Design with (Human) Nature

Recovering the creative instrumentality of social data in urban design

Karl Kullmann

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Introduction: satellite urbanism

In the late 1990s through to early 2000s, the influential movement of landscape urbanism germinated at the intersection of architecture and landscape architecture (Allen 2009). With urban discourse wedged between the well–documented failures of modernism and the neo-traditional reactions of new urbanism, landscape urbanism proposed a third way. Essentially reversing the familiar relationship of conventional black and white urban figure/ground plans that denoted the city as an assemblage of solid buildings interspersed with neutral white space, landscape urbanism instrumentalised the ground in-between (see Pollak 2006) (figure 1). In the process, the myriad components that make up the city were re-conceptualized into ecological systems (Bullivant 2006; Waldheim 2002). If the Modern City was conceived as a machine for living, the Landscape City resembled a living machine.

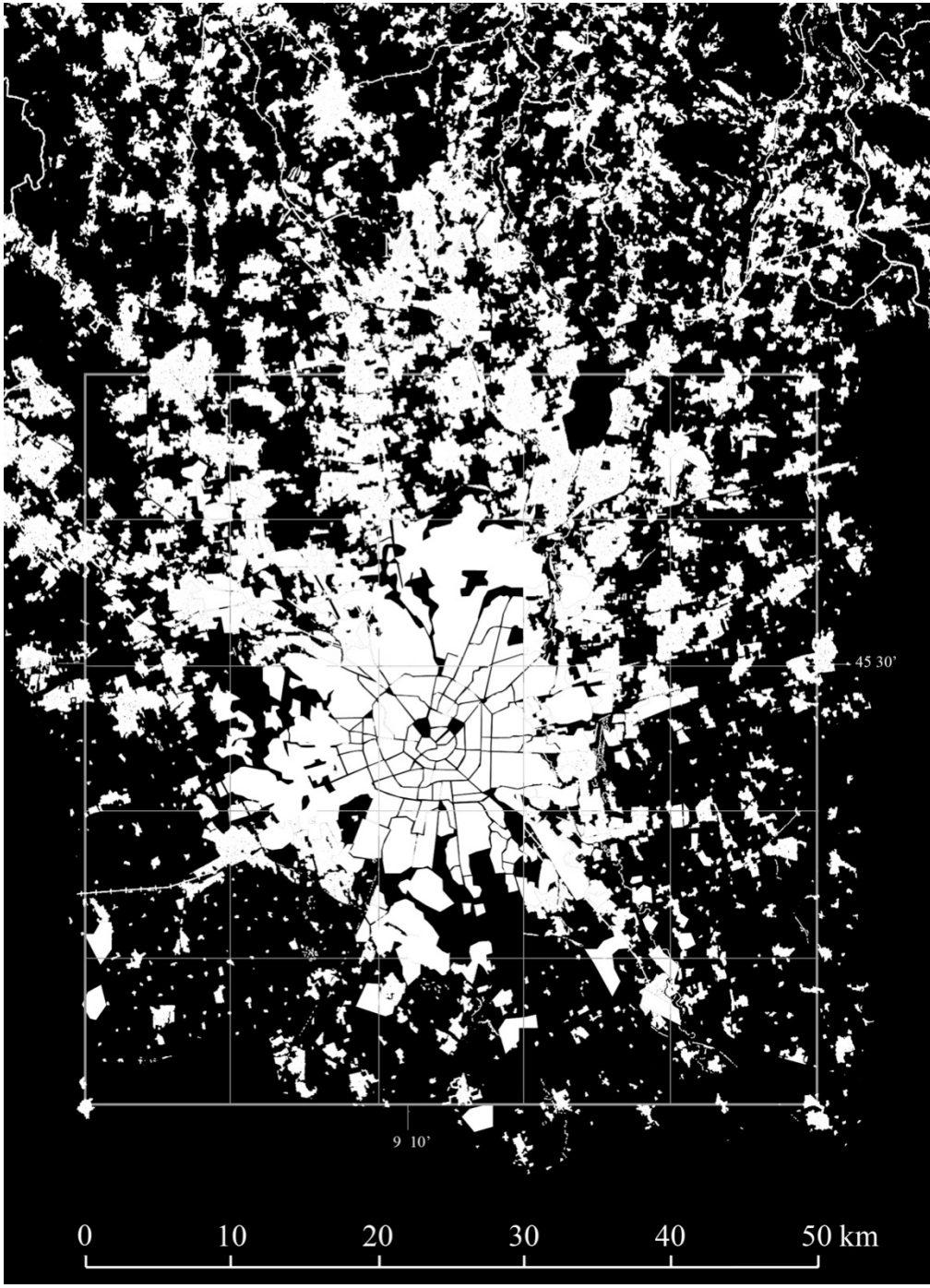

Figure 1. Inversed figure/ground plan of Milan, Italy illustrating the complex and boundless interrelationship between landscape and urbanism (© 2017 Peter Bosselmann, reproduced with permission)

Several factors contributed to the incubation of landscape urbanism. Firstly, imaging technology played a significant role, with the satellite's encompassing view revealing urbanism on a planetary scale. From 500 miles above the surface of the earth, urban morphologies more closely resembled complex organic processes than structured urban planning (Corner 2006). Secondly, the growth of Geographic Information Systems enabled a new wave of digital mapping that provided a platform for engaging the satellite's view (see Amoroso 2010; Kullmann 2017). And thirdly, as city planning increasingly invested in the complex area of urban policy, landscape urbanism became the medium through which other design fields (such as architecture and landscape architecture) reengaged with urban design (see Dagenhart and Sawicki 1992) (figure 2).

