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SPATIAL ASPECTS OF DELINQUENCY

IN

URBAN BRISBANE

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15th February, 1980

The Chairperson,
Criminology Research
Council,
WODEN. 2600 A.C.T.

Dear Sir,

Your council assisted in the funding of the study on spatial aspects of juvenile delinquency in Urban Brisbane. I am please to report to you finally, some of the results of that investigation.

It was always my intention to provide a descriptive account of the geography of delinquency. This was stated in my application and in my discussion with your research staff. The approach I have adopted is therefore somewhat discursive and does not focus on policy. It is clear that the data and information in the report could inform policy decisions.

The delay in presenting this report has been the result of a combination of factors: size of the data set, failure to anticipate high costs in the initial request for funding and finally my own professional commitments in the area of education.

I should be pleased to answer any questions you might have about the conduct of the study or the results presented in the report.

Yours faithfully,

A handwritten signature in cursive script that reads "V.L. Bartlett".

V.L. Bartlett
Lecturer in Education.

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LIST OF ABBREVIATIONS AND TERMS

JAO	:	Juvenile Aid Office
SA	:	Statistical Area
LGA	:	Local Government Authority
CD	:	Collectors District
DRA	:	Delinquency Residence Area
DOA	:	Delinquency Occurrence Area
UK	:	United Kingdom
US	:	United States

DELINQUENCY OCCURRENCE	:	Location of theft offence
DELINQUENCY RESIDENCE	:	Home address of offender

CHAPTER ONE

INTRODUCTION

INTRODUCTION

This study is about delinquency. It is a study of the spatial distribution of delinquency in a city. The distributions are given meaning through areal and ecological analysis at different scales. The spatial bias observed in patterns of delinquency is described and the various social, demographic and ecological influences thought to be related to these patterns are proposed and discussed.

THE STUDY AREA

The city studied in this investigation is the area delineated by Urban Brisbane which prior to the 1971 census was termed the Brisbane Metropolitan Area. The area of study is therefore within the Brisbane Statistical Division (Figure 1.1). Dormitory shires such as Beaudesert, Albert, Pine Rivers, Caboolture and Moreton were excluded from the investigation. One section of the Moreton shire (Goodna) on the boundary of the study area is included because of its proximity to Urban Brisbane and because of its importance as a delinquency area as revealed in later analysis of results.

At the 1971 census, the population of Urban Brisbane was 700,620: this represented 38.3 percent of the Queensland population and an 18 percent growth rate in the study area in the previous ten years. Some thirteen point five percent of Brisbane's population was in the 13 to 19 year age bracket compared with a Queensland average of 12.8 percent and a national average of 12.5 percent. The geographical distribution of this younger age group was reflected in the age distribution of the sample population in the study. The proportion of older subjects in Brisbane city was quite similar with persons over 60 years constituting 13.4 percent of the

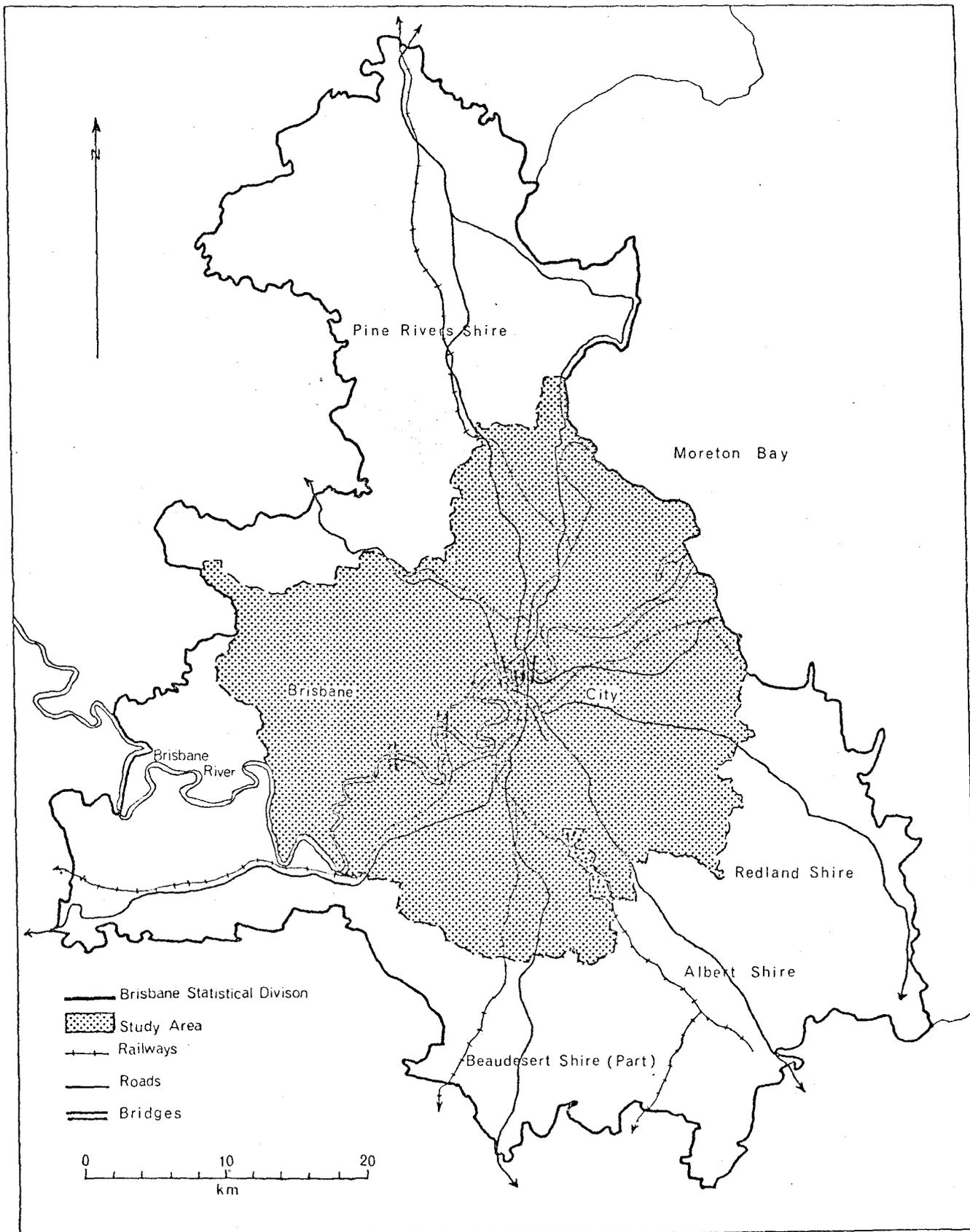


Figure 1.1 : The Study Area



Figure 1.2 : Areal Units of Study in Urban Brisbane

population as compared with 13.2 percent for Queensland and a national proportion of 12.2 percent. The geographical distribution however was markedly different for the two age groups. Greater numbers of youths 13-19 years lived near the northern and southern boundaries and to the east of the city centre. The areas with higher proportions represented recent growth areas. In contrast, distribution of the 60+ age group showed a distinct age gradient with greater numbers distributed from the centre outward¹. The areas approximated the distribution of the oldest areas of built environment in the city.

Greatest relative percent change in total population growth was observed to the west in the study area in Kenmore and The Gap (Figure 1.2). The southeastern areas of Mt. Gravatt, Fruitgrove-Sunnybank and Archerfield showed slightly less increased percent change. The greatest real growth however was observed in the northern parts of the city at Chermside, Stafford, Geebung; in the south-west of the study area at Inala and Coopers Plains and to the south-east in the Holland Park, Mt. Gravatt areas. It is of interest to note that these new growth areas contained many of the housing projects developed by the Queensland Housing Commission. The overall growth rate of 18 percent reflected the continued drift to the capital of Queensland and to the densely populated south-east part of the state even though Queensland as a state, was comparatively decentralised by Australian estimates.

Topographically, the study area is sited in a relatively flat lowland surrounded by hills and ranges which appear to have some effect on residential differentiation. Brisbane is a river city and there is some evidence to suggest that the river acts as an intervening barrier, between the southern and northern sections of the study area². The river could be regarded as a major barrier to communications and communities of interest. There are six bridges

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1. The interpretations are based on McDonald's (1974) study.
 2. There is limited empirical evidence to substantiate this hypothesis although the divisive character of the river has been demonstrated for medical services (van Konkelenberg, 1977).

across the river, four of which are close to the city centre: the close proximity of these four links may reduce the barrier effects of the river at or near the places they are sited. The river itself constitutes a notional boundary for almost all political and administrative functions in the city.

Access and transport links within the area indicate a distinct sectoral pattern (Figure 1.1). Three major routes lead from the city centre to the north (Bruce Highway and the Northern Expressway) to the south-east (Logan Road and South-east Freeway) and to the South-west (Ipswich Road). There are important access routes to bayside suburbs as well as major roads directly west and south. The rail-link system follows the major roads to the north and to the south-west, and the south bound and bayside roads. There is no rail link along the densely populated south-east sector or the lightly populated western area. Within Urban Brisbane, a number of sites are foci for trip patterns³. These include Chermside and Nundah in the north and Indooroopilly - Toowong to the south-west. There is some sectoral bias in the north and south-east because of existing transport routes. The bayside areas of Wynnum and Sandgate and the suburb of Inala in the south-west have a predominantly internal network as might be expected given their physical and to some extent, functional and psychological separation from the rest of Brisbane.

The study area shows some distinct patterns of socioeconomic status. Low socioeconomic status areas are scattered in the outer suburbs and the southern areas (Inala and Coopers Plains). An inner city group of low status areas (Paddington, Spring Hill and South Brisbane) also exists. High socio-economic areas exist in two broad linear patterns in the western sector from Toowong to Kenmore and to the north in the Ascot - Albion Heights area, Aspley and The Gap. To the south-east, sections of Mt. Gravatt are high in socioeconomic status⁴. The scattered pattern of status areas

3. Queensland Main Roads Department information.

4. Observations based on a study by Logan et.al. (1975).

contrasts with the zonal pattern of dwelling types⁵. Low scores on dwelling type are found in areas around the city centre, the bayside suburbs of Wynnum and Sandgate, Wacol-Darra area and parts of Ascot. Suburbs with high scores on dwelling type are observed in the middle and outer suburbs, especially at Stafford, Chermside, The Gap, Kenmore, Camp Hill and Mt. Gravatt. Flats and boardinghouses with associated demographic characteristics are generally not found in these areas.

