

NUMBER

CAN THE ORGANISATION OF COMMERCIAL SPACE IN CITIES ENCOURAGE CREATIVITY AND 'SELF-GENERATING' ECONOMIC GROWTH?

A return to Jane Jacob's ideas

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ABSTRACT

This paper explores the implications of Jane Jacob's ideas about the 'self-generating economic culture of cities' (Soja, 2000) for the way in which urban commercial spaces are organised and managed. Jacobs saw economic development as an emergent process, based on economic branching, and the development of '*new work on the basis of old*'. Drawing on three case studies from London (on railway arches, the Winkley Road Estate and Gillett Square in Dalston) this paper explores the key spatial factors which Jacobs identified as supporting bottom-up economic growth, such as the intermingling of old and new buildings of different types, sizes and conditions; the mixing of commercial and residential uses; and high population density. In her later works, Jacobs shifted away from her neighbourhood focus to explore how city economies work more globally, highlighting the multiple opportunities for collaboration offered through diverse city supply chains. At this point she did less to imagine how the physical structure of cities might play an enabling or constraining role. The paper concludes by suggesting that Space Syntax might have something to contribute here, through underlining the importance of local-global spatial linkages in cities.

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KEYWORDS

Jane Jacobs; commercial space; cities; emergent growth; economic development; innovation; mixed-use; diversity; entrepreneurship

1. INTRODUCTION

In her book *The Economy of Cities*, Jacobs (1969) argued that new work emerges on the basis of the fragments of older work. She famously gives the example of the New York dress maker who began to experiment with bra-manufacture, and later developed this side-line into a successful business. Jacobs sees economic development as a 'branching' process which is based in part on the imagination and problem solving of workers, who develop new work after '*tinkering, taking apart and reproducing*'. At the same time, cities offer diverse possibilities for new products to be brought to market, through the presence of complex supply chains. The bra manufacturer in New York needed a whole host of different inputs when setting up her new company including packing, advertising and distribution, that were all available to her in her local neighbourhood. Jacobs finds that new work is often built on the 'fragments' of older work, and that smaller companies with cultures of relative inefficiency are often the most fertile grounds for new innovation. As companies grow and become more efficient, they tend to eliminate waste, providing less opportunity for people to experiment with different products and develop new ways of doing things.

As cities become more diverse, Jacobs feels that this sets up a virtuous circle – '*the greater the sheer numbers and varieties of divisions of labor already achieved in an economy, the greater the economy's inherent capacity for adding still more kinds of goods and services*' (1969 p.59). This idea has been substantiated in recent studies: Youn et al (2016) looked at data on NAICS codes for 366 metropolitan statistical areas in the United States and identified super-linear scaling of economic diversity over time, suggesting that cities keep adding new work to old, and support economic branching even when very large. This is despite the fact that both the total number of establishments and total number of employees only scales linearly. After analyzing micro-data on changes to occupational titles in US cities, Lin (2009) also found that workers are more likely to be observed in new types of work in locations that are initially dense in both college graduates and industry variety.

Jacobs' focus on the role of concrete problem-solving in spurring innovation has also been developed elsewhere in the economics literature - for example, Jensen et al (2007) argue that much innovation comes from '*doing, using and interacting*' (DUI) as opposed to formal scientific research and development practices. Cooke (2016) argues that such innovation is like 'dark matter' in that it is largely invisible to research, but is very much responsible for what he calls 'generative growth'. Elsewhere Toner (2011) has argued, like Jacobs, that middle-level workers are particularly important contributors of such incremental innovation - as Jacobs writes – '*when humble people, doing lowly work are not also solving problems, nobody is apt to solve humble problems*' (1969). In fact, Jacobs was a very early proponent of the 'creative city' in its broadest sense, suggesting that cities should provide all their residents with opportunities for creativity. This is a very different way of thinking about the creative city than theories based on a more privileged 'creative class' (Florida, 2002).

