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Topological London

Kris Erickson[1]

Abstract: This chapter considers the topological ordering of urban space enabled by mobile computing devices, using London as a field site and example. Building on theory developed by Scott Lash, Rob Shields and others, I first distinguish between virtual and topological figurations of the city. I then consider the various implications of topological spatiality for urban politics, before moving on to an attempt to empirically develop a typology of mobile applications centred on London, each offering different opportunities for urban encounter and representation. The central argument advanced in this chapter is that mobile-enabled topologies are important and increasingly routine social imaginaries with the potential to radically disrupt other kinds of socio-spatial order.

In 1931, Henry Charles Beck's map of the London Underground revolutionised urban transport by offering passengers the ability to visualise their journey as a series of interconnected transfer points rather than a tangle of separately operated railway lines, which it was in actual fact. Beck aimed with his representation to simplify the task of charting one's route through unfamiliar terrain, and he did this by straightening out paths along horizontal, vertical, or diagonal lines, adding tick marks to denote stations and diamonds to symbolise interchanges (see Figure 1). By systematising the graphic design and jettisoning dependence on cartographic accuracy, Beck invented a new language for urban mobility that was rapidly copied by other cities around the world.

At the same time that London has risen in prominence as a global financial centre, the Tube map has itself become a commodity in the networked information economy, where symbolic exchange, more than the movement of actual, tangible goods, characterises economic production in late capitalism. The London Underground has become a ubiquitous and iconic symbol of interconnected 21st century life, along with other trappings of frictionless globalisation: airport coffee shops, familiar consumer brands and 24-hour news.

The status of economic, social and political life in the age of interconnected global capitalism has been a topic of intense academic study since the 1970s, with a vast body of work exploring the articulations, disconnections and transformations wrought by the transition from fordist production in the early 20th century to post-fordism and the rise of the information economy by the end of the century (Jessop, 1988; Harvey, 1989; Lash & Lury, 2007). Theorists turned to the concept of the network to make sense of connections between actors and places that seemed to operate according to a capricious logic, rewarding some nodes (New York-London-Tokyo) while punishing others (the hinterland, the Global

[1] Lord Kelvin Adam Smith Research Fellow, University of Glasgow.
Kristofer.erickson@glasgow.ac.uk

South) depending on one's position in the spatial or social order (Castells, 1996; Latour, 2005). Urban centres became locked in competition as they sought to secure investment from global capital which circled the Earth like a plague of locusts (Mitchell, 2003, p. 165). Cities and regions responded with 'cultural planning', efforts to emulate the success story of places like California's Silicon Valley by attracting young, hip and digitally literate creative people (Florida, 2005; Kovacs, 2011). The traces of this approach are visible in the curious non-places such as those surrounding London's 'Silicon Roundabout' cluster. By the early 2000s, the network had become social as well as global, making us entrepreneurs and curators of ourselves, enjoining us to 'add' new connections and reward our friends with 'likes'. Our lives increasingly reflect the topological interconnections of Beck's vision for modern city life.

Although we now routinely reside and act within them, global information networks remain largely inaccessible to local political governance and critique. In light of controversy surrounding surveillance activities by the NSA and tax sheltering techniques used by American Internet firms, the problem is acutely experienced by European citizens. Scholarship on political activism has remained focused on the urban (and its network linkages) as a significant and contestable site of struggle, evidenced recently by the occupy movement and other social-media augmented protests in opposition to economic austerity (Castañeda, 2012; Dowling et al, 2012).

Mobile networked technologies are implicated in this contemporary urban politics. Protests in London in the summer of 2011 were widely reported to have been coordinated over social media networks such as the Blackberry Messenger (BBM) service (Fuchs, 2012). Much of the scholarship on urban politics has focused on the role of networked technologies in facilitating and coordinating offline social movements, to understand changing and co-constitutive relationships between personal, everyday technologies and society. A smaller but growing body of work draws attention to the way that mobile technologies are themselves contestable, and besides routing political action through their networked architectures, themselves are potential sites of political movement, struggle and understanding. This chapter contributes to discussions on the politics of technologically-mediated urban mobility, by examining possibilities offered to users of mobile applications (apps) in London.

