of becoming 'smart'. The paper identifies these territorialisations in two ways: firstly, by using the data visualisation software ImagePlot to create a visualisation of 9030 tweeted images related to smart cities; and secondly, by responding to the affective pushes of the image files thus visualised. It identifies two colours and three ways of affectively becoming smart: *participating* in smart, *learning* about smart, and *anticipating* smart, which are enacted with different distributions of mostly orange and blue images. The paper thus argues that debates about the power relations embedded in the smart city should consider the particular affective enactment of being smart that happens via social media. More generally, the paper concludes that geographers must pay more attention to the diverse and productive vitalities of social media platforms in urban life and that this will require experiment with methods that are responsive to specific digital qualities.

Keywords
Smart cities, Twitter, affective territory, data visualisation, colour

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Introduction

This paper is about what happens when smart cities are pictured on the social media platform Twitter. Twitter started in 2006 as a microblogging site and has developed from mostly phatic chatter to something more like a 'medium for event following' (Rogers, 2014: xvi; and see Weller et al., 2013). It is also an important medium for corporate branding, marketing and professional networking (Nitins and Burgess, 2013). All of the key actors in smart cities have a significant presence on Twitter, and many smart city-related tweets have images attached. As well as individual cities' accounts like @MKSmartProject (Milton Keynes) and @adamsmartcity (Amsterdam), smart city-related Twitter accounts include @IBMSmartCities, @SmartCityexpo and @FutureCitiesCat, which have 13,400, 30,200 and 16,700 followers, respectively. Much smart city activity on Twitter is also routed through hashtags like #smartcity, or through accounts related to the Internet of Things (a term which refers to digitally connected devices whether urban or not): these include large corporations like @Cisco_IoT (55,600 followers) and @IBMIoT (58,500), as well as newsfeeds like @IoTNewsroom (179,000), @IoTInsider (109,000) and @TheIoT (66,200). The paper considers how this extensive Twitter activity contributes to ways of being 'smart'.

It does so specifically in relation to the images that circulate on Twitter attached to smart city-related tweets. Many smart city corporations and organisations are present on a number of social media platforms, and much of this activity involves visuals of various kinds. Indeed, visualisations are central to smart cities. Smart cities are the latest manifestation of a range of postwar efforts to improve the management of cities through the use of data. However, one of the things that makes 'smart cities' somewhat distinct from their cybernetic and intelligent forebears is that their every aspect is intensely visualised. While data visualisation was certainly important to their predecessors (Halpern, 2015), in smart cities, images are everywhere. Data is mapped, graphed and otherwise visualised; smart cities are pictured in photorealistic computer-generated images and digital animations; graphics explain smart hardware and software; photographs provide evidence of smart activity (or its failure). Such images display many kinds of content in diverse styles and genres; they are materialised in specific formats; and they are viewed in many different situations. This paper examines just one manifestation of this image corpus: images that stream across Twitter's various screen interfaces, tagged as having some relation to smart cities.

Social media platforms like Twitter have received considerable scholarly attention because if 'sociality itself is undergoing transformation in digital societies' (Marres, 2017: 3), then social media are central to that transformation. Social media platforms are part of new communicative infrastructures which, as social practices also shift and co-emerge, enable new forms of social connectivity (Bruns and Hanusch, 2017; Dijck, 2013). Twitter is one of the most significant of these sociotechnical platforms; it has around 320 million monthly users worldwide, and 500 million tweets are sent each day. This paper takes the connectivity of images on Twitter to be one of their peculiarly digital characteristics. Via tweets, likes, shares, links, feeds, retweets and replies, social media images travel from screen to screen. Those journeys create a labrynthine field of nodes, links, feeds, hubs and relays, constantly in flux as links, swipes, signals and glances interact. This 'spreadability' of digital images is an affordance of their digitality (Jenkins et al., 2013), and it is also part of the 'surging, vibrant crowd of becomings' that Amin and Thrift (2016: 60) identify as the urban. Social media images are an important part of the emergence of smart as a peculiarly digital form of urban being.

The paper elaborates this contention by drawing on a number of accounts of social media that approach the connectivity of social media as affective: that is as located at 'the

intersection of sensation, intensity and materiality' (Paasonen et al., 2015: 4; and see Coleman, 2012; Dean, 2015; Hillis et al., 2015; Paasonen, 2016; Papacharissi, 2015). 'Circulations of links, images, invitations, videos and pieces of text are driven by individuals' interest in and quest for affective encounters with others' (Paasonen et al., 2015: 2). If Twitter is understood as an affective field (although not only affective, as will be discussed below), then post-humans are being co-constituted with its glowing flows of imagery.[1] Understanding this visual field as affective suggests that Twitter is a technics through which *becoming* smart eventuates. This becoming generates the key questions of this paper. How are hyper seen tweeted images co-constituting particular forms of smart, post-human becoming? Or, what is it like to be smart with Twitter? The emergence of specific forms of post-humans in conjunction with images of smart cities is the soft power with which this paper is concerned.

