Light as material/lighting as practice: urban lighting and energy

Keywords

Light, lighting, public realm lighting, urban design

Introduction

Light is a messy material that spills, bleeds and interchanges promiscuously with adjacent materials and spaces, often uncontrollably and in ways that constantly escape planning and design. Artificial urban lighting, the focus of our attention, is the by-product of many other practices, which it reflects and extends into a social space: public light may arise from the headlights of cars, people switching on domestic lights, the glow of televisions, or civic infrastructural provision. Whereas urban lighting planning and regulation attempts to forecast the energy consumption of public realm lighting on a technical basis (and both cities and manufacturers attempt to implement new LED and digital control technologies on the basis of a reductive technological rationality), this article will use material from Configuring Light research on public realm lighting to argue that deciphering energy consumption really does require equal attention to the *material properties of light* and the interlinked *practices* through which social spaces come to be lit.

Our argument addresses these connections between materiality and practice. As a material, light has properties: it is a social material we all configure in everyday life and routine practices. In our homes we use overhead lights, lamps, possibly candles, etc., while lighting designers' practices draw on many tools and techniques to light public spaces. However, the materiality of light is often lost because light is quite abstract and, unless we are lighting professionals, we often fail to recognise or understand its materiality, or simply not reflect on it. Indeed, despite its pervasive presence, light is perversely invisible: we just flick a switch.

Understanding material and social lighting practices in an urban context is complicated by two dominant regimes for acting on light that tend to be split off. On the one hand, light is routinely treated as a purely technical matter, as an economic and

environmental cost that is subject to purely material calculation in terms of measurable quantities of light at a specific cost per unit. This approach is encapsulated in the idea of standards: standards schematise social practices and spaces into conventional forms for which minimum lighting levels can be recommended (Busch, 2011). These standards are then introduced, uniformly, in myriad settings as if they were scientific and universal, often ignoring the many different forms of social life in which they are implemented. Indeed, some of the blandness of lighting in many city streets and public spaces (ugly masts, too bright and flat lighting, for examples) comes down to this tendency to impose a single standard of lighting on to spaces uniformly, regardless of the variations of social life that might actually characterise these spaces or streets. For example, a pedestrianised shopping street in a city like Derby (see our study, Entwistle et al, 2015) does not have to be blasted with light ramped up to 'motorway standards' from inhumanly tall masts in order to make the space safe and secure; it is normally more effective to attend to the ways in which specific types of social actors use and interact in this space and how lighting can support their practices.

On the other hand, and conversely, especially in city branding and place marketing practices within and without municipal governance, light is routinely and increasingly treated as an aesthetic matter. Place-marketing strategies of this ilk tend to reduce the material properties of light to sensuous imagery, 'to-be-photographed' spaces for city brochures. As critiqued by Julier (2005) these images display a familiar concern with architectural form and 'landmark buildings' found in many similar place branding materials. As Lee (2014) argues, drawing on Taylor (1988), the emergence of the skyline as a favoured perspective in nineteenth-century New York has to do with how people began to approach the city by rail and road. Generally, then, this imagery is concerned with the city from a distance, a photogenic perspective, 'as seen from Marina Bay', or from any of the high-rise hotels, condominiums and office towers skirting the city. This distinct perspective is meant to be both experienced and photographed, a memorable 'image of the city...' (Lee, 2014, p 147).

The potential of light as 'affective' material cannot be denied (Edensor, 2012; 2017) and is one reason why light festivals – such as *Glow* in Eindhoven, *Fête des Lumières* in Lyon and *Vivid* in Sidney – are proliferating around the globe. Yet the problem here is that the material properties of light are reduced to representations that standardise the city or place identity, and are often treated as part of spectacular display rather than everyday practice: lighting is once again separated from the actual social practices of diverse people who use that place.

