Proactive state geographies: Geocoded intelligence in London’s ‘suburban shanty towns’

Theo Barry Born
Queen Mary University of London, UK

Abstract
This article draws on an ethnographic approach to concrete institutional practices and machine learning algorithms to analyse emergent proactive state geographies in London’s suburbs. The article assesses predictive modelling in housing enforcement in respect of the government of migrant housing precarity in the interstices of rentier and racial capitalism. The article develops two central contentions concerning these proactive state geographies. First, relations between geopolitics, the racialisation of urban space and algorithms need to be situated in relation to institutional state prosaics. ‘Connecting the dots’, a motif of post-9/11 pre-emptive securitisation, is located in suburban housing enforcement regimes corresponding to the politicisation of overcrowding, while the enactment of data-driven intelligence, including in raids, renews the border in these suburbs. Second, proactive technologies work through state data infrastructures. Geocoding, a technique of urban legibility designating the property grid, organises the algorithmic production of legality/illegality and consequently public health and housing futures in the digital city. While the analysis stems from a specific context, the article aims to contribute to interdisciplinary debates about politics, algorithms and state transformation spanning political, urban and digital geography and cognate fields.

Keywords
Machine learning, prediction, enforcement, the state, informal housing, urban borders

Sitting in a local authority Insight Hub in 2017, a window open on a Dell laptop screen shows four differently sized blocks representing the predictive power of an ‘anti-social behaviour’ variable in an algorithmic model. The model is being worked on by a data scientist and is meant for use by housing enforcement officials to target uniquely identified
properties for inspection. At an online conference in 2020 organised by a company championing machine learning and prediction, a workshop run by a data analytics expert focuses on how to use Excel effectively in frontline housing enforcement work.

Data-driven experimentation that commenced in London in the early 2010s as local experimental interventions in governing ‘suburban shanty towns’ had, by the end of the decade, spawned new ‘proactive’ approaches to housing enforcement that included use of digital technologies such as predictive models and mobile phone apps. Whereas ‘reactive’ enforcement has responded to complaints and referrals, proactive enforcement is premised on predicting illegal housing through data-driven intelligence at specific addresses. Here, ‘connecting the dots’, a key motif in post-9/11 pre-emptive securitisation, is grounded in prosaic geographies of local state enforcement (Amoore and de Goede, 2008; Aradau and Blanke, 2017). I attend to these shifts in what I refer to as the proactive state. The analysis of the proactive state contributes to debates spanning geopolitics, political, urban and digital geography, alongside cognate fields such as critical data studies and critical border studies, bridging these rich interdisciplinary currents to account for the transformation of the state and politics in an age of algorithms and big data. It does so through attending to how proactive housing enforcement is entangled with and transforms concrete institutional practices associated with governing precarious urban lives (Fassin, 2015).

Building on ethnographic approaches to the state and algorithms, the article accounts for proactive state geographies in relation to the politicisation of suburban densities and circulations stemming from overcrowded migrant housing (McFarlane, 2016). As such, it locates the fashioning of novel diagrams of state power and control in an urban context of rentier and racial capitalism in the Global North, where housing is (re)bordered (El-Enany, 2020; Ferguson and McNally, 2015; Soederberg, 2020). The turn to proactive enforcement in London’s suburbs is a fruitful site for ethnographic enquiry into the digital transformation of state practices, for the central place of housing in political economy and the historical significance of overcrowded and migrant housing as objects and spaces of state practices. While the article recognises the limits of placing London at the centre of such an argument, in respect of geographies of precarity and surveillance and of knowledge production, it offers insights into entanglements of urban politics, algorithms and the state in a nonetheless salient context in the Global North with the hope that these ideas remain instructive when put to work in other contexts.

The article advances two central contentions concerning proactive state geographies. First, the proactive state is sanctioned and put to work in the urban interstices of rentier and racial capitalism. Suburban circulations associated with overcrowded housing such as overflowing bins, noise and the presence of recent migrants have become increasingly politicised. Mobilisations crack down on ‘rogue landlords’ and ‘beds in sheds’, with blame repeatedly attributed to a few ‘criminals’, reinforcing the political legitimacy of rentier interests.1 Local authority housing enforcement teams partner with police and immigration enforcement officials on housing raids, while enforcement officials have begun to establish how data can be used to predict the illegal/criminal ‘anomalies’ (Aradau and Blanke, 2017, 2018). Combined data-driven and multi-agency approaches effect new geographies of algorithmic violence, through what Safransky has referred to as ‘a repetitive and standardized form of violence that contributes to the racialization of space and spatialization of poverty’ (Safransky, 2020: 202). Enforcement teams act pre-emptively rather than reacting to complaints, while raids are conducted in early morning operations without notice given to tenants (Anderson, 2010). The proactive state therefore recalibrates the ordering and bordering of the city by managing circulations incumbent on rentier and racial capitalism.
Second, the proactive state works through historical techniques of legibility that simplify and render urban space calculable, with its world-making effects mediated by such urban data infrastructures (Joyce, 2003; Scott, 1998). Models are finessed by predicting ‘crimes’ at specific addresses by using data ‘geocoded’ to uniquely identified properties (Rose-Redwood, 2012). The property grid underpins the model’s parameters of what constitutes normal and abnormal patterns of occupancy, while classifications and variables entering the model already carry the weight of liberal government and urban political economy (Blomley, 2003). The boundary between legal and illegal housing is worked on in geocoded modelling and its enactments. The proactive state therefore reworks pre-digital governmentalities and infrastructures in the digital age. The ‘object of interest’ enacted is neither an individual subject passing through a checkpoint or subject to risk profiling, nor a zone or neighbourhood represented in digital cartographies, but a uniquely identifiable property (Amoore and Piotukh, 2015; Graham, 2009; Sadowski, 2020a). And yet, despite the seemingly discrete nature of the geocoded address, the house it is taken to represent is ontologically neither fixed nor stable, where attributing criminality to specific addresses both reinforces the idea of a few ‘rogue’ houses while opening up ethicopolitical space for multiple state practices invested in such an address. Geocoded data infrastructures therefore have ethicopolitical consequences in setting the boundaries of what public health and housing might amount to in the digital city (Amoore, 2020).

While the research was largely conducted prior to the Covid-19 pandemic, the pandemic has given these arguments renewed urgency, revealing stark racial inequalities in infections and deaths linked to overcrowded housing, the geopolitics of public health and the need for public scrutiny and understanding of the design, practices and effects of algorithmic government (Amoore, 2020). Furthermore, although beyond the scope of this article, the proactive state does not foreclose other governmentalities and is likely both to transform and to work in tandem with, for instance, ethopolitical regimes of responsibilisation or ‘nudge’ governmentalities in housing and public health (Davies, 2015; Rose, 2001). I therefore offer this analysis of proactive state geographies in light of questions concerning housing and public health futures.