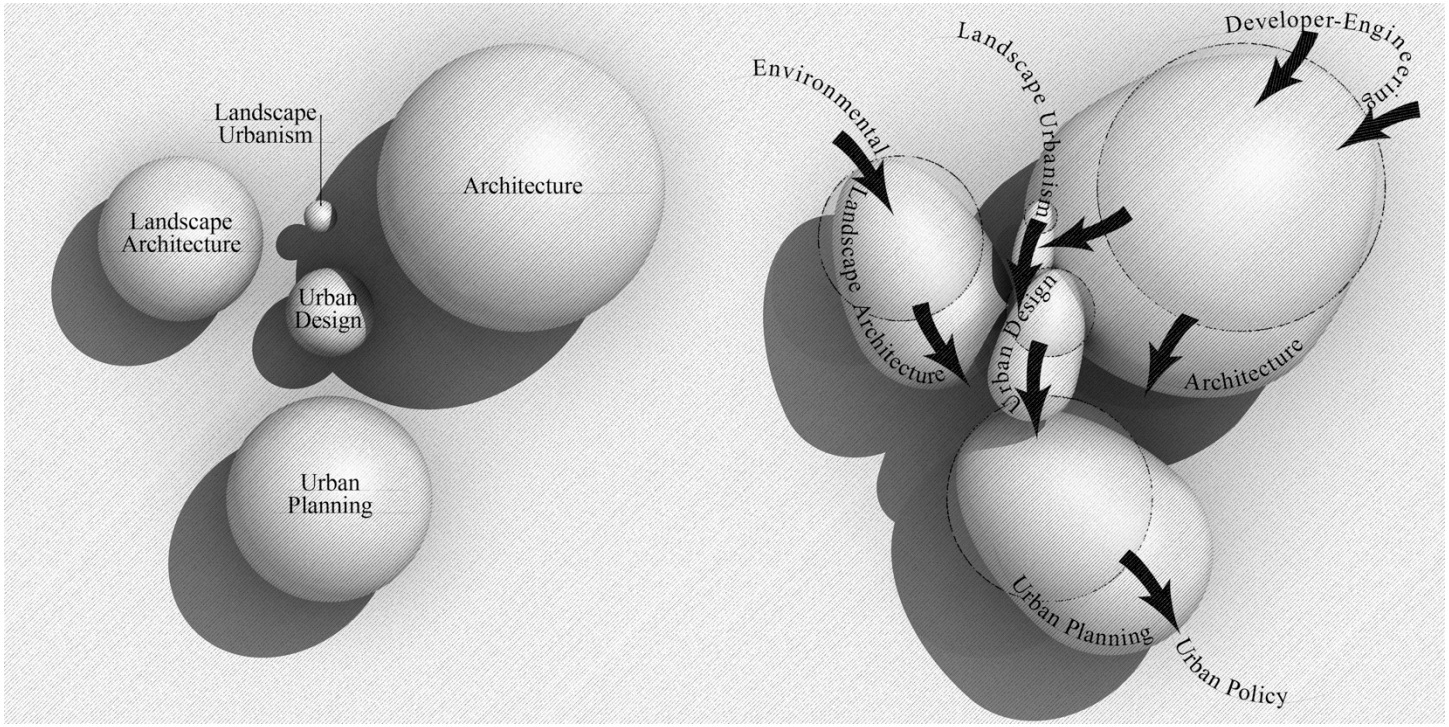

Figure 2. Static and shifting models that position landscape urbanism within the constellation of core design and planning disciplines (© 2017 Karl Kullmann)

As it gained momentum, landscape urbanism proved tremendously effective at usurping urban agendas. Whereas the practice of urban design had become principally concerned with the 'bricks-and-mortar' city of housing, streets, typology and legibility, landscape urbanism brought ecological systems and infrastructures into the urban framework. While landscape had always been present in both urban theory and practice, more often it was relegated to the role an innocuous bucolic counterpoint to the 'real' city of buildings and pipes (see Duany/Waldheim 2011; Kullmann 2016). Empowering landscape as an active agent that structures—rather than just reacts to—urban processes, provided a framework for healthier and more sustainable cities.

Although full of promise, landscape urbanism ultimately remained enigmatic overall. Whereas traditional urbanism supplied a prescriptive template for assembling a neighbourhood from the ground up, landscape urbanism's elevated satellite perspective was far more convincing as a lens on the urban condition than it was as a grounded instrument of urban formulation. This disjunction led to a new opposition, with traditional urbanists criticizing landscape urbanism as merely a repackaged variation on modern urbanism (Duany and Talen 2013). This position had some basis, in the sense that landscape urbanism appeared to reintroduce modernism's green setbacks at the expense of the street-life that several generations of urbanists had campaigned so persistently to reclaim (see Duany 2002; Gehl 1971; Jacobs 1961; Jacobs 1993).

Nonetheless, in the same way that the once prevalent late twentieth century debates around defining postmodernism (as either an evolution of or clean break from modernism) faded away, contradictions within the landscape urbanism movement remain largely unresolved. Instead—as is inherent in any movement—discourse moves on, with the ideas that are carried forward becoming normalized. Following this template, some of the more accessible lessons of landscape urbanism—such as respecting riparian zones and programming outdoor space—filtered down into urban planning strategies from around the world.

Research scope and methods

Set within the context of landscape urbanism's emergence and diffusion as a vanguard urban movement, which other aspects of urban design are ripe for renewal? Could or should a new reactive movement signal a well-defined counterpoint to landscape urbanism, or should it continue to incrementally morph and evolve? Indeed, in today's fickle social media fuelled climate of instant aesthetic gratification, does a place even remain for sustained discursive movements within the design and planning fields?

Firstly, although now more complicated to propagate and cultivate, discursive movements do remain possible and relevant. Clearly this takes new forms, with ideas catalysed in the social media age evolving more rapidly, uncontrollably, and collectively than those constructed within the confines of traditional academic practice (see Borgman 2007). And secondly, it is likely that urban design continues to be a unifying topic of concern across the design and planning fields. Moreover, with urban processes now either directly or indirectly impacting the entire planet and increasingly dissolving distinctions between city and the country (Brenner 2014; Dettmar and Weilacher 2003), it is likely that landscape and ecology will remain central topics for urban design.

In this context, building on the trajectory of landscape urbanism is demonstrably more productive than a rear-guard movement that, for example, sends architecture back into the contradictions of poststructuralism, landscape architecture reprising its search for the *genius loci* (essence of place), or urban design caricaturizing preindustrial cities. Based on this assertion, the article outlines a case for critically re-engaging the unfulfilled potential of the social or behavioural side of urban design theory as a counterbalance to the ecological side that came to define landscape urbanism. To achieve this goal, the article follows Swaffield and Deming's (2011) interpretive framework for discourse analysis. This primarily deductive methodology places phenomena in context through iterative mediations between theoretical understandings and empirical observations.

Because it straddles the modernist versus traditionalist positions that have dominated almost a century of urban discourse, literature relevant to this topic is typically highly polarized. Further to these now well-defined opposing positions, a third category of less dogmatic bridging writing seeks to reconcile the most promising aspects of landscape urbanism (which appears most effective at the regional structural scale) with the most successful aspects of traditional urbanism (which appears most effective at the local neighbourhood scale) (see Heins 2015, Kullmann 2015). In addition to continuing this more pragmatic approach to the topic, the article explores themes that transcend the conventionally accepted frameworks of landscape urbanism and traditional urbanism.

Two paradigms: ecologies and psychologies of the city

From the late 1950s through to early 1970s, the Situationist International movement progressed the Letterist notion of the city as a fluid topography of spontaneity and emotion. Channelling the wistfulness of Baudelaire's *flâneur* into impulsive urban *dérive*, Situationists extracted creative stimulation from the unexpected disjunctions and correlations between their minds, their maps, and their cities. As defined by chief protagonist Guy Debord, psychogeograpy was the most visible methodology through which these experiences were recorded, classified, and eventually applied through anti-planning urban visions such as Constant Nieuwenhuys's *New Babylon* (Sadler 1999). In essence, the Situationists imagined a

malleable metropolis that morphed in deference to the interactions between the city and its people.

