

2. Towards a cartographic criminology?

Maps are too important to be left to cartographers alone. (Harley, 1992: 231)

Crime maps are everywhere. They can be seen on television, in the newspapers, and online. These crime maps inform interested parties of the spatial distribution of particular crimes and help shape policies to combat the crime problem. However, as the previous chapter demonstrated, maps should not be accepted passively. Rather, maps must be problematised, and this is especially true when it comes to crime maps. This chapter aims to do just that by posing a series of questions about how cartography and mapping practice have been used within criminology. More specifically, it will introduce the history of cartography within criminology, arguing that, whilst there is a field of study known as the ‘cartographic school’ of criminology, the discipline has yet to employ cartographic methods with any real sophistication or understanding. By focusing on a series of key historical moments when criminologists sought to place (crime) maps at the very heart of their analysis, this chapter will assert that, not only has criminology tended to reproduce the type of mistakes outlined in the critiques of cartography discussed in the previous chapter, but that it has also created a further set of problems that have detrimentally affected the discipline.

Criminology has a fecund and well-documented relationship with space and the environment. Consequently, trying to summarise/appraise this relationship in any substantive detail is a task beyond that of a doctoral dissertation. Instead, my goal here is a more circumspect one: to illustrate how criminology has utilized maps and mapping information, and more specifically to analyse this utilization via the critical cartographic literature introduced in Chapter 1 (Cartography: the development and critique of maps and mapmaking).

The use of maps in the formal study of crime and deviance dates back to the nineteenth century when criminologists and demographers began to use cartographic techniques to plot and track the incidence and frequency of crime. However, in the last few decades with the advancement of user-friendly automated (and increasingly digitised) cartographic systems, criminology has witnessed a significant surge in map production/employment. This advance in technology has inspired those interested in what criminologists call the ‘geography of crime’ (Herbert, 1989: 1-2) and helped create new cartographic methods which have greatly improved criminological knowledge about the

places and spaces where crime occurs. However, this rush to develop “sophisticated” crime maps using cartographic methods has also resulted in criminology proceeding with a rather underdeveloped conceptualisation of maps and map construction.

Indeed, as beneficial as recent technological advancements in the field of crime mapping have been, the visual patterning/mapping of crime still lacks effective critical evaluation. As such, we have yet to appreciate the full value and responsibility of maps and mapping and moreover fail to question the multiple narratives about society, politics, and culture inherent in all maps. Put bluntly, environmental criminologists have largely failed to recognise that maps are subjective constructions masquerading as objective models.

The narratives and constructions intrinsic in maps are indicators and communicators of power and ideology. They are highly influential even though they may not present complete truths about crime. Further, we disregard the fact that maps are snapshots suspended in time and space, indicators of the past and not reliable gauges of the future. Rarely is the information obtained from maps and their authority in criminological research scrutinised. This results in our inability to appreciate the power of the map as a tool of social knowledge (Monmonier, 1991: 1). With this in mind, let us now embark on a brief inventory of prior criminological attempts to utilize cartography; our goal here being to improve and expand criminology’s understanding of crime maps and thus point the way forward for a more geographically informed (critical) cartography of crime.

2.1 Criminology’s engagement with cartography: moments in disciplinary history

This chapter presents a series of ‘moments’ in which criminology merges with cartography. As expressed above to engage with all aspects of spatial criminology is unfeasible. Rather, this chapter will address the literature on the production and *use of maps within criminology*. With this proposed focus, there are four notable ‘moments’ that explore criminology’s important achievements in cartographic expression. The first significant moment in criminology’s engagement with cartography began with the early nineteenth century ‘cartographic school’ of criminology. As the only period in criminology’s history labelled as ‘cartographic’, this section presents and reviews the maps of Andre Michel Guerry (1833) and the *carte thematic* of Adolphe Quetelet. Additionally, it examines the maps of early ethnographers such as Friedrich Engels (1844), Henry Mayhew (1862), and Charles Booth (1882).

The second significant moment in criminology’s engagement with cartography

features the research of the Chicago School of the early twentieth century. The Chicago School is generally accepted as the origin of ‘ecological’ analyses of crime and deviance. Burgess’s (1957[1925]) famous concentric-zones map in addition to the maps published by his colleagues, such as Thrasher (1927) and Shaw and McKay (1931,1942), popularised visions of Chicago’s deviant areas.

The third important stage in criminology’s engagement with cartography covers the nineteenth century development of ‘pin-maps’ to contemporary ‘hot spot’ mapping, i.e. the long history of police maps designed to spatially track and analyse criminal activity. Despite 200 years of practical use, it will be argued that this field of law enforcement map production is still fraught with problems.

Finally, the fourth moment in criminology’s engagement with cartography centres on the (more recent) introduction of automated cartographic programmes and geographic information systems (GIS) into the discipline. Criminology’s employment of GIS and automated cartographic programmes has provided its first real engagement with highly technical cartographic practices. However, this heightened use of maps in criminology over the past few decades has not been accompanied by any real theoretical critique, something that, in my opinion, is a serious oversight.

Although these four ‘moments’ provide various foci of analysis, these moments are not mutually exclusive. All contain the same deficits that pervade cartography. While reading each section keep in mind that each map has multiple texts expressed in one image. The description and analyses provided are not all of the possible interpretations – far from it. Critiquing maps and the map-making process demonstrates how maps are subjective projections, with ideologies and power communicated by both the creator(s) and the procurer(s).

2. 1a The nineteenth-century ‘cartographic school’ of criminology

The ‘cartographic school’ of criminology is afforded relatively little room, if any, in criminological texts. Criminology texts rarely deviate from the same telling of the ‘cartographic school’ and the origins of mapping crime¹. The two greatest contributions attributed to the ‘cartographic school’ rest in the method of employing official statistics to

¹ There appears to be a difference between criminology texts in the United Kingdom and the United States. From general observations, criminology texts in the United Kingdom tend to reference the ‘cartographic school’ of the nineteenth century more than texts in the United States. One speculated reason as to why is because social science in the United States commenced with the early twentieth century Chicago School whereas Europe and the United Kingdom’s engagement with the social sciences began long before then.

‘explain’ crime, and the general finding that crime is unevenly distributed across cities and regions.² Beyond these two observations, little else is written in general sources. Certainly, the wider innovations and lessons of the ‘cartographic school’ are under played. Hagan (2007:109), for example, is typically dismissive: ‘this group tended to rely on maps and aerial data in their investigations’. Clearly, there is a need for more even-handed and richer evaluation.

Those involved in investigating the spaces of crime during the nineteenth century constituted a clear and definable ‘cartographic school’ of criminology – and one that was not without a degree of critical reflection on map development. They not only relied on maps as a source of information to depict the distribution of crime, but utilised maps to evaluate and produce useful information regarding the nature (and occasionally the causes) of crime. Critical readings of these early works reveal an awareness of cultural difference, social values and governmental power. For example, the early use of the term ‘moral statistics’ demonstrated how social judgments were often incorporated in the process of classification of behaviour(s) as being moral or immoral (Hankins, 1908:83). ‘Moral statistics’ were not only the official data used by early crime mappers but were strongly correlated with particular social groups, often residing in the lower classes. These observations formed newer bodies of knowledge that challenged beliefs about criminal behaviour prevalent at the time.

The ‘cartographic school’ of criminology is, at times, jointly referenced with the rise of positivism.³ This is unsurprising given the extent to which cartography itself is founded on attempts to scientifically produce accurate representations of geographic reality (see Turnbull, 1996: 6). Indeed, all social science disciplines measure and calculate spatial dimensions to create maps, and in this sense hold to classical notions of positivist scientific knowledge. In terms of criminological cartography, from its very inception it also drew upon statistical – and importantly new census – data. Indeed, it was the regular census data that facilitated a period of rapid progress in thematic mapping, something which in turn led to the development of *cartes thematiques*.⁴ These thematic maps gained

² The earliest writers of ‘cartographic criminology’ pioneered the use of scientific analysis to investigate the roots of crime, setting the standards for future generations. Even more significant is the transition attributed to the ‘cartographic school’ for moving the study of crime from a theological and philosophical approach to the scientific methods of the twentieth century (Grunhut, 1951).

³ Whilst numerous explanations of positivism exist, for the purposes of this section, I will proceed with the position expressed by Auguste Comte, i.e. that positivism advocates a scientific approach to the development of knowledge as opposed to the prioritization of religious or philosophical perspectives.

⁴ By 1865, common techniques for thematic maps were well developed and have not changed much since (Thrower, 1996: 152-3).

considerable popularity in the belief that they could aid in solving social problems. Certainly, early spatial investigations of where and when crimes occurred were quickly imbued with the belief that they might also contribute to the ‘why’ question of crime.⁵

The significance of the early nineteenth century ‘cartographic school’ lies in its use of mathematics and statistics in conjunction with cartographic practices to promote (allegedly) scientific knowledge about crime’s relationship to social factors. The two most influential scholars in this area were Adolphe Quetelet and Andre Michel Guerry. While both these figures occasionally appear in criminology textbooks, their work is rarely fleshed out or explained in any substantive detail (on this point see Beirne, 1993). This is clearly an oversight given the now prominent role of crime mapping in contemporary criminological discourse. This being the case, I offer a discussion of their work here, in a bid to tease out various points of interest to be developed later in the thesis.