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Like Massey (1984), Jacobs saw economic activities as being intrinsically 'spatial' – not only in terms of being based in places such as cities, but also in terms of developing within particular physical buildings and streets. In *Death and Life of Great American Cities* (1961), for example, she went into detail about the physical factors necessary for lively city neighbourhoods, including the mixing of residences and working places; small and short blocks; the intimate intermingling of buildings of different ages, types, sizes and conditions of upkeep, and high concentrations of people. While these factors reflect Jacobs interest in developing successful residential areas, they also point towards an organisation of space that can promote economic growth and entrepreneurship. Her focus on the intermingling of different building types, in particular, highlights the importance of cheap commercial spaces that support creativity and experimentation, and that are flexible enough to support expansion and the branching of firms into new spaces and locations as they grow.

Jacobs ideas about the spatial dimensions of bottom-up economic development have been developed by a number of architectural theorists. For example, Davis (2013) asserts the importance of developing hierarchies of different spaces in cities as a key tool in encouraging economic diversity, drawing on research in areas of London such as Whitechapel and Dalston. Rantisi and Leslie (2010) likewise identify how small-scale makers in the creative sector need spaces that are unfinished and expandable. The discipline of Space Syntax has also explored how the spatial morphology of urban neighbourhoods might influence the mixing of commercial and residential uses. This discipline has shown, for example, that the configuration of streets in cities produces underlying patterns of pedestrian and vehicular movement that then have knock-on effects on how the locations of commercial activities develop. Space syntax has also explored how the organisation of space might encourage encounters between people and hence opportunities for communication and collaboration (Hillier and Penn, 1991).

In her later works, such as *The Economy of Cities*, Jacobs shifted away from her neighbourhood focus to explore how city economies work as a whole, highlighting the diverse opportunities for collaboration offered through global city supply chains. However, she did not explore the physical properties of such creative city economies beyond restating the key principles for lively neighbourhoods that she set out in 1969. This means that while we have an increasing understanding of what a creative neighbourhood looks like, we have less understanding of how creative and 'generative' city economies might work spatially at a larger scale. One interesting current line of enquiry is the role of local-citywide spatial linkages. Read (2015), for example, identifies that cities are multiscale, with their residents ideally having access to both their local neighbourhood, and broader city level networks at every point in the urban system. He documents how '*fine-grained neighbourhood to city economic relations*' have been key to the flourishing of city economies at certain points of history, where somewhat haphazard informal neighbourhoods being effectively linked into broader city markets through 'switch points' (Read and Budiarto, 2003) or 'stitches' (Turner, 2009). He suggests that such switch points might boost economic networking in the city as a whole. Hillier similarly identifies how the 'dual structure' of foreground and background networks in cities is often closely linked, with a 'two step logic' operating In the City of London, for example, whereby it never takes more than two changes of direction to find yourself on one of the main roads running through the system (Space Syntax Ltd, 2008). Such close interconnections may

again support synergies between local commercial spaces and more global economic networks in cities.

This article seeks to explore these factors in more detail through looking at three case studies, all drawn from London – that of London’s railway arches, the Winkley Estate in Bethnal Green and Gillett Square in Dalston. Each of these case studies demonstrates how the spatial principles identified by Jacobs and others as being important to economic development can be realised in practice.

The three case studies were studied through a variety of techniques. The railway arches research drew on the use of historical sources, direct observation of present spaces, and space syntax analysis of maps situating the arches in the larger urban fabric. The Winkley Estate has been studied through the development of detailed architectural plans, the use of historic street directories, observations of current uses, and the development of j-graphs to understand detailed building relationships. And Gillett Square has been analyzed through direct observation, interviews with the former director of the organisation that developed the square, and the use of historic and contemporary maps that describe and situate it.

2. CASE STUDIES

Railway arches: a lifeline for manufacturing in London?

The first case study involves railway arches—the thousands of individual spaces that were formed by the construction of the railway viaducts in the nineteenth century. These structures, all over London but mostly south of the Thames, were built to allow the tracks of the main line railroads to approach their termini above ground thus avoiding the tracks creating an impermeable barrier that cut through neighbourhoods. This could have also been done by putting the tracks below ground, and having street continuity with bridge above the tracks, but particularly south of the Thames, marshy land often resulted in viaducts rather than cuts.