This duality – light is either a technical or aesthetic matter – divorces lighting and its energy costs from social practices. Generally, lighting immediately becomes an economic and technical equation to be solved within a functionalist and technocratic framework. This tendency is increasing with the technological shift towards LED and 'smart' lighting systems. For example, municipalities widely cite energy cost savings of up to 85 per cent (eg, The Climate Group, 2012) to be achieved by implementing LED streetlighting, projections that are based mainly on the cost per lumen technically required to produce the same light levels as older technologies. This ignores the actual social patterns of energy demand, some of which are generated by the technology itself. There is a healthy, if as yet unresolved, debate about the 'rebound effect', for example, whereby the very cheapness of LED running costs leads cities to install far more and far brighter lights than required, thereby squandering the energy gains made on a purely technical basis (Tsao & Waide, 2010; Jenkins et al, 2011; Schleich et al, 2014; Winther & Wilhite, 2015) (see also http://advances.sciencemag.org/content/3/11/e1701528). Lighting designers (in our research), as opposed to planners and engineers, tend to be sceptical about gains over older technologies, particularly since their focus is on the lowest light levels needed to support social practices. Indeed, lighting designers have a host of strategies for lighting in energy efficient and aesthetic ways that cut across the dominant schism by virtue of an understanding of the special material of light and what it can do in social space. In other words, what we have found is that energy and economic cost is actually all too visible, even obsessive, in lighting planning; what gets obscured are the social issues and the ways designers can design with the social in mind. Our research would suggest that debates about energy tend to result in technocratic 'solutions' that miss out the fundamental point of all energy use and consumption: how it is practiced, socially embedded and used. Therefore, to unpack all this we need to examine precisely what sort of material light is and also what we mean by 'social practices'.

Firstly, light is a relational material. We do not perceive light directly but only in the ways it interacts with other materials and surfaces – by reflecting, colouring, texturing, shadowing and so on. To even begin to calculate what levels of lighting and energy are desired, the designer has to consider the workings and interactions of all the material surfaces in a space as they are assembled through diverse and overlapping practices.

Secondly, light has a fluid quality that makes it difficult to control, and which makes the very idea of lighting design and planning a bit of a fiction. Lights spills and bleeds outside of its intended area, flooding adjacent spaces, overlapping with neighbouring designs and schemes. Light wreaks havoc with the idea of a lighting master plan, which is easily disrupted by a shop's bright signage or a passing car, or other planning decisions taken, as happened in our study of the lighting masterplan of Derby city centre. The same day the lighting designers delivered their master plan to the Council they were told that the Marketing Derby office were about to install huge LED screens along the ring road around the city centre which would bleed out vast levels of light, undermining their careful lighting plan. This bleeding plays a significant part in the ratcheting up of light levels in cities: an over-lit area casts adjacent spaces into comparative darkness, making them feel too dark and thus 'unsafe', and putting pressure to increase their lighting in order to compete. In energy terms, this lighting 'arms race' is clearly unsustainable, as well as detrimental to human and animal well-being.

Thirdly, the relational and fluid qualities of light are compounded by the fact that most lighting arises as a by-product of social practices which are not intended as 'design' or 'planning': people switch on lights to do stuff in their homes, illuminating the street outside, while car headlights and street and shop signage are part and parcel of the mix of private and public social practices with light that combine in myriad ways with the practices of councils and planners in their streetlighting and safety regulation. More than simply disrupting plans and designs, we've come to think of all this lighting as related in an 'indexical' way to the practices that give rise to them: the lighting that makes up a scene arises as a by-product of practices which it supports, while at the same time structuring the relationship between that practice and adjacent ones.

Fourthly, if lighting is relational, fluid and indexical, then it is more like a temporal event than like a material structure, and lighting designers use a language that is often quite theatrical: lighting involves narrative, pathways, scenes, transitions and so on. Lighting designers, as opposed to, say, architects, understand space as *emergent*: a space is lit in terms of complex and largely uncontrollable relations between many different materials, spatial zones and social practices that rely on, and often produce, light. Designers generally talk about ensuring that a space 'works', that the lighting should make the space navigable, legible, convivial, safe and so on. This also tends to focus attention squarely on what people are trying to do in a space, and the conflicting things they may be up to, and giving a material order or cultural form to the space in which those practices are carried out.