Andre Michel Guerry’s (1833) publication of *Essai sur la Statistique Morale de la France* and Adolphe Quetelet’s ([1835] 1842: see Hankins, 1908) publication *Sur l’homme et le développement de ses facultés ou Essai de physique sociale* were the two foundational essays in of the cartographic school of criminology. These essays are important in the story of crime mapping because of the way they Quetelet and Guerry – with typical positivistic zeal – extrapolated outward from the ecological study of crime to construct (what they believed were) social ‘facts’ (Grunhut, 1951). Their research drew heavily on the 1827 publication of the *Compte*; France’s first officially published criminal statistics. The use of ‘moral statistics’ as ‘social facts’ promoted an epistemological principle asserting that the science of nature and the science of the social can be investigated and measured in similar ways. This first systematic ecological measurement of social phenomena based on empirical data helped determine the relationships between human situations and the social disease of crime (Elmer, 1933; Levin and Lindesmith, 1937; Lazarsfield, 1961)⁶. The results of their collected efforts were a plethora of maps depicting social ills across France. Most significantly in terms of this account, however, were the highly illustrated criminal *cartes thematiques* that sought to correlate certain

⁵ Some texts claim that early cartographic school attempts were not interested in why crime occurred. Walsh and Hemmens (2008:78) write, ‘[r]ather than asking why individual commit crimes, cartographic criminologists are more interested in where and when criminal behaviour is most prevalent’. However, these statements appear to be made from superficial readings of these early investigations. Quetelet’s advocacy for social reform suggests that *why* crime happens was just as important as where and when.

⁶ Though, as argued specifically by Levin and Lindesmith (1937), England manifested the initial interest in regional studies in crime and social ills between 1830 until the close of the nineteenth century. These early English ecologists, utilised different methods. Their research is not, however, often included in the mainstream spatial criminology literature.

environmental factors with crime. Even though Quetelet and Guerry's achievements are often lumped together in "histories" of cartographic criminology, it is important to bear in mind that they each contributed a specific dimension to the mapping of crime.

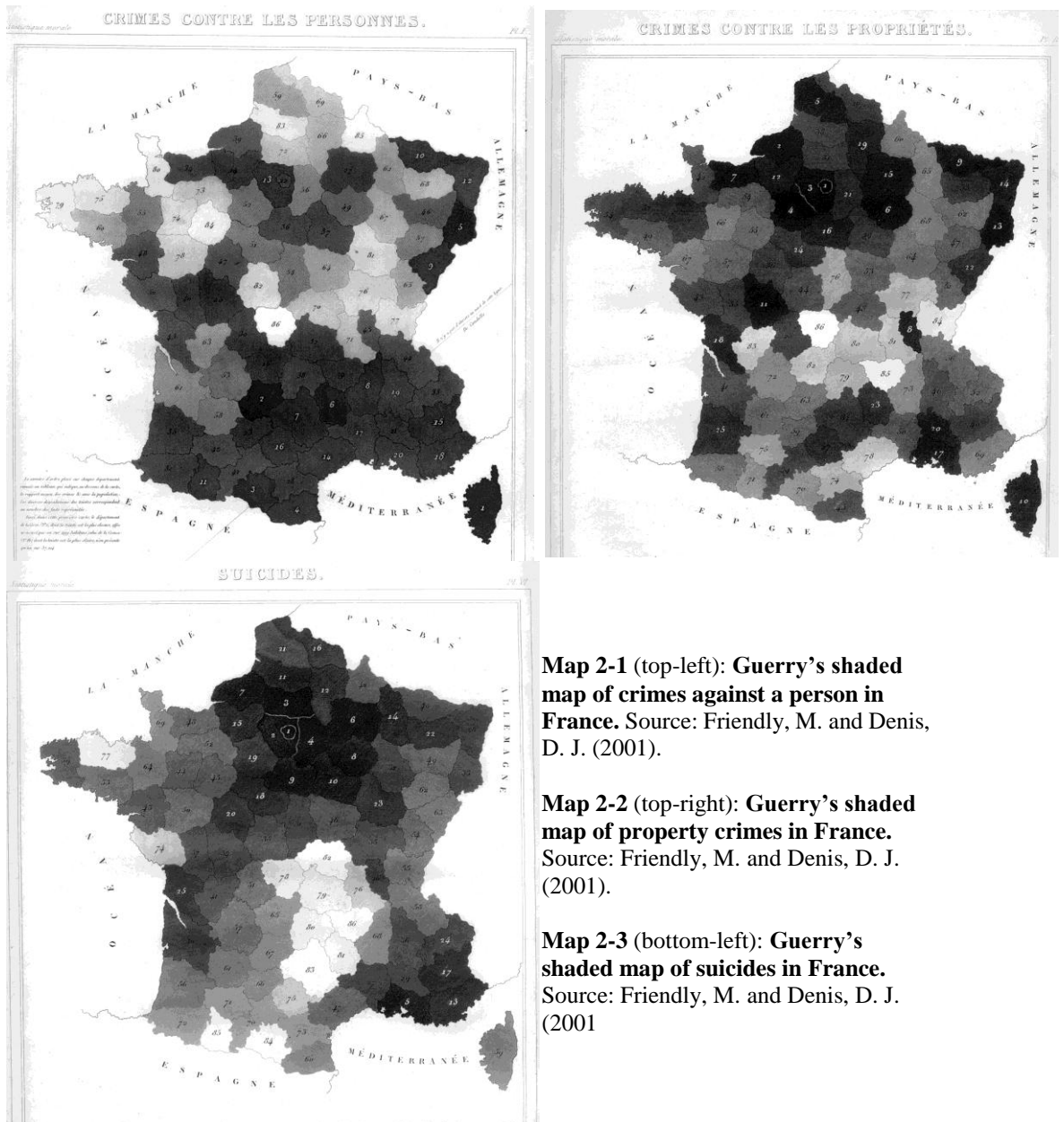
Quetelet's contribution to the 'cartographic school' of criminology rests primarily in his promotion of statistics as a source of knowledge about crime. By formulating probabilities of criminal offending, using large official statistical reports such as the *Compte*, Quetelet's 'social mechanics of crime' attempted to demonstrate the existence of law-like regularities (see Beirne, 1987:1140; Beirne and Messerschmidt, 2000:75). Though statistics cannot account in any detail for individual action, he discovered that the larger society demonstrated spatial patterns of offending amongst certain groups of individuals and within particular social conditions. Hence his famous construct of *home moyenne*.

Guerry's particular contribution to the 'cartographic school' stems from the way his map-analyses sought to determine potential relationships between social factors and French crime rates/criminal statistics. He compared French regional and district rates of 'moral statistics' (such as accused criminal activity, illegitimacy, and suicides, see Elmer, 1933; Marsden, 1983), with geographic location and demographic factors such as age, sex, and education level. Further, Guerry is also credited with being one of the first researchers to compare international crime statistics, using 16 years of official English crime statistics and 22 years of official French crime statistics⁷ (Grunhut, 1951:140). He mapped French regions as a means of exploring and analysing the distribution of crimes against persons (see Map 2-1), crimes against property (see Map 2-2), and suicides (see Map 2-3).

An examination of Guerry's maps reveals that property crime rates were the highest in industrialised urban spaces, where pockets of wealth were found alongside pockets of poverty (as opposed to areas where impoverishment was more universal). Suicides rates, likewise, were also more visible in industrialised urban spaces, echoing the patterns associated with crimes against property. Crimes against persons, however, appear more prominent in the southern regions of France. As we can see from the illustrations below, Guerry's maps offered very broad views of moral patterns that informed general knowledge about regional issues. These maps provide limited information about the size and demography of the regions, or the nature of the employment and trade within these

⁷ Grunhut (1951:142) also mentions Quetelet's comparative analysis between France and England in his 1864 publication *Statistique morale en Angleterre comparée avec la statistique morale de la France*. This work contained a number of published maps 'indicating the intensity of crime in various districts of both countries'.

provinces. Likewise, there is little specific data about the nature of the offences that constitute the category of ‘crimes against persons and property’. Regardless, the macro-level illustration of crimes and suicide still provided beneficial at-a-glance information about the social (or more accurately regional) patterning of these phenomena within the French state.



Map 2-1 (top-left): Guerry’s shaded map of crimes against a person in France. Source: Friendly, M. and Denis, D. J. (2001).

Map 2-2 (top-right): Guerry’s shaded map of property crimes in France. Source: Friendly, M. and Denis, D. J. (2001).

Map 2-3 (bottom-left): Guerry’s shaded map of suicides in France. Source: Friendly, M. and Denis, D. J. (2001)

Even with differing approaches and slightly varying epistemologies, Quetelet’s and Guerry’s research ultimately yielded similar findings. As Hacking (1990:118-119) explains, Guerry was a true positivist, striving to maintain integral separations between social facts and social values. As such, Guerry believed that moral analysis should not

influence legislation. Quetelet, on the other hand, was a reformer who advocated legislation to introduce changes in society to decrease crime. Regardless of their intended research positions, their findings are worth noting.

