

RESEARCH PAPER

The streetlights are watching you: A historical perspective on value change and public lighting

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ABSTRACT

This article investigates questions of ‘designing for value change’ via a ubiquitous, yet often taken-for-granted, technology – streetlights. Smart city trends are spurring a new generation of streetlights, with lampposts being fitted with sensors, cameras and a host of other technologies aimed at monitoring and data collection. This has raised concerns about privacy, surveillance and power relations, arguably creating a changing value landscape for streetlights. However, the article will argue that, while smart streetlights may seem to instantiate a moment of value change, they in fact represent a continuity of values fundamental to the very foundations of public lighting. They embody a set of values – and value tensions – that can be traced back to the origins of modern public lighting in the seventeenth–eighteenth centuries. Moreover, urban nights occupy a liminal space at the boundaries of social order, which likewise informs streetlights’ technical functions and symbolic meanings. Appreciating this continuity of values (and value tensions) is necessary for analysing the potential impacts of new innovations, as well as the value landscape that will inevitably shape their design and use. In adopting a historical perspective on a specific case study, as well as proposing the notion of value continuity, the article offers generalizable insights, as well as future research directions, for the theory and practice of designing for value change.

Lantern smashing

When put into conversation with contemporary debates, what can an examination of the history of public lighting reveal about the relationship between streetlights and moral values? And more generally, what can it reveal about the theoretical question of value change and its relation to technology development, or more accurately, its relation to urban sociotechnical systems? To make progress on these questions, this article will present a narrative about the enduring entanglement of values, public lighting and urban nights that has played out over the centuries. Of course, this is not *the* narrative or *the* value-level analysis of public lighting or urban nightscapes; complex and multifarious topics such as these are shaped by – and in turn, themselves shape – a wide range of social, political and technical factors. However, it is a critical narrative for the future of public lighting, and one that presents a challenge to the notion of designing for value change.

As an entry to these questions, consider the following scenario: mass unrest and protests against an authoritarian government have erupted on the streets of a major metropolitan city. The protesters, wary of surveillance by authorities, begin to target lampposts. Seen as a ubiquitous and pervasive means of monitoring the city’s public spaces, protesters take to destroying (or at least functionally disabling) their surveillance capabilities. This act is seen as a symbol of defiance and a practical necessity to protect the anonymity of those opposing the government. If this scene evoked

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images of a recent global event, you would be correct: during the 2019–20 demonstrations in Hong Kong, protesters took to cutting down or gutting smart streetlights around the city. The main reason was that new lampposts contained cameras and sensors which allegedly used – or were compatible with – facial-recognition technologies (Fussell, 2019; Yang, 2020). However, if these scenes remind you of a much older event, you would also be correct. Another group of protesters did something quite similar during their own revolution, namely lantern smashing to create a wall of darkness to hide beyond. However, these protesters also went much further symbolically and in practice. After succeeding in their revolution, they used lampposts as makeshift gallows to hang publicly members of the overthrown regime. This was Paris in the late eighteenth century, during the French Revolution (Schivelbusch, 1988; Alvarez, 1996).

At issue here is not an anecdotal link between the politics and civil unrest of two events centuries apart *per se*. This quick (and admittedly reductive) comparison is not intended as a political statement, nor is it meant to trivialize Hong Kong protesters' courage and ongoing struggles (as of 2021). Instead, it is used to exemplify a descriptive point regarding the perceived functions and associated symbolism of streetlights within these events.¹ Thus, the article is critical of the degree to which we should see debates over surveillance by smart streetlights as a novel value conflict and how such a perspective frames policy and design interventions. Instead, the article argues that contemporary debates about smart streetlights and surveillance are the latest iteration of a centuries-long conflict and struggle over control of urban night-time spaces. While smart streetlights may seem to instantiate a moment of value change, they actually represent a continuity of values fundamental to the very notion of public lighting. Efforts to enact social control via public lighting have been a recurring theme for centuries. Streetlights have long been utilized and perceived as a form of policing and imposition of social order,² creating recurring tensions among autonomy, safety and surveillance. While offering significant improvements in accuracy and precision, smart streetlights embody a continuity of values – and value tensions – that can be traced back to the origins of public lighting in the seventeenth–eighteenth centuries. In reference to lantern smashing during the French Revolution, Edensor (2017, p.172) notes that 'Ever since, there has been a continuous conflict between seekers of dark spaces and those who authoritatively aim to extend surveillance across the nocturnal city.'