Following the injunction of several scholars of the digital to deploy methods that engage with the specificity of the digital (Paasonen et al., 2015; Rogers, 2013; Ruppert et al., 2013), the paper addresses this question by enacting two symptoms of what it is also discussing. First, it uses a data visualisation software called ImagePlot to visualise thousands of images attached to tweets using smart city-related hashtags. That is, it uses code to explore aspects of the digitality of tweeted smart city images, specifically certain aspects of their luminiscent flow across screens. Secondly, the paper acknowledges the embodied affects of those images. Like Bissell and Fuller (2017) in their analysis of images of a new road building project, the first author allowed herself to be affected by Twitter images of smart cities, asking what they wanted of her. Drifting around a visualisation produced by ImagePlot, she felt there were three ways of being smart, clustered in particular parts of the ImagePlot visualisation. The paper explores those three as well as the wider visual field which they territorialise. The paper concludes by recommending that geographers pay more attention to the diverse vitalities of social media platforms in urban life and experiment with digital methods to do so.

Affective social media: Flow, glow and territorialisations

Smart cities manifest in many ways (Hollands, 2008) and one of them is the #smartcity. As digital images in and of cities proliferate and circulate, 'new scales and speeds are inserted into the warp and weft of everyday life' (McQuire, 2016: 20). Digital luminescence shines from screens large and small as brightly coloured, glowing images dance and stream across their surfaces (Kane, 2014), as smart is seen and done. While much of the content of tweeted smart city imagery can be criticised as being no more than advertising of one kind or another (see e.g. Wiig, 2016), this paper argues that tweeted images should nonetheless be taken seriously as a significant modality in the production of smart cities. This section explains why by discussing the paper's conceptualisation of social media imagery as affective.

In her discussion of digital sociology, Marres (2017) usefully distinguishes between three different approaches to social media technologies. The first of these is technology-centred, in which the technical capacities of platforms or devices are understood as generating social effects. The second approach focuses on the vast amounts of data generated by the use of social media platforms. This data permits the tracking of activities, transactions and attributes (by researchers both in universities and social media corporations) which can be analysed to create a 'dynamic, lateral, granular description of distributed groupings' (Marres, 2017: 51). Finally, Marres discusses approaches to social media technologies which focus on digital practices: that is how people understand and make use of such technologies.

Research on Twitter has taken all these approaches. There have been discussions of Twitter as a platform with specific technical affordances (e.g. Dijck, 2013). Large datasets scraped from the platform have been used by many academic researchers partly because they are relatively straightforward to access from Twitter (Rogers, 2014; Weller et al., 2013). And there have been some discussions of tweeting as a social practice, for example Halavais's (2014) discussion of how retweeting developed as a practice among Twitter users before the platform had a retweet button. This paper takes a fourth approach, however, which is to explore the affectivity of Twitter.

The affectivity of images in tweets depends in part on the fact that, in digital visual culture, an image is a data file and is therefore 'the continuous actualization of *networked* data' (Hoelzl and Marie, 2015: 3, my emphasis; see also McQuire, 2016). As digital files, images circulate between different screens as part of their production, distribution and circulation (Melhuish et al., 2016). The shift from analogue to digital popular photography, for example was enabled not only by digital cameras but also by increasingly seamless connections between cameras, other viewing devices like computers and, more recently, phones and social media platforms (Rubinstein and Sluis, 2008). A digital image is, therefore, a networked image.

> A networked image is both instantaneous in the sense that it can move across the Internet close to the speed of light and multipl[e] in the sense that it can bifurcate into any number of copies. In this climate repetition, seriality and divergent parallel narratives take precedence over significa- tion and representation. (Rubinstein and Sluis, 2013: 154)

Images appear on multiple screens, in different forms, at different sites. They are shared and modified, liked or deleted, copied and posted. The huge numbers of images in circulation, as well as their mobility, is enacting 'shift from the singular . . . image to image sequences: the image 'pool' . . . the image 'feed' . . . something more akin to live transmission' (Rubinstein and Sluis, 2008: 22). This pulsing, transversal digital visual swarm is best thought of as a *field*, 'an intensive field of network energetics' (Munster, 2013: 28). More dynamic and dispersed than an archive (McQuire, 2016: 67), this is a morphing population of images both slick and wretched (Steyerl, 2012), and constantly emergent.

While this connectivity is clearly enabled by the technical affordances of specific plat- forms (Dijck, 2013), Dean (2010, 2015) argues that the circulations across and between social media platforms are also affective and have to be understood as such: 'affective links are stronger than hypertextual ones', she claims (2015: 91). She argues that spending time on social media is driven by a desire for affective intensity. Twitter, for example, is scrolled through in an ongoing search for something that will capture attention and provoke feeling. 'The active desire for jolts of interest, amusement, and diversion . . . drives users' restless motions across multiple screens and applications' (Paasonen, 2016: n.p.). That so much of social media fails to satisfy this desire produces a search through yet more that is both pleasurable and anxious. (Indeed, Dean [2015] drawing on Lacan argues that is it is inherently unsatisfiable.) Other accounts of social media use emphasise other affective dis- positions: towards navigation perhaps (Verhoeff, 2012), or aspiration (Rangaswamy and Arora, 2016), or entrapment (Sundaram, 2015). This paper suggests that being 'smart' is yet another.

