

KEY REQUIREMENTS IN THE DEVELOPMENT OF A SPATIAL-ECOLOGICAL THEORY OF CRIME IN SOUTH AFRICA

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ABSTRACT

South Africa is a country ravaged by crime, yet few theoretical frameworks exist by which to guide crime reduction initiatives, and none incorporating a spatial component. Crime scientists are becoming increasingly aware of the importance of spatial dynamics in their research, with both the geographic distributions of offences and offenders seemingly playing important roles. However, empirical research investigating the spatial dimension of crime in South Africa is sorely lacking, which is a worrying fact, given the importance of this factor in understanding crime in the country. In this paper key requirements in the development of a spatial-ecological theory of crime in South Africa are outlined and investigated. Although these requirements necessarily have a geo-analytic bias, they will, nevertheless, have an impact on the associated field of criminology in South Africa. Within this context local researchers would be able to provide feedback on the dominance and ethnocentric bias of “American” criminology as well as lay a theoretical foundation for a critical-realistic understanding of crime in the country.

INTRODUCTION

Crime is a complex and multi-dimensional phenomenon. Crime typically includes behavioural, psychological, criminological, spatial (geographic), managerial, correctional and perceptual dimensions. It is also a destructive socio-economic phenomenon and the search for the rationale behind crime is an ongoing task. The rate and nature of crime in post-apartheid South Africa is currently perceived as one of its main challenges (Altbeker 2007). Since 1994, two diverse strategies have been employed to control the rapid escalation of crime in the country – the National Crime Prevention Strategy (NCPS) implemented in 1994 and the National Crime Combating Strategy (NCCS) launched in 2000, both arguably with limited success (Van der Spuy 2001; Leggett 2004). One of the main reasons often cited for the failure to bring crime under control in the country, particularly in urban environments, is the lack of a comprehensive local critical theory of crime. The purpose of such a theory would be to guide the management of the social, spatial and managerial dimensions of crime, which would, ideally, be integrated in the theory. The theory should additionally be an overarching one that entails more than just post-modernist deconstructions, administrative “every-day life” perspectives, perceptual interpretations, social anthropologies and hermeneutic arguments.

According to Dixon (2001), a critical social criminological theory of post-apartheid South Africa should go beyond idealist views linking present levels of crime in the country to the continuity of apartheid divisions. His call is to rather follow an approach of critical realism. In addition to the legacy of apartheid, a critical realistic perspective also acknowledges the impact of unrealistic economic expectations linked to the unequal opportunities associated with a shift in state policy towards neo-liberalism (Bond 2000), and the challenges of a typical society in transition (Shaw 2002). But, as Altbeker (2007) rather cynically points out, South Africa should acknowledge that it is “a country at war with itself” – one where the rate and violent nature of crime cannot be explained in terms of the universal reasons for crime, the general characteristics of a typical country in transition, globalisation, neo-liberalism, and even the unique legacy of apartheid. Critical introspection should also acknowledge that crime in South Africa has become a phenomenon that “fuels itself” (Altbeker 2007), amongst others, as a result of post-apartheid moral degeneration, and a political-administrative hegemony that

is increasingly in conflict with itself. Only the ignorant will argue that a new critical realistic perspective should be devoid of a localised spatial-ecological interpretation of crime, a topic largely neglected in South Africa.

Crime is inherently a spatial phenomenon. Criminal offences and criminal offenders both exhibit a distribution in space with these two aspects traditionally forming the central concerns of environmental criminology (Bottoms & Wiles 2002). The theoretical underpinning of environmental criminology is that offences and offenders cluster together, and that within this context spatial randomness is the exception rather than the rule (Harries 2006). Social structure theorists argue that people living in equivalent environments tend to behave similarly, and if the environment didn't influence human behaviour crime rates would be distributed equally across the social and geographical structure, which of course they are not (Siegel 2001). In South Africa, empirical investigations into the spatial distribution of offenders and offences are sorely lacking. As a result, local researchers are continuously confined to the social conditions – and spatial interpretations – pertinent to First World, in particular North-American, theoretical frameworks when conducting local crime analyses and interpreting criminological findings. The problems associated with simply adopting current theories of crime are well documented with researchers highlighting the fact that the obvious problem is the inapplicability of many key theoretical concepts and assumptions (see Willis et al 1999; Lynch & Groves 1995). For example, South African offenders may not subscribe to the generally agreed-upon principles of least-effort, familiarity, criminal range, safety zones and mental buffers, among others, in the selection of a target. Similarly, local offenders may experience adverse ecological factors, such as high residential mobility, differently to “international” offenders. In short, as part of a comprehensive critical theory of crime this country also requires a theoretical perspective to make sense of the spatial reality of crime.

This paper aims to identify a number of key requirements in the development of an indigenous spatial-ecological theory of crime in South Africa. Methodological issues that hinder the understanding of the socio-economic, criminological and ecological interpretations of crime in the country are also noted, with specific reference to geographical information technologies. The paper concludes by recommending avenues for future research that will enable policymakers to become better informed about crime in the country.

KEY REQUIREMENTS

The purpose of this section is to identify a number of key requirements in the development of a spatial-ecological theory of crime in South Africa. In each instance the requirement is examined while a brief overview as well as assessment of its current status in the country is provided.

