UTS ePRESS

Construction Economics and Building

Vol. 20, No. 2
June 2020

RESEARCH ARTICLE

Trojans of ambiguity vs resilient regeneration: visual meaning in cities

Pieter Marthinus de Kock[1*] and Silvio Carta[2]

[1] Lincoln School of Architecture and the Built Environment, University of Lincoln, Brayford Pool, Lincoln LN6 7TS, UK
[2] School of Creative Arts, University of Hertfordshire, College Lane Campus, Herts AL10 9AB, UK

***Corresponding author:** Pieter Marthinus de Kock, Lincoln School of Architecture and the Built Environment, University of Lincoln, Brayford Pool, Lincoln LN6 7TS, UK; Email - pprojexio3@gmail.com

DOI: 10.5130/AJCEB.v20i2.6605
Article history: Received 5/19/2019; Revised 5/10/2019 & 13/11/2019 Accepted 11/28/2019; Published 22/06/2020

© 2020 by the author(s). This is an Open Access article distributed under the terms of the Creative Commons Attribution 4.0 International (CC BY 4.0) License (https://creativecommons.org/licenses/by/4.0/), allowing third parties to copy and redistribute the material in any medium or format and to remix, transform, and build upon the material for any purpose, even commercially, provided the original work is properly cited and states its license.

Citation: de Kock, P.M., and Carta, S. 2020. Trojans of ambiguity vs resilient regeneration: visual meaning in cities. *Construction Economics and Building*, 20:2, 6-24. http://dx.doi.org/10.5130/AJCEB.v20i2.6605

ISSN 2204-9029 | Published by UTS ePRESS | https://epress.lib.uts.edu.au/journals/index.php/AJCEB

Abstract

This paper presents a theoretical framework that helps identify visual sustainability in urban projects and evaluates its relevance for the use, design and making of public space. It is aimed at showing how the process of urban regeneration is far more nuanced and sophisticated than much of today's building industry allows for. The first part of the article provides an outline of this framework, by drawing from the notion of ambiguity and discussing regeneration around a concept of trojans of ambiguity: by which we simply mean that modern-day regeneration projects are often a confusion of meaning. The framework is then applied to two case studies: Heygate, and Sidewalk Labs Toronto. The Heygate regeneration produced a negative emotionally charged process and social displacement. By contrast Sidewalk Labs Toronto exemplifies a technologically clean start for regeneration, on a site with little social vitality or history. The starting points for each ultimately point to two very different outcomes. Visual sustainability represents 'the technology before the technology' and future research must recognise how human needs, not technology, provide the meaning into 'how' we may create a successful, smart, and sustainable urban environment.

Keywords:

Sustainability, Meaning, Smart Cities, Visual, Public Realm

DECLARATION OF CONFLICTING INTEREST The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article. **FUNDING** The author(s) received no financial support for the research, authorship, and/or publication of this article.

Introduction

Trojans of ambiguity can be defined in this paper as *confused meaning*. Meaning that when acted on, either through an intention or in the act itself, presents a threat to one or both parties in a contract. The threat lies specifically and ultimately in the betrayal of an expectation or expected outcome. The contract may be a social contract (implied) or a regeneration contract (explicit).

This paper is theoretical; and empirical examples are intended only to illustrate a philosophically driven point about how we should and why we must continue to seek to extend the conversation around objective and subjective meaning in urban regeneration. This paper does so by looking at two very different urban regeneration case studies. Philosophically we will also look at the context of "how the organism is anchored to the world" (Heft, 2013). How visual sustainability agitates meaning through concepts of shared territory, creativity and the concept of ambiguity as described by Evans and Jones (2008). Because urban regeneration cannot be solved where "people could stop shouting at one another and settle matters peacefully by sitting down with pencil and paper and saying, "Let's calculate" (Gigerenzer and Todd, 1999, p.29). The process of urban regeneration, it will be asserted in this paper, is far more nuanced and sophisticated.

The sophistication lies in the process of self-actualisation, which can be argued exists through the emergent properties of visual sustainability. Visual sustainability in turn lies at the base of Maslow's hierarchy of human needs and is driven by a mapping process using tools and options (Peterson, 2017).

Sustainability goals 3 and 11 of the Sustainable Development Goals (SDGs) (UN, 2019) advances the argument from "chasing a moving shadow" (Bell and Morse, 1999) or "playing two games on the same field" (Owen and Dovey, 2008) to a level of analysis addressed by Searle's fallacy of ambiguity (John Searle on Perception & Philosophy of Mind, 2015); obviously evident one could argue in the delivery of affordable housing. This paper looks at aligning SDGs with visual sustainability. In two case studies, one traditional inner-city; the other iconic high-tech, we explore the origination of sustainable meaning and emergent interactions from complex adaptive systems. One example used is agent-based modelling. Future efforts in successful urban resilient regeneration (de Jong et al., 2015) depend less on what we can see, and more on what we cannot.

What does inner city urban regeneration in London have in common with a new smart city in Toronto? On the one hand, as much as meets the eye; on the other, the promise of a greater understanding of the role of visual meaning. In this paper, because being smart is being sustainable and vice-versa, the phrases are used interchangeably. The processes involved in brand new smart cities has much to offer urban regeneration. In 'starting from scratch' it should be possible to reset the conversation and recreate the conditions of emergence, of urban's basic building blocks. We do not create thriving cities; we create the conditions for cities to thrive. One hypothesis presented in this paper is that the emergent qualities of visual meaning create the right conditions of growth in urban regeneration. This is true especially in bottom up processes; conditions ideally suited to complex adaptive systems which is arguably what regeneration projects are.

In an age where "corporations are more central players in global affairs than nations" (Younge, 2014, 18, cited in Cuthbert, 2017, p.142), this paper calls on visual meaning to shore up urban regeneration in a locally sustainable way. This study will argue that an existential threat to society lies in trojans of ambiguity; which in extreme cases causes a dumbing down of

our environment to single-sense experiences; to a "reduction and simplification of reality… the hyper-reality of Baudrillard, a reality more real than the real" (Rodaway, 2011, p.173). Several examples of what may be referred to as 'trojan activity' will be presented throughout, and in the context of this paper represents ambiguous information in the visual world that stalls the engine of healthy regeneration.

While recognising how urban regeneration "has come to represent strategies to change the built environment in order to stimulate economic growth" (Jones and Evans, 2013, p.3), a conscious effort has been made to traverse the chasms that still exist between the various disciplines serving the built environment; by drawing on philosophical, psychoanalytical, psychological, and scientific domains of knowledge. In so doing, this paper explores the concept of visual sustainability not only in terms of stimulating business activity "to heal the body of the city" but also to heal "the soul of the nation" (Furbey, 1999 cited in Jones and Evans, 2013, p.3). Cities, it may be said, increasingly present themselves as 'hotel-like' lobbies, acting as symbolic gate-keepers of society; declarative of "a transcendental homelessness… the quintessential space of modernity" (Kracauer, cited in Leach, 1997, p.xv). "Here, in the space of unrelatedness" (Kracauer, 1995 [translation] 'The Hotel Lobby' cited in Leach, 1997, p.55), if we are to counter the strident march of alienation, then the importance of *how* regeneration takes place (Jones and Evans, 2013, p.7) remains as valid today as it has ever been. This paper asserts that visual meaning provides us with the how, before any other variable.