What does all this mean for energy consumption? It is notable that every lighting designer we've worked with has not only been committed to installing *less light* and working with more darkness but routinely characterised their relationship with clients as a struggle to 'light less but more intelligently'. We take this to mean that a lower energy approach to public lighting needs to work not only through the social practices it is meant to sustain, rather than hiding the social behind the technical or aesthetic; it must also work through a knowledge of the material properties of light as they are understood by designers to structure a social space. Lighting designers have at their disposal a range of techniques and strategies that involve lowering the light levels, lighting strategically to mark out socially significant features in a space (a tree, a statue, and so on), to increase legibility and navigability of that space in ways that make it feel safer and more secure. Such lighting is designed for the space, much like a stage design, as opposed to a technically engineered lighting solution of whacking up a bright light, as is so often the case when public lighting is merely engineered. Contrast the two pictures of Museum Square in Derby (see Figures 1 and 2). The top image demonstrates the 'motorway lighting' discussed above, a large, bright overhead mast blasting down bright light and casting the surrounding areas in relative darkness, making the space illegible. The picture below is an image of the lighting designers Speirs+Major's public mock-up for the city council and public, showing how the square could be lit with the same lux/lighting level but in a more even and socially meaningful way that picks out the features in the space and therefore make it more legible and navigable: both lighting scenes involve the same energy cost.

Figure 1

© James Newton/Speirs+Major

'Motorway lighting' at Speirs+Major lighting demonstration, Derby

Figure 2

© James Newton/Speirs+Major

Distributed and atmospheric lighting at Speirs+Major lighting demonstration, Derby

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Demonstrating the significant properties of light to various publics (councillors, interest groups, businesses, residents, 'general public') is an important way lighting designers communicate their knowledge to clients to show the material properties of light in public space, evidencing ways to light differently and 'more intelligently' and demonstrating how lighting can support everyday practices within a social space. Making the space 'work' better through lighting, for any reputable lighting designer, will always mean working in an energy efficient, or 'energy sensible' way; working with and through very specific but complex material properties and social flows.

Designing lights in Colombia

To flesh out our argument, we draw on a recent research project in Colombia, where we collaborated with Ove Arup's global lighting group on a pilot research and lighting installation project in Cartagena, Colombia called Smart Everyday Nighttime Design.[1] The concept was firstly that 'nighttime design' needs to be treated as a specific design discipline with its own problems and solutions. Secondly, the project was premised on looking for small scale design interventions rather than big and pervasive infrastructure – small designs that could be rolled out iteratively across a neighbourhood. Thirdly, the designs set out to promote community engagement, not only in consultation, but also in allowing people to customise and choose lighting variations and then to mount them at a human scale. (See Video 1 for a short film documentary of the project. See also Arup, 2015; Arup global research, 2016.)

Video 1

© PLANE—SITE

Smart Everyday Nighttime Design is an interdisciplinary research project spearheaded by Arup, with Leni Schwendinger and the support of the London School of Economics, Universidad Jorge Tadeo Lozano and Despacio, iGuzzini, and Findeter, documented by PLANE—SITE