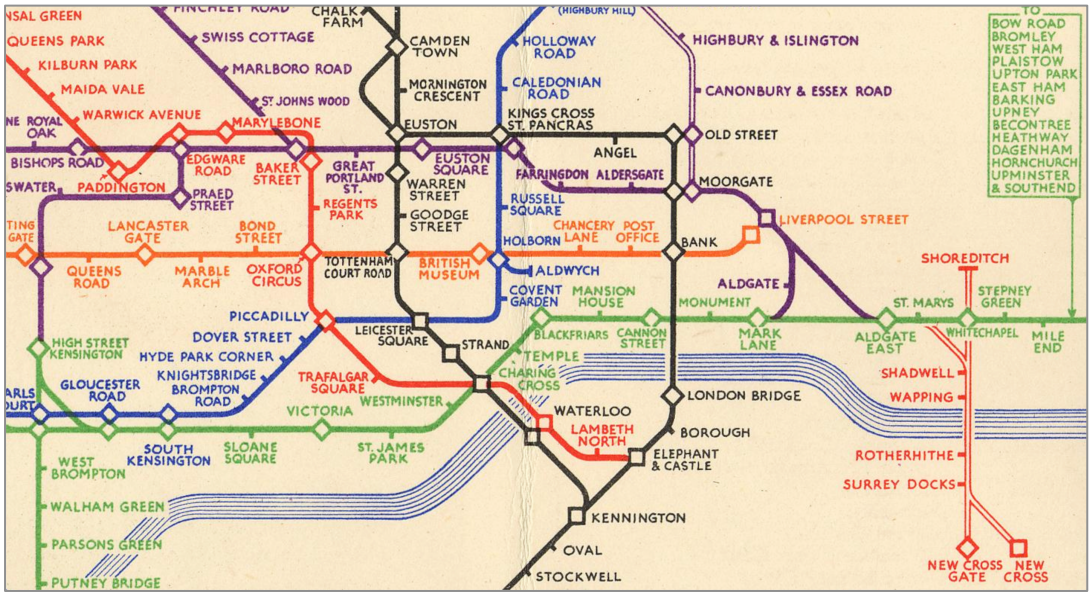

Figure 1. Detail of 1933 printed edition of Beck's London Underground map.

In this chapter, I will argue for an interpretation of technologically-mediated contemporary London not as a space of networks, or a virtualised space, but as a topology. Drawing upon recent theory by Lash (2012) which develops a historical post-Cantorian interpretation of topology as a space of social imaginary, I argue that certain mobile technologies enable movement beyond the virtual, with its own challenges for political subjectivity, towards a new and highly abstract space where possibilities for political engagement with the urban are re-ordered according to a topological, relational logic. This way of thinking and being in the world is compared with earlier critiques of the alienating effects of symbolic capitalism by members of the Situationist International (S.I.). Situationist strategies of the *dérive*, *détournement* and *rencontre* were developed to confront the Euclidean geometric closures of monumental urbanism, which were seen to inhibit possibilities for real connection between human beings and their built environment. The predictable geometric ordering of urban space was seen as anathema to disorderly, authentic encounters between people, and promoting such encounters became a key aspect of the situationist project. Today, the problem is rendered more complex for urban dwellers who hold in their hands devices which can re-arrange and cut across space according to software-coded logics, in some cases rendering the city as a topology. But what are the opportunities for political and social connection in topological space? Proceeding from the situationist dissatisfaction with older geometric urban cartographies, I propose a methodology for assessing the capacity of new mobile interactive applications to promote encounters between Londoners and their city.

Distinguishing virtual and topological abstractions

In the discussion of mobile and spatial information technologies that will follow, it is important to distinguish between different technological visions of the city, of which the topological is only one configuration (albeit increasingly so).

When personal computers entered mainstream consumer culture, they were accompanied by a discourse of virtuality, expressed in hacker fantasies of zooming through 'cyberspace' as a disconnected avatar. This conception of empowered individual netizen was offered against prevailing cybernetic visions of centrally commanded intelligent systems. Perhaps the most famous of these was British cyberneticist Stafford Beer's effort to build an omnipotent computerized command room for the Chilean government in the early 1970s (Axelrod & Borenstein, 2009). The eclipse of the concept of the virtual as popular entertainment rather than as a technique for governing complex social relations distorted public opinion about what it meant to live in virtual space as a political subject. Commonplace invocations of the virtual relegated it to a kind of escapism, through which one might leave the 'real' and achieve satisfying but ultimately illusory fulfilment in the unreal world of the computer. Of course the advent of 'increasingly personalized computing' achievable through mobile and wearable technologies renders escapist critiques less salient and less possible (Wilson, 2014; also see Deuze, 2011).