The article proceeds through six sections. The first provides a theoretical framework for proactive state geographies and applies this to the context of overcrowded migrant rental housing in suburban London. The second section offers methodological reflections on studying the proactive state, drawing on ethnographic approaches. The third section provides an overview of the shift towards proactive enforcement in national policy and local practice, with the fourth section grounding this in local experimentation and entrepreneurialism by housing enforcement officials, and the relative success of an enforcement-led proactive approach compared to a city-wide ‘smart city’ governance initiative. The fifth section discusses the geocoded data infrastructures through which proactive enforcement intelligence is produced, while the final section returns to how geocoded intelligence is enacted by enforcement regimes in hostile suburbs.

Locating the proactive state

Contemporary political geographies of the state are understood to be increasingly unhinged from their historical underpinnings: war is ‘everywhere’, borders are ‘polymorphic’ and legal precarity and exception are increasingly entangled in everyday life (Burridge et al., 2017; Butler, 2006; Gregory, 2011). Yet none of this is to say that space no longer matters. Rather, the key is to locate and examine the emergent state spaces and practices of these ‘contrapuntal’ geographies (Gregory, 2011). Cities have emerged as key arenas for geopolitics,
through militarisation, the reterritorialisation of borders and data-driven securitisation of urban space (Fauser, 2019; Graham, 2009; Sadowski, 2020a). Data passports, biometric checkpoints, risk scoring and drone surveillance in cities has led to a growing geographical exploration of implications for the spatial patterning of urban social control, inequalities and injustices (Eubanks, 2018; Iveson and Maalsen, 2019; Shaw and Graham, 2017), while such shifts can be located in genealogies encompassing racialised surveillance, ‘algorithmic war’ and pre-emptive and anticipatory governance (Amoore, 2009; Anderson, 2010; Browne, 2015; Graham, 2009). In these urban arenas, algorithmic diagrams and the spatial imaginaries and practices they entail are shaping the futures of cities through novel spaces of racialisation, policing and incarceration of the urban poor (Jefferson, 2018; Safransky, 2020). Moreover, in ‘the captured city’ of militarised urbanism and algorithmic surveillance, the bodies and territories of precarious urban lives ‘are the testing grounds for new methods of surveillance and control’ (Sadowski, 2020a: 160).

While the state can sometimes drop out of such analyses of urban geopolitics and algorithmic government, it remains a key actor grounding shifting geographies of sovereignty, territory and borders. Political geography has increasingly come to see banal, everyday state practices and ‘prosaics’ and the complex, disaggregated, interwoven assemblages of state power as key to understanding the geographies of the state and its transformation (Allen and Cochrane, 2010; Painter, 2006). Institutions are central to these state transformations. For instance, in a genealogy of institutional ‘concrete practices’ at the heart of the French state, Fassin assesses the interplay of penal, welfare and liberal rationalities in governing precarious populations as a ‘new social question’ at the intersection of race, class and religion ‘within a colonial genealogy’ (Fassin, 2015: 256). Ethnographic approaches have further challenged the Weberian model of the state by focusing on the state’s territorial margins and the limits of its claims to legibility (Das and Poole, 2004). Geographies of algorithmic violence need to be examined in respect of these banal, concrete institutional practices that make sense of and govern precarious life at the margins of the state (Safransky, 2020). In considering the shift to machine learning, this article examines state margins that are at once territorial (suburbs), shaped by (bordered) subjects about whom claims to sovereignty are ambiguous, incomplete or unstable (migrants) and occupy spaces where the local state’s claims to legibility are put in question (informal housing).

These margins have historical as well as contemporary significance in a genealogy of the British state. The policing of those historically positioned outside the property grid as ‘vagrants’ has been a defining feature of the modern capitalist ‘fabrication of social order’, limiting alternative possibilities of subsistence to wage labour (Neocleous, 2000). Overcrowding in working-class slum tenements of 19th-century industrial-era urbanisation was central to the growth of public health bureaucracies through biopolitical concerns about the circulation of disease and moral failure, with Irish migrants often positioned as especially culpable (Foucault, 2007; Gidley, 2000). Alongside planning and slum clearances, housing inspections emerged a crucial spatial technology in the making of a British ‘social body’ (Poovey, 1995). While inner-city municipal housing took off in the early 20th century, London’s suburbs grew as distinct from and understood in contrast to the overcrowded inner-city slums of the industrial era, establishing topographies that have broadly persisted into the 21st century. Low-density semi-detached estates were built for emergent middle classes of the early 20th century and new terraces built for the working classes in areas of industrial urban sprawl (Boughton, 2018; Potts, 2020).

Over time, with the decline of formal British imperialism, housing in Britain can be understood as a site of (re)colonial territorialisation through the bordering of social infrastructures. Accommodation regimes remain structured by racial capitalism and
state-sanctioned hostility towards migrants: citizenship still structures access to social hous-
ing, while the Immigration Act 2016 has criminalised landlords for not checking prospective
tenants’ ‘right to rent’ (Danewid, 2020; El-Enany, 2020; Lukes et al., 2019; Yuval-Davis et al., 2019). Private rental housing is increasingly prominent in London as a site of surplus and survival, of rentier accumulation and the precarious reproduction of the global working class (Christophers, 2020; Ferguson and McNally, 2015; Sooderberg, 2020). The effect of extortionate rents relative to low wages is frequently abject, overcrowded housing (Potts, 2020). While the suburbs have historically been spaces of reproduction for predominantly White British families, over recent decades settled racialised minorities have increasingly moved to these areas, joined by migrants arriving from outside the UK (Rhodes and Brown, 2019). The gardens and interiors of suburban semi-detached houses, terraces and flats above shops on high streets now provide the formal containers for crowded migrant rental hous-
ing, from makeshift room-sharing to subdivisions of space and shed dwellings. Manifest in raids today, suburban enforcement regimes can therefore be located as part of a genealogy of coloniality and bordering precarious life in the city (Wemyss, 2015).

The deployment of algorithmic prediction in suburban housing enforcement invites reflection around how, where, why and to what effect the proactive state recalibrates sov-
ereignty and violence directed towards the working class or racialised other, as addressed empirically in the remainder of this article. Recent literature on algorithms and politics offers useful starting points. Machine learning encompasses human and non-human actors, from coding software and open source algorithms to data engineers and enforcement officials (Mackenzie, 2017). Prediction works through ‘feature space’, where features are assigned significance by machine learning algorithms to identify what a fraudulent ‘needle’ looks like among ‘the haystack’ of data points and use this as a basis for predicting fraud-
ulent cases (Aradau and Blanke, 2017). Sociotechnical assemblages of enforcement algo-
rithms require attention to sightlines between machine learning and the state’s margins: political rationalities guiding modelling around overcrowded housing; urban data infra-
structures and fusion of data attributed not to individual ‘risky’ subjects but properties; algorithmic operations and outputs (risk scores, rankings, lists, etc.) and how they frame state practices governing precarious urban lives (Amoore, 2009; Amoore and Piotukh, 2015; De Goede et al., 2016; Sadowski, 2020a).