There are up to ten thousand arches created by the masonry construction of the viaducts, and many of them have been used since their creation for a variety of mostly commercial and industrial uses. It was originally thought they might be used for housing, but there was too much noise, pollution and vibration. They were used for functions such as stables, storage and other marginal uses. More recently, their uses have been service or small-scale industrial functions of various kinds, including auto-repair shops, taxi services, storage facilities, crafts relating to furniture and woodworking, sheet-metal fabrication and other businesses that tend not to require the same kind of visibility as retail shops on high streets. Indeed, the rows of arches—and their businesses—are often seen at the "edges" of neighbourhoods rather than at their centres. Despite this, space syntax analysis of arches in three locations in London (Bermondsey, Bethnal Green and Hackney) found that the arches had relatively high choice and integration values compared to their surrounding urban fabric, perhaps because tunnels through the arches open them up to local movement (Froy and Davis, 2017).

In recent years, the economic value of the arches—which in London are largely owned by Network Rail—has increased, and in some places the arches are beginning to house

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businesses of the new "creative economy" as well as cafés and restaurants. Like many old industrial and warehouse buildings, the arches have gained an aura of "edginess," favoured by entrepreneurs and customers who like their basic masonry construction, which is often unfinished on the inside except for a coat of paint, as well as the fact that their interiors may be completely visible from the outside.

The arches have traditionally been managed by the quasi-public entities Network Rail and Transport for London, who have set rents relatively low. However more recently there has been an attempt to extract more value from the arches to invest back in the wider rail infrastructure. The rent rises threaten to force out older, secondary businesses to make room for the creative, production and leisure-oriented businesses of the "new economy" who can afford to pay more. But even so, the railway arches tend to be cheaper to rent than buildings on nearby streets.

The business owners in the three case study locations in London were found to be taking advantage of the 'modular' spaces provided by the arches - for example, the London Fields Brewery in Mentmore Terrace, Hackney, owns a number of adjacent arches, each being used for a different type of activity. They host brewing facilities for thirteen varieties of local beer, a small bar, a larger beer hall and concert venue, and an office (constructed as a mezzanine). Further along Mentmore Terrace, the E5 Bakehouse used to use its next door arch for grain milling, but has now opened this up into a second café/restaurant space. In Bermondsey, the Neal's Yard Dairy on Druid Street uses two arches side by side, one for the maturing of cheeses, and the other as office accommodation.

The study found that there was a relatively high degree of communication between the firms using the arches in the case study areas. Communication was most frequent with immediate neighbours (cited by 21 businesses), but was also present between a larger set of firms in the arches (21 businesses) and in the surrounding locality (9 businesses). Only two firms said that they had no communication with the firms around them. Types of cooperation included sharing and using each other's products, making referrals and helping out in a crisis. There was also evidence of the benefits of local networking to support business start-ups. The owner of the E5 Bakehouse in Mentmore Terrace, for example, benefitted from initially being able to set up a kiln to start baking at the 'Happy Kitchen,' a wholesale-oriented firm that operates from an arch a few doors down. The Happy Kitchen itself initially started up in a business incubator at the Westgate Centre, only a few streets away.

The arches and their spatial configurations have a number of attributes that are relevant to our investigation:

1. Although property values are rising—and along with them the rents of the spaces in the arches—the arches operate within a cheaper 'parallel rental market' run by Network Rail and Transport for London. Rents are in particular depressed because the arches are not sought after as residential locations. In Jane Jacobs's terms, they are "old buildings," and useful because they provide space for businesses that cannot pay larger rents, but that are nonetheless essential to the local economy.
2. The arches are often directly opposite housing, and particularly social housing. Since social housing is often segregated from the surrounding urban fabric, the

arches suggest the possibility of economic relationships between the businesses and the social housing.

3. They are flexible in their use and exist in a variety of sizes, as the width of railway viaducts vary, and as varied sizes and configurations, even in a particular location, exist when two viaducts combine into one. The spaces are simply formed with brick or stone, allowing for permanence and sense of "toughness", but also allow for partitions, lofts and balconies, and varied ways of designing and building the wall to the outside.
4. They have a linear arrangement, with a direct relationship to the pedestrian or vehicular realm often without a footpath or space for cars to park. Where they contain industrial functions they form "industrial streets", that are very different to more hierarchical and segregated industrial estates. These "streets" act like most city streets do—they allow for interaction among the businesses that are along them; and they also allow for visibility and access to the public.