To apply a value-sensitive approach to the design of public lighting, we need to appreciate the history and inherited symbolism of this urban infrastructure (see Stone, 2021a). This reveals a contradictory tension at the very core of the functionality and goals of public lighting. Opening up the time and space of urban nights offers a means for liberation, freedom of movement and divergent social practices to emerge. Yet, operating as a networked infrastructure that effectively creates our urban night-time spaces carries the inherent capability for surveillance – hence the close association between public lighting and policing. Streetlights have been, and continue to be, one way to control the night and impose order (Edensor, 2017). This tension is reinforced by positioning urban nights as liminal spaces at the boundary of social order and social norms. As such, there is a perennial tension between control and liberation in urban nightscapes, with debates over smart lighting the latest iteration.

The notion of designing for value change (van de Poel, 2021) can be seen in urban lighting with the growing awareness of light pollution and its link to environmental values (Stone, 2017). However, the successful integration of environmental values into urban lighting must also address the inherited symbolism (and tensions) of public lighting, or else risk uncritically falling back into centuries-old narrative tropes. There is, therefore, a need to surface and analyse the inherited value

¹A clarification of terminology: in this paper, 'streetlights', 'street lighting' and 'lampposts' are used interchangeably to refer to a generalized typology of public lighting infrastructure.

²Throughout, a cluster of (often contentious) values will be examined under the broad label of 'social order (at night)' which encompasses safety, surveillance, security, autonomy and nightlife, and their continued entwinement with streetlights.

tensions and dynamics of public lighting – as an instance of value continuity – to fully appreciate the context within which new values emerge and to which they must ultimately respond. Without this, it will be much more challenging to see beyond entrenched ways of thinking towards more sustainable and inclusive lighting policies and designs.

While this analysis focuses on streetlights and the past (and future) of public lighting, as part of the special issue *Designing for Value Change*, it can also be read as a reflection on the categorization and conceptualization of value change within technological innovation. Specifically, it raises a challenge to the initial taxonomy of value change (van de Poel, 2021): that for specific technologies, values or value tensions are so deeply entrenched that it is difficult to disentangle them from the technology itself, functionally or symbolically. If the following argument is accepted, it necessitates considering something akin to value continuity within technologies, or at least within sociotechnical systems and urban infrastructures. This can refine the theory and methods of designing for value change – something which the article addresses in the conclusion. First, however, it will examine the history of public lighting and social order at night through the lens of value continuity, and then explore the implications for contemporary debates.

The night's watch: a (very brief) historical perspective on social order at night

As an urban infrastructure, public lighting has a long temporal resonance – debates today are necessarily layered upon past choices. Further, as a sociotechnical system deeply embedded in cultural norms and practices, it carries a symbolic dimension that extends beyond specific technical functions (i.e., providing some amount of illumination for a given area or surface). To appreciate the values associated with streetlights, we should therefore draw from historical research that analyses the origins and rationale for public lighting.³ It is also critical to appreciate the spatial-temporal setting in which this analysis is situated – namely, darkness and night – and the legacy of inherited symbolism that comes along with these categories. Highlighting a category as fundamental as night may appear trivial at first glance, but it is crucial for appreciating how we perceive, move through and monitor our cities after dark. Combined, this will allow us to surface and analyse recurring value tensions related to public lighting.