Key to the picture in London is how densely occupied migrant rental housing is dispersed unevenly, interwoven with formal housing topography, and often physically undetectable viewed from the street or above, characteristic of informal housing in comparable regions and cities of the Global North (Durst and Wegmann, 2017). The typically cash-in-hand sublet arrangements are far removed from datafied middle-income rental markets emergent in post-2008 financialised urban landscapes (Fields, 2019). Informality has been increasingly understood as a register of northern urban housing, where the state plays a central role in marking the informal as legal or illegal, and is an important factor in the mechanics of machine learning. As Roy has argued, urban informality is a ‘heuristic device that uncovers the ever-shifting urban relationship between the legal and illegal, legitimate and illegitimate, authorized and unauthorized’ (Roy, 2011: 233). The use of digital technologies including Google Maps and algorithmic software to quantify and map informal settlements across various geographies have been explored in terms of how the digitisation of territory enacts new forms of inclusion and exclusion (Ascensão, 2016; Connolly and Wigle, 2017; Luque-Ayala and Neves Maia, 2019). And yet formal housing, and indeed property regimes, are far from out of the picture. A central feature of predictive modelling in housing enforcement has been identifying criminality hidden within the grid of formal properties. As the latter sections of this article demonstrate, the world-making effects of the proactive state are
conditioned by interfaces with informality through data matched to the property grid. At stake in these proactive state geographies is how algorithms create, as Amoore has argued, the ‘bounded conditions of what a democracy, a border crossing, a social movement, an election, or a public protest could be in this world’ (Amoore, 2020: 4) – or, for that matter, public health and housing.

**An ethnographic approach to algorithms and the state**

The analysis presented here forms part of a broader research project on the urban politics of overcrowded migrant rental housing in London. Data gathered for the larger study comprise 63 recorded, semi-structured interviews and many unrecorded interviews and conversations conducted during 14 months’ participant-observation in various sites across London (in 2017, and 2018 to 2019), as well as subsequent online research (in 2020). Interviews concerning enforcement were carried out with 19 local government officials and partners, among them Environmental Health Officers (EHOs) and other officials specialising in housing enforcement, data scientists and various managerial, political and corporate actors, while the broader study includes interviews with migrants, rental market intermediaries, advocates, activists and residents. I attended several inspections with EHOs and tenant advocates (without police or immigration enforcement officials) that dealt with disrepair, an illegal sublet business and illegal evictions in order to gain insight into inspection practices and environmental health expertise. The research focus on enforcement algorithms unfolded as staff referred to shifts from ‘reactive’ to ‘proactive’ enforcement and to data-driven approaches. This article is the outcome of reflection on and analysis of this material. While the research is broadly ethnographic and therefore contextually specific, the article aims to contribute to wider theoretical and empirical understandings of political geographies of the state, algorithms and precarious urban lives.

Political geographers have increasingly turned to ethnographic methods to study the state, institutions, territory and geopolitics, often to complement rather than displace more traditional orientations towards discourse and quantitative analyses (Billo and Mountz, 2016; Megoran, 2006). More recently, researchers have identified ‘ethnographic tactics’ and actor-network approaches as significant to ‘knowing algorithms’ as ‘neither black nor box’, complementing the ethnographic turn in political geography. Bucher cites John Law and Bruno Latour as to how ‘methods are always emerging, or at least they should be’ in relation to the messiness of the social world and its ‘blackboxing’ (Bucher, 2016: 85). Algorithms are frequently constructed as secret and unknowable, yet can in fact be made more knowable, including through interrogating how, where and by whom secrecy is produced (Bucher, 2016; Seaver, 2017). Seaver advocates ‘scavenging’ as an ethnographic tactic for ‘piecing together heterogeneous clues’ and ‘tracing cultural practices across multiple locations’ where algorithms themselves appear to be elusive, while paying attention to the ‘texture of access’ as an epistemological tool (Seaver, 2017: 7). Entrepreneurialism and managerialism were particularly amenable to research, for instance when visiting a local authority in which data-driven approaches were receiving significant managerial support, or in examining material published online by GeoDataInspect, a private sector company effectively selling the proactive approach, including blogs, reports, and a ‘Digital Summit’. The study of housing enforcement and wider study of the urban politics of overcrowding provided crucial insights into the sociotechnical relations in which algorithms are embedded, pointing to their ‘praxiography’ (Seaver, 2017, citing Mol, 2002), as imagined, enacted and worked on by various actors invested in urban politics. Geographies of the proactive state can be assessed through these enactments. Such methodological approaches are furthermore
attuned to how the ‘authorship of the algorithm is multiple, continually edited, modified and rewritten through the algorithm’s engagement with the world’ (Amoore, 2020: 22).

Beyond this, a number of methodological issues are important to address. Snowballing generally resulted in further interviews with less senior officials or officials in other local authorities, with no more than three interviewees in any one local authority. Rather than a deeper engagement in one institution, the study offers insight into how proactive approaches have been taken up over time across London and the UK, with desk-based research on policy changes, grant funding for local authorities and digital entrepreneurialism supplementing interviews and observations. The study does not encompass how data are processed or used by institutional actors other than local authorities, and further research could usefully consider the interplay of different sources of data-driven intelligence by the proactive state. A limit concerns the London-centric nature of the study. The point here is not to lay claim to the unique geographical origins of the proactive state, which can both be understood contextually and as entangled in broader institutional genealogies of bordering, surveillance, biopolitics and pre-emption. Rather, it is precisely in this light that London is a significant site for studying proactive state geographies, in relation to the politics of migrant housing in a global, rentier city.

As others have suggested, greater understanding of algorithmic socio-technical assemblages is at stake in charting nodes and courses for ethicopolitical interventions and social action not only for engineers and data scientists but for wider publics concerned with social and spatial injustice (Amoore, 2020; Bucher, 2016; Safransky, 2020; Shaw and Graham, 2017). To this end, while the research in part concerns the local state’s role in specific issues including tenant safety and security, the article also speaks to a wider set of concerns about shifting algorithmic diagrams of state power and social control in urban society. The remainder of the article therefore offers a partial, situated reading of the proactive state in respect of housing and migrant justice in the digital city.

**Proactive enforcement in the ‘suburban shanty town’**

The past decade has seen a shift towards proactive enforcement in local authority strategies and central government policy. An overview of local authority enforcement in 2015 summarised that low levels of enforcement around unsafe housing in general reflected a complaints-led (reactive) approach (Battersby, 2015). However, a steep growth of proactive, data-driven and multi-agency initiatives targeting ‘rogue landlords’ and ‘beds in sheds’ was already underway. In 2016, a Radical Housing Network (RHN) report detailed how central government funding grants awarded to local authorities in 2012 and 2013 (£1.8 million and £4 million, respectively) for purposes of tackling ‘beds in sheds’ and ‘rogue landlords’ were being used for housing raids coordinated with authorities and local police and immigration enforcement teams. Ten of the 30 local authorities to receive funding were in Greater London and 8 of those in Outer London suburbs, with Outer London boroughs making up 5 out of 10 local authorities awarded over £200,000 by the two grants. Houses were targeted for inspections and raids by a range of reactive and proactive approaches, from organisational referrals and complaints to street surveys, aerial photography, geographic information system (GIS) mapping, identifying properties ‘owned by suspect landlords’ as well as those ‘above takeaways’ and using information and data from internal local authority departments and external agencies (RHN, 2016).