Requirement 1: Understanding the complexity of crime and the urban environment

Owing to its recent political history, South Africa is a country that is inherently confronted with social disorganisation and socio-spatial fragmentation (Pieterse 2004). Increasing income inequality, linked to multi-ethnicity, racial and ethnic segregation, family disruption and population mobility, are main characteristics of many emerging cities of the world. Owing to its apartheid history, South Africa's cities represent an archetype in this regard. However, before the development of a spatial-ecological theory of crime in South African cities can be contemplated, the complexity of crime, its causes and the changing nature of cities and society should first be considered.

Crime is not an empirical, uncontested fact. It is an anti-normative process that requires an examination between incivilities (anti-social behaviour), criminality (criminal tendencies) and actual crime (Davies 2005). The study of crime is further complicated by categories of failed, actual, reported, investigated, charged, and convicted crime, as well as by notions of anomie,

alienation and deviance, and by labelling and demonisation. Consequently, crime is a relative, culturally contested variable that reaches across space and time. Such a relativist, hermeneutic interpretation of crime obviously challenges narrow, empirical explanations of crime. Nevertheless, criminologists have offered a multitude of alternate, sometimes overlapping, and often competing theoretical explanations for crime. Based on the interpretations of Herbert (2002) and Davies (2005), five sets of explanations are considered. *Individual explanations* of crime initially linked crime to “innate evil” in the individual and later to biological deficiency and disorder. Individual criminality may also be the result of learned behaviour among people who never socialised beyond anti-social and criminal behaviours. Fonagy (2003) argues that these social and biological explanations may be converging in the individual criminal. There may also be *group or sub-cultural explanations* for criminal behaviour, for example juvenile delinquency and gangsterism, also in addition to economic desperation and moral degeneration that are linked to the notions of value, socialisation, as well as social, economic and political conflict. *Area explanations* link crime to the environment and include the physical environment of locality resulting from urban design, architecture and maintenance, as well as the ecological environment of the neighbourhood that, for example, could support theories of social deprivation and social disorganisation, and, thirdly, the perceived environment representative of the cognitive-affective domain of the beholder and/or community. There are also *societal explanations* for criminal behaviour which are founded on so-called critical conflict theories and that attribute crime to deep-seated structures or mechanisms of society such as economic materialism and apartheid, resulting in dynamic consensual and conflict tendencies in society. Finally, there is the *explanation of intentional, professional crime* as an alternative way of life, that is, criminality that cannot be explained by individual deficiency, environmental influence or social disorder, but rather by a premeditated choice of criminality as a mode of economic production and as a career path.

The spatial-ecological criminologist should in particular be aware of the changing structure and dynamics of cities as well as societal changes. Increased spatial mobility as a result of improved transportation, and increased inter-connectivity as a result of technological advance, provide impetus to urban processes such as decentralisation and urbanisation. This leads to the creation of polycentric cities (Pacione 2005), which not only enlarges the area of an individual’s activities but also accentuates the spatial polarisation of race and class, that, amongst others, result in distinctly different geographies of crime location and offender origin in the late-modern city (Herbert 2007 personal communication). In addition, overall societal processes, such as social, cultural and economic globalisation, de-industrialisation, cultural post-modernism, and changing international and regional migration patterns, have a huge impact on the spatial and social expression of urban cosmopolitanism, exclusivity as well as the nature and patterning of crime. South African spatial-ecology is further complicated by the dynamics and challenges of a unique society in transition where the legacy of the past, new forms of exclusion, and democratic volatility strengthen notions of relative rather than absolute deprivation, individualist immediacy, hedonism and self-actualisation, as well as ontological insecurity (Dixon 2001; Shaw 2002). Thus, although the spatial ecology of crime and offenders represents only a small part of the crime equation, it nevertheless makes a very important contribution to the overall understanding and management of crime.

Requirement 2: Approach and the use of GIS within crime science in the country

Spatial-ecological interpretations of crime are often associated with the Chicago school of social ecology (Shaw & McKay 1942) and its later variants, namely social area analysis (Shevky & Bell 1955) and factorial ecology (Murdie 1969). These interpretations of crime are often disregarded because of their perceived association with environmental determinism and its mechanical method. However, two developments have led to the resurgence of spatial-ecological interpretations of crime. The first is the development of environmental criminology as a field of study. The main focus of environmental criminology is on the link between crime

and the layout, design, servicing and maintenance of localities and structures. The principles of this perspective are also applicable to larger spatial units such as neighbourhoods. Although the association between crime and the urban environment is more contextual than causal, it is nonetheless real (Davies 2005). Moreover, environmental criminology offers a range of testable hypotheses, a developing set of concepts, and a clear set of linkages with urban structures and policies that can be used to advance the understanding of crime as a phenomenon in the urban environment (Herbert 2002).

The second reason for the revival of spatial ecological studies is the development of geographic information systems (GIS). The rapid advancement and proliferation of GIS has increased interest in crime mapping and revolutionised crime science (Bowers et al 2004). The technology is *sine qua non* for ecological studies across all disciplines, as it allows for the structuring and manipulation of rapidly multiplying aggregated data sources and converting it into useful information (Longley & Clarke 1995). Within a crime context this translates into the establishment and exploration of links and spatial relations between data derived from, among others, crime reports, census variables, transport information and land use (Bowers & Hirschfield 1999). Additionally, geographic information systems can support both exploratory and confirmatory analysis, provide tools for both inductive and deductive approaches, as well as support both scientific research and the implementation of public policy based on GIS models (Mark 1999). Recently, several tools have also been integrated into GIS software to facilitate more rigorous analyses of the spatial patterning of crime through the use of exploratory spatial data analysis (ESDA) procedures. According to Cameron (2005), the central feature of ESDA is the use of formal statistical tests to determine whether crime or offender locations show evidence of clustering or whether they are randomly distributed. These include nearest neighbour analysis tests for point pattern data and spatial autocorrelation tests for aggregated data or event data that have intensity values applied to them. In both instances a more thorough spatial understanding of the distribution of criminal events are provided to the user.