Fear of the dark

The associations we continue to hold regarding darkness and nights have a history that extends well beyond debates over streetlights. Fear of the dark, and the association of darkness and night-time with evil and danger, are very deeply embedded in the vast majority of cultures throughout history in some form or another (Ekirch, 2005). It may even be an evolutionary trait inherited from our prehistoric past, as humans seem to develop an instinctive fear of the dark at a young age (Ekirch, 2005). Likewise, nights have been seen as a time and place for nefarious activities and supernatural

³This is an extremely brief overview that paints complex social developments and value conflicts in broad strokes. A great deal more nuance to the issues highlighted here can be found in book-length studies or edited collections on the history of lighting and cities at night (e.g., Schivelbusch, 1988; Nye, 1990; Schlör, 1998; Palmer, 2000; Ekirch, 2005; Koslofsky, 2011; Isenstadt *et al.*, 2014; Edensor, 2017; Dunn and Edensor, 2021); via recent scholarship into the relationship between social practices at night, darkness, and race that further complicates questions of power and surveillance within urban nights (e.g., Browne, 2015; Elcott, 2021); through analysing the related spatial and social differentiation within different cities created by lighting choices (e.g., Williams, 2008; Edensor and Dunn, 2021); and through delving deeper into other political forces closely intertwined with electric light, such as capitalism and changing labour conditions (e.g., Isenstadt, 2018; Shaw, 2018). However, while these issues would add depth, nuance, and perhaps some diverging perspectives to this argument, the overarching continuity of value conflicts within urban nightscapes – and critically their continual manifestation in/through the specific infrastructure of street lighting – would remain.

occurrences. In contrast, illumination has been seen as a source of literal and symbolic good, of safety, knowledge, the divine, etc.

This amounts to a groundwork of symbolism related to darkness that shaped – and continues to shape – the uses and perceptions of cities at night. City nights, at least in the West, have long been perceived as a dangerous time and place. In medieval and pre-Enlightenment Europe, the night was foreboding, chaotic, dangerous and haunted. It was the underside of divine natural order and full of religious symbolism. In discussing Boston, but applicable to pre-modern nights more generally, Beamish (2014, p.10) describes the night as ‘treacherous’. It was a time of accidents, crime, fires, social unrest and a host of other unseen hazards. This created legal and social restrictions on access to public spaces at night; if not a law in all cities, it was custom to stay in at night. Most cities had curfews, and walled cities would often close their gates at sundown.⁴ Nightwalking was a crime in most European cities from at least the Middle Ages, and only the night watch – an early form of citizen-led policing – roamed the streets freely at night. Others out at night, and especially those without any illumination source, were suspect (Beaumont, 2015). That said, Shaw (2018) notes that the analyses of pre-industrial nights by Beaumont (2015) and Ekirch (2005) also reveal a surprising amount of activity, either by choice or by necessity. Lantern carriers, so-called ‘night-soil men’ (who cleared the streets of waste) and astronomers all had reason to be out at night. Interestingly, Shaw (2018, p.29) notes that ‘The presence of the legislation against night-time activity . . . is itself evidence for the desire of various groups to be active at night.’ But at the same time, pre-industrial and pre-capitalist nights were ‘marked by reduced activity, and in places where governmental structures had formed, it was a timespace that was tightly regulated through harsh punishments for any form of activity’.

For the present analysis, what can be highlighted is that questions of safety, surveillance and control were persistent and ongoing concerns for urban nights. Even before the advent of modern forms of artificial illumination, and before the formation of modern public lighting systems or policies, there was a set of (predominantly negative) values associated with urban nights and those who inhabited them, and a variety of strategies aimed at the imposition of social order. As we will see below, with the implementation of public lighting schemes and the invention of new lighting technologies, this did not stop; rather, authorities simply found new ways to regulate the night (Edensor, 2017).

