Design Practice as Fieldwork, Describing the Nocturnal Biome Through Light and Sound

Rupert Griffiths

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Abstract. *Human and non-human behaviours are regulated by cycles of light and dark, while many such behaviours can be detected through sound. This article asks how we might use recordings of light and sound to make the nocturnal urban environment meaningfully legible as a more-than-human biome. It reports on several prototypal methods that bring together art/design practices and fieldwork techniques. The aim of this ongoing work is to raise awareness of the night as an ecology, communicate the multiple temporalities characteristic of a healthy biome and provide tools that can inform responsible urban design interventions that improve the quality of the night from a more-than-human perspective.*

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Introduction

The night time ecology of the urban environment is of great importance to humans, flora and fauna. Yet, when thinking about the quality of the urban environment, the night is often overlooked, and, for many of us, the ecological dimension of the city recedes from view for much of the period between dusk and dawn. Synthesising fieldwork and creative practice, this article considers prototypal methods of bringing into shared public view the often-invisible rhythms of the nocturnal environment – particularly those of biological cues, in this case light, and the corresponding activities of human and non-human life.

Many aspects of the behaviours of humans, flora and fauna are regulated by light (Fonken & Nelson, 2014). Before widespread artificial lighting, the predominate sources of light were the rhythmic cycles of sunlight and moonlight. In contemporary urban and non-urban environments, the anthropogenic contribution of light at night is considerable. This can influence human behaviours, and indeed is often designed to do so, as well as affecting health and wellbeing. Artificial light allows us to work longer, feel safer and express our cultures. Meanwhile, it is also associated with depression, insomnia, cardiovascular disease, and cancers (Chepesiuk, 2009). Similarly, it significantly affects non-human life (Rich & Longcore, 2013), often in unplanned or unacknowledged ways. It disrupts the circadian clock that regulates the physiologies of most organisms (Fonken & Nelson, 2014), affecting, for example, the adjustment of trees to seasonal variations in light, which affects animals and insects that depend on them. It disrupts foraging and predation, altering the balance of ecosystems, and it confuses birds, disturbing migratory routes or causing collisions with buildings (Longcore & Rich, 2004). It is clear that these issues cannot be considered in isolation – an approach that considers the environment as a more-than-human ecology would be more appropriate.

Although there is a large body of research regarding the effects of anthropogenic nocturnal light upon both humans and non-humans, research tends to be focused in narrow disciplinary silos – few studies consider the human and non-human dimensions of light together or the interdisciplinary collaboration required for such an approach (Kyba et al., 2020). This is, in part, because the night tends to be largely ignored as a habitat in the social sciences (Edensor, 2017), and approaches to artificial light tend to be dominated by issues of human safety, security and cost. Furthermore, despite the abundance of data available in our daily lives, we know relatively little about our immediate environment, particularly the nocturnal environment (Dunn, 2016). There are few methods for describing the nocturnal environment as a biome, particularly when considering the broad audience of stakeholders within urban environments.

An Applied Poetics of Data

New methods are needed to capture and communicate the qualities of the nocturnal environment in a language that can speak to diverse groups and interests. This paper proposes an approach – an applied poetics of data – that collects and disseminates environmental data in ways that extend the imaginative framework through which the night is perceived, particularly as a more-than-human (Whatmore, 2002) ecology. This approach does not seek to instrumentalise data, but rather to engage an audience in the spatial, temporal and imaginary realms that emerge through the multitude of biological, meteorological, geological and cosmological processes that we are held within. This approach is concerned with what Whatmore describes as "rhythms and motions of inter-corporeal practices [which] configure spaces of connectivity between more-than-human life worlds" (p. 162). It emphasises the topological over the topographic – i.e. relation over proximity – and is intimate and affective in its concern with the interrelations among life and land and how these emerge as a shared ecology.

Art and design practices, such as David Bowen's *Telepresent Wind*[1], Thijs Biersteker's *Symbiosia*[2], Zach Poff's *Pond Station*[3], or Jem Finer's *Score for a Hole in the Ground*[4], are examples of how environmental data can be transformed into visual and material forms of poetry that give observations, ideas and affects mobility. Through sensory experience, such works encourage people to inhabit both real and imaginary dimensions of the environment. This is valuable when considering a more-than-human perspective that cannot be directly perceived through human eyes but can, to some extent, be inhabited imaginatively. Such practices offer a template for communicating environmental data in a compelling manner that acknowledges both human and non-human sensoria, experience and agency. They move away from the instrumental æsthetic representations of data visualisations towards poetic expression (see Koblin, 2012).

