

Co-evolution: Cityscapes, Lights, and Us

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Abstract

I propose to address the design development of the urban nightscape as a co-evolutionary process, by drawing lateral connections between current research on urban, lighting and visual systems. A complex context, urban space lies in the interstices of the built environment, and our experience of it is layered, sequenced, and plastic. For instance, I will illustrate how new paradigms in the cityscape ("kit of parts" and "shared space" planning strategies, architectural and commercial "light-tech envy" etc.), "wirelessness" in the sustainability narrative,

and adaptive behaviors to lighting (in urban black-outs, contrasted cultures etc.), challenge our designs for visual order versus chaos. I will also investigate how novel lighting technologies, controls, and visual efficacy (e.g. variance in spectral power distribution versus color temperature, brightness and mesopic vision) could modulate our light at nighttime. My findings about what whole can emerge from these multidisciplinary parts will not be exhaustive nor prescriptive, but rather indicative.

Keywords:

lighting design,
urban nightscape,
evolution, light pollution,
sustainability

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Pictures and graphics

I. From Google Earth: Phoenix, USA. 8 July 2006.

II. From Google Earth: Gongqing, China. 8 July 2006.

III. From Google Earth: Caracas, Venezuela. 8 July 2006.

"In [...] the pure research area, three topics deserve attention. The first is mesopic vision!"

Boyce 519

Time - at an evolutionary scale - will tell if Homo Sapiens, ill-equipped for lengthening its days, might eventually mutate eye receptors better suited to nocturnal life. Other species have nurtured luminescence² meanwhile we have accessorized light. Our habitat has grown urban: "[...] movement towards cities is growing at three times the rate of population expansion worldwide. [...] in ten more years roughly two thirds of humanity will live in the cities" (WRI³, 1996). As UNEP's Executive Director Achim Steiner stated at The World Urban Forum, "In 2007, for the first time in history, more people will be urban than rural dwellers. By 2050, some six billion people are expected to be city dwellers" (ENS, 2006). In the context of emerging urban nightscapes, what lights and lighting systems can we uncover?

As illustrated in publications such as Professional Lighting Design, Transnational Lighting Detectives, or La lumière Urbaine (Narboni), Western urbanism, from historic cities to new towns, sees most of lighting design. The urban roads of pedestrian and vehicular flows are paved with a robust model of lighting adjacency



I. From Google Earth: Phoenix, USA. 8 July 2006.



II. From Google Earth: Gongqing, China. 8 July 2006.

(Mosser 65), characteristic and unperturbed by cultural differences or post-modern quests for identity⁴. This has led to steady improvements in luminaire design, as well as lamp and optics efficacy, but to few new lighting paradigms⁵. In contrast, in the interstitial realm of the built environment, public space breeds a spiraling variety of light installations, temporary or permanent, ever competing for originality and dynamism⁶. City agencies and elected officials conduct works realized by designers and artists in the disciplines of lighting, architecture, landscape, advertising and graphics, and pyrotechnics⁷.

Nightscares that accompany the growth of further contemporary urban phenomena are less explored and deserve notice. New urban blurring strategies of merged flows (shared space⁸) and urban ecosystems commend our attention. Sprawling urban patterns in developed countries contrast with bursting cities in the developing world⁹. In the footsteps of the Old and New Worlds' slums, dense shantytowns exist throughout Africa, South America, and Asia. On sites of urban devastation

(post war or post-natural disaster), light too needs reconstruction.

The racing expansion of artificial lights and air pollution led to the unnatural brightness that now glows above¹⁰, but how dark is our future? With ubiquitous references in professional lighting and laymen talk alike, the mission of "re-darkening" the skies¹¹, if reduced to lighting, could conceal a polluted hell: confluent politics on energy and environment (Kyoto Protocol, 1987, Clean Air Act, 1990¹²) are likely to shed a healthier darkness¹³.

The brilliant technologies of "e-billboards" that display brand iconography¹⁴ have moved on to the sustainability narrative. Smarter than ever, the engineering of lamps and controls has come a long way since photosensors first crowned luminaire heads; modulated lighting scenes are now permeating roadway infrastructure¹⁵. Moreover, "wireless" battery operated and/ or solar powered lights¹⁶ may increasingly shine. Freed from linear utility layouts, they bend the logic of conventional lighting masterplanning¹⁷.



III. From Google Earth: Caracas, Venezuela. 8 July 2006.

Beyond design, a variety of pervasive patterns of light and light noise have emerged in cityscapes, with various levels of brightness (commercial signage, building windows, traffic lights and signals, urbanites' electronic mobile gadgetry such as phones, shoes, jewelry, clothing, car kits, etc.). In situations of necessity, adaptive behavior to lighting takes place as temporary measures are diverted towards permanence¹⁸.