Illuminating the night

By the mid-seventeenth century, many cities had begun to recognize a need for improved nighttime illumination on major streets and thoroughfares. No major European city had formalized public lighting before 1650, but this changed quickly: Paris enacted a lighting strategy in 1667, Amsterdam in 1669, Berlin in 1682, London in 1683 and Vienna in 1688. This rapid shift, according to Ekirch (2005), can be attributed to a few crucial factors: technological innovations in oil lamps, the emergence of the early modern state (with accelerated government regulation), commercialization and associated entertainment (such as drinking and organized prostitution) and urban growth. Artificial illumination at night could also serve the essential practical functions of aiding people on essential errands (e.g., doctors) and assisting the night watch with its duties. These factors would be combined with more significant societal shifts emerging in the eighteenth century, namely Enlightenment thinking that saw scientific rationalism and scepticism superseding magic and superstition. In sum, these factors contributed to significant changes in night-time behaviours during the seventeenth, eighteenth and nineteenth centuries. People were increasingly going out at night, and many city curfews were relaxed or lifted entirely.

⁴As examples: in Catalonia, no more than four men could walk together at night (Ekirch, 2005); in Paris, all houses had to be locked at curfew and the keys given to the magistrate (Schivelbusch, 1988) and other cities went as far as to lay logs or chains across main streets to prevent travel at night (Ekirch, 2005).

In considering the origins of public night-time lighting, two important points should be noted. First, old habits did not die easily or quickly; darkness still represented a time both sacred and dangerous for some. It remained the custom to stay home in many places, except on special occasions, and devote an evening to prayer and rest (Ekirch, 2005). Curfews may have been lifted in many cities, but for many, a ‘moral curfew’ remained (Beaumont, 2015). Nevertheless, new perceptions and uses of urban nights were taking root. Second, despite technical improvements to oil lamps, lighting was still relatively poor, and city streets were mostly dark; only main streets were lit, and initially only on the darkest nights of winter for a few hours. But, as Schivelbusch (1988, p. 96) asks, ‘if public lighting in the seventeenth and eighteenth centuries did not really light up the street, then what was the point of it?’ While the fear of spirits and demons at night was diminishing in cities, other dangers remained a persistent issue; improved public illumination was one method authorities utilized to combat rising crime and enact social control (Schivelbusch, 1988; Ekirch, 2005; Brox, 2014). In *Disenchanted Night*, Schivelbusch (1988, p.87) asserts that public lighting represented a ‘symbolism of domination’, a form of authority and policing. So strong was this connotation – despite the lack of functional illumination – that in Paris ‘lantern smashing’ became a common occurrence during the 1789 revolution, as the lights were seen as surveillance devices of the oppressive regime (Dewdney, 2004). This was an act of ‘symbolically unseating the authority they represented: the darkness that prevailed after the lanterns had gone out stood for disorder and freedom’ (Schivelbusch, 1988, p.98).

Nightlife and control of the city at night

Despite (or perhaps because of) these contestations over control of the urban night, by the mid-1800s, the nocturnal city in many parts of the world was effectively opened up: social and physical barriers that had existed for centuries were collapsing, and people started to go out at night (Schlör, 1998). Supporting these changes was the advent and proliferation of gas lighting in the nineteenth century. With its new scale of industrialization and resultant increase in actual illumination, public lighting in the modern sense became possible for the first time. Thus, during this period, a new word came into use – ‘nightlife’ (Brox, 2014).

While many saw this as liberating and providing the possibility of increased freedom, authorities also saw it as a security problem. More people out at night meant more opportunities for crime and more activities outside political or social norms. As a result, darkness and night – at least from the authorities’ perspective – remained associated with crime, rebellions and illegal gatherings. Shaw (2018, p.29) notes that this led to a shift in management strategies for urban nights:

Street lighting’s introduction marked not just a moment of technological innovation or sociological advancement, but fitted alongside other socio-political changes in the eighteenth and nineteenth centuries to give birth to the modern understanding of the operation of the state. . . . Indeed, Foucault’s argument about the coevolution of technologies of surveillance and control with modern forms of state power could easily be applied to street lighting. This new technology helped to facilitate a move from legislation which prohibited night-time activity with rather strong punishments to regulation and control of new forms of nocturnal activity.