The arches are sometimes relatively small compared to much industrial or retail space in the city, but they form an important part of what we suggest is a necessary hierarchy of spaces for industrial and creative uses. The arches are visible, well-connected to street networks and appealing to various types of entrepreneurs. Jane Jacobs would likely have seen them as spaces with the potential to play an important role in the creative functions of a city.

Figures 1 and 2: Railway arches as commercial spaces



a. Railway arch owned by car repair firm in Bethnal Green



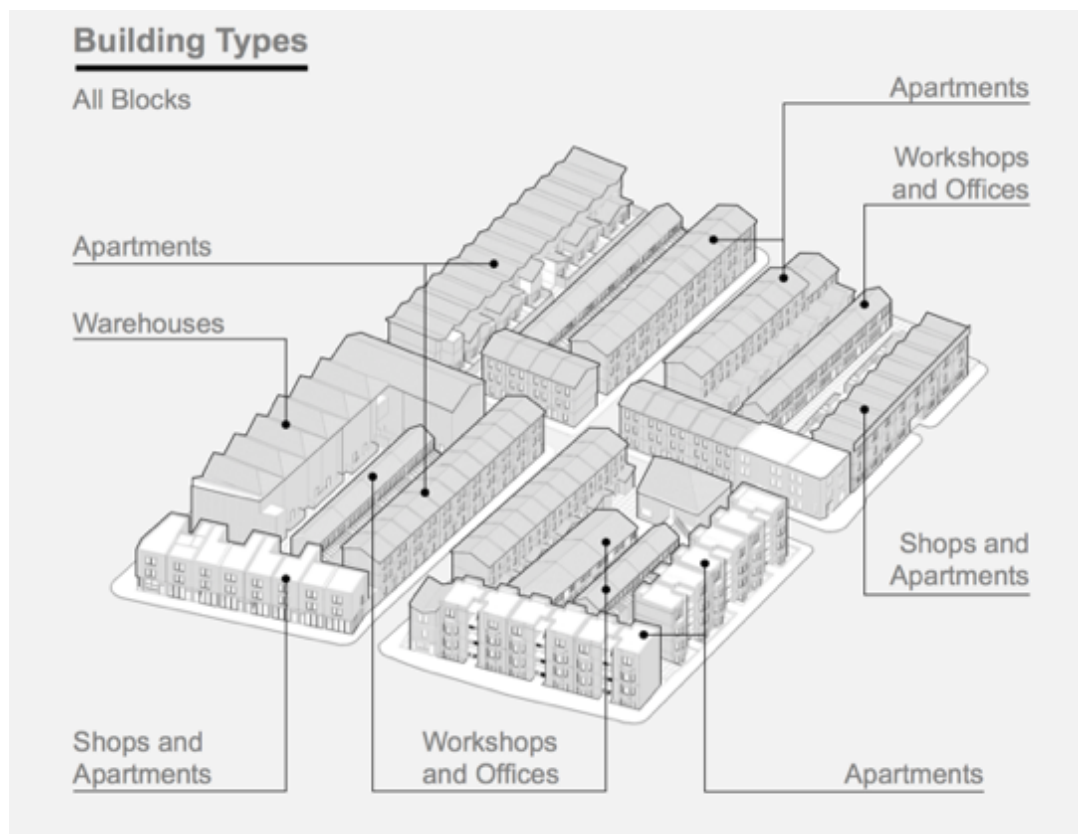
b. Retail firms sharing a railway arch space in Bermondsey

Winkley estate: a mixed industrial and housing estate

The second case study is a four block estate in the Bethnal Green neighbourhood of London.

The Winkley Estate, as we call it, was built by the property developer Charles Winkley around 1900. Although it was designed and built as a single integrated development, it is unusual in that it consists of a variety of different building types, housing a variety of functions. It incorporates two and three story terraced houses without spaces dedicated to commercial or industrial uses, three story terraced houses with retail shops on the ground floor, three story terraced houses with workshops occupying the ground floor and a basement below, blocks of flats served by stairs that give access to two flats at each landing, and factory buildings with large open spaces on each floor (see Figure 3).