Theoretical framework

AMBIGUITY AND THE TROJANS OF AMBIGUITY

Trojans of ambiguity can be defined in this paper as *confused meaning*. Meaning that, when acted on, either through an intention or in the act itself, presents a threat to one or both parties in a contract. The threat lies specifically and ultimately in the betrayal of an expectation or expected outcome. The contract may be a social contract (implied) or a regeneration contract (an explicit outcome).

One trojan of ambiguity, for example on a macro-scale, that can be considered exposed lies in the projected benefits for ordinary people, of globalism; as "shrinking cities, temporary environments, toxic high streets and vacant sites are set to increase" (Cuthbert, 2017, p.143). Another is the watered-down mantra that 'form follows function'; to such an extent that function "has come to mean merely 'readable'… the architect is supposed to construct a signifying space wherein form is to function as signifier is to signified" (Lefebvre and Nicholson-Smith, 2011, p.144); that is, the signs are the cue to make the space readable. The sterility and banality (Marshall, 2008 cited in Boeing, 2018, p.10) of the signifying elements leaves us with "nothing to code and decode [which] has gone so far that some architects have even begun to call… for a return to ambiguity, *in the sense of a confused and not immediately interpretable message*" (Lefebvre and Nicholson-Smith, 2011, p.144, emphasis added).

Perhaps the thinking of Searle et al. offers the greatest hope for reconciliation by what he describes as the "fallacy of ambiguity" (Lefebvre and Nicholson-Smith, 2011, p.403), or by what Lefebvre calls a "false problem" (2011, p.420); between subjective and objective reasoning; in this case in and of our built environment.

> **The fact that a domain is ontologically subjective, doesn't mean that you can't have an epistemically objective science of that domain … Science is indeed epistemically**

> **objective, but there's nothing about the objectivity of scientific claims that prevent those claims from being about a domain that's ontologically subjective... so you can have a science of consciousness even though consciousness is ontologically subjective, and science is epistemically objective (Searle, 2015).**

In identifying underlying 'structural' problems in our cities, the importance of visual sustainability for regeneration cannot be overstated. Heft provides insight into how "behaviour settings and affordances constitute the ecological resources of a place, considered from a psychological point of view" (Heft, 2013). Cullen (1995, p.169) and Salingaros (1999) have identified and warned of a creeping phenomenon in which our built environment is slowly being stripped of visual richness and meaning. Rapoport (1990, p.81) refers to how ambiguity of information causes anxiety; conflicting with expectations (Rodaway, 2011, p.145); inevitably promoting an environment where people find it difficult to make decisions. This phenomenon is described by Peterson (2017) as freezing; where people can be reduced to a state of chaos, fighting to negotiate in and out of states of the unknown.

If Cuthbert is right, that "urban design has replaced urban planning to the extent that increasing private sector influence means a demand for an accelerated return on fixed capital assets" (Cuthbert, 2017, p.143) then the "shred of good news" he proclaims may help kick-start a more resilient form of regeneration. One in which practitioners have a fighting chance of stitching together pockets of our cities in a visually sustainable way. If we take account of Brenner's call to recognise the urban as a forcefield, an important concept is unearthed: that which we don't or can't see:

> **the urban is not just simply a territory that you can draw a circle around and then you focus on that… the urban is a force field of spatial transformations associated with capital accumulation, industrialization commodification. So, it's a very complex terrain of spatial transformations that takes many different morphological forms. The city is one (interviewed on pmilat 12 June 2014).**

It may be helpful then in terms of urban regeneration, to reframe the conversation around *that which we can't or don't see*. Visual richness, it may be argued, provides more certainty of purpose as a concept than ambiguity does. As Scruton says of ambiguous expression "each of these characters may be thought to be appropriate, but only one of them, at any moment will be *seen*" (Scruton, 1979, p.200). While the meaning may be interpreted differently by each person, the meaning cannot be accounted for in ambiguity. It can be argued that clarity of interpretation is the important part of encoding/decoding in our environment.

It may also be helpful for the remainder of this paper, to consider regeneration also in terms of regeneration of the 'landscape'; where landscape

> **is not merely an aesthetic background to life, rather it is a setting that both expresses and conditions cultural attitudes and activities, and significant modifications to landscapes are not possible without major changes in social attitudes… Landscapes are therefore always imbued with meanings that come from how and why we know them (Relph, 1976, p.122 cited in Rodaway, 2011, pp.127–128).**

COMPLEXITY IN URBAN REGENERATION

Another trojan may be said to reside in the interdependent relationship that exists between sustainable development and regeneration. The former guides policy framework for

regeneration while the latter acts as a portal of delivery for the principles of sustainability (Jones and Evans, 2013, p.149). This reciprocity, when taken together with the idea that our environment is made up of a network of complex adaptive systems (CASs), produces increasingly complex solutions that become increasingly insignificant in the real world. Rodaway provides us with some real-world examples for this complicated messaging by pointing out the diminishing returns we experience from our regeneration efforts. Particularly evident, he argues, in the effects of alienation on the individual in redeveloped heritage sites; where the hyper-real has become the new reality (2011, p.160). When regeneration produces themed environments that mimic not just shape but texture through use of materials, then a point has been reached of sensual confusion: where "all is visible yet strangely hidden from view" (2011, p.160). This confusion simply put, alienates people from the environmental processes that they normally rely on.

The danger for regeneration is in blurring the boundaries between the meaning of objects in space that we rely on for orienting ourselves. The negative effects of "historical simulation" (Wakefield, 1990, 113, cited in Rodaway, 2011, p.169) creates the conditions for complicated (as opposed to complex) and senseless layers of ambiguity in the name of regeneration. These conditions ultimately undermine the policy framework as well as the portal for delivery. It breaks apart both economic and social relationships and sets them off on an increasingly divergent course.

TURNING THE AMBIGUITY AROUND

Turning our attention to ways around the ambiguity, this paper asserts that the raison d'être for urban regeneration is embedded in the concept of visual sustainability. Visual sustainability through visual meaning, seeks out to disambiguate processes in complex systems, while retaining the 'magic' of emergence; that the whole is more than the sum of its parts. Complex systems may be simply described as "large networks of simple interacting elements which following simple rules produce emergent collective complex behaviour" (Complexity explorer, 2018j).

It is commonly understood in scientific circles (Complexity explorer, 2018b) that it is the environment in fact that acts as a 'machine for living in', a giant information processing machine; with computation occurring at all levels. While nature consists of analogue patterns distributed over time (Complexity explorer, 2018b), the advance of the digital realm has reinforced the existence of man-made patterns. Visual behaviour patterns should thus become apparent or emergent through computational modelling, since it represents the creative act that bore it. In thinking ahead to the Quayside case study, it is thus conceivable that visual meaning also exists in high tech environments.

Every instance of man-made endeavour consists arguably of simple 'patterns on patterns'; *appearing* to be complex, but in fact more fractal-like: curiously simple. Shannon information applies to the built environment in terms of how much information is contained in the message from the objects around us (Complexity explorer, 2018h). The predictability of the message however in much of modern architecture, even if there is information, has become problematic. With the first case study, the Heygate in mind, in regeneration projects the industry norm seems to consist of throwing away as much data as possible, despite much protestation to the contrary.