Several further central government grants have been available to local authorities over the past decade, and a paradigmatic shift towards proactive enforcement has become increasingly embedded. In 2016, 12 London boroughs received part of a £5 million rogue landlord enforcement fund (Department for Communities and Local Government, 2016).
Following this, funding was available for housing enforcement through the Controlling Migration Fund, with nine awards to London boroughs either entirely for housing enforcement or with some element devoted to it, usually specifically referring to rogue landlords (Ministry of Housing, Communities and Local Government (MHCLG), 2018). In 2019, the MHCLG published its latest ‘rogue landlord enforcement’ guide for local authorities which provides guidance specifically about ‘proactive’ approaches, being led by intelligence, and developing multi-agency initiatives (MHCLG, 2019). A further 2019 rogue landlord grant of £2.4 million was given to 50 local authorities across the UK, geared towards data-sharing and software innovations. This was followed in 2020 by Private Rented Sector Innovation funding of £4 million for 100 local authorities, with 5 London-based local authorities receiving funding to support data analytics and intelligence-driven enforcement as well as borough partnerships that extend across administrative boundaries (MHCLG, 2020).

These recent developments in central government policy supporting intelligence-led proactive enforcement have taken shape in the context of rentier accumulation in overcrowded migrant dwellings in suburban areas. Accompanying the 2012 funding for ‘beds in sheds’ enforcement, the UK government’s then Housing Minister, in a semiotic reterritorialisation of high density southern urban topographies, referred to the proliferation of back garden dwellings as ‘suburban shanty towns’ (Department for Communities and Local Government, 2012; Lombard, 2019; Roy, 2011). In recent years, everyday materialities of suburban multi-culture have disrupted the normative whiteness of suburban space, providing a canvass for xenophobic and racist mobilisations (Nayak, 2010). In an illustrative example, in 2006, the local electoral success of the White nationalist British National Party in Barking and Dagenham in suburban east London was grounded in public spectacles in which mundane practices such as litter picking on estates were adjoined to racist political mobilisations (Trilling, 2012). Human and material densities associated with overcrowding have been politicised, the policing of ‘dirt’ and ‘social dirt’ intertwined in the enforcement of relations between property and propriety (McFarlane, 2016; Neocleous, 2000). In a suburb where I conducted research in 2019, campaigns had been initiated by residents in collaboration with local authority officials, police and politicians to reduce ‘anti-social behaviour’, ‘kerb crawling’ and fly-tipping. Associations are made between perceived neighbourhood decline, overcrowded housing and recent migration, pointing to blocked driveways, public urination and excess waste on residential streets and in front gardens. Neighbourhood forums and patrols are organised, residents instructed to report to a police hotline and additional zoning regulations brought in.

A number of experiments in making visible ‘beds in sheds’ and ‘rogue landlord’ dwellings to local state planning and housing enforcement have ensued. Since 2013 thermal imagery, aerial photography and GIS have been popular in mapping illegal outbuildings in some suburbs, but the approach is not widely understood to be able to target effectively other illegal makeshift dwelling practices. ‘Tasking days’ are also used in some places, with officials conducting street surveys in teams, looking out for ‘clues’ such as stud walling in windows above shops and knocking on doors to gather information. I noticed a map of these surveys up on the wall of an enforcement office I visited, with roads already visited highlighted. However, street surveys are also understood to be labour and resource intensive, especially in an austerity context. In this context, data-driven technologies have become increasingly central to the shift towards the proactive state.

**Proxies for overcrowding in enforcement-led experiments**

Experimentation at the local level has been instrumental in driving the shift to the proactive state in housing enforcement. In 2020, GeoDataInspect, a private company founded in 2018
and contracted by local authorities to assist with digitisation and datafication of their licensing and enforcement approach, hosted its first Digital Summit. Some of my London-based interlocutors spoke at the summit, which also reflected wider UK geographies of housing and enforcement, with senior managers from a southern coastal town and another large metropolitan area in the north of England speaking about their approaches. In one session, two former senior enforcement colleagues at the London Borough of Newham, one of whom went on to co-found GeoDataInspect, traced an institutional genealogy of data-driven experiments back to a single ward.

‘Newham was the place to be at that time . . . if you were really up for a challenge’, mused the GeoDataInspect director. Their dialogue recalled how following the Housing Act 1988, which deregulated private sector tenancies, Newham went from having approximately 300 private landlords and 6,000 private rented units in the early 1990s to approximately 17,000 private landlords and 50,000 units in 2020. This follows broader London trends, in which the proportion of households renting from a private landlord had risen from 14% in the 1991 Census to 26% in 2011; growth in Newham was rapid over this period, from 25% in 2006 to 39% in 2011. Public health concerns associated with this growth has caused significant problems in resourcing and expertise for local authorities, especially in the advent of austerity. In 2016/2017, the median number of qualified EHOs was around 2 per 10,000 privately rented homes across London boroughs (Battersby, 2018). During the 2000s, enforcement officials in Newham were seeing more ‘crime and ASB’ – from ‘enviro-crime’ such as rubbish dumping on streets, leading to perceptions of neighbourhood decline, to more organised crime, including ‘brothels and beds in sheds’. Local politicians began to demand action, with an ambitious plan to apply for borough-wide licensing of all private rented housing, the first council to do so.

Newham Council ran a pilot landlord licensing scheme in one local ward, Little Ilford. Trialling a more ‘holistic approach’, they began to work alongside the police as well as other departments including planning enforcement, building control, trading standards and street cleansing. The Little Ilford pilot was ‘a test tube or a sandpit’. The GeoDataInspect director, then an EHO, began to realise there were ‘hidden crimes’, and his team could work to make them ‘unhidden’. Little Ilford was where he and his team conceived of the possibility that data from street cleansing about over-filled bins could be ‘a proxy for overcrowding’. The council had ‘amassed a vast amount of intelligence’ that it wasn’t using and which could be used in enforcement, built around the principle that there was ‘interconnectivity . . . between different crimes’. They held daily meetings over several months to develop their approach to using data. The GeoDataInspect director was, according to his former colleague, a ‘great advocate of that kind of transformation, to get rid of all [the] paper and go completely digital and further’. Specifically, ‘going digital’ traced the contours of street-level state prosaics and visibilities through connecting the dots around overcrowded housing and associations of criminality (Aradau and Blanke, 2017; Painter, 2006).