The decreasing cost of desktop computers and the increased availability of geo-referenced information at a neighbourhood level have also allowed ever more sophisticated and flexible GIS representations to take shape (Messner & Anselin 2004). More recent manifestations of GIS technology in crime science include hot-spot analysis (Block & Block 1995; Eck et al 2000; Bowers et al 2004), journey-to-crime modelling (Liggett et al 2003; Rossmo 2000), geographic profiling (LeComber et al 2006; Cooper et al 2001; Laukkanen & Santtila 2006), and more recently, geo-demographic analysis (Ashby 2004; Ashby & Longley 2005; Williamson et al 2006). In all these applications GIS provides an important platform for understanding the spatial and temporal incidence of crime and, consequently, analysing and extending existing criminological theory. Thus, the contemporary GIS-based spatial-ecological approach is far removed from the meta-explanation of classical spatial-ecological theory and instead offers an integrated and complimentary dimension to critical crime analysis.

The use of GIS in crime science in South Africa is in its infancy. Region-specific and demographically representative monitoring of crime only began after the democratically elected government came to power in 1994 (Blackmore 2003), while the use of crime mapping within the South African Police Service (SAPS) is at an embryonic stage (Eloff 2006). From a governmental perspective, legislation has recently been put into place to ensure that a GIS exists (or is at least supposed to exist), at the majority of police stations in the country. Currently the Crime and Information Analysis Centre (CIAC) of the SAPS collates and co-ordinates crime information across the country in order to provide intelligence at all levels of policing namely station, area, provincial and national level (Buys 2003). A number of semi-privatised parastatals, such as the Human Sciences Research Council (HSRC) (Schwabe & Schurink 2000; Weir-Smith 2004) and the Council for Scientific and Industrial Research (CSIR) (Gilfillan 1999; Schmitz et al 2002) also conduct independent geographic

investigations of crime. Independent research utilising GIS within a crime context include that conducted by Lochner and Zietsman (1998), Redpath (2001) as well as Erasmus and Mans (2005). In a number of these examples, however, concern has been expressed regarding the actual ability of the government, in general, and the SAPS, in particular, to harness the technology to supplement the policing process. Researchers also expressed concerns ranging from incomplete spatial data (Gilfillan 1999; Schwabe & Schurink 2000; Eloff 2006) to the ineffective capturing and coding of crime information at the crime scene (Schwabe & Schurink 2000; Buys 2003). These concerns not only question the ability of researchers to undertake spatial-ecological studies of crime in the country but highlight a pressing need for a more thorough investigation into the present use of GIS within crime science in the country with regards to Geographical Information (GI) infrastructure, capacity and knowledge. Within this context it is also important to highlight the various spatial analytic operations that GIS technology offers to crime scientists in South Africa, as well as to identify the major inhibitors to the potential offered by GIS to supplement policing and inform researchers regarding existing spatial-ecological approaches to crime.

Requirement 3: Determine the spatial-ecological explanations for crime

The location of crime and the spatial origin of offenders are both fundamental considerations in any quantitative assessment and extension of existing criminological theory. This requirement is divided into two separate sections dealing first with the need to identify the spatial-ecological characteristics of crime-incident locations, and second, the need to identify the ecological characteristics of offender locations.

Crime-incident locations

In ecological theory the characteristics of the population and the characteristics of the place influence whether or not a crime will occur or the “crime potential” of an area, i.e. the likelihood that a crime will be exhibited in an area as a function of various ecological features (Brantingham & Brantingham 1993). Two basic data requirements are essential to an ecological investigation into the spatial patterning of criminal incident locations. The first is crime information, which typically acts as the dependent variable in the model and most often appears in the form of crime rate; the second is some form of demographic or “lifestyle” data aggregated by area and acting as the explanatory variable, most often in the form of census or other ancillary datasets. While variations of these two data requirements are common in international ecological crime research (Ouimet 2000; Cahill & Mulligan 2003; Oh 2005; Andresen 2006), the basic premise is generally the same, which is to illuminate the characteristics and features of crime-incident locations within an areal unit. Locally, crime information is released by the SAPS to the public in the form of crime statistics. These crime statistics are released annually in an aggregated form as a crime count per police station boundary. Despite crime statistics in general being compounded by scepticism and mistrust (Herbert 1982; Altbeker 2005), they nevertheless represent the only official and spatially complete crime dataset available in the country. In terms of demographic or “lifestyle” data, the primary source of information is the censuses released by Statistics South Africa (SSA). Other ancillary datasets released by SSA, which can also be utilised in ecological studies of crime, include the victimisation, labour force and general household surveys as well as datasets released by other government departments and parastatals including the Environmental Potential Atlas (ENPAT) of the Department of Environmental Affairs and Tourism (DEAT) and the CSIR’s land cover dataset.