Figure 3: Mixed use buildings within the Winkley Estate

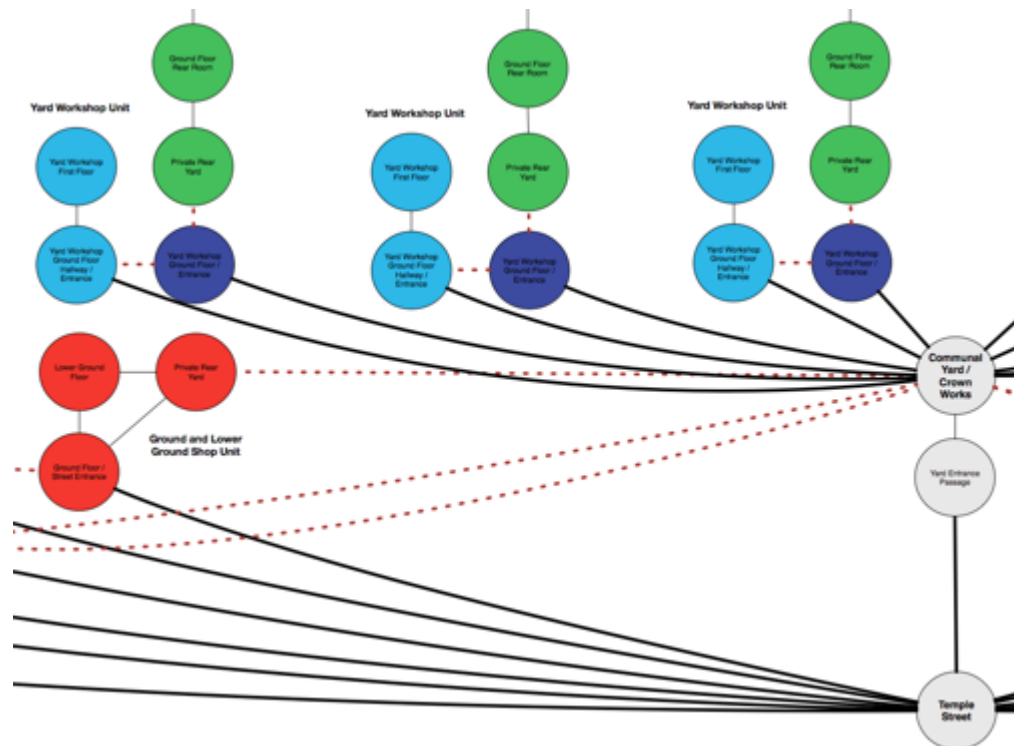


In addition, the estate includes two-story workshop buildings in the interior of the blocks, located between the house terraces that face outward to the streets. These workshop buildings are accessed from yards that are themselves accessed by means of passages through the house terraces. Although the project is quite dense, each house has outdoor space, and because some of the terraced houses are raised up above shops or workshops, they have quite adequate daylight.

The spatial and functional variety is accompanied by a great deal of flexibility in the ways that the different spatial units can be connected to each other. For example, the two-story

workshops that are underneath the two-story terraced houses on Temple Street may be accessed independently from the street, or internally from the stair leading up to the residence. This allows the workshop to be rented independently or used by the family living upstairs. Likewise for the buildings on Old Bethnal Green Road—the retail shops have internal doors leading to the residential stairs, allowing for the same kind of flexibility. This is a typical arrangement for shop/houses, but it is perhaps unusual for industrial or workshop space. The workshop spaces have good levels of daylight and all the units apart from the flats have outdoor space in the form of roof terraces. Space syntax analysis reveals that a communal yard space is highly central to many of the workshop units (see Figure 3 below), offering a space for co-presence and encounter.

Figure 4: Part of J-graph for the Winkley Estate



Legend: Each colour indicates an individual unit or space, solid black lines are permanent connections whilst dashed red lines indicate optional connections.

But perhaps most interesting are the spatial relationships regarding the internal ranges of workshops—internally and in their relationships to adjacent dwellings. First, these buildings have two adjacent entry doors—one leading to the ground floor, and the other leading to the stair. This allows for the workshops to be rented separately or together. In addition, some of the workshops may be accessed either directly from a public yard or from the private back area that is connected directly to the house. This allows for more flexibility in the connectivity of the workshops.

