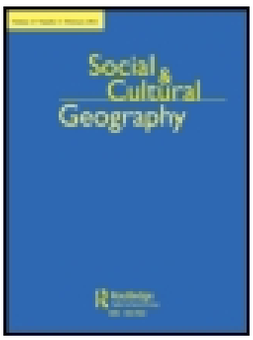

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The lit world: living with everyday urban automation

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ABSTRACT

In this article, we develop and advance the concept of *the lit world* by bringing together literatures about everyday lighting, automation in everyday life and human perception, along with our ethnographic research into people's experience of automated lighting in Melbourne, Australia. In doing so we formulate and argue for an approach to automation that situates it as part of everyday mundane worlds and acknowledges its entanglement with the emergent and experiential qualities of everyday environments as they unfold. We demonstrate this through the example of automated lighting, understood as a situated technology that has contingent effects and participates in the making of particular ways of seeing and feeling the world. We thereby argue for an account of automation that reaches beyond its potential for the management of human (and other) behaviour, to ask how the qualities and affordances of automated technologies might seep out of their intended domains, and create new perceptual and experiential opportunities. In a context where automation is increasingly prevalent in everyday life, such attention to the experience and use of automated technologies which already exist on a large scale is needed. Urban lighting is an example par excellence of automation in the world because it has a long history beyond the recent association of automated technologies with code and digital infrastructures. As scholars debate how automated technologies will become part of our future digital lives, understanding how people live in a lit world offers a starting point for considering how we might live with other anticipated algorithmic forms of automation.

Le monde éclairé: vivre avec l'automation urbaine quotidienne

RÉSUMÉ

Dans cet article, nous développons et mettons en avant le concept du *monde éclairé*, en rassemblant les recherches sur l'éclairage quotidien, l'automation dans la vie de tous les jours et la perception humaine, en plus de notre recherche ethnographique sur l'expérience des gens de l'éclairage automatique à Melbourne en Australie. Ce faisant, nous formulons et préconisons une approche de l'automation qui la situe comme faisant partie du monde banal de tous les jours et qui reconnaît son lien avec les qualités émergentes et empiriques des environnements quotidiens à mesure qu'ils se produisent. Nous démontrons cela par l'exemple de l'éclairage automatisé, compris

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comme une technologie située qui a des effets contingents et qui participe à des visions et appréhensions particulières du monde. Nous préconisons donc un compte rendu de l'automation qui aille au-delà de son potentiel de gestion du comportement humain (et autre), pour demander comment les qualités et les moyens (*affordances*) des technologies automatisées pourraient s'échapper de leurs domaines voulus et créer de nouvelles opportunités perceptuelles et empiriques. Dans un contexte où l'automation devient de plus en plus répandue dans la vie quotidienne, une telle considération de l'expérience et de l'utilisation des technologies automatisées qui existent déjà à une grande échelle est nécessaire. L'éclairage urbain est un exemple par excellence de l'automation dans le monde parce qu'il a une longue histoire au-delà de la récente association aux technologies automatisées avec un code et des infrastructures numériques. Tandis que les chercheurs débattent de la place des technologies automatisées dans nos futures vies numériques, comprendre comment les gens vivent dans un monde éclairé offre un point de départ pour considérer comment nous pourrions vivre avec d'autres formes algorithmiques anticipées d'automation.

El mundo iluminado: viviendo con la automatización urbana cotidiana

RESUMEN

En este artículo, se desarrolla y promueve el concepto de *mundo iluminado* reuniendo literaturas sobre la iluminación cotidiana, la automatización en la vida cotidiana y la percepción humana, junto con nuestra investigación etnográfica sobre la experiencia de las personas en iluminación automatizada en Melbourne, Australia. Al hacerlo, se formula y defiende un enfoque de la automatización que la sitúa como parte de mundos cotidianos ordinarios y reconoce su entrelazamiento con las cualidades emergentes y experienciales de los ambientes cotidianos a medida que se desarrollan. Esto se demuestra a través del ejemplo de la iluminación automatizada, entendida como una tecnología situada que tiene efectos contingentes y participa en la creación de modos particulares de ver y sentir el mundo. Por lo tanto, se defiende una explicación de la automatización que va más allá de su potencial para la gestión del comportamiento humano (y otro), para indagar cómo las cualidades y los usos de las tecnologías automatizadas podrían salir de sus dominios previstos y crear nuevas oportunidades perceptivas y experienciales. En un contexto en el que la automatización es cada vez más frecuente en la vida cotidiana, se necesita prestar atención a la experiencia y al uso de tecnologías automatizadas que ya existen a gran escala. La iluminación urbana es un ejemplo por excelencia de la automatización en el mundo porque tiene una larga historia más allá de la reciente asociación de tecnologías automatizadas con infraestructuras digitales y código. A medida que los estudiosos discuten cómo las tecnologías automatizadas se convertirán en parte de nuestras futuras vidas digitales, entender cómo la gente vive en un mundo iluminado ofrece un punto de partida para considerar cómo podríamos vivir con otras formas algorítmicas anticipadas de automatización.

Introduction

Much everyday urban lighting is automated, at least from the perspective that the person experiencing it is not the perpetrator of its presence. Cities may be lit randomly, or at the

whim of single individuals or collectives, but they are also lit as outcomes of institutional, regulatory, governmental or other processes or logics. For instance, street or other urban space lighting, car lights, traffic lights or market-oriented lighting, lighting for safety or security at night seeping out of indoor offices or shops or illuminated in response to sensor technologies, window displays, advertising or other commercial lighting all contribute to what we perceive as urban lighting.

Thus, the lit city is not subject to a single source of control or synchronisation. Pedestrian crossing lights may appear not to be synchronised with trams, causing us to miss our public transport while waiting to cross the road. Office lights controlled by motion-activated sensors may turn off as we work at our desks, unable to detect the movements of our arms and hands as we sit still and type. Wet streets and pavements on rainy nights reflect car lights at intersections in a multi-coloured display, creating unexpected aesthetic effects. In all these cases, we perceive and experience a complex sensory world with light sources that mix, augment and ameliorate each other in visually chaotic ways, in connection with 'the intensity of light, the depth of darkness, and the qualities of the surfaces on which light reflects, deflects, and is absorbed'. (Edensor, 2017, p. x). Often, automated lights exceed their intended purposes, seeping out of the spaces or activities they are designed to illuminate or signal and creating unexpected visual and spatial effects.