Guerry concluded from mapping crime that the individuals engaged in criminal activity were overwhelmingly poor, young and male. Quetelet's findings mirrored Guerry's (i.e. he too concluded that the vast majority of offending was undertaken by poor, young men in impoverished social conditions). However, importantly Quetelet added that 'gaps' in the social status were also an important indicator of criminal motivation/commission. In this sense, he very much anticipated both Friedrich Engels' conclusions about crime in working class areas of England (see below) and the much later literature on the distinction between absolute and relative poverty. Indeed, Quetelet argued that society must accept partial blame for the uneven commission of crime. If social conditions construct materially indulgent sections on one side and impoverished subordinates on the other, then criminal activity is a logical outcome. As Quetelet famously stated 'society prepares the crime and the guilty is only the instrument by which it is accomplished' (cited in Hankins, 1908:88).⁸

Across the English Channel, early British crime scholars had also begun to formulate similar rudimentary hypotheses about how external forces contributed to the commission of crime. The emergence of such an intellectual position at this time was not surprising. The rapid growth of British cities had brought with it a suite of social problems including crime, disease, squalor and disorder (Gordon, 1973). In large part, these abhorrent conditions had been brought to the fore by a group of early reformers and social commentators who immersed themselves in the daily chaos and disorder of the nineteenth century urban slum. Interestingly, at least in terms of the current account, these Victorian reformers also employed complex areal maps, only this time they relied as much on biography and anecdote as numbers and statistics

The goal of oral-ethnographers (Morrison, 1995) or proto-ethnographers (Hayward, 2004a) such as Friedrich Engels (1844), Henry Mayhew (1861), Octavia Hill (1883), Charles Booth (1882), and Andrew Mearns (1883) was fairly clear: to decipher the

⁸ It is worth noting that this quote from Quetelet is at times misinterpreted. Courtright and Mutchnick (2002:176) claim that "Quetelet placed responsibility for the individual criminal upon the shoulders of society... everyone except the actual perpetrator was guilty of the crime". Whilst an understandable interpretation from a shallow reading of Quetelet's quote, it does not mean Quetelet denied the existence of free will. As Hankins (1908: 88-89) carefully explains, Quetelet believed free will to be "a capricious element acting within a narrow circle of possibilities". Simply, social conditions produce only so many paths from which one can chose. Hankins interpretation of Quetelet's position on free will is consistent with Quetelet's attitudes toward social reform.

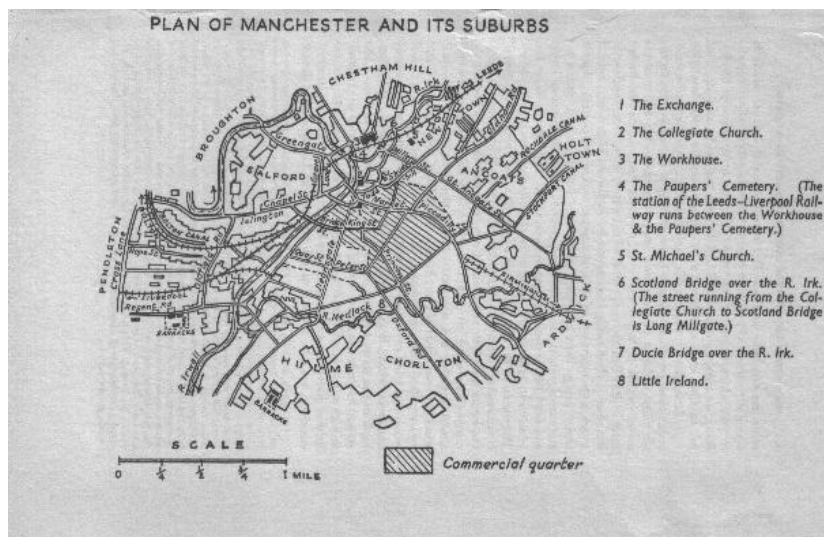
relationship between the abhorrent economic and social conditions of the city and criminal deviance. The result was a series of stunning studies based on empirical data drawn from street level investigation that offered a dark, gritty portrait of human experience within the impoverished spaces, including - most famously - London's notorious rookeries.⁹ As mentioned above, what is interesting in terms of our history of criminological cartography is that these social observers sought to taxonomise the social lives (and in many cases the intrinsic deviance) of individuals residing in these underprivileged neighbourhoods via the use of maps based on oral testimony, direct observation, and personal experience of each urban area under study. Let us pause to consider a few of the more prominent examples of this form of ethnographically-infused cartography.

Witnessing the deplorable conditions in Manchester - a city that, at that point, was at the very heart of the English industrial revolution - Friedrich Engels (1844) noted that capital growth meant the worse possible forms of exploitation for the working classes. Those fortunate (or arguably unfortunate) enough to be employed in the factories of Manchester often suffered from high incidences of work-place injury and higher rates of mortality. Capitalist production through the manufacturing process polarized class relations, creating further injustices between the bourgeoisie and the proletariat. The escalating inequalities between wages, health, mortality, and life prospects agitated the deprived poor, creating deep-rooted resentment towards the powerful. Engels's work suggested that certain forms of criminality were in fact a form of resistance against these hierarchical disparities. Engels communicated his message about capitalist exploitation in his classic text *The Condition of the Working Class in England*, a stunning work that also included a number of maps. One such map (see Map 2-4) of 'Manchester and Its Suburbs', was accompanied by a description of a section in Manchester that detailed an abhorrent slum around the River Irk. His description tells of cramped and decaying living quarters where squalor and disease were the norm. He depicted a place reeking of human waste and garbage, with the dirty river providing residents with their only access to water. Finally, he exclaimed, 'Enough of this! All along the Irk slums of this type abound' (Engels 1844[1958]: 62). Engels' map included the path of his walk down the Irk, both as a means of documenting his experience, but also so that readers could - if they were so inclined - experience Manchester's disparities and injustices for themselves. From a cartographic perspective, the map represented a fairly close representation of the geographical features

⁹ See also Charles Dickens' *Oliver Twist*, interestingly first published in 1838, several years before the emergence of early Victorian ethnographic investigations.

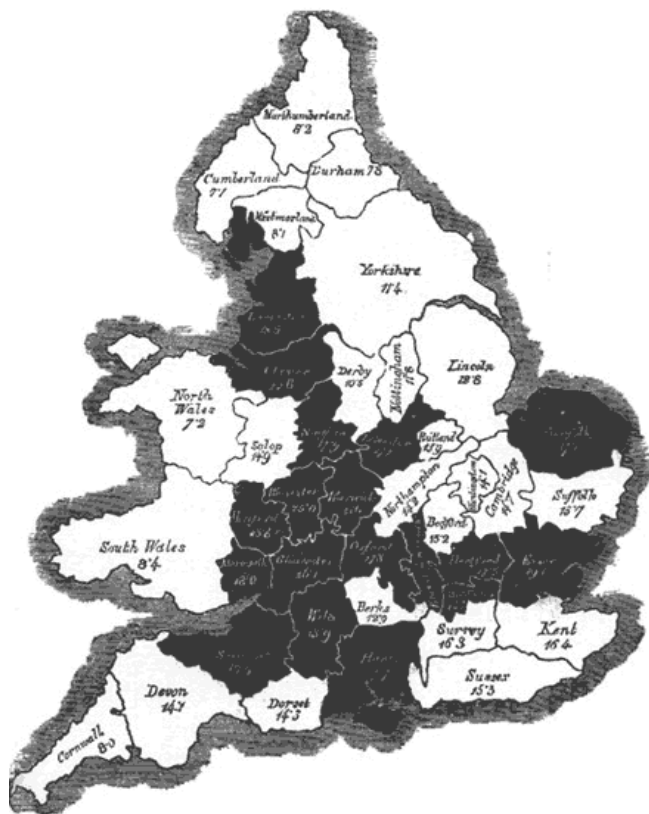
of the city. The urban landmarks denoted by Engels were key elements in his narrative about working classes residential areas. In short, not only did it provide an easy guide to navigating Manchester, but it also presented a neglected working class view of a city.

Henry Mayhew's (1861) four volume publications, *London Labour and the London Poor*, contained his observations, notes, and choropleth maps¹⁰ of crime and deviance in England, and especially London (for example, see Map 2-5). Similar to Guerry's maps in France, Mayhew's maps offered a bird's eye view of the distribution of crime in England and Wales. Unlike Guerry, however, Mayhew included in his maps county-specific statistics, indicating the number of offenders per 10,000 persons in each region. Many of his colourful and carefully-shaded maps also displayed macro-level views of individual cities - and even the entire country. Whenever possible, Mayhew took a truly grounded approach to his map construction, his goal being to try and tease out relationships between place and social category. Often his commentary suggested a degree of empathy for many of those living in the squalor of overcrowded nineteenth century urban centres. More importantly, like Engels before him, Mayhew also attributed certain forms of criminal behaviour to the substantial financial disparities that existed between rich and poor in Victorian times.