Rob Shields (2003, 2006) suggests that we understand the virtual not as an opposition to the 'real' but rather as its immaterial although highly effective twin. For Shields, following Deleuze and Proust, the virtual is 'real without being actual, ideal but not abstract' (2006, p. 284). Although not materially actualised, the virtual exists in direct relation to the materially real. After all, Shields reminds us, a virtual office is as much a real office in its purpose and effects. So too might a virtual representation of a city have effects

for its residents: as a model, a *maquette*, a projection of traffic flows and future growth upon which planners decide. London was extensively virtualised in advance of the 2012 Olympic Games, both to plan architectural development and to prepare security forces and emergency responders (see Figure 2).

Figure 2: A virtual projection of London used to prepare security forces in advance of the 2012 Olympics. *Image credit: AEgis Corporation*

Virtual representations are possible to render via mobile technology, but not all mobile-enabled visualisations are virtual. In contrast with the 3D projection of London above, Beck's Underground map is not a virtual representation of the city, but a topological one. With enough determination, one might reconstruct a material replacement for London by working from the plans contained in AEgis corporation's 3D software. The same is not true of Beck's representation, which in fact does not represent London at all, but a series of possibilities contained within its network of underground tunnels.

For Lash (2012) these topological spaces warrant further attention and differentiation from virtual spaces, in order to progress what he considers a 'mathematical turn' in social theory leading from Badiou's project of translating Georg Cantor's mathematics of set theory into philosophy (2012, p. 263; See Badiou, 2009). Cantor's contribution to mathematics, further refined in axiomatic set theory and expanded in topological mathematics, offers to Badiou an ontology which is consistent with multiplicity while also being internally consistent and formalisable (Bowden, 2012). Set theory enables comparison of seemingly incomparable groups (such as infinite series of numbers) by describing correspondence (bijection) between elements of multiple sets. Sets can be described topologically according to corresponding properties and transformed in such a way that elements retain their topological relationship (homeomorphism). Topological spaces are abstract constructs built out of equivalences between the properties of points which can be arranged in relational space. Lash refers to the philosophical status of topological space as a 'self-organising socio-technical imaginary', in order to distinguish it from Euclidean abstractions, including those we might consider 'virtual':

> 'In topology the virtual does not generate the actual. […] A circle and a square are topological equivalents. They are not topographically equivalent, yet they belong to the same topological set. This is the set of their shared properties, such as being planar and having an inside and an outside separated by a boundary. […] The movement, the process at stake is not the generation of an actual by a virtual, but the deformation of, as it were, two actuals into one another via their topological properties.' (Lash, 2012, p. 265)

Lash's project is partially to think through the implications of the cultural object as topological figure. Cultural objects, which are the exchange commodities of the global culture industry, are topological in the sense that they de-form into one another via equivalences in their properties. For Lash, the underlying framework for the topological equivalence of brand images is intellectual property and in particular, trade mark. The relationship between two brands as protectable IP is the 'shared property of the morphing contemporary cultural object.' (2012, p. 277).

Of course, corporate brands and trade marks are only one set of symbols used and exchanged in the information economy. The mobile technologies and devices which underline daily lived experience are, on one hand, reducible to their brand markings. But these technologies also permit topological deformations in other ways: mobile devices function as converged platforms, capable of accessing software applications which, due to the shared language of programming and information protocols such as GPS, are able to communicate with other applications. In fact, the reimagining of the city and indeed of all social space into the so-called 'Internet of things' is facilitated by the confluence of these two socio-technical conditions of convergence and equivalence.

Three main features of topological space differentiate it from other kinds of material and virtual space, with implications for the politics of urban mobility:

1. Topological spaces are not real or virtual, but imaginary;
2. Topological mappings re-order space according to functional equivalencies;
3. Topological objects deform into one another according to these equivalencies.