Several ideas stand out in terms of visual sustainability and future-proofing of existing built environments. Crutchfield's reference to the "degree of surprise…of unpredictability

in a system, or how random a system needs to be" (Complexity explorer, 2018c) is one such interesting concept. Mitchell points out how "the meaning of the information comes from information processing, that is, what the sender or receiver does upon sending or receiving a message… how self-organising systems process information in order to extract meaning" (Complexity explorer, 2018i).

Another interesting idea is in how the presence of seen and unseen networks in an environment relate in a structure of nodes and hubs. How can networks of visual meaning be compared with sustainability networks? The dynamics *of* networks versus dynamics *on* networks (Newman, 2003, p.11); how the information on networks changes appears to be strongly related to visual meaning. Can data from a visual network be reconciled with data from a sustainability network? The built environment and the social are networks. Many areas of the built environment can be thought of as self-organising systems, where "self-organization is the production of highly organized patterns or behaviours resulting from localized interactions within the components of the system without any central control" (Complexity explorer, 2018f). Networks in complex adaptive systems can be investigated through changes in the interacting agents (Case Western Reserve University, 2008). It can be argued that the nodes and hubs in an urban network of meaning represent concentrations of visual meaning. In regeneration projects this invisible matrix of activity should arguably be treated with the same importance as the physical constructs.

Then there is the idea that visual meaning is ideally suited to be classed as a self-organising system. Mitchell explains the *self* , that "behaviour arises only due to interactions within the system"; while *organising* refers to "the appearance of what we would call organized patterns" (Complexity explorer, 2018f). Visual meaning only arises due to the interactions, and the meaning produces organised patterns, which in turn produces the visual meaning.

In addition to these ideas there is the challenge of difference in thinking by people from different disciplines (Complexity explorer, 2018b). The notion of emergence in complexity theory is that "the complex behaviours we see from the group cannot easily be understood by adding up the behaviours of the individual components" (Complexity explorer, 2018f). This paper asserts that this is key to understanding successful urban regeneration: that the whole is more than the sum of its parts.

As human beings we simply love to seek out information. Information lies at the heart of complexity: "Although complex systems differ widely in their physical attributes, they resemble one another in the way that they handle information. That common feature is perhaps the best starting point for exploring how they operate" (Gell-Mann, quoted in Complexity explorer, 2018d). In cities, information is manifest through population levels and POIs (points or places of interest). This is arguably where emergent *visual* information in cities is situated at maximum levels of human interaction and concentration.

If meaning can concentrate in space and time, then it should be possible to study areas in a city that exist as nodes of meaning or POIs. How then may we correlate meaning with residents? What characteristics does the network between nodes possess? Why are some nodes in a city more sustainable or have more activity than others? Did the jobs and transport links arrive first, or did the meaning arrive first? What concentrations of other activity accumulate around these emergent constructs? Is visual meaning a form of survival? The theory of preferential attachment, that 'the rich get richer' is arguably closely intertwined with meaning. So how can we think about visual meaning in these kinds of networks?

UNDERSTANDING INVISIBLE INTERACTIONS

In responding to these types of questions, the use of agent-based modelling (ABM) is proposed as "idea models… to explore general mechanisms that underlie behaviour, explore the effects of different kinds of environments, different kinds of parameters on the behaviour, etc" (Introduction to Complexity: Models of Cooperation in Social Systems, 2018). These simulations will help to extract out conditions of meaning in preferential attachment structures. Holland strongly advocates for agent-based modelling or simulation models to understand complex adaptive systems; or to "describe a real-world system… as a proof of concept" Rand (Complexity explorer, 2018a).

A clear definition of how emergence is related to agent-based modelling can be found in Jankovic's work on emergence-based approach to designing (Jankovic, 2012). He contrasts the evolution and self-organisation of natural systems to human organisation in design: "unlike man-made designs, natural designs have evolved to highly sophisticated structures without conscious and careful planning, through the process of emergence" (Jankovic, 2012, p.327). For Jankovic, agent-based models are used to demonstrate how statistical and algorithmic approaches are instrumental to deal with complex systems by means of several simple coordinated rules. When simple design problems are observed in their entirety of possible outcomes, the number of variables and potential solutions can quickly spiral into very large numbers (Jankovic, 2012, p.330). Agent-based models run in computers are efficient in computing such complexity, especially if every single agent is considered for its own behaviour in relationship with its neighbours. This notion draws from the concept of cellular automata (Wolfram, 1983).

Before turning to how ABM may be applied to better understand the role of visual meaning in regeneration, the following three additional key concepts are proposed to locate visual importance in urban regeneration models and projects:

1. Visual sustainability may be hypothesised simply as: the process by which people are sustained and enriched in daily life through the visual relationship they hold dear to their surroundings.
2. Beauty, aesthetics and visual richness. *Beauty* perhaps is undeniable because, simply stated, we know it when we see it, emergent in the act of "aesthetic judgement" (Zangwill, 2014, p.1). "Beauty has traditionally been counted among the ultimate values, with goodness, truth, and justice (Sartwell, 2017, pp.1–4). *Aesthetics*, on the other hand in this paper, refers to cold evaluations (Makin, 2018, p.191)); not as "a 'hot' emotional reaction" (Makin, 2018, p.190) that cannot be reproduced in a laboratory. *Visual richness* talks more to the severe limitations of a "button-press methodology" (Haun et al., 2017, p.3) in determining richness of visual experience. Ultimately it means that we "open our eyes to the true richness of experience and to its neuronal substrates (2017, p.1). Direct perception and phenomenological experience are thus not considered ambiguous conflicts. In fact the recommendation by Haun et al. is that science should move beyond simplified binary data generation and to "analyse reports of experience more broadly" (2017, p.1).
3. Visual meaning exists along a "spectrum from the concrete to the abstract", a spectrum marked by object recognition; relations; and abstract relations. Important is that meaning is flexible and can change: "A given set of input data may be perceived in a number of different ways, depending on the context and the state of the perceiver" Meaning can change according to belief systems, intended goal, external context, and situational context (Chalmers, French and Hofstadter, 1992, pp.196–197).

MEANINGFUL AND MEANINGLESS ENVIRONMENTS

This study now turns to the famous Schelling model (Schelling, 1969) which can be adapted to demonstrate proof of concept, as an abstract representation, of segregation between *meaningful* and *meaningless* environments. Urban segregation (Feitosa, Le and Vlek, 2011) and Schelling's experiments demonstrate a deeper fault-line; that even at low preference level settings of a 30% bias (percentage of meaning desired by people), urban environments naturally coalesce into larger patterns that form distinct islands or groupings of meaningful and meaningless environments, which we can call dependent variable 1 (Figure 1).

A second dependent variable, in terms of correlation, can be introduced as a new layer and modelled over this typology of large distinct islands of information. In this case, at the 30% threshold, it is required that an agent have at least three neighbours of the same *economic status*. Using the parameters of the Schelling model, patterns should emerge representing groupings of similar wealth status. As land value drops, (along with the variable of visual meaning) neighbours move out of the system. This then activates 'developer' agents who profit from low land and property prices, and develop large-scale residential projects designed to attract. This in turn produces wealth through simple network dynamics, as certain nodes become more connected, the 'have's' increase over the 'have nots' purely as a result of the phenomenon of connectivity.