Map 2-4: Engel's city map of Manchester and its suburbs, highlighting key features and urban landmarks during his walk through the working classes residential area.
 Source: Engels, Friedrich (1844[1958]:59) *The Condition of the Working Class in England*. Translated and edited by W.O. Henderson and W.H. Chaloner. The Macmillan Company: New York

¹⁰ Choropleth maps are maps that use various degrees of shades or colours to show regional distributions of phenomena.



Map 2-5: Mayhew’s map Showing the number of criminal offenders to every 10,000 of population in each county of England and Wales. Source: Mayhew, Henry (1861) *London Labour and the London Poor*, Volume 4.

Of the noted British contributors to cartographic criminology, it is arguably Charles Booth’s (1882) seventeen volume series, *Life and Labour of the People in London*, which stands out as the most important. Certainly, in terms of our story, it is Booth’s work that stands out as the most prominent in terms of an attempt to ground crime and deviance within the context of the everyday social environment (Morrison, 1995: 247). Booth’s illustrious maps (for example, see Map 2-6) are probably the most recognized artefact from this oral ethnographic cohort. They are also a testament to Victorian statistical zeal, and as such also provide a wonderful example of nineteenth century empirical social science.

Booth’s ability to give life to his maps by using official statistics coupled with social observation was truly outstanding – and something that contemporary crime mappers could greatly learn from. As Baker remarks on Booth’s mapping of London:

The maps attempt to articulate city space, not only in its topographic form, but as a social and economic cartography, but its view of London is ultimately *from above*, implicating the reader in a powerful spectatorial position, able to read the economic life of the city at a glance (2003: part 3).

Even with this ‘view from above’ perspective Booth’s maps offer a human quality thanks to Booth’s detailed accompanying narrations. Moreover, Booth did not rely strictly on

official census tract data to create the colour-coded schematics of his illustrated maps. Instead, he walked the streets of London in a bid to witness first-hand the conditions of each street, alleyway, and corner. Only then, would he ascribe social phenomena a category or locate criminal behaviour within a typology.



Map 2-6: Charles Booth's Descriptive Map of London Poverty. 1889. This is the North-Eastern sheet, comprising parts of Hackney, Islington, and Holborn; the whole of the City, Shoreditch, Bethnal Green, Whitechapel, St. George's-on-the-East, Stepney, Mile End, and part of Poplar. Source: London Topographical Society, Publication No. 130 (1984)

What these early (proto) ethnographers found in the excavation of the nineteenth-century metropolis was the shame of the Victorian city. Friedrich Engels (1844) blamed capitalist growth for the disparities and inequalities between classes in England. Mayhew (1861) partially blamed the problems of the wretched neighbourhoods he studies on the lack of suitable public housing for the London poor. While Booth (1882) and his contemporary Andrew Mearns (1883) likewise blamed intolerable housing conditions for most of the problems, including crime and disorder, that beset the London poor. In sum, these studies asserted that the commission of crime and deviance in England stemmed from deplorable environments, resistance to capitalist-created inequality, and feelings of frustration and social exclusion.

As the story of environmental and geographic criminology is told, these nineteenth century studies, be they of the cartographic school or of the proto-ethnographic type, set the precedent for the aerial/spatial approach to the study of crime and deviance. However, outside of a few cursory sentences, these studies are rarely critiqued for their failure to adequately question power dynamics within society – whether in relation to the production

of urban space¹¹, or with regard to the respective scholar's standpoint epistemology.

To a certain extent, then, this literature represents the breadth of the so-called 'cartographic school' within criminology. Inevitably, it is a body of work that stopped short of making any thoroughgoing *theoretical links* between environmental factors and crime. Yet, one can say that, for the time at least, this work was extremely progressive (see Bierne, 1993, and Amatrudo, 2009 on Quetelet) - especially when it came to identifying patterns of injustice and deprivation (and their putative link to criminality) via cartography. These theoretical links would famously be forged elsewhere, as the next section will explain.

2.1b The Chicago School and the ecology of crime

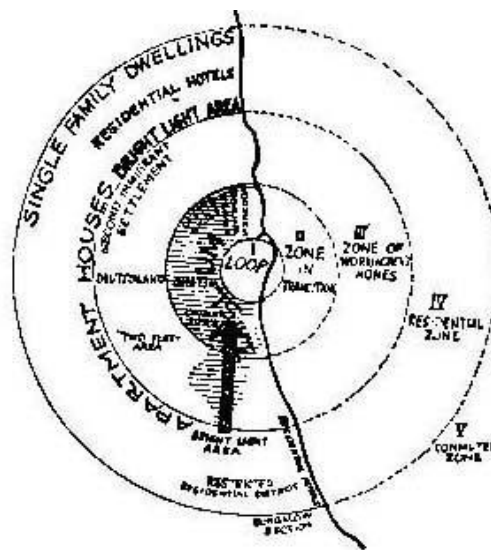
The early twentieth-century sociological studies at the University of Chicago, often referred to as the 'Chicago School' greatly contributed to the fields of sociology, urban studies, and criminology. A significant collection of essays from the Chicago School entitled *The City* (1967 [1925])¹² set the stage for understanding the spatial dynamics of human settlement in the budding metropolis of Chicago. While the work of the Chicago School had a profound impact on the discipline, this section will not be seeking to undertake a detailed review of the entire canon. Rather, the aim of this section is to emphasise how the Chicagoans used segregated spaces in the study of social deviance and crime.

Like many US cities at this time, Chicago was undergoing rapid expansion of its population. In this sense, it was experiencing a similar set of problems to those encountered a half a century earlier by London, Paris and many other booming European cities. The big difference here, of course, was that Chicago was experiencing this mushrooming of its population in a very short time frame; the result being mass overcrowding and the attendant problems of deprivation and crime. Unlike most of its European counterparts, however, Chicago was also a city divided by enclaves sharply delineated by race, nationality, languages, and even religion. These spatial segregations were a pronounced feature of the city, and one that members of sociology department at the new University of Chicago were keen to study.

¹¹ Tannenbaum, for example, comments on this convergence of space, power, and control during the growth of industrialised societies: '[i]ndustrialism has forced upon the urban community sharp differences of group interests which have called for a great body of law and which have provided a new series of possible unsocial and illegal types of behaviour hitherto unknown' (1938:31).

¹² See also Park's (1952) collection of essays, *Human Communities: The City and Human Ecology*.

The Chicago school formulated a spatial approach to social research modelled on methods drawn from the natural sciences. First introduced by Park in 1921, the term *human ecology* signified the study of the natural distribution of urban communities and enclaves, grouped together according to similarities in population and ethnicity (Voss and Petersen 1971). Like the formations that occurred in natural ecology, Park et al. (1967[1925]) hypothesized that the urban environment was organised around demographic structures of neighbourhoods with definitive boundaries between the collective groups. Their research created a series of generalisations about the urban social structure and neighbourhood constructions therein (Davidson 1981). The demographic characteristics of neighbourhoods designated the basic premise of Burgess's (1957[1925]) concentric zone hypothesis¹³ (see Map 2-7). Each zone symbolised the sub-population of each spatial district, naturally formed and designated for diverse activities, cultures and divisions of labour.



Map 2-7: Burgess's concentric circle map, indicating his proposed five zones of Chicago. Source: Chicago Maps Collection, University of Illinois, Chicago

¹³ An overwhelming body of literature reviews the concentric zone hypothesis (five zones drawn at two mile intervals), so only a brief explanation is offered here. The centre of the city was the designated space for commerce and industry. The second zone on the outskirts of the city centre of Chicago and the featured zone of most criminological discourse is the 'zone of transition'. This zone was marked by substantial deterioration; cheap and substandard housing (often referred to as slums); heavily populated by newly arrived immigrant and rural settlers, vagrants and undesirables; and discernible amounts of vice. The third zone housed the working class population and fourth zone a better residential district comprised of middle-class citizens. Lastly, the fifth zone housed the affluent population who could afford the daily (and relatively costly) commute to the centre of the city. This unique mapping practice illustrated a clearer division of economy, labour, and social deviance that created a foundation from which knowledge of urban space emerged.

The city itself was a mosaic of segregated people, each group with their own cultures and mores, spatially situated in a way that set up the potential for conflict and contestation (Park, 1952; for further discussion see Tannenbaum, 1938). The generalisations about the complex distribution of populations within the urban system created assumptions about the city being simplistic enough to be broken down for analytic purposes into distinctive zones (Davidson, 1981; Morris, 1957). As a result, a better understanding of the urban system was made possible as the city was broken into aggregate pieces, which are both figuratively and statistically mapped.