Yet, in politicizing efforts to control the urban nightscape, we should be careful not to put all the blame on authority. Given the inherited symbolism of night and darkness, subjective experiences also give rise to the apparent need to monitor our night-time spaces. Alvarez (1996, pp.xii–xiv) poetically captures this sentiment when stating, ‘However efficiently artificial light annihilates the difference between night and day, it never wholly eliminates the primitive suspicion that night people are up to no good.’

The question this raises is: who exactly were these night people and what were they doing that required monitoring? This points to the interesting counter-position, as nicely summarized by Edensor and Dunn (2021), that it has historically been marginalized groups and members of the

lower classes who sought out darkness as a means of freedom from labour and social scrutiny. Similarly, Shaw (2018, p.34) positions the night as a space of opportunity for those ‘who are either economically disadvantaged or socially excluded’. Citing Palmer (2000), Edensor and Dunn (2021) further note that the cover of darkness was a time in which activities outside political or social norms could thrive, so-called moral pseudo-transgressions: revolutionaries, subversive or libidinal activities (e.g., affairs, prostitution, drinking, gambling, breakdown of racial segregation, live music, homosexual affairs). In this sense, the cover of night offers a means of liberation to do things you could not do during the day. Thus, ‘Darkness serves to de-territorialise society when it obscures, obstructs, or otherwise hinders the deployment of the strategies, techniques, and technologies that enforce the rationalising order of society, thereby allowing potentially transgressive behaviours to occur under a veil of anonymity’ (Williams 2008, p. 518).

The combination of increasing night-time activity in cities, combined with illegal and (perceived) immoral activities carried out under cover of darkness, led to increased efforts to exert social order over urban nightscapes. One means to do this was by ubiquitous surveillance in the form of artificial illumination. The formalization of modern policing and the advancement of public lighting often occurred in tandem and are so intertwined that they can be seen as ‘two sides of the same coin’ (Alvarez, 1996, p. 224). The dark spaces of nineteenth-century urban nights were seen as ‘a precondition of urban poverty, teeming with life and menace. By the same logic, street lighting was a precondition of law and order; it was less a public amenity than a way of keeping an eye on the unruly underclass’ (Alvarez, 1996, p. 223). This intertwining continued with the invention and proliferation of electric lighting in the late nineteenth and early twentieth centuries, perhaps best articulated by the Chief of Police in New York City who stated (concerning the installation of electric lighting) that ‘every light erected means a policeman removed’ (Dewdney 1994, p.105; Alvarez 1996, p.226). Yet despite this promise, it has not proven to be the case: more illumination brings more people into the street, which leads to more instances of crime (or other ‘transgressive behaviours’), which in turn offers a justification for increased surveillance – perpetuating a continued struggle between control and liberation.

Streetlights get smarter

The twenty-first century has seen a new chapter in the streetlight’s history, encapsulated within the emergence of the ‘smart city’ and ‘smart urbanism’ at large. Proponents champion the smart city as a means of creating more efficient cities via real-time monitoring, data collection and management of city systems. However, smart urbanism and smart lampposts have also faced sustained ethical and political criticism because of ubiquitous surveillance, violations of the right to privacy and the increasing influence of corporate actors in the public sphere – critiques raised both in scholarship and popular writing (e.g., Timan, 2013; Sadowski and Pasquale, 2015; Holder, 2018; Kitchin, 2016; Sadowski and Bendor, 2019; Sadowski, 2020). Relatedly, smart cities’ top-down prescriptive planning strategies have been criticized from the perspective of participatory urban planning ideals (e.g., Sennett, 2019). More generally, smart city technologies align with contemporary concerns in the ethics of technology regarding ubiquitous surveillance (by corporate actors or states) made possible by ever more data collection and monitoring of our digital (and physical) activities (e.g., Vallor, 2016).