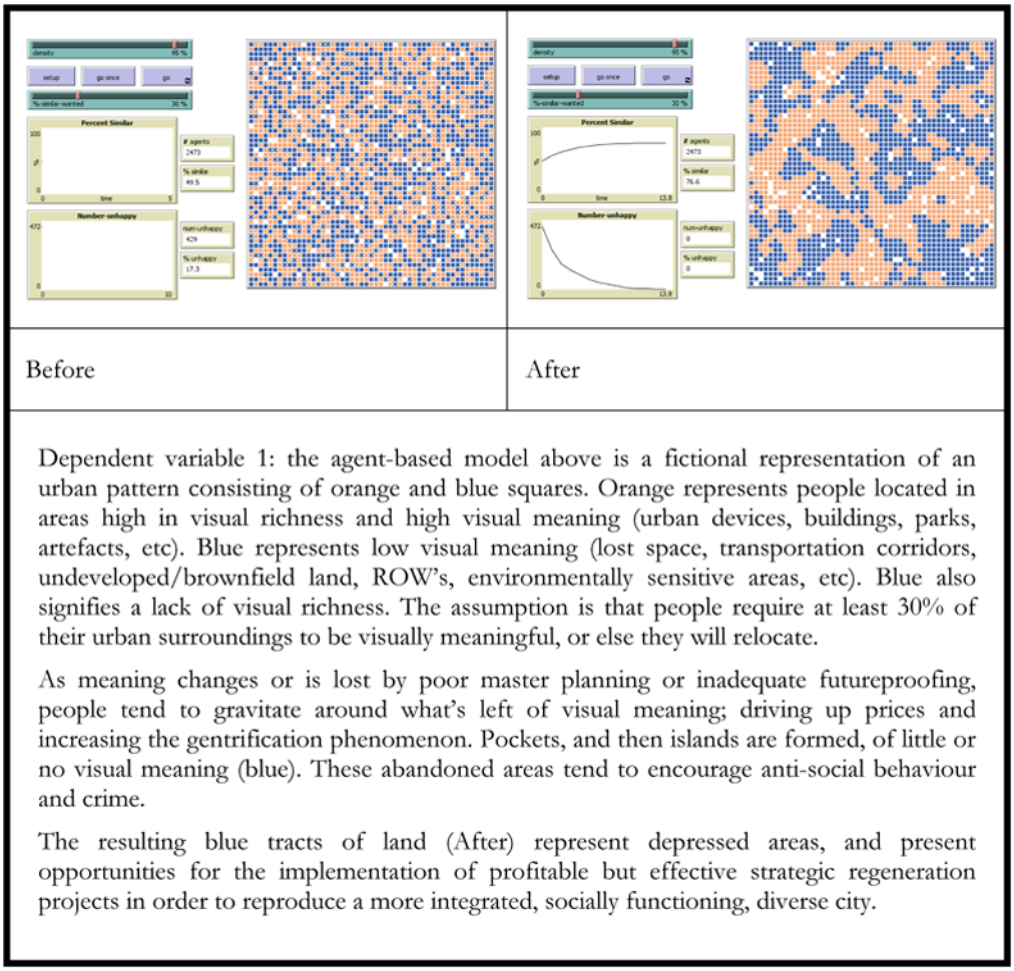
Regeneration thus occurs in response to new pricing structures, and the result is a decimation of affordable housing in an area that was once vibrant. However, in this new scenario it may be argued that visual meaning still remains a problem (Figure 2) because meaning now only exists as a simulacrum. It can be argued that entire islands of similar economic status and meaning are based on a combination of thematic design, speculative buying, and/or overseas investments; leaving these areas in dormant or uninhabited condition states; where visual meaning has been diminished or obliterated.

A tangential way to understand a concept like visual meaning is through a third set of variables, its building blocks. Many major discoveries occur simply through re-using existing; using previous inventions and combining them in new ways (Case Western Reserve University, 2008). So, the hypothesis is that in our visual world successful urban regeneration is predicated on visual sustainability: building on the existing visual information and not on an 'instant noodle' variety of meaning.

Holland claims that transition nodes, "the study of signals and boundaries, how they form, how they co-evolve… is central to understanding…especially about hierarchy" (Case Western Reserve University, 2008). His example of the building blocks of human faces offers the possibility using surveys, of recombining elements of buildings to establish new insights into visual meaning in the built environment.

This offers an intriguing parallel for urban regeneration. Holland asks that since, "there is no person in that next generation that is a copy of any person in the previous generation… what information being preserved from one generation to the next, if there's no copies?" (Case Western Reserve University, 2008). The answer he claims, lies in the building blocks; of recombining the uniqueness inherited from previous generations. Regeneration projects it can be argued, should treat environments in the same way: as an inheritance, indivisibly unique. This argument counters many claims by leading practitioners of copycat design of historical conditions in regeneration projects, if instead copying or imitating complex layers of visual meaning is passed on in the way Holland advocates. For Holland the key challenge is in "carefully phrasing your question; getting the question in a way that makes it susceptible to

some kind of simulation or theoretical attempt, and then spend time to discover the building blocks" (Case Western Reserve University, 2008).



Before	After

Dependent variable 1: the agent-based model above is a fictional representation of an urban pattern consisting of orange and blue squares. Orange represents people located in areas high in visual richness and high visual meaning (urban devices, buildings, parks, artefacts, etc). Blue represents low visual meaning (lost space, transportation corridors, undeveloped/brownfield land, ROW's, environmentally sensitive areas, etc). Blue also signifies a lack of visual richness. The assumption is that people require at least 30% of their urban surroundings to be visually meaningful, or else they will relocate.

As meaning changes or is lost by poor master planning or inadequate futureproofing, people tend to gravitate around what's left of visual meaning; driving up prices and increasing the gentrification phenomenon. Pockets, and then islands are formed, of little or no visual meaning (blue). These abandoned areas tend to encourage anti-social behaviour and crime.

The resulting blue tracts of land (After) represent depressed areas, and present opportunities for the implementation of profitable but effective strategic regeneration projects in order to reproduce a more integrated, socially functioning, diverse city.

Figure 1 Visual sustainability

This approach is ideal for what initially appears to be an ambiguous, ontologically subjective domain of knowledge such as visual sustainability. What then are the epistemic building blocks of visual sustainability? Perhaps the answer or innovation lies, as Holland states, in the "recombination of old building blocks" (Case Western Reserve University, 2008).

Case Studies

HEYGATE ESTATE INNER-CITY REGENERATION, LONDON

In comparison with Figure 1, the Heygate Estate regeneration (Figure 2) is a real representation of an urban pattern whereas in dependent variable 1 meaning changed but authenticity was lost, by inadequate futureproofing of local communities. People have been displaced without safeguarding what's left of visual meaning; driving up prices and adding to the phenomenon of gentrification.

Typical of ABM behaviour of dependent variable 2, it appears that aggressive financial models of privatisation can stimulate or diminish social interaction and meaning. This is further

inflamed by concepts of territory, where differences between public and private space have been camouflaged and what appears to be public is often private property. If activity is diminished because we feel uncomfortable or alienated, then social integrity will be compromised, by negatively biasing our participation in society; which is of course unsustainable.