A photograph of Plaza Trinidad (see Figure 3), the main gathering space in our particular neighbourhood, Getsemaní, illustrates all the properties of light discussed above; relational, fluid, indexical and emergent over time and through practices. The energy use literally pulses with the life of the inhabitants, recursively reflecting it and supporting it: the lit scene is an assemblage of a vast array of interacting lighting practices, including municipally-provided sodium lights on extremely tall masts; commercially provided restaurant lights and signage; moving car lights from both private cars and taxis; bright neon from food and drink stalls run on pirated electricity; shadows (prized above all by lovers, drinkers and criminals) provided by broken lights, blind-spots, physical barriers and dimmed church lights after mass; and we can add myriad little lights such as upper storey domestic windows and lots of little smartphones (including screens, flashes and torches). On the one hand, one can look at this picture as typical failed infrastructure in the Global South, a mess of cables and chaos, unregulated, un-designed and malfunctioning, with attendant waste of energy and other scarce resources. On the other hand, what all our interviews showed was both a love of the resulting atmosphere (a love shared by otherwise diverse and often conflicting social groups) and – at the same time – an ability to read the chaotic output of all this lighting as a coherent and interpretable pattern. As one interviewee said, sitting in that scene, behind the umbrella on the right: "We all know where to put ourselves." Thus, rather than look at this scene as 'failed' and chaotic (and to be corrected *technically*), we can see instead an informational ecology: the lighting provides a wealth of information through which materials and practices can interact and mutually orient themselves. Put otherwise, the main Arup designer, Leni Schwendinger (then Arup's global urban lighting lead), when she arrived here simply said, maybe we shouldn't design anything, because "we could only screw this up". Her reaction acknowledges that any design intervention aimed at energy issues is an engagement with a complex information system that both emerges from and in turn supports complex ways of life; and it needs to be an engagement with that material-semiotic complexity rather than merely the technical (or aesthetic) portions of it.

Figure 3

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Chaotic lighting and sociability in the Plaza Trinidad, Getsemaní district of Cartagena, Colombia

There is no intrinsic reason why the chaotic lighting of Plaza Trinidad should be any more or less energy efficient than some of the high-tech and 'designed' lighting solutions that could be imposed as part of urban modernisation in the Global South (see Figure 4, depicting a standardised 'modern' mall just around the corner from Plaza Trinidad). What can be asserted confidently is, firstly, that any realistic assessment of energy efficiency in a lit scene needs to take account of *all* the practices that generate and demand lighting. The wider social 'chaos' will not and in fact should not go away. Secondly, that therefore an intelligent approach to lighting needs to look at the informational ecology of the social space, the way in which material properties of light and ongoing social practices can interact in ways that support a social life in energy efficient ways. To go back to the designer's response (and the eventually proposed lighting design, discussed below), this may require us to build on the existing forms of lighting provision, however chaotic, rather than relying on purely technical calculations of energy saving (standardised infrastructure models simply modified to use low-energy LEDs) and rather than moving to a purely 'aesthetic' understanding of the space unrelated to the social life that generates its atmosphere.