A foundational concern over smart city initiatives – and smart lampposts, as key nodes in these systems – is their impact upon the public sphere. For example, Van der Sloot and Lanzing (2021) critique the Stratumseind living lab in Eindhoven from this perspective. In this downtown street, known for nightlife, experiments were conducted to see if lighting colour, brightness and intensity changes can reduce violence and aggressive behaviour, thus increasing public safety. Doing so, however, requires large amounts of data collection and video surveillance, heat sensors and monitoring of social media feeds to enact preventative measures. Van der Sloot and Lanzing (2021) criticize the lack of transparency and consent (citizens were not informed about the experiments or

monitoring), the chilling effects on behaviour caused by constant surveillance and infringements on individual freedom and autonomy via so-called ‘preventative’ actions. More fundamentally, they contend that such interventions are at odds with the liberal democratic ideals of the public sphere as an inclusive, open and neutral – in the sense that ‘no vision of the good life is presupposed or excluded’ (Van der Sloot and Lanzing. 2021, p.323) – space for deliberation.

These tensions coincide with other value-level debates over the public sphere at night, such as the increasing presence of nightlife entertainment districts. While early versions often emerged organically (or accidentally), they are now recognized as a significant economic benefit to cities; as a result, these night-time spaces are increasingly planned and regulated. The knock-on effect is that more attention is paid to these areas, including the presumed need for surveillance and control (Timan, 2013) – perhaps indicative of why areas like Stratumseind are seen as ideal targets for such experiments.

Values and streetlights reconsidered

Given the (renewed) attention to the ethics and politics of technological interventions in the public sphere brought by the emergence of smart urbanism, it is tempting to argue that we are witnessing a foundational shift in the function of streetlights. No longer simply providing illumination, they actively monitor their environment and those who inhabit it, creating a vast network of data-gathering nodes encompassing urban spaces. Combined, the novel functions and capabilities of streetlights seemingly create a new terrain of moral concern. In other words, there is a technically and morally significant change.

Yet, our brief history reveals that seeing contemporary debates over the role of streetlights in the public sphere as novel is tenuous at best. Suppose we contextualize technical innovations to lampposts seen in smart city initiatives – such as those dismantled in Hong Kong – within the longer evolution of public lighting. Should we be surprised by the surveillance technologies embedded within them? Or should we understand them as a more effective fulfilment of the intended functions that led to the establishment of public lighting? It would seem that the latter is a more accurate (conceptual) position. Rather than instantiating an instance of value change, they are just relatively better at doing many of the things streetlights have always been meant to do. While offering a significant improvement in capabilities and precision, smart streetlights embody a continuity of values – and value tensions – that can be traced across the modern history of public lighting. Combined with the inherited symbolism of darkness and light, we can appreciate that the goals of surveillance, regulation and control of urban nightscapes have endured. Contemporary innovations represent new means of fulfilling foundational goals of public lighting, just as resistance to them offers fresh versions of protest, circumvention and critique. It would seem that these value tensions are a recursive facet of this sociotechnical system.

This is not meant to denigrate contemporary political struggles or important debates about power and influence over the public sphere. But it does call into question the framing of contemporary debates and what such critiques can offer a value-sensitive approach to urban lighting. At the level of conceptualizing and specifying values concerning streetlights, an historical perspective assists in elucidating important characteristics requiring attention. To move forward with a value-sensitive approach to lighting policy and design, we should be explicit with some baseline conditions, which may seem obvious but require mention. First is that (social) safety will always be a concern in urban nightscapes. Nights are a time when darkness provides cover and when many people are indoors or asleep. This both the problem – and opportunity – of urban nights. Second, for some, part of the appeal of nightlife is the excitement and (potential) danger (Shaw, 2018). Regarding nightlife districts and the balance of fear versus fantasy, Timan (2013, p.96) notes that ‘excitement and even fear might not only be a side-effect of creating “safe and pleasant” nightlife districts, it might also be something that is sought for’. For these reasons, Timan and others caution against the Disneyfication of city centres, which creates homogeneous and predictable places.

