Introduction

Criminologists have long been interested in mapping crime, and today, computer-aided crime mapping is used by police forces around the world (Chainey and Tompson 2008). Yet despite crime mapping's burgeoning popularity in recent decades (Sharon 2006), criminology's use and understanding of maps, their production and application remains largely superficial and uncritical (see, for example, Anselin *et al*. 2008; Boba Santos 2013; Chainey and Ratcliffe 2005; Hill and Paynich 2013). This article calls for criminologists to look at maps and map-making anew, and to critically reengage with cartography as an object of theoretical critique and inquiry; as a methodological toolkit; and as a vehicle for social and political intervention.

Beginning with a brief overview of the history of crime mapping, the article then considers the development of critical cartography; a constellation of theoretical critiques and new mapping practices that challenges how we think about maps, and which, it is argued, can provide a useful corrective to criminology's cartographic illiteracy. Also considered are the production and achievements of "counter-maps" which reframe the world in such a way as to articulate alternative, subversive and marginalised interests.

The remainder of the article proceeds in three parts, exploring the implications of critical cartography for criminological theory, method, and social and political intervention, respectively. First, criminologists are urged to challenge conventional crime mapping's use and efficacy, and to interrogate its epistemological and ideological presumptions. Relatedly, it is argued that as new forms of digital mapping become increasing popular, cartography and its implication in crime, control and resistance, should comprise a focus of criminological enquiry.

Second, it is argued that cartography affords a host of innovative methodologies that criminologists have yet to take advantage of. Despite the recent 'spatial turn' within criminology (see Hayward 2004, 2012; Campbell 2013), criminologists have so far been reluctant to explore the abundance of cartographic research opportunities at their disposal. Some tentative suggestions are made as to how criminologists might utilise maps and map-making in order to generate unique empirical insights and yield other methodological advantages.

Finally, the article considers how criminologists might harness maps' communicative power to better engage with the public and to promote social justice. Several examples are considered, which point towards innovative new approaches for action research and opportunities for more critically informed, political engaged mappings of crime and its control. However, whilst socially progressive mappings give cause for optimism, criminologists must nevertheless remain vigilant against cartographies of intolerance and vindictiveness.

A brief history of crime mapping

The history of crime mapping is punctuated by three defining moments. Ever since the first recognisable examples of crime maps were produced in the early 19th Century by André-Michel Guerry and Adolphe Quetelet, following the publication in France of the first national crime statistics, cartography has maintained something of a flickering

presence in criminology (Courtright and Mutchnick 2002). In many ways Guerry and Quetelet's *cartes thematiques* anticipated contemporary crime mapping, with areas shown shaded according to the rates of various categories of crime, as well as other socio-demographic features, such as poverty and education levels (Wortley and Mazerolle 2008; Beirne 1993; see figure 1). Importantly, Guerry and Quetelet's maps showed that crimes were not evenly distributed but clustered geographically along with other observable social variables such as poverty and education levels, and that such patterns were consistent over time (Courtright and Mutchnick 2002; Hill and Paynich 2013; Wortley and Mazerolle 2008). Credited with founding what is now termed the 'cartographic school', Guerry and Quetelet's methods formed the basis of a flourish of studies throughout the 19th Century – perhaps the most well known of which is Mayhew's (1862) survey of London's rookeries – as well as offering a direct challenge to Lombroso's biological positivism (Chainey and Ratcliffe 2005).

(Figure 1 here)

The next substantial and somewhat more influential moment in the history of crime mapping, to which modern criminology's fascination with charting the spatial distribution of crime can be more or less directly traced, is the work of the Chicago School sociologists in the 1920s and '30s. The theoretical and empirical initiatives of the Chicago School and its legacy have been discussed at length elsewhere and need not be reiterated here (see, for example, Hayward 2013). However, of particular relevance to the present discussion is the iconic significance of Ernest Burgess's "concentric zone" model (Park *et al*. 1925), arguably 'the most famous diagram in social science' (Davis 1995). Inherent in Burgess's model is a particular *way of seeing* urban space which has endured for almost a century (see Hayward 2004): today, the concentric zone model remains the quintessential expression of criminology's conception of the city[1]. Schematic, rationalised and 'mappable from above' (Hayward 2004: 97), the model is emblematic of what the French philosopher and urban theorist, Michel de Certeau (1984), would later describe as the 'concept city': 'the city as seen by planners, developers, statisticians and, all too often, criminologists… distilled to leave only quantitative data, demographics and rational discourse' (Hayward 2004: 2). Unfortunately, it is the School's superficial interpretation of urban space which has since predominated within criminology, having 'set the geography of crime down a… narrow conceptual path from which it has rarely deviated' (Hayward 2012: 443).

The next significant development in crime mapping occurred during the late 1970s and '80s when the so-called "second wave" of environmental criminology reinvigorated interest in the spatial distribution of crime (Hayward 2004). In the following decade, developments in computerised mapping software, the availability of affordable hardware, and the digitisation of police records heralded a new era of "desktop" crime mapping (Chainey 2009). Today, digital crime mapping software is used by police forces around the world to identify crime "hot spots" and to target resources where they are apparently most needed (see, for example, the volume edited by Chainey and Tompson 2008). Recent developments include acoustic gunshot detection systems, which use hidden microphones and sensors to triangulate and alert the police to the location of gunshots in real time, and predictive crime mapping software, which enables police to

[1] As Hayward notes, the School's appreciative focus, exemplified by groundbreaking ethnographic studies such as Anderson's *The Hobo* 'increasingly fell victim to outside policy influence and rational abstraction… a road that led ultimately to the creation of disciplinary variants such as environmental and administrative criminology' (2012: 445).

identify 'prospective hot spots' (Bowers *et al*. 2004; see www.predpol.com). Perhaps most significantly, however, recent years have seen a growing trend in the publication of crime maps on the Internet, often hosted on the websites of police departments, and increasingly in an interactive format (Ratcliffe 2002; see, for example, www.police.uk or maps.met.police.uk).

Critical cartography

Crime mapping is now arguably *the* growth industry in criminology, with its own dedicated journal (*Crime Mapping*), hundreds of books published on the subject and a plethora of commercially available software applications (Byrne and Pease 2011: 361; see, for example, Hirschfield and Bowers 2001; Murray *et al*. 2001; Weisburd and McEwen 1998). Yet despite crime mapping's growing popularity in recent decades (Sharon 2006), criminology's use and understanding of maps, their production and application, remains superficial and largely uncritical (see, for example, Anselin *et al*. 2008; Boba Santos 2013; Chainey and Ratcliffe 2005; Hill and Paynich 2013).

Meanwhile, recent years have seen the development of critical cartography: a perspective that applies the lessons of critical theory to how we think about maps, and which can provide a useful corrective to criminology's cartographic shortsightedness. A host of academic, artistic and activist contributions have challenged the authority of conventional cartography, through both theoretical critique and through new and imaginative mapping practices (Crampton and Krygier 2006; see, for example, Bhagat and Mogel 2008; Crampton 2010; Harley 1989; Kitchin *et al*. 2011; Wood and Fels 1986; Wood *et al*. 2010). In what follows I consider, first of all, the emergence and nature of this theoretical critique. I then discuss the practice of "counter mapping" and its potential as a tool for bolstering the territorial claims of indigenous and marginalised populations, and contesting dominant narratives.

The power of maps: Theoretical and political critiques of cartography[2]

Although critique and contestation have accompanied cartography since its inception as a discipline, contemporary critical cartography as a more or less unified body of critique rose to prominence during the 1990s (Crampton and Krygier 2006). Catalysed by the critical debate surrounding the growing use of Geographic Information Systems, geographers began to pay increasing attention to how maps privilege certain ways of seeing and support dominant political structures (Schuurman 2000; Crampton and Krygier, 2006). Around the turn of the decade, a constellation of theoretical critiques began to call into question the presumptions of professional and academic cartography, and to address the political implications of mapping (see, for example, Harley 1988, 1989, [1991] 2001; Harley and Woodward 1987; Wood 1992). This nascent perspective challenged conventional geographical understandings of maps as neutral scientific documents, instead interpreting maps as instruments of government, social constructions and inscriptions of knowledge and authority (Crampton and Krygier, 2006).

[2] I allude here to Dennis Wood's *The Power of Maps* (1992), an early and influential work of critical cartography.