The main differences between the fictional representation of urban pattern (Figure 1) and the Heygate example (Figure 2) lies in the process of intentional neglect by authorities over decades (Sheena, 2010; 35% Campaign, 2012; 35% Campaign, 2013; LSBUA, 2013; Larry And Janet Move Out, 2016). These conditions of alienation helped depress the area, and in so doing presented the ideal opportunity to negotiate and deliver on the terms of a lucrative regeneration project contract. One could argue the ambiguity that the Heygate was demolished by a top-down process masquerading as bottom-up.

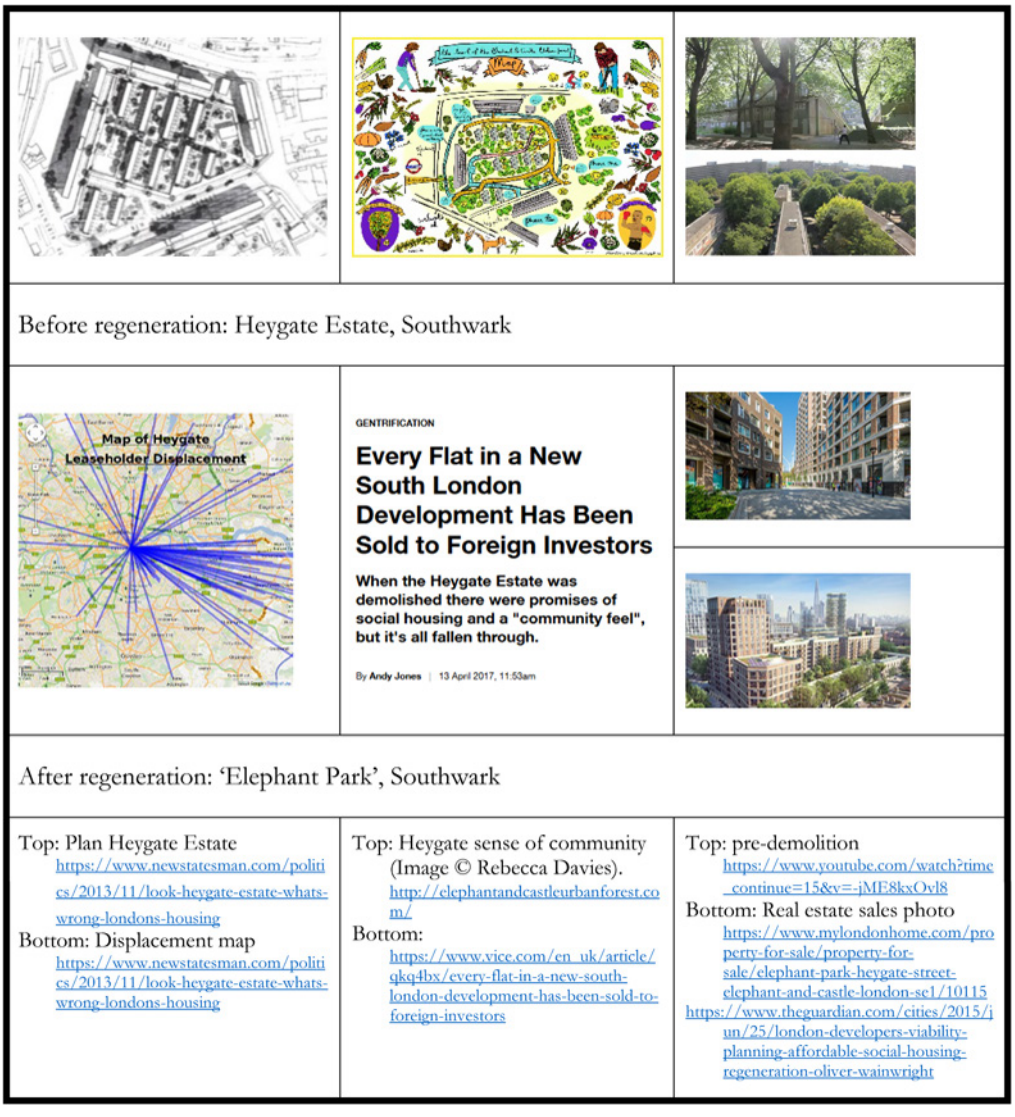


Figure 2 Heygate Estate becomes Elephant Park: controversial and fiercely contested urban regeneration.

Whether the new development, rebranded to Elephant Park, produces a more integrated, socially functioning, diverse part of the city is yet to be determined. Perhaps the final word

on what might have been; of a profitable regeneration that kept visual meaning intact, is best summed up in the following interview statement: "There isn't the evidence that this was a crime hot spot and that, that is an urban myth. What has happened here is that the grand ambitions to turn this into a very forward-thinking progressive environmentally friendly development have fallen apart, and we are left with the scraps now… what we're getting now isn't that planned, it's much more conventional, and I think that's a pity because this could have been a really forward-thinking place; which I think it will struggle to be now" (LSBUA, 2013).

SIDEWALK LABS' QUAYSIDE, TORONTO.

We turn our attention again from a messy, complicated, emotive process, to one free of 'baggage'. Sidewalk Labs is a company controlled by Alphabet Inc. (parent company of Google) and is the combination of an urban innovation organisation and a tech company that: "seeks to combine forward thinking-urban design and cutting-edge technology to radically improve urban life, in Toronto and around the world" (https://www.sidewalklabs.com/mission/). A new development in the eastern waterfront of Toronto called Quayside was introduced in 2017.

Figure 3 Context.
Source: (Sidewalk Labs, 2017, p.13). Credit: Sidewalk Labs.

Sidewalk Labs' Quayside sets out to be a very different urban environment, with the stated radical bottom-up approach in the design process. The development combines a physical layer (infrastructure, mobility, public realm and buildings) with a digital layer. The physical dimension has been conceived to be flexible over time (Sidewalk Labs, 2017, p.18). Buildings are considered flexible entities, with amenities and services accessible from any point in the neighbourhood. This removes the need for hierarchical distribution of urban space and elements.

Space is intended to be fluid and interchangeable, adapting to people's choices and activities. People are central to the spatial structure, and physical elements are responsive to their activities and interests. The public realm thus becomes adaptable, evolving and following individuals and their actions in space and time.

Where the physical dimension of the development is designed to be non-hierarchical, highly visible, and adaptable to follow the erratic behaviour of its inhabitants, the digital layer

is invisible and ubiquitous. Through a complex and interconnected system of sensors, cameras, microphones, LiDars, scanners, radio waves detectors, beacons, routers, hotspots etc., this layer enables a new level of insight into behavioural patterns, use of public space, security, as well as urban and building performances, including use of resources, mobility and waste management.

Figure 4 An absence of visual meaning; or is context the visual meaning?
Source: (Sidewalk Labs, 2017, p.13). Credit: Sidewalk Labs.

The presence of this ubiquitous and pervasive hidden digital layer and its impact on people's routines is key to understanding the value of this project in the context of visual sustainability. The more the internet of things (IoT) is deployed, the more its influence becomes apparent to individuals. For example, driverless cars are controlled by a central interconnected system that continuously gathers data from urban sensors and cameras displaced throughout the urban fabric. The system is not visible, but its physical ramifications (all the devices, sensors etc. that feed data into the system) and the technology that underpins its existence, are physically noticeable and increasingly present. And if cars are like buildings in this analogy, then the same concept applies to Quayside. The disconnection between physical elements (devices) and digital components (data, algorithms, analytics) is intended to incentivise individual behaviour.