In researching evolutionary lights in our diverse urban environments, we can start collecting data on the uses and applications of products and technologies (new vs. old, private vs. public, indigenous vs. planned), and propose correlations and causalities in the lighting models they are sponsoring. Satellite imaging provides an unprecedented tool for the observation of anthropogenic patterns of construct¹⁹. NASA "Global Lights" images, though diverted from their initial purpose²⁰, and despite the problems that arose with interpretation²¹, have shown light to be a tremendous indicator of global measures²². Human groups are complex, nonlinear, and self-organizing. Computational models have begun to enlighten us as we engage in the understanding of our evolutionary systems, from neurophysiology (Rangan) to regional spatial dynamics (White, Engelen). May they come to light.

References

1. "[...] There is a large gap in the luminance range between photopic and scotopic conditions for which there are no CIE recommendations for relative spectral sensitivity, namely between approximately 0.001 and 3 cd/m². This range is called the mesopic condition" (Boyce 10).
2. "Half of all cephalopods are bioluminescent, including all those that live in deep water."(Sinclair 48). "Some fish and squid that emit their own bioluminescent excretions, [others] use the glow emitted by the bacteria as bait. The flashlight fish [...] uses the bacteria it carries in its eyes as a lamp" (64-5).
3. World Resource Institute (ENS).
4. Since the 1980s, cities have increasingly embraced lighting in the promotion of their identity.

5. Noticeably, Jane Jacobs seldom mentions urban lighting in her seminal 1961 text on urban systems.

6. As shown in Neumann's "Spectacular Urban Illumination", this is not a new phenomenon (12-4).

7. See fire-work by artist Cai Guo-Qiang.

8. by Dutch traffic engineer Hans Monderman (b. 1947). His philosophy is to make roads appear more dangerous, by removing lines, signs, and other traditional "road safety" paraphernalia, so that drivers stop looking at signs and start looking at people.

9. Gongqing, in China, has 10 million inhabitants and a growth rate of half a million per year.

10. "Assuming average eye functionality, about one-fifth of the World population, more than two-thirds of the United States population and more than one half of the European Union population have already lost naked eye visibility of the Milky Way" (Cinzano et al.).

11. International Dark Sky Association (IDA), 1988. A resolution for the protection of dark skies as part of global heritage was proposed at a 1992 UNESCO conference.

12. "On June 26 2006, the U.S. Supreme Court announced that it will hear this Fall a coalition of Environmental Groups, twelve States (California, Connecticut, Illinois, Maine, Massachusetts, New Jersey, New Mexico, New York, Oregon, Rhode Island, Vermont) and three cities 'against the federal agency EPA, charged with non-conformity with the atmospheric emissions regulations set by the Clean Air Act" (Pegg).

13. The reduction of security issues to lighting solutions is equally ambiguous (Mosser, Devars).

14. Heller (117).

15. Solid State fixtures and controls; Philips' 2006 Cosmopolis system.

16. See the work with battery operated LED fixtures and solar systems developed by MIT Engineering's Amy Smith, architects Kiss + Cathart and Kennedy+ Violich.

17. Setting a precedent, wireless technologies have recently revolutionized hardwired telecommunications.

18. Imagery posted on miscellaneous videoblogs extensively documents the 14 August 2003 North America blackouts. 8 July 2006 <http://www.gothamist.com/archives/2003/08/15/the_new_york_city_blackout_edition.php> <<http://www.satanslaundromat.com/sl/archives/000112.html>>

19. Google Earth, <http://download-earth.org/>, Spaceyes, <http://www.spaceyes.fr/>

20. "The images were taken by a Defense Meteorological Satellite Program's (DMSP) Operational Linescan System (OLS). This network of satellites was originally designed to pick up on lunar illumination reflecting off of clouds at night in order to aid nighttime aircraft navigation. What the Air Force discovered is that on evenings when there was a new moon, the satellites were sensitive enough to record the illumination from city lights. Over a period of several new moons, the data the satellites retrieved could be pieced together to produce a global image of city lights" (Weter).

21. There is less in these pictures than meets the eye: "The raw image overestimates urbanized areas by as much as seven or eight times, [Imhoff] says. The problem came mostly from the effects of the relatively bright city lights on the satellites' sensor array. The sensors on these satellites are made up of photoelectric cells organized into in a grid-like pattern, like pixels on a computer monitor. When light emanating from the Earth's surface hits one pixel on the array, it is registered in the satellite data as a 2.7-km by 2.7-km square area of well-lit land surface" (Weter).

22. See further studies of the artificial night sky brightness by Cinzano et Al.

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