Critical cartography has called attention to the ways in which maps and map-making are enrolled as instruments of state control, and implicated in struggles over territory, identity and meaning (Kitchin *et al.* 2011). Historically and contemporarily, mapping has played an instrumental role in Western imperial domination and exploitation. By rendering distant territories 'knowable, navigable and claimable', maps have allowed military and commercial power to be wielded efficiently and effectively from afar (Kitchin *et al*. 2011: 390; see Latour 1987). In addition, the 'cartographic gaze' – a way of seeing implied by the dehumanising and rationalising visual grammar of cartographic abstraction, and which renders the complexity of human life as mere dots – allows those in power to take action without witness to its human consequences (Pickles 2004; Kitchin *et al*. 2011: 390). Moreover, once a territory is occupied, colonisers' maps erase the presence and territorial claims of subjugated indigenous populations. In the partition of India (Kalpagam 1995), the 'terra nullius' of Australia (Gibson 1999), and the annexation of Palestinian land (Tawil-Souri 2012), cartography has been integral to colonial coercion (Harley 1988). Today, mapping practices – from real-time surveillance and "strip mapping" by unmanned aerial vehicles (UAVs) or "drones", to the Pentagon's new 'cartography of enmity' (Shapiro 2007; see Barnett 2004) – remain essential to contemporary geopolitical conflicts (Raza 2012: 182).

Alongside its complicity in colonial, imperialist and capitalist domination, cartographic mapping has long been a key strategy within states' internal regimes of governmentality (Rose-Redwood 2006). 'To govern', says Rose, 'it is necessary to render visible the space over which government is to be exercised' (1999: 36). In theoretical terms, mapping can be said to be concerned with the institution of what Deleuze and Guattari (1987) term 'striated space': 'a space within which movements and □ows are regulated in ways which enable authorities to act; a space that is measured, directed and standardized' (Barry 1996: 127-128). In fact, cartography has long facilitated surveillance and control by both the state and capital (Harley 1989: 12). Since the early 19th Century, states have used maps in their assessment and management of population and resources, and their distribution across territory (Crampton 2010). Meanwhile, the production, ordering and inscription of cartographic space 'has historically been related to the… processes of capital accumulation, the circulation of commodities, and the creative destruction of urban landscapes' (Rose-Redwood 2006: 470-471). Today, mapping practices remain central to the politics of the production (and consumption) of urban space (Graham 2005). To give a contemporary example, the geodemographic profiling of individuals and neighbourhoods – 'fitting them into idealised consumer types, fixing them into a spatial grid of quantifiable economic value and ranking them based on their 'worth' or 'risk'' (Kitchin *et al*. 2011: 391) – reifies and exacerbates social and spatial differences and easily leads to the discriminatory process of 'redlining', whereby areas deemed unprofitable or high risk are denied services (Graham 2005; Pickles 1995). Furthermore, recent developments in mapping and GIS technologies offer unprecedented opportunities for new forms of surveillance and tracking (discussed below).

Besides power *external* to cartography – surveillance, for instance, is achieved *with* the help of maps – critical cartographers have also called attention to the ways in which power inheres *within*, or *internal* to, cartography itself: how power is 'embedded in the map text' (Harley 1989: 13), and 'constituted in the very design and creation of maps' (Kitchin *et al*. 2011: 390). Several scholars have argued that *all* maps are inherently ideologically loaded, reflecting the interests of their creators (see, for example, Wood and Fels 1986; Harley 1989; Pickles 1992). Whilst we have been 'indoctrinated into the

conventions of cartographic sign systems' and conditioned to read maps as 'natural', cartographers invariably 'have to make a whole series of decisions regarding content, presentation, scale and so on' (Kitchin *et al*. 2011: 390). Perhaps the most well known and controversial example of maps' embedded politics is the Mercator projection. Whilst it remains the most popular form of world map, the projection was originally devised in 1569, intended as a navigational aid for European sailors, and actually distorts the relative size and position of nations and continents (Monmonier 2004). Not only are Europe and North America shown to be much larger than they actually are, but the map places Europe literally at the centre of the world. Thus, the projection is arguably as much an inscription of European world domination as it is an accurate depiction of the earth's surface, and, in misrepresenting the size of third world countries and continents, has arguably fostered European imperialist attitudes for centuries[3] (see, for example, Peters 1974, 1983; Wood 1992).

Power, then, is subtly constituted through even the most seemingly benign of maps: the school atlas (Kitchin *et al*. 2011: 390). All maps are inherently selective in what they communicate and 'include all kinds of 'silences' about other information' (Kitchin *et al*. 2011: 390). Furthermore, by leaving certain oppressed and underprivileged social categories "off the map", maps also reproduce specific power relations (see, for example, Brown and Knopp 2008; Gleeson 1996; Harley 1988; Matthews and Vujakovic 1995; Winlow 2001). 'Once it is accepted that certain conventions are "natural" or "normal", the danger is that they acquire a coercive and manipulative authority' (Harley [1991] 2001: 202). It is in this way that maps' apparent objectivity belies their inherently ideological character.

Counter-mapping: Critical cartography in practice

Critical cartography's theoretical critique has been accompanied by experimentation with new and alternative mapping practices by a variety of actors from outside the academy: artists, activists, disenfranchised and minority groups and other "non-experts" (Crampton and Krygier, 2006). "Counter-mapping" refers to the use of maps to re-frame the world in such a way as to challenge dominant power structures and to articulate alternative, progressive, and even radical interests (Hodgson and Schroeder 2002; Kitchin et al. 2011). The creation of alternative, subversive maps is by no means a recent phenomenon: particularly well-known instances include the 1929 Surrealist map of the world (figure 2) and the Situationists' psychogeographic guide to Paris (reproduced in Sadler, 1999: 21). Both of these early counter-maps distort existing cartographies in order to contest official representations of space, yet whilst witty and provocative, their impact is easily overstated: they remain vague in their political intent, and of negligible consequence.

(Figure 2 here)

[3] The cultural and political significance of the Mercator projection and its subsequent rivals (such as the Gall-Peters and Robinson projections) remains the source of considerable controversy and debate (see, for example, Crampton 1994; Monmonier 1995, 2004; Taylor 2004; Wood and Fels 1992).

More recent examples have, by contrast, yielded very real achievements (Wood *et al*. 2010: 111). During the 1990s anthropologists and cartographers worked alongside indigenous Inuits in Canada to produce maps documenting their patterns of land use such as fishing sites, travel routes and settlement locations. These maps went on to play a key role in negotiations that would enable the Inuit to assert a territorial claim to the 2 million km^2 of Canada now known as Nunavut (Wood *et al*. 2010). The participatory mapping of indigenous lands in order to secure their tenure has since spread to other parts of the world including Southern Asia, Africa and Australia (see Chapin *et al*. 2005 for a review).

Since 2005, the United Nations has been mapping the restricted access to, physical enclosure and illegal occupation of the Palestinian territories in response to the ongoing violations of international humanitarian and human rights law by the Israeli government (UNOCHA, 2010). This project has established a powerful counter-narrative to Israel's rendering of the conflict; the maps produced hang in consulates and embassies around the world, affirming the reality of the occupation for the diplomatic corps and making it an inescapable topic (Wood et al. 2010: 247).

Contrary to popular conceptions then, maps are socio-political constructs, instruments of domination and government, and expressions of power and ideology. Yet they can also be powerful tools for social justice. In what follows I suggest some ways in which criminology might critically reengage with cartography: firstly, as an object of research and critique; secondly, as a methodological toolkit; and thirdly, as a vehicle for social and political intervention.

Thinking criminologically about maps

Whilst other so-called "environmental" criminologies have long met with ardent opposition, crime mapping has hitherto tended to elude criticism. First and foremost then, a critical cartographic criminology – if we can imagine such a thing – must take conventional administrative crime mapping to task. Criminologists must not only challenge crime mapping's use as a tool for crime analysis and law enforcement, but by extending the analysis of critical cartography, move beyond conventional (albeit valid) criticisms of bias, inaccuracy and inefficacy, and interrogate crime mapping's epistemological presuppositions, its latent political and ideological functions, and its aesthetic and semiotic grammar. Furthermore, mapping and its implication in crime, control and resistance should constitute an object of criminological enquiry in itself. In the remainder of this section I consider these aspects in turn.

Even judged according to their own criteria, crime maps are often 'worse than useless' (Arthur 2011). To begin with, crime maps are dependent on police-recorded crime statistics rather than, for instance, the more authoritative British Crime Survey, and thus reflect the reporting of crime, police recording practices and insurance company policies, rather than any "true" measure of crime, whatever that might entail (Jenkins 2011; see for example, Morrison 1995, Ch.8). Furthermore, it is increasingly the case that it simply does not make sense to think about certain types of crime in terms of our conventional notions of space. Cybercrime, white-collar financial crime, transnational terrorism, fraud and identity theft all have very real local (and global) consequences, yet "take place" within, through or across the 'space of flows' (Castells 1996). Such a-spatial or inter-spatial crime is invariably omitted from conventional crime maps. Moreover,

even those illegalities that, crime maps would otherwise have us believe, neatly adhere to a set of geolocational coordinates are frequently misrepresented; clustered, for instance, according to the nearest residential postcode. Thus, a quiet residential street in Portsmouth appeared as a "war zone" according to the Home Office's online crime map after being misallocated crimes from a nearby shopping centre and neighbouring bars (Morris and Carter 2011).