A GeoDataInspect blog in April 2020 begins by pondering whether the Minority Report fantasy is now becoming a reality, alluding to the possibility that enforcement officials could stop crimes happening before they occurred (Anderson, 2010). In 2012, the Newham enforcement team was faced with ‘identifying 10,000 unlicensed and unsafe private rented properties hidden amongst 105,000 residential properties spread across 14 square miles’. The Little Ilford pilot had shown that ‘unlicensed properties were much more likely to have poor housing standards . . . So, find the unlicensed properties and we would find the housing crimes’. The idea had sparked that criminality could be identified at specific addresses. However, while councils could ‘dispatch a small army of council officers to walk the streets, spotting properties that “looked” like they might be rented, through signs of disrepair,
overflowing bins and even the “dirty curtain test”, this is ‘costly and unreliable’. The solution they developed instead was to build a predictive model using data indexed to Unique Property Reference Numbers (UPRNs), a reference number for individual addresses. As a data analytics expert hired to help develop the model wrote later in the blog: ‘It is a computer version of the “dirty curtain” test, that doesn’t rely on a small army of council officers’.

Newham Council’s proactive approach fared better compared to another initiative. In 2016, the city-wide governing authority, the Greater London Authority, launched the London Office of Data Analytics (LODA) in partnership with data science and innovation consultants as a pilot for smart city governance. The decision was taken to focus the initiative’s pilot project on predicting the location of unlicensed Houses of Multiple Occupation (HMOs), one among several options proposed, as a clear and useful problem to which machine learning algorithms could be put to work. Following this, the private sector consultants spoke to enforcement officials about what might be the most useful predictive variables. The resulting model, however, performed very badly in an initial Randomised Control Trial, with enforcement officials dismayed at the model achieving no correct predictions. Lessons were learned and the model was adapted. By 2019, the main local authority partner to LODA had contracted GeoDataInspect services, after several other local authorities had already dropped out. By 2018, LODA had been rebranded as the City Data Analytics Programme, encompassing a wider set of smart city initiatives.

A pertinent contrast between Tenure Intelligence and the LODA project, and one that may explain their different fortunes, were the institutional prosaics through which each was enacted (Painter, 2006). Even before GeoDataInspect was founded, Newham Council’s approach was emerging as paradigmatic among enforcement officials, mentioned on several occasions to me during interviews and conversation. Since 2018, GeoDataInspect has sold its digital products and services to local authorities over the UK Government Digital Service’s Digital Marketplace, including a cloud-based system, an online licensing application system, a street-level inspection app and ‘Tenure Intelligence’ predictive modelling, with bespoke machine learning algorithms used to unveil the local housing stock. Inspections are carried out with an iPad, with notes feeding directly through the app into the cloud. In 2020, GeoDataInspect was developing and marketing its digital products to a wider array of ‘Public Protection’ services ‘to deliver the productivity gains on offer’. The contrast points to how proactive state geographies in housing enforcement have been shaped at least as much by street-level bureaucracies operating in suburban space as more generic, city-wide smart city projects set in motion by consultants and data scientists. That being said, both the LODA project and Tenure Intelligence modelling understood machine learning to be capable of providing intelligence that could be operationalised in street-level enforcement while rooting machine learning in local urban data infrastructures. The next two sections scrutinise more closely machine learning, predictive modelling and situated enactments of intelligence.

**Urban machine learning and geocoded intelligence**

If the proactive state in housing enforcement has taken shape through inspection prosaics in the rentier city, it has also been mediated by data infrastructures pertaining to the property grid. These infrastructures represent urban territory according to historical governmental techniques of simplification and calculability (Scott, 1998). The task of machine learning algorithms in this context is to target individual properties for inspection. A data scientist working on the LODA project is taking me through the model, where this article began. He
loads up a spreadsheet showing a dataset of local properties and a predictive score column. He has just shown the top address predicted to be an HMO to the enforcement manager, who confirmed it was an address they had been looking into. The first iteration of the model used a ‘needle in a haystack’ algorithm, typically used by banks to detect financial fraud. The data scientist has since trialled logistic regression, a balanced random forest algorithm and an XGBoost algorithm, which also uses random forests and has given the best results so far. Random forests pick a specified number of variables (e.g. 3, 4, 5) at random for thousands of decision trees and calculate the predictive power of variables on this basis. A decision tree will ‘carry on splitting all the variables until you end up with what are called leaves at the end of the trees’, he explains. The model’s predictions are shaped by the scoring system of the most effective trees, thus providing a score for each unique property.

What connects the variables in each decision tree? As with Tenure Intelligence, the cornerstone of machine learning in this model is the UPRN. The UPRN is a 12-digit unique identifier for an official address registered by Street Naming and Numbering departments at local authorities through the Local Land and Property Gazetteer when a new block or apartment is built or a building is subdivided into flats. GeoPlace was established in 2011 to maintain a national data infrastructure of UPRNs (among other data) by the Local Government Association and Ordnance Survey, the latter established in the late 18th century as Britain’s principal mapping organisation, with a history connected to imperialism, industrialisation and now digital innovations in government (Joyce, 2003). The legibility of the city through data is mediated by the digitisation of geocoded space (Luque-Ayala and Neves Maia, 2019; Rose-Redwood, 2012). The UPRN anchors data about different properties through geocoding to a street address. Predictive scores are assigned to a UPRN to reflect the probability that the address is an unlicensed HMO. Digitised geocoding provided a crucial infrastructure for the proactive state emergent in Newham following the Little Ilford pilot and in GeoDataInspect’s work. As an EHO in Newham Council explained in 2017, ‘that [UPRN] code is used in all the council databases’, including council tax, housing benefit, licensing, noise complaints, waste and anti-social behaviour. The work of data scientists and technical engineers, but also enforcement officials, is enacted through this urban data infrastructure.

A data scientist’s judgement and meetings with enforcement officials can have powerful effects. Historically, local authorities have had various systems of data storage, and even different ways of recording complaints by residents. The data scientist shows me how he has compiled databases and is now ‘cleaning’ the council’s ‘anti-social behaviour’ records. He has ‘already done the matching of the addresses’, but ‘it’s nowhere near being useful for machine learning yet’. Anti-social behaviour records are made following complaints via a phone line or email about noise, graffiti, abandoned vehicles, fly-tipping and ‘eyesore gardens’. The database has roughly 67,000 records. He says there may be hundreds of categories. The next stage is simplifying them. He makes a ‘value judgement’ about which categories matter, and which can be conflated. Using R to code, he gets the number down to 8 categories. He can ‘send that off to the enforcement officers and say: “do these categorisations make sense?”’ He creates a new file called ‘ASB summary’, containing 21,300 records of households with an ‘ASB event’ in the past three years.

These variables and their fusion in predictive models are not politically neutral; rather, they are shaped by suburban politicisations of more-than-human assemblages associated with overcrowding. In turn, classifications and variables assembled to pinpoint criminality are underpinned by policing transgressive forms of urban inhabitation according to relations of property and propriety (Neocleous, 2000). The LODA data scientist takes me through graphs showing the predictive power of different variables. Anti-social behaviour
is a useful predictor, as it is in GeoDataInspect reports for local authorities. ‘Side waste’ is one of the most strongly predictive variables, referring to over-filled bins. ‘Data science not rocket science’, the data scientist jokes, in a similar vein to the GeoDataInspect blog’s reflexive evaluation of the epistemological shift from the ‘dirty curtain test’ to machine learning.