Although psychogeography became synonymous with a kind of radical anti-urbanism, it was not formed in isolation. As a portmanteau of the legitimatized disciplines of psychology and geography, the term psychogeography emerged in parallel to the interdisciplinary field of environmental psychology, which rapidly evolved into a field of enormous potential (see Wood 2010). If researchers could decipher how environments shape human behaviour, targeted strategies for recalibrating those environments and their human users to positive effect would follow (Moore 1979). In the context of the rapid and profound transformation of cities in the decades following WWII, myriad opportunities existed for these evidence-based strategies to improve the quality of the urban environment.

A range of fields invested in human environments adopted these approaches, with Kevin Lynch's classification of urban image formation marking a defining advancement of environmental psychology in urban planning (see Lynch 1960). In addition to Lynch's city imaging, enduring products include anthropologist Edward T. Hall's categorization of personal space (proxemics) and geographer Jay Appleton's theory of spatial preferences (prospect and refuge theory) (Hall 1966; Appleton 1975). In the design and planning disciplines these theories and methods were routinely applied through field observation and mapping, with examples including the work of the distinguished sociologist and urbanist William H. Whyte and internationally renowned urban designer Jan Gehl (see Gehl 1979; Whyte 1980) (figure 3).

Despite this initial promise, by the 1980s innovation in environmental psychology had slowed (Stokols 1995). This occurred for a range of reasons. Firstly, the impact of postmodernism unravelled the kinds of reductive universal theories that environmental psychology tended to foster. From physics to linguistics to planning, universal truths yielded to a multitude of context-specific approaches (see Pile and

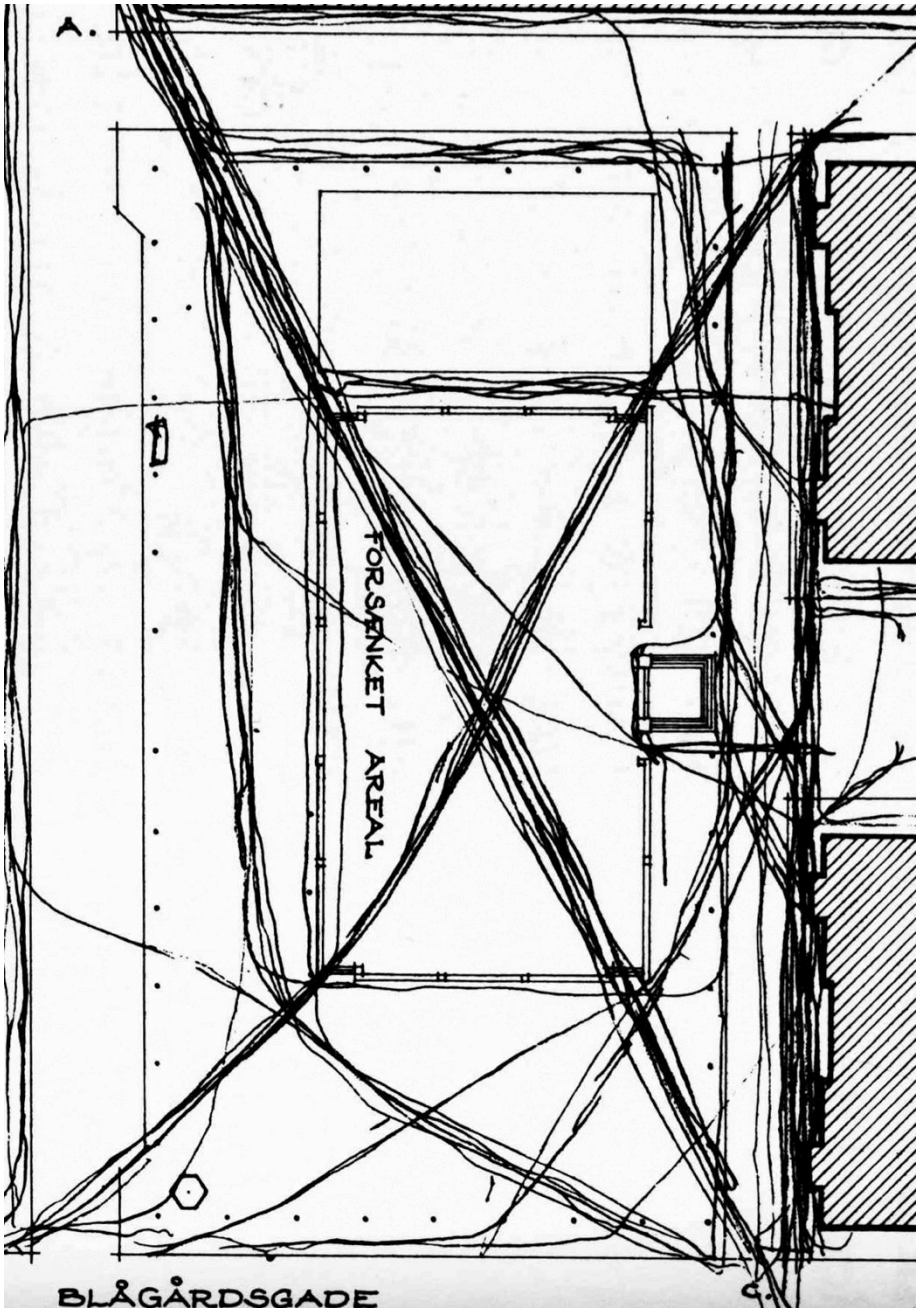

Figure 3. Tracing pedestrian routes urban spaces is a longstanding technique in urban design (from Life Between Buildings by Jan Gehl. Copyright © 2011 Jan Gehl. Reproduced bypermission of Island Press, Washington, DC)

Rose 1992). Secondly, the analogue techniques and technologies available to researchers of the day generated small, manually aggregated datasets. Although valuable on their own terms, the narrow scope of these results restricted broader application. And thirdly, a recurring disjunction between urban research and practice persisted, with studies of urban behaviour typically intersecting in only limited ways with the study and design of urban form (see Portugali 2004).

Over time, the application of environmental psychology through behaviourally based design came to suffer from acceptance problems within the design and planning fields (see Gifford 2007). Although difficult to quantify, the perception that behaviourally based design deterministically leads to the creation of bland urban spaces appears to be a particular source of distrust amongst practices engaged in cutting-edge design (see Mallgrave 2012; Philip 1996). Even uptake of the contemporary Evidence-Based Design template has remained somewhat limited, with its prescriptive methods often perceived as undermining the designer's creative mandate (see Hamilton and Watkins 2009; Powell 1987).

Here it is instructive to compare the trajectory of behaviourally based methods against the ecological methods that were developed and deployed over a similar timeframe. On the other side of the formerly well-defined social/natural divide, Ian McHarg's celebrated work *Design with Nature* provided a systematic ecologically grounded approach to the organization of cities and regions (McHarg 1969). As with behaviourally based design, ecological planning offered a template for shaping space—albeit at a regional rather than human scale—that was ostensibly based on objective methodologies. And as with behaviourally based design, ecological planning fell out of favour as designers snubbed the deterministic tendencies of a method that apparently left little room for the spontaneous or disjunctive moments that often create memorable urban experiences (see Franck and Stevens 2006).