First, topological spaces are imaginary as opposed to virtual spaces which are idealisations or extensions of the real. In that sense they are, according to Lash, a kind of 'social-imaginary'. The political meaning of the imaginary status of topological space is difficult to discern and is still emerging from this new literature. One thing which is not clear is how much correspondence matters between a topology and real space. In the London Underground map, the City branch of the Northern line is shown to lie east of Mornington Crescent station, when in actuality it passes to the west. That fact does not seem to alarm Londoners who rely on the topological information contained in the map in their daily commute. On one hand, topologies can only exist by consensus obtained from users of the topological figure in social practice. On the other hand, the imaginary status of the topological map seems to offer potential for new politically productive imaginings and configurations.

Second, rather than describe Euclidean geometric forms and distances, topologies describe relational information between elements residing in sets with equivalence. In Lash's deployment of topology as analytic to understand political subjectivity in the information economy, making things equivalent renders them easier to transact. This is the basis of the processes of economic and cultural globalisation (digitalisation, standardisation, protocols, logistics). Continuing with the London Underground example, in the topological configuration, Finsbury Park and Shepherd's Bush become equivalent to one another

because they lie in Zone 2. This functional equivalence elides other non-equivalences in the socio-cultural reality of lived experience in these places. Topological ordering promotes a kind of totalism which extends the software-sorting of places predicted by 'big data' algorithmic governance (Dodge et al, 2009). The latter makes reference to data inductively generated from 'real' transactions and behaviours, while the former is a deformation of space to correspond to a social imaginary.

Third, topological space enables the deformation of objects into one another according to their shared properties (Lash, 2012, p. 264). This vertigo-inducing feature makes topological organisation generative for informational capitalism. From the perspective of Transport for London, all passengers in the network are interchangeable. Topologically, I deform into you because we are both ticket-holders of a 2-zone fare. Never mind that I am traveling to Islington while you are going to Kensington. This de-formational movement, enabled by topological ordering, may engender new kinds of political subjectivity or it may re-produce certain kinds of subjects (for example consumers of Transport for London's services).

Topological systems are, like the London Tube map, designed to cut through the messy friction of the real. They both permit and exalt systematic and relational thinking. Topologies are imaginary spaces, but imagined by whom? In order to achieve consensus as social-imaginaries, topological understandings must be collectively sustained by social actors. But topological orderings also reflect the imaginations of people working in a particular software design paradigm which appears to be animated by a distaste for friction and disorder. There is, in a topological model, nothing which cannot be relationally 'fixed' within the boundaries of the figure. The topological design paradigm for mobile information services emerges both from the functional limitations of computer code and from a cultural progression of the Californian Ideology and the more diffuse startup ideology which has superseded it (Barbrook & Cameron, 1996).

Despite the efficiencies that mobile technologies seem to apport to everyday life, they have become the focal point for popular critiques, some of which have achieved the level of moral panics. These appraisals have variously characterised mobile technology as frivolous, addictive, antisocial, fetishistic and co-incident with a disaffected and dangerous urban youth culture. Critiques have tended to deploy either the medicalised discourse of addiction or a criminological rhetoric of anonymous anti-social behaviour. However, perhaps mainstream anxiety about mobile technology is driven less by fear of virtual escapism, and more by its tendency to present anti-Euclidean political opportunities.

Mobile applications have the potential to disrupt not only the geometric capacity of authorities to monitor space; they also disrupt markets and social relations. For example, the anonymous dating application *Grindr* leaps across spatial and social boundaries to create information linkages and opportunities for erotic couplings that are independent from material infrastructure of social interaction. The popular transportation app *Uber* does the same for taxis and is also independent of the regulatory, policy and material infrastructure which organises the taxi driving profession. Using Lash's language, the geolocational capability of the mobile phone transforms the problem of finding a taxi and the problem of finding a mate into functionally equivalent topological problems. Mobile application developers, speaking the language of networked information services are geared up to solve these problems using the same approach: anonymised geolocative matchmaking.

The kinds of problems and opportunities which are opened up by mobile technology are reflected in earlier dissatisfaction with urban space and social relations articulated in another era by the situationist movement, which sought to reconnect the lives of everyday people with a built environment seen to increasingly reflect the interests of commercial exchange rather than individual human agency. The following section outlines some of the

tactical and methodological responses developed by the situationists in response to issues which resonate with present-day anxieties about mobile technology: its capacity to produce disconnection and abstraction from the built urban environment.