Third is the continuity of value tensions. Urban nights have always been a time and place where authorities have prioritized social order and surveillance because they are a liminal landscape, a time and place at the boundaries of social order. They continue to be utilized by counter-cultures for the circumvention of social norms. They will therefore also be a site of continued contestation and a time and space that, for many, will be seen to require the imposition of social order. This will lead to resistance from those (counter-)cultures that see the night as a means of liberation, freedom, or revolt. So entrenched is this tension that Williams (2008) asserts it is, in fact, these very contestations that created urban night spaces as we know them (see also Timan, 2013). Fourth, and closely related, is the appreciation that urban nights are a technologically mediated space; they are created, managed and maintained by artificial illumination. Further, urban night-time environments are not just technologically mediated, but socially mediated and constructed (Shaw, 2018). Meanings and uses are not essential but the product of social practices, imaginaries and narratives:

Although night is a natural phenomenon, night spaces are not. They are socially mediated. They do not exist prior to, or apart from, human practices and the attendant social relationships that seek to appropriate, even control, the darkness in its myriad human uses and meanings. However, night spaces are neither uniform nor homogenous. Rather they are constituted by social struggles about what should and should not happen in certain places during the dark of the night. (Williams, 2008, p.514)

Through design and policy interventions, such as channelling activities and routing or creating physical barriers, urban nights are continually mediated, with artificial illumination as a key tool (Williams, 2008).

Herein lies a fundamental tension intertwined with the very idea of street lighting. Our urban nights are created by illumination, an artificial space only accessible through our lighting technologies. The very act of illuminating our nights is thus an act of control and the imposition of a social order over the natural cycle of light and dark, night and day (see Melbin, 1987). The same technology that allows free movement through the city at night also acts as a form of surveillance, for good or ill. This is the underlying contradiction of streetlights: opening up the night also imposes control over it. We are, in some ways, trapped within our own techno-moral value conflict between a desire to liberate our urban nights without losing control over them.

Artificial lights carve tunnels and caverns out of the night, spaces in which we can operate as if it were day. . . . In another way, though, we are confined by light. We cannot wander outside of it unless equipped with night vision. (Dewdney, 2004, pp.96–7)

Dewdney goes on to compare our reliance on artificial light at night as akin to termites' need for humidity. For all their pervasiveness, termites are ultimately quite fragile to environmental conditions, and without airtight corridors will die in a matter of minutes.

Similarly, we require a larger colony to build the infrastructure, streetlights, and roads for individuals to use. We are prisoners of artificial light who cannot stray outside its perimeter . . . (Dewdney 2004, p.97)

In this conflict, we can also see Winner's (1980) theory of the political nature of technologies manifest, precisely his second form of politics. Winner's example of the Long Island Parkway overpasses is most often discussed as an example of how technical design choices can be used to enact political goals. But Winner also argued that some technologies are inherently political, that they require, or are at least strongly compatible with, specific social arrangements. It would seem that the infrastructure of street lighting is, at the least, extremely compatible with the quest for social order at night, which is itself derived from notions of public safety, which in turn requires surveillance over the public sphere. Considered from a Latourian perspective, the 'script' of a streetlight is

something like ‘I’m watching you’ (see Timan, 2013). Streetlights were, are, and will be intertwined with this value tension.

Designing for (or against) value continuity?

This article has explored the theoretical foundations and practical implications of designing for value change via a close look at a ubiquitous technology, but one that is often taken for granted – streetlights. Bettencourt (2014), in discussing the (potential) impact of big data analytics on urban planning, notes that such innovations – and in particular the speed at which analyses of problems or situations can be done – open new opportunities to address a myriad of urban issues. But he also notes that big data analytics simply provide a means and are not an end in themselves. ‘Data and technologies, then, do not create or solve urban problems so much as they enable people and social organisations to address them better’ (Bettencourt, 2014, p.17). Thus, Bettencourt holds that smart cities are best situated as an extension of old ideas and provide new precision to age-old problems within urban planning and design. Optimism aside, this article makes a similar argument, but at a conceptual level: that while smart streetlights offer new functions and levels of precision, they also embody a continuation of values that go back to the origins of public lighting. Contemporary critiques of smart lighting manifest a value tension inherent in the very foundations of public lighting and thus the sociotechnical infrastructure of street lighting. The goal of social order at night continues to shape lighting strategies, leading to a recursive conflict between surveillance and liberation with the streetlight as a prominent actor in this struggle.