Figure 4
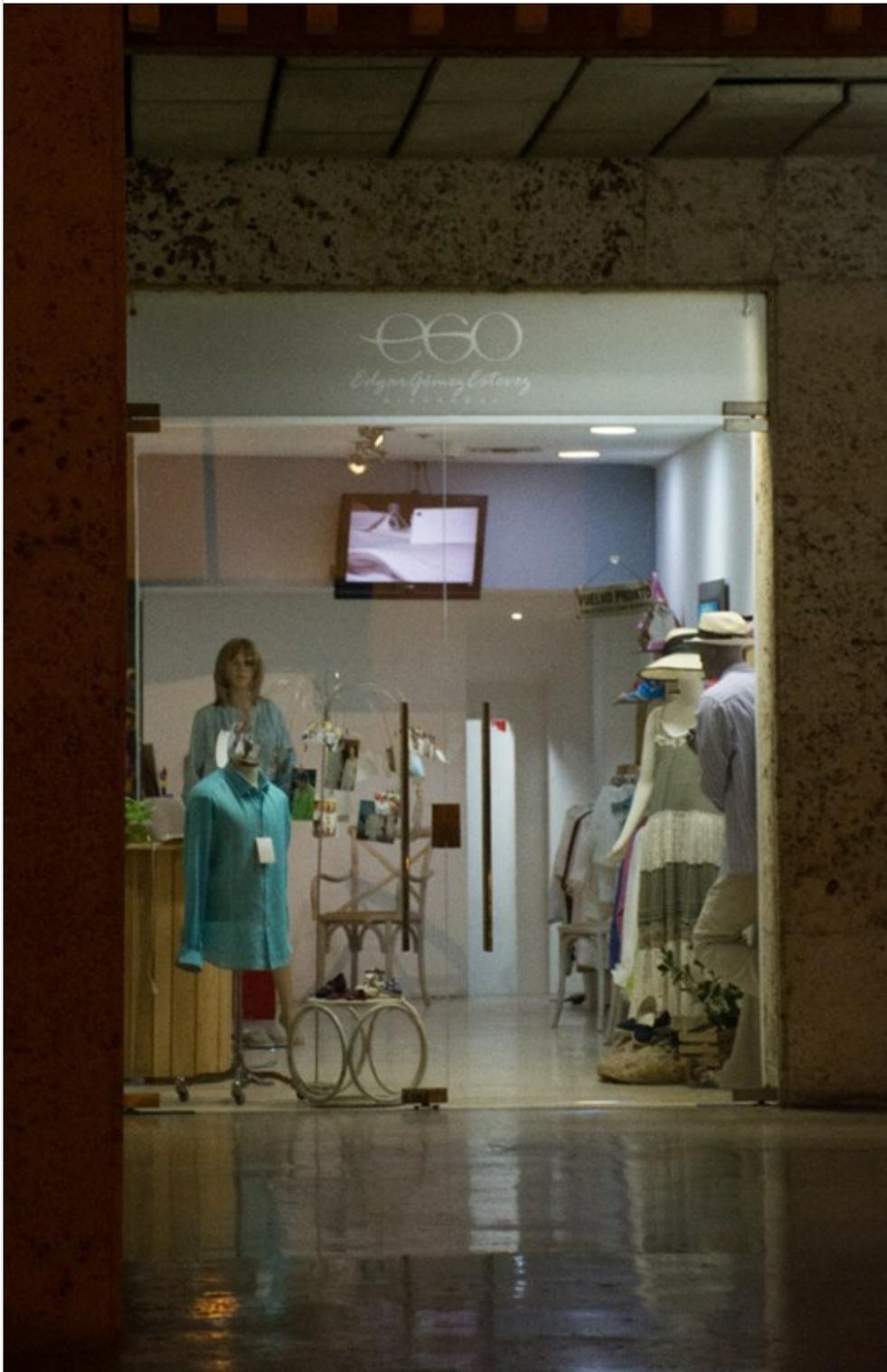
© Don Slater/Configuring Light

Standard shopping mall lighting in Getsemaní

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This logic of working with the indigenous informational ecology (rather than simply replacing it with a 'modernised' lighting infrastructure) informed the design and research project. We found that the 'chaotic' qualities of light were crucial to ways in which people used their spaces more generally. Above all, because light is relational, fluid, indexical and emergent, it does not

respect common boundaries between public and private, municipal and domestic energy use: public and private lighting had to be treated as an integrated system, as a single and integral ecology. Approaches to energy consumption that divide into public and private costs miss the ways in which energy demand is assembled.

To give an example: the original project brief for the Smart Everyday Nighttime Design programme was to produce lighting interventions for street-corners and doors. These assumptions (largely drawn from New York City where some of the designers came from) was that these are crucial and repeatable urban morphologies that are suitable for promoting an atmosphere of conviviality, gathering, welcome, hospitality and so on. The problem was that Getsemaní, as we discovered after the first few hours of fieldwork, had neither street corners nor doors that played a significant role in the ways sociability was performed. Firstly, the neighbourhood barely had pavements, and the meeting points of streets were rarely meeting points for people. Rather, sociable gathering (outside of the main square) was spatially organised through the distribution of little pools of light around doorways, with people sitting on plastic chairs or the front steps of their houses (see Figure 5). Hence, *doors* were socially unimportant (and in any case they were mainly open if there was anyone home) while door*ways*, on the other hand, were utterly crucial to nightlife: the little pools of light for sociable gathering were mainly defined by light spilling through the grilles that covered the doorways, light coming from internal room lights and flickering televisions. The boundary between inside and outside was drawn differently from up north, with people sitting in their front rooms as if on the street, or sitting in groups on the street lit by their front rooms.