In this article, we examine the role and significance of the presence of automated lighting in urban experience. We explore the value of the concept of *the lit world* by bringing together literatures about everyday lighting, automation in everyday life, and human perception, along with our ethnographic research into people's experience of automated lighting in Melbourne, Australia. We argue for attention to automated lighting as part of everyday mundane worlds from a perspective that acknowledges its entanglement with the emergent and experiential qualities of everyday environments as they unfold.

Attending to the lit world in this way highlights the situatedness of automated technologies, and offers a new perspective on the relationship of automated technology to everyday materialities, human perception and improvisation. In a context where automation is increasingly prevalent in everyday life (Kitchin & Dodge, 2011), and as possibilities created by and public discourses about new technologies (including automated cars and homes) emerge, such attention to the experience and use of automated technologies which *already* exist on a large scale is needed. Urban lighting is an ideal example of how automation can be part of everyday worlds since it has a long history preceding the recent association of automated technologies with code and digital infrastructures. As scholars debate how automated technologies will become part of our future digital lives, understanding how people live in a lit world offers a starting point for considering how we might live with other anticipated algorithmic forms of automation, with which automated lighting will be entangled.

The approach we advance here entails going beyond existing discussions in human geography on the regulatory implications (Kitchin & Dodge, 2011) or affects of digital technologies and code on humans in human-technological, material and spatial configurations (Ash, 2013; Kinsley, 2014). Instead we propose paying 'attention beyond the material qualities of the digital/virtual and the affects of human-technology interaction, and towards their often less visible or less obvious co-constituents' (Pink & Fors, 2017), through a sensory ethnography (Pink, 2015) investigation of the often unspoken and unobservable elements of everyday encounters with automation. We argue that a concept of the lit world offers a frame through which we can: (1) more fully understand how forms of technological presence underpin how

people experience and make sense of the city, and (2) produce insights about how people make meaning, improvise around and live with urban automation.

Lighting and light

There has recently been a surge of interest across human geography, sociology and anthropology in lighting design, experience and use in urban, architectural, festive, arts and home contexts (Bille, 2014, 2015; Bille & Sørensen, 2016; Ebbensgaard, 2014; Edensor, 2012, 2015, 2017; Edensor & Lorimer, 2015; Ingold, 2016; Isenstadt, Petty, & Neumann, 2015; Morris, 2011; Pink & Leder Mackley, 2016; Shaw, 2014a; Sumartojo, 2014). This work understands lighting as co-constitutive of atmospheres and well-being, both in the practical sense of safety and in that of affective forms of comfort. It also demonstrates how people may use lighting in improvisatory or creative ways, for instance, to create domestic cosiness (Bille, 2014), the accomplishment of routines (Pink & Leder Mackley, 2016), or particular festive atmospheres (Edensor, 2012, 2015), and develops powerful social science-based critiques of lighting design (Entwistle, Slater & Sloane, n.d.).

Research and practice in lighting design and use, however, has tended to be localised, site-specific and category-specific, for example, by focusing on systems of street lighting (Shaw, 2014b), lighting routes for safety, or a particular housing estate or development (Entwistle et al., n.d.). Through the concept of the lit world, we build on this existing research, but depart from its concerns with how the experience of lighting might be 'improved' in localised areas or neighbourhoods, or within events or festivities.

We instead examine how an often unsynchronised multiplicity of forms of everyday automated lighting are part of emergent and ongoing everyday environments. Although automated light is integral to everyday experience, our access and engagement with it is frequently controlled, designed and timed to suit interests that we do not necessarily share, but that we must nevertheless use, make sense of and navigate. For instance, consider the relationship between streetlights and shop windows, or advertising and car lights. Each of these might represent a range of stakeholders with different, overlapping, competing or simply incompatible interests. Our approach is sensitive to the relationalities through which the experience of automated lighting in the city is constituted; through different institutional, regulatory and market logics; and through everyday forms of human engagement, negotiation and navigation with these. It seeks to understand what it means to live in the lit world, where automated and non-automated lighting of different kinds configure part of the experience of the mundane in ways that are taken for granted, never usually spoken about, and therefore not usually accounted for.

Our inspiration for the concept of the lit world derives from anthropologist Tim Ingold's notion of the 'weather world' whereby he proposes that

> The experience of weather lies at the root of our moods and motivations; indeed it is the very temperament of our being. It is therefore critical to the relation between bodily movement and the formation of knowledge. (Ingold, 2010, p. S122)

Ingold continues that 'the weather is not so much what we perceive as what we perceive in', allowing for a role for the sunlight along with the other elements:

> We see in sunlight whose shades and colours reveal more about the composition and textures of the ground surface than about the shapes of objects, we hear these textures in the rain from the sounds of drops falling on diverse materials, and we touch and smell in the keen wind that – piercing the body – opens it up and sharpens its haptic and olfactory responses. (2010, p. S131)

For Ingold the weather as part of the outdoors, is juxtaposed to the artificiality of the indoors, as he writes: 'even the residents of the hyper-modern city have to contend with the weather, despite their best efforts to banish it to the exterior of their air-conditioned, temperature-regulated, artificially lit, and glass-enclosed buildings' (2010, p. S131). Both temperature and light have to be contained through material-technological techniques are often leaky. Light is difficult to contain since it flows out, and in, seeping around the edges of curtains or doors, or bouncing off reflective surfaces in unexpected ways. Artificial automated lighting is part of indoor and outdoor environments, it gets mixed up with the weather in both indoor and outdoor contexts. In parallel to Ingold's (2016) critique that research that seeks to define atmospheres has neglected the place of the weather in their constitution, here we call for a closer accounting for the role of the weather in the configurations of processes and things through which urban lighting is constituted and experienced. Lighting and weather seep in and out of each other, and therefore in both practical and theoretical senses might be understood as open, leaky and processual, rather than being discrete or closed off from other processes and things.