However, in contrast with environmental psychology and behavioural design, ecological planning underwent considerable renovation under the guise of ecological design in the late 1990s (figure 4). While the renewed urgency of environmental consciousness within the design and planning fields (that mirrors society at large) is relevant to this renaissance, it was predominantly a consequence of technology. Whereas patchy ortho-photos and acetate map overlays curtailed Ian McHarg's original methods in the 1960s, by the turn of the century high-resolution satellite imagery and derivative data sets had become increasingly ubiquitous. At the same time, Geographic Information Systems evolved from perfunctory spatial archival systems maintained by specialists to sophisticated mapping applications accessible to non-specialist designers and planners (Dangermond 2010) (figure 5).

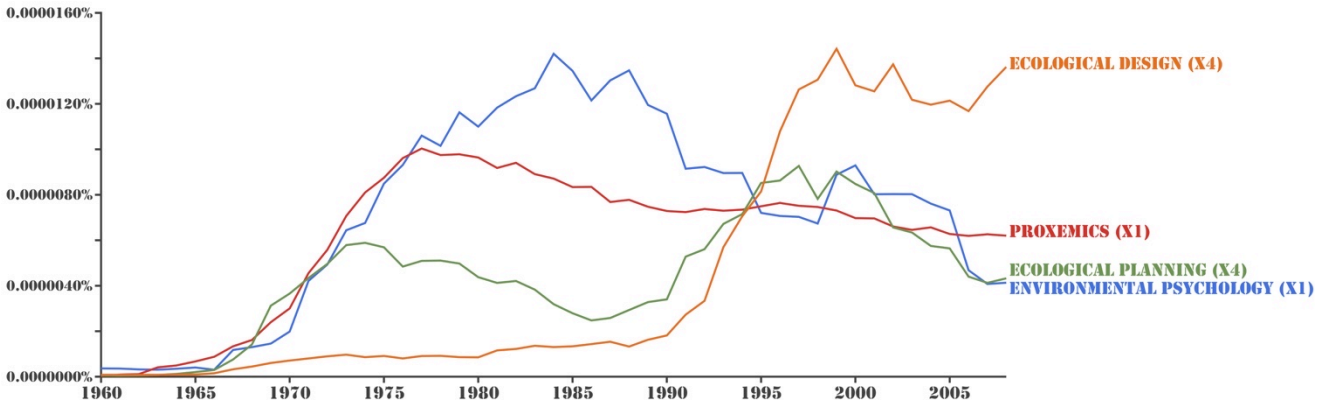

Figure 4. Common usage of four terms between 1960 and 2008 expressed as a percentage of the total corpus of digitized English language books available for analysis by Google Ngram Viewer. While this data source should be interpreted with caution, comparison does suggest general decline in usage of the term "proxemics" since the mid 1970s and "environmental psychology" since the early 1980s. In contrast, following declining in usage in the early 1970s, "ecological planning" undergoes a revival in the early 1990s, with this momentum transferred later in the decade to the term "ecological design" (data source: © 2013 Google. Graphic Karl Kullmann)

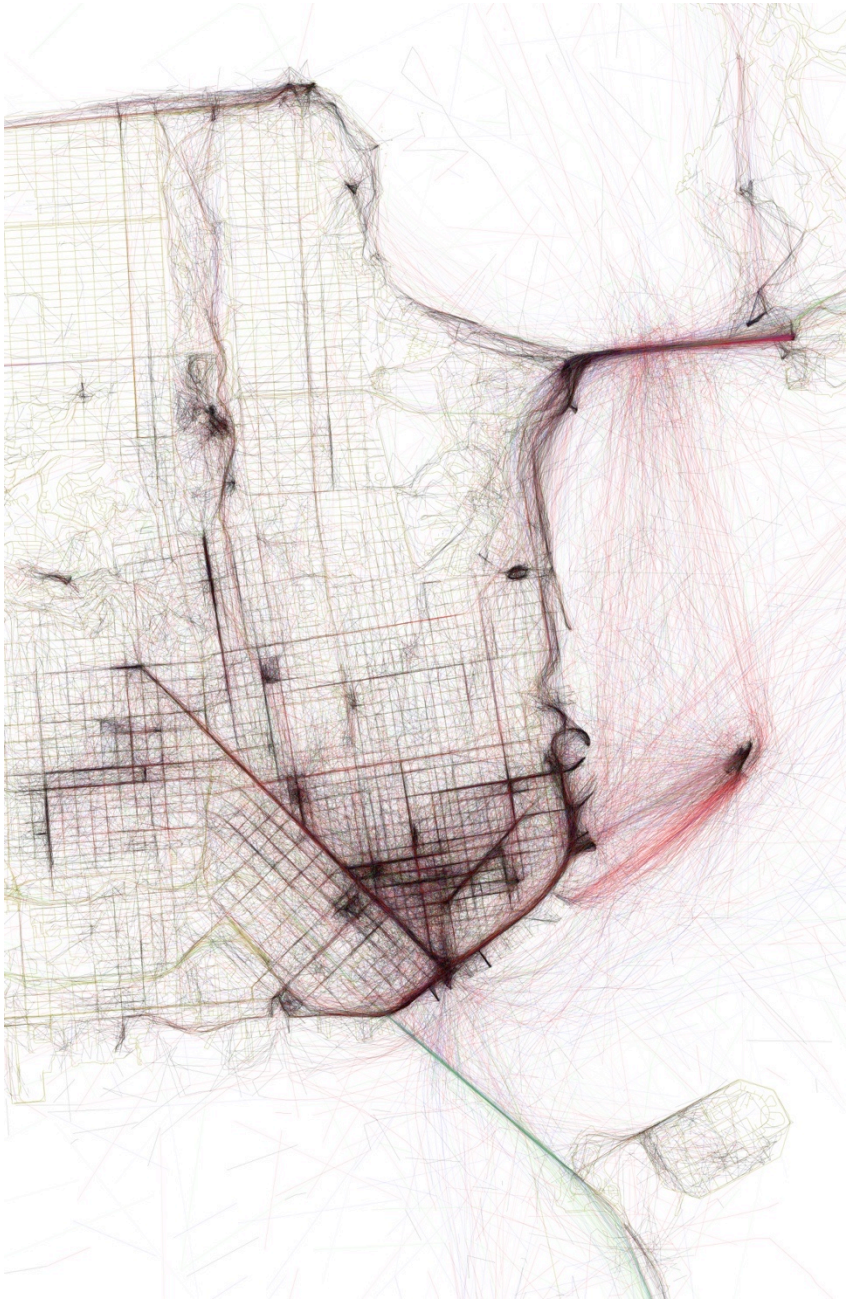

Figure 5. GIS flow map illustrating tourist hotspots of San Francisco generated by compiling publically available geotagged photographs from flicker.com (© 2015 Eric Fisher/Mapbox, reproduced with permission)

Re-envisioning environmental psychology: techniques and technologies

To borrow a term from artificial intelligence, the 'technological singularity' of satellite driven GIS stimulated the new wave of creative cartography that in turn enabled the instrumentality of landscape urbanism. It raises an intriguing question: if ecological planning/design underwent a culturally and technologically triggered revitalization that retrospectively elevated its ethos within urban discourse, what about socially based approaches to design? Is environmental psychology disposed to its own technological singularity, and if so what form might this take? In exploring these questions, this section addresses three topics: (1) identifying a cultural impetus; (2) complexity as an antidote for determinacy; and (3) innovation in technologies and techniques.