While it may appear as if the basic data requirements are available to ecologically analyse crime-incident locations in the country, two major methodological issues restrict investigations. The first is the misalignment of administrative units such as police station boundaries with census boundaries such as enumerator areas (EA), sub-place¹ and municipal boundaries. The result is that census data for example, as an auxiliary dataset in ecological

studies of crime, can only be used from provincial boundary level upward (Eloff 2006). This provides a very crude ecological portrayal of the determinants of crime in the country and makes any inferences drawn from these findings more susceptible to the inherent limitations associated with the boundaries defined through mapping such as the modifiable areal unit problem (MAUP) and the ecological fallacy (Bailey & Gatrell 1995; Openshaw 1984). Although a number of alternate disaggregation procedures have been used in South Africa to counter the problem of spatial incongruencies (Gilfillan 1999; Schwabe & Schurink 2000; Schmitz & Stylianides 2002; Eloff 2006; Naude 2007), GIS researchers often question the assumptions upon which these procedures are based (Vickers 2003; Singleton 2004). Figure 1 (Appendix A) illustrates the misalignment of police station boundaries with sub-place and municipal boundaries for the City of Tshwane Metropolitan Municipality (CTMM). The misalignment is clearly evident throughout the municipality with some police station boundaries not only cutting across smaller sub-places but also spilling over into other municipalities and magisterial districts. In some instances, Schmitz & Stylianides (2002) note that police stations serve up to five larger administrative units simultaneously, so depending on where the crime occurs within the police station's area of jurisdiction, one investigating officer might be required to appear in five different courts at the same time on the same day, many kilometres apart! Consequently this is not only a logistical and administrative nightmare for policing authorities but also hinders spatial-ecological studies using these spatial boundaries.

The second issue that hinders spatial-ecological investigations into crime-incident locations in South Africa is the problems related to the Case Administration System (CAS) of the SAPS. The CAS is a spatial unit that was created to accurately record information at a police station and contains information such as the code, address and time of the crime. The first problem relates to the uncertainty regarding the spatial partitioning of police station boundaries into smaller so-called case administration (CAS) blocks. Thus, embedded within police station boundaries, are these finer aggregated areas known as CAS blocks. When a crime occurs in South Africa, it is spatially located within a CAS block, which defines what police station is responsible for managing and investigating the offence. Major problems relating to CAS blocks include the fact that they have not been electronically captured on a country-wide basis, resulting in a lack of clearly defined spatial boundaries for CAS blocks and an associated lack of diagnostic controls as to what it constitutes (Cooper 2007, personal communication). Uncertainty abounds within the SAPS regarding the beginning and end of spatial boundaries of CAS blocks, resulting in crimes being reported and recorded at police stations outside their jurisdiction. Whereas a CAS block could entail numerous suburbs, it could also be defined as a road or as a railway station. To confuse matters further, a railway station may constitute a CAS block in some regions of South Africa, but in other regions it could constitute part of a greater CAS block containing additional railway lines, parking facilities and other rail amenities (Eloff 2006). When a crime occurs, it could therefore be spatially located in the "wrong" CAS block and would then be aggregated up and reported at the wrong police station level. The result is that at the initial and most integral stage of the GIS process – data collection – there is doubt regarding the accuracy and authenticity of crime data. An independent audit report in 2004 also found that effective record keeping was not always possible within the CAS due to the lack of computers. In one province, for instance, 29 police stations did not have computer equipment (SAPS 2004). Another report of the auditor-general to parliament in 2005, found ineffective monitoring and control of the CAS to the extent that dockets at certain units were assigned to members who had since left the unit, while the status of cases and dockets on hand per investigator was not always reviewed and followed up by the area or provincial offices. In a certain province, for example, the status of 18 407 dockets remained unchanged for more than five months, while a lack of trained staff and controls to safeguard docket-related information, resulted in ineffective docket keeping and an increased risk of dockets being lost or stolen (SAPS 2005). For other technical problems pertaining to CAS, consult Louw (1998).

Other non-spatial problems and practices involving crime data in the South African context are summarised as follows by Schwabe and Schurink (2000):

- The tendency to capture only the most serious offences with less serious crime phenomena not included in the crime statistics
- Inconsistency in the definition of crime phenomena and ambiguous crime definitions
- Ineffective collection of relevant and comprehensive information at the crime scene, including the location where the crime was committed
- Inaccurate capturing and reproduction of crime statistics as a result of poorly trained officials
- Corruption of police officials
- Manipulation of crime statistics through the application of a variety of non-standardised weightings.

Despite these problems, a limited number of studies have been undertaken in the country to examine the spatial-ecological causes of crime-incident locations. These include the study by Gilfillan (1999), who used regression analysis to indicate which socio-economic variables best predicted crime phenomena. The researcher aggregated a number of demographic variables from the 1996 census from an EA level to the police station level and constructed ordinary regression models for over 26 different crime categories, ranging from murder to car hijacking. The researcher found a spatial relationship between the prevalence of poverty, low social status, and deficient social structures and norms in certain parts of the country, leading to an increase in crime across certain crime types. In this instance, GIS not only enabled crime to be put in its geographical context but also allowed for the effective integration of information on different crime types with demographic and other variables. With reference to the methodological issue raised earlier, Gilfillan (1999) did indeed indicate the problems he experienced during the process of aggregating demographic variables from one spatial level into the police station level. The problems experienced were such that some demographics from the census, such as unemployment and related socio-economic indices as well as family structure and cohesive indicators, were not used. More recently, the Centre for Justice and Crime Prevention (CJCP) launched its Crime and Victimisation Mapping Tool² that maps crime trends in different provinces, police districts and towns of the country. Among the findings, the researchers identified hot spots of criminal activity in predominantly rural areas as opposed to major metropolitan areas, as well as a spatial association between high levels of inequality and house robberies and high levels of equality with more social contact crimes. Other ecological studies of crime include Brown (2001) and Blackmore (2003). In all these additional studies, however, a cruder magisterial or provincial unit of analysis is modelled which, as mentioned previously, is less precise than smaller areal units and can therefore give rise to misleading inferences regarding the effects of the characteristics of neighbourhoods in relation to existing crime patterns. Nevertheless, these examples indicate that despite being plagued by methodological constraints, spatial-ecological analyses of crime locations and their correlation with socio-economic and other community conditions are proceeding. While this information may be encouraging to crime researchers in the country, a review of international ecological crime research indicates that much more must be done to match international spatial analytic studies of crime.