The above argument, if accepted, asks us not to see smart streetlights as instantiating a change in value-level debates around public lighting; instead, it reveals a continuity of the (symbolic) role of lampposts in the public sphere. In overlooking these fundamental characteristics, contemporary discourse risks falling into old tropes and uncritically repeating old debates. Put more bluntly, current ethical and political debates are at risk of a failure of moral imagination in the sense of creating a space for constructive discussion and creative problem-solving. There exists within this critique the potential for reimagining the city at night and the role of streetlights therein, but only if we take seriously our civic past and the symbolism that our infrastructures embody such that they longer have any hold over us (Timmerman, 2012). In our streetlights, we see a conflict over control of the night centuries in the making. We now need a critical perspective that accounts for this inherited layering of values and asks if we can use this knowledge to rethink how and why (as well as when and where) we illuminate our urban nights. This, in turn, can open new directions for lighting policy and design, alongside a sober look at innovations that presume to alter – or worse, resolve – the uses of cities after dark. This could include a continued move away from hegemonic and homogeneous lighting and towards decentralized management practices and/or more diverse aesthetic and experiential considerations (Williams, 2008; Ebbensgaard, 2020; Stone, 2021b). Or, more radically, taking seriously speculative design proposals to abandon the streetlight entirely (e.g., PLDC, 2017). A great deal more work on the moral, political and technical feasibility of such proposals is a task for future research, but must consider the value tensions highlighted here.

Beyond addressing issues specific to urban lighting, this analysis highlights future research directions for the theory and methodologies of designing for value change. In conceptualizing value change, van de Poel (2021, p.28) notes that ‘changes in the understanding or interpretation of a value can occur while the value itself remains the same’. From this vantage point, one could argue that smart lighting is an instance of value change as the conceptualization of values (such as surveillance) has been altered by shifting socio-political developments and technological innovations. New technologies fitted into smart lampposts would thus fall into van de Poel’s taxonomy of value change, in that smart lampposts change the specification of certain value(s) via novel digital technologies (which in turn necessitate new value-sensitive design requirements). Yet, this would omit the fundamental entwinement of social order with street lighting and the symbolism imbued in this sociotechnical system. Further, this overlooks the continuity and recurrence of similar value conflicts within urban

nights, centred on the function and symbolism of the streetlight. This omission can have downstream consequences for how we frame value-sensitive policy and design innovations within public lighting; instead, understanding streetlights as embodying and manifesting a set of dynamic (but continuous) value conflicts can allow new and imaginative solutions to surface.

Methodologically, this analysis highlights the importance of taking an historical perspective, especially for layered systems, such as urban infrastructures. Understanding the history of values (and value tensions) can help elucidate and critique contemporary discourse and instances of supposed value change. Conceptually, it raises questions regarding the initial taxonomy of value change from van de Poel (2021), and if a conception of value continuity can be incorporated or accounted for, not as a static account of technology-value relations, but as a driver of the dynamic relation between society and innovations for a specific technology or infrastructure (see Boenink and Kudina, 2020; van de Poel, 2020). Finally, it can open explorations into how a typology of value change maps onto cities and urban technologies, which necessitate a refined approach to design for values and value-sensitive design at large (Stone 2021a). In sum, this article can be read on two levels – as a critical look at current debates and future directions for urban lighting, and as a first step in refining a conceptualization of designing for (or perhaps in this case, against) value continuity.

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