The Situationist International encounters London

In September 1960, the fourth conference of the Situationist International was held in London, at the British Sailors Society hall in Limehouse. Situationism, which grew out of the avant-garde movement of Lettrism in the 1950s, circulated through a countercultural network connecting Paris, Berlin, London, Brussels, Geneva and a cluster of other European cities. The movement united an interest with the traces of contemporary capitalism on the urban landscape, and the development of tactics for resisting the geometric and temporal patterns of life imposed by the spectacular capitalistic society. These tactics grow largely from the practice of psychogeography, a method of exploring space which invited participants to relinquish prior expectations and commitments and drift (*dérive*) through space according to chance, along the way sensing the psychological atmosphere of each portion of the landscape. The purpose of this technique, along with other techniques of engagement promoted by the situationists, was to destabilize the expectations, rhythms and ordering of capitalist urban existence.

A unit of philosophical importance for the situationists was the encounter. Encounters were seen to encapsulate authentic connections between individuals as well as their surroundings, in opposition to the routinised interactions that characterised most of life in the modern city. Psychogeography and more aggressive tactics of *détournement* and the construction of situations, were above all pursued as a means to promote the emergence of new encounters, thus actively subverting other kinds of spatiotemporal order.

On the fist day of the London conference on 24th September 1960, S.I. member and urbanist Attila Kotányi proposed a radical means of statistically measuring, until that moment, the efficacy of situationist efforts. If the unit of analysis was the encounter, then societies could be compared on the basis of their capacity to promote encounters, which could be objectively calculated:

> 'We know that, for a variety of reasons, these encounters do not produce themselves. The lack of encounters can be expressed by a concrete number, which could characterise the historical state of the world […] Our activities, flowing from this analysis, must *practically* critique the reasons for why there are no encounters (independently of all 'progress' in the means of communication, for example) […] This is the minimum required for the construction of situations.' (Debord et al, 1960, p.19)

Of particular importance in Kotányi's critique was the acknowledgement that the technologies of communication whose constant improvement characterised modern life were not sufficient, on their own, to generate new encounters of the politically productive sort he envisaged. The members then spent the rest of the day discussing the implications of such an instrumentalist approach for the status of situationism as an international social movement. If Kotányi's proposal was not uniformly endorsed by the other nine attending members of the S.I. (such propositions rarely were), it nevertheless cast light on the problem of empirical and objective measurement of the common activities of S.I. adherents, even if there was lack of consensus about rationalisation of the movement as a collective political endeavour. Kotányi himself continued to be interested in the political as well as the

spatiotemporal configurations of the city, turning his attention to what he saw as the geometric imposition of urban planning, remarking in 1961 as the 'Director of Unitary Urbanism' that, 'We are living under a permanent curfew. Not just the cops — the geometry.' (Kotányi & Vaneigem, 1961).

Given the challenge of characterising the political opportunities presented by topological space as presented to us via mobile technology, is it possible to extend Kotányi's search for an empirics of urban encounter? The next section outlines one possible methodology to account for and enumerate the possibilities present in different mobile spatial technologies. Taking London as the field site as the situationists did some half-century ago, one might in this case generate a typology of ways of being in the urban environment, as well as gain a sense of the intensity and direction of movement of technologically-mediated everyday life.

A method to characterise mobile encounters

Digital networks offer up a banquet of data, not only in the service of advertisers who seek to locate, track and connect with consumers, but also for sociologists seeking to understand the patterns of life as represented in traces left by users as they interact in space. In order for mobile platforms to perform tasks, they must be furnished with applications (apps), some of which, like geolocative mapping software, come pre-loaded on a user's device as a default. Other apps must be chosen by the user and downloaded to their device before being used. Platforms containing a selection of commercially available apps, are to a certain extent open to public view and can be approached empirically.

Content analysis of some 252 mobile applications residing on the Google Play download service and containing the word 'London' in their description offers a window into the mobile practices of people living in – and moving through – the city. In order to render a wide range of software applications countable and comparable, such a content analysis technique must first decide the dimensions of individual apps to be used for comparison, and secondly define the operationalized variables which will be recorded in order to generate 'data' from the observations.

Much of the information available about apps on the mobile marketplace is numeric or categorical and readily comparable: variables such as product type, number of downloads, price, and user rating are easily obtained. However, while useful for measuring the consumption rate and consumer opinion of these products, such information does not enable meaningful comparison of the features, much less the opportunities for political subjectivity, embedded in the range of different application types.