Crime mapping is frequently touted as an indispensible aid to law enforcement, and has contributed to a veritable paradigm shift in policing (Sharon 2006). For these reasons its strategic implications are also worth considering; in particular, the targeted policing of so-called "hot spots". Undoubtedly the best known instance of crime mapping's operational use is the New York City Police Department's COMPSTAT program[4], heralded by many as the policing success story behind the New York "crime miracle" of the 1990s (Muncie 2013; Rosenbaum 2006). However, on closer scrutiny the role of police strategy in explaining the crime drop appears less certain. Objective evaluations of the COMPSTAT process are limited (see, for example, Kelling and Sousa 2001) since many "assessments" have been written by persons deeply involved in the program, and are essentially works of advocacy (Hoover 2013: 165; see, for example, Bratton and Knobler 1998; Maple and Mitchell 1999; McDonald 2002).

Meanwhile, COMPSTATs critics argue that the crime decline is better explained by other factors including increasing imprisonment, the receding crack epidemic, and broader demographic shifts (see, for example, Levitt 2004). Regardless of its effectiveness, COMPSTAT's operationalisation of "broken windows" theory, coupled with New York's Giuliani-era brand of zero-tolerance policing left a trail of "collateral damage" in its wake, the brunt of which was borne by a politically powerless underclass (Eterno and Silverman 2012; Howell 2009; Muncie 2013). More generally, whilst a small number of evaluative studies suggest that hot spots policing can be effective in reducing crime (see for example, Koper 1995; Sherman and Weisburd 1995), others show that its impacts tend to be small, inconsistent, and short-term (see Rosenbaum 2006 for a review).

At a more fundamental *epistemological* level, established crime mapping techniques – predicated on a Cartesian conception of space as an "empty grid" – inevitably fail to capture the spatial dynamics of crime, as they reduce complex social phenomena to dots or shadings on a two-dimensional surface (Bear and Lee 2011). After all, crime and criminality do not exist as a scattering of discontinuous, static points, suspended in isolation; they have a history and a trajectory, an ambience (or aura?) that surrounds them in both time and space. Conventional dot distribution or choropleth crime maps show only those coordinates at which these trajectories, individual biographies or confluences of criminal "opportunity" (Felson 1986, 1998) – once reported, recorded, categorised, classified and quantified, distilled into static data points – are 'assimilated into an administrative grid' (Scott 1998: 24). Moreover, as Rosenbaum points out, the implications of this superficial understanding of the interrelationship between space and crime extend to crime mapping's strategic use:

> Rarely do we see a detailed analysis of the characteristics of the hot spot and the nature of the problem. How much can we really learn about the problem from the

[4] Whilst COMPSTAT refers to the NYPD's overall management and accountability system, crime mapping is integral to this process (Chainey and Ratcliffe 2005).

> spatial distribution of calls about drug transactions, crime incidents, or arrests? [...] The real problems are hidden behind the calls for service or arrest data. The real story is more complex, more dynamic, and more difficult to summarize (2006: 248)

Beyond such epistemological inadequacy, crime mapping performs several insidious political and ideological functions. First, by rendering the city as an urban dystopia – a "threatscape", depicted solely in terms of criminality – crime mapping legitimates the existing criminal justice apparatus (Wallace 2009). With no clues as to motivation, context or mitigating factors, crime is portrayed simply as 'the result of individual irrational predators' (Wallace 2009: 22). Moreover, digital crime maps are often 'hyper-local in the sense that the displayed results are only made meaningful at the highest level of zoom, in which individual streets rather than whole sections of the city can be seen' (Wallace 2009: 18). This privileges punitive street-level approaches to crime, to the neglect of macro-level social and political interventions, which might actually address crime's social, economic and cultural roots. All this is not to mention that crime maps invariably exclude many of the crimes of the powerful. Financial, corporate and environmental crimes simply do not feature on conventional crime maps (Wallace 2009).

Second, whilst the decision to publicise crime maps is invariably rationalised in terms of community empowerment and police accountability (Jones, 2009; Tompson and Chainey, 2012), it can also be seen as an extension of what David Garland has termed 'responsibilization'. This is a process whereby the state attempts to shift responsibility for crime control onto non-state agencies, organisations and individuals (Garland, 2001: 124-5). In this way, crime maps implicate citizen-users in their own safety, and in doing so promote a neoliberal agenda of individual responsibility (Wallace, 2009).

All the while, crime maps maintain a persuasive, yet ultimately superficial, 'aesthetic of authority' (Ferrell 2009: 78). High definition satellite imagery, geolocational coordinates and decimalised crime statistics all 'provide an assuring sense of precision and order' (Ferrell 2009: 78). According to an aesthetic or semiotic reading of the type popularised by cultural criminologists (Ferrell 2006; Ferrell *et al*. 2008), crime maps are best understood as 'symbolic performances of scientific objectivity' (Ferrell 2009: 78). It is interesting at this juncture to invoke Latour and Woolgar's (1979) notion of scientific diagrams and documents as *inscriptions*: 'material representations used in the production of scientific knowledge and evidence' (Finn 2009: xv). Of particularly relevance here is that, according to Latour and Woolgar, once a scientific object or process is translated into a graphic-textural form, it assumes the status of irrefutable, visually objectified evidence (Born 1997; Latour 1987: 64-70). Thus, crime maps are not only traces of where crimes are alleged to have occurred, but "proof" that they did (Wallace 2009).

'Postmodern cartography', crime and control

Besides advancing a critique of "crime mapping" *per se*, it remains to critically theorise the broader criminological implications of a host of other contemporary mapping practices. Of particular relevance here is the proliferation of digital maps; what critical cartographers have referred to as the emergence of 'postmodern cartography' (Farman 2010) or 'maps 2.0' (Crampton 2009). To take one example, as of 2013, over one billion people were using Google Maps services every month (Choudhary 2013), and the

Google Maps smartphone app was the most popular app in the world (Mari 2013). As digital maps become increasingly ubiquitous, mobile, immersive, interactive and user-generated, our relationship with cartography is undergoing a qualitative, paradigmatic shift. More and more, '*the boundary between consulting a map and interacting with the world outside it is blurring*' (Burkeman 2012, emphasis added). Maps are now interwoven with our everyday lives, implicated in crime and its control, and embroiled in political struggles as never before, yet this nexus has thus far been neglected by criminologists.

Importantly, new mapping technologies offer unprecedented opportunities for social control. Technologies including GPS, the Internet, CCTV and wireless communications – many with military origins – are now being reappropriated as the bases for new architectures of surveillance and tracking (Graham 2010). 'Everything from mobile phones to passports is fitted with microchip radio frequency tags that have the potential to turn their hosts into tracking devices' (Graham 2010: 66). In 2013, it was revealed that the American military contractor Raytheon had developed software capable of tracking individuals' movements and predicting future behaviour by mining data from social networking websites (Gallagher 2013). The software, named RIOT, is able to extract and analyse information including the geolocation metadata with which many smartphones now automatically embed images.

At the same time, such technologies also offer new possibilities for resistance, subversion and transgression. In the West Bank, whilst Zionist mapmakers erase the presence and territorial claims of Palestinians in a process of cartographic ethnic cleansing (Tawil-Souri 2012), Palestinian militants use Google Earth to help determine their targets for rocket strikes (Chassay and Johnson 2007). And in my own research in London, shoplifters and graffiti writers use Google Street View to "scope out" potential targets. In a world of ubiquitous digital mapping, our understandings of space, knowledge and power, and how all this relates to crime and its control must be reconsidered.

Maps as a methodological toolkit

Not only might cartography constitute a novel area of criminological critique and inquiry, but maps and map-making also afford a host of innovative research tools and opportunities that criminologists have yet to explore. In the fields of geography, psychology, sociology and anthropology, maps have long been used to document and analyse the experience and meaning of place and space (Powell 2010). Established research methods which have incorporated cartographic maps include: semiotic analysis (Wood and Fels 1986); graphic elicitation (Crilly *et al*. 2006) and 'mental' or 'sketch mapping' (Gieseking forthcoming 2013). In recent years cultural criminologists, drawing on intellectual developments provoked by the 'spatial turn' in social theory, have begun to offer a more sophisticated rendering of the lived experience and socio-cultural complexities of (urban) space / crime (see Hayward 2004, 2012; Campbell 2013). However, this enterprise has thus far been a largely theoretical one. It is my contention that by utilising maps as research aids, criminologists can develop innovative and explicitly spatial(ising) methodologies with which to generate further empirical insights into this exciting new subfield.