Offender locations

In contrast to the spatial-ecological studies of crime-incident locations, there have been no investigations into the unique spatial relationships that underlie the geographic distribution of offenders across areas in South Africa. As a result, both the population and place characteristics of areas affected by high and low rates of offenders are unknown. In fact, data of offenders has never been analysed at any spatial scale in the country, which remains an astonishing fact for a country with such a rampant crime problem. In terms of the formation of an indigenised spatial-ecological theory of crime, the residential environment of the offender is a vital part of the crime equation, relating both to measurable qualities, such as the distance

to crime, and to wider social and economic conditions that produce criminality. There are a number of possible reasons why an investigation into this aspect of criminality in the country has been neglected. Firstly, the methodological issues referred to earlier also hold true for spatial-ecological investigations into offender patterns in the country. Secondly, the sensitivity of the information involved plays a role. Knowing “where offenders live” can potentially lead to the negative labelling of suburbs and the inferences gained from such knowledge could be construed in some parts of the country as blatant racism. Thirdly, in a fledgling democracy like South Africa, which has already suffered socio-spatial segregation in terms of its political history, the profiling and subsequent stereotyping of suburbs as “high risk” or “hot-spots” could echo state policies of years gone by. However, a need exists to transcend the racial stigmatising of offending in the country and refocus towards a spatial appraisal of offenders and distribution patterns. In doing so, policymakers can gain a spatially based perspective of the motivators driving criminal behaviour and integrate that knowledge into current crime reduction initiatives.

A number of non-spatial studies have, however, been conducted in South Africa to gain greater insight into offenders and their behaviour. Local researchers highlight poor socio-economic status (Blackmore 2003), community disorganisation (Pelser & De Kock 2000), the availability of alcohol and drugs (Maree 2003), high unemployment (Brown 2001; Blackmore 2003), family characteristics (Wedge et al 2000), poverty (Maree 2003), racial and economic inequality (Demombynes & Özler 2005) as being general risk factors for offending. When contrasting it with international studies assessing criminogenic risk for offenders, Maree (2003) found that South African research findings do concur with foreign studies regarding the main categories of criminogenic risk factors, although differences were noted regarding the sequencing of the risk factors, with factors present within the family considered more often as risk factors in a local context and environmental and community risk factors also emphasised more. Spatial-ecological studies assessing criminogenic risk for offending are less forthcoming however, and this highlights the need to gain spatially based insight into the ecological motivations behind offenders, particularly if, as Altbeker (2007) suggests, a strategic shift is required in South Africa from managing crime to managing offenders.

Notwithstanding the methodological issues referred to earlier, geo-analytic studies of “where crime occurs” as well as “where offenders live” are both important factors in the formation and development of a spatial-ecological theory of crime in South Africa. It is evident from this synopsis that while a number of studies have been conducted exploring the spatial-ecological determinants of crime, a major shortcoming of research of crime in the country based on geo-analytic factors, is the lack of attention placed on the spatial distribution of offenders. This knowledge, supplemented with an understanding of the spatial-ecological causes of crime, will not only inform crime prevention programmes and policies regarding the ecological factors that influence criminal behaviour, but provide a solid platform from which to develop a spatially based theoretical understanding of crime in general in the country.

Requirement 4: Generate offender/crime profiles of neighbourhoods

Closely aligned with the need to identify the spatial-ecological determinants of crime in the country (Requirement 3), is the need to generate offender/crime profiles of neighbourhoods. An important distinction must be drawn here: Determining the spatial-ecological reasons for crime identifies either those factors that place people at risk of becoming offenders or that place neighbourhoods at risk of becoming crime-incident locations. Generating offender/crime profiles on the other hand takes this process a step further by dividing neighbourhoods into groups based on similarities in terms of the various criminogenic factors identified. Neighbourhoods are clustered on the basis of social similarity, rather than locational proximity (Webber & Longley 2003), with the classification being both mutually exclusive and collectively exhaustive (Harris et al 2005). The resultant profiles can reflect a prioritisation of neighbourhoods that require specific government intervention based on the

characteristics of each “risk category” profiled. In reviewing neighbourhood crime profiles, Chainey & Ratcliffe (2005) differentiate between an offender profile and an offending profile. According to the researchers, the former represents an investigation into a particular crime in order to determine the type of person likely to be a key suspect, while the latter identifies the more general characteristics of those likely to commit crimes. An offending profile can be obtained directly by using information on existing offenders or could be inferred through an ecological examination of the offender’s area of social interaction. The emphasis is subsequently placed on the spatial location of the offender in conjunction with the contextual influences that are exerted on that particular individual.