Although the percentage of foreign-born persons is relatively low in Urban Brisbane compared to other major capital cities in Australia, there are concentrations of ethnic groups in the city. Persons of southern-European origin aggregate in areas near the city centre. Eastern-European born Australians tend to record high percentage of numbers in city centre areas on the south bank of the river and to the south-west. Persons with Western-European backgrounds tend to group in the boundary areas to the south, south-east and south-west. The presence of a migrant hostel probably distorts this pattern since this hostel is intended as a temporary residence.

Urban Brisbane displays therefore social, demographic and geographic divisions, of the kind found in other Australian cities. Brisbane's role as the principal economic and political centre of Queensland identifies it as a place of importance. Its growth rate suggests that as in other large metropolitan cities, crime and delinquency will become an increasingly difficult problem to control.

THE SOCIO-LEGAL SYSTEM

In the study area, agencies which deal with the problem of delinquency and which can bring juveniles to the notice of public authorities (government constituted or controlled) are three in

5. Observations based on study by McDonald et.al.(1974). Dwelling type is defined by characteristics of dwellings and demographic characteristics associated with dwellings; high scores on dwelling are associated with owner-occupied single family dwellings and high percentage of 5-15 year olds; low scores are characterised by many flats, multi-unit dwellings and shared facilities.

number: the Department of Childrens Services, a government section within the Tourism, Community and Welfare portfolio⁶; the Police Department with its own special unit for juvenile law enforcement, the Education Liaison Unit⁷; and the Juvenile Aid Office (JAO) staffed by police personnel but guided by a policy emphasising prevention and counselling of offenders.

Several courses of action can be taken in treating delinquents. Juveniles can be admitted to the 'care and protection' of the Children's Services Department by a court order or on voluntary application by a parent, guardian, relative of the child or a person of good repute. Admission to care by Children's Services does not require court procedures. The welfare agency can follow a number of courses of action including institutionalisation of the juvenile, placement with foster parents, accommodation in a family group, home or hostel etc. The agency oversees all aspects of the child's welfare through its child-care officers. Treatment is principally reactive, that is, it occurs after the detection and report of the offender.

A second course of action in the treatment of delinquents begins with detection by or reporting to the Police Department. Police personnel are required to commit the offender to a Children's Court either on the basis of their own judgement or at the insistence of the victim. At the time of this study, many police officers referred 'less serious' cases to the JAO⁸. Treatment again is principally reactive and may be punitive.

The Juvenile Aid Office is the third agency to control problems of delinquency. This institution was established in 1963,

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5. Since changed after the period of data collection with Tourism being created as a separate portfolio.
 7. Recently disbanded with a change of Police Administration.
 8. From 1973 this practice ceased by order of the then Commissioner of Police. At this time the JAO manned by police officers came under the administration of Health, Welfare and Sport Department. This action is discussed in the section on problems with data.

to place *potential* delinquents on the right path and *prevent* them from incurring a connection which would be a permanent blot on their character⁹.

This policy of liaison and co-operation suggests a proactive treatment of juveniles. The office's (or Bureau's) staff consist entirely of police officers, who counsel and supervise delinquents. Offenders may be (a) brought before the Children's Court after which a number of actions are possible: The offender is usually placed under the supervision of the Welfare Department and Children's Services section or committed or (b) supervised (after parental co-operation is guaranteed) by the office's personnel for a time determined by the officer-in-charge. The range of offences dealt with by the JAO may be seen in Table 1.1. Further observations from this table suggests that the predominant type of offence is theft and that many offences brought to the JAO's attention, are the type referred to by Sellin and Wolfgang (1964) as 'consensual offences' (that is, lawful but against public order such as likely to fall into life of crime, neglected child etc.). The percentage of offences treated by the JAO and brought before the Children's Court is difficult to establish. At the time of data collection, it was estimated to be 15 - 20 percent of all court cases¹⁰.

This brief overview of treatment of delinquents in the study area is necessary not only for understanding problems with data discussed in chapter three but to demonstrate the concern of sections of society (at least) with the problem of delinquency. Although gross figures are apt to be misleading and although the figures cited here are certainly influenced by a change in policy¹¹ of treatment of juveniles, never-the-less the number of charges preferred in Queensland Children's Courts increased by 162.5 percent from 1971 to 1973¹². This apparent increase expresses the concern by Australians

9. Lewis, T., 1969. Italics are the researcher's.

10. Personal communication JAO staff

11. The reference to the establishment and policy of the Police Department's Education Liaison Unit.

12. In 1971, 2962 cases were preferred: by 1973 this had risen to 7714.

TABLE 1.1: NUMBER OF MALE CHILDREN UNDER SUPERVISION OF THE JUVENILE AID OFFICE FOR VARIOUS OFFENCE TYPES, 1970-1974.

Class of Offence	1970	1971	1972*	1973 ⁺	1974
Attempted suicide			3		
Assault	19	22	7		4
Associating with undesirables	39	44	20		5
Breaking and entering	82	124	59	4	20
Child seeking guidance	1				
Delinquent prone	24	35	150	32	58
Discharging concealable firearm					1
Drinking liquor at school					3
Drug offences	7	10	8		6
Drunk in a public place					4
Exposed to moral danger				5	9
Extortion			1	2	
False pretences	9	11	3	1	5
Habitual truant	254	335	104	55	105
Likely to lapse into a career of vice/crime	34	41	2		
Neglected child	17	17	10	1	4
Obscene Language					4
Obscene Literature	7	8	6		1
Obscene telephone calls	9	9		1	1
Receiving stolen property	15	26	36	3	26
Refusing to work	5	7	2	1	1
Running away from home	27	41	72	5	26
Sexual promiscuity	83	98	67	12	15
Stealing	924	1326	1423	222	1455
Uncontrollable	215	260	97	25	111
Unlawful use of motor vehicle	3	4	4		2
Unlicensed driver			2		2
Wilful damage to property	22	44	15	2	12
Wilful exposure	4	6	4	3	3

* Total male and female offenders

+ Six months period only 1.1.73 - 30.6.73

generally about the importance of delinquency and crime as a problem in Society. (Congalton and Najman, 1973).

ORGANIZATION OF THE STUDY

Chapter one has provided a brief overview of the characteristics of the study area and how juvenile delinquency is treated legally in Urban Brisbane. In chapter two, approaches to the study of delinquency are outlined primarily through an historical perspective. The chapter also contains a discussion of the meaning of crime and delinquency and patterns of delinquency occurrence and residence. A broad conceptual framework is presented and important problems with data and data collection are discussed. Data sampling and coding procedures are provided and the objectives of the study are stated.

Chapter four and five contain an areal analysis of delinquency in Urban Brisbane. Chapter four begins with a broad description of the distribution of delinquency and of trends in the data which suggest directions for analysis. The chapter describes the characteristics of the offender sample and attempts to analyse these data to draw attention to problems inherent in crime data generally and in the data collected in this study. Chapter five provides an areal analysis of the form of delinquency with the highest incidence, shoplifting; centrographic techniques are used in the quantitative description of spatial bias aspects of offence.

Chapter six presents an ecological analysis of delinquency in Urban Brisbane. Principal social, demographic and environmental variables are identified and these are related to rates for different offence categories. The study concludes with a summary and recommendations for further research.

CHAPTER TWO

APPROACHES TO THE GEOGRAPHICAL STUDY OF DELINQUENCY

INTRODUCTION

Approaches to the study of crime and delinquency are perhaps better understood from an historical perspective. The singular tradition of research reported in criminological literature may be labelled the 'ecological' tradition. It is into this genre of research that geographers have entered; they have built upon a tradition which, as Baldwin (1975) correctly asserts, has been more concerned with spatial factors rather than with ecological qualities interpreted in a true biological sense. Many geographical studies have attempted to add a new dimension to the spatial analysis of delinquency within the mainstream of criminological research. This chapter reviews the development of knowledge about crime and delinquency and describes the more recent advent of geographical studies in this field.

THE BEGINNING

The earliest studies of delinquency focussed on cartographic representation of incidence of delinquency in different regions or areas (Phillips, 1972). This tradition represented the earliest studies in criminology and was to be the forerunner of the Lombrosian school and its emphasis on genetic heritage. The latter school of thought was soon displaced by the Chicago school of human ecology.

The intraurban ecological analysis of delinquency later developed from the Chicago school of human ecology. Within this tradition many studies of a sociological nature were stimulated by the seminal works of Burgess and McKenzie (U.S.) and Burt (U.K.) and in particular Shaw's 1929 and 1942 studies of delinquency patterns in Chicago. The last two mentioned studies established the existence of delinquency gradients; a high incidence of delinquency was found in socially disorganized areas particularly the central areas, with decreasing incidence outwards from the centre of urban zones. The aim of these studies and numerous ones to follow, was to demonstrate a correlation between social and economic determinants and delinquency distribution. The latter was associated with such variables as ethnicity (negro or foreign born groups), population change and

numerous factors which manifested social disorganization.

The social ecological school (Georges, 1978) and its stress on relationships or association has provided the foundation studies for geographical approach to delinquency (Figure 2.1). The emphasis on spatial aspects of delinquency already existed in the social ecological school whose use of spatial concepts was confined principally to the relationship between social organization and the physical spatial expression of a given delinquent act. (The social organization of the delinquent act in itself is the particular interest of the criminologist). The uniqueness of the geographer's methodology or perspective is expressed by Georges (1978):

its focus (is) on the spatial expression of the delinquent or criminal act and the possible diffusion of similar acts or social organizational factors which enables the spatial manifestation of the act to occur in a given locale (p. 4)

This focus therefore requires the *identification* and *analysis* of factors that result in a particular spatial expression of abnormally high frequency occurrence of delinquent acts. The method of identification and analysis however may be quite different as can be seen in Figure 2.1.