As noted above, conventional two-dimensional and static crime maps inevitably fail to capture crime's complex spatial dynamics, and perhaps there is something naive, even futile, in any attempt to fix and objectify such a fluid and elusive phenomenon. Yet if we

look beyond the methodological conventions of administrative crime mapping, we can imagine new, more creative, revealing and meaningful ways to map crime. Deleuze and Guattari's (1987) concept of the rhizome – a dynamic, acentered, non-hierarchical network – provides an instructive "image to think with" here. And in fact, critical geographers have already deployed the rhizome concept in theorising cartographies of cyberspace (see Dodge and Kitchin 2000). Along the same lines, it is possible to imagine alternative mappings of densely enmeshed and multidimensional, criminogenic and criminalising processes – urban (socio)spatial configurations, individual biographies, institutional dynamics, and so on – that would constitute a more vivid rendering of the interrelationship between space and crime.

Furthermore, recent years have seen the increasing use of computerised "geographic information" systems such as GPS mapping software in qualitative research (Jones and Evans 2012). Several methodological developments with potential application for criminologists are worth considering here. Particularly innovative examples include: participatory photo-mapping projects, in which photographs are geo-tagged and made viewable on a digital map (Dennis *et al*. 2009); and walking interviews, in which audio recordings are matched with a GPS log of participants' route to create a kind of 'spatial transcript' (Jones *et al*. 2008; Jones and Evans 2012). A more experimental form of participatory mapping is exemplified by the "bio-mapping" project developed by Nold (2009). Here, participants wear a portable device comprised of a biometric Galvanic Skin Response sensor and a GPS receiver. The biometric sensor measures changes in the moisture level in participants' skin – a crude indication of emotional intensity – whilst the GPS records their location. This data is then integrated and visualised as an "emotional map" (figure 3): the wearer's journey is represented as a visual track superimposed onto Google Earth's "satellite view", the height of which indicates the level of physiological arousal at a given moment. This in turn functions as a visual prompt to elicit 'detailed and personal interpretations of [participants'] bio-data' (Nold 2009: 5). In the remainder of this section I offer some tentative suggestions as to how these methods and others incorporating maps and map-making might be deployed by criminologists.

(Figure 3 here)

"Criminological cognitive cartography"

In a short but intriguing chapter, Canter and Hodge (2000) probe some of the ways in which sketch maps – participants' drawings of their mental or cognitive "maps" (see Kitchin 1994) – might offer researchers an insight into individuals' experiences of space / crime. Having asked offenders to draw maps indicating where they had committed crimes, they present four examples to demonstrate sketch maps' potential value to criminologists. Particularly interesting questions here concern how respondents choose to interpret the instructions to "draw a map", as well as the sorts of details that they recall or choose to symbolise. Canter and Hodge offer some speculative interpretations of the maps presented, noting that, for instance, 'crimes that are a dominant part of an offender's life might be expected to dominate their conceptualizations of places and be the primary focus of the maps they draw' (2000: 186). This idea is particularly unnerving when one considers the map drawn by a serial rapist, in which '[t]he lack of any other details… than the rape sites and his home show how important these assaults became in defining his existence' (Canter and Hodge 2000: 190). Researchers must

remain wary, however, of treating these drawings as straightforwardly "projective", and interpreting sketch maps without any other background information can be misleading. Rather, they are better used as a focus for interviews exploring the participants' lifestyles and offending, and the emotions and conceptualisations associated with the image produced (Canter and Hodge 2000: 187, 190).

It is unfortunate that the authors did not choose to pursue this methodological sortie further, since it clearly has the potential to provide insight into individuals' experiences of crime (and control) and the spaces and places in which it occurs. What, for instance, might homeless people's drawn maps of the city tell us about the stigmatisation, criminalisation and spatial exclusion of the poor amidst the ongoing privatisation of public space and the socio-aesthetic sanitisation of city centres? And what might young people's maps of their local areas tell us about the nature of inter-neighbourhood territoriality, ethnic tensions and gang rivalries (see Kintrea *et al*. 2008)?

(M)apping crime

The increasing availability and popularity of GPS-equipped smartphones, accessible and open-source mapping software, and social network geo-tagging offers new opportunities for researchers to engage with wider audiences and participant populations. Mappiness (www.mappiness.org.uk) is a smartphone application developed by researchers at the London School of Economics, and designed to measure the relationship between emotional wellbeing and environmental quality. The app asks users-cum-research participants how they feel at random intervals throughout the day, whilst using the iPhone's GPS to record their approximate location, and its microphone to measure ambient noise levels. Whilst the research's subject is undoubtedly intriguing, perhaps even more significant is the project's unprecedented response rate: to date over 57,000 people have participated! Criminologists would do well to exploit mobile apps' versatility, their popularity and their accessibility, as well as smartphones' capacities to function as "pocket research labs" (see Cunnane 2011). Potential research applications include mapping fear of crime through time and space; tracking the sprawling midnight "bombing" missions of graffiti writers (a potential interview prompt); and documenting unlawful stop and searches, wrongful arrests and police brutality (with the possibility of uploading and geo-tagging photographs and video footage).

'Bio-mapping' the 'crime-consumerism nexus'

It is interesting to think about how Nold's (2009) "bio-mapping" might be used to map the late modern city's manufactured landscapes of (criminogenic) consumer desire. A small but significant body of literature has detailed designers of retail environments' efforts to 'seduce the consumer through specific variations of space and place' (Miles 2010: 8; see for example, Crawford 1992; Goss 1993; Shearing and Stenning 1984). Consumers are often unconsciously manipulated through a host of strategically deployed environmental features – flooring patterns, seating, lighting, music, and even scent – in order that they 'adopt certain physical and social dispositions conducive to shopping' (Goss 1993: 31-2). In recent years, cultural criminologists have begun to unravel the various interrelationships that exist between the values and emotions associated with consumption and consumerism on the one hand, and various forms of expressive and acquisitive criminality on the other (Hayward 2004; Hayward and Kindynis 2013). Put

simply, the same dispositions actively cultivated in a consumer culture, and which consumer environments attempt to induce – insatiable desire, aggressive and competitive individualism, hedonism and impulsivity – can also find expression in criminal behaviour (Hayward and Kindynis 2013). How do these architecturally-induced subjectivities play out over time and space? What kind of 'bio-data' or "emotional maps" might a drift (or *dérive*, to use the Situationists' terminology) through London's militarised post-Olympic landscape or Westfield supermall yield? And what might this data reveal to participants and researchers alike about their experiences of these insidiously contrived consumer spaces?

These methods and many more can offer researchers an insight into how people see their world and their lived social relations. What is more, maps' provide an untapped opportunity for criminologists to engage with the public (see Loader and Sparks 2010). Unlike so many datasets and impenetrable academic jargon, maps are visually appealing and intuitively legible, and it is to maps' communicative power that we now turn.

Mapping for (and against) social justice

The institutionalised inequalities of criminal justice and social control; the ongoing abrogation of human rights in the name of "total policing", "counterterrorism", and neoliberal economic interests; hate crime, domestic violence and rape: this is all the stuff of criminology, and like it or not, there is no neat choice between academic analysis and political involvement (Ferrell *et al*. 2008: 13). If we acknowledge that criminologists have a responsibility not just to interpret the world, but to try and change it, cartography offers us a powerful tool for action research and a vehicle for promoting social justice. By re-framing the world in a way that forces us to look at it anew; by making visible that which otherwise goes unseen; and by juxtaposing stark and shameful inequalities, counter-mapping asks questions deemed insignificant, inappropriate or "difficult" by those in power (Kitchin *et al*. 2011). And the counter-mapping of the criminological landscape is already well underway, albeit not by criminologists.

A map of London's prohibition zones – in which otherwise legal activities, such as drinking alcohol, dog walking, or political protest are criminalised – has been charted by the Manifesto Club, a group that campaigns against what it calls 'the hyperregulation of everyday life' (The Manifesto Club 2012; Bowcott 2012). The map exposes the dramatic extent of these quasi-legal jurisdictions, which together cover around half of the city. What is particularly interesting is the way in which this map hijacks the visual language of conventional crime mapping, yet turns the picture on its head, rendering the city as a landscape of social control. As well as a key, the map provides further information about each of the prohibition zones, the option for users to submit reports of their own experiences, and links to relevant petitions and protest organisations, thus making explicit the project's normative ideals.