**Enacting intelligence in hostile suburbs**

The geocoded intelligence produced by predictive models inflects enforcement geographies and practices. Tenure Intelligence analysis provides local authorities with an enhanced evidential basis concerning their local housing stock, which can be used in applications to central government for more extensive local landlord licensing schemes. In addition, risk scores offer a numerical, possibilistic account of illegality at any given address, and hence a basis for conducting an unannounced licensing check or multi-agency operation with local partners. Geocoded digital interfaces mediate intelligence for enforcement officials, in Excel and CSV (‘comma-separated value’) files, as well as more recent innovations such as the GeoDataInspect app. CSV files are complex lists with data records on separate lines (here different properties), with an equal number of fields (columns for different features, alongside the UPRN, address and predictive score). For the LODA pilot, as another data scientist explained, the aim was to ‘get an ordered list of all the [unlicensed HMOs] in the borough, and you would be able to give that to somebody and they’d go out and knock on doors’ (De Goede et al., 2016).

Notions and enactments of intelligence, grounded in ideas and technologies of Artificial Intelligence and epistemologies of securitisation during the Cold War and post-9/11, are central to the proactive state. However, rather than having a stable ontology, geocoded intelligence may be enacted as multiple, reworking what ‘environmental health’ and ‘housing crime’ amount to in hostile suburbs. The MHCLG (2019) guidance for local authorities advocates proactive intelligence-led and multi-agency approaches, where ‘working in partnership enables intelligence, data and resources from a variety of organisations to come together to tackle issues of overcrowding, homelessness and illegal immigration in a more effective way and with better outcomes’ (MHCLG, 2019: 54). A 2018 GeoDataInspect blog contends: ‘It all starts with intelligence. Greater intelligence sharing within the council and across agencies is crucial. Intelligence driven enforcement allows multi-agency teams to focus on properties which link to most crimes.’ A key component of intelligence comes from big data: ‘Big data enriches analysis and enhances authorities’ ability through advanced statistics to predict the location of housing crimes’. In the multi-agency context, housing crimes associated with rogue landlordism are not limited to illegal tenancies and unsafe housing; rather, they also include tax and benefit fraud, drugs, trafficking and housing migrants without a ‘right to rent’ in the UK as specified by the Immigration Act 2016, the latter a key legislative part of the Home Office’s ‘hostile environment’ agenda.

The convergence of predictive data analytics in local authorities and hostile state practices has significant ethicopolitical implications concerning violence and injustice in the digital city (Amoore, 2020; Sadowski, 2020a; Safransky, 2020; Shaw and Graham, 2017). By identifying unique properties, geocoded intelligence reproduces the idea of a few bad apples, providing both ideological cover for rentier urbanism and ethicopolitical cover for multiple state practices to become invested in these same bad apples. Between 2015 and 2019, 44,225 raids were carried out on people’s homes in the UK.¹ Housing enforcement officials expressed a range of feelings in interviews and conversations about raids, from discomfort and ambivalence to pragmatism and enthusiasm. A GeoDataInspect report
from 2018 recalls how the Newham team grew to include ‘15 PRS [private rental sector] enforcement officers supported by 18 licensing officers’, while ‘up to 25 Metropolitan Police Officers that LBN [London Borough of Newham] directly funds were made available to support enforcement operations’. Newham Council would not clarify when asked in 2016 by RHN how many of the ‘nearly 400 arrests while on joint property licensing operations’ were of landlords and how many were of tenants, while the 2018 GeoDataInspect report gives a figure of ‘756 arrests . . . made by the police during licensing operations’ (RHN, 2016). Several suburban local authorities have since purchased GeoDataInspect’s services and products while also engaging in multi-agency collaboration with the police, immigration enforcement and other partners.

Multi-agency approaches have included carrying out several early morning joint operations each month, planned in advance by managers from different agencies. In this context, a list of street addresses coded by UPRNs may enter into the assemblage of multi-agency intelligence used to plan raid itineraries and orchestrate entry to specific addresses. Although further research is needed to explore with greater precision how and when intelligence is enacted as multiple, intelligence in multi-agency settings may nevertheless be understood to be emergent, both through machine learning processes, and through intelligence-sharing arrangements – phone calls, meetings and emails between agencies. In the context of domestic violence, campaigners and lawyers have raised concerns about police and immigration enforcement data-sharing practices in ‘Multi-Agency Risk Assessment Conferences’ (Liberty and Southall Black Sisters, 2018). In multi-agency housing enforcement, for EHOs, intelligence pertaining to specific addresses may indicate where they can find the worst infringements with regard to housing conditions; for immigration enforcement officials, it may signal where undocumented migrants are likely to be living. The convergence of proactive and multi-agency approaches signals what geocoded intelligence might become, where state hostility is aligned with apparently more benign interventions. In the proactive state, geocoded intelligence has the potential to bridge penal and welfare rationalities in a colonial genealogy, reworking the boundaries of legality/illegality in housing through urban data infrastructures, classifications, machine learning and multi-agency enforcement (Fassin, 2015; Mol, 2002).

**Conclusion**

While the arguments presented here about the proactive state are based on contextualised ethnographic research and localised institutional geographies, the aim of the article has been to elucidate geographies that have wider significance for understandings of the state, algorithms and the governing of precarious populations and subjects. I have examined the proactive state emergent in suburban London as a context characterised by informal migrant urbanisms and the (re)bordering of space in a politicisation of densities and circulations (McFarlane, 2016). The analysis offered may therefore be relevant for Global North geographies marked by rentier and racial capitalism and comparable renderings of urbanisation, territory and securitisation, although it may also have purchase when put to work in other places. I would like to conclude by offering three broader contributions to geographical scholarship on algorithms, space and politics.

First, proactive state geographies can be studied through a methodological approach that encompasses ethnographic approaches to algorithms and the concrete institutional practices of the state at its margins. It is worth recalling Bucher’s point, citing Latour, that ‘the critic should engage in forms of reverse blackboxing, identifying the specific actors and processes that are made invisible in the process of making the box appear as a stable and static entity’
(Bucher, 2016: 92). This is epistemologically and politically significant with respect to the political lives of algorithms in state transformation. Geographies of algorithmic violence cannot be reduced to deterministic accounts of smart cities or algorithmic government as such, but are emergent in institutional and infrastructural contexts (Safransky, 2020). Rather than simply a call for specificity, however, this methodological approach clarifies distinctive mechanisms through which the (re)bordering of space is encoded in proactive state technologies. It furthermore reveals the world-making effects of the proactive state to be emergent and unstable and identifies the points at which alternative possibilities are open and foreclosed, thus offering some prospects for the orientation of social action (Amoore, 2020).