Firstly, if the cultural impetus for reviving ecological design was a new urgency of environmental awareness, then the incentive for reviving socially based design is the urgency of how city-dwellers interface with the urban condition itself. While the outside-in approach of landscape urbanism made some claims in this regard, it never convincingly addressed how people interact with—and create meaning within—an ever more rapidly urbanizing planet (see Thompson 2012). Despite efforts to associate landscape urbanism with a more contemporary collaborative understanding of ecology, the movement remained unwittingly overshadowed by the Chicago School of urban sociology, which in the early twentieth century described the city in distinctly Darwinian terms as a competition for space and resources (see Park, Burgess and McKenzie 1925). Applying reductive biological metaphors to the dynamics of human communities fundamentally de-humanizes the city, in the sense that ecologies of any form do not care for the fate of the individual organism (Zimmerman 1994).

In contrast to landscape urbanism's theoretical indifference towards place making, a range of approaches seek to reconcile the social and ecological models of urbanism. These include revisiting the neglected social dimension of ecological planning (Linehan and Gross 1998; Barthel 2016), adapting a scale-specific ecosystem approach from the

Chicago School (Vasishth and Sloane 2002), and applying actor-network theory with the aim of moving beyond restrictive human/object distinctions (Murdoch 2001). By critically re-examining the scale at which actors engage with their urban environments, a re-invigorated environmental psychology potentially compliments these approaches in addressing the shortcomings of the ecological city.

Secondly, any technologically stimulated renovation of environmental psychology and behaviourally based design assumes a manifold increase in complexity, activity, and accessibility in the field. As the transformative influence of digital mapping in urban design demonstrates, improving accessibility increases opportunities for non-specialists to explore the creative design potential of new technologies. A range of creative engagements diversifies the pool of potential urban design directions. A diversity of design directions reduces the likelihood of the prescriptive outcomes that stymied the wider application of environmental psychology since its mid-century zenith of methodological innovation.

With its rapid cycle of novelty, the creative field of industrial design exemplifies the harnessing of this wider diversity of responses to design stimuli in order to maximize market penetration (see Hekkert and Desmet 2002). This is not to suggest that the inherently lengthier timeframe of urban place making should be accelerated to match the planned obsolescence and cunning psychologies of product design and marketing. Rather, it illustrates how urban spaces might be recalibrated to arouse a range of other responses including intrigue, curiosity, playfulness, and awe (see Carter 1993; Stevens 2007).

And thirdly, innovative techniques and technologies relevant to re-catalysing the social space of urban design and theory are rapidly developing. In the following discussion, these innovations encompass different fields of enquiry (environmental psychology and behavioural mapping and analysis) and different technologies and data (ranging from specialist neurological machines to general everyday devices).

In the fields of neuroscience and behavioural psychophysics, the application of magnetic resonance imaging (MRI) and electroencephalography (EEG) demonstrate that human responses to environmental stimuli can be measured, mapped, and re-triggered in the brain (see Kitson and Bratt 2016). The neurobiological foundation of human behaviour that cognitive neuroscience illuminates provides experimental evidence that often corroborates or challenges existing theoretical concepts (Papale, et al 2016).

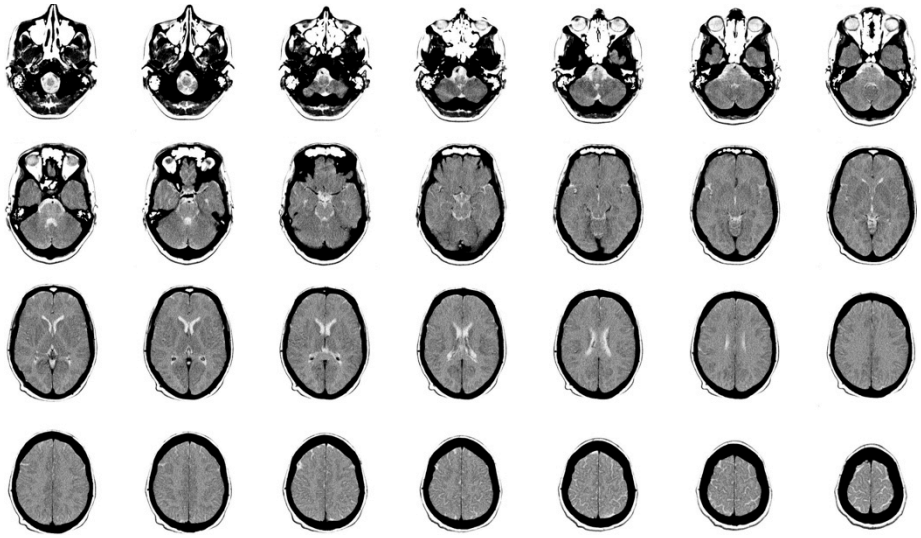

Figure 6. Magnetic resonance imaging of the human brain using tomographic mapping methods (© 2007 Department of Radiology, Uppsala University Hospital, reproduced under creative commons license)

In the design and planning fields, a nascent 'neuro-turn' is evident (see Mallgrave 2011). For example, upon neural cross-examination, Appleton's prospect and refuge theory emerges as a measurable phenomenon, albeit one that takes on myriad complex variations as opposed to a single reductive model (see Brown and Lee 2016). Similarly, city imaging—which in Lynch's original rendition was little more than a premise supported by a few-dozen student subjects—comes to life in the MRI as human cognitive maps and image memory banks fire along synaptic connections (see Maguire, et al 2006) (figure 6). Whereas Lynch's mental mapping methodology classified urban

way finding and image formation at the conscious level of spatial awareness (see de Lange 2013), neuroscience discloses human spatial agency derived from subconscious levels of cognition.

A similar threshold is evident in spatially aware mobile technology, which has remained largely incidental to urban design theory. Now attached to one third of the world's humans, smart phones suggest urban design potential beyond convenient navigation tools or playful distractions (such as the psychogeography app that subverts goal-oriented journeys with spontaneous urban drifts). Although still in its infancy, harnessing this crowd-sourced hive of locational information in more systematic ways potentially offers a richer reading of spatial behaviour. For example, the received gospel of Hall's proxemics takes on new life as smart phones—along with their symbiotic humans—interact en mass in both expected and unexpected ways in the public realm (see McCall 2017). This window into the behavioural landscape in turn feeds back into projective design via recent advancements in the simulation modelling of complex phenomena such as crowd behaviour (Cannell 2015; McKee 2015).