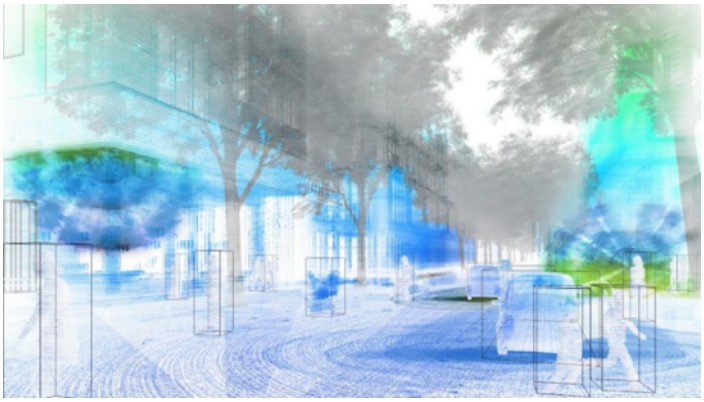


Figure 5 Physical and digital layers
Source: (Sidewalk Labs, 2017, p.71). Credit: Sidewalk Labs.

This point is strengthened by the concept promoted by Sidewalk Labs, that places individuals at the forefront of activity, as they are asked to continually reconfigure the urban space in which they live, and therefore the ways in which it is used. They are thus required to exercise a great level of subjectivity in both the interpretation of spatial use and personal judgements. Visual meaning will arguably be more accessible and programmable than ever before.

When technology takes control of the infrastructural, economic and more mundane mechanisms needed to run a neighbourhood by means of a centralised interconnected system, the emergence of two interesting characteristics becomes apparent. The first is of the elimination of ambiguity and therefore the elimination of unpredictability. If machines are running all the mechanics in the background without people being involved at any stage, this removes any degree of vagueness and indecision. By their nature, machines operate along a rigid protocol dictated by algorithms and an intricate system of scripts.

Figure 6 Visual intent
(Sidewalk Labs, 2017, p.25). Credit: Sidewalk Labs.

The second characteristic is the emergence of people's individuality and spontaneity. As the consequence of the elimination of unpredictability by computers, new patterns of use of space and behaviours around new visual meaning are likely to emerge. These two characteristics will, it can be argued, encourage the inhabitants of this new development to create their own visual meaning, articulating their own judgment on what they see and perceive. Such an approach advocates for a more humane side of technology and computer-driven developments (Tierney, 2019, p.14). Quayside triggers a process of sense-making in its inhabitants, asking them to reconfigure their own space and the ways in which not only to use space, but also to understand it interactively.

This induced creation of visual meaning results in continuous cycles of new ways of reconsidering the same built environment, as sense and values that each individual subjectively attributes to the development is constantly refreshed. Thus, the continuous demand for new understanding and new attribution of values to places of the physical and digital, becomes the main driver for the emergence of visual sustainability in this development.

Findings and discussion

The case studies present several interesting findings that can be summarised below.

Table 1 Summary of findings.

Project	Finding
Heygate	For whatever reason there was a failure to understand and deal with ambiguous meaning and intention. Ambiguity thus became a threat in two ways. Firstly, for residents whose lives were turned upside-down with no real recourse available to them. Secondly, for both the council and the developers; by significantly complicating the entire regeneration process.
	Social contracts are important and should not be ignored. They are implied in a diverse range of ways, from simple gestures to a complex array of verbal interpretation.
	Visual sustainability should never be underestimated in future regeneration projects. It simply refers to the reality that "people are sustained and enriched in daily life through the visual relationship they hold dear to their surroundings" (De Kock, 2019).
Sidewalk Labs	Elimination of ambiguity and therefore the elimination of unpredictability.
	Emergence of people's individuality and spontaneity

The potential Quayside offers this study is to highlight new typologies of regeneration through Holland's concept of building blocks, where a tabula rasa exists that can be built on; that when combined with cutting edge technology can provide the best possible conditions in which to understand again how cities may be made. One difference between the Heygate Estate regeneration and Quayside is in how these developments are 'front-loaded'. In the iconic Quayside development, the front-end consists of technology; while with the Heygate example the existent controversy of visual and environmental meaning dominated the early exchanges. However, in a trend likely to be repeated in Toronto, the absence of genuine affordability and partial discrimination based on access to certain housing standards in the Heygate conversion, remains controversial. Investment in big footprint, large-scale residential themed regeneration projects continue to amplify conditions of gentrification and speculative investment patterns.

Trojans of ambiguity in regeneration and affordable housing thrive particularly well, it can be argued, in iconic-driven redevelopment. "It is no longer a question of a false representation of reality (ideology), but of concealing the fact that the real is no longer real" (Baudrillard, 1983, p.25). The existence of a network of visual richness; of "experiential qualities of place" (Roberts, 2017, p.164) is fast becoming a rarity in many inner cities.

The idea that "Mentally people are forced to associate culture with 'great shiny building[s]' (Comunian and Mould, 2014, p.70) or risk being left behind, is similar to the idea that bigger or taller in cities is always better. These ideologies never seem to quite translate over as well as expected; perhaps only ever excelling as iconic elements by way of the commodity of scarcity, so helping stimulate public imagination by a notion of irreplaceability. For resilient regeneration to challenge the iconic grip on cities, we should instead actively seek to replace the cult of architecture with one driven by logical reflection (Salingaros, 2019). This study then suggests that Quayside is iconic not in a physical sense but by way of what it represents, its technology. Perhaps then this technology represents a vision for a future where individuals can be released from mundane tasks such as driving or shopping and have more free time. This will

arguably restore and reinforce urban attentiveness which can only be beneficial for visual urban spatial structures and visual sustainability.

Quayside was considered a good case study to contrast with Heygate, if only to highlight invisible needs of visual meaning; that technology can contribute to typological building blocks that can be iteratively deployed. It is similar in a way to the King's Cross redevelopment. In both no single element dominates the whole. Despite the duplicity of private space fawning as public space, there are aspects of the King's Cross regeneration, for example, that bind the social in a visually positive way (Regeneris, 2017). Nevertheless, this paper accepts that value in authentic iconic objects or precincts increases exponentially, and beyond our comprehension, over time. Emergent, durable visual properties are wonderful activators of the urban and social; extending self-similar ontological constructs out into the surrounding city. Think here for example of the Eiffel Tower and its effect on the fractal-like self-similarity of the surrounding city.

This paper anticipates therefore that Quayside will emerge as an iconic environment, less for its visual intent, but more likely because it represents conceptual emergence in the same way perhaps as the Pompidou Centre once did (Moore, 2017). Quayside represents a force that cannot be stopped: the proliferation of technology and artificial intelligence (AI). The promise of a new visual in a new city is irresistible. "What would a city look like if you started from scratch in the internet era—if you built a city from the internet up?" (Daniel L. Doctoroff, "Reimagining Cities from the Internet Up," [Medium] November 30, 2016, cited in Tierney, 2019, p.1). How it purports its existence from the internet up is yet to be seen. In the production of visual meaning the challenge will be to produce regenerative resilience in Toronto; not just another icon like the Pompidou.