Second, the article examines algorithms and datafication in relation to urban informality and the state; to date, studies of algorithmic government have paid relatively little attention to informality (Luque-Ayala and Neves Maia, 2019). In the context of rentier capitalism, the analysis of the proactive state complements analyses of digitisation and datafication in the formal arenas of ‘automated landlords’ and the ‘internet of landlords’ (Fields, 2019; Sadowski, 2020b). The article has shown how the digital, rentier city is made not only by new financial instruments and practices but also by state machine learning algorithms that render calculable and governable informal, precarious migrant urbanisms. Algorithms and data practices are implicated in modulating migrant rental housing as what Yiftachel refers to as a ‘gray space’, between legality and illegality, safety and demolition, shelter and incarceration (Yiftachel, 2009: 89). ‘Urban warfare’ – the geopolitical securitisation of the city and the racialised precarity of the urban poor through property and financial accumulation regimes – is thus shaped by how machine learning and prediction enact boundaries between legal/illegal (Graham, 2009; Rolnik, 2019).

Third, and finally, the proactive state extends the ‘locatability’ of risky subjects in post-9/11 geographies of ‘algorithmic war’ (Amoore, 2009) from individual subjects to places and spaces of indeterminate circulations and transient bodies such as cities, zones or houses (Jefferson, 2018; Sadowski, 2020a). Proactive state geographies are inflected by contemporary spaces of geopolitics and capitalism, institutional state genealogies and data infrastructures, affirming a new body of research at the intersection of urban, political and digital geographies. In the city of the proactive state, ‘an arsenal of categories to define and treat gray space and bodies, such as “illegal resident/immigrant”, “unapproved development”, “illegal housing”, “building and planning infringements”, or “land invasion”’ acquires new meaning through urban machine learning processes, leaning heavily on a geocoded data infrastructure attuned to the property grid and its other – ‘property’s “outlaws”’ (Blomley, 2003: 132; Yiftachel, 2009: 93). The overcrowded, criminal house is thus both anomaly and othered (Aradau and Blanke, 2018). At stake here are precisely questions about what public health and housing futures may amount to in the digital city (Amoore, 2020; Shaw and Graham, 2017).

**Author’s contribution**
Theo Barry Born – sole researcher and author.

**Ethical approval**
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Notes
1. ‘Beds in sheds’ emerged as a term to describe illegally occupied outbuildings. ‘Rogue landlord’ is a discourse concerning landlord illegality.
2. ‘Housing crime’ is a discourse that was prevalent in Newham Council during the emergence of their proactive and multi-agency approaches to enforcement and has also been used in a GeoDataInspect blog on prediction in housing enforcement.
3. GeoDataInspect is a pseudonym. Material concerning GeoDataInspect presented here is available publicly via online sources including the company’s website, blogs and reports.
4. The distinction between Inner and Outer London is made for administrative and statistical purposes. Broadly speaking, Outer London refers to historical suburbs.
5. Census statistics from https://www.trustforlondon.org.uk/data/housing-tenure-over-time/. Local statistics on housing tenure from GLA London Datastore https://data.london.gov.uk/dataset/housing-tenure-borough/ (both last accessed 21 February 2021).
6. Licensing regulations under the Housing Act 2004 apply across the UK to some HMOs and for other private rental housing according to local licensing schemes.
7. Minority Report was a 2002 film directed by Steven Spielberg in which police have access to technology that makes it possible to stop a crime happening before it is committed.
8. HMO is a classification specifying shared private rental accommodation in the UK.
9. A gazetteer is a geographical index, for example, accompanying a map.
10. Statistics from https://www.jcwi.org.uk/the-hostile-environment-explained (last accessed 5 April 2021).

References
Allen J and Cochrane A (2010) Assemblages of state power: Topological shifts in the organization of government and politics. Antipode 42(5): 1071–1089.
Amoore L (2009) Algorithmic war: Everyday geographies of the war on terror. Antipode 41(1): 49–69.
Amoore L (2020) Cloud Ethics: Algorithms and the Attributes of Ourselves and Others. Durham, NC: Duke University Press.
Amoore L and De Goede M (2008) Transactions after 9/11: The banal face of the preemptive strike. Transactions of the Institute of British Geographers 33(2): 173–185.
Amoore L and Piotukh V (2015) Life beyond big data: Governing with little analytics. Economy and Society 44(3): 341–366.

Anderson B (2010) Preemption, precaution, preparedness: Anticipatory action and future geographies. Progress in Human Geography 34(6): 777–798.

Aradau C and Blanke T (2017) Politics of prediction: Security and the time/space of governmentality in the age of big data. European Journal of Social Theory 20(3): 373–391.

Aradau C and Blanke T (2018) Governing others: Anomaly and the algorithmic subject of security. European Journal of International Security 3(1): 1–21.

Ascensão E (2016) Interfaces of informality: When experts meet informal settlers. City 20(4): 563–580.

Battersby S (2015) The challenge of tackling unsafe and unhealthy housing. Available at: http://sabattersby.co.uk/documents/KBReport2.pdf (accessed 10 September 2020).

Battersby S (2018) Private rented sector inspections and local authority staffing. Available at: http://www.sabattersby.co.uk/documents/Final_Staffing_Report_Master.pdf (accessed 10 September 2020).

Billo E and Mountz A (2016) For institutional ethnography: Geographical approaches to institutions and the everyday. Progress in Human Geography 40(2): 199–220.

Blomley N (2003) Law, property, and the geography of violence: The frontier, the survey, and the grid. Annals of the Association of American Geographers 93(1): 121–141.

Boughton J (2018) Municipal Dreams: The Rise and Fall of Council Housing. New York: Verso Books.

Browne S (2015) Dark Matters: On the Surveillance of Blackness. Durham, NC: Duke University Press.

Bucher T (2016) Neither black nor box: Ways of knowing algorithms. In: Kubitschko S and Kaun A (eds) Innovative Methods in Media and Communication Research. Cham: Palgrave Macmillan, pp. 81–98.

Burridge A, Gill N, Kocher A, et al. (2017) Polymorphic borders. Territory, Politics, Governance 5(3): 239–251.

Butler J (2006) Precarious Life: The Powers of Mourning and Violence. New York: Verso Books.

Christophers B (2020) Rentier Capitalism: Who Owns the Economy, and Who Pays for It? New York: Verso Books.

Connolly P and Wigle J (2017) (Re)constructing informality and “doing regularization” in the conservation zone of Mexico City. Planning Theory & Practice 18(2): 183–201.

Danewid I (2020) The fire this time: Grenfell, racial capitalism and the urbanisation of empire. European Journal of International Relations 26(1): 289–313.

Das V and Poole D (2004) Anthropology in the margins of the state. Santa Fe: School of American Research Press. Oxford [England], pp. 3–33.

Davies W (2015) The Happiness Industry: How the Government and Big Business Sold Us Well-Being. New York: Verso Books.

De Goede M, Leander A and Sullivan G (2016) Introduction: The politics of the list. Environment and Planning D: Society and Space 34(1): 3–13.

Department for Communities and Local Government (2012) £1.8 million to tackle scandal of ‘beds in sheds’. Available at: https://www.gov.uk/government/news/1-8-million-to-tackle-scandal-of-beds-in-sheds (accessed 9 April 2021).