In a recurring theme, the universal and reductive becomes complex and multivalent at the hands of novel digital technologies and techniques. To be certain, a valid criticism of innovation in behavioural technologies and techniques is that its application to urban design remains specialized, inaccessible, and unproven. However, in the same manner that mapping became mainstream, improved usability—along with the confidence that a growing corpus of knowledge instils—suggest transformative potential for the field. In the immediate future, the readily accessible and rapidly developing technology of drone-based imaging is potentially relevant to bridging ecological and social angles in urban design theory and practice.

A case in point: drone urbanism

In 1908, the German pharmacist and amateur inventor Julius Neubronner patented a miniature lightweight camera with an aluminium harness that he strapped to homing pigeons and released above several European cities. Equipped with a timing mechanism and a mind of its own, each 'pigeon-cam' offered a single unpredictably framed image of the urban landscape (figure 7).

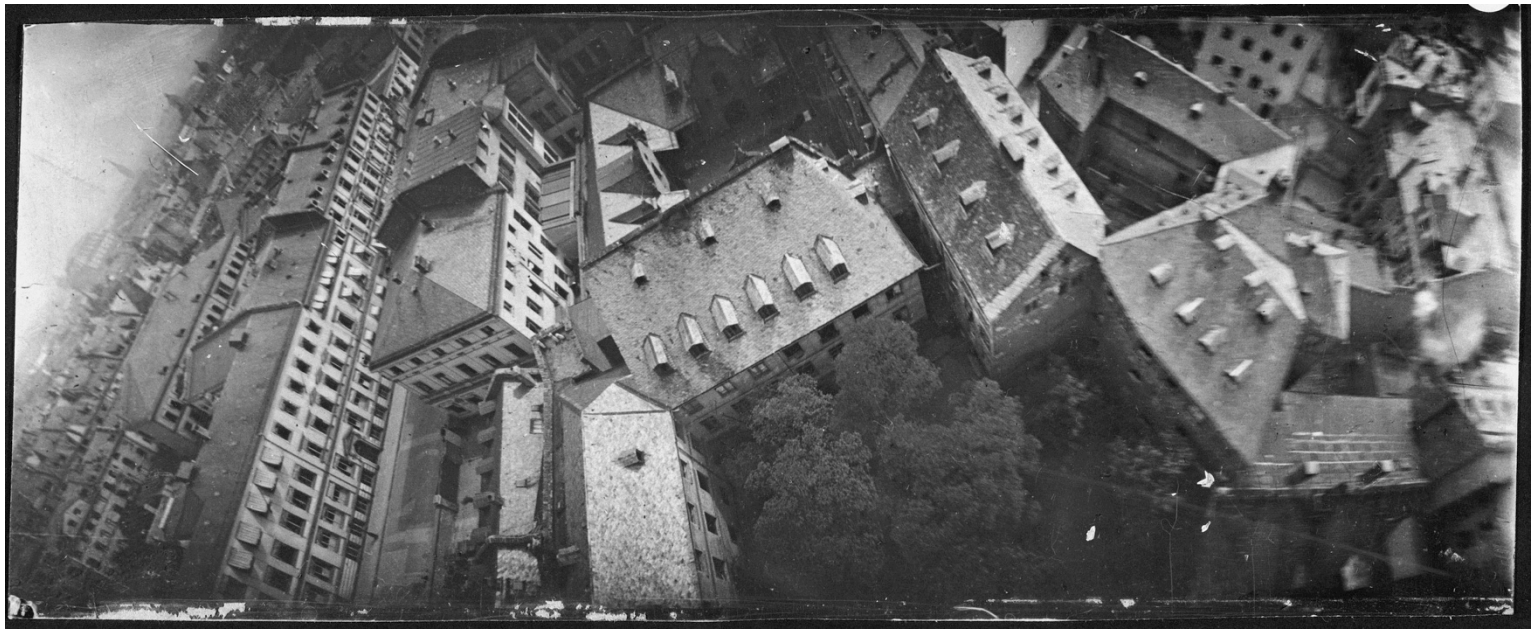

Figure 7. Pigeon's-eye view of Frankfurt, Germany. Julius Neubronner, circa 1907 (source: Deutsches Museum, Munich, Archive, reproduced with permission)

Although literally capturing the historically coveted bird's-eye-view of the city, airplanes overtook Neubronner's invention as the ever-higher trajectory of mechanized aerial reconnaissance took flight (see Cosgrove 1999). At the apex of this skyward journey, imaging satellites came to reveal landscape patterns and associations whilst overlooking the camouflaged nuances and details that enrich the individual's experience of the landscape (see Rekittke et al 2013).

A century later, mechanized renditions of Neubronner's pigeon-cam began to reverse the ascending sequence of ever more expansive overviews of the earth. Initially disclosed to the public as mysterious appliances of remote warfare, multi-rotor drones have been available to consumers to fly below 150m in the EU and 122m in the US since 2009, and reliably carried high-definition cameras since 2012. Over this short timeframe the produce of these devices has become abundant, with low-aerial pictures and videos of everyday landmarks now widely circulated across digital media. In urban design practice and research, early adopters have deployed drones for site documentation, design communication and for the observation of cultural patterns and natural processes.

Whereas this first generation of manually piloted devices captures the bird's-eye-view as a framed picture, next generation technology facilitates more sophisticated imaging functionality. Through the integration of GPS with on board avionic sensors, automated navigation enables tracking of the ground dwelling 'pilot' from the air and streamlines the process of landscape imaging and mapping. Geo-