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*1. Using sensors and actuators, the movement of a dried plant stalk in the wind at an outdoor location in Minnesota is replicated in real time across an installation of dried plant stalks in a contemporary culture centre in Bilbao (*https://www.dwbowen.com/telepresent-wind*)*

*2. Biersteker collaborated with professor Stefano Mancuso to create an artwork that reveals the symbiotic relationship between trees and their communication in relation to climate change (*https://thijsbiersteker.com/symbiosia*)*

3. Pond Station *is a modular platform that monitors and transmits data related to the hidden activity of a freshwater pond in New York (*https://www.zachpoff.com/artwork/pondstation*)*

*4. Finer installed a camera in a tree and left it recording for two years, capturing 18,000 photographs as the view transitioned through the seasons. Lying somewhere between a film and a photograph, Still is a generative sequence of these images composed in real time such that every viewing of the work is different (*http://www.scoreforaholeintheground.org*)*

The former has a specific message – the data visualisation Show Your Stripes[5], for example, intuitively and urgently communicates the increase in global temperatures that has occurred since 1850. Meanwhile, the latter seeks dialogue and reflection with and among its audience – for example, Jem Finer's Score for a Hole in the Ground gives us a nuanced, embodied and open-ended engagement with the environment. The former strategy assumes us to be instrumental consumers of data, whereas the latter assumes us to be participants in the process of observation and interpretation – more akin to Ingold's understanding of landscape as dwelling (Ingold, 2000). This approach asks us to use our bodies and senses to inhabit the environment physically and imaginatively and our relationship to it. Such works also encourage us to become attentive not only to spatial and temporal dimensions of the landscape, but also that which is not captured by data, the excess that escapes description (Dewsbury et al., 2002). This paper is concerned with these types of approach.

Methods

There are a number of methods I am experimenting with in this vein. This article will briefly describe two and provide illustrations of each before going on to discuss the longer term aims. The examples presented here was mostly recorded close to Glasson Dock, which sits on the River Lune estuary in Northwest England. One method records the variation of visible light over the night and day, while the other records variations in wide-spectrum sound. The underlying rationale is that light is a driver of behaviour in the environment, whereas sound is a proxy for behaviour.

The first method uses a lens-less photographic technique that combines stop-frame animation and slit-scan photography to record changes in ambient light over time. Figure 1a shows a four-hour period over the transition from day through civil, nautical and astronomical twilight and into night. This light recording can be considered as a datum against which to read behaviour – a datum that is perhaps more obviously associated with non-human than human activity. The image, reproduced in greyscale here, is constructed from several thousand still colour-field images of the night sky. As can be seen, the sky does not begin to become truly dark until almost two hours after sunset (the 6 o'clock position). The colour images show an amber hue, which persists into the night, caused by sky glow from various anthropogenic sources, including the dock, the nearby city of Lancaster, the nuclear power station at Heysham and the marina itself. This technique can also be extended to longer periods. Figure 1b shows a 24-hour recording made in Beijing during the spring equinox in 2018.

The second method employs radial sonograms to show human and non-human behaviour in the environment. Sonograms visually represent sound frequency as a function of time and are used by soundscape ecologists, for example, to evaluate the health of natural biomes (Pijanowski et al., 2014). Energetic biological, meteorological, technological and occasionally geological events all cause disturbances to the air, and sound can thus be used as a proxy for such environmental activities. Sonograms of short periods – a couple of seconds – can be used to identify specific bird or insect calls, while much longer recordings of hours, days or weeks tend to show the accumulation of events in an environment and their rise and fall over time according to the various processes that guide them.

The sonograms shown in Figure 1c and d show the same four-hour period as Figure 1a. These have been rendered radially rather than the usual linear format to emphasise the rhythmic nature of behaviour and behavioural cues in the environment. To encourage a relational reading over one of absolute measurement, labels, scales and grids

5. *See at:* https://showyourstripes.info/

have omitted. The first sonogram shows frequencies that extend beyond human hearing (approximately 20 Hz to 20 KHz) into infrasonic and ultrasonic frequencies (3 Hz to 96 KHz). The second shows a much narrower band of low frequencies (3 Hz to 300 Hz). These emphasise different aspects of behaviour in the environment. In Figure 1c, the infrasonic calls of an insectivorous bat species (Nyctalus noctula) can be seen, way beyond our hearing range. These start around the 1 o'clock position, as dusk falls (see Figure 1a), as mating swarms of midges appear above the water. In contrast, Figure 1d shows sounds of a predominantly anthropogenic technological source – engines and motors, the hum of electrical transformers, automated systems and electronic signals. Many of these sounds tend to go unnoticed, being either filtered out by the brain or simply below the threshold of hearing. However, the sonograms make it clear that as night falls, human activity continues unabated.