When the estate was built, and for several decades thereafter, Bethnal Green and the adjacent neighbourhood of Shoreditch together comprised one of the centres of the furniture industry in London. The industry was made up of thousands of very small shops, each housing a particular, specialised craft. These included frame makers, joiners, F.Froy, H.Davis and A. Dhanani

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upholsterers, polishers, carvers, turners, as well as various suppliers of wood, oil, tools, fabric, furniture hardware and upholstery trimmings. These individual businesses often acted as subcontractors to wholesalers who sold their products to retailers all over London and outside the city. Working with the retailers, the wholesalers were directing the manufacturing process in what may be considered a flexible, open system, that changed from one furniture order to the next, employing different combinations of individual craftsmen. The organisation of the industry within an organically-developed local urban morphological structure, is shown by another paper at this conference. In this system, proximity of the shops was important. Although the Winkley estate was designed all at once, it has a similar spatial structure to the organically-developed neighbourhood around it.

Table 1: Businesses in the Temple and Crown Yards at Winkley Estate in 1910 and 1940

1910	1940	present
Cabinet makers Boot manufacturers Chair maker Wood carvers Tailor Upholsterer Basket maker Antiseptic amonia seller Pub French polisher Printers	Cabinet makers French polishers Table makers Show case makers Mirror maker Wood carver Chair maker Upholsterers Wood turner Printers	Designers Architects Artists Video production Map maker Furniture maker

Source: London Street Directories

London street directories show that many workshops in the Winkley Estate were used for the various crafts of the furniture industry for several decades after the project was built (see Table 1). The four blocks escaped much bombing during the Second World War and the buildings are now used for the so-called "new economy" including spaces for designers, architects, artists, video production companies, a map maker, a furniture maker and other similar. One retail space, directly on Old Bethnal Green Road, houses an architect's office that also runs a café at the front.

The Winkley estate exhibits the following attributes that are relevant to our discussion:

1. There is a considerable range of sizes of work spaces, ranging from whole floors in the factory buildings (in which two or more floors can be combined for a single business) down to a single floor in the workshops that are in the yards behind the terraced houses.
2. There is flexibility in connections between work spaces and dwellings, and between work spaces themselves. This allows for businesses to expand and contract, and for relationships between businesses, and between businesses and dwellings, to evolve over time.
3. There is density and consequent proximity, setting up spatial affordances to possible economic relationships.

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4. Although property values and rents are rising, as they are all over London, they are still lower than they are in other places in the city—and the availability of very small spaces in these old buildings means that although rents per square meter may be high, the spaces themselves are still affordable to start-up businesses without a great deal of cash flow.

Gillett Square: bringing community and enterprise use of a public square together

Our third case study is Gillett Square in the London neighbourhoods of Dalston. Gillett Square is a public space that is the result of a bottom-up process of conceptualisation and design, that was built over about twenty years. Located near the Dalston Kingsland Overground station and the Ridley Road Market, it was built on the site of a former car park that was itself located on the space formerly occupied by terraced houses on either side of Gillett Street.

A local organisation, Hackney Cooperative Development (HCD), took the lead in organising the financing, approvals, and neighbourhood politics required for the project. The project happened in a series of stages that included the following:

1. The renovation of a row of terraced-houses-with-shops on an adjacent street. This renovation allowed startup businesses to occupy the shops, eliminated the inside stairs, and put outdoor galleries for access to the upstairs rooms on the back, facing what would become Gillett Square. These upstairs rooms are rented to very small businesses and to the offices of local cultural organisations.
2. The renovation of an old clothing factory into the "Dalston Culture House" that now houses the Vortex Jazz Club and a café.
3. The design, by means of a competition, of a series of small prefabricated metal kiosks, that were placed outside the backs of the terraced houses and facing the square. These kiosks are rented to small businesses that include a juice bar, a recording studio, a local radio station, a tailor, an international money-transfer service, and similar businesses.
4. The paving of the square itself, to make it suitable for informal pedestrian activity, a place for children to play, as well as a place for concerts and performances of all kinds.
5. The reuse of a factory on the north side of the site, to make it suitable for spaces rented to various small businesses and a social housing organisation.