Figure 5

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The distribution of lighting and sociability on a residential street in Getsemaní

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Crucially, the lights and shadows thrown by interior lights were an integral part of the streetlighting and its atmosphere, as well as central to the informational system by which people spatially distributed their sociability and by which they navigated the streets and decided which streets were safe or welcoming (it is also worth noting that Cartagena, as Colombia in general, had only gradually been emerging from the decades-long 'Violencia', an ever-present memory of these streets as incipiently fatal). This meant that the relationship between public and private, civic and domestic energy use was not just complicated and

interdependent: public and private lighting really had to be treated as one integrated system, as a single and integral ecology. People were clearly concerned about the distinction between public and private energy costs: when we asked people about who should provide lighting on their street, they answered that the council should be providing and paying of course, followed by typical and entirely justified complaints about the quality of municipal provision, as well as detailed narratives of provision failures like broken lights and power outages. Therefore, as some interviewees said, as they gathered in one of these pools of light, we contribute our own lighting and pay for it because otherwise we could not sit outside and people could not use this street. They then went on to a describe how their own domestic lights from their living room and the surrounding ones – civic masts, car headlights, shop signage and so on – worked together to construct the gathering scene that they enjoyed every night, and how the placement of themselves and their chairs related to the overall assemblage of lighting. Their own discourse clearly connects up material properties of light and its cost with the social patterns of life they were trying to sustain.

The methodology for this programme was crucial. Firstly, the multidisciplinary team included a social research team comprising a sociologist (Don Slater) and an anthropologist (Laura Mendoza) who were supported for two 10–14 day stints of intensive fieldwork, in which we were able to interview and observe an extensive range of stakeholders, and map out the social practices of local spaces (particularly the Plaza Trinidad and surrounding residential streets) in considerable detail. Secondly, a team of spatial analysts based in architecture and urban planning were able to carry out a detailed spatial mapping. And, finally, the lighting designers on the team were able to both raise social and spatial issues, and to respond to research findings in their own terms. This team and programme was, unusually, sustained across two years allowing for extensive dialogue, and iteration, between social, spatial and design thinking. Based on this kind of fieldwork and dialogue, the Arup designers sought to avoid 'screwing it up' by working with the relationship between this indigenous assemblage of lighting provision, the sociable practices of diverse users and the night time atmosphere that was so valuable to diverse urban stakeholders.

The design strategy that evolved from this research approach was to take up the well-loved lantern form, which is associated with a range of traditional street forms but also provides lighting that is human scaled, wall-mounted to relate to personal interactions, and producing pooled lighting rather than uniform coverage. Moreover, these lanterns could be customised by residents both in terms of colours and patterns and in terms of positioning. We piloted these lanterns through a public engagement event in one of Getsemaní's streets, as shown in Figures 6 and 7, below. The installation looks very different from typical lighting master planning exercises and infrastructure demos mainly because it is so *dark*. But that darkness clearly doesn't arise from either technical energy saving calculations or place-making aimed at aesthetic moodiness (and, in fact, the pilot lanterns actually produced requisite brightness levels, meeting normal standards). It came out of the stories that people told us about the relationships between the material properties of light and the forms of gathering that they valued. And it was very popular.