A number of offender profiles have been compiled in South Africa. Mistry & Dhlamini (2001) profiled perpetrators of farm attacks as young, single, unemployed black South African males between the ages of 15 and 35 from an unstable family background, while Minnaar (2000) concluded that “cop-killers” were most likely to be single, black males in their mid-20s with a low level of education, having had a deprived childhood in a dysfunctional home. Other offender profiles have also been compiled by Wood (2000), Delpont and Vermeulen (2004), and Hennop et al (2001). The offender profiles outlined above, while important in highlighting those demographic risk factors, neglects the geographic context in which they occur. Not all unemployed black South African males commit crime, and it is often within the spatial context of his or her community that these risk factors are accentuated. The tools of spatial econometric modelling, in the form of geodemographic classification systems, are especially well suited to profile what Johnston (2000:52-56) refers to as “communities at risk”.

Geodemographics is posited on the now familiar “First law of Geography”, namely that “everything is related to everything else, but near things are more related than far things” (Tobler 1970). More colloquial expressions would be “birds of a feather, flock together” or “you are where you live” or YAWYL (Sleight 2004). In principle, geodemographics assume that two people who live in the same neighbourhood are more likely to exhibit similar characteristics, and behaviours, than two people chosen at random (Debenham et al 2001). Despite geodemographics having etched out significant research domains in both the disciplines of geography and sociology (Williamson et al 2006), the use of the technology in criminological research is relatively immature (Ashby & Longley 2005). Williamson et al (2006:197) finds it extraordinary that “while the recognition of crime-prone communities has a long history, geodemographic analysis of crime and offender trends is underdeveloped.” A number of exceptions do apply, however, and illustrate the potential of this geo-analytic technique to provide valuable insight into the location of offenders and criminal offences. For example, Ashby (2005) illustrated how victims of crime in the south-west of England were three times more likely than average to come from neighbourhoods classified as *Welfare Borderline* in the MOSAIC UK proprietary geodemographic typology, and that the likelihood of offenders residing in *Municipal Dependency* neighbourhoods is over four times the average rate for all neighbourhoods. Similarly, Williamson et al (2005) found that approximately 70 percent of all youth crime committed in Nottinghamshire over a five-year period was attributed to young offenders residing in only 14 of the 61 different neighbourhood types as classified by the MOSAIC system. Other examples are offered in a number of works such as Ashby (2004), Ashby and Longley (2005), and Williamson et al 2006. Not surprisingly, geodemographics has been used within a crime context in South Africa. Schwabe and Schurink (2000) used geodemographics to create a socio-crime classification of over 1 100 police stations in South Africa. A database consisting of more than 250 census variables and 74 crime variables was created and linked to police station boundaries and entered into an ANN. Kohonen’s Self-Organising Map (SOM) algorithm was subsequently used to cluster the 1 100 police stations into 20 primary socio-crime categories. The 20 categories reflected a prioritisation of police stations that required specific government intervention according to the dominant crime types and socio-demographic characteristics that occurred in each category. The researchers concluded by reporting on the possible use of geodemographic systems to

compile a national or provincial profile of offenders for each crime type in South Africa. They also hypothesised that such a system will not only facilitate “a better understanding of the cultural diversity of the country” (Schwabe 2000:24), but will also provide insight into the social context of crime and highlight the socio-economic causes of offender development. Rose (2004) also speculates on the use of geodemographics to develop offender profiles, much like retailers identify customers and areas of high market potential.

A need thus exists to generate offender/crime profiles of neighbourhoods in South Africa. The ongoing geographic nature of social inequality and deprivation in the country linked with race and ethnicity calls for a closer investigation into this dimension of crime and offending. As criminogenic risk factors may tend to cluster in certain areas, investigations paying closer attention to these clusters rather than single variables are preferable. The advantage of an offender/crime profiling system lies not only in the ability to profile potential offenders and crime locations and thereby improve crime detection rates but, more importantly, to provide a spatial platform from which to develop a spatial-ecological theory of crime in the country. Different social-structural conditions of at-risk neighbourhoods across racial and ethnic divides can additionally be investigated. According to Ericson & Haggerty (1999), policing is changing from the traditional focus on maintaining law and order to a role that is more about detecting and managing risk and communicating that risk to other institutions in society. A central task of governments should be to control these risks that cause public consternation, including that of crime and offending (Giddens 2002). By profiling “communities at risk” (Johnston 2000:52-56), a knowledge-based approach to the problem of crime can be espoused that focuses not only on risk factors pertaining to potential offenders and crime locations, but also more importantly on their incidence as linked to space.

Requirement 5: Gauge the relevancy of international spatial-ecological theories of crime in a local context

A growing body of literature has emerged to empirically test common spatial theories of criminal activity, including the social disorganisation theory (Ouimet 2000; Cahill & Mulligan 2003), routine activities theory (Felson 1997; Smith et al 2000), strain theory (Sharp et al 2001; Froggio & Agnew 2007), and the general theory of crime (Sorenson & Brownfield 1995; Burton (Jr) et al 1999). Despite these criminological theories being predominantly developed in the United States (US), cross-national analyses and testing of so-called “American” theories of crime have taken place in Australia (Braithwaite 1995), the United Kingdom (UK) (McCulloch 2002), Yugoslavia (Separovic 1983), China (Bao et al 2004), the Philippines (Maxwell 2001), Korea (Kang 1983; Moon & Morash 2004), Japan (Fenwick 1996) and South America (Defleur 1970). In each instance, the theory that underlies the prospective “American” approach is tested within a local context to gauge its relevancy and accuracy, with varying degrees of success. In some instances, localised concepts have been blended in with “American” theory to help explain crime and delinquency. For example, in Australia, Braithwaite (1995) incorporated localised shame and reintegration with “western” theory, while Korean criminologist Jin-Kew Shin incorporated concepts from western developed countries in formulating his own “dynamic theory of criminal behaviour” (Kang 1983). Within this context Willis et al (1999) bemoans the lack of attention given to theoretical developments unique to the historical, cultural, and social structural characteristics of lesser-known societies. In South Africa, researchers have for quite a while highlighted the lack of theoretical frameworks for understanding crime in the country (Dixon 2001, Shaw 2002; Ovens 2003; Altbeker 2007), while Ovens (2003) has long advocated for the “Africanising” of existing criminological theory.