The co-constitution of specific kinds of post-humans with social media images specifically is distinctive. Driven by the desire for intensity, engagements with social media images are often quick and distracted rather than slow and attentive. Visuals flow and glimmer, and their constant streaming invites quick and distracted attention. Just as slow, careful reading

is being joined by 'hyper reading, which includes skimming, scanning, fragmenting, and juxtaposing texts' (Hayles, 2012: 12), close ways of seeing are being joined by what might be termed *hyper seeing*, a restless form of looking, glancing and casual, on the lookout less for meaning than for feeling. Foster (1988: ix) defines visuality as 'how we see, how we are able, allowed, or made to see, and how we see this seeing and the unseeing therein'. Hyper seeing is the visuality through which social media images are visible. Hyper seeing is a glancing search through (what then becomes) the constantly emergent, transient, conjunctural digital image field, in which images of many kinds appear and disappear as screens light up, feeds refresh, searches complete and screens are swiped. In this process, 'the flow of tweets transmits what exceeds any specific tweet ... one even gets accustomed to overlooking tweets in their singularity, enjoying instead getting swept into their flow' (Dean, 2010: 98).

Connective flow is one defining component of social media's affect, and another is colour. Thrift (2012) notes that colour is an important means by which affective currents are digitally configured in contemporary capitalism as part of its 'manufacture of rolling worlds' (Thrift, 2012: 142). Colour is constituted by a number of visual qualities: hue (the actual colour), tone (pale or dark), saturation (vivid or dull), brightness (how much light is emitted or reflected) and transparency (transparent or translucent) (Biggam, 2007: 183). Much discussion of digital colour focuses on its 'stunning' intensity (Kane, 2014: 2). Many urban environments now are 'decked from head to toe in electronic hues ... luminous screen savers, and brightly colored multiscreen installations in shopping malls, airports, airplanes, gyms and cars' (Kane, 2014: 23), and such 'variation and intensity of luminosity and colour' has been described as one of the affective infrastructures of digitally mediated cities (Amin and Thrift, 2016: 55). In her history of digital colour, Kane (2014: 1) elaborates the qualities of contemporary digital colour as 'hypersaturated' and also 'sleek' and 'lucious', a rich sensorial vocabulary which suggests a fully embodied, affective response to the jewel-like colour of digital images onscreen. Coleman (2013) also argues that the intensity of digital screens is embodied and affective. Much digital imagery offers striking colour content made smooth and glossy by the 'dazzling varnish' created from a panoply of light effects (Geuens, 2013: 53; see also Dorrian, 2015; Vernallis and Herzog, 2013). It is also the case that other digital imagery 'is supposed to look like shit' (Douglas, 2014), with low-resolution images, limited colour palettes and sloppy finishing (and see Ash, 2015). But regardless of their different hues, saturations and levels of finish, what all tweeted images share is a glowing brightness, as they glimmer on all sorts of screens. Shininess has been associated with the consumerism of capitalist modernity (Maffei and Fisher, 2013), and it seems that onscreen coloured luminescence is a key affective component of contemporary 'platform capitalism' (Srnicek, 2016).

If the affect of images on social media is in large part articulated through flow and coloured glow, then, this affect is complex. Dean (2015) insists that the flow of social media enacts both pleasure and anxiety; Paasonen (2015: 701) describes the 'sharpness and disturbing itchiness' when network connections or logins fail. This affect is also territorialised. It has an 'unevenness [and] patchiness' (Munster, 2013: 3). Paasonen (2016: n.p.) stresses that 'attention and distraction are better understood as variation in the intensities and zones of perception and experience' of social media. Such descriptions of 'patches' and 'zones' imply that this amorphous and constantly emergent affective field must be understood as contingently organised. As images flow and luminesce, there are innumerable 'microprocesses of visualization that form via relays, captures, and releases and that resonate to compositionally produce emerging sociotechnical ensembles' (Munster, 2013: 57). These diverse emergent ensembles include post-humans, individuating with digital screens and the glowing images that they stream. Post-humans of various kinds are thus

co-constituted with this field of images, in 'a technics of conjoining the nonhuman and the human through a dynamics of recursion' (Munster, 2013: 7).

Certain concatenations of data, images and post-humans are repetitively assembled, whether by algorithms sorting search results (Graham et al., 2013), by persistent visual tropes or by new or established ways of seeing. Within this febrile, constantly emergent field, these concatenations and clusterings that more or less hold are described by Munster (2013: 13) as 'established affective territories'. Specific ensembles have certain forms of 'push' (Thrift, 2014: 9). They affectively realise particular ways of being. These territorial-isations shape and differentiate post-human experience as something like 'a direction that might be traced or felt' (Munster, 2013: 39). This paper now conducts a sortie into that part of the digital visual field inhabited by tweeted smart city-related images, to explore its territorialisations and the sorts of post-humans that are recursively assembled with them. The next section describes its methods.