Figure 6
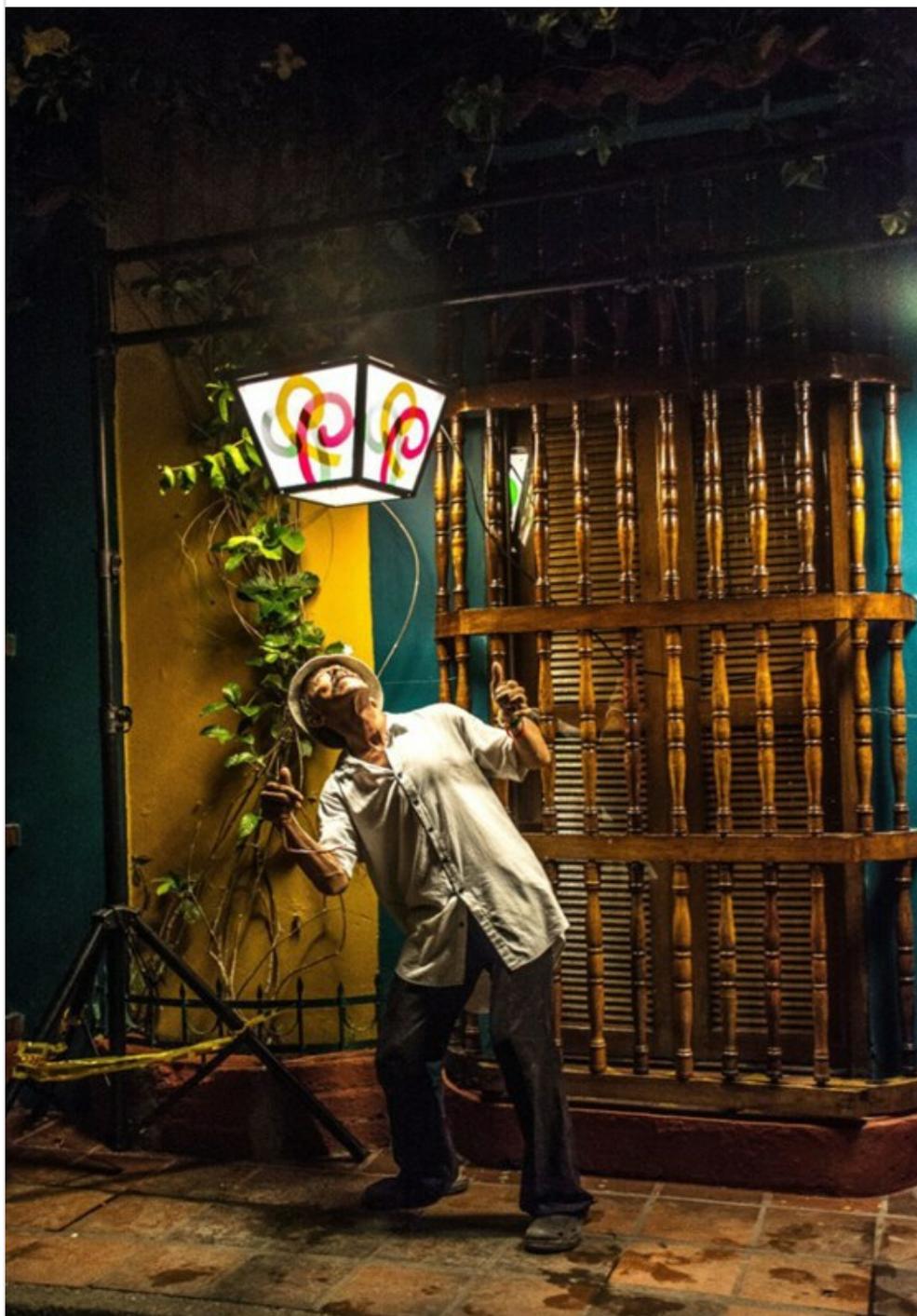
A customisable lantern design for human-scaled lighting

Figure 7

© Don Slater/Configuring Light

Pilot lighting installation in Getsemaní aiming to work with vernacular patterns of sociability