Two traditions of geographical research may be identified according to country of origin although the differences between these two mainstreams of British and American research are becoming more tenuous. UK research has focussed on areal studies (which are also called ecological studies). These area studies may include the description of spatial manifestations of delinquency as *incidental* to the main thrust of research; which may be sociological or criminological in emphasis; as *ends* in themselves that is as a basis for prediction or planning; or as a *means* of evoking directions for further research by suggesting hypotheses

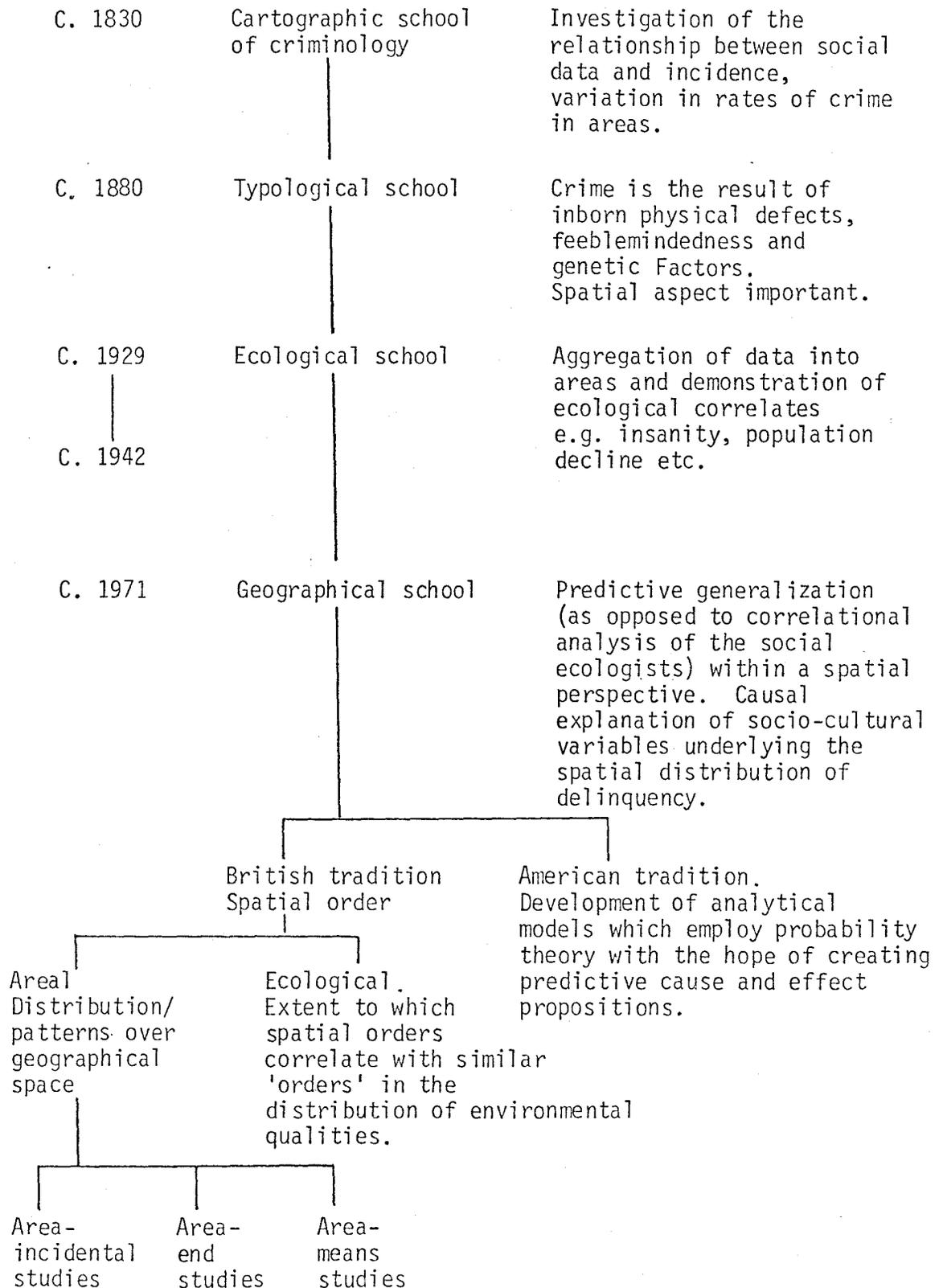


FIGURE 2.1: Historical Approaches to the Study of Crime and Delinquency (Sources: various).

to be tested and questions to be answered¹. The plotting of delinquency rates or locations leads to the identification of ordered patterns which are then interpreted in the three ways indicated. When these spatial orders are correlated with similar 'orders' in distribution of social and demographic qualities, the analysis is described as ecological (Johnston, 1976).

The ecological tradition characteristic of US research in the geographical study of delinquency, emphasises predictive generalization within a spatial perspective using theoretical models whose only support more often than not is a complex statistical technique (Scott, 1972). The fallibility of this tradition is emphasised by some investigations (Baldwin, 1975; Robinson, 1950). Ecological studies rely heavily on official statistics, a procedure which results in problems with data processing and interpretation. These problems are reviewed more comprehensively in chapters three and four with specific reference to the data used in this study; three principal limitations are briefly reviewed here. Firstly, ecological research relies on the use of area units (census areas, council areas etc.) a procedure which provides difficulties in interpretation. Robinson's "ecological fallacy" is one danger in this form of analysis where the areal or ecological correlation is attributed to the properties of individuals who reside in the area. A second problem deals with the *meaning* to be attached to measures derived from official statistics. Thirdly, the term ecological has changed in its meaning and requires careful definition if any credence is to be placed on its usefulness.

-
1. Robson (1969) notes that the difference between British and American research is due to the presence of "difficult" council housing estate areas in Britain as opposed to slum areas in the U.S. The former has resulted in residential differentiation which defies analysis using urban concentric ring type theories. A second suggestion by Baldwin (1975) emphasises the greater availability of data in the U.S. hence the greater possibility for complex statistical analysis. The suggestions maybe peripheral and the real reasons may well lie in the paradigmatic perspectives of British and American researchers.

The meaning of 'ecological' is discussed in chapter seven.

However, one of the real problems that has been compounded in geographical and criminological research into crime and delinquency is the definition of these two latter terms.

CRIME AND DELINQUENCY

Behavioural research in geography has led to a more acute awareness of the problems with data; but there are also problems of definition. The distinction between crime and delinquency for example, is necessary if certain types of offence - loitering, running away from home etc., are to be included in the more generic term, crime. The latter is generally defined as an intentional act, a violation or omission against the law and deemed by the socio-legal system to be a felony or misdemeanor (Tappan, 1960).

A number of distinctions may be drawn between the notion of crime and the concept of delinquency. The first is based upon the age of the offender. At the time of commencement of data collection for this study, the official age range for a delinquent was seven to seventeen years. In 1976, the official age range was altered from seven to ten years in keeping with recognized limits in other countries². A second distinction reflects more serious problems and implications for data collection namely, which categories of offence are to be included in official records. Criminal records including court records on juveniles, include offence categories which are contraventions of the laws officially defined within the socio-legal system. Many acts generally regarded as unacceptable behaviour are not defined within the criminal code. These behaviours however, are often the principal forms of offence committed by younger people defined according to age as delinquent. The term delinquent therefore refers to vague and subjective forms of behaviour, incorrigibility, loitering, uncontrollable, but also to more specific forms of behaviour, shop lifting, assault etc. (Wilson, 1975).

2. This fact had no effect on data recording by the JAO or on data collection in the study since all offences for all ages (seven to seventeen) were recorded in the JAO files. Criminal Code Amendment Act No. 25, 1976.

A third distinction related to the above is the degree of seriousness in acts of crime and acts of delinquency. Both types of act may be similar or identical or within the distribution of moral acts ranging from the morally unacceptable end of the scale to the morally tolerated (Wilkins, 1968). Certain delinquent acts may be defined as crime in a culture's criminal code. But they may not be enforced similarly by different agencies. What is criminally wrong may be delinquent but may not be subjected to law enforcement even though the law remains in the statute books. Generally the consensus of a society about acceptable levels of behaviour varies according to the age of the offender *before* the officially defined age of responsibility (in Queensland, seventeen years). Recorded acts of delinquency are therefore influenced by the perceived seriousness of offence, the cultural interpretations of the law and the acceptable levels of behaviour at particular times of offence. This distinction creates data problems with court records of delinquency. In this study, all offences brought to the notice of, or detected by the JAO, were recorded and included in the study sample population. This creates some problems as will be observed but the procedure produces distinct advantages when compared to the bias produced by data selectivity in court records.

Finally the problem of definition of delinquency has been compounded by the theoretical definitions and labels identified with the term. Braithwaite (1977) indicates that delinquency may be defined:

- 1) as a *biological* type with the offenders displaying physical differences or abnormalities. This definition has no relevance in this study;
- 2) as a *socially disadvantaged* youth, for example, coloured or poor. While social characteristics and correlates are investigated in the study, the offenders in the sample are not *defined* by their social status or other characteristics;
- 3) as a *stereotype*, that is, the study of individuals or groups apparently delinquent to the investigator.

This latter definition was adopted in the present investigation because,

- i. it is easily understood and interpreted by policy makers

- researchers and laymen;
- ii. it is an attribute conferred upon forms of behaviour by the JAO, in this instance the principal external authority dealing with delinquency in the study area;
 - iii. there are no alternative definitions proposed by radical or traditional geographers or criminologists;
 - iv. the definition best fits the data since seriousness of offence was not considered (except for the distinction between petty and grand theft in relation to shoplifting and stealing) in the analysis of data. The kinds of offence were typed into identifiable categories, distinctions between which could easily be observed. All offenders of both legally defined crime and acts of unacceptable behaviour who were recorded in the files of the JAO were considered in the sampling procedure in the present investigation.