Prison Map (www.prisonmap.com) is a project which uses satellite imagery from Google Maps to visualise America's carceral epidemic. The maps creator explains that, 'When discussing the idea of mass incarceration, we often trot out numbers and dates and charts' (Begley 2012). 'But what does the geography of incarceration in the US actually look like?' Often located far from population centres, prison buildings are a rare sight for many Americans (Alexander 2010: 190). By collecting and concentrating these images in the same place, Prison Map seeks to make visible this hidden penal

architecture, and with striking effect: a surreal and seemingly endless grid of satellite photographs, a dystopian archipelago of incarceration.

Dronestagram (www.dronestagram.tumblr.com) employs a similar methodology, posting Google Maps satellite images of the locations of drone strikes to the social networking website Instagram. Each image is supplemented with a summary drawn from the Bureau of Investigative Journalism, which compiles reports on drone strikes in Pakistan, Yemen and Somalia (Bridle 2012; see TBIJ 2013). A typical captions reads:

> At least 16 people killed and more injured in a strike by four missiles on a house near the Miranshah bazaar. Drones remained over the target for some time after the attack preventing the injured being rescued. The Pakistan government protested the strike as a violation of sovereignty, and released a statement that "drone strikes are counterproductive, entail loss of innocent civilian lives and have human rights and humanitarian implications." #drone #drones #pakistan (www.instagram.com/p/bT9aNBLB6i)

There is something undoubtedly quite powerful about this drone's-eye-view of covert robotic assassinations rudely interrupting an Instagram feed of friends' photographs.

Many of these projects are both critical cartography and public criminology in all but name, and point towards new opportunities for participatory action research and a more politically engaged criminology. However, such progressive mappings have their reactionary equivalent in *cartographies of intolerance and vindictiveness*[5]. Offender Locator is an app which allows smartphone users in the US to locate registered sex offenders living in their area. The app's developer, ThinAir Wireless, Inc., has compiled and mapped names and addresses from all 50 states' "Registered Offender Databases", rendering them searchable by name or location. According to the developer, Offender Locator is designed to offer its users "peace of mind", yet it is not difficult to imagine how publicising such information might serve as a catalyst for vigilante justice. Numerous other websites host interactive "offender search" maps, many of them produced by local and state-level authorities. Perhaps owing to the availability of offenders' personal information, this kind of vigilante crime mapping has thus far been limited to the US. However, in 2012 a map allegedly depicting the prevalence of "Muslim paedophile gangs" in the UK began circulating on the extreme-right blogosphere (see kafircrusaders 2012)[6]. Whilst the map does not purport to show the home addresses of the alleged offenders, it nevertheless serves as icon of thinly-veiled racist propaganda: ostensibly evidence of a pervasive ethno-racial crime threat. Fortunately, such cartographies of intolerance remain few and far between.

Conclusion

This article has sought to challenge criminologists to think differently about maps, to critically reengage with cartography as an object of research, and to explore its

[5] I refer here to Jock Young's work on the 'criminology of intolerance' (1999) and the 'sociology of vindictiveness' (2007).

[6] As of July 2013, the map had over 87,000 views. On the construction of this racial crime threat and its co-option by the extreme right, see Cockbain (2013).

implications for theory, method, and social and political intervention. After briefly reflecting on crime mapping's history, the article considered the development of critical cartography and its theoretical, methodological, social and political relevance for criminology.

It was argued that criminologists must not only challenge conventional crime mapping's efficacy as a tool for crime analysis and its strategic implications for law enforcement, but must also interrogate its epistemological basis and its hidden political and ideological functions. Furthermore, it remains for criminologists to theorise the implications of a host of other new mapping practices, particularly the proliferation of digital mapping, and their implications for our understandings of crime and its control.

It was suggested that by using maps and map-making as research aids, criminologists can develop pertinent spatially-oriented methodologies, with which to generate empirical insights to compliment emergent critical and cultural criminological theorisations of space/crime. Moreover, not only are maps more visually interesting and easily accessible than dense academic articles and textbooks; the increasing popularity of GPS-equipped smartphones and digital mapping applications offers researchers a unique opportunity to engage with new audiences and potential participants.

Lastly, the article considered how counter-mapping offers criminologists a powerful tool for action research and promoting social justice. However, whilst progressive mappings provide opportunities to challenge the inequities of criminal justice and social control, criminologists must nevertheless remain vigilant against cartographies of intolerance and vindictiveness. My hope is that this article will encourage criminologists to reconsider maps' meaning, power and significance; to innovate and experiment with new cartographic methodologies; and use maps to engage, excite and enrage the public, policy makers and practitioners, about crime, (in)justice and social control.

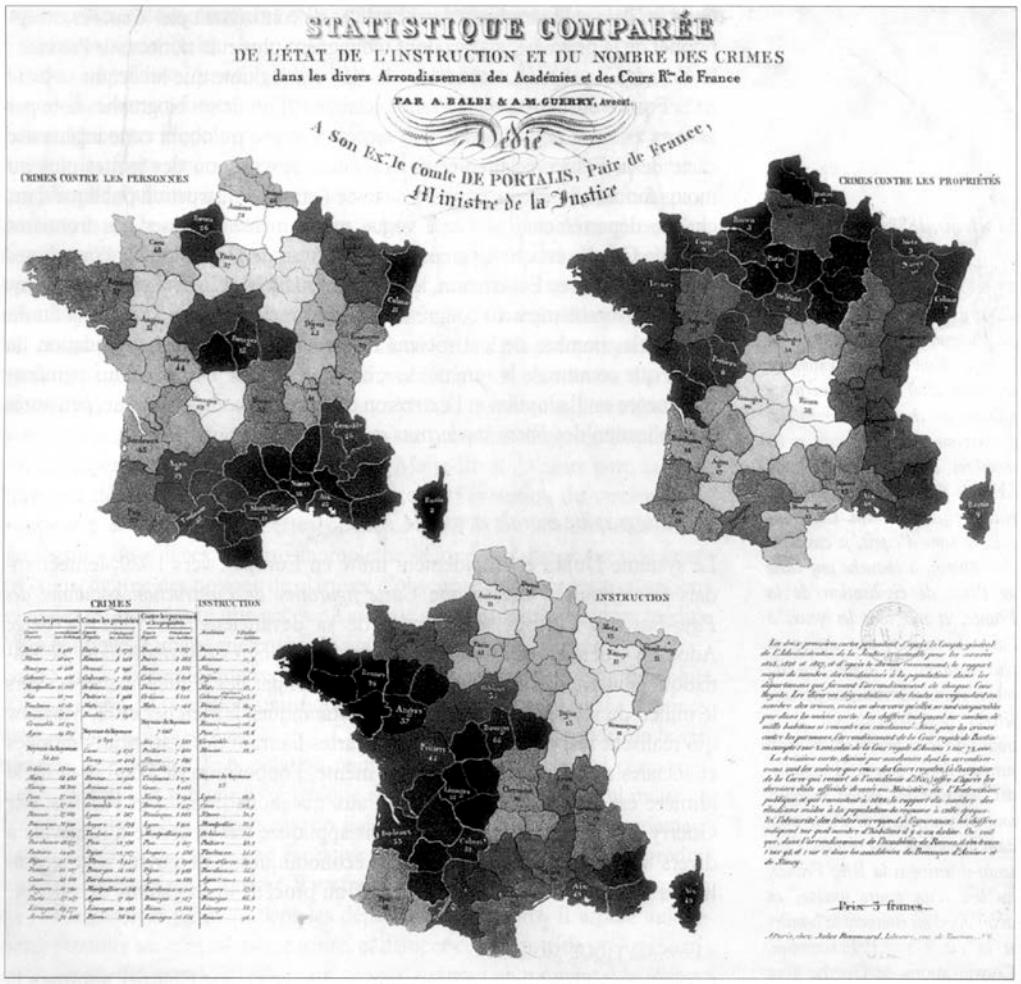

Figure 1. Adriano Balbi and André Michel Guerry, 1829. *Statistique comparée de [l'é]tat de l'instruction et du nombre des crimes [d]ans les divers arrondissemens des Académies et des Cours Rles de France*.