## How to see smart cities on Twitter: A method

There are few studies of tweeted images, and most focus on analysing the content of those images. They use a 'blended' approach (Lewis et al., 2013: 36), which assumes that large numbers of tweeted images can be analysed, sometimes automatically, to produce *patterns* of varying degrees of interest, but that the (more important) *meaning* of tweeted images must be identified by human observers looking at much smaller numbers (see Hochman and Manovich, 2013; Manovich and Douglass, 2011; Vis et al., 2013). In fact, most studies of tweeted images conduct a manual content analysis on a few hundred tweeted images at most (see e.g. Cowart et al., 2016; Kharroub and Bas, 2015; Seo, 2014; Thelwall et al., 2016; Vis et al., 2013). This method rests on long traditions of close hermeneutic reading in both the humanities and the social sciences (Brooker et al., 2016). It is certainly useful, particularly because it allows not only careful content analysis but can also give an indication of the source of images and their embedding in other social networks and image-making practices, as well as suggest some of their circulation routes (Bruns and Hanusch, 2017) and 'the multifarious ways Twitter users create and mobilise images as means of communicating their experiences and thoughts' (Vis et al., 2013: 396).

What these methods do less well, however, is address the affective qualities of Twitter which are part of its digital affordances: its hyper seen, connective flow and glow. If it is indeed the case that social media platforms are now co-producing a hyper seen, affective image field, then that may most effectively be explored by using methods that are 'more attuned to the newness inherent in social media' (Brooker et al., 2016: 2). Several authors have therefore argued (in slightly different ways) that digitality requires digital tools for its analysis (Marres, 2017; Rogers, 2013; Ruppert et al., 2013). Following that logic, this paper applies data visualisation software to the files of thousands of tweeted images related to smart cities. The software, called ImagePlot (http://lab.softwarestudies.com/p/imageplot. html), creates visualisations that show thumbnails of very large numbers of images. To gather the collection of tweeted images, a persistent connection to the Twitter streaming service was set up and allowed to run for the period from 00:34 on 20 November 2016 to 19:38 on 6 December 2016 (GMT).[2] Our use of the streaming service ensured that all tweets posted in this time were collected, rather than the smaller selection made available by Twitter for historical searches. (The service was accessed using the twython library of the python programming language.[3])

Table 1 shows the hashtags used as search terms, and the number of tweets posted which contained both the hashtag and at least one image.

Table 1. The hashtags used as search terms and number of tweets collected for each hashtag.

#smartcities	3743	#smartcity	5480	#smartlighting	33
#smartcitizen	15	#smartcommunities	5	#smarttransport	6
#smartcitizens	17	#smartcommunity	21	#smartwaste	20
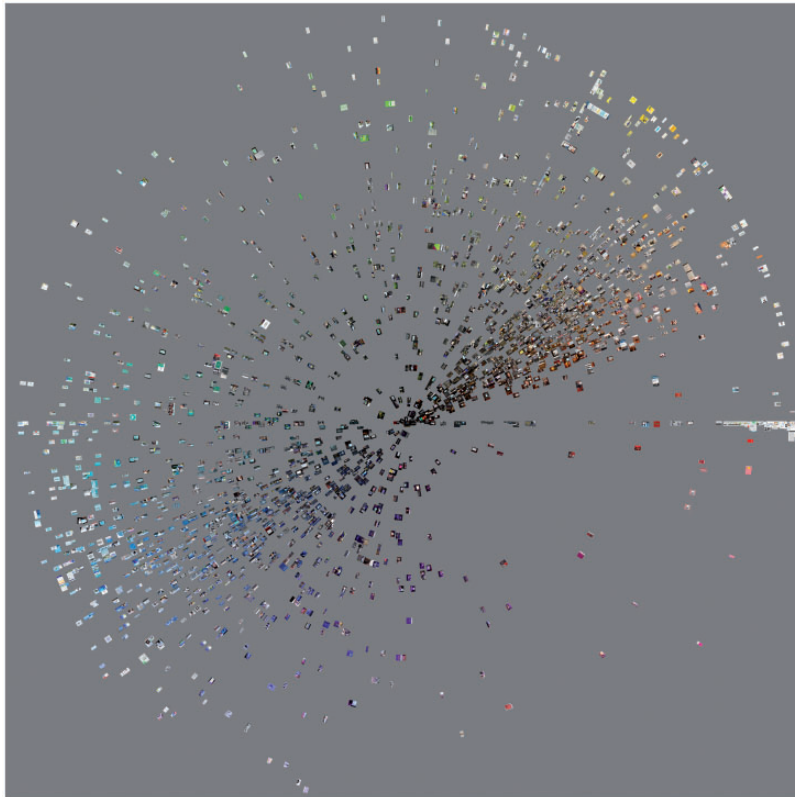
Figure 1. The median hue (*y*-axis) and brightness (*x*-axis) of 9030 tweeted images visualised using ImagePlot.

In total, 9150 tweets were collected in the specified period. (Note that the total numbers in Table 1 sum to more than this, because many tweets contain multiple hashtags.) The data scraped included the tweet's URL, its 140 characters, the URL of all associated image files (some tweets contained multiple images), the time it was tweeted and the account details of the tweeting user. Tweets whose images were no longer available at the end of the collection period were excluded from the set, which gave a final total of 9030 images. ImagePlot was then used to analyse this dataset. The final visualisation (Figure 1) is generated as a .tif file which shows the entire field of images but which, onscreen, can also be zoomed into to show each individual thumbnail.