Department for Communities and Local Government (2016) £5 million cash for councils to stop rogue landlords. Available at: https://www.gov.uk/government/news/5-million-cash-for-councils-to-stop-rogue-landlords (accessed 10 September 2020).

Durst NJ and Wegmann J (2017) Informal housing in the United States. International Journal of Urban and Regional Research 41(2): 282–297.

El-Enany N (2020) (B) Ordering Britain: Law, Race and Empire. Manchester: Manchester University Press.

Eubanks V (2018) Automating Inequality: How High-Tech Tools Profile, Police, and Punish the Poor. New York: St. Martin’s Press.

Fassin D (2015) At the Heart of the State: The Moral World of Institutions. London: Pluto Press.

Fauser M (2019) The emergence of urban border spaces in Europe. Journal of Borderlands Studies 34(4): 605–622.
Ferguson S and McNally D (2015) Precarious migrants: Gender, race and the social reproduction of a global working class. Socialist Register 51: 1–22.

Fields D (2019) Automated landlord: Digital technologies and post-crisis financial accumulation. Environment and Planning A: Economy and Space 1–22.

Foucault M (2007) Security, Territory, Population: Lectures at the Collège de France, 1977-78. Berlin: Springer.

Gidley B (2000) The Proletarian Other: Charles Booth and the Politics of Representation. London: Goldsmiths University of London.

Graham S (2009) Cities as battlespace: The new military urbanism. City 13(4): 383–402.

Gregory D (2011) The everywhere war. The Geographical Journal 177(3): 238–250.

Iveson K and Maalsen S (2019) Social control in the networked city: Datafied individuals, disciplined individuals and powers of assembly. Environment and Planning D: Society and Space 37(2): 331–349.

Jefferson BJ (2018) Predictable policing: Predictive crime mapping and geographies of policing and race. Annals of the American Association of Geographers 108(1): 1–16.

Joyce P (2003) The Rule of Freedom: Liberalism and the Modern City. New York: Verso Books.

Liberty and Southall Black Sisters (2018) Super-complaint prepared by Liberty and Southall Black Sisters. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/767396/Super-complaint_181218.pdf (accessed 13 January 2021).

Lombard M (2019) Informality as structure or agency? Exploring shed housing in the UK as informal practice. International Journal of Urban and Regional Research 43(3): 569–575.

Lukes S, de Noronha N and Finney N (2019) Slippery discrimination: A review of the drivers of migrant and minority housing disadvantage. Journal of Ethnic and Migration Studies 45(17): 3188–3206.

Lunque-Ayala A and Neves Maia F (2019) Digital territories: Google maps as a political technique in the re-making of urban informality. Environment and Planning D: Society and Space 37(3): 449–467.

Mackenzie A (2017) Machine Learners: Archaeology of a Data Practice. Cambridge, MA: MIT Press.

McFarlane C (2016) The geographies of urban density: Topology, politics and the city. Progress in Human Geography 40(5): 629–648.

Megoran N (2006) For ethnography in political geography: Experiencing and re-imagining Ferghana Valley boundary closures. Political Geography 25(6): 622–640.

Ministry of Housing, Communities and Local Government (2018) Controlling migration fund prospectus (Annex A: Summary of projects already funded). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/733135/Annex_A_summary_of_projects_already_funded.pdf (accessed 10 September 2020).

Ministry of Housing, Communities and Local Government (2019) Rogue Landlord Enforcement: Guidance for Local Authorities. London: Author.

Ministry of Housing, Communities and Local Government (2020) Private rented sector innovation and enforcement grants. Available at: https://assets.publishing.service.gov.uk/media/5e217235ed915d1f223cedc1/prs-ie-grant-project-summaries.pdf (accessed 10 September 2020).

Mol A (2002) The Body Multiple: Ontology in Medical Practice. Durham, NC: Duke University Press.

Nayak A (2010) Race, affect, and emotion: Young people, racism, and graffiti in the postcolonial English suburbs. Environment and Planning A: Economy and Space 42(10): 2370–2392.

Neoceleous M (2000) The Fabrication of Social Order: A Critical Theory of Police Power. London: Pluto Press.

Painter J (2006) Prosaic geographies of stateness. Political Geography 25(7): 752–774.

Poovey M (1995) Making a Social Body: British Cultural Formation, 1830-1864. Chicago, IL: University of Chicago Press.

Potts D (2020) Broken Cities: Inside the Global Housing Crisis. London: Zed Books.

Radical Housing Network (2016) Wolf in Sheep’s Clothing? How Funding to Tackle “Rogue Landlords” Has Harmed Tenants. London: Author.

Rhodes J and Brown L (2019) The rise and fall of the ‘inner city’: Race, space and urban policy in postwar England. Journal of Ethnic and Migration Studies 45(17): 3243–3259.
Rolnik R (2019) Urban Warfare. New York: Verso Books.
Rose N (2001) The politics of life itself. Theory, Culture & Society 18(6): 1–30.
Rose-Redwood R (2012) With numbers in place: Security, territory, and the production of calculable space. Annals of the Association of American Geographers 102(2): 295–319.
Roy A (2011) Slumdog cities: Rethinking subaltern urbanism. International Journal of Urban and Regional Research 35(2): 223–238.
Sadowski J (2020a) Too Smart: How Digital Capitalism is Extracting Data, Controlling Our Lives, and Taking Over the World. Cambridge, MA: MIT Press.
Sadowski J (2020b) The internet of landlords: Digital platforms and new mechanisms of rentier capitalism. Antipode 52(2): 562–580.
Safransky S (2020) Geographies of algorithmic violence: Redlining the smart city. International Journal of Urban and Regional Research 44(2): 200–218.
Scott JC (1998) Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed. New Haven, CT: Yale University Press.
Seaver N (2017) Algorithms as culture: Some tactics for the ethnography of algorithmic systems. Big Data & Society 4(2): 1–12.
Shaw J and Graham M (2017) Our Digital Rights to the City. London: Meatspace Press.
Soederberg S (2020) Urban Displacements: Governing Surplus and Survival in Global Capitalism. London: Routledge.
Trilling D (2012) Bloody Nasty People: The Rise of Britain’s Far Right. New York: Verso Books.
Wemyss G (2015) Everyday bordering and raids every day: The invisible empire and metropolitan borderscapes. In Brambilla C, Laine J and Bocchi G (eds) Borderscaping: Imaginations and Practices of Border. Farnham: Ashgate, pp.187–196.
Yiftachel O (2009) ‘Theoretical notes on gray cities’: The coming of urban apartheid? Planning Theory 8(1): 88–100.
Yuval-Davis N, Wemyss G and Cassidy K (2019) Bordering. Hoboken, NJ: John Wiley & Sons.

Theo Barry Born is a PhD researcher in the Geography Department, Queen Mary University of London. Taking an ethnographic approach, his recent research has focused on the urban politics of overcrowding in London. Previously, he has worked as a professional researcher conducting quantitative analyses of housing, homelessness and poverty in London and the UK. He also lives in London and was a founding member of a local tenants’ union.