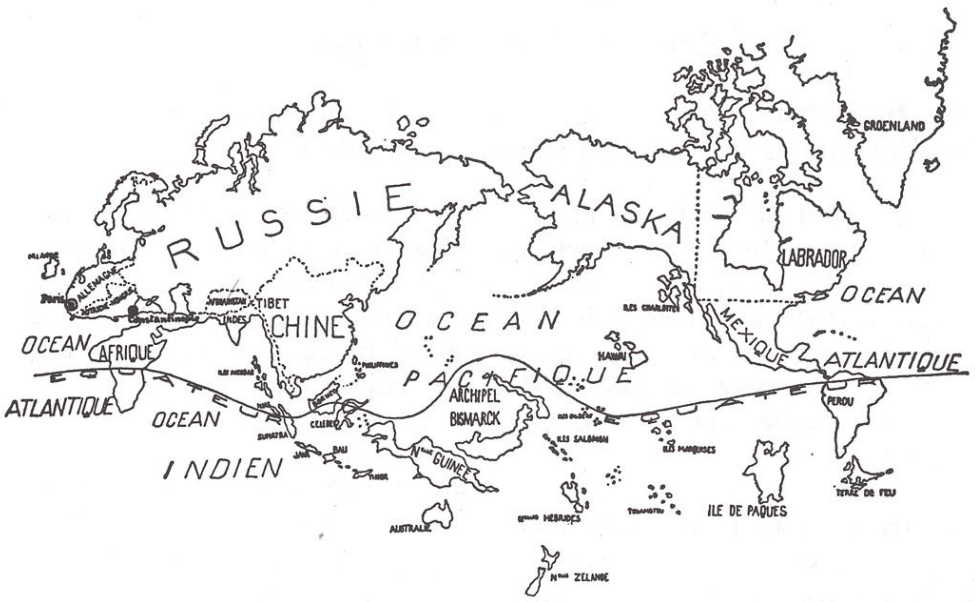

Figure 2. Artist unknown, 1929. Surrealist Map of the World. From 'Le Surréalisme en 1929', special issue of Variétés (1929: 26–7).

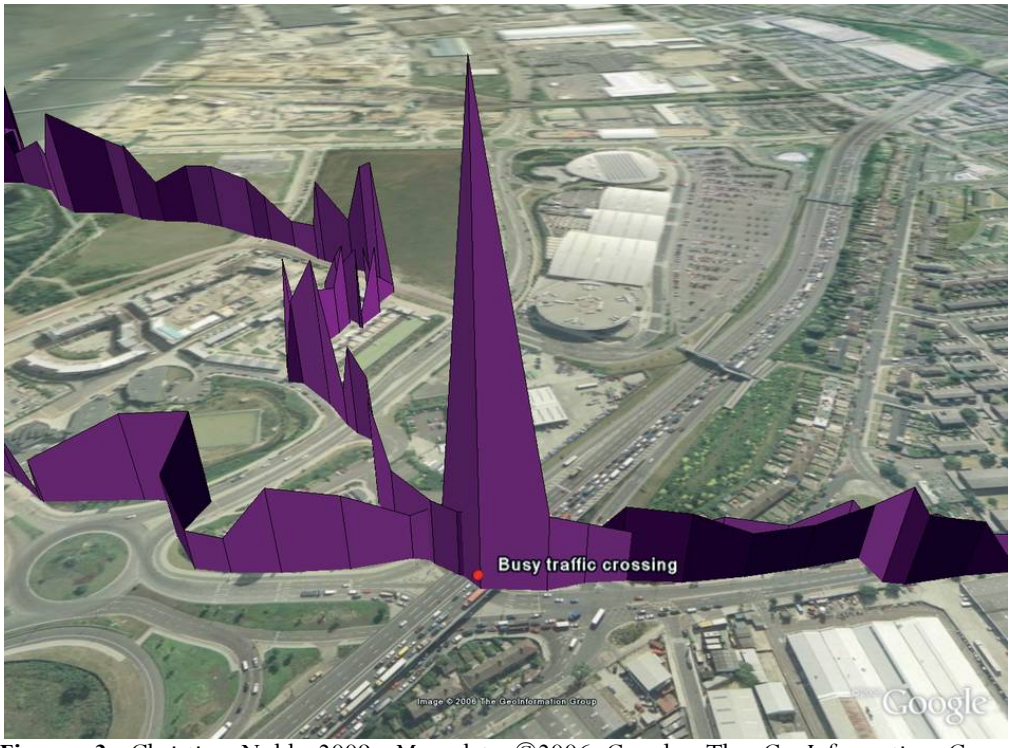

Figure 3. Christian Nold, 2009. Map data ©2006 Google, The GeoInformation Group. Reproduced with permission of the copyright owners. From Nold, C. (2009) *Emotional Cartography: Technologies of the Self*, p.13.

References

Alexander, M. (2010) *The New Jim Crow: Mass Incarceration in the Age of Colorblindness*. New York: The New Press.

Anselin L, Griffiths E and Tita G (2008) 'Crime mapping and hot spot analysis', in R. Wortley and L. Mazerolle, eds, *Environmental Criminology and Crime Analysis*. Cullompton: Willan Publishing.

Arthur, C. (2011) 'Crime maps are 'worse than useless', claim developers', *The Guardian*, 2 February. Available at: http://www.theguardian.com/technology/2011/feb/02/uk-crime-maps-developers-unhappy (Accessed 10 September 2013)

Barnett, TPM. (2004) *The Pentagon's New Map: War and Peace in the Twenty-First Century*. New York: GP Putnam's Sons.

Barry, A. (1996) 'Lines of communication and spaces of rule' in A. Barry, T. Osborne and N. Rose, eds, *Foucault and Political Reason: Liberalism, Neo-Liberalism and Rationalities of Government*. London: University College London Press.

Bear, D. and Lee, M. (2011) Crime maps, policing and fear. *The Guardian*, 2 February. Available at: www.guardian.co.uk/commentisfree/2011/feb/02/crime-maps-policing-home-office (accessed 7 May 2013).

Begley, J. (2012) 'About', Prison Map. Available at: < http://www.prisonmap.com/about > [Accessed 20 May 2013].

Beirne, P. (1993) *Inventing Criminology: Essays on the Rise of 'Homo Criminalis'*. Albany, NY: State University of New York Press.

Bhagat, A. and Mogel, L. (eds) (2008) *An Atlas of Radical Cartography*. Los Angeles, CA: Journal of Aesthetics and Protest Press.

Boba Santos, R. (2013) *Crime Analysis with Crime Mapping*. London: SAGE.

Born, G. (1997) 'Computer software as a medium: Textuality, orality and sociality in an artificial intelligence research culture' in M. Banks and H. Morphy, eds, *Rethinking Visual Anthropology*. Wiltshire: Redwood Books.

Bowcott, O. (2012) Banned in London: The capital's 435 prohibition zones mapped. *The Guardian,* 11 September. Available at www.guardian.co.uk/news/datablog/interactive/2012/sep/11/banned-in-london-zones-dogs-alcohol-gatherings-prohibited (Accessed 17 May 2013).

Bowers, K.J., Johnson, S.D. and Pease, K. (2004) Prospective hot-spotting: The future of crime mapping? *British Journal of Criminology* 44(5): 641–658.

Bratton, W. and Knobler, P. (1998) *The Turnaround: How America's Top Cop Reversed the Crime Epidemic*. New York: Random House.

Bridle, J. (2012) Dronestagram: The drone's-eye view. *Booktwo.org*. 8 November. Available at: www.booktwo.org/notebook/dronestagram-drones-eye-view/ > (Accessed 17 May 2013).

Brown, M. and Knopp, L. (2008) 'Queering the map: The productive tensions of colliding epistemologies', *Annals of the Association of American Geographers* 98(1): 40–58.

Burkeman, O. (2012) How Google and Apple's digital mapping is mapping us. *The Guardian*, 28 August. Available at: www.guardian.co.uk/technology/2012/aug/28/google-apple-digital-mapping (Accessed 13 May 2013).

Byrne, S. and Pease, K. (2011) 'Crime reduction and community safety', in T. Newburn, ed, *Handbook of Policing*. Second edition. Oxon: Routledge.

Campbell, E. (2013) 'Transgression, affect and performance: Choreographing a politics of urban space', *British Journal of Criminology*, 53(1): 18–40.

Canter, D. and Hodge, S. (2000) 'Criminals' mental maps' in L.S. Turnbull, E.H. Hendrix and B.D. Dent, eds, *Atlas of Crime. Mapping the Criminal Landscape*. Phoenix, AZ: Oryx Press.

Castells, M. (1996) *The Rise of the Network Society, The Information Age: Economy, Society and Culture, Vol. I*. Oxford: Blackwell.

Chainey, S. (2009) 'Crime mapping' in A. Wakefield and J. Fleming, eds, *The Sage Dictionary of Policing*. London: SAGE.

Chainey, S. and Ratcliffe, J. (2005) *GIS and Crime Mapping*. Chichester: Wiley.

Chainey, S. and Tompson, L. (2008) *Crime Mapping Case Studies: Practice and Research*. Chichester: Wiley.

Chapin, M., Lamb, Z. and Threlkeld, B. (2005) 'Mapping indigenous lands', *Annual Review of Anthropology* 34(1): 619–38.

Chassay, C. and Johnson, B. (2007) Google Earth used to target Israel. *The Guardian*, 25 October. Available at: www.guardian.co.uk/technology/2007/oct/25/google.israel (Accessed 13 May 2013).