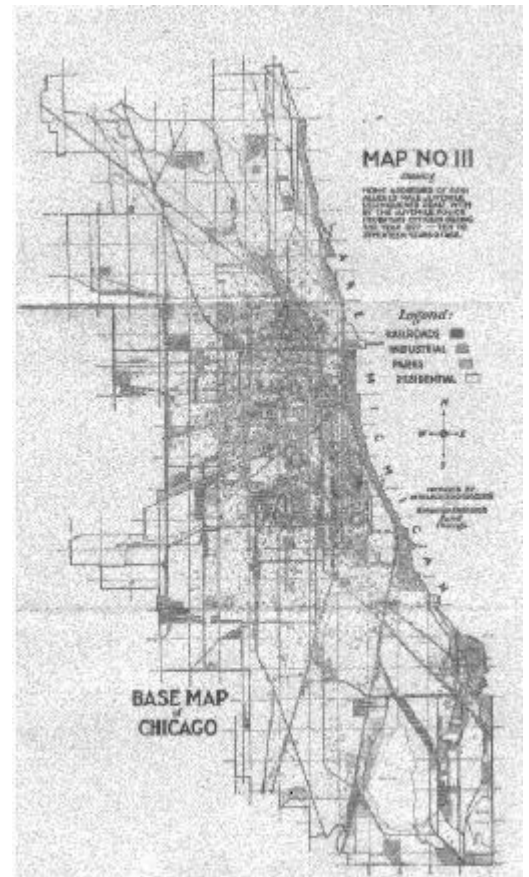
For example, the early Chicago ethnographer Frederic M. Thrasher (1927) employed the use of a map (see Map 2-8) to display the spatial distribution of street gang activity in the city. Thrasher's map of Chicago's 'Gangland' was only one of many other illustrations and tables he used to visually communicate the inner-workings of the gang and certain aspects of gang life. He described gangs as existing in socially and geographically 'interstitial' regions, marking the gangs as socially excluded or cultural 'othered'.

The most influential Chicago School contribution to the 'geography of crime' literature stems from Shaw and McKay's (1931, 1942) study of the spatial distribution of juvenile offending (see Map 2-9; note the similarity to Map 2-8, Thrasher's 'Gangland' map). Credited by Harries (1999:18) as the 'landmark piece of research involving crime mapping in the first half of the 20th century'¹⁴, Shaw and McKay's research utilised officially recorded delinquency data to plot troubled neighbourhoods. Using the city's juvenile offending official statistics they created a 'pin' map to plot the spatial distribution and concentration of delinquency, discovering that delinquency was spatially inconsistent across Chicago. More specifically, delinquency was heavily concentrated in the 'zone of transition', an area characterised by economic deprivation, social marginalization and high-speed immigration (Tannenbaum 1938: 217-218). Simply stated, this observation cemented the correlative relationship socio-environmental factors and high rates of crime..

¹⁴ Strangely eclipsing the earlier mapping efforts of Thrasher's 1,313 gangs in Chicago several years prior.



Map 2-8: Thrasher's map of Chicago presenting the core location of the various gangs he investigated.
 Source: The University of Chicago Library; G4104-C6E625-1926-T5



Map 2-9: Shaw and McKay's map of Chicago illustrating official counts of juvenile delinquency. Source: The University of Chicago Library; G4104-C6E625-1927-S5

In addition to exposing the connection between crime and economic factors, Shaw and McKay sparked considerable interest in the relationship between cultural milieu and deviance. Their research created a narrative of what was happening on the streets of these troubled neighbourhoods, offering insights into why it was that juvenile offending occurred in these areas. At this micro-level, they saw deviance emerging as a result of 'cultural transmission', with deviant values learnt in the family and neighbourhood socialisation process. The cultural transmission of values became the vital difference in the zonal areas and individuals residing in each zone (Akers, 2000; Voss, 1971)¹⁵. Adopting what David Matza would later call an *appreciative position*, the Chicagoans prioritised the cultural transmission of values through their subjects' life experiences in worlds 'sharply divided along lines of language, culture, religion, class, ethnicity' (Melossi 2000: 161).

¹⁵ This emphasis on values offered a jumping off point for latter Chicago school criminologists (such as Albert Cohen, 1955, and Richard Cloward and Lloyd E. Ohlin, 1960) to move away from the environment as a focal point to socio-cultural theories of anomie and strain which focused primarily on criminal gangs and subcultures.

Despite the fact that individual neighbourhoods and enclaves possessed their own cultural norms and value system, the larger society had to create official definitions of deviance and practices of social control that, at times, suppressed oppositions of plurality in the city. Narratives of suppressed oppositions and micro-level insights were never represented on Shaw and McKay's maps and therefore were not a part of the narrative represented through their maps.

The ecological analyses of Shaw and McKay (1931) gave the main impetus to the Chicago school's focus on crime mapping. Some Chicago School ethnographies and their maps have been largely ignored by geographers interested in crime (Lowman 1986:88), as demonstrated by Harries' reveal of Shaw and McKay's maps produced subsequently to Thrasher's similar 'Gangland' map (as further explored in Chapter 3). Overall, the efforts of the Chicago School demonstrated the relationship between the community and crime with the use of zonal and pin maps.

2.1c Police pin- maps and geographic 'Hot Spots': mapping the distribution of crime

The third 'moment' in criminology's engagement with cartography is not so much a 'moment' as it is an extended engagement with "map" making. For centuries, law enforcement agencies have employed the use of maps to both track and effectively respond to crime, and to inform policing operations and future crime prevention policies. This section will look back on this period in a bid to identify key themes and trends that have been consistent over time and thus can provide further insight into the use of cartography within criminology.

Nineteenth century English law enforcement revolutionised the way crime and deviance was tracked and categorised. As outlined above, British urban society had been radically transformed by the industrial revolution, resulting in overcrowding and a palpable fear of crime and disorder (Terry and Hartigan, 1982). No surprise, then, that the upper classes were keen to exercise increased levels of state control within urban areas (see Baker, 2003). Where previously, places such as the London's rookeries had been no-go areas for law enforcement agents, now there was a heightened demand to bring these spaces in line with the ordered folds of modern society. In short, there was a clamour for control agents who could react to and effectively prevent crime and incivility within the city (Miller, 2006). In response to such demand, "A Bill for Improving the Police in and Near the Metropolis" was passed by Parliament in 1829, effectively creating the London

Metropolitan Police Force (see Lyman, 1964). While every policing scholar knows that Robert Peel's 'new police' were the first modern state-funded police force, it is less well-known that "the Peelers" were also the first force to use maps for the purposes of tracking criminal offending.¹⁶

The 1846 implementation of territorial boundaries in policing 'beats' (Bruce, 2007a) - or geographic districts for assigned policemen to patrol - quickly helped to facilitate community-based control and accountability for enforcement practices (James, 2006).¹⁷ A central tool in this amelioration was Peel's practice of using 'pin' maps to note where a (reported) crime occurred. ('Pin-maps' were basically wall maps of any enforced area with locations of criminal incidents marked with a colour-coded pushpin. Visually this allowed law enforcement agencies a birds-eye-view of the distribution and density of criminal locations). This spatial strategy of policing was aided by the assignment of two detectives to each division or 'beat' to enforce law and order within that territory. These assigned officers collected crime statistics in their respective areas to better understand the distribution of crime for the City of London (Bruce, 2007a). This ability of the London Metropolitan police to track crime incidents into spatial patterns established a method of crime analysis still used by police forces today (Bruce, 2007b; Levine, 2006). Indeed, the contemporary policing of geographic districts and the tracking of criminal events using pin-maps have remained relatively unchanged ever since.

However, as cities grew more complex during the twentieth century, the need for more sophisticated ways to demarcate space for the purposes of policing also grew more urgent. One response was for police precincts to be geographically distributed across the metropolitan region. For example, the large American city of Philadelphia in Pennsylvania houses 31 police precincts (see Map 2-10). Within each of these precincts, officers are assigned 'beats' to patrol. The use of precinct/patrol 'beat' maps not only helps police forces coordinate their interventions, but increasingly these maps are now disseminated to citizens in a bid to better inform them about how their community is being policed. Indeed, according to the standard language of late modern police publicity officers, being aware of

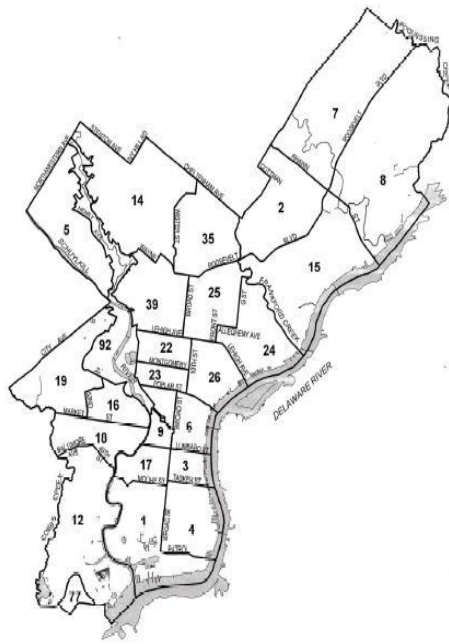
¹⁶ In 1845, New York City's police, modelled after Peel's London Metropolitan police structure, became the first established law enforcement agency in the United States (for further discussion see Bruce, 2007a, 2007b; Miller, 2006).

¹⁷ As James (2006:473) reports, 'In 1829, the Metropolitan Police Act drew together the existing 450 police officers of the burgeoning industrial London area and was followed by newly created forces around the country based on county or borough boundaries. A principal objection to the new police was the fear of national police force that would turn Britain into a "police state". Thus, policing developed nationally along local lines.' This response continues to modern day policing with geographical jurisdiction amongst law enforcement agencies.