A focus on the lit world is also pertinent for developing an understanding of our experience of and engagement with automation and its affordances. This is because light has held a particular status in philosophical and scientific understandings of human perception, for instance in the work of Merleau-Ponty, Irigaray and Levinas, as discussed by Vasseleu (1998). While we cannot pursue a discussion of the trajectories of theory in this field, here, our concern is with how the ideas of Merleau-Ponty (1962/2002) and Gibson (1966, 1979) in particular have been advanced for understanding light, as Ingold (2011, p. 258) puts it, as 'a phenomenon of experience, of that very involvement in the world that is a necessary precondition for the isolation of the perceiver as a subject with a "mind", and of the environment as a domain of objects to be perceived' (2011, p. 258). Ingold's conceptualisation of light is based on a discussion of 'natural' light, and in that sense varies from our interest in artificial light. However, his most recent writings in this area are relevant because he argues that light perception can be understood in relation to what he coins as a '*fission/fusion reaction* that drives all perception' (Ingold, 2016, p. 174). This conceptualisation stands for an anti-Cartesian perspective, disagreeing with the proposition that we internally place meanings on things that we sense but are external to ourselves and instead following Merleau-Ponty in that 'the seer is inwardly at one with the cosmos but divided from himself' (2016, p. 174). Building on this, Ingold argues that the air and light are not external things to us that we give meaning to but

> In the experience of light, the atmosphere 'coils over' – to adopt an evocative expression from Merleau-Ponty (1962/2002, p. 140) – such that in my own vision the world sees itself through me, even as I breathe in and out. (2016, p. 175)

Therefore we concentrate on ways of looking and knowing *in* light and *through* light, in agreement with Bille and Sørensen (2016, p.160) who understand light as 'not something you see, but something you see in'. Thus, if light is fundamental to our perception of the environment, and if automated lighting has an ubiquitous presence in the urban environment, any understanding of our experience of the city needs to account for how lighting is implicated in this. Below we first connect this understanding to our approach to automation, and then outline how this played out ethnographically.

Defining automation

In the science and engineering context, it is suggested that 'Automation research emphasizes efficiency, productivity, quality, and reliability, focusing on systems that operate

autonomously, often in structured environments over extended periods, and on the explicit structuring of such environments' (Goldberg, 2012[1]). For the social sciences and humanities, questions concerning how automation is situated in the world are focused through prisms that differ from the concerns of engineering. For instance in media studies, Hight (2014, p. 237) writes about automation as emerging in a world where 'forms of implicit collaboration between human and machine, or more specifically between human and algorithm, are already at work in various ways throughout digital platforms and infrastructures'. The sociologist Strengers similarly has noted two key problems embedded in existing assumptions about how automated technologies provide 'smart' solutions, which highlight how their situatedness is neglected. First, that while technologically 'automation is premised on an extremely functional and utilitarian understanding of everyday life where we can identify and separate discrete activities' (Strengers, 2016, p. 65), in fact ethnographic evidence shows that everyday activity is ongoing (e.g. Pink & Leder Mackley, 2016; Strengers, 2016); this means that the experience of automation should instead be conceptualised as part of the ongoing and emergent flow of life. Second, Strengers points out that 'automated technologies aim to operate in the background of everyday life … [and] are not always discrete technologies in their own right' (Strengers, 2016, p. 65). These approaches conceptualise automated technologies as relational to other technologies and to people, and as things that we cannot necessarily separate out from the wider everyday ecologies of which they are part. It therefore follows that automated light, as an element of the lit world – 'something you see in' (Bille & Sørensen, 2016, p. 160) – is an aspect of ongoing everyday experience, rather than a technology that can be rendered distinct from and has effects on other elements on the experiential world.

In human geography there has been a focus on the politics and governance issues surrounding automation. Kitchin and Dodge engage a concept of 'automated management' to discuss how 'new software systems survey, capture, and process information about people and things in automated, automatic, and autonomous ways, making judgments and enacting outcomes algorithmically without human oversight' (2011, p. 85). This they see as a mode of governance in that: '[A]utomated management is the regulation of people and objects through processes that are automated (technologically enacted), automatic (the technology performs the regulation without prompting or direction), and autonomous (regulation, discipline and outcomes are enacted without human oversight) in nature'. The critical perspective on neo-liberal governance, and the regulatory regimes associated with it, has been firmly debated by geographers and anthropologists across a range of institutional contexts (e.g. Anderson, 2010; Pink, Morgan, & Dainty, 2014; Shore & Wright, 2015). This critique is similarly applied to the discourses of innovation and growth that are manifest in the values of 'efficiency, productivity, quality, and reliability' cited by Goldberg (2012) as being central to automation, when viewed as a form of technological innovation.

There are however theoretical and ethnographic approaches to understanding human action and perception that offer other ways to consider how, as a system of governance and regulation, automation might be complicated and entangled with other aspects of the world. Kitchin and Dodge acknowledge that automated technologies would need to contend with 'consumer resistance along political or ethical lines' and 'the messy, contingent, and fluid circumstances through which people's daily lives unfold' (2011, pp. 236–267). Indeed as anthropologists frequently argue, contingency (Irving, 2017) and messiness are fundamental to everyday life with technologies (Dourish & Bell, 2011; Pink et al., 2016) and need to be

considered in relation to human tendencies to improvise through the world (Hallam & Ingold, 2007; Ingold, 2013). Taken together, these accounts invite us to re-theorise what a concept of automation might mean, and an understanding of how automated technologies might operate in the world.

Below we first outline our ethnographic methodology. We then examine what it means to reshape our understanding of what automation *is*, and what automation *can be*, in the *experienced everyday world* through a set of paired concepts: contingency/mess, improvisation/creativity and resilience/resistance. These concepts emerged as part of a dialogue between the ethnography and our existing theoretical commitments, rather than being pre-determined prior to the fieldwork.

Approaching automation through ethnographic practice and theory

It is acknowledged that ethnographic approaches can provide new insights into automated technologies in everyday worlds (e.g. Kitchin & Dodge, 2011, p. 255). However, to understand automated technologies as experienced rather than as simply systems with which humans interact, we depart from the conventional and conservative sociological approaches which aim to undertake 'holistic studies'. Such ethnographies produce representations of culture and patterns of life, and when used to research automation (e.g. Kitchin & Dodge, 2011, p. 256) have led to descriptive accounts that tend to linger on the surface rather than taking us to what MacDougall (2005) would describe as the 'quick', or an empathetic touch with experience. To understand the experience of automation within everyday environments we need a phenomenological and non-representational ethnography for doing research *with* others (Ingold, 2008) in collaborative modes as they move through their continually shifting everyday worlds (Pink, 2015). The 'sensory ethnography' (Pink, 2015) that we engage here probes beneath how people simply describe their experience and instead uses participant-generated visual materials to allow people to show us how they encounter automated light as part of everyday life.