Hence the definition of delinquency used here refers to normative rules for behaviour or "conduct norms" (Cohen, 1967) which in some ways have been infringed. The rules in this instance relate to those offences identified by the JAO, offences which include transgressions against societal laws *and* other forms of identifiable delinquent behaviour.

A final but critical theoretical distinction must be made between delinquency occurrence, the place where the offence occurs and delinquency residence, the place where the offender lives.

PATTERNS OF DELINQUENCY OCCURRENCE AND RESIDENCE³

Several major studies of crime occurrence have demonstrated the spatial and distributional qualities of various types of offence.

-
3. The term *delinquency occurrence* has limited use in this study although in the analysis of theft offence (chapter four) the seven 'theft centres' form a pattern of delinquency occurrence. The use of the term *delinquency residence* is finding wider acceptance in geographical literature (Herbert, 1975a, 1976b, 1977) and is the term adopted in this study to indicate distribution of home addresses of delinquents.

Most of the research on crime occurrence however has been for populations of adult offenders; undoubtedly because police records have greater reliability about the place of offence compared with the residence of the offender. Occurrence patterns can be analysed in terms of opportunities and access: where high numbers of centres offering access or opportunities are recorded, delinquency prone environments may occur (Boggs, 1965). But there is little reason *not* to maintain the distinction between patterns of occurrence (the offence population) and patterns of delinquency residence (the offender population). Delinquency areas may best be regarded as clusters of both offences and offenders (Schmid, 1960) but initial analysis ought to keep both distributions separate. This does not preclude the need to relate the home of the offender and the place where he offends if the data warrants such an analysis. For certain types of offence for example, shoplifting, this may be a necessary condition for understanding distributions of delinquency residence. This is demonstrated in chapter five.

Studies in the literature which examine the relationship between location of offence and the location of the offender's residence emphasise spatial interaction and accessibility between delinquent prone and delinquent producing environments. Haring (1972) found that the average distance travelled to offence from the offender's residence varied with offence type. Ley and Cybriwsky (1974) examined travel patterns between residence and offence. There appears to be a need for studies on the spatial coincidence of residence and offence occurrence and for a closer examination of the links between offender and offence at least for certain types of offence.

Delinquency residence studies emphasize spatial qualities related to social environments which may be delinquency producing-or-conditioning. Herbert (1976) proposes that

delinquency as a concept is better understood in the context of residence of offenders; delinquency areas are identified through spatial concentrations of residence and the hypothesis must be that the

individual in these areas is more likely to turn to delinquent behaviour than in other areas.

No mention has been made of Australian research into spatial aspects of delinquency. While there have been studies of social deviance (Vinson and Marshall, 1976) and sociological studies of delinquency (Braithwaite, 1977; Wilson, 1977) little to no geographical research has been attempted. Recent research by Vinsen and Homel (1975) has found some relationship between the incidence of medical - social deprivation and juvenile delinquency in areas within the city of Newcastle. Scott (1965) investigated the incidence of probationers and broken homes in Hobart and provided an excellent review of delinquency studies (Scott, 1972). The few Australian based studies that have been published have been in the genre of British areal-incident studies by non-geographers.

SUMMARY

The majority of delinquency studies have focussed on delinquency residence with the ecological tradition of criminological research. Geographers have recently entered this field of study attempting to add a new dimension to the spatial analysis of delinquency. These analyses have been areal or ecological and have differed according to the country where the research has been conducted. Studies relating to specific research foci within the present investigation are cited at the beginning of analyses in each chapter. The next chapter outlines a broad conceptual framework and the type of analysis used.

CHAPTER THREE

THEORETICAL DISCUSSION AND METHODOLOGY

INTRODUCTION

Theoretical perspectives about the geographical study of delinquency have ranged from the long established positivist tradition to a phenomenological perspective (Guelke, 1974). The former is represented by the 'ecological' school described in the previous chapter: geographers have continued to work within this theoretical orientation. Others however, have advocated an alternative perspective. These include Harvey's (1973) approach and Peets' (1976; 1977) contention that problems of crime and delinquency ought to relate to social problems, to the system of material production and to the origin of class struggles rooted in such systems.

CONCEPTUAL FRAMEWORK FOR THE STUDY

The broad conceptual schema for this study (Figure 3.1) draws largely upon the work of Herbert (1977) and the studies of Gray (1975), Rex (1968) and Pahl (1975).

Gray (1975) following the lead given by Harvey and 'radical' geographers, has emphasised the need to investigate the allocation of resources; the *allocative processes* are the origins of inequality in urban areas. Inequalities may be so pronounced that some areas may be called deprived. Deprivation (Herbert, 1975) may be associated with the *socio-legal system* which may attempt to prevent, control or exaggerate aspects of deprivation by formulating specific resource allocation policies. In the study of delinquency in Brisbane, this socio-legal system is represented principally by three government welfare and police enforcement agencies¹. Both the allocation of resources process and the socio-legal system may influence a 'cycle of poverty' in deprived areas. The 'cycle of poverty' produces disadvantages from which it is difficult to escape and which gradually characterise an area over time. Herbert

1. The policies of these agencies may in fact be responsible in part for the phenomena of delinquency areas since the policies vary as indicated in chapter one and in the next section. Different policies are reflected in official data bias.

(1977) elaborates the cycle with its disadvantages and suggests how it operates in two forms of deprived environments. The *built environment* describes the quality of buildings which include owner occupied dwellings, rented flats, council and housing commission establishments etc. in various states of physical condition. A poor built environment could produce disadvantages which create conditions for delinquency in that environment either as the place of occurrence or as the place of residence of offenders.

A second form of environmental context is the *social environment*. This includes the *impersonal social* environment and the *personal social* environment. The latter refers to the attitudes and values underlying the delinquent's use of his personal space. Investigation of this context would require a behavioural approach which is not the focus of interest in this study. The emphasis is on the *impersonal social* (and *built*) environment which is identified by variables such as demographic structure, social status, and ethnicity of groups living in this kind of context. How these characteristics and influences in the *built* and *impersonal social* manifest themselves spatially is a complex question: yet they are thought to contribute to the cycle of poverty and the ecology of delinquency areas. Whether the manifestation involves a conditioning or reinforcement process, that is, areas gain a reputation for delinquency over time because of or aided by deprivation qualities, or whether these qualities cause delinquency areas, is a matter for theoretical debate. Theories of social disorganization for example, could be measured by ethnicity, small households and shared dwellings, variables which influence the cycle of poverty and the manifestation of delinquency in an area. The problem of how areas become delinquent is made more complex when it is observed that some areas are transient and anomic while others are stable despite the fact that the code of social ethics of its residents includes the sanctioning of illegal activities.

The purpose of this study of delinquency in Brisbane is to describe the *environmental context and conditions* under which delinquent behaviour occurs. The description will focus on

particular forms of offence such as shoplifting, and the spatial bias aspects of movement patterns of offenders and distribution of delinquency residence. Other sections of the study will emphasise deprivation in the *built* and *impersonal* environment and the description will be via an ecological approach.

METHODOLOGICAL PROCEDURES

The spatial expression of delinquency can be studied at two levels of analysis described as areal and ecological (Figure 3.1). The former type of analysis is characterised by descriptive analysis: distributions of delinquency are plotted and distinctive aggregate qualities and spatial variations are described. Mapping of data at a variety of scales shows ordered patterns with clear clusters of incidence rates in specific areas in cities.

The research methodology in this study employs cartographic and descriptive techniques complemented by centrographic methods.² The latter procedure provides quantitative statements about the morphology of static delinquency distributions. The analysis may be extended to the patterns of movement of delinquents between place of offence and place of residence. This dynamic interaction between individual locations may be studied in an absolute sense or a perceived sense. The latter involves a behavioural emphasis: the former approach assumes that constraints are placed on delinquent behaviour or distributions by space and distance and that the spatial structure of the city influences the mobility of juveniles. If spatial bias aspects are analysed and related descriptively to environmental conditions in the city, it may be possible to understand better the behaviour of delinquents. *Areal and spatial analysis* in the study consists of broad descriptions of patterns of delinquency residence and occurrence (chapter four) and investigations of spatial bias aspects of a particular form of offence (chapter).

2. Centrographic analysis or centrography uses descriptive statistics for measuring central tendency and dispersion in areal distributions.