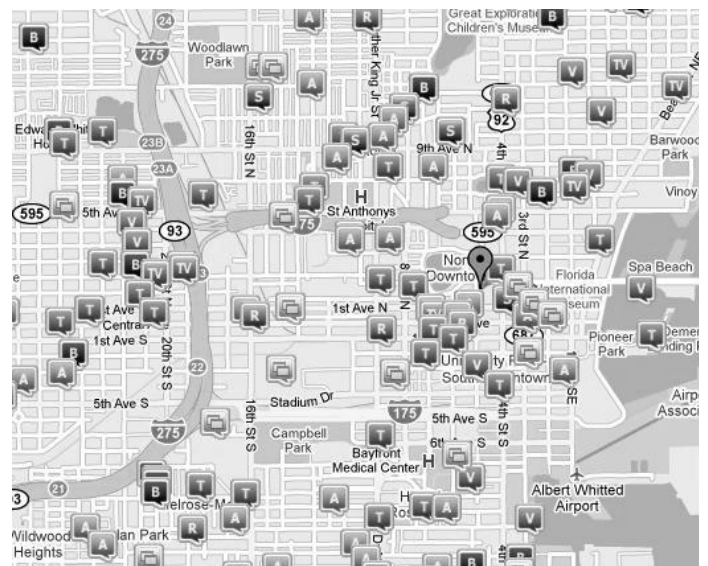
the exact police precinct in which one lives greatly helps ‘galvanize neighbourhood solidarity’.

A more significant move forward in pin-map practice came, of course, with the onset of digital technology. Digital pin-maps, like pin-maps of old, also indicate locations of criminal events with character dots (for example, see Map 2-11). However, whereas before the colour-coded pins indicated various criminal offences, digital pin-maps signal locations of specific offences with a legend of signs. The increased processing power of these computer-generated maps makes it very easy to map very specific forms of offence in any given neighbourhood. And as stated above, maps of this nature are increasingly circulated to the public via the internet. In the United Kingdom, for example, the National Policing Improvement Agency (NPIA) has a ‘CrimeMapper’ website (<http://maps.police.uk>), which enables the mapping of various reported offences in all neighbourhoods throughout England and Wales. Similarly in the United States, national crime mapping websites, such as ‘CrimeReports’ (www.crimereports.com) or ‘SpotCrime’ (www.spotcrime.com), (along with a host of individual city police department websites¹⁸), disseminate map-based information about specific criminal offences at neighbourhood and even street level.

¹⁸ Most large police departments in the United States offer online crime maps available to the public. A few examples include Los Angeles Police Department (<http://www.lapdcrimemaps.org/>), Atlanta Police Department (<http://www.atlantapd.org/index.asp?nav=crimemapping>), Chicago Police Department (<http://gis.chicagopolice.org/>), and Las Vegas Police Department (<http://www.lvmpd.com/crimeviewcommunity/>). Though each department exercises discretion when publishing the locations of criminal events, the crime in the city of one’s choice is easily discovered.



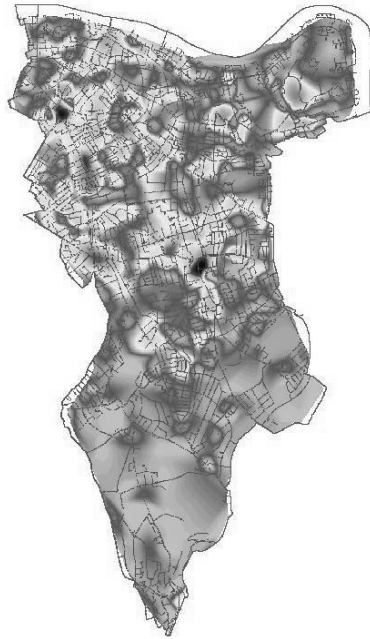
Map 2-10: Precincts in Philadelphia, Pennsylvania. Police precinct map available to citizens to help determine which station to report criminal activity and to track crime in their community. Source: Philadelphia Police Department (PPD) website, 2009



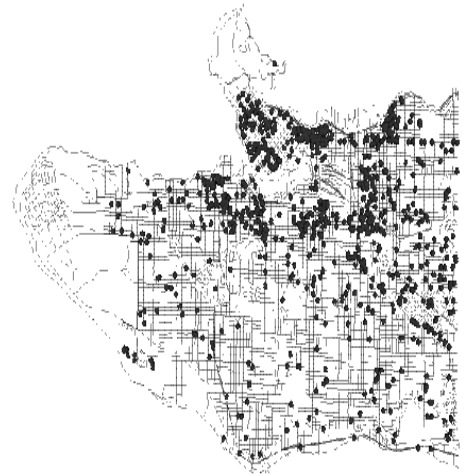
Map 2-11: Digital Pin-Map of Reported Crime in St. Petersburg, Florida. Map illustrating various criminal events in a specific neighbourhood. The variations in markers indicate specific criminal or deviant incidences as well as further information on the case if available. Source: CrimeReports website.

One of the primary drivers of this third moment in criminology's engagement with cartography was the development of 'hot spot' theory. Put simply, 'hot spot' is a term used to denote the spatial clustering of reported criminal incidents - 'small places in which the occurrence of crime is so frequent that it is highly predictable, at least over a one year period' (Sherman 1995:35). While hot spot research has gathered tremendous traction since Lawrence Sherman's famous study of police callout data in Minneapolis, in reality, the logic of practice here is very similar to some of the early modes of criminal cartography discussed above. For example, the maps of Guerry (see Maps 2-1, 2-2, and 2-3) used different shades of grey to identify intense areas of recorded crime in France. Likewise, Mayhew's map of criminal offending in England (see Map 2-5) could also be seen as an, albeit very rudimentary, form of proto hot spot mapping. The big difference of course is the extent to which computer technology is now used to spatially depict reported crime (see section 2.1d below). Yet, despite all this technology, it is interesting to reflect on how similar – in terms of design and style - these new computer-generated maps look when compared with their nineteenth century predecessors. For example, Map 2-12 below bears

a striking resemblance to some of Quetelet's designs, while Map 2.13 looks strikingly similar to the sort of pin map that might well have been on the wall of an early Metropolitan police station.



Map 2-12: 'Hot spot' map of reported crimes in Southwark. Source: Duback, 2001.
<http://www.crimereduction.homeoffice.gov.uk>.



Map 2-13: 'Hot spot' map of reported crime using digital pins to mark criminal activity. Lodha, Suresh K. and Arvind Verma, 1999

Returning to the present, advocates of contemporary hot spot research point to the way hot spot maps help police forces to effectively target their resources and implement mechanisms of deterrence to combat future crimes at specific locations (Paulsen, 2004). Not only does this (naturally) help lower victimisation in hot spot areas, but it also has crime displacement implications. As Sherman et al (1989:46) claim, 'a routine activities criminology of place hypothesizes that crime cannot be displaced merely by displacing motivated offenders; the offenders must also be displaced to other places with suitable targets and weak guardianship.' In this quote, we see the importance of combining hot spot analysis with bespoke and highly focused crime prevention/reduction strategies (see e.g. BBC 2002, 12 September).

This type of dual-pronged approach is not only of interest to residents of crime hot spots and the police officers who police these areas. Corporate institutions, most notably the insurance industry, also benefit from publicly available information about crime hot spots and crime prevention implementation (see O'Malley, 2007 on the relationship between spatial patterns of offending and risk assessment practices in the insurance

industry). This is an important development, for while the underlying logic associated with hot spot research might not be new (as we saw above), the linking of hot spot data to new modes of actuarial science based on wider database analysis is. Such practices, of course, have tremendous social implications – not just in terms of this thesis, but in terms of society as a whole. It is therefore a subject I will return to in more detail in subsequent chapters. However, for the moment it is worth noting the extent to which such practices represent the leading edge of forms of control and regulation that completely fail to recognise the dynamic nature of space; replacing it instead with a form of quantitative-cartographic analysis that is absolute, non-negotiable and static.

The exact form of these new spatial modes of control and regulation will be explored in Chapter 4 (*The Political Geography of State Crime and Violence: Reviewing Genocide and Resistance*) and Chapter 6 (*Reflections on a Cartographic Criminology and Ethical Considerations and Consequences to Crime Mapping*). What follows now is a review of the computerised cartography and geographical information systems (GISs) that make these ultimate forms of government at a distance possible.

2.1d ‘The Cartographic Guide to Crime Mapping’: Geographic Information Systems and Harries’ handbook

While academic geography has witnessed a decline in the use of maps¹⁹, other disciplines are investing in the diverse uses of maps as visual communicators of information and tools for the spatial analysis of social phenomena. Dodge and Perkins argue that this shift in cartographic practice is due to increased investment in technological mapping techniques, particularly the advent of Geographic Information Systems (GIS) and remote sensory technology. Greater emphasis is placed now, more than ever, on the training skills and empirical construction of maps ‘at the expense of wider social concerns or emotional engagement’ (Dodge and Perkins, 2008:1272). The frequent problem here, of course, is the false claim to objective geographical knowledge by those who promote this mode of map making. This creates a discrepancy between those researching mapping as a practical form of knowledge and those critiquing the process and results of mapping (Perkins, 2003: 342).