We might then construct additional qualitative variables, in order to capture aspects of software relating to its functionality. For example, 'intensity of connectivity' might be measured through comparison of the 'permissions' that an application asks of its device owner. Some applications need access to the Internet only occasionally, for example to update core components of the software. Other applications are more invasive, requesting access to the user's address book, social media profiles, and geographic coordinates, so as to continuously track the owner through space. Additionally, access to geolocational data can be more granularly sorted according to its intensity: none, approximate location (network based) or GPS coordinates.

Of particular interest here is the ability to compare applications according to their spatial configuration (in order to sort those which offer virtual representations of London from those which use topological abstraction). We might investigate this proposition by constructing a variable to record the representational perspective(s) contained in the app. For

example, software interfaces may be comprised of text only, still images, moving animations, first-person perspective, overflight, cartographic views, or topological relationships.

Consequently, it is possible to generate two separate axes for comparison of the body of mobile apps focused on London. One axis reflects the perspective range offered by a given application, derived from human coding of the contents of the application according to the visual categories described above. This axis is concerned with what the application enables a user to 'see'. The second axis represents the functional capabilities offered by the application to its user, derived from the proxy variable of technical permissions (which assumes a two-way exchange of personal data for added functionality). This enables us to compare what applications enable the user to 'do'.

y-axis: visualisation permitted by the application
Can one see things that are there
Can one see things that are there, from a perspective not normally allowed (virtual)
Can one see things that are not there, relationships made visible in a new way (topological).

x-axis: functionality permitted by the application
Can one do things
Can one do things in a way not normally allowed (virtual)
Can one do things informed by relationships made visible in a new way (topological)

Discussion

A schema for assessing the content of apps is represented in Figure 3. The two-by-two grid contains four quadrants, and in each case a mobile application from London is offered as an example to illustrate the possibilities available to mobile users. The schema proceeds from the bottom-left, characterised by the lowest intensity of spatial abstraction and the lowest intensity of information exchange, to the top-right, characterised by intense abstraction in the spatial and informational dimensions. Top-right apps most closely resemble topological spaces, although capturing the precise moment of abstraction from real to virtual to topological can only be approximate.

Reading across the different experiences offered by apps on the Google Play marketplace, we experience London in different spatiotemporal configurations. In box 1: *Rainy London Live Wallpaper* offers users the ability to change the background image on their mobile device to an animated photograph of London streets. Water droplets accumulate on the screen to simulate the titular rainy atmosphere. The visual perspective of the app is first-person view at street level. One could virtually imagine themselves standing in the scene, weather and all. Minimal data is given or taken by the app, with only a few permissions required to use the software.