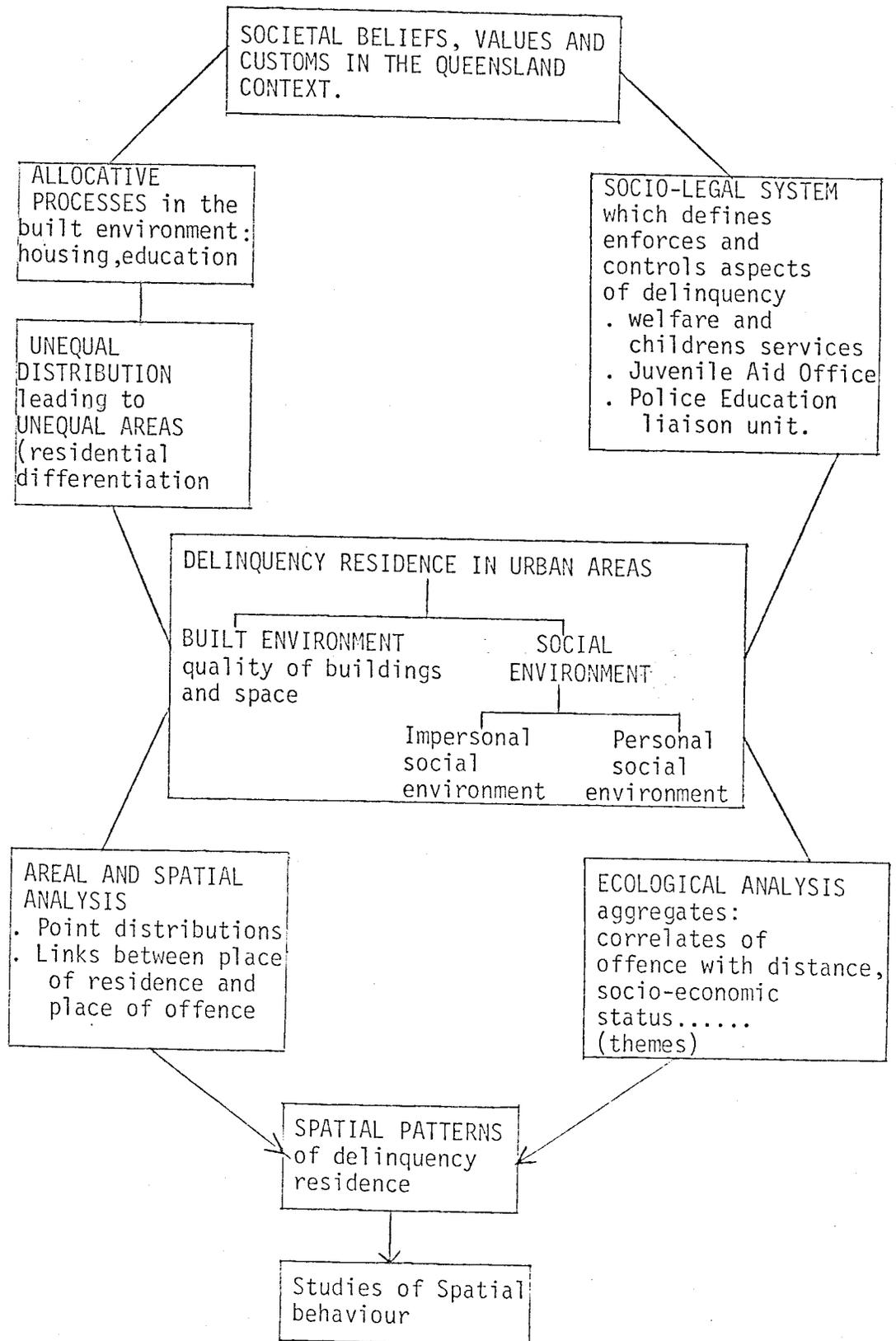


Figure 3.1 : Conceptual Schema for the Study of Delinquency (adapted from Herbert, 1977).

The *ecological analysis* in the study rests on the assumption that spatial differences between defined areas affect behaviour in a number of ways; for example, the type of housing, government housing, flats, high rise buildings etc. in areas, could affect the freedom of juveniles in as much as it indirectly influences adult supervision. Spatial order (Johnson, 1976) may be observed in the distribution of social and demographic qualities and these 'orders' may be correlated with 'order' in patterns of delinquency residence. The examination of the extent of correlation between this spatial order of delinquency residence with similar 'orders' in the distribution of environmental qualities is called ecological analysis. In this study therefore *areal* analysis precedes and is accompanied by *ecological* analysis. The conceptual framework for the study does not rely on a fully articulated theory of delinquency since there is none. The methodology used, relies on the plotting of distributions of offender rates for different types of offence: the procedure of areal analysis and examination of data related to the offender sample ought to provide a source of questions or propositions for theoretical explanation. Two scales of analysis are used therefore as a means to an end; to describe delinquency residence and to derive research questions and propositions for further testing. From this beginning, further understanding of delinquency is attempted by correlational analysis.³ The conceptual framework requires an eclectic approach rather than a carefully conceived set of hypotheses supported by a theoretical model of analysis. This approach to the study of social issues such as delinquency is evident in the research literature (Johnston, 1979).

The ecological analysis approach requires a commitment to correlational and descriptive analysis techniques. Many ecological studies of crime and delinquency have used more sophisticated factor analytic techniques (Lander, 1954; Bordera, 1958; Chilton, 1964; Schmid, 1960; Giggs, 1970; Herbert, 1976). The procedure of

3. Theoretical concepts are used in a speculative way to test propositions or hypotheses leading to generalized statements. The result is a set of empirical observations with a high degree of generality rather than theory as such (Glaser & Strauss, 1968).

aggregating data sets from two sources⁴ and analysing these as one set is of doubtful validity; problems of use of these techniques are compounded by meaningless interpretation of factor structures. This is evident in Schmid's (1960) study in which the variables in the factor dimension have very little conceptual relevance. Other studies of crime and delinquency have used or advocated the use of canonical correlation (Pyle, 1974; Gittus and Stephens, 1973; Corsi and Harvey, 1975; Herbert, 1977). The aim has been to relate the pattern of delinquency rates and poor social environments. Again in many of these investigations the canonical factor structure is difficult to interpret.

Regression analysis techniques are used in this study for several reasons. Firstly, regression techniques keep the dependent variable (in this instance delinquency rates), in the forefront of analysis. The problems of multicollinearity or existence of interrelationships among independent variables can be reduced by careful control of the variables used in the analysis. Aggregated data can be used more carefully therefore and the hazards of 'ecological fallacy' minimised. Secondly, difficulties of interpretation of factor structures observed in factor and canonical analysis are absent. Thirdly, regression analysis allows the explicit use of theoretical insight. Lastly, this control over variables in the analysis is necessary because of the exploratory character of the study and the desire to reduce error in using aggregated data. In using regression in this phase of the study, single indices or measures of social variables were correlated with measures of delinquency. The use of dimensions or factors as independent variables was considered to have similar problems to the statistical or factorial procedures described above.

4. Census data and delinquency data usually collected from office records.

PROBLEMS OF DATA AND DATA COLLECTION

Problems of data derive in part from theoretical considerations such as the distinction between crime and delinquency discussed in a previous section and in part from the nature of the data. In this study, data were obtained from the official records of the Juvenile Aid Bureau, the Australian Government Census and to a limited extent the observations of the author.

The deficiencies and possible biases in official data sources are well documented (Hindess, 1973; Galliken and McCartney, 1977; Reid, 1976; Quinney, 1975). All sources suffer the shortcoming of scale; that is, the knowledge of precise locations; the primary data collected from JAO records however enabled point locations to be established for the place of offence and for the residence of the offender. The data therefore offered the opportunity to undertake macro and micro scale analyses and suggested in fact that both scales ought to be used in the methodology adopted in the study. A further deficiency of most official records is that sources tend to be inaccurate and poorly recorded by a variety of government and local control agencies. Two of the three possible sources of data for this study were subject to this kind of distortion. Court records, where available, were the product of several "filters" such as the activities of the Children's Services Department and the JAO and direct prosecution by police. The Education Liaison Department, a special branch of the Police Department was established in 1973 principally to increase police detection rates.⁵ All offenders irrespective of the gravity of the offence were prosecuted in the Children's Court; little social and ecological data were recorded and the data in any case were strictly unavailable.

5. Two police agencies therefore existed; one to prosecute juveniles where possible and the other to rehabilitate offenders before and after the offence. The official Police Dept. policy was stated in a memorandum by the Commissioner of Police, Mr. R. Whitrod that police were to "take appropriate action" if the specific offence was within "the ambit of the law", that is to charge all offenders where possible, irrespective of the gravity or nature of offence. The political disruption which followed resulted in the transfer of the JAO (staffed by police) to the Welfare portfolio under Mr. J.D. Herbert.

JAO data were recorded on a form used by all personnel. Social and demographic data relating to individual offenders were available although it was necessary to aggregate this information for adequate description of offence types and categories. Data which relied on subjective assessment by Bureau staff, for example, attitudinal data, were sampled but used only for description of the population sample. The characteristics of the data set are revealed more thoroughly in Chapter Four which attempts to describe the nature of the sample and how the biases in official data indicated below influence the validity of the data.

Two principal deficiencies are recognized in officially recorded data, technical deficiencies (Walker, 1971), and social deficiencies (Wilis, 1971). These criticisms are acknowledged. Those deficiencies which most affect this study are briefly reviewed here. Problems begin with the question of 'counting' rules. If a juvenile steals four articles in one place at one time, is this counted as four offences or one offence? Since delinquency residence was the principal sample sought for this investigation, the number of offences were ignored if they could not be discriminated by time and place of occurrence, and offence type. When juveniles committed similar offences in different places on the same day, the number of offences equalled the number of places of offence occurrence. The low incidence of recidivism (repeated offences by an individual) meant that many problems of 'counting' did not have to be solved. The only real problem of counting presented itself when offenders stole in company. While this was unexpectedly low in incidence it required consistency in sampling procedure. With individuals who offended in company, the JAO files generally recorded the principal offender in the group. One offence occurrence was sampled. If the offence was considered serious, for example, stealing of goods to the value of \$100 or more, the residences of offending individuals were recorded and the incident counted as several cases. In reality decisions about this kind of counting were required on only three occasions. A second problem relates to offence

detection. According to McClintock and Avison (1968) crime detection rates vary with type of offence but on average are not much above forty percent.⁶ Detection by the JAO relied on a wide range of sources (Chapter Four) and it is this fact together with the desire of these sources to implement JAO policy⁷ and to report detected offences that reasonable confidence may be placed on the validity of the JAO data. For example, while not all commercial stores reported detected offences, all the major retailers in the city centre and in larger regional centres reported all detected shoplifting. The security within stores was another source of bias which remains unmeasured.⁸ Many stores employed former police personnel as security officers. Deficiencies in recording of data useful to the current study, such as lack of specification of the type of house in break and enter cases, failure by the investigation to record the number of articles stolen in one place at one time, might also be observed. Despite these deficiencies, there is wide scope in the JAO data which represents more than indictable offences characteristic of court records. How *representative* JAO recorded offences are of all offences and how representative detected offenders are of all offenders can only be found by comparative analysis with other sources and by self report and victims studies. There is reason to believe that the recorded data are not only representative of the nature of the JAO but also representative of the nature of offence of juveniles. The fact that approximately twenty percent of offences recorded in Children's Court records are referred by the JAO reflects the JAO's policy of prevention, rehabilitation and unwillingness to prosecute on the first offence. The fact that these, as well as

6. Although Annual Reports of the Police Department claim high 'clean up' and detection rates, the figure is probably as low as 40 percent for detection of *criminal* activity.