We approached everyday automation through collaborative video and photography techniques, presentations and discussions and video interviews. We sought to foreground experienced but infrequently verbally articulated elements of everyday life, that tend to happen when people are alone, in the background of everyday life. We asked participants to self-document their experiences of automated urban lighting as they undertook their routine evening commutes home through the city, by photographing or making short videos as they chose. The research was undertaken during the winter when it was dark or semi-dark during participants' commutes. The approach acknowledged that how automation is experienced and conceptualised in everyday life is contextual – it is always *part of something else* – therefore the experience of lighting was treated as part of the regular routes followed. The materials were then viewed or played back with the participants and we discussed the situations from which these images and reflections had emerged, either in one-to-one interviews or in a collective design studio context, which were video recorded. Thus, we used video and photography to share and access elements of everyday experience that would not be accessible through traditional verbal interviews or participant observation, that account only for what is said and is visible.

We worked with seventeen participants, including our own auto-ethnographic experiences and participation. This enabled us to account for and compare our experiences with

those of others and involved using our own prior experiences to make empathetic connections with what we were able to imagine participants had experienced. Participants were all professionals or students working in Melbourne. We intentionally chose ten adult male and seven female participants of different ages (ranging from their early twenties to mid-forties) and who lived in different areas of the city, from the inner city to the outer suburbs to nearby regional towns. We chose them based on their use of a variety of combinations of walking, cycling, driving and public transport to get home because we aimed to scope out and understand how lighting was implicated in and situated diverse ways of moving through the city. While categories such as gender, race and age are important elements of urban experience, in this study we were primarily concerned with the experiences of commuting within a group of participants who had in common that they were all professionals working or studying in the city and who needed to commute in some way to move between work and home. The sample was selected in this way in order to focus our analysis on how automated lighting was experienced in the context of commuting. However, because age, professional status and mobility preferences all impact on transport choices we do not seek to generalise about the impact of age and status on the experience of light in the city, and this would moreover not be an appropriate question to interrogate through an ethnographic research project of this design.

Our ethnographic research sought to understand how people encountered, defined, experienced and engaged with automated lighting. We asked participants to identify and discuss with us lighting they thought was automatically already there. This did not mean that their definitions kept to a strict account of what we had pre-supposed automation to be. Rather, it enabled us to understand how, for instance, other people's car lights could be considered a form of automated lighting which might be theorised as an automated system of governance or regulation – regardless of whether the cars in question did indeed have lights that automatically came on in darkness (as some do), or if their drivers were required to switch them on by a regulatory framework that automatically (or at least unrelentingly) administered putative measures against those who did not. To elucidate this, we next outline what automated lighting was for our participants, and then discuss how it manifested through the categories of mess/contingency, resistance/resilience, improvisation and creativity.

Encountering automated lighting in the city

For all participants, determining what was automated formed an early step in the research task of photographing automated light, and was one of the first questions we discussed together. They commonly arrived at working definitions that were then refined or altered as they photographed, asking themselves whether they were taking the 'right' type of photos, and sometimes deleting photos to adhere to the categories they had defined.

Their definitions always involved human activity and response to their surroundings, with some subtle differences. For example, Nick, a design student in his early 20s, considered the play of light and shadow on the internal walls of a shared working space at university, and the 'inspiring' effect it had on design students working there. This then helped him redefine automation to include the daily movement of the sun:

> I guess you could say in some ways that the sun is automated because we don't have any control over it. There are specific times of day in Building 100 [where Nick studied] that you get these

> sharp shadows from the discs and sometimes they have a very specific light to them as well that lasts only seconds.

As Nick's photo in Figure 1 shows, automated indoor office lighting and the seeping through of sunlight were mixed as part of an environment where, as we stressed above, the weather and lighting are not necessarily separated in our everyday experience.

Ben, a professional in his mid-forties, likewise started his discussion of how he arrived at his working definition with office lighting. His development of a category of 'automated light' was grounded in his previous experiences of office lighting that turned on and off based on motion detectors, so his starting point was that automated light should be defined as responding to motion-sensing technologies. However, the photographing task made him reexamine this, as did the mediating effect of the camera, as he explained: 'it was only really when looking at this [a scene of a campus plaza] with a camera that I started to think about other forms of what automation might mean'. After taking a few photos he arrived at the rule of thumb that would guide what else he photographed: 'Any light that comes on without having to switch it on I determined as automated'. As we discussed his photos, Ben explained how he had taken a photo of the train signalling lights at the busy suburban train station near his office (see Figure 2), becoming certain that they were automated:

> And this was when I thought, this is definitely automated, and the degree of complexity that I imagine a railway timetable at a busy station like Caulfield has to deal with and it's all regulated by lights. Because a train comes probably every three, four minutes, there's a lot going on there. And I thought this is the first instance of not lighting for space, this was about lighting for system or function.

Ben explained that when he was taking the photo, he was initially attracted to the sunset, then noticed the building lighting and street lighting before he registered the train signals, a lit world scene he described as 'complex'. Furthermore, certain affordances were attached

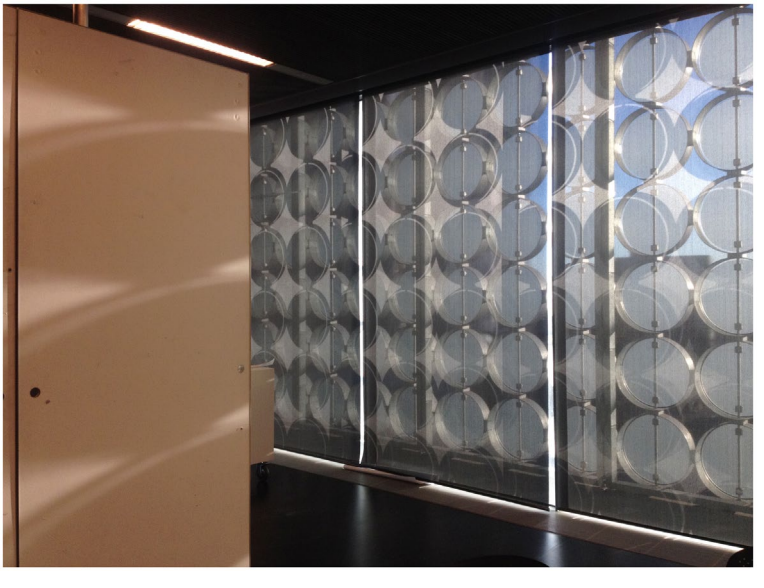

Figure 1. Nick's shared working space at the university with the shadows and light cast through the building's facade. Source: Photo: Nick.