There were two main reasons for the decision to use the specific digital affordances of ImagePlot as a means of exploring aspects of the field of tweeted smart city images. Firstly, it seemed necessary to be able to work with thousands of images because that encourages the enactment of a visuality similar to the experiencing of immense field of circulating images on Twitter. Faced with thousands of images, what tends to happen is hyper seeing.

A visualisation of thousands of images is thus more likely to allow the affective territorial-isations of swiped and streaming Twitter images to emerge; its size may render 'the turbulent dynamics of sociocultural emergence within an open informational milieu' more sensible (Terranova, 2004: 71).

Secondly, in its default settings ImagePlot analyses the hue, saturation and brightness of each pixel in an image and calculates their median value and standard deviation. It can then plot two of these values on x- and y-axes. That is in its default settings, ImagePlot analyses what the introduction to this paper suggested is one of the core affective qualities of plat-form capitalism, and what persists in even the most hyper of seeing: colour. The use of ImagePlot here thus also gestures towards affective vitality and generativity of the software code that carries the luminiscent pigmentation of tweeted images. The arguments of the paper, then, are in part shaped by a software with an affinity for the onscreen streaming colours of tweeted smart city images.

It is important to pause here and note what aspects of the data we are not able to visualise. As less than 1% of the collected tweets contain geolocation data, it is not possible to visualise the data by the location of the tweet. For the same reason, it is not possible to extract from the data any insight into the geographical circulations of the tweeted images. Although the specific text accompanying each image may inflect its affect, in this particular project, we have not attempted any linguistic analysis of this text. Finally, the problems with using hashtags to scrape Twitter are well-known: focussing on hashtags alone will miss tweets that are about, say, smart citizens but that do not use the #smartcitizens hashtag; conversely, tweets will be collected that use the hashtag #smartcity but have nothing to do with smart cities as this paper defines them. These are all significant issues, but on the other hand, research in social media analytics has highlighted the value of appropriately selected hashtags, when used with appropriate caveats (Tufekci, 2014). We believe that important insights into the affective generativity of social media images can nevertheless be obtained from Twitter data carefully handled. Tools such as ImagePlot form an important part of this work.

As well as allowing a glimpse at something like a field of tweeted images and their coloured glow, ImagePlot also allows further investigations and explorations. Having gen-erated the ImagePlot visualisation in Figure 1, the affordance of the visualisation's .tif file format meant that it was possible to experience both the overall field of images, as shown in Figure 1, and also to zoom in and out of the image. Moving from field to thumbnail, drifting across groups of thumbnails, inhabiting a condition of 'freefall' (Steyerl, 2012: 24), the paper's first author assumed that the next stage of the research would be to identify a sample of the 9030 images to interpret in more detail. Every 10th image from the tweet collection was selected; this ensured that the images spanned the whole range of the period of the collection. Once all the images were checked for relevance to smart cities, all text-only image files and tweets with unavailable images were removed, sample of 834 tweeted images remained. The initial aim in making this selection was to better understand the types of images through which smart cities were pictured: photographs of actually existing cities, or computer-generated fantasies, or maps, say. This effort to categorise the images into types became exceedingly complicated, though, and eventually collapsed. It was scuppered by what Hoelzl and Marie (2015: 51) call the 'general indefinability of the image in a digital environment'. It was not consistently possible to distinguish between images taken with cameras and digitally created images that were made to look like photographs, for example or between photographs that did seem to be digitally manipulated but remained 'photo-graphic' and photographs that incorporated digital imagery.

What instead began to emerge from the experience of scanning hundreds of sampled images in an attempt to categorise them, as well as from exploring Figure 1, was something else. Instead of the author tagging the images as one type or another, the images started to push back. Like other researchers working with images and visualisations (Bissell and Fuller, 2017; Brooker et al., 2016; Coleman, 2013), other things started to happen. The feeling grew that what the images were showing was less their format or content or genre, and more certain ways of becoming. That is certain zones and patches of different sorts of intensity and affect were being experienced 'immanently, lived out through the body' (Coleman, 2013: 11). Uneven and variable, what were becoming visible were the 'affective territories' described by Munster (2013: 13). Rather than categories and counts, what emerged was a sense of the different ways of experiencing smart that the images were instantiating; that is the analysis shifted towards sensing the affective territories that different clusters of images were felt to configure. The next section describes and explores these affects and territorialisations in more detail.

Seeing the smart city on Twitter: Participating, learning and envisioning in blue and orange

Figure 1 shows that the median colour of most smart city-related images on Twitter fall into two colour ranges: yellow-orange-brown and azure-blue-teal. These are the colours that territorialise the look of smart cities as Twitter scrolls through endless screens. The 'new art of illumination' (Thrift, 2012: 154) is visualising the smart city as orange and blue.