7. An unpublished survey (1976) by the JAO suggests high confidence in JAO policy by sources and near 100 percent report of all cases detected.

8. Some research has been conducted on influences which bias detection rates. Mays (1963) argues that official records are biased against workless people.

all other offences recorded in JAO files, offences which may be recorded as indictable by other agencies (certainly by the police department's Education Unit) for a period of this study were included in the sampling procedures in this study, suggests that there is a reasonably high level of representativeness. The problem of representativeness of data with official statistics is stated well by Walker and Bottoms (1974);

Criminal statistics sometimes do reflect real distributions, but these can never be ascertained by the statistics themselves.

Official statistics therefore provide an important starting point in geographical studies of delinquency (McClintock, 1970). They are accepted if research is provisional and seeks to raise questions rather than provide solutions (Baldwin and Bottoms, 1976).

Other bias inherent in and common to official statistics such as relational distance between the complainant and the suspect, race, social status etc., (Kitsuse and Cicourel, 1963; Terry, 1967; Williams and Gold, 1972), undoubtedly may occur in the data set used in this study. Despite this inherent bias in data in JAO files, the fact that *all* detected and reported offence activity was recorded in a written report suggests that there are advantages in using the JAO data. Bias due to a 'filtering process' after delinquency detection, is absent from the data which is associated with a proactive rather than reactive control system (Black, 1970). The operational processes in the JAO are such that there is an immediate pressure for police action particularly in the deterrence of further juvenile offence. Offending cases are dealt with within a brief period of time by a closely organized group of officers. Where the offence is legally substantive or where the offender is recidivist or where there is little evident response to previous JAO supervision, offenders are charged in the Children's Court. Supervision of all other cases begins immediately an offence is detected or reported. The time of detection of the violative act and the violating person is near simultaneous. The long temporal (and technical) process which tends to characterise most official delinquency agencies and which more frequently leads to biases in the data is avoided.

Finally, a second real advantage in using JAO official data is that their records contain specific geographical locations of the place of offence and the residence of offenders as well as social and demographic information about individuals. Official court records and police statistics do not provide this kind of information.

The final problem with data is concerned with the use of census data. A number of generalized statements about all census data have some reference to the present study. Generally there are fewer problems with lack of representativeness of Australian government census data which (it is assumed) is obtained from *all* inhabitants: the assumed 100 percent count produces less danger of bias. Some social variables which may have been useful in analysis were missing, for example, median income of families, the length of transport routes and types of routes in areal units etc. Size of areal units presented some difficulty in analysis of aggregated data. Statistical areas (SA's or LGA's - local government areas) varied in size and shape and their distribution could bias interpretation of rates and spatial aspects of offence. The larger Western Area (LA number 66) for example had to be considered when interpreting analysis at macro and micro levels. A further problem of magnitude of numbers in the statistical areas required that some areas had to be combined to ensure meaningful interpretation of data. In calculating the mean age for areas, the age distribution of delinquents required that some areal units had to be joined. Similarly, the sample size required that the unit of analysis was the larger statistical area rather than the collector's district. The latter areal unit however was used in the derivation of a measure of socio-economic status. Census data was collected separately and kept separate from offender data though analyzed in relation to it. This procedure avoided interpretation problems observed in Schmid's (1960) study where census and offender data was factor analysed together.

OFFENDER TYPOLOGIES

Twenty-six offence types were established in the recording of JAO data. This number was too cumbersome for analysis and provided limited data sets for some types of offence.

TABLE 3.1 : CLASSIFICATION OF OFFENCE TYPES INTO CATEGORIES

Offence Typology	Offence Type
Property Offences	<ul style="list-style-type: none"> . Wilful damage . Unlawful use of vehicle . Stealing other than shoplifting . Receiving goods. . Break and enter . Arson
Grand Theft	<ul style="list-style-type: none"> . Stealing (shoplifting) goods to value greater than \$15, or
Petty Theft	<ul style="list-style-type: none"> . Stealing (shoplifting) goods to value less than \$15.00.
Offences Against the Person	<ul style="list-style-type: none"> . Wilful exposure . Sexual promiscuity . Obscene language . Obscene literature . False pretenses . Drug offences . Assault with bodily harm . Indecent interference . Extortion . Self inflicted wounding
Under Age Offences	<ul style="list-style-type: none"> . Uncontrollable . Running away from home . Refusing to work . Neglected child . Habitual truant . Exposed to moral danger . Delinquent prone . Associating with undersirables . Discharge of firearms

The need for a typology or categorisation of offenders or offence types was evident. The problem was not that juvenile law-breaking involved a heterogeneous collection of activities which required 'breaking down' for study into homogeneous units but that there was some difficulty in deciding criteria for the kind of typology suited to the data set used in the study.

The literature indicated two basic kinds of typologies were available (Hood and Sparkes, 1970). Causal or etiological typologies identify patterns of crime or criminal behaviour that develop from specific etiological backgrounds. Social-structural correlates that produce different kinds of delinquency can be identified. However the JAO data did not allow causal inferences of this type to be stated with confidence. A second kind of typology is designed to provide a basis for treatment interventions so that treatment "fits" the offender. The interpretation of this approach offered by Gibbons (1975) appeared relevant to the study data:

There is a relatively large quantity of data that appears to show that delinquents are not markedly less well adjusted, emotionally healthy, or interpersonally mature than non-offenders.

This interpretation suited the sample data and guided the development of a classification of offence types. The aim was to devise a scheme which identified commonalities found in delinquent incidents. This was achieved by focussing on the content or patterns of delinquent acts. The emphasis was therefore placed on delinquent acts rather than characteristics of delinquents. Five categories were established (Table 3.1) and used in the analysis. Each type was clearly identifiable. Property offences included victimless indictable crime other than the category of shoplifting. The latter single offence type was the dominant form of offence (Chapter Four) and warranted separate analysis. The arbitrary decision to divide stealing into grand and petty theft was based on the nature of the data and procedures adopted in previous studies (Mitchell and Brady, 1971; Gibbons and Prince, 1962). Offences against the person were clearly victim crimes although of varying degrees of seriousness. Under age offences were grouped on the basis of their non-indictable offence type. These latter formed the 'nebulous' type of behaviour referred to in the definition of delinquency.

DATA SAMPLING AND COLLECTION

Official data on delinquency in the study area was difficult to access at the time of this study because of the strict controls placed on official files by the Government of the day.⁹ The only two investigations in the study area had attempted to use survey techniques (Wilson and Braithwaite, 1975) and participant observation (Smith, 1977) but did not provide, in the case of both studies, relevant research methodology or data on spatial aspects of juvenile delinquency.

In August 1973, permission was granted to obtain data from the official records of the Juvenile Aid Office.¹⁰ A form was designed to gather data on the place of offence, the residence of the offender and other demographic and social characteristics of offenders. Because of limited time and the need for the author himself to collect data for reasons of confidentiality, the volume of data on individuals was reduced by using the form indicated and a shortened version of this form. In the latter, the original coding system was retained : all spatial and locational information was recorded on both sampling forms. Approximately 1 in 2.5 cases registered missing data (social and demographic only) because of use of this shortened data form.

Data were collected between December, 1973 and March 1976. The JAO's files were numbered and this numerical sequence approximated very closely the chronological sequence of offence activity. The 'lag-time' between the occurrence of offence and the filing of a written report averaged six to nine months.

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9. The National (Country) Party led by Mr. Joh. Bjelke-Petersen ruled under a coalition agreement with the Liberal Party.
 10. Permission was granted by the late Honourable Minister for Tourism, Sport and Welfare, Mr. J.D. Herbert (Liberal Party) under whose portfolio the Bureau had been transferred. The Police Minister, Mr. M. Hodges (National Party) was responsible for the Education Liaison Unit.

The frequency of different types of offence was recorded in a preliminary sampling to determine how the offence types were ordered. The twenty-six types of offence were found to occur randomly within the files. This fact together with the nature of the Bureau's filing procedures (temporal ordering) suggested that systematic sampling procedures might be used for the present study. Relevant data on every fourth file were examined and recorded on the survey form. Approximately every second individual in the sample was recorded on the shortened data form; after sampling, missing data were evident on both long and short data collection forms. No discrimination was made for sampling offence types or for sampling records for particular treatment of offences; for example, if the offender was charged in the Children's Court, placed in care, supervised etc. This sample of approximately twenty-five percent of all cases for 1970-1975 was considered representative of the true population. 2252 files were recorded with the total data collection time requiring over 1500 hours.¹¹

Although the files included information on male and female juvenile offence, male offenders only were the subject of this study. Two principal reasons necessitated this decision. The motivation for offence activity appears to be different for males and females; sex differentials in delinquency have been the major preoccupation of a number of theorists (Veder and Somerville, 1970; Cohen, 1955; Cowie, 1968; Gibbons, 1970; Klein, 1973). Since the study of male and female offence would require separate investigations and since there were limited resources in time and labour (the latter imposed for reasons for confidentiality already mentioned), sampling was confined to the male offender population between the ages of seven and seventeen: this final sample population contained spatial, social and ecological information and could be treated as two distinct data sets, the offence sample (the location where offence occurred) and the offender sample (the location where the delinquent resided).

11. Data were collected on a part-time basis during the JAO working hours.

ANALYTIC CODING PROCEDURES

Previous discussion indicated two possible levels of analysis of the data. The macro-level required the production of rates within the offence and offender samples. Initially a map of the study area was used with a census map overlay. The relevant addresses or locations were identified on the base map and associated with the relevant statistical areas. Frequencies of offence were obtained for each of the fifty-eight statistical areas and for each offence category within the typology previously described. These frequencies were then converted to rates per thousand. The distinction between and the use of absolute and relative frequency measures observed by Pyle(1974) was noted and the relative frequency measures retained.

The second level of analysis involving centographic methods required the mapping of point locations. This was achieved by using a trace overlay with grid reference points (Appendix D) so that actual locations identified in the study area could be given a reference value based on the vertical and horizontal axes. From these values variables such a distance could be measured and spatial aspects of the pattern of point locations could be determined.