¹⁹ As Dodge and Perkins (2008:1271) contend, ‘a lack of map use has been well noted in the discipline over the last couple of decades (Martin, 2000; Wheeler, 1998). Across a range of geographical practices - be it research, publishing, or teaching - many, and perhaps the majority, of geographers do not see the need to map (Kain and Delano-Smith, 2003). Paradoxically, mapping is much easier to do, but in the geography discipline is best left to the technicians in drawing offices and to the GIS ‘geeks’.

While mapping has always been a tool employed to support dominant power structures (Perkins, 2004), digital mapping and GISs have now emerged as a prominent source of geographic knowledge that informs political decision-making (Crampton, 2004b).

Geographic governance and management through GIS mapping continues unchecked and unquestioned, without any recourse to theoretical and critical issues surrounding the politics of space (see Crampton, 2004a). Indeed, the emergence of so-called digitally-constructed ‘predictive maps’ (Ormeling and Kraak, 2008), further subjugates human subjectivity to the concerns of power and the interests of the political classes.

GIS is an acronym for geographic information system. However, there is no clearly recognised single definition that explains exactly what constitutes a GIS system. Rudimentary definitions such as Martin’s (1996) see a GIS as system that use digital data to represent geographic information, while DeMers (1997) prioritizes the processing of digital data to analysis geographic information (DeMers, 1997). Burrough and McDonnell (1998: 11) meanwhile provide three definitions of GIS: as a ‘toolbox’ for storing, retrieving, and presenting geographic digital data; as a ‘database system’ where spatial digital data is measured and analyzed to provide information on the geographic information; and as an ‘organization structure that integrates technology with a database’. While these definitions are a useful starting point when attempting to define complex digital geographic software, none of them are as thorough in their efforts to define the use and function of GISs as Huxhold (1991: 127):

[a GIS] stores map information in digital form by using a cartographic data base consisting of individual records that contain attributes of each *cartographic feature* represented on a map. A cartographic feature is something that can be named (i.e. street, manhole) and can be located on a map as well as on the ground in the real world. When it is seen on the ground, it is a *cartographic entity*. When the attributes that describe its geographic representation are stored digitally, it is a data record called a *cartographic object*. Thus, the cartographic feature ‘street’ is not only the entity upon which we drive our cars, but it is also that object that is stored in the computer and displayed on a map. The automated mapping functions of a GIS transform the attributes of cartographic objects stored in the cartographic data base into graphic representations on a map.

Stated more succinctly, Huxfold’s definition is important for the way it views GIS as essentially an art of digital cartography.

Definitional issues aside, it is important to stress at the outset that GIS mapping is different from other spatial computing programs, such as computer-assisted cartography

(CAC), computer-aided mapping (CAM), or computer-aided design (CAD)²⁰. Each of these spatial data analysis programs have very distinct disciplinary functions, however, in recent times, we have seen increasing integration of all three approaches, something that has extended each approach to a range of users from different disciplinary backgrounds.

The advance technological development of image processing and remote sensing using digital spatial information delivered from satellites has increased the efficiency of data processing and environment management; a process often referred to as ‘earth observation’ (Martin, 1996: 21). This practice is central to all modern GIS programmes. GIS ultimately improves the management of spatial data, increases productive uses of geographic information, and helps the analysis capability of spatial data (Huxhold, 1991). Additionally, according to DeMers (1997), GIS exceeds the research possibilities of traditional analogue maps because of their ability to pre-process spatial data after initial data input, thus facilitating large data storage, retrieval, and management. Further, it provides the ability to manipulate spatial data (i.e. via so-called modelling functions) and present spatial information in array of forms (e.g. tabular, graphic, or map). As a result, maps can be produced more quickly and can be better tailored to meet user’s needs (Rhind, 1977: 74-78; Burrough and McDonnell, 1998).

While traditional GIS programmes were intended for application in the environmental sciences (such as geology and geophysics)²¹, their use quickly spread to other fields during the 1990s (Martin, 1996) – most notably public and local government administration. It is at this point that a major problem emerges: i.e. that the function of a GIS is to model geographic space, not to provide accurate models of the ‘geographic reality’ of external *social attributes* (Martin, 1996). As we have seen, maps are always abstractions of space. This abstraction does not go away just because technology has improved. On the contrary, the very processes associated with digital map production actually facilitate abstraction through a series of decision making processes related to the areas of data collection and measurement level (nominal, ordinal, interval, and ratio). Indeed, almost at every turn, assessments are being made about what to include or exclude from the map, or how one should go about representing the data in graphic form (DeMers,

²⁰ These three prior programmes provided basic GISs with the ability to provide image-processing, representations of spatial data, automated cartography, and modifications of digital spatial processing. The development of CAC did not allow for modification of geographic reality or interpretation of space. While computer-aided mapping (CAM) allowed for a greater possibility of analysis because of its ability to create conventional topographic maps, it lacked the ability to effectively manage spatial data. Computer-aided design (CAD) emerged from the architectural field. It was a spatial programme capable of producing automated maps, but it lacked the ability to analyse external descriptive data files (DeMers, 1997).

²¹ According to Jones (1997), utility companies have historically been the primary users of GIS programmes.

1997). Even more straightforwardly, like any computer-generated information, the quality of data models constructed and analysed in GISs only mirrors the quality of data collected and entered.

Burrough and McDonnell (1998: 18) assert that there are six levels of model development and abstraction that can feature in a spatial data model. The first two levels are heavily reliant on individual perspectives of space, with the *conception* model beginning with a general view of reality, and an *analogue* model illustrating the human conceptualisation of the space. A *spatial* model is the formalisation of the analogue model without restrictions on implementation. The spatial data is then recorded in the programme with spatial relationships established and particular representations of data structures recognised. The *physical computation* model is then developed and is advanced to a *data manipulation* model, developed under chosen axioms and rules for handling the spatial data. The last level of the map development and abstraction is the *graphical* model, which figuratively displays and presents the spatial data.

Spatial data is analysed and presented in either a vector (object based) or raster (location based, not continuous) format (Jones, 1997). A vector is the representation of spatial data by points, lines, and polygons. Raster is a regular grid of cells covering an area, spatial information in the form of regular grid cells, or simply, grid representations (Burrough and McDonnell, 1998). The chosen format depends on the intended function that the created representation of space is expected to fulfil.

There is another problem: GIS data output is not easily read and deciphered. Digital cartography communicates a range of spatial information through displays of environmental locality, shape, size, and orientation. However, that information varies in terms of its capability to reflect empirical reality. Most obviously, while environmental features such as roads and buildings have definite locations, social and economic data is spatialised over the mapped environment. As a result any subsequent analysis needs to differentiate between which features in a digital cartographic map are finite truths to the space, and which are predefined by the information collected by organizations, governments, or other research bodies (Bracken, 1994). For example, in the field of public administration, the treatment of population data (age, race) and social conditions (unemployment, crime) over geographic codes (postal codes), in a process Martin (1996) terms *georeferencing*, is often unsuitable for GIS data modelling because of the imprecise

nature of this type of data.²²

In a bid to combat such problems, Martin (1996) calls for better education and curriculum development in the field - and especially enhanced basic training on how to use GISs. Interestingly enough, Rhind (1977: 76-79) echoed some of these same concerns decades earlier. Firstly, he expressed a concern that the art of manual cartographical methods might be lost with the acquisition of these contemporary computerised methods. (Whilst this may not be an immense concern of the scholarly community, it does raise concerns about the erosion of a skill set that might be lost forever). Secondly, Rhind argues that there is a danger of producing new maps simply because the facility is there to do so and not because the maps are necessary in and of themselves. This poses a very important question about why map so much social phenomenon? What are the consequences of creating maps just because it is easy to do so? (cf. Chapter 6: *Reflections on a Cartographic Criminology and Ethical Considerations and Consequences to Crime Mapping*).

Inevitably, as technology advances, so does the process of digital cartography. For example, one can immediately see how the emergence of popular Global Positioning Systems (GPS) and associated programmes such as Google Earth (where a specific location anywhere in the world is quickly accessed and viewed on any personal computer with internet capabilities) will impact on the future of GISs²³. Such software, as MacDonald (2007) wryly comments means 'we can all be cartographers at the click of the mouse' – the creation of maps no longer restricted to a small number of arcane specialists. While this is an exciting, if somewhat frightening, prospect, one should not lose sight of the fact that traditional ground mapping techniques are still required for areas not open to clear GPS images (such as the spaces in and around high-rise buildings, see Huxhold, 1991). Moreover, and more generally, digital cartographers using GISs to create maps

²² Likewise, consider the distinction between environmental certainties (such as streets and houses) and information regarding a category such as race, a category all-too-often condensed in digital maps for ease of entry and analysis (Jones, 1997). Openshaw (1994) similarly illustrates a weakness of GIS when examining patterns emerged from spatial data analysis. He contends GIS is often used to analyse tri-space data: geographical (or location) information, temporal details, and other 'attribute' data (i.e. social conditions, population, and socio-economic status). The purpose of spatial analysis of tri-space data is to yield potential patterns or relationships in the data. However, GIS only has the capability of analysing these three spaces individually, or at best two of the three spaces together. The capability of analysing all three simultaneously simply does not exist.