Common criminological theories such as the ecological theories have never been practically implemented and assessed locally (Eloff 2006). A cursory review of local criminological research reveals that while “American” theories of crime have often been used to interpret and explain research findings in the country (Schurink 1976; Gilfillan 1999; Schwabe & Schurink

2000; Davis 2001; Weir-Smith 2004), they have never been utilised as a basis to, for instance, inform variable selection for ecological analysis or to provide a clearer specification for the use of one or more statistical model. As Eloff (2006:230) states:

“There is room for improvement in environmental criminology in the South African context, as well as in the integration of specific natural science concepts within criminology to expand the knowledge base of future criminologists to apply new technologies to improved crime prevention strategies and crime analysis.”

As a result the relevance of international ecological theories and their associated concepts of collective efficacy, social cohesion and community fragmentation, among others, within a local context are largely unknown. There is thus a need in South Africa to assess and investigate the applicability of international spatial-ecological theories of crime in order to potentially develop and extend existing theories using local theoretical constructs.

South Africa is a country with unique social, economic, political and environmental features. A history of social inequalities and segregation has ensured that much of the country's population remains divided along social, economic and racial lines, with persisting geographic parallels to these divisions (Van Niekerk 2007). Among the more prominent socio-political factors to have scarred South African society, is the creation of the former homelands and urban townships that were designed and implemented by the former apartheid regime (Schwabe 2000). These townships spatially segregated South African society on the basis of race and the results of this may be spatially incongruent with an “American” theory of crime where, for instance, ethnic heterogeneity plays a significant facilitating role in offender propensity. In addition, the impact of post-apartheid neo-liberalist exclusions, de-industrialisation, affirmative action, moral degeneration, and cultural and political strife on the applicability of “American” theory to the mutating spatial ecology of crime in South Africa is a largely unknown factor.

A test of existing criminological theory is therefore a key requirement, not only in evaluating the ethnocentrism of American criminology, but also in the development of an indigenous spatial-ecological theory of crime in the country. If existing criminological theory is found to accurately account for the spatial distribution of crime phenomena in South Africa then the spatial theory holds true, if not, then as Inverarity et al (1983: 31) notes: “The problem in evaluating a theoretical statement is not one of discovering exceptions, but of imagining alternative theories that explain the phenomenon better.”

CONCLUSION

It is apparent at this juncture that South Africa is in need of an inclusive critical-realistic theory on crime embedded in space and focusing predominantly on offenders. Crime scientists are becoming increasingly aware of the importance of spatial dynamics in empirical research and as a result ecological studies of crime are returning to the forefront of criminological inquiry (Messner & Anselin 2004). Within this context, GIS stands at the vanguard of criminological research, in measurement terms as more data is being collected about aspects of crime than ever before; and in analysis terms as the toolkit of spatial analysis GIS offers allows it to match diverse data sources and accommodate the uncertainties created by scale and aggregation effects (Longley 2005). Indeed, much of the growth in the ecological analysis of crime over the past 25 years has been supported by the development of improved procedures for the analysis of ecological data (Gruenewald et al 2006). The rapid development of GIS technology and the concomitant testing and extension of ecological theories of crime worldwide must not leave South Africa in its wake.

This paper identified a number of key requirements in the development of such a spatial-ecological framework. To satisfy these requirements would not only result in a significantly better theoretical understanding of crime in the country but in a number of important tangible

benefits. From a governmental perspective, a theory inclusive of a spatial-ecological framework of crime and, particularly, offenders, will provide a number of important benefits to the tactical, operational and strategic plans of the SAPS. *In tactical terms*, the intelligence garnered from a spatial-ecological understanding of crime in South Africa can be used to guide operational units to specific locations and individuals linked to criminal activities, potentially leading to the arrest of wanted suspects and suspicious persons. *In operational terms*, the development of a spatial theory of crime in South Africa will inform a number of operational actions that are undertaken by the SAPS. For example, the routes for vehicle and foot patrols could be better delineated; the locations of roadblocks could be better identified; the locations of cordon-and-search and stop-and-search operations could also be better targeted. These operational locations would not necessarily take place where the “most crimes occur” or where the “most offenders live” but where the *risk* of crime occurring or offenders residing is high in accordance with the theory. Lastly, from a *strategic perspective*, government and other role players that are responsible for specifically addressing the long-term solutions to crime can utilise the theory to highlight the root causes of crime and measure ways to address them.