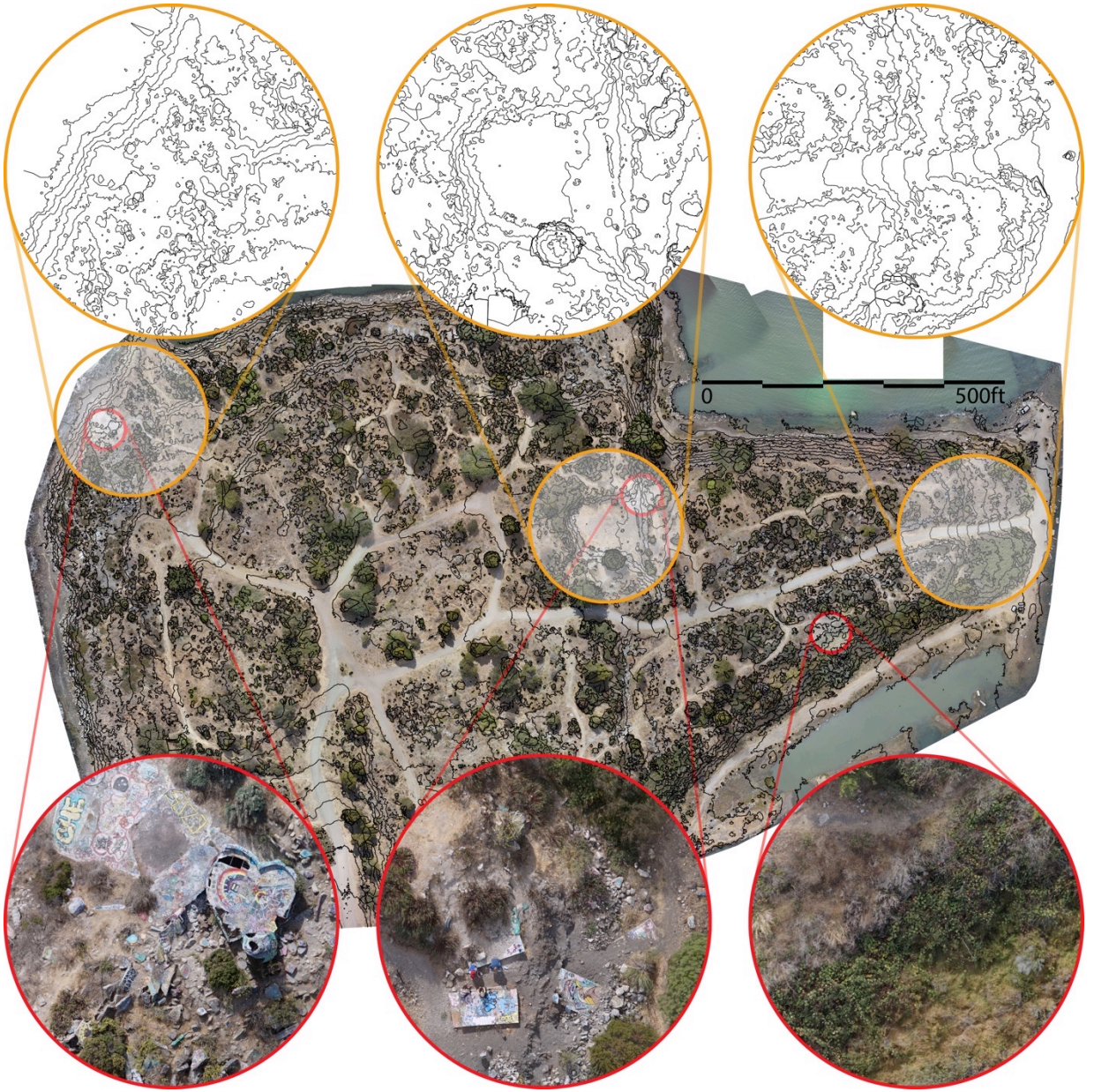

Figure 8. High fidelity drone mapping of the Albany Bulb landfill site on San Francisco Bay, California. One of the detail enlargements reveals people interacting with the landscape (© 2017 3DRobotics and Karl Kullmann)

referenced imagery is digitally composited into extremely high-resolution photo-mosaics and converted through a sophisticated form of photogrammetry into three-dimensional topographic models. In comparison with the baseline fidelity of Google Earth and GIS maps, the results are enlightening. Detailed topographic site features are mapped down to a level of clarity that is comparable to the world as perceived from on the ground (figure 8).

In contrast to satellite mapping, which reveals large-scale landscape systems and associations, drone mapping illuminates small-scale landscape details and nuances that are overlooked from higher altitudes. This capability is potentially relevant to urban design theory. Just as widespread access to the satellite's expansive view stimulated an ecological approach to urbanism, increasing familiarity with the drone's close-in view is potentially instrumental in re-stimulating urbanism at the scale at which people interact with cities. This close-in-aerial view potentially recaptures the "social space" of urban inhabitation that low altitude aerial photography illuminated early in the aeroplane age (see Haffner 2013, p. 109) (figure 9).

In the hands of urban design practitioners and researchers, drone imaging could catalyse this shift in focus through several means. Firstly, the drone's close relationship with the ground potentially reinvigorates fieldwork in urban design and theory (see Ninsalam and Rekittke 2016). Although fieldwork occupies a seminal position within the urban design corpus, the convenience of remote online mapping applications encourages a retreat from on site surveying and ground proofing (see Girot 2013). Drones instigate a digitally escorted return to the field, with current regulations and technologies requiring the operator to be positioned within the urban landscape that is being imaged or mapped. Launching the drone upward from within the survey zone in real time reverses the delayed downward zoom of satellite imagery. This low aerial, near-ground position suggests a 'thickened' three-dimensional form of aerial fieldwork that fulfils the Classical definition of surveying, whereby an overview of a landscape is established by working from the inside out (Casey 2002; Cosgrove 2008).

Figure 9. Still taken from drone video of bowls players at the Merredin Bowling Club, Western Australia, revealing an intricate association between landscape, culture and behaviour (© 2017 Carr and Drone, reproduced with permission)

Through the agency of cartography, the capacity to map the urban landscape at a close scale strongly correlates with the capacity to engage this scale in design and theory. Just as abundant satellite imagery fuelled disciplinary interest in large-scale ecological systems, it follows that a drone-enabled revival of fieldwork supports improved disciplinary focus on the near-scaled social aspects of cities.

This focal shift is particularly applicable to the exploration and mapping of postindustrial wastelands and other marginalized landscapes that have been culturally appropriated (see de Solà-Morales Rubió 1995). Although often suggestive of community-generated alternatives to intentionally designed public spaces, the coarse fidelity of satellite mapping and abstraction of conventional survey plans typically overlook the social nuances of such places. Because of the difficulty in capturing and advocating for the social value of such sites, their lessons have remained peripheral to established urban design theory. The capacity for drones to illuminate

in detail how people shape these marginal landscapes into social spaces suggests considerable potential for enhancing the value placed on emergent cultural landscapes within urban design.

Secondly, drone imaging and mapping features offer novel perspectives and angles on the urban landscape that potentially reinvigorate observation in the field. As per fieldwork, the observation of urban processes is a core tenet of urban design that has undergone limited innovation over the past half century. While the stagnation of observation techniques may imply that there is nothing new to observe, it is also a consequence of the privileging of modelling processes in the virtual realm over empirical observations in the real city. And although data modelling continues to provide new windows into previously concealed urban patterns and processes, modelling and observation are most constructively partnered together. In this regard, crowd behavioural modelling and analysis is an immediate potential application for drone-based observation, with the technology offering the capacity to revisit the ephemeral choreographies of crowds in public spaces that Whyte originally traced by hand (Birtchnell and Gibson 2015).

To be certain, the utility and influence of drone fieldwork and observation within urban design theory and practice is likely to be impeded by its pervasive association with surveillance. Civilian drones are somewhat beholden to the parallel legacy of military drones as the ultimate manifestation of the data-driven visual logic of disembodied global airpower (Shaw and Akhter 2012). And although satellite and airplane imagery have long provided aerial intelligence above urban areas people generally remain suspicious of being overtly or clandestinely surveilled in specific contexts. The begrudging acceptance of security cameras in pedestrian zones and commercial venues, but emphatic pushback against Google Glass™ in casual social interactions indicates the presence of nuanced social norms with regards to capturing and augmenting optical information in the public realm (see Kotsios 2015; Noble and Roberts 2016).