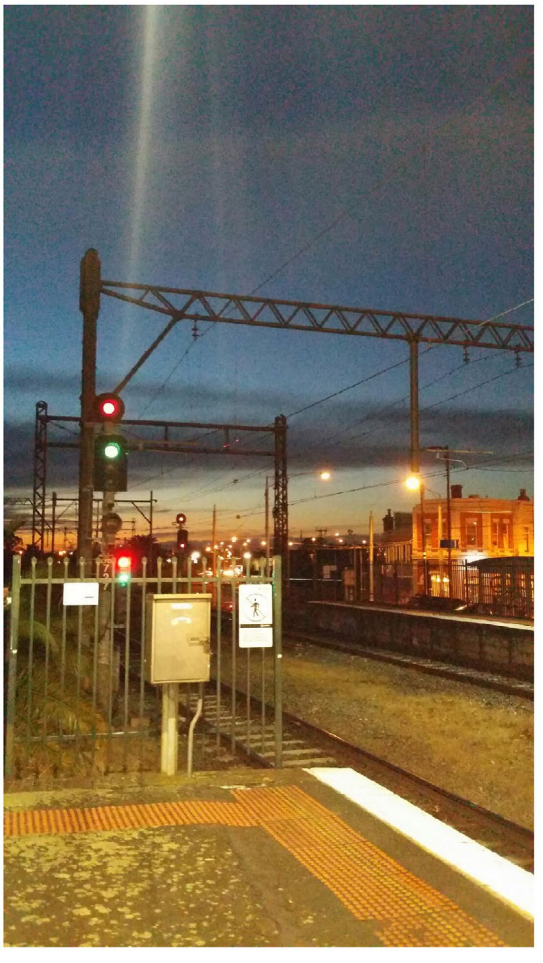

Figure 2. The lit world of a busy suburban Melbourne train station. Source: Photo: Ben.

to aspects of the photo that he could identify: the complicated system of automated signal lights carried an affective charge for Ben, helping him to feel 'safe', as trains were prevented from colliding and he was able to travel home without mishap.

Ben's growing certainty about what he considered automated contrasted with how some participants questioned their choices or deleted photos they felt were 'wrong'. For example, Jordan described how he began taking photos of lights, but then deleted these because he was not sure that they were automated. A friend suggested that automated lights 'turn off and on by themselves', and this became his working definition – lights that switched on and off without human intervention. This meant he thought about each image and whether people had turned them on – although in many cases he was 'guessing' whether or not they were automated. An illuminated train timetable became an ambiguous form of automation and information that Jordan said 'feels automated' but imagined that there must be someone who would change it if the train was late. He guessed that the sign was somehow automated, but a change to the regular schedule is subject to special audio announcement.

Amy, a student in her 20s, had a working definition that was slightly different, although still depended on human intervention: automated lights required that she interact with them, and they had an automated response to this interaction. Still, she was not sure if her photos were 'right'. This working definition of responsiveness was confounded by a crossing light at a busy city centre intersection which she explained she had recently discovered is 'completely automated', working on a timer that is not responsive, even though the buttons were retained to help people feel less frustrated. She included this photograph in her series even though she believed that pressing the button did not affect the changing of the lights. The ambiguity of the definition of automation was common for participants, and they were consistently uncertain about whether lights were automated, but assumed they were in many cases for the purposes of taking photographs, and these assumptions were based on the *effect* the lights had on their activities and movements through the city as much as whether a person had actually and directly switched them on.

Photographing automated lighting brought to the foreground an element of participants' quotidian urban experience that they did not often consciously contemplate. They were not sure what was automated and what was not, neither were their perceptions of the origins or extents of the agency, intentionality, and capacity associated with automated lighting clear. The example of automated lighting reveals how forms of automation participate in the constitution of an ambiguous, undetermined, messy and potentially chaotic layer of everyday life.

As these participant-generated categories show, their definitions of automated lighting were always contingent on a set of different elements: the contextual knowledge that they had, respectively, of the transport systems the lighting in question was implicated with, and the relationship between humans and technologies. As these findings indicate, it is impossible to understand people's experiences of and ways of knowing (about) automated technologies as separate from the everyday environments they are part of, or from the human and other agencies they are co-implicated with. The implication is that human experience and knowing related to the material and perceptual qualities of automated technologies are always entangled in and indeed contingent with the messy complexities of the everyday. We explore this further in the next section.

Mess and contingency

The majority of light sources that participants depicted were from street lights, traffic lights, car lights, lights of advertising or signage and light seeping out of office buildings into the urban night. Taken in isolation, each of these had particular affordances and temporalities that conditioned participants' lit worlds. However, the photos showed complex and sometimes chaotic combinations and mixtures of light that participants often did not realise were co-present until taking the photos, as shown in Figure 3 where streetlights, shop and office lights and light from car traffic combine. The 'environment as a domain of objects to be perceived' (Ingold, 2011, p. 258) is in this sense always contingent and situated, and depends on the different configurations of things that combine in any one moment to determine how automated lighting emerges within everyday worlds. This means that the empirical world we encounter as researchers is always 'messy' (Law, 2002), and as the work of Dourish and Bell (2011) reminds us, this is equally important to keep in mind when seeking to understand the technological elements of our worlds and how they configure with other elements. This messiness is related to the contingent character of the environments we live in.