A spatial-ecological theory of crime in South Africa should ideally include aspects pertaining to both the location of crime incidents as well as offenders. The exploratory work on the ecology of crime incidents must, of course, be expanded upon but it is the opinion of the authors that the most pressing need is to launch an investigation into the residential distribution and related geodemographics of offenders. To date no empirical investigations examining the potentially unique spatial-ecological relationships of offenders in South Africa and of its cities in particular have been conducted. The formalisation of a spatial-ecological theory of offender distributions in South African cities will thus be original across the two complementary disciplines of GIS and criminology. In terms of the key requirements referred to in the article, such research would represent the first time that GIS technology has been used to: (1) Measure what effect location has in terms of generating the offender profile of a suspect in South Africa, i.e. the importance of space, (2) determine what spatial-ecological risk factors are associated with high or low levels of criminal behaviour in the country, (3) profile and develop a taxonomic delineation of suburbs assessing risk of offender development, (4) assess the relevance and applicability of international spatial-ecological theories of crime within a local context and finally, (5) develop a spatial-ecological interpretation and framework for understanding crime in the country.

The knowledge garnered from such investigations will necessarily impact on the associated field of criminology in South Africa. Local crime scientists would be able to provide feedback to the dominance and ethnocentric bias of American criminology as well as lay a theoretical foundation for a critical-realistic understanding of crime in the country.

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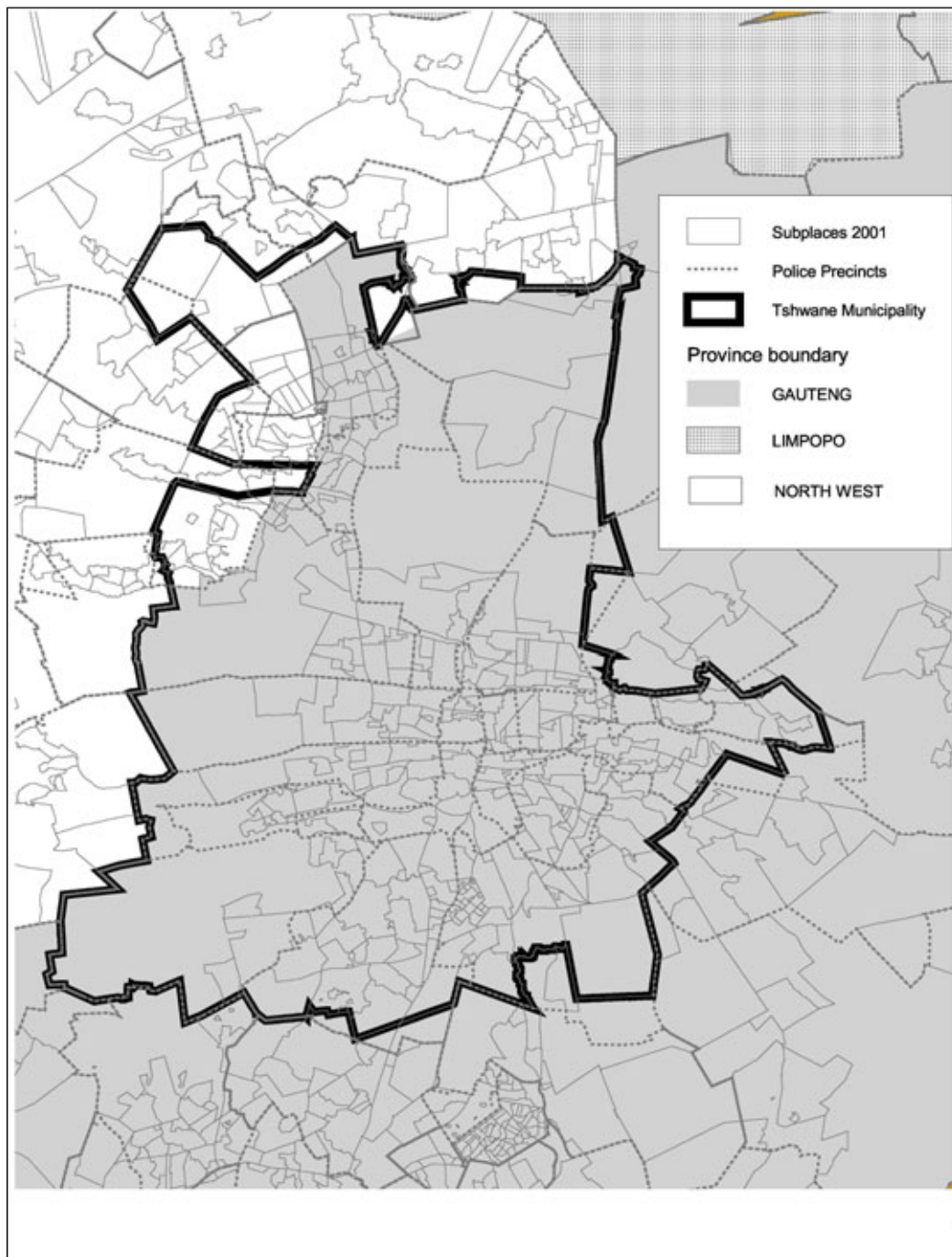
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Appendix A

Figure 1: Misalignment of sub-place boundaries within police station boundaries



Endnotes

¹ Sub-place (SP) level is the next level up from Enumerator Area (EA) and one below the main place in the geographical area hierarchy structure of SSA. It represents the highest spatial resolution at which Census2001 information has been legally provided by the South African government. SSA defines the sub-place level as the combination of all EAs with a population of less than 500 with adjacent EAs within the same sub-place. 21 243 SPs were coded during Census2001, covering the entire country.

² Available at: <http://cjcjcp.poweredbyit.com/intro/mapintro.html>