What to make of this colouring? One response would be to consider the cultural significance of orange and blue. Interpreting colour is notoriously problematic: its meanings are highly culturally specific (Favero, 2017). But for many Western audiences, blue and orange do have different associations. Blue is a cool colour. Images of digital interfaces in popular culture are overwhelming blue (Shedroff and Noessel, 2012), so it's no surprise that images associated with digitally mediated smart cities have lots of blue in them. Figure 1 shows that the blue zone is dominated by images with graphics using blue, often to show data flow or WiFi signals, by photograph-like images with deep blue skies, and by blue overlays onto darker photographs (smart city imagery on other social media platforms is very fond of showing WiFi signals streaming through and above photorealist urban landscapes as blue glowing pulses and lines [Rose, 2018]). There are also a few photos of blue suits and PowerPoint projections. The orange colour range instead is generated mostly by photographs taken without flash of white people indoors (at smart city events, as will shortly be discussed). There are also a few city street scenes or aerial views that also generate a brown-orange-yellow hue. In Western colour schemes, orange is felt as a warm colour. Figure 1 thus suggests a series of contrasts between blue and orange, cool and warm, sky and earth, digital and human, 'code and clay, data and dirt' (Mattern, 2017). Certainly, such a distinction seems to underly much of the hegemonic discourse about smart cities, which assumes buildings and people (= orange) are something on which the digital (= blue) can act (Rose, 2018; Söderström et al., 2014: 316; Vanolo, 2016).

In Amin and Thrift's (2016) affective account of the city, however, the cultural meanings attached to digital pigmentation are beside the point. For them, luminescent colour is one of the urban's 'asignifying elements pulsing directly through the body', prior to representation (Amin and Thrift, 2016: 55). And there are other elements of this colour field that exceed signification. There are technological processes, for example. 'Algorithmic color is code first and image second' (Kane, 2014: 244), and the digital materiality of the tweeted images is

also enacted here. The paper has already discussed how technologies of screen and code produce hypersaturated, glowing imagery. But in the orange zone, there are other devices at work, particularly cameras. The orange-like hue is generated not only by what the images show but also by the tungsten tone of photos snapped indoors without a flash. As for blue: perhaps the dominance of blue in representing the digital mimics 'the fact that all visual electronic media are overwhelmingly dominated by cool blue or green hues' (Kane, 2014: 274). Then there is the desire of Western graphic designers to create images with visual 'pop'. Orange and blue are, in Western colour schemes, contrasting colours that will deliver that pop, which is an aesthetic that intensifies colour rather than making it signify.

Colour can also be approached as compositional (Stewart, 2015). Colour can push because of what it weaves together and what congeals through it: for Stewart (2015: 24), colour is 'an energetics of form'. Certainly as engagement with the ImagePlot visualisation shifted from the entire image field to its constituent thumbnails, and as they started to push, various coloured zones and territories became evident. As the previous section noted, the .tif file format of Figure 1 allows the viewer to zoom in and across the visualisation looking at each thumbnail image; and the paper's first author also paid particular attention to the sample of 834 images. What emerged from this experience was a sense of three pigmented, affective territorialisations of the larger image field. These three ways of being post-human with smart are smart as *participating* (mostly orange), smart as *learning* (orange and blue) and smart as *anticipating* (mostly blue). These are visualised in Figure 2, which shows the sampled images allocated to each of these territories.

The largest of the three territories, with nearly half of the sample images and the most orangey-brown hue (Figure 2(a)), is being smart by *participating*. This group of tweeted images enacts participating in smart city-ness in three ways. First, this territory is
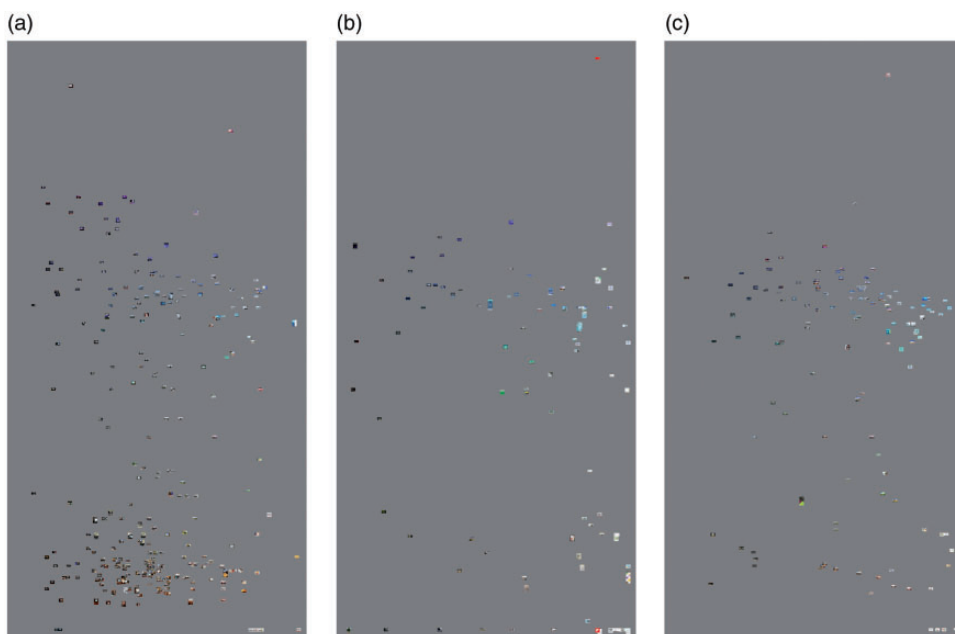