Choudhary, S. (2013) Attract new customers with local ads on the Google Maps app. Google: Inside AdWords, 8 August. Available at: www.adwords.blogspot.co.uk/2013/08/attract-new-customers-with-local-ads-on.html (Accessed 2 December 2013).

Cockbain, E. (2013) 'Grooming and the 'Asian sex gang predator': The construction of a racial crime threat' *Race & Class,* 54(4): 22–32.

Courtright, K.E. and Mutchnick, R.J. (2002) 'Cartographic school of criminology' in D. Levinson, ed, *Encyclopedia of Crime and Punishment, Volume 1*. London: SAGE.

Crampton, J. (1994) 'Cartography's defining moment: The Peters projection controversy, 1974 – 1990', *Cartographica* 31(4): 16–32.

Crampton, J.W. (2009) 'Cartography: Maps 2.0', *Progress in Human Geography* 33(1): 91–100.

Crampton, J.W. (2010) *Mapping: A Critical Introduction to Cartography and GIS*. Chichester: Wiley-Blackwell.

Crampton, J.W. and Krygier, J. (2006) ;An introduction to critical cartography, *ACME: An International E-Journal for Critical Geographies* 4(1): 11–33.

Crawford, M. (1992) 'The world in a shopping mall', in M. Sorkin, ed, *Variations on a Theme Park: The New American City and the Design of Public Space*. New York: Hill and Wang.

Crilly, N., Blackwell, A.F., and Clarkson, P.J. (2006) 'Graphic elicitation: Using research diagrams as interview stimuli', *Qualitative Research* 6(3): 341–366.

Cunnane, S. (2011) The research lab in your pocket: Apps and the academy. *Times Higher Education*. 28 July. Available at: www.timeshighereducation.co.uk/416937.article (Accessed 2 July 2013_.

Davis, M. (1995) Beyond Blade Runner: Urban control (1) The ecology of fear. Available at: http://www.mediamatic.net/6147/en/beyond-blade-runner-urban-control-1 (Accessed 23 May 2013).

De Certeau, M. (1984) *The Practice of Everyday Life*. Berkeley, CA: University of California Press.

Deleuze, G. and Guattari, F. (1987) *A Thousand Plateaus: Capitalism and Schizophrenia*. New York: Continuum.

Dennis, S.F., Gaulocher, S., Carpiano, R.M., and Brown, D. (2009) 'Participatory photo mapping (PPM): Exploring an integrated method for health and place research with young people', *Health & Place* 15(2): 466–73.

Dodge, M. and Kitchin, R. (2000) *Mapping Cyberspace*. London Routledge.

Eterno, J.A. and Silverman, E.B. (2012) *The Crime Numbers Game: Management by Manipulation*. Boca Raton, FL: CRC Press.

Farman, J. (2010) 'Mapping the digital empire: Google Earth and the process of postmodern cartography', *New Media & Society* 12(6): 869–888.

Felson, M. (1986) 'Routine activities, social controls, rational decisions and criminal outcomes' in D. Cornish and R.V. Clarke, eds, *The Reasoning Criminal*. New York: Springer-Verlag.

Felson, M. (1998) *Crime and Everyday Life*. Second edition. Thousand Oaks, CA: Pine Forge Press.

Ferrell, J. (2006) 'The aesthetics of cultural criminology' in B.A. Arrigo and C.R. Williams, eds, *Philosophy, Crime and Criminology*. Urbana, IL: University of Illinois Press.

Ferrell J (2009) 'Against method, against authority… for anarchy' in R. Amster, A. DeLeon, L.A. Fernandez, A.J. Il Nocella and D. Shannon, eds, *Contemporary Anarchist Studies: An Introductory Anthology of Anarchy in the Academy*. Oxon: Routledge.

Ferrell, J., Hayward, K. and Young, J. (2008) *Cultural Criminology: An Invitation*. London: SAGE.

Finn, J.M. (2009) *Capturing the Criminal Image: From Mug Shot to Surveillance Society*. Minneapolis, MN: University of Minnesota Press.

Gallagher, R. (2013) Software that tracks people on social media created by defence firm. *The Guardian*, 10 February. Available at: www.guardian.co.uk/world/2013/feb/10/software-tracks-social-media-defence (Accessed 24 June 2013).

Garland, D. (2001) *The Culture of Control: Crime and Social Order in Contemporary Society*. Oxford: Oxford University Press.

Gibson, C. (1999) 'Cartographies of the colonial/capitalist state: A geopolitics of indigenous self-determination in Australia', *Antipode* 31(1): 45–79.

Gieseking, J.J. (forthcoming 2013) 'Where we go from here: The mental mapping method and its analytic components', *Qualitative Inquiry*, 19(9).

Gleeson, B. (1996) 'A geography for disabled people', *Transactions of the Institute of British Geographers*, 18(1): 387–396.

Goss, J. (1993) 'The "magic of the mall": An analysis of form, function, and meaning in the contemporary retail built environment', *Annals of the Association of American Geographers*, 83(1): 18–47.

Graham, S. (2005) 'Software-sorted geographies', *Progress in Human Geography,* 29(5): 562–580.

Graham, S. (2010) *Cities Under Siege: The New Military Urbanism*. London: Verso.

Harley, J.B. (1988) 'Maps, knowledge and power', in D. Cosgrove and S. Daniels, eds, *The Iconography of Landscape*. Cambridge: Cambridge University Press.

Harley, J.B. (1989) 'Deconstructing the map', *Cartographica*, 26(2): 1–20.

Harley, J.B. ([1991] 2001) 'Can there be a cartographic ethics?' in P. Laxton, ed, *The New Nature of Maps: Essays in the History of Cartography*. Baltimore, MD: Johns Hopkins University Press.

Harley, J.B. and Woodward, D. (1987) *The History of Cartography: Volume 1*. Chicago, IL: University of Chicago Press.

Hayward, K.J. (2004) *City Limits: Crime, Consumer Culture and the Urban Experience*. London: Glasshouse Press.

Hayward, K.J. (2012) 'Five spaces of cultural criminology', *British Journal of Criminology*, 52(3): 441–461.

Hayward, K. (2013) 'Chicago school of sociology' in E. McLaughlin and J. Muncie, eds, *The SAGE Dictionary of Criminology*. Third edition. London: SAGE.

Hayward, K. and Kindynis, T. (2013) 'Crime-consumerism nexus' in J.I. Ross, ed, *Encyclopedia of Street Crime in America*. London: SAGE.

Hill, B. and Paynich, R. (2013) *Fundamentals of Crime Mapping*. Second edition. Burlington, MA: Jones & Bartlett Learning.

Hirschfield, A. and Bowers, K. (eds) (2001) Mapping and Analysing Crime Data: Lessons from Research and Practice. London: Taylor and Francis.

Hoover, L. (2013) *Police Crime Control Strategies*. Clifton Park, NY: Delmar Cengage Learning.

Howell, K.B. (2009) 'Broken lives from broken windows: The hidden costs of aggressive order-maintenance policing *New York University Review of Law and Social Change* 33: 271–329.

Jenkins, S. (2011) All the crime map shows up is Whitehall's pointless zest for data. *The Guardian*, 3 February. Available at: www.guardian.co.uk/commentisfree/2011/feb/03/crime-map-information-theresa-may (accessed 20 June 2013).

Jones, P., Bunce, G., Evans, J., Gibbs, H. and Ricketts Hein, J. (2008) 'Exploring space and place with walking interviews' *Journal of Research Practice* 4(2). Available at: < http://jrp.icaap.org/index.php/jrp/article/view/150/161 > [Accessed 15 May 2013].

Jones, P. and Evans, J. (2012) 'The spatial transcript: Analysing mobilities through qualitative GIS', *Area* 44(1): 92–99.

Jones, S. (2009) Police launch online neighbourhood crime maps. *The Guardian*, 6 January. Available at: http://www.guardian.co.uk/uk/2009/jan/06/crime-maps-online-police (accessed 24 May 2013).

kafircrusaders (2012) Map showing the true extent of the Muslim Grooming and Paedo Epidemic in Britain. 5 October. Available at: www.kafircrusaders.wordpress.com/2012/10/05/map-of-the-muslim-grooming-and-paedo-epidemic-in-britain (Accessed 4 July 2013).

Kalpagam, U. (1995) 'Cartography in colonial India', *Economic and Political Weekly* 30(30): PE87–PE98.

Kelling, G. & Sousa Jr. W. (2001) 'Do police matter? An analysis of the impact of New York City's police reforms' *Civic Report*, 22 (December). New York: Manhattan Institute for Policy Research.

Kintrea, K., Bannister, J., Pickering, J., Reid, M. and Suzuki, N. (2008) *Young people and territoriality in British cities*. Project report. Joseph Rowntree Foundation. Available at: www.jrf.org.uk/sites/files/jrf/2278-young-people-territoriality.pdf (Accessed 2 July 2013).