Conclusion

This paper focused on the 'visual' in urban development and regeneration. A sense of déjà vu exists; of cascading linear events, oscillation between old and new. When all is new; how conditions change over time; when an intervention is mandated and by who; the intervention; and finally, the 'new-new'. The main takeaway is that even a brand-new smart city often acts as a self-fulfilling prophecy: most likely one day itself the host of a regeneration project. In each of these transitions visual meaning exists through a conscious and unconscious gathering together of assemblages of meaning. It's the meaning that becomes the glue, not the tech. We not only access physical variance, but we also access memory, and gather up emotions, associations, and relational linkage information.

Turning away from lessons learnt, from the emotive and often distressing dialogue of the Heygate experience, Quayside promises something completely different. In the process of foregrounding technology both invisible and visible, infrastructures provide a sense of optimism, of a new start, of bottom-up meaning. The difference is that one site (Quayside) is arguably free of people-memory', but on the negative side there is no 'people-memory'. It will take many years to develop. In this sense then visual sustainability in resilient regeneration is like an old tree. Once it has been chopped down, the magic is gone; which no amount of simulacrum will replace. Until of course a new tree grows old again and generates the same fractal-like compositions of memory and meaning that once existed in the old tree.

The main message of this paper is that visual meaning provides the resilience we seek in regeneration and urban renewal. The conceptual intersection lies in discarding ambiguity. One

such ambiguity is that affordable housing and inner-city living are mutually exclusive. This is simply not true.

On the positive side it appears that even the most depressed, neglected slum is capable of being retooled with visual meaning through social interaction; to once again become a smart sustainable part of the city. The main lessons to be learnt about active technology in the urban lies in producing the right conditions for growth. The right condition for growth depends from the outset on visual meaning. For growth to continue, visual meaning must remain intact over time. This paper asserts that visual sustainability represents 'the technology before the technology' and sits at the base of Maslow's hierarchy of human needs. These elements drive the 'how' in successfully creating smart sustainable urban networks.

References

35% Campaign, 2012. *Elephant & Castle - Greenest Regeneration Scheme in London*. [video online] Available at: <https://www.youtube.com/watch?v=M9H_K3msMSc> [Accessed 22 Apr. 2019].

35% Campaign, 2013. *Revisiting the Heygate*. [video online] Available at: <https://www.youtube.com/watch?v=zffKMFTbrBk> [Accessed 19 Apr. 2019].

Baudrillard, J., 1983. *Simulations*. Foreign agents series. New York City, N.Y., U.S.A: Semiotext(e), Inc.

Bell, S. and Morse, S., 1999. *Sustainability indicators: measuring the immeasurable?* London: Earthscan.

Boeing, G., 2018. Measuring the complexity of urban form and design. *URBAN DESIGN International*, [online] 23(4), pp.281–92. Available at: <http://link.springer.com/10.1057/s41289-018-0072-1> [Accessed 2 Feb. 2019].

Chalmers, D.J., French, R.M. and Hofstadter, D.R., 1992. High-level perception, representation, and analogy: A critique of artificial intelligence methodology. *Journal of Experimental & Theoretical Artificial Intelligence*, [online] 4(3), pp.185–211. Available at: <http://www.tandfonline.com/doi/abs/10.1080/09528139208953747> [Accessed 7 Feb. 2019].

Complexity explorer, 2018. *Agent-Based Modeling: Description, Explanation, Experimentation, and Analogy*. [video online] Available at: <https://www.youtube.com/watch?v=-q5oafB4140> [Accessed 1 Mar. 2019].

Complexity explorer, 2018. *Introduction to Complexity: Guest Spotlight, Doyne Farmer*. [video online] Available at: <https://www.youtube.com/watch?time_continue=1&v=n0miQxZPUvw> [Accessed 1 Mar. 2019].

Complexity explorer, 2018. *Introduction to Complexity: Guest Spotlight, Jim Crutchfield*. [video online] Available at: <https://www.youtube.com/watch?time_continue=1&v=SAU43m7qhR8> [Accessed 1 Mar. 2019].

Complexity explorer, 2018. *Introduction to Complexity: Information, Order, and Randomness*. [video online] Available at: <https://www.youtube.com/watch?time_continue=147&v=8UwcOaiA1m8> [Accessed 28 Feb. 2019].

Complexity explorer, 2018. *Introduction to Complexity: Information Processing in Biological Systems*. [video online] Available at: <https://www.youtube.com/watch?time_continue=96&v=GatlvjF_C_I> [Accessed 1 Mar. 2019].

Complexity explorer, 2018. *Introduction to Complexity: Models of Biological Self-Organization*. [video online] Available at: <https://www.youtube.com/watch?time_continue=2&v=YFnQUdk6bGQ> [Accessed 1 Mar. 2019].

Complexity explorer, 2018. *Introduction to Complexity: Models of Cooperation in Social Systems*. [video online] Available at: <https://www.youtube.com/watch?v=mjjvcymSd9Q> [Accessed 1 Mar. 2019].

Complexity explorer, 2018. *Introduction to Complexity: Shannon Information Part 1*. [video online] Available at: <https://www.youtube.com/watch?v=POT3P6rI95Q> [Accessed 1 Mar. 2019].

Complexity explorer, 2018. *Introduction to Complexity: Shannon Information Part 3*. [video online] Available at: <https://www.youtube.com/watch?time_continue=217&v=-_cAv6bTn3k> [Accessed 1 Mar. 2019].

Complexity explorer, 2018. *Introduction to Complexity: Wrapping Up*. [video online] Available at: <https://www.youtube.com/watch?v=_xs6-V83Apk> [Accessed 1 Mar. 2019].

Comunian, R. and Mould, O., 2014. The weakest link: Creative industries, flagship cultural projects and regeneration. *City, Culture and Society*, [online] 5(2), pp.65–74. Available at: <https://linkinghub.elsevier.com/retrieve/pii/S1877916614000174> [Accessed 29 Oct. 2018].

Cullen, G., 1995. *The concise townscape*. Oxford ; Boston: Butterworth-Heinemann.

Cuthbert, A., 2017. Urban decay and regeneration: context and issues. *Journal of Urban Design*, [online] 22(2), pp.140–43. Available at: <https://proxy.library.lincoln.ac.uk/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=121611856&site=eds-live&scope=site> [Accessed 10 Mar. 2019].

de Jong, M., Joss, S., Schraven, D., Zhan, C. and Weijnen, M., 2015. Sustainable–smart–resilient–low carbon–eco–knowledge cities; making sense of a multitude of concepts promoting sustainable urbanization. *Journal of Cleaner Production*, [online] 109, pp.25–38. Available at: <https://linkinghub.elsevier.com/retrieve/pii/S0959652615001080> [Accessed 11 Jan. 2019].

De Kock, P.M., 2019. *The Meaning in Seeing: Visual Sustainability in the Built Environment*. AMPS Proceedings Series 17.1. Education, Design and Practice – Understanding skills in a Complex World. Stevens Institute of Technology, USA. 17 – 19 June (2019), pp.69–77.

Evans, J. and Jones, P., 2008. Rethinking Sustainable Urban Regeneration: Ambiguity, Creativity, and the Shared Territory. *Environment and Planning A*, [online] 40(6), pp.1416–34. Available at: <http://journals.sagepub.com/doi/10.1068/a39293> [Accessed 10 Jan. 2019].