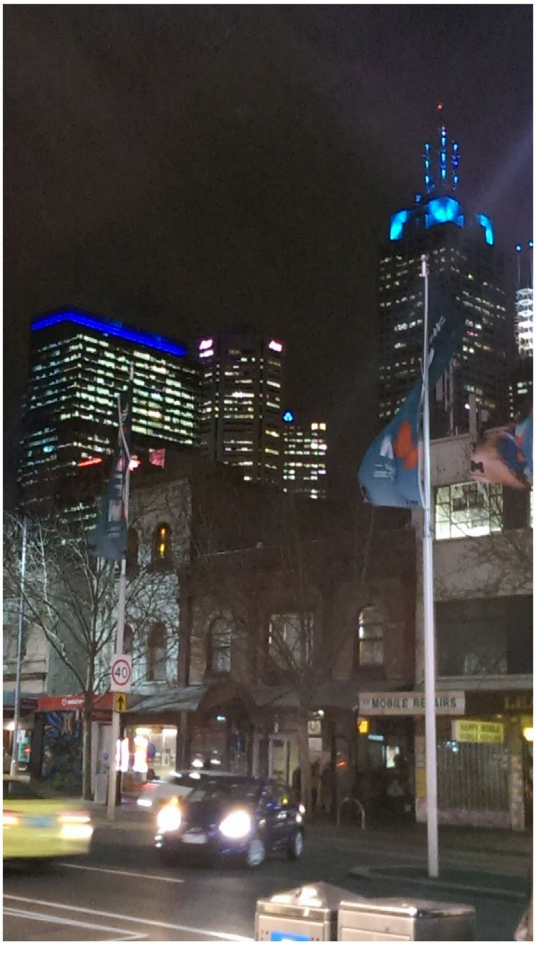

Figure 3. Lights from shops, office buildings, streetlights and cars combine and reflect off pavements and windows in a Melbourne city street. Source: Photo: Shanti (author).

There is acknowledgement of the contingency of the configurations of life and their experiential affects in the human geography literature with reference to atmospheres (Anderson, 2009) and technology (e.g. Ash, 2012, 2013). However it is where the detail of how contingency is played out, in relation to lighting (Bille, Bjerregaard, & Sørensen, 2015; Pink et al., 2016) that ethnographic research illuminates the importance of attending to how 'contingency is at the core of understanding how futures play out' (Pink & Salazar, 2017, p. 16), and indeed as Irving proposes, acknowledging 'the radical contingency of the future, including futures that we do not and will never know about' (2017, p. 39). Keeping in mind that the future of automation with be similarly contingent, in this section we focus on how this characterised participants' engagements with and experiences of automated lighting.

Several participants recorded car and street lighting and discussed these in relation to the weather. They were struck by the aesthetic effects of different configurations of the rain, the darkness and street and car lights. Their engagements with these aspects of automated and regulatory forms of lighting revealed subtle and often beautiful ways that light became

part of a configuration of the everyday, which was contingent and unplanned. For example, Nick described his observations of car lights moving across his bedroom wall:

> one of the most interesting things I came across was in the morning, where there's a sort of particular time in the morning when the light would shine through the edge of my curtains in a certain way and like the traffic became this strange little light.

Although car lights are part of a system of safety governance, here they contributed to a striking aesthetic effect in combination with other light sources and the material elements of room walls and curtains (Figure 4).

The relationship between automated light, the built environment and the weather was also explicit in the narratives of participants who had documented their commutes home in the rain. For instance the images of two participants, Nick and Meegan (student in her early 20s), show sensory encounters that relied on automated light, but that far exceeded its intended purpose of street illumination. Instead, automated light was part of a much more complex, contingent and emergent environments that affected how they perceived and felt about their surroundings.

Nick, for example, was very aware of how the car lights became reflected in the puddles as he travelled home in the rain. Meegan, also studying design, documented her encounters with automated light as it became reflected in the rain on the street, and on different surfaces. As the examples from her route show (Figure 5), these ways of seeing *through* light rather than seeing things that were illuminated *by* light, highlight the importance of understanding automated technologies in relation to two considerations: how they become situated in the world; and how we are disposed to perceive their qualities and affordances as they emerge within contingent configurations of processes and things. In these examples, the perception of automated light and the values ascribed to it occurred within complex sensory and material assemblages whereby the automated element of often went unnoticed. This suggests that we need to understand automated technologies more generally as part of messy contingent worlds, rather than as devices that have effects on worlds. Automated lighting, as a background technology that supports the completion of mundane everyday routines, of commuting by car, bike or train, is therefore more than a simple hidden and taken for granted infrastructure of the everyday. It is a situated technology that has contingent effects and

Figure 4. Video still from Nick's film of traffic lights shining onto his bedroom wall around the curtains.
Note: The video showed how the colours of the cars going in both directions crossed as they reflected onto his wall.