SUMMARY

This chapter has presented a broad conceptual schema for the study of delinquency in Urban Brisbane. The methodology that derives from this conceptualization suggests broad aims for the study:

- (i) to describe the distribution of delinquency residence in Urban Brisbane;
- (ii) to examine the social and demographic characteristics of offenders;
- (iii) to determine and describe the spatial bias in distributions of specific or dominant form(s) of offence in the built environment;

- (iv) to relate spatial patterns of delinquency residence with patterns of environmental, social and economic variables (in the study area) associated with the notion of a "poor" or deprived built and impersonal social environment.

Specific propositions-to-be-tested will be formulated in the following chapters as relevant research questions unfold from the data.

CHAPTER FOUR

OFFENCES AND OFFENDERS IN URBAN BRISBANE

INTRODUCTION

The methodology outlined in the previous chapter suggests that initial analysis of patterns of delinquency might begin with broad distributions to be used as sources of questions to be answered and propositions to be tested. Spatial distributions of delinquency residence and delinquency occurrence are examined and the areas and the offence types requiring further investigation are defined. The remainder of the discussion centres on the social, demographic and environmental characteristics of the sample population. The aim again is to provide guides for later spatial analysis of selected variables with delinquency and to demonstrate the characteristics of and problems with the data suggested by the discussion in chapter three.

DELINQUENCY OCCURRENCE AND RESIDENCE

Delinquency rates were calculated based on the number of juvenile offenders per 1000 juveniles in each statistical area in Urban Brisbane (Appendix B). Rates for delinquency residence and occurrence (Appendix C) were then used to plot patterns of delinquency in the study area. Several procedures were used to determine the most adequate and representative measures of delinquency residence and occurrence.¹ The method selected required standardization of rates (z-score transformation) for each offence category and adding scores to give a total crime index for each S.A. (Appendix D). Index scores were ranked and grouped into quartiles. The procedure accounted for bias in the distribution of rates scores and was similar to that adopted by Smith (1974). Maps of delinquency occurrence (Figure 4.1) and delinquency residence (Figure 4.2) were plotted. Two propositions were examined:

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1. Rates were categorised according to natural grouping in the data and then plotted. Distributions were also obtained using rank order grouping (Appendix G) and standard deviation grouping about mean rates (Herbert, 1977). Although these three different techniques produced approximately similar distribution, the skewed distribution of rates for the fifty-eight S.A.'s suggested that a standardized data procedure might be used.

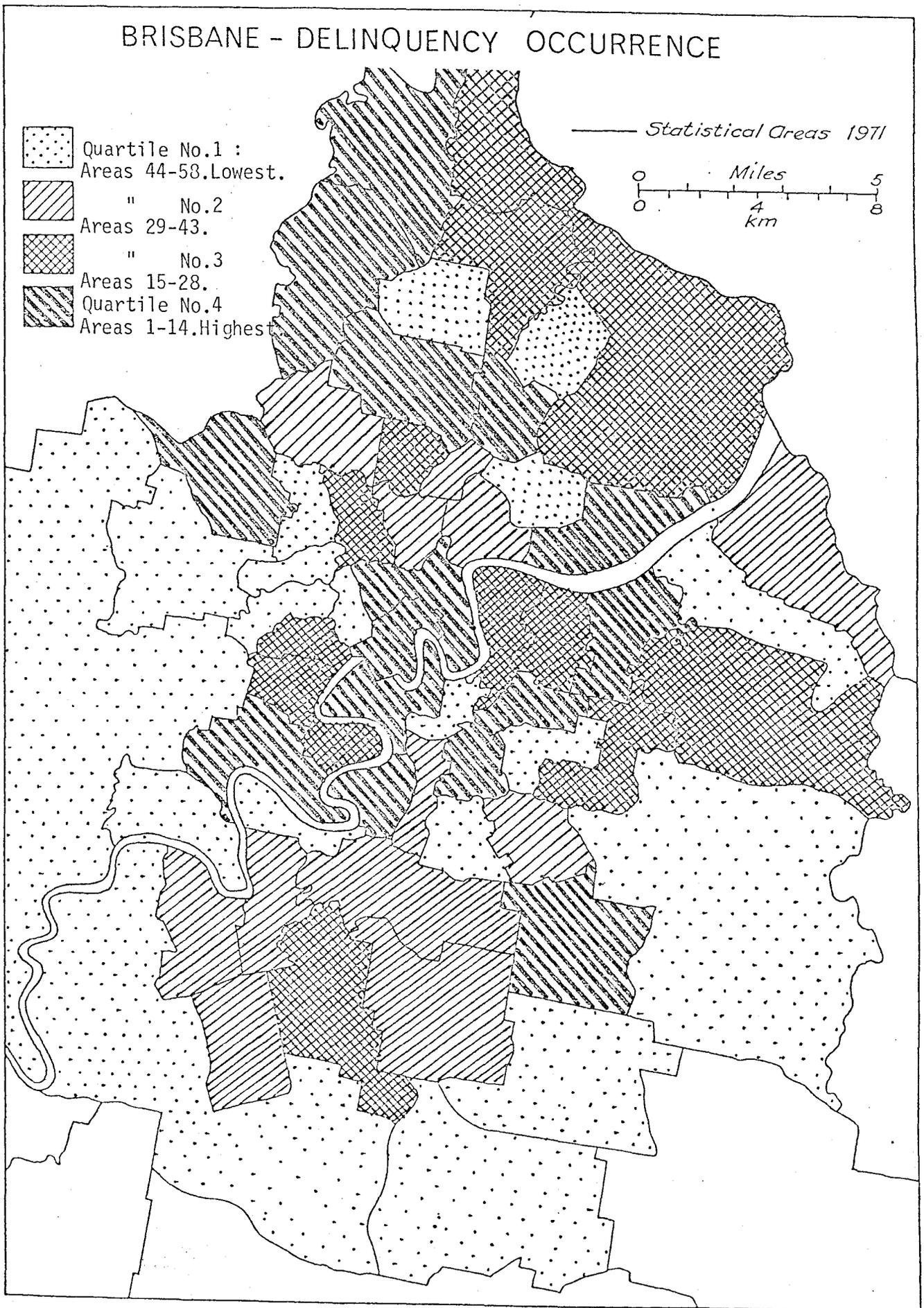


Figure 4.1 : Delinquency Occurrence in Urban Brisbane.

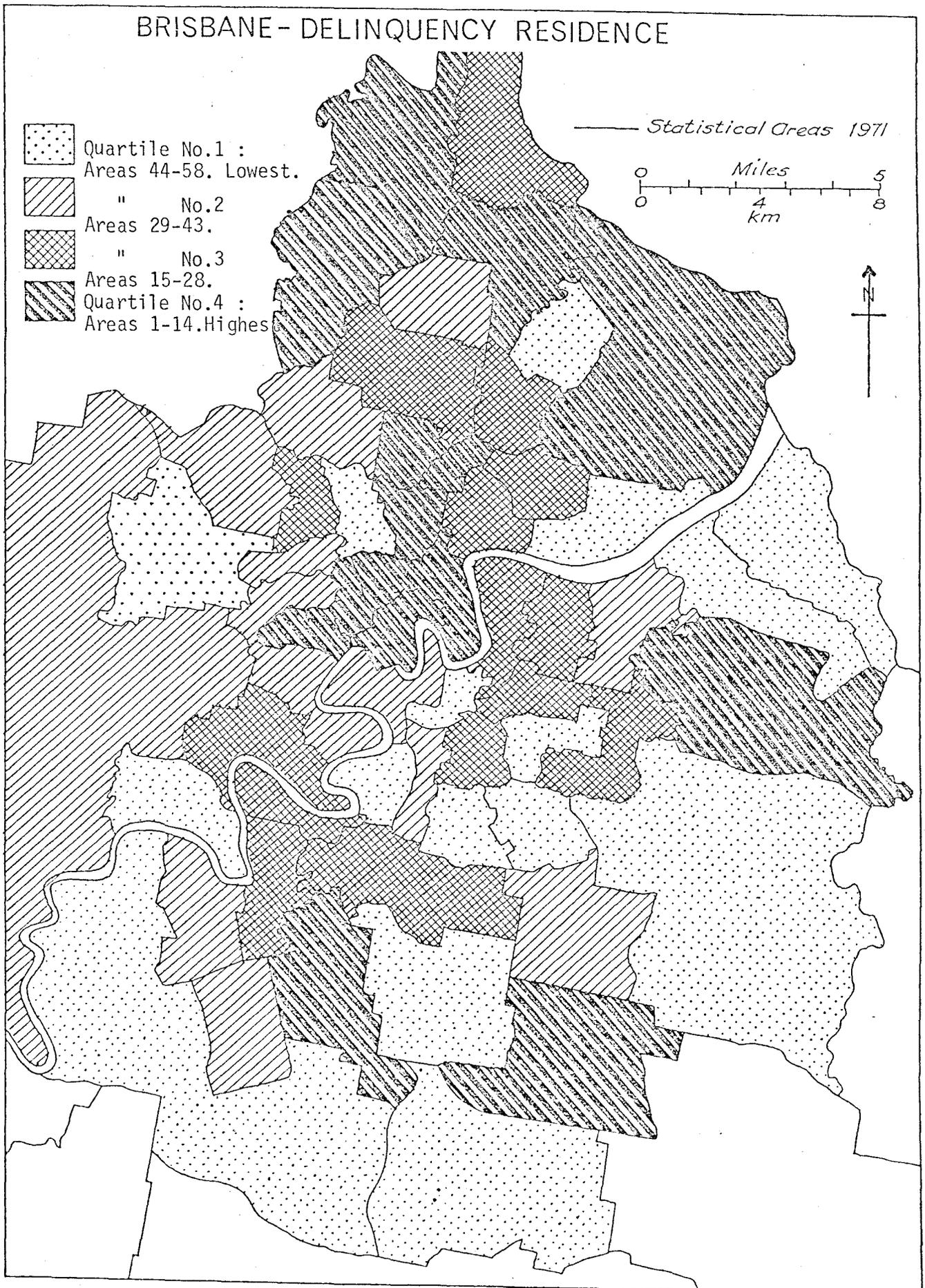


Figure 4.2 : Delinquency Residence in Urban Brisbane.