Feitosa, F.F., Le, Q.B. and Vlek, P.L.G., 2011. Multi-agent simulator for urban segregation (MASUS): A tool to explore alternatives for promoting inclusive cities. *Computers, Environment and Urban Systems*, [online] 35(2), pp.104–15. Available at: <https://linkinghub.elsevier.com/retrieve/pii/S0198971510000608> [Accessed 18 Apr. 2019].

Gigerenzer, G. and Todd, P.M., 1999. *Simple heuristics that make us smart*. Evolution and cognition. New York: Oxford University Press.

Haun, A.M., Tononi, G., Koch, C. and Tsuchiya, N., 2017. Are we underestimating the richness of visual experience? *Neuroscience of Consciousness*, [online] 2017(1). Available at: <https://academic.oup.com/nc/article/2017/1/niw023/2970153> [Accessed 31 Aug. 2018].

Heft, H., 2013. *The Ecological Approach to Perception and Action.* [video online] Available at: https://www.youtube.com/watch?v=k4fKBqu-Ris [Accessed 12 December 2018].

Jankovic, L., 2012. An Emergence-based Approach to Designing. *The Design Journal*, [online] 15(3), pp.325–46. Available at: <https://www.tandfonline.com/doi/full/10.2752/175630612X13330186684150> [Accessed 18 Apr. 2019].

Jones, P. and Evans, J., 2013. *Urban regeneration in the UK*. 2nd edition ed. Los Angeles: SAGE.

Larry And Janet Move Out , 2016. *Larry And Janet Move Out: a documentary about the Heygate Estate, Elephant and Castle*. [video online] Available at: <https://www.youtube.com/watch?v=MvSmC7susNI> [Accessed 19 Apr. 2019].

Leach, N. ed., 1997. *Rethinking architecture: a reader in cultural theory*. New York: Routledge.

Lefebvre, H. and Nicholson-Smith, D., 2011. *The production of space*. Nachdr. ed. Malden, Mass.: Blackwell.

LSBUACCOUNT, 2013. *Heygate Estate: A Troubled Story*. 2013. [video online] Available at: <https://www.youtube.com/watch?v=GQXkbBzkT28&feature=youtu.be> [Accessed 19 Apr. 2019].

Makin, A.D.J., 2018. *The Gap Between Aesthetic Science and Aesthetic Experience*. p.30.

Case Western Reserve University, 2008. *Modeling Complex Adaptive Systems*. Directed by J.H. Holland. Available at: <https://www.youtube.com/watch?v=6aN6PlsvkpY&feature=youtu.be> [Accessed 22 Feb. 2019].

Moore, R., 2017. Pompidou Centre: a 70s French radical that's never gone out of fashion. *The Observer*. [online] 8 Jan. Available at: <https://www.theguardian.com/artanddesign/2017/jan/08/pompidou-centre-40-years-old-review-richard-rogers-renzo-piano> [Accessed 16 May 2019].

Newman, M.E.J., 2003. The structure and function of complex networks. *SIAM Review*, [online] 45(2), pp.167–256. Available at: <http://arxiv.org/abs/cond-mat/0303516> [Accessed 25 Feb. 2019].

Owen, C. and Dovey, K., 2008. Fields of sustainable architecture. *The Journal of Architecture*, [online] 13(1), pp.9–21. Available at: <http://www.tandfonline.com/doi/abs/10.1080/13602360701865373> [Accessed 31 Aug. 2018].

Peterson, Jordan B., 2017. *2017 Maps of Meaning 1: Context and Background*. [video online] Available at: <https://www.youtube.com/watch?v=I8Xc2_FtpHI&list=PL22J3VaeABQAT-0aSPq-OKOpQlHyR4k5h&index=1> [Accessed 22 Aug. 2018].

Peterson, Jordan B., 2017. *2017 Maps of Meaning 8: Neuropsychology of Symbolic Representation*. [video online] Available at: <https://www.youtube.com/watch?v=Nb5cBkbQpGY&list=PL22J3VaeABQAT-0aSPq-OKOpQlHyR4k5h&index=8> [Accessed 22 Aug. 2018].

Searle, John., 2015. *Perception & Philosophy of Mind. Interview on Philosophy Overdose* [video online] Available at: <https://www.youtube.com/watch?v=Oh2NylJZRHs&feature=youtu.be> [Accessed 15 Dec. 2018].

pmilat, 2014. *Neil Brenner : Urban Ideologies and the Critique of Neoliberal Urbanization*. [video online] Available at: <https://www.youtube.com/watch?v=7wjLEdK0LP0&feature=youtu.be> [Accessed 21 Jan. 2019].

Rapoport, A., 1990. *The meaning of the built environment: a nonverbal communication approach*. Tucson: University of Arizona Press.

Regeneris, 2017. *The Economic and Social Story of King's Cross*. [online] Argent LLP. Available at: <https://www.argentllp.co.uk/content/The-Economic-and-Social-Story-of-Kings-Cross.pdf> [Accessed 16 May 2019].

Roberts, M., 2017. Urban design, central London and the 'crisis' 2007–2013: business as usual? *Journal of Urban Design*, [online] 22(2), pp.150–66. Available at: <https://www.tandfonline.com/doi/full/10.1080/13574809.2015.1106914> [Accessed 10 Mar. 2019].

Rodaway, P., 2011. *Sensuous geographies: body, sense, and place*. 1. iss. in paperback ed. London: Routledge.

Salingaros, D.N.A., 2019. *Twentieth-Century Architecture as a Cult*. [online] Available at: <https://www.newenglishreview.org/custpage.cfm?sec_id=189607> [Accessed 16 May 2019].

Salingaros, N.A., 1999. *Urban Space and its Information Field, by Nikos A. Salingaros*. [online] Available at: <http://zeta.math.utsa.edu/~yxk833/UrbanSpace.html?utm_medium=website&utm_source=archdaily.com> [Accessed 3 Sep. 2018].

Sartwell, C., 2017. Beauty. *The Stanford Encyclopedia of Philosophy*, p.18.

Schelling, T.C., 1969. *Models of Segregation*. p.7.

Scruton, R., 1979. *The aesthetics of architecture*. London: Methuen.

Sheena, 2010. *Heygate Lives: Demo of interactive locative narrative on iPod*. [video online] Available at: <https://www.youtube.com/watch?v=y4T_1KHw1EU> [Accessed 22 Apr. 2019].

Sidewalk Labs, 2017. *Sidewalk Labs RFPNO. 2017–13*. [online] Available at: <https://sidewalktoronto.ca/wp-content/themes/sidewalktoronto> [Accessed 18 Apr. 2019].

Tierney, T.F., 2019. Toronto's Smart City: Everyday Life or Google Life? *Architecture_MPS*. [online] Available at: <https://scienceopen.com/document?vid=665c1905-950b-4bbe-ac52-570d5a796535> [Accessed 19 Apr. 2019].

UN, 2019. *About the Sustainable Development Goals*. [online] UN Environment. Available at: <http://www.unenvironment.org/explore-topics/sustainable-development-goals/about-sustainable-development-goals> [Accessed 28 Oct. 2018].

Wolfram, S., 1983. Statistical mechanics of cellular automata. *Rev. Mod. Phys.*, [online] 55(3), pp.601–44. Available at: <https://link.aps.org/doi/10.1103/RevModPhys.55.601>.

Zangwill, N., 2014. Aesthetic Judgment. *The Stanford Encyclopedia of Philosophy*, p.17.