Figure 5. Gillett Square, showing the Dalston Culture House on the right, the backs of renovated terraced houses and the prefabricated business units on the left.



The square is located within sight of and about 50 meters from the Kingsland High Street, which is the continuation of the Kingsland Road to the south and the Stoke Newington Road to the north. It has public access from the Kingsland High Street, from Boleyn Road to the west, and from Bradbury Street, along which are located the renovated terraced houses that are a part of the scheme, to the south. The square thereby connects a residential district with an important high street. In this respect, Gillett Square is connected to its surroundings much more strongly than the usual London residential square that is typified perhaps by Lonsdale Square in Islington, the lack of connectivity of which was shown as an example in Hillier and Hanson's *The Social Logic of Space*. Indeed, Gillett Square is much more typical of squares on the European continent which are at or near the crossroads of important streets.

Gillett Square has been highly successful. The Vortex Jazz Club is one of the best jazz venues in London, with internationally known performers. The radio station and recording studio are the source of music heard far beyond the square. The square itself is the site of programmed performances of all kinds—dance, music, theatre, mixed performances of various kinds-- as well as spontaneous, unprogrammed artists, and was one of the sites for the handover of the Olympics to Rio de Janeiro at the end of the London games in 2012. People come there for informal mingling as well as for scheduled performances. It has turned out to be a place of cultural and artistic innovation, with a strong mixture of performers, cultural entrepreneurs, along with start-up and established cultural organisations.

In summary, Gillett Square has the following attributes that are relevant to this paper:

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1. It was built through a bottom-up process, gradually over about two decades. This process necessarily involved many different participants, political entities, and sources of funding. Although Dalston is gentrifying, the square—the land of which is held by HCD in a 99-year lease—is seen by many people in the neighbourhood as a bulwark against gentrification.
2. The square is near important centers of Dalston, including the Dalston Kingsland and Dalston Junction Overground stations, the Ridley Road Market, and the Kingsland Road/ Kingsland High Street/ Stoke Newington Road high street. It is visible from the high street and helps form a link between the high street and the residential neighbourhoods to the west. It would seem therefore to be both locally and globally connected.
3. The square incorporates buildings of different sizes and ages, including old buildings that have been minimally changed, old buildings that have been substantially reconfigured, new buildings built on site, and new prefabricated buildings that were delivered and installed on site. These buildings incorporate a wide variety of cultural uses, often by organisations and businesses with a minimum of capital. Although some housing was built on the square, it is not regarded to have been successful as it is affected by the noise of cultural events—the square is more a shared commercial and public/community space.

We hypothesise that these characteristics help the square develop and maintain its status as a place of artistic innovation. It provides a wide range of spaces for creative performing artists, puts them together in the same place, and allows them to rub shoulders with people from the neighbourhood and city that support them financially and help disseminate their artistic products.

3. CONCLUSIONS

This article has set out to identify how the organisation of commercial space in cities can help support the bottom up 'self-generating' economic growth that was so cherished by Jane Jacobs. It has explored how the spatial principles that she identified (such as the intermingling of different buildings, mixed use areas, density) are actually realised within specific neighbourhoods in London. In each case, the neighbourhoods provide 'spatial affordances' necessary for emergent economic development, including cheap spaces, a mixture of old and new buildings, and an intermingling of commercial and residential spaces.

Understanding the value of adaptable spaces for urban production is particularly important today as the risk of gentrification and the loss of commercial space is ever present. The rental values of railway arches are on the rise in parts of London, while industrial areas such as the Winkley Estate are gradually converting to residential uses. In the UK this year, amendments to the Town and Country Planning Order will soon create a new permitted development right to allow conversions from light industrial (Class B1c) to residential (Class C3). This is despite the fact that urban manufacturing is increasingly prized. Froy and Davis (2017) point out that within the 'postfordist' economy, industry is being attracted back into inner city areas, with production often being cleaner, and requiring less space than before. As production has reemerged in cities, theorists have noted a blurring between manufacturing, design and retail, leading to the creation of hybrid forms of urban

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enterprise (Coyle, 2001, Evans, 2009). All this means that a "mixed-use" approach may be increasingly appropriate, in which factories and shops are intermixed, and located near residential areas.