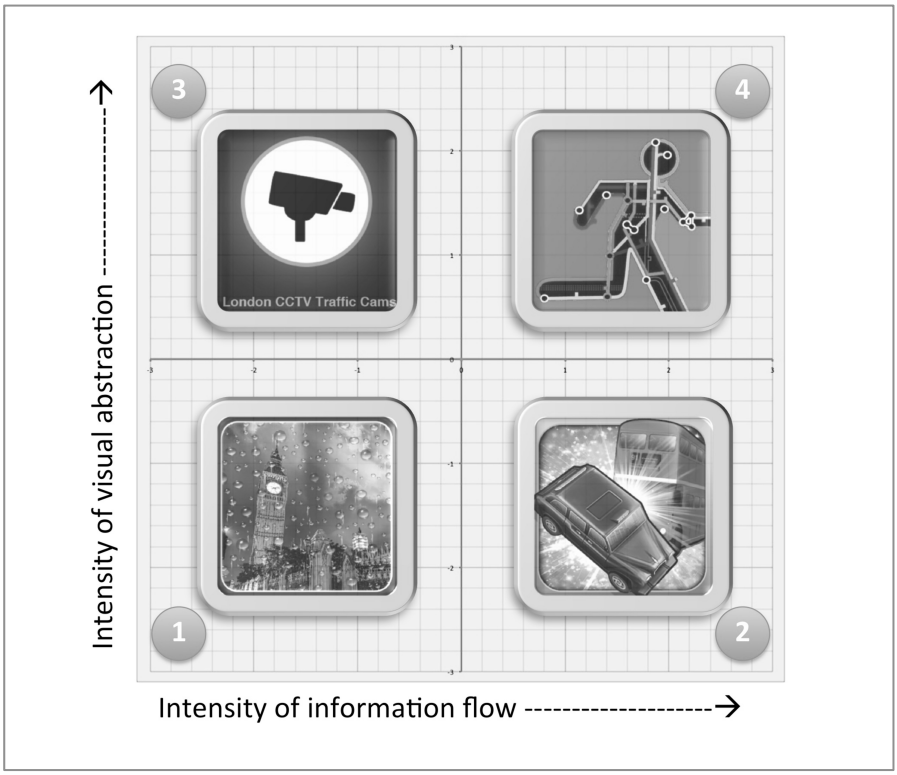

Figure 3: Typology of mobile software applications tagged with 'London'.
Illustration: the author

Box 2: *Traffic Panic London* is an interactive 3D mobile game in which users control traffic lights at key intersections to facilitate the flow of traffic or initiate explosive crashes. The app presents a 'realistic' visualization of London in 3/4ths overhead view. Slightly more data flows between the application and the user, with the latter required to give inputs and the former requesting a surprising amount of permissions to access. Box 3: *London CCTV Traffic Cams* localizes a popular form of application granting the user access to real-time traffic cameras throughout the city. The view may be alternated between video cameras looking down on the motorway and a cartographic representation of streets with higher or lower levels of congestion. The application requests minimal permissions from the user other than their geographic location. Box 4: *London Transport Planner* is a full-featured integrated travel app, uniting publicly available data from underground, rail, bus and cycle linkages. Users are invited to plan their trips using a series of drop-down menus which produce diagrammatic route maps and itineraries. The app demands a large number of permissions from the user, including GPS location and access to the user's stored data and contacts.

It is clear that our relationship to the built environment of the city is becoming increasingly mediated, and that mobile software applications are implicated in facilitating and intensifying new socio-spatial relationships. We might call this, as Kotányi did, 'progress in the means of communication'. However, using the situationists' criteria, it is uncertain whether applications surveyed in this brief taxonomic exercise objectively improve the capacity for authentic encounters with the urban. Virtual escapes allow us to experience the city independent of its physicality, through a wallpaper souvenir or a representational video game. Geolocative services offer efficient ways of cutting through its materiality, by enabling train connections or routing us around traffic during a commute out of the city. These mobile software applications, although descriptively tagged to be for and about 'London', actually grant us access to an abstract or idealised city, whose topologies

might – in the case of serialised applications 're-skinned' for other global cities – be preserved under continuous deformation.

In his own experiment inspired by psychogeographic techniques, O'Doherty inscribed the words 'Order' and Disorder' on an A-Z map of Greater Manchester and then set out to walk the contours of each mathematically-drawn shape through real space. By applying such an arbitrary 'order' onto the city, O'Doherty hoped to achieve what he termed 'the interruption of topology' (O'Doherty, 2013). What his experiment actually detected were the interactions of multiple, overlapping and incompatible topologies – one, his own arbitrary inscription and 'folding' of the Euclidean map; another, the topology of the daily Möbius-like progression of capitalist exchange and movement; third, an imaginary topology of Masonic symbolism centered on the Royal Exchange Theatre. Considering the political significance of his experiment he proffers modestly that 'the resulting narrative was not without its insight into hidden forms of inhabitation and modes of organization that is also generative of new political imaginaries in the city' (2013, p. 226). However, to organise such an encounter required tremendous effort and highlights the extent to which we cannot rely solely on smooth mobile technologies to 'interrupt' urban topologies, absent of significant intention.

This chapter has sought to chart a journey from early topological representations of London's Underground rail network, through situationist critiques of the same rationalised urban vision, later intensified via convergence and the global culture industry. We arrive at a present moment when mobile devices offer access not only to virtualised experiences, but also topological imaginaries. The situationists were interested in accessing the authentic, by promoting encounters between urban dwellers and the city around them. The applications which drive mobile technology offer a range of different ways of encountering London. Some are virtual-representational, painstakingly re-presenting the street level to the viewer. Others are data intensive abstractions, offering users the ability to encounter the city in ways not permitted by Euclidean geometry (for example to peer down anonymously from CCTV camera). The city that exported a vision of topological urban mobility is now itself transformed, via the shared morphology of software design, into a topological projection of itself, a metaphorical hyperspace.

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