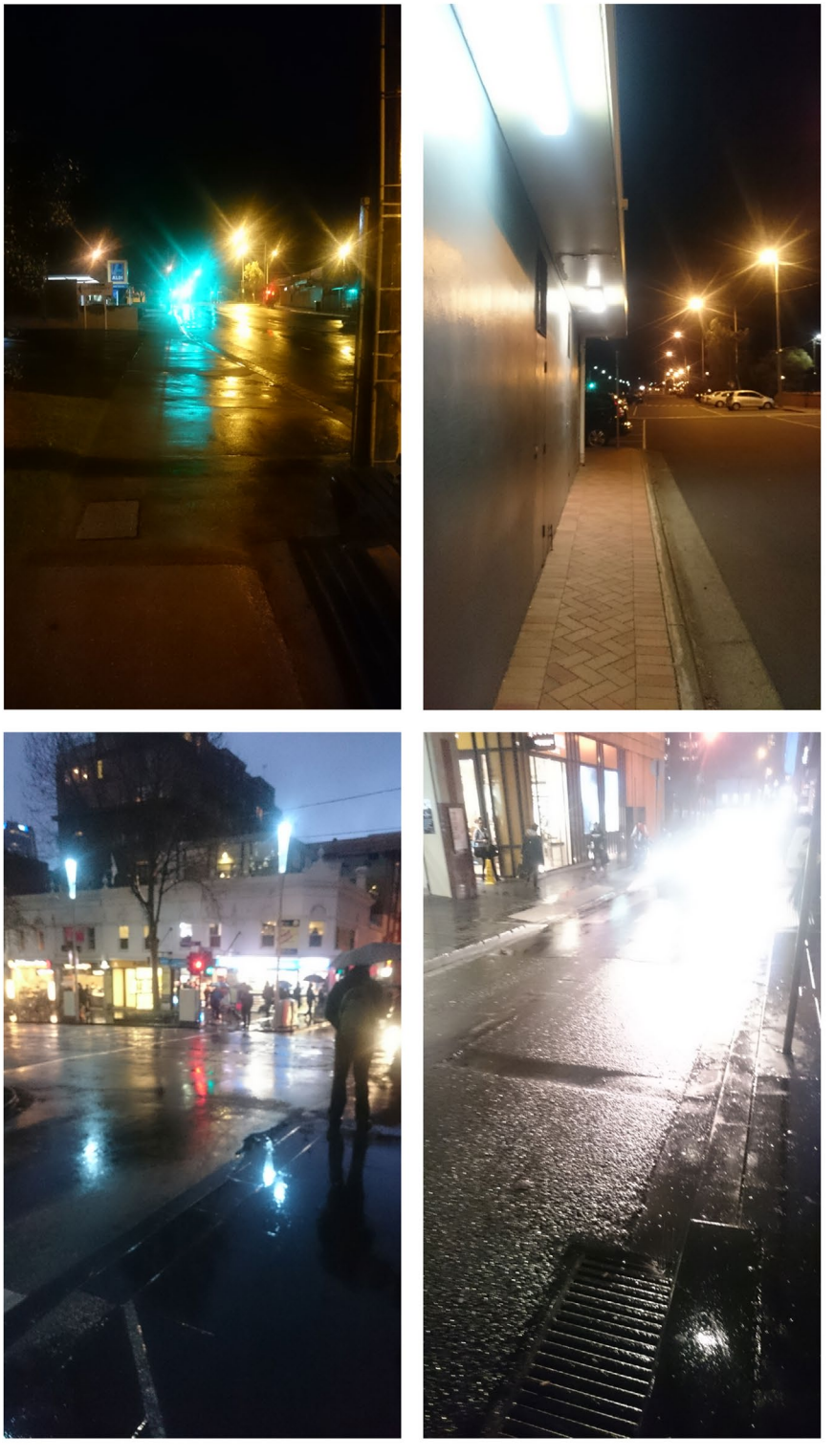

Figure 5. Reflecting and combining light effects on wet city streets. Source: Photos: Meegan.

participates in the making of particular ways of seeing and feeling in the world/environment. These accounts remind us to account for automation beyond its potential for the management of human (and other) behaviour, to ask how the qualities and affordances of automated technologies might seep out of their intended domains, and create new perceptual and experiential opportunities.

Resistance, resilience, improvisation and creativity

Above we introduced Kitchin and Dodge's (2011) notion of 'consumer resistance' to automated technologies, which offers a way to consider how people might use or engage with automation in unintended ways. We propose reframing this through a critical view of the binaries that the notion of resistance creates. The notion of resistance assumes that people are pushing up against, or seeking to push back an (often greater) external power or force. However, while this can be seen in the case of movements involved in activism such as direct action, everyday engagements with power relations with regulatory institutions are often better conceptualised as forms of resilience. Here resilience is understood as a way of 'living with' but not necessarily accepting the force or presence of an unwelcome power or influence. It is associated with the improvisatory manner that we weave our ways through the world and its 'systems'. Examples include how slow city activists live with a fast food burger drive-in on their doorstep (Pink & Lewis, 2014), how people do not use the smart metres they are issued to measure energy usage in their homes (Strengers, 2013), and how workers develop their own ways to stay safe at work when compliance to regulatory guidelines would be limiting (Pink et al., 2014).

Applied to the question of how people engage with and experience automated lighting, and in particular its regulatory functions, adopting the prism of 'living with' automation enables us to see how people become resilient to its irritations, and in doing so improvise around its systems. Traffic lights were singled out by some participants as standing for systems of control, and as Jordan pointed out, were part of his daily reality of walking through Melbourne: 'I do think about them [traffic lights] because the police will fine you if you jaywalk now, so I do wait for the little person to turn green'. Jordan (mid-forties) saw traffic lights as 'there to serve a function and that's to control the flow of traffic and pedestrian movement ... they're symbolic of the controls that we live with every day in our cities' – as opposed to 'chaos and life', commenting that

> The city experience is controlled by various functional imperatives that we have no say over, they come through legislation of H[ealth] and S[afety] concerns … they're there to protect us and make us safe or they're there to reduce certain responses or moods related to our consumer habits.

The idea that traffic lights performed a particular form of urban governance was shared by other participants, although the ways they engaged with them were contingent.

For example, as a pedestrian Ben felt that 'I do have that sense of exposure as a pedestrian, I always sort of check that a car has kind of just jumped the lights or gone through the red lights for whatever reason'. When he was in a car, he told us, 'the traffic light is regulating the fairness that everyone, you know, the only we'll get through this is to take our turn and wait patiently and eventually we'll get there'. In contrast, for Chris, as a cyclist in his 30s, there was a different way to be situated in relation to traffic lights. He video-recorded his cycle commute home, showing us how his route would change depending

on the traffic lights. As we discussed his video clips, he described how he believed there were pressure sensors in the road, but unlike a car his body weight on the bike could not trigger a change in lights, leaving him subject to an automated system that would not react to his presence. Because he knew his route well, he could anticipate what the lights were going to do by a few moments,

> different kinds of rhythms from these lights … I was really aware … that I stopped for over two minutes waiting for the light to change … there's a sense of impatience … where you have to exercise patience sometimes … it can be frustrating if you can see that there are no cars going through that intersection and you're stuck there waiting … my behaviour would anticipate certain types of intersections, what the light's going to do.

In the video we watched as he changed route at one set of traffic lights which brought him to a stop, cutting across the main road to turn into a quieter side street. Thus Chris improvised to manage the automated light system, in relation to other road users, his knowledge of the traffic light cycle and his feelings of impatience or tiredness.

Participants were also resilient to automated lighting by finding ways to ignore aspects of commercial lighting that they found irritating. Jordan showed us photos of his route home through the city, including the railway station where he felt most of the lights he encountered were telling him what to do. Some of these needed to be accounted for, such as the light signs at the train station that told him when the next train was coming – this invoked varied feelings for him depending on whether he had just missed a train or was in time to catch an express-train home. Similarly, as Ben put it, 'You're forced to pay attention to that because it gives you critical information you need for your journey'. Other lit screens were irritating, such as the illuminated advertisements Jordan showed us, that he could not avoid passing as he went through a shopping mall to the train station; he felt these were 'demanding presences' of advertising to convince people to buy particular products. He ignored these signs, which he saw as limiting other possibilities for the use of the spaces they occupied. These automated lights were part of the banal background to everyday life, not usually noticed or even conceptualised as light by participants. They were part of environments where as Jordan put it: 'there are a lot of things that are imposed on us whether we like it or not', and that participants moved through.