The case studies illustrate the benefits of adaptability and flexibility, and of relative low-spec adaptable commercial spaces that can be added to in a modular fashion as businesses expand. The Winkley Estate workshop spaces, for example, have proved adaptable to both craft and design uses over their history. When designing commercial spaces, relatively low-spec spaces may be particularly sustainable in adapting to new uses over time. As Hillier (1999) points out, *'form changes only slowly while function changes rapidly'* (p.126), and commercial spaces need to be designed with this in mind.

Further, the three case studies show the benefits of designing commercial spaces in a way that encourages collaboration. In the case of the railway arches, the openness of the facades and the location of the arches in 'industrial streets' encourages communication between the hosted businesses. In the Winkley Estate, the yards provide semi-public spaces which may encourage interaction, complemented by the presence of cafés. In Gillett Square the location of commercial and artistic production spaces on a public square encourages mixing with local people. While in the latter case, collaboration was stimulating creativity within the arts, all three case study examples point to the importance of commercial spaces that promote synergies and creativity within other types of production and retail, contributing to Jacobs' broad vision of the 'creative city'. The levels of new product innovation within such neighbourhoods and within different commercial spatial forms could well be the focus of future research.

The case studies have also illustrated the value of bringing manufacturing into residential areas. The integration of spaces where manufacturing takes place with social and residential space renders the processes, skills and tools used in manufacturing visible. This visibility makes the connections between people and the products they use and consume more tangible and understandable, which has become obscured due to manufacturing being relocated outside of major populations centres or abroad (in the majority of economically developed countries). The integration and visibility of manufacturing also acts to demystify the processes of production and alert people to the possibilities of also engaging in manufacturing, whether as a cottage industry simply equipped with a sewing machine, woodworking with a set of chisels or prototyping ideas for objects with 3D printers. These small-scale explorations of manufacturing can then potentially open the way for wider participation and understanding of manufacturing processes. This holds promise for those policy makers hoping to promote inclusive growth in cities (Green et al., 2016, RSA, 2016) through opening up the benefits of entrepreneurship and economic participation to a broader section of the city population.

A common criticism of high-end urban manufacturing industries is that they are fundamentally a niche phenomenon and are unlikely or unable to grow to a size that makes a major contribution to the economy. Moretti (2012) suggests, for example, that urban manufacturing usually 'piggy backs' on highly skilled knowledge economy work in cities, which provides the salaries necessary for people to indulge in expensive niche products. Whilst this is a valid criticism, it seems to ignore the long history of wealthy individuals who have acted as patrons to craftsmen and artists. This patronage is similar to the phenomenon that we see today, and whilst primarily supporting high-end

manufacturing, has potential trickle down effects, encouraging the growth of new sectors, or revitalising nascent old ones.

In each of the case studies it was clear that the economic activities examined were embedded within much broader economic networks, and that this may be being supported by spatial linkages or 'stitches' to the broader urban fabric, for example through proximity to major city routes. In this respect, it would seem to be important not to focus too closely on creative districts and innovative urban milieux (Hall, 1998, Hessler and Zimmerman, 2008) without understanding how they are 'stitched into' broader economic and spatial networks of the city as a whole. Space syntax can contribute here by pointing towards the importance of local-global spatial linkages, and this is an area for further exploration. For example, the Winkley Estate seems well-connected into the city of London via the Old Bethnal Green Road, but detailed analyses can confirm this. Gillett Square is also close to major city routes, such as Kingsland High Street and appears to be a strong connector between that street and the residential areas to the west. In addition to analysis of the street configuration, it would be useful to undertake detailed analyses, possibly involving convex maps, of the square itself, to understand local linkages between its different uses. The railway arches, despite sometimes seeming relatively segregated, were also bringing production into relatively central city areas. The impact of this could also be further explored.

More broadly, in the future it would seem fruitful to further develop Jane Jacob's ideas of the spatiality of economic development, to understand the urban morphologies associated with creative and productive cities. Does the global spatial organisation of street networks in some cities make them particularly likely to support self-generating economic growth? If so, how might this be examined and theorised?

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