Figure 2. The hue (*y*-axis) and brightness (*x*-axis) of three affective territorialisations in tweeted images of smart cities: (a) participating, (b) learning and (c) anticipating.

constituted in large part by images (203 of them) showing participation in smart city events: specifically, photographs of people (usually men) giving presentations at smart city workshops and expos, or talking informally in the audience or exhibition hall. A few are selfies taken in front of smart city expo stands, and there a few portraits of smart city leaders. There are also photographs of PowerPoint presentation screens and expo stands, and a scattering of images which are adverts for smart city events. Secondly, there are a number of photographs of smart city buildings and objects. Cities are photographed from the street and from above and so too are smart touchscreens, lamp posts, smart operation centres, and doors and so on in smart city streets. These photographs are orange-brown images of smart events and smart objects, but they often include city scenes with bright blue skies, which accounts for the scattering of blue in Figure 2(a). They register a witnessing of smart objects in real time and thus, again, of participating in as smart as it is happening. (There are also a series of hourly tweets showing flights from Bergamo airport: once more, [almost] real-time recording but non-photographic.) And thirdly, these are all moments that can be shared by being tweeted, seen and retweeted. The sharing and tweeting and retweeting creates networks which are also distributed through the visual field in an extended witnessing of the enactment of smartness. The taking, tweeting and retweeting of photographs constitutes the third mode of participating in the smart city.

A second affective territory constituted by the circulation of smart city images on Twitter is that of *learning* about smart (174 images of the 834). These images instantiate a desire to explain smart cities, smart products and smart processes by conveying explicit information about them. These are images that, in order to explain, are often graphics and also carry text; perhaps because of the importance of their written text, their colours are diverse (see Figure 2(b)). Sometimes the images are diagrams of smart cities, with textual explanations of how smart works; sometimes the images are more like serious memes, with an image accompanying some kind of wise or insightful message from a smart city leader or guru. A few – 15 – show maps of where the smartest cities are, locating the future that other smart cities must aspire to (Söderström et al., 2014: 317). In their desire to educate, these images assume that there are those who need to learn, and many are thus part of the city as a 'learning machine' promoting smart policies and urban entrepeneurialism (Gabrys, 2016; McFarlane, 2011). Smart needs to be learnt about now in order to materialise soon. Photographs cannot show the emergence of something not yet there, of course. So graphics are designed to show and explain the future smart city.

Finally, Twitter not only teaches about smart cities and enables participation in smartness; it also allows smart visions to be *anticipated*. This anticipation is generated by non-realist and non-photographic visions of smart cities (see Figure 2(c)). These images constitute the second largest group in the sample of tweeted images; and of the total 251, 197 are either entirely computer generated or are photographs with digital overlays, and the rest are graphics with no text. These images are dominated by the blue of the digital. That blue, in the form of networks and WiFi signals, often appears floating over photographs of cityscapes. This is smart as a kind of augmented reality: blue signs of the digital and its data are pasted over urban scenes. There are also images of things even more impossible to see: images of cities unfolding from tablets and books, glowing and floating, for example inhabiting a future saturated by intensely coloured visions of digitalised cities.

Swiping through smart city-related tweets, then, allowing their images to glimmer on a screen before being scrolled or swiped away, instantiates three affective territories. Hyper seeing this digitally mediated visual field generates three post-human dispositions, co-produced with particular colours and kinds of onscreen images. Blue and orange,

mostly, swirl through three different affects – participating, learning and anticipating – which are three ways of being post-human with smart cities on Twitter.

Conclusions

This paper has explored the affective emergence of being smart through the hyper seeing of tweeted images about smart cities. Visualising the smart city is no simple matter. The contemporary convergence of the datafied city with the datafied image is complex and differentiated. Smart cities are made visible in multiple materialisations of image files on screens of many kinds, in many different places. Historical legacies of seeing the city continue to linger, for example in the use of computer-generated images that look like photographs. But new kinds of images and new ways of seeing are also emerging. This paper has focussed in particular on the images attached to smart city-related tweets. Such images constitute an extensive, diverse and febrile visual field. They glow and sizzle colourfully on screens, constantly refreshed, streaming, scrolled and swiped. The paper has drawn on a number of theorists to suggest that this field of contemporary networked image must be understood in terms of affect.

For Dean (2010), the affect of social media is located in the constant search for an intensity which flows through them. For her, images on social media thus carry not only their visual content but also the energetics of that flow: 'an image is not simply itself but itself plus a nugget or shadow or trace of intensity' (Dean, 2010: 115). This paper has described that flow more specifically in relation to social media images as a pigmented hyper seeing – glancing at a screen, swiping quickly through networked images, briefly scanning a feed – a kind of looking that co-produces particular ways of being. In this co-constitution of technologies and post-humans, affective territories are delineated by specific pushes or intensities, and this paper has identified three of these: participating, learning and anticipating. Each of these is way of being smart even as they are simultaneously ways of seeing smart. The distinct colouration of smart city images on Twitter gives credence to Amin and Thrift's (2016: 55) suggestion that 'the variation and intensity of luminosity and colour' is one of the affective infrastructures of digitally mediated cities. The ways of being smart that are enacted when tweeted images are hyper seen tend to cluster around different kinds of images and are also composed by different distributions of mostly blues and oranges.