Automated urban lighting, as explained so far, does not form a coherent system of illumination. It is rather composed of many different lights, driven by the ownership, ambition or intentionalities of different stakeholders. Its calls for attention or attempts to regulate are moreover navigated in ways specific to the situatedness of the person who encounters it. We could argue that the systems that the technologies stand for are seen *through light* (Ingold, 2011). This was particularly clear in our study, as we asked participants to think about automation in relation to light. Yet it was also the very lighting up of the technologies that participants felt was relevant. Here the common meaning for participants was the call to attention they associated with automated lighting. Therefore they endowed it with a displaced agency that sometimes stood for an imposition, sometimes with necessary communications. They did not perform acts of resistance *against* this automated technology, yet as the examples discussed in this section show, they found various ways to live with it. Improvisation is ongoing in everyday life, even when it is barely noticeable, as people weave their ways through the world. Therefore, as exemplified in this section, to understand what people do with automated technologies, we need to ask how they improvise in their engagements with them.

Conclusion

In this article we have argued for an approach to automation that accounts ethnographically for the ways that people encounter, improvise with and are resilient to automated technologies in everyday situations. We have proposed that in order to understand how our experiences of and relationships with everyday automation unfold we need to attend to the messiness and contingency of the everyday. Through the example of how participants in our study encountered and felt about everyday automated lighting we have developed an ethnographic dialogue with concepts of improvisation (Ingold, 2013), mess (Dourish & Bell, 2011), contingency (Irving, 2017) and resilience (Pink & Lewis, 2014). This we propose, offers a convincing alternative to research agendas that theorise automated technologies in relation to the affects they have on the world, and/or focus on the human-technology relationship or interaction as their key unit of investigation and analysis.

With particular reference to our example of the *lit world*, we have demonstrated a range of ways that automated lighting comes to have meaning in the world, and how it becomes entangled with the practical activities that people go about as part of their everyday lives. Our discussion was based on the premise that automated lighting forms a background and infrastructural element of our everyday urban worlds and the routes we take through them. It is as such *part of* the environments in which we live, however as we have shown, because these environments are messy and configured in ways that are contingent and emergent, automated lighting becomes implicated in the generation of activity and experiences that diverge from its intended uses. It is, moreover entangled and co-implicated with the weather, the ground under our feet and the air that swirls around us. It participates in the constitution of the everyday environments that we live in and feel, and it is part of our social and professional lives. Therefore the concept of the *lit world* might be applied to understanding urban environments, as being almost inevitably lit in ways that form an integral part of how people experience the city and how they navigate through and use it. Because the city is inescapably seen and experienced *through* automated forms of lighting, it is important that we acknowledge this in order to account for urban experience adequately. However, as our ethnography has shown, to do so requires us to also acknowledge the complexities of how automated lighting is engaged with.

We were particularly interested in urban lighting because it offered us an existing form of automation that is both well established and ubiquitous in many cities around the world, including Melbourne, the site of our ethnography. This allowed us to mobilise the concept of the lit world in order to examine what we might learn from an analysis of how research participants defined and navigated forms of everyday automation as they went about their lives in the city. While urban lighting technologies are an 'older' rendering of automation than the technological systems that are discussed in contemporary discourses about future smart cities (Lanzeni, 2016), they still have much to tell us about how people live with automation and therefore what the possibilities might be for how people may live with automation in the future. We might assume that we will continue to live in cities that are the sites of competition between a range of different governmental, corporate and other stakeholders, and even when competition is not an issue, gaps are likely to remain in the synchronicity between different regimes or systems of automation.

It is not at all surprising that we found that automated light is implicated in our lives in so many dimensions – ranging from the aesthetics of its encounters with the weather, to the ways it is navigated, accounted for, ignored, or resented for its insistence and prevalence and

appreciated for the sense of safety and well-being that people generate through it. As noted above, we sought to undertake our research with a sample of participants diverse in age range and gender precisely so that we could gain a sense of this, and develop a set of analytical principles that would reveal patterns within this difference. These differences also imply how difference is embodied and how therefore the embodied experience of light is contingent on both the specific environmental configurations in which people find themselves and on their biographies and their complex situatedness as embodied individuals. This does not mean that it is impossible to generalise about the principles of how automated light and automation more generally might be encountered. However it is within this diversity of embodied experience and engagement that we need to contemplate questions about how people will engage with emergent and future automated technologies – including those with which scholars whose work we have noted above have already started to critically engage, such as autonomous driving cars, smart domestic technologies and smart cities (to note those we consider particularly relevant to the discussion here: Kitchin & Dodge, 2011; Lanzeni, 2016; Laurier & Dant, 2012; Strengers, 2016). Here we have sought to uncover the significance of how an already existing and taken for granted automated technology is experienced – that is, we have suggested how the contingency, resilience and creative improvisation that characterises the flow of the everyday as lived out, meets with the continual presence of automated lighting technologies.

The lit world, and by implication other elements that constitute our environments technologically, are not worlds apart from what Ingold has called the weather world (2010) or from what Heidegger called 'being-in-the-world'. Rather, the concepts we use to describe these technological elements of these worlds need to be understood as inseparable from these and other related concepts. As an example of everyday mundane automation, the concept of the lit world offers us a way to single out a particular aspect of automation for analysis. Through this we have considered on the one hand how everyday automated technologies become part of complex unsynchronised urban environments, where different stakeholders and users each invest their interests, intentionalities and frameworks in ways that overlap, contradict or co-exist with each other; and on the other, what this means for people who encounter and experience such environments as they go about their lives. The infrastructures of automated environments are therefore complex, because they are not constituted in ways that are uniform, non-competitive and synchronised. Digital forms of automation are emerging in this very world, where the future is conditioned by and emergent from the present, and is not a separate alterity in which things will be different. We therefore call on researchers to attend to the actual settings that new automated technologies will become part of, through close ethnographic analysis, to arrive at understandings that can be enabling from the outset rather than simply critical in the aftermath.

Note

1. Goldberg, Editor-in-Chief of the *IEEE Transactions on Automation Science and Engineering*, here quotes the Society's Field of Interest Statement.

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