Translated to camera-equipped drones, intrusive use of the apparatus by a researcher or designer without explanation or consent is likely to be counter-productive in the sense that it alters the behaviour of urban subjects. For example, until social, legal, and technological constraints evolve, hovering drones above urban squares to track pedestrian trajectories may deliver mixed results, whereby the spectacle of the device is likely to attract certain people and repel others. While this example demonstrates the potential obstacles to applying a new tool to an old method, as yet unforeseen new applications and methods are likely to emerge over time as drone users become more adventurous with the technology. As is evident throughout the history of imaging technology (see North 2005), these applications will raise their own unique creative and technical opportunities and constraints.

Moreover, novel drone applications are unlikely to be limited to the methodical activities of professionals and researchers in the field. In the same manner that the absorption of widely available satellite imagery in everyday life fed into the development of landscape urbanism, the proliferation of consumer drones in the hands of amateurs is also significant for urban design and theory. Just as the public pointed the cameras in smartphones back onto institutions of authority and ultimately back onto themselves, the use of drones as appliances of personal vanity is likely to surpass the use of drones as professional instruments of surveillance and mapping. Essentially becoming personal mirrors in the sky, operators witness and share themselves in the third person, situated within the surrounding landscape. While recording their activities, amateur operators inadvertently capture more of the landscapes in which they are immersed than they do their own bodies in action.

The utilization, interpretation, and assimilation of this circumstantially captured crowd-sourced data into both the discipline and wider culture is potentially significant for urban design theory. It is unlikely to remain inert since the aerial view inherently invokes a certain degree of imagination and envisioning of alternative futures. The drone's low-aerial viewpoint is likely to influence how individuals view,

image and cognitively map their immediate landscapes. With their horizons extended to include the surrounding landscape, creators, sharers and consumers of drone imagery and mapping invariably interact with cities at the scale at which place making occurs. Urban design practitioners and researchers could in turn curate and analyse this trove of user-generated data for patterns and anomalies that reveal interactions between people and their environments. Applying shared user generated content in this way also points to the broader potential for using distributed data to forge new directions in environmental psychology.

Conclusion: ground up urbanism

In his 1958 master's thesis at the University of California, Berkeley, and later in the classic 1968 essay Alles ist Architektur, the German architect Hans Hollein explored the Bauhaus notion of total design (Hollein 1968). In this capacity, the architect/designer transcends scales and specializations to include everything from appliances and furnishings, to buildings, landscapes, transportation, infrastructure, and ultimately, cities. Hollein provocatively flipped this received wisdom on its head, arguing that if everything is now architecture, then it follows that everyone is a now an architect. Although Hollein came at this idea from a distinctly architectural worldview, the aspirational notion of dissolving divisions of scale and expertise is an evocative leitmotif for conceptualizing new directions in urbanism.

Whereas the satellite ecologies of landscape urbanism literally and metaphorically arrive at the city from the top down, the social scale of the city emerges from the ground up. However, although social space has traditionally been integral to urban design and theory, the importance placed on social data-based approaches to urbanism waned over the past few decades. Of the many factors that influenced declining interest in environmental psychology, the technological limitations of the available tools and deterministic tendencies of the associated methods were particularly significant.

As recent advancements in novel technologies and techniques begin to reinvigorate environmental psychology, the social aspects of urban

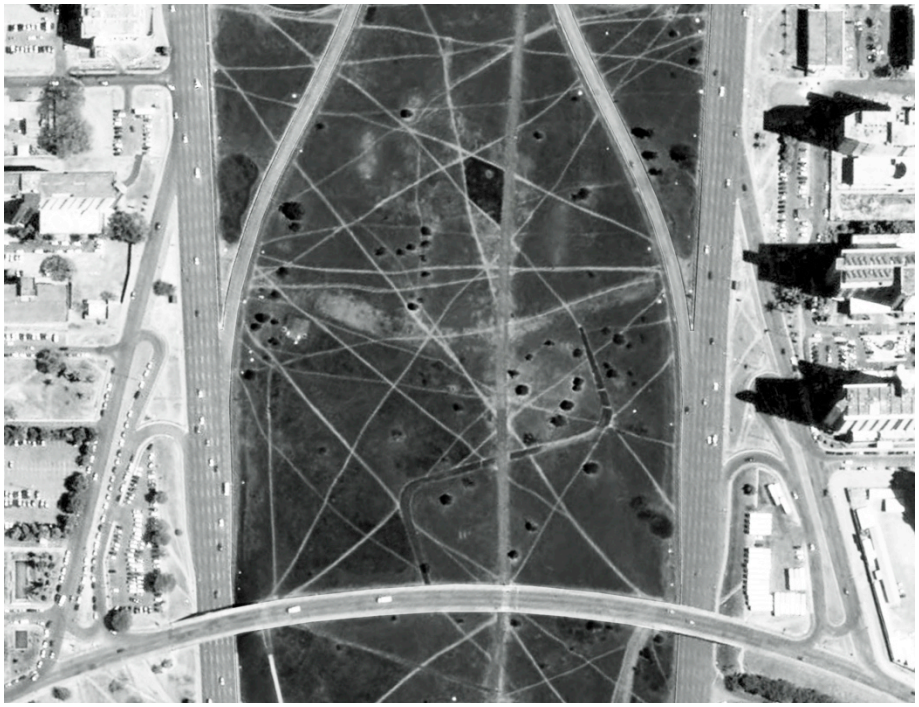

Figure 10. Pedestrian desire lines wandering across the Monumental Axis, Brasilia, Brazil. Here, the landscape vividly discloses the relationship between space and behaviour (© 2011 Google Earth)

design theory are also potentially renewed. From the neurologics illuminated through MRI and EEG machines, to the locational data harvested from everyday devices, to the high fidelity of drone mapping, a range of developing technologies captures a variety of social and perceptual data. Given such diversity of new technologies, the new techniques that result are potentially as, if not more, significant for urban design as satellite imaging was for ecological planning.

However, to reinvigorate social space in contemporary urban discourse and practice, the incorporation the new wave of innovations in spatial cognition and mapping must address a specific limitation of legacy methods. Since its emergence in the 1960s, a recurring deficiency in environmental psychology has been the implication that

people are analogous to lab rats caught in the maze of the city. Stripped of agency, people merely react and adapt to environmental stimuli as observed or triggered by 'white-coated' researchers (see Ledrut 1973). On the contrary, just as the city shapes human behaviour, behaviour actively shapes the city (figure 10). Therefore, any reinterpretation of the agency of environmental psychology within contemporary urban design needs to assimilate the back-and-forth more comprehensively between urban actors and urban environments.

Drawing on ever-increasing troves of distributed user-generated data from spatially aware devices and drone map depositories suggest substantial capacity for diversifying the field beyond received notions of behavioural urban design as a closed laboratory experiment. This process might draw inspiration from the Situationist International's concept of psychogeography to channel a more fluid interchange between space and behaviour. In essence, the Situationists imagined a malleable metropolis that morphed in deference to the interactions between the city and its people. In this city, old distinctions between nature and culture, ecology, and behaviour, and between professionals and communities are not overly relevant. In this city, where everything is urbanism, everyone is an urbanist.

University of California, Berkeley

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