Kitchin R (1994) Cognitive maps: What are they and why study them? *Journal of Environmental Psychology* 14(1): 1–19.

Kitchin, R., Perkins, C. and Dodge, M. (2009) 'Thinking about maps' in M. Dodge, R. Kitchin and C. Perkins, eds, *Rethinking Maps: New Frontiers in Cartographic Theory*. Oxon: Routledge.

Kitchin, R., Dodge, M. and Perkins, C. (2011) 'Introductory essay: Power and politics of mapping' in M. Dodge, R. Kitchin and C. Perkins, eds, *The Map Reader: Theories of Practice and Cartographic Representation*. Chichester: Wiley-Blackwell.

Koper, C.S. (1995) 'Just enough police presence: Reducing crime and disorderly behavior by optimizing patrol time in crime hot spots', *Justice Quarterly* 12(4): 649–72.

Latour, B. (1987) *Science in Action*. Cambrdge, MA: Harvard University Press.

Latour, B. and Woolgar, S. (1979) *Laboratory Life: The Social Construction of Scientific Facts*. London: Sage.

Levitt, S.D. (2004) 'Understanding why crime fell in the 1990s: Four factors that explain the decline and six that do not', *Journal of Economic Perspectives* 18(1): 163–190.

Loader, I. and Sparks, R. (2010) *Public Criminology?* London: Routledge.

The Manifesto Club (2012) Banned in London. Available at: www.bannedinlondon.co.uk (Accessed 17 May 2013).

Maple, J. & Mitchell, C. (1999) *The Crime Fighter*. New York: Doubleday.

Mari, M. (2013) Top global smartphone apps, who's in the top 10. GlobalWebIndex, 2 August. Available at: www.blog.globalwebindex.net/Top-global-smartphone-apps (Accessed 2 December 2013).

Matthews, M.H. and Vujakovic, P. (1995) 'Private worlds and public places: Mapping the environmental values of wheelchair users', *Environment and Planning A* 27(7): 1069–1083.

Mayhew, H. (1862) *London Labour and the London Poor*. London: Griffin Bohn.

McDonald, P. (2002) *Managing Police Operations: Implementing the New York Crime Control Model – Compstat*. Belmont, CA: Wadsworth.

Miles, S. (2010) *Spaces for Consumption*. London: SAGE.

Monmonier, M. (1995) *Drawing the Line: Tales of Maps and Cartocontroversy*. New York: Henry Holt.

Monmonier, M. (2004) *Rhumb Lines and Map Wars: A Social History of the Mercator Projection*. Chicago, IL: University of Chicago Press.

Morris, S. and Carter, H. (2011) Crime map website a victim of its own success. *The Guardian*, 1 February. Available at: www.guardian.co.uk/uk/2011/feb/01/crime-map-website-crashes (accessed 20 June 2013).

Morrison, W. (1995) *Theoretical Criminology: From Modernity to Post-Modernism*. London: Cavendish.

Muncie, J. (2013) COMPSTAT. In: McLaughlin E and Muncie J (eds) *The SAGE Dictionary of Criminology*. Third edition. London: SAGE, pp.64–66.

Murray, A.T., McGuffog, I., Western, J.S. and Mullins, P. (2001) 'Exploratory spatial data analysis techniques for examining urban crime', *British Journal of Criminology* 41(2): 309–329.

Nold, C. (2009) Introduction: Emotional cartography - technologies of the self. In: Nold, C. (ed.) *Emotional Cartography: Technologies of the Self*. Available at: www.emotionalcartography.net (Accessed 14 May 2013).

Park, R.E., Burgess, E.W. and McKenzi, R.D. (eds) (1925) *The City*. Chicago, IL: University of Chicago Press.

Peters, A. (1974) The Europe-Centered Character of Our Geographic View of the World and Its Correction. Available at: www.heliheyn.de/Maps/Lect02_E.html (accessed 8 June 2013).

Peters, A. (1983) *The New Cartography*. New York: Friendship Press.

Pickles, J. (1992) 'Texts, hermeneutics and propaganda maps' in T.J. Barnes and J.S. Duncan, eds, *Writing Worlds: Discourse, Text and Metaphor in the Representation of Landscape*. Oxon: Routledge.

Pickles, J. (ed) (1995) *Ground Truth: The Social Implication of Geodemographic Information Systems*. New York: Guildford.

Pickles, J. (2004) *A History of Spaces: Cartographic Reason, Mapping and the Geo-Coded World*. London: Routledge.

Powell, K. (2010) 'Making sense of place: Mapping as a multisensory research method', *Qualitative Inquiry* 16(7): 539–555.

Ratcliffe, J.H. (2002) 'Damned if you don't, damned if you do: Crime mapping and its implications in the real world', *Policing and Society* 12(3): 211–225.

Raza, S.S. (2012) 'The North West Frontier of Pakistan: Preoccupation with "unveiling" the battlefield and the continuing violent cartographies' in S. O. Opondo and M.J. Shapiro MJ, eds, *The New Violent Cartography: Geo-Analysis After the Aesthetic Turn*. Oxon: Routledge.

Rose, N. (1999) *Powers of Freedom: Reframing Political Thought*. Cambridge: Cambridge University Press.

Rosenbaum, D.P. (2006) 'The limits of hot spots policing' in D. Weisburd and A.A. Braga, eds, *Police Innocvation: Contrasting Perspectives*. Cambridge: Cambridge University Press.

Rose-Redwood, R.S. (2006) 'Governmentality, geography, and the geo-coded world', *Progress in Human Geography* 30(4): 469–486.

Sadler, S. (1999) *The Situationist City*. London: MIT Press.

Schuurman, N. (2000) Trouble in the heartland: GIS and its critics in the 1990s, Progress in Human Geography, 24(4): 569 – 90

Scott, J.C. (1998) *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*. New Haven, CT: Yale University Press.

Shapiro, M.J. (2007) 'The new violent cartography', *Security Dialogue* 38(3): 291–313.

Sharon, C. (2006) 'The history of crime mapping and its use by American police departments', *Alaska Justice Forum* 23(3): 1, 4–8.

Shearing, C.D. and Stenning, P.C. (1984) 'From the panopticon to Disney World: The development of discipline' in A. Doob and E. Greenspan, eds, *Perspectives in Criminal Law*. Toronto, ON: Canada Law Book.

Sherman, L.W. and Weisburd, D.A. (1995) 'General deterrent effects of police patrol in crime hot spots: A randomized controlled trial', *Justice Quarterly* 12(4): 625–48.

Tawil-Souri, H. (2012) 'Mapping Israel-Palestine', *Political Geography* 31(1): 57–60.

Taylor, A. (2004) *The World of Gerard Mercator: The Mapmaker Who Revolutionized Geography*. London: Harper Collins.

TBIJ (2013) 'Covert war on terror: The datasets', The Bureau of Investigative Journalism. Available at: www.thebureauinvestigates.com/category/projects/drone-data (Accessed 17 May 2013).

Tompson, L. and Chainey, S. (2012) 'Engagement, empowerment and transparency: Publishing crime statistics using online crime mapping', *Policing* 6(3): 228-239.

UNOCHA (2010) Map Centre. United Nations Office for Coordination of Human Affairs: Occupied Palestinian territory. Available at: www.ochaopt.org/generalmaps.aspx?id=96 (Accessed 13 November 2013).

Wallace, A. (2009) 'Mapping city crime and the new aesthetic of danger', *Journal of Visual Culture* 8(1): 5–24.

Weisburd, D. and McEwen, T. (eds) (1998) *Crime Mapping and Crime Prevention*. Monsey, NY: Criminal Justice Press.

Winlow, H. (2001) 'Anthropometric cartography: Constructing Scottish racial identity in the early twentieth century', *Journal of Historical Geography* 27(4): 507–528.

Wood, D. (1992) *The Power of Maps*. New York: Guilford Press.

Wood, D. and Fels, J. (1986) 'Designs on signs: Myth and meaning in maps', *Cartographica* 23(3): 54–103.

Wood, D., Fels, J., and Krygier, J. (eds) (2010) *Rethinking the Power of Maps*. London: Guilford Press.

Wortley, R. and Mazerolle, L. (2008) 'Environmental criminology and crime analysis: Situating the theory, analytic approach and application' in R. Wortley and L. Mazerolle, eds, *Environmental Criminology and Crime Analysis*. Cullompton: Willan Publishing.

Young, J. (1999) *The Exclusive Society: Social Exclusion, Crime and Difference in Late Modernity*. London: SAGE.

Young, J. (2007) *The Vertigo of Late Modernity*. London: SAGE.