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Conclusion

Light, as material, is complex stuff which is perhaps less easily manipulated and designed than other materials, yet it is also a material routinely shaped and configured in ways that blend a multitude of social practices by lighting professionals and by all of us non-professionals. There is, in fact, more overlap between public and private, professional and non-professional, when it comes to light than one would expect. Discourses around public lighting, especially concerning headline-grabbing issues around energy consumption, light pollution and sustainability, have a predictable pattern to them, referencing the potential of technocratic solutions, new 'smart' lighting, LED technology, to 'solve' energy problems and manage use and consumption. However, as we've discussed and illustrated through our empirical examples, until the particular qualities of light as material are acknowledged, and lighting is understood as embedded within a wider analysis of social practices, such top-down, technocratic solutions are unsatisfactory. They fail to understand the ways in which light behaves in space and how its unruliness cannot be planned away; they are also potentially damaging to the social life they seek to illuminate if they impose a set of universal standards, generated from algorithmic protocols, that diminish or destroy the nocturnal life that happens on the street; plans can and do 'screw it up'.

In the sociological perspective we've developed in the Configuring Light programme, the aim is to return to the social world that is being lit in order to understand how lighting is used, and how it facilitates practices, and our concern is both with everyday, non-professional users and the practices of lighting designers. What we try to bring to the table are social research methods that attempt to capture the everyday social practices in space to ensure that lighting designers understand and design for them. Energy use and consumption clearly form part of this overall picture but are not the sole focus of attention; by helping

designers to understanding social space better, and by working with communities and stakeholders to help them understand light better, we aim to promote a wider conversation on light and lighting that takes energy use and consumption as part and parcel of materials in practice.

Tags

- Science and society
- Public engagement
- Twenty-first century
- Material culture
- Energy

Footnotes

References

1. Arup, 2015, *Nighttime Design: Principles and methods*
2. Arup global research, 2016, Community-focused night-time lighting design http://research.arup.com/projects/smart-night-time-design-principles-and-methods/#impact.
3. Busch, L, 2011, *Standards: Recipes for reality* (Cambridge, Mass: MIT Press)
4. Edensor, T, 2012, 'Illuminated atmospheres: anticipating and reproducing the flow of affective experience in Blackpool', *Environment and Planning D: Society and Space* 30 (6), 1103–1122
5. Edensor, T, 2017, *From light to dark: Daylight, illumination, and gloom* (Minneapolis: University of Minnesota Press)
6. Entwistle, J, Slater, D and Sloane, M, 2015, 'Derby', in Isenstadt, S, Dietrich Neumann and Petty, M M (eds), *Cities of Light: Two Centuries of Urban Illumination* (New York: Taylor & Francis/Routledge), pp 159–164
7. Jenkins, J, Nordhaus, T and Shellenberger, M, 2011, *Energy Emergence: Rebound & Backfire as Emergent Phenomena*
8. Julier, G, 2005, 'Urban designscapes and the production of aesthetic consent', *Urban Studies* 42 (5), 869–887
9. Lee, K-W, 2014, 'Feeling like a State: Design Guidelines and the Legibility of "Urban Experience" in Singapore', *International Journal of Urban and Regional Research* 38 (1), 138–154
10. Schleich, J, Mills, B and Dütschke, E, 2014, 'A brighter future?: Quantifying the rebound effect in energy efficient lighting', *Energy Policy* 72, 35–42
11. Taylor, W, 1988, 'New York and the origin of the skyline: the visual city as text', *Prospects* 13, 225–248
12. The Climate Group, 2012, *Lighting the Clean Revolution: The rise of LEDs and what it means for cities* https://www.theclimategroup.org/sites/default/files/archive/files/LED_report_web1.pdf
13. Tsao, J Y and Waide, P, 2010, 'The World's appetite for light: empirical data and trends spanning three centuries and six continents', *LEUKOS* 6 (4)
14. Winther, T and Wilhite, H, 2015, 'An analysis of the household energy rebound effect from a practice perspective: Spatial and temporal dimensions', *Energy Efficiency* 8 (3), 595–607

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