Smart city-related activity on Twitter thus brings specific kinds of smart people into being: people who participate in smart events, people who learn about smart and people who anticipate smart futures. Such post-human dispositions are deeply implicated in the various kinds of value and profit that the smart city industry hopes to generate, of course. Many of these tweets are various kinds of advertisements, for smart cities, smart products, smart events, smart news, smart leaders. While not offering the same kind of monetisation of affect achieved by say Google or Facebook (Paasonen, 2016), nonetheless much smart city related activity on Twitter focuses on the commodification of smart. Realising the anticipated value of smart cities depends precisely on the production of post-humans invested in being smart.

Given that, it is also important to consider some of the frictions in this colour-full infrastructure (Rose, 2016), and in particular to note that the three affective smart city territories identified in this paper do not entirely converge. The three affects of learning, participating and anticipating as ways of seeing and being smart have different temporalities. They are oriented to different modalities of the present and the future. Participating is about being active in a current event and thus inhabiting a present. Learning is more about

gaining understanding of an emergent innovation that will be of value in the future. Anticipating smart, meanwhile, feels more like a constant state of looking forward to a future yet to be realised. These different temporal orientations are bound into the blue and orange colours through which they are mostly pictured. Events are pictured in the orange-brown hues of (certain) bodies and buildings; as already noted, these are often photographs capturing and sharing live moments. Orange, then, figures participating in a *present* moment. Blue, on the other hand, is much more visible in the territorialisations of learning and anticipating. The paper has already noted how blues dominate in visions of future cities and in preparatory learning for them, which suggests that blue imbues these images with a sense of *futurity*. The smart city of future signals its emergence through blueness.

There may be frictions between these temporalities as they roil and swarm in the digital visual field, allowing for the possibility of reinventions by agential post-humans who combine and recombine them with other urban visions to create different visions of the present and future (Rose, 2017). For example, other things may be witnessed and placed in critical relation to smart. In the sample of tweeted images, there were a small number of images attached to tweets that the author interpreted as critical of smart. All but one are photographs of things in the urban environment that are not smart: rubbish bags piled on a street pavement; a city skyline barely visible through smoggy air; a slum building; a street jammed with cars and people; a tarmac road with a few orange cones placed on it. With the exception of a hand-drawn cartoon, all are in the orange-brown colour range. They stand as photographic evidence of a present very different from the blue future of smart city, and interrupt the flow of smart events, explanations and visions with a quite different urban present.

To claim with confidence that these images are indeed critical of the smart city requires attention to the tweeted text that accompanies them. This paper has chosen not to focus on its tweets' text, not because they are unimportant but because it wanted to explore an aspect of Twitter currently neglected: its imagery and how it is seen. In terms of thinking through the mediation of urban spaces more generally by social media, the specific dynamics of platforms like Twitter deserve careful attention. These dynamics are complex, various and require sustained work on both their images and their text and on both their representational and non-representational aspects. This paper has focussed only on the affective territorialisations of tweeted images; other work by geographers is beginning to examine other aspects of the data generated by other platforms in order to understand their various and particular mediations of urban spatialities (Boy and Uitermark, n.d.; Crutcher and Zook, 2009; Graham et al., 2013; Ryan, 2016). Given the widespread and intensive use of social media platforms, much more such scholarship is needed.

Such scholarship will require methodological experimentation. If 'the image within the network is doing something other than showing us pictures' (Rubinstein and Sluis, 2013: 156), content analyses of images (and text) are of specific but limited value. Moreover, accounts of digital technologies cannot be written by humans alone: such accounts must also be co-authored with the machines that are co-constituting the present. Of course, almost all discussions of social media and urban spaces would now use, and be shaped to some extent by, word processing and citation management software. This paper has worked with other code and software, however, to create a dataset of images, to analyse those images, to visualise them and explore them. ImagePlot is in some ways the third author of this paper, and like any investigatory companion, has left its imprint in what the paper does and does not do. ImagePlot is no good at divining semantic meaning since it uses code to detect other code; as its designer admits, when using ImagePlot 'the trick is to focus on visual form (which is easy for computers to analyze) and not semantics (which is hard to

automate)' (Manovich and Douglass, 2011: 326). What it is very good at, however, is being a tool for working with thousands of images, evoking something of the field-like qualities of social media flow and the hues and brightness of its glowing colours. As social media becomes ever more embedded into the warp and weft of everyday life, there is a pressing need not only to consider all its modalities – affective and otherwise – but also for more kinds of experimentation to grasp the particularities of those mediations.

Notes

1. 'Post-human' here refers to forms of human subjectivity that are co-constituted with technologies. The term also invites attention to subjectivities that are not the white, straight bourgeois masculinity with which the 'human' is so often conflated (see Rose, 2017).
2. See http://developer.twitter.com/en/docs.
3. See www.python.org/.

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