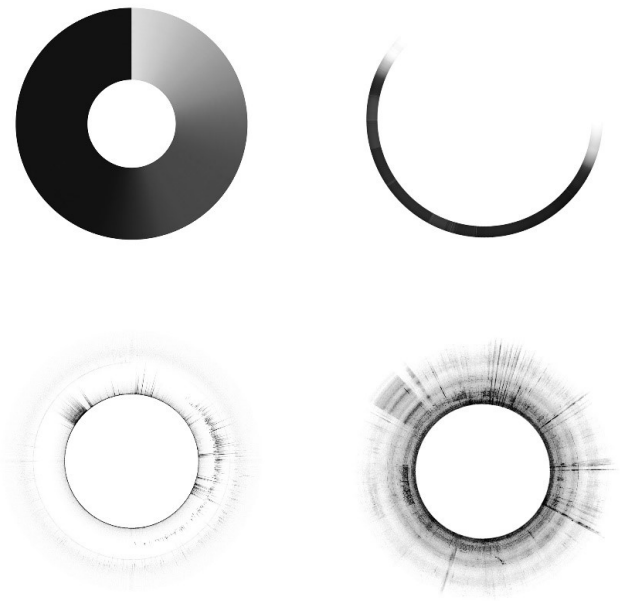

Figure 1. Left to right, top to bottom: (a) Light recording, dusk, Glasson Dock, Northwest England (19:45 to 23:05, April 16, 2020) (b) Light recording, vernal equinox, Xisi, Beijing, (solar noon to solar noon, 2018); (c) radial sonogram, Glasson Dock, 3 Hz to 96 KHz (19:45 to 23:05, April 16, 2020); (d) radial sonogram, Glasson Dock, 3 Hz to 300 Hz (19:45 to 23:05, April 16, 2020)

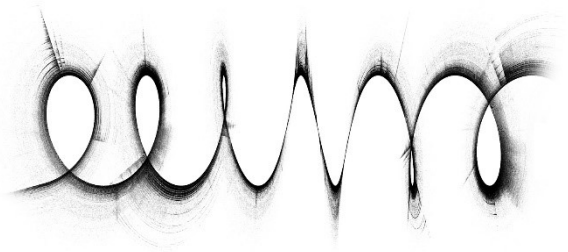

Figure 2. A proposed helical sonogram aims to capture the periodicity of events at particular temporal scales, such as circadian, weekly, circalunar, or monthly © Rupert Griffiths

Coda

These brief descriptions are intended to give an indication of how an applied poetics of data might begin to manifest in practice. A longer-term aim of this research is to develop a suite of methods and techniques that communicate such data through objects and materials as well as images. Future work will also record and communicate much longer periods – from days, weeks and months to years – to bring out the many rhythms in urban environments and the processes that drive them. Figure 2 shows a prototype of a continuous recording process. This is currently implemented in JavaScript, capturing a live stream from a microphone and recording it as a helical sonogram shown in three-dimensional space. The circumference of the helix can be changed to match particular periods – with long enough recordings, it could be adjusted to a diurnal, circalunar or various anthropogenic periods. Future iterations and additions to the toolkit will capture other dimensions of light and sound, such as ultraviolet and infrared light and variations in the polarisation of light over time. It will also align them with perambulatory methods that take an audience into the landscape (Drever, forthcoming; Dunn, 2016). This will articulate an expression of the urban biome that acknowledges our human sensorium and its limits in understanding what concerns our non-human companions.

In summary, the aim of these methods is to use recordings of environmental data to physically and imaginatively engage an audience in the environment as a more-than-human ecology – to facilitate a chimeric stance (Haraway, 1991). Such works also encourage a view of the environment that sits at an intersection between lived experience and timescales that extend beyond the day to day, acknowledging a more-than-human understanding of temporality that embraces the bio-, geo- and technological.

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