²³ Satellites orbiting the earth take snapshots of geographic environments and process these images in GIS for analysis. However, the readily available geographic information and abilities to create maps from GPS is reliant on the United States, or alternatively on the Russian Global Navigating Satellite System until 2011 when the Galileo Positioning System will provide an alternative. This creates a power paradigm of both the US and Russia to provide the means to access the information from these satellites and their ability to control this information.

need to be constantly aware that the greater the distance from the point of observation to the space being mapped, the greater the likelihood that one might lose sight of matters such as cultural context or the nuances of human interaction.

Yet, such concerns about ‘at a distance’ abstraction are seldom raised, certainly not in the mass of new textbooks on digital cartography. Here, understandably, the story is one of unbridled possibility, a brave new world of GPS, GIS, and Google Earth. However, while only a fool would decry the many positive aspects of household navigational devices by manufacturers like TomTom, OnStar and Garmin, a word of caution is also appropriate. For whilst such technology at the moment is employed in purely objective forms, such devices could also open the door to a more pejorative reading of (urban) space. I refer here to the fusion of GPS technology with private and publicly held data on health or crime risks within certain locations. This vision, as Ormeling and Kraak (2008: 130) have argued, could extend to a point where these maps become predictive tools used to assess statistical risks or make digital inferences about particular neighbourhoods, a point that I will develop in more detail in Chapter 6 (Reflections on a Cartographic Criminology and Ethical Considerations and Consequences to Crime Mapping).

In summary, then, GISs are representations of geographic space modelled from data, and as such they are just as subjective as more traditional maps. As Wood so eloquently puts it:

... *knowledge of the map is knowledge of the world from which it emerges* – as a casting from its mould, as a shoe from its last – isomorphic counter-image to *everything* in society that conspires to produce it. This, of course, would be to site the source of the map in a realm more diffuse than cartography; it would be to insist on a *sociology* of the map. It would force us to admit that the knowledge it embodies was socially *constructed*, not tripped over and no more than... *reproduced*. (1992:18, italics emphasized by Wood)

This is probably a good way of thinking about the issues raised by digital cartography, but what about when digital cartography is employed by criminologists? Here we are confronted by a more complex set of issues. Clearly, these issues will be addressed as the thesis unfolds, but for the moment it is worth pausing to consider, by way of an introduction to digital crime mapping, what is arguably the most important text in the field.

Largely as a result of the advent of GIS, crime maps are being created by a greater number of individuals and organisations who may not have background in cartography, geography, or statistics. As such, Keith Harris’ (1999) guide, *Mapping Crime: Principles and Practices*, is written for the specific needs of those producing and using crime maps without extensive cartographic practice (*ibid.*: 3). Harries even goes so far as to suggest

that, with the advent of GIS, mapmaking is now seen as a branch of information technology and is no longer strictly for geographers who, as he claims, were ‘late getting into the act’ (*ibid.*: 4). It is clear from the first few pages that this guide to crime mapping has a simple purpose: to provide basic theoretical insight to those who are already involved in the production and design of crime maps.

Right from the outset Harries emphasises that mapping is a scientific activity, and in this sense, his position is very similar to that set out in some of the very earliest historical guides on cartography. Likewise, he also asserts that the ‘science’ of mapmaking is inseparable from the artistic decisions presented in a map. Indeed, differences in the subjective choices presented in the map (e.g. about colour, symbol, or subheading) are critical since they visually change the message conveyed by the map.

A considerable portion of the first chapter is taken up describing how the ‘power’ of crime maps can be used to convey certain aspects of “reality”. This aspect, however, is determined by selecting limited factors and perspectives of some criminal context. The abstractions of a map present the choices of the mapmakers to present certain information in favour of information obfuscate on the map. The abstractions of social facts on a map can distort reality to a certain extent and may ‘lie’ or misrepresent the ‘truth’ as a result of element selection. Maps that misrepresent ‘reality’ or misinform the audience are not necessarily intentional and are virtually unlimited. Mapmakers must consider their choices in the creation of the map to avoid potential fatal flaws and maintain ethical criteria for their mapmaking.

In his guide, Harries does not offer any substantial theoretical discussions or critical analysis of mapmaking other than subjective choices made for elements of the maps. Though his efforts to introduce basic cartographic principles to the discussion of crime mapping, it falls short of truly integrating the two disciplinary literatures. The larger critical arguments in cartography (cf. Chapter 1: Cartography: the development and critique of maps and mapmaking) are unfortunately omitted altogether. In sum, this guide to crime mapping only speaks to criminologists and criminal justice practitioners from a position within the field. His omission in the introduction of the guide downplays critical cartographic theory by suggesting that cartography is simply about mapmaking. As such, maps are seen as tools to visually communicate limited information and nothing more. This proposition reflects the past century’s use of maps in criminology, promoting the same narrative of scientific activity to create a tool to better policing strategies. The guide concludes by offering potential uses of crime maps for geographic profiling, forecasting

crime, and police use of GIS and GPS integration. Appreciating that Harries' initially remarks that this guide is specific to crime mappers, it is still scarce on cartography knowledge.

2.2 Towards a geographically-informed criminology

All knowledge is necessarily subjective as well as objective, delineations of the world that are surely matter-of-fact ordinarily seem to arid and lifeless to assimilate; only colour and feeling convey verisimilitude. Besides unvarnished facts, we require fresh first-hand experience, individual opinions and prejudices. (Lowenthal, 1975: 116)

This chapter has reviewed a series of criminology's past engagements with cartography, from early nineteenth century *carte thematique* to contemporary GIS crime 'hot spot' maps. Each moment in the literature highlights a subtle change in the practice of mapping deviance since the technique first emerged in the nineteenth century. However, it is also true to state that, in many ways, very little has changed since the onset of crime mapping in the 1800s. For example, as we have seen, one of the constant problems in this field has been the reliance upon official statistics with very little critical consideration given to the accuracy of this type of data. Maps, especially those created with official statistics and under a 'scientific' pretext, offer many interesting facts but also contain misrepresentations about the social space (see relatedly, Young' concept of 'Griffen's paradox, 2004: 17-18).

Likewise, as this chapter has shown, there are no such things as purely objective, scientific maps. Maps should be scrutinized in a bid to comprehend the sources of power and subjectivity that undergird their commission and construction, yet too often in criminology's history this process has not been undertaken with any real sophistication. The result, as Williams (1984: 98) might put it, is that 'there is no appreciation of the phenomena at hand. If understanding exists at all, it is only of what has been collected, which lacks the richness of the full social and historical dynamic in which any event operates'. Criminology needs to emerge from the philosophy that confuses empiricism with interpretation. It needs to invest in a cartographic method that seeks to understand spatial distributions of crime beyond the visual patterns created on a map. Finally, it needs to reengage in a basic theoretical interest in criminal and deviant behaviour and its relationship with space.

In other words, the time is ripe for a new 'moment' in criminology to emerge; one that engages with cartography on a creative and imaginative level. Such a goal should not

be beyond a discipline which is so steadfastly interdisciplinary. Yet, when it comes to criminological research on spaces of crime it is interesting to note that criminology has often been reluctant to reach out to other disciplines for inspiration.²⁴ This inwardness can no longer continue. In particular, as I will explain over the next four chapters, criminology must interact with new developments underway in the field of academic geography.

Throughout its history, geography has developed numerous approaches to the exploration of space. Initially a discipline that explored physical landscape, it has expanded to include ‘human geography’ which investigates social, economic, political, historical, and cultural interactions between humans and the environment. Each of these sub-fields contributes to and shapes geographical discourse, aiding the elucidation of the human condition (Benko and Strohmayer, 2004: xi).

Selecting which geographical sub-fields to use to aid our understanding of spatial crime is not an easy task, not least because the barriers that demarcate these sub-fields are not mutually exclusive. After all, social phenomena transcend structures, cultures, and politics. Nonetheless, I will endeavour to make a start. The three sub-fields of geographical discourse chosen to contextualise views of spatial crime are i) social geography; ii) political geography; and iii) cultural geography. The subsequent three chapters present basic literature for each of these geographical sub-fields before going on to explain how each field can aid criminology’s understanding of spatial crime.

Map analysis and creative map development is the method by which this thesis addresses the study of a geographically-informed criminology. Unsurprisingly there is an abundance of maps representing criminal and deviant behaviours. As with the careful selection of geographical sub-fields to contextualise spatial criminology and instances to exemplify each, the maps selected for analysis are based on a variety of criteria (as explained in each chapter). Not all maps selected, however, are popular material maps featured in orthodox criminology. Each chapter will engage with popular criminological maps as well as unexpected maps not often seen in criminological research, such as ethnographic literary maps, cognitive maps, and interactive humanitarian maps.

²⁴ For example, in the introduction to their edited book *Crime, Policing, and Place: Essays in Environmental Criminology*, Evans et al. (1992) note that most of the greatest contributions to the geography of crime come from within criminology (they point to the work of the ‘cartographic school’ and the Chicago school of social ecology as making the most important contributions to the discipline).