1. that delinquency gradients characteristic of many cities would be found in Urban Brisbane; and,
2. that delinquency residence and delinquency occurrence areas were coincident.

There was evidence of a delinquency occurrence gradient in the south of the study area with high delinquency occurrence areas (DOA's) from the inner-city centre outwards. Low DOA's were recorded for areas bordering the southern boundary; with the exception of Mt. Gravatt, this result contrasted with areas in the north of the study area. The gradient to the north was less evident with high DOA's in all areas on the northern boundaries. To the west (Kenmore, Western...) sparsely populated areas registered low DOA's while to the east the pattern was quite dissimilar; high DOA's contrasted with the western section. Delinquency residence gradients were not nearly so evident with high delinquency residence areas (DRA's) recorded in the north and south of Urban Brisbane. High DRA's (and DOA's) were observed in the inner-city. Although the pattern for DRA's was not so clear, there was a broad similarity between the two distributions.

There were exceptional areas. These are summarised in Table 4.1 where contrasting areas are identified. Thirteen areas are listed as non-coincident suggesting a number of approaches to further investigation. The high mobility of offenders may be one factor; ready access over a distance to places of offence may be another; opportunity structures outside the area of offender residence may be important. The possible coincidence of DOA's and DRA's was suggested by the fact that nineteen areas registered similar levels in the two distributions. Low DOA's and DRA's were located on the periphery; high DOA's and DRA'S occurred in the city centre and northern sections. It was difficult to make generalized statements from these facts as there were a number of distorting factors involved. A smaller number of juveniles in an area combined with few offenders or offences recorded for the area could have biased the level of delinquency

ascribed to that area. Meeandah and Murrarie may have been cases in point.² There were a number of unexpected patterns. The areas with coincident levels (generally low) for residence and occurrence were all low in socio-economic status despite the overriding conclusion from delinquency research that high delinquency levels are associated with low socio-economic status.

TABLE 4.1 : COMPARISON BETWEEN DELINQUENCY RESIDENCE AND OCCURRENCE AREAS

High DRA - low DOA		Low DRA - high DOA	
Fruitgrove (1-4)*		Meeandah (4-1)	
Mt. Gravatt (1-3)		Newmarket (4-2)	
Graceville (2-4)		Mitchelton (3-1)	
Hendra (2-4)		Mt. Gravatt (3-1)	
Normanby (1-3)		Murrarie (3-1)	
Windsor (1-3)		Yeronga (4-1)	
Enoggera (2-4)			
Low DRA and DOA	High DRA and DOA	Coincident DRA-DOA	
Banyo	Bald Hills	Darra (3)	
The Gap	Aspley	Inala (3)	
Kenmore	City	Morningside (2)	
South Western	North City	Carina (2)	
South Eastern		Ekibin (3)	
East Brisbane		Sandgate (2)	
Chatsworth			
Tarragindi			
Wynnum West			

* Numbers in parenthesis refer to levels based on the rank order of residence and occurrence in respective areas.

2. Implicit in this observations is that delinquency rates are associated with population size. This pattern has been demonstrated from size of urban areas.

Despite the limitations of a broad epidemiological approach of this kind, there are two significant observations which are relevant to further investigation in this study. Firstly, highest DRA's occurred in the inner-city and near the boundary of the city especially in the north and in the east.³ Secondly, while there was evidence of a delinquency occurrence gradient, the measures for some areas - Mt. Gravatt, Camp Hill, Indooroopilly, Chermside, Nundah, Mitchelton, Bald Hills, Aspley - could not be 'explained' without closer inspection of the data. Appendix G (Table G2) shows that high rates of delinquency occurrence for these areas, with the exception of Aspley and Bald Hills (the latter two areas show high figures for offences against the person and property offences) were influenced by the figures for petty and grand theft. The highly specific nature of offences together with the location of regional shopping centres in these areas suggested directions for further analysis.

Clearly the figures suggested that stealing in the various forms was a dominant form of offence. This was supported by the data in Table 4.2 Stealing or shoplifting was the principal form of recorded delinquent activity; it accounts for 69.5 percent of all delinquent activity in the sample population. Chapter five deals with this offence type in greater detail.

A second form of broad general analysis of rates of offence categories for statistical areas was pursued prior to description of the social and locational characteristics of offenders. Initial calculation involved the correlations among rates of delinquency residence offence categories for the fifty eight statistical areas (Table 4.3). The correlation matrix indicated that areas with high petty theft rates were related to areas with high under age offence rates ($r=0.84$); that rates for grand theft in areas were similar to rates for property offences ($r=0.56$); and that there was a high degree of association of rates in areas for grand theft and under age offences ($r=0.53$) and petty theft and grand theft ($r=0.45$). The total correlation values indicated the general

3. All areas except Coopers Plains had a low number of juveniles.

TABLE 4.2 : THE INCIDENCE OF OFFENCE TYPES IN THE STUDY SAMPLE POPULATION

Offence Type	N	%N	Offence type	N	%N
1. Wilful exposure	5	0.2	15. Exposed to moral danger.	3	0.1
2. Wilful damage	26	1.2	16. Drug offences	12	0.5
3. Unlawful use	27	1.2	17. Delinquent prone	35	1.6
4. Uncontrollable	84	3.7	18. Break and enter	132	5.9
5. Running away	16	0.7	19. attempted suicide	-	-
6. Sexual promiscuity	11	0.5	20. Assoc.undersirables	4	0.2
7. Stealing	1562	69.5	21. Assault	18	0.8
8. Refusing to work	1	0.0	22. Arson	7	0.3
9. Receiving	48	2.1	23. Indecent interference	28	1.2
10. Obscene calls	4	0.2	24. Extortion	1	0.0
11. Obscene literature	1	0.0	25. Discharging Firearms	5	0.2
12. Neglected child	4	0.2	26. Self inflicted wounding	1	0.0
13. Habitual truant	203	9.0	TOTAL	2252	
14. False Pretences	14	0.6			

TABLE 4.3 : INTERCORRELATION FOR DELINQUENCY RESIDENCE RATES OF OFFENCES IN STATISTICAL AREAS

	Petty theft	Grand theft	Offences against persons	Under age	Property offences	Σr
Petty theft	1.00	0.45*	0.18	0.84*	0.27	1.74(2)
Grand theft		1.00	0.38	0.53*	0.56*	1.51(3)
Offences against the person			1.00	0.20	0.39*	1.15(5)
Under age offences				1.00	0.31	1.88(1)
Property offences					1.00	1.53(4)

* Significant at 0.001 level

pattern of interdependence among offence rates for the 58 statistical areas. Under Age offence rates and petty theft rates showed the highest overall interdependence with other offence rates in areas. Four summed intercorrelation values were quite dissimilar

however, from the value ($\Sigma r=1.15$) for offences against the person category.

This result may be important because it suggested that areas with high rates (or low) of under age forms of delinquent behaviour were also the areas with high rates (or low) of petty theft offence behaviour. These areas differed in areal rates of offence against the person, a form of delinquency quite different in character from the two categories above. The figures suggested the importance of differentiating between offence categories in later ecological analysis of delinquency (chapter seven).

The remainder of this chapter focusses on social, demographic and locational characteristics of the offender samples and illustrates the degree of reliability and confidence to be played in the sample data set. A number of hypotheses or propositions are stated and tested in the course of discussion.

THE CHARACTERISTICS OF OFFENDERS

Several J.A.O. police personnel who completed the police files were the source of social data (with accompanying bias) collected in the study. Some characteristics of offender groups (Table 4.4) were derived from the perceptions of staff in the J.A.O. and therefore too great a reliance could not be placed on the validity of this data. The additudinal data supported the J.A.O.'s claim that parents of juvenile offenders brought to their notice offered co-operation, and that perceived family relationships were generally healthy. The results tended to support the basis for categorisation of offences in this study and the fact that juveniles in the study were similar in characteristics to non-offending juveniles. The trend in this data was supported by the fact that 78.8 percent of cases came from families with parents living together (there was no data on the quality of the relationship) : 21.3 percent of offenders however came from a background which suggested some instability in the family.

TABLE 4.4 : CHARACTERISTICS OF JUVENILE OFFENDER GROUPS (%).

<i>Accomplices In Offence (N=905)</i>		<i>Attitude To Father (N=818)</i>	
Present	54.3	Accepts usually	85.8
Absent	45.7	Accepts sometimes	10.1
<i>Marital Status of Parents (N=850)</i>		Accepts never	4.1
Living together	78.8	<i>Attitude To Mother (N=875)</i>	
Parent(s) deceased	12.7	Accepts usually	93.4
Parents separated	6.0	Accepts sometimes	5.4
Parents divorced	2.2	Accepts never	1.2
Other	0.3	<i>Reaction To Discipline of Father (N=762)</i>	
<i>Previous Convictions (N=898)</i>		Accepts usually	78.9
Recorded	27.8	Accepts sometimes	18.9
Unrecorded	72.2	Accepts never	2.2
<i>Family Size (No. of Children) (N=861)</i>		<i>Reaction To Discipline of Mother (N=853)</i>	
1	14.8	Accepts usually	71.2
2	23.3	Accepts sometimes	25.9
3	22.4	Accepts never	2.9
4	12.9	<i>Relationship Between Offender and Parents (N=827)</i>	
5	10.4	Appears satisfactory	73.4
6-7	11.4	Gives some concern	10.8
8-9	4.8	Clearly unsatisfactory	15.8
<i>School Type (N=817)</i>		<i>Attitude of Parents (N=862)</i>	
State public	83.7	Reluctant to cooperate	8.1
Independent (Catholic)	11.5	Passive acceptance of assistance	13.0
Independent (non-Catholic)	4.4	Active cooperation	78.9
Parish (Catholic)	0.4		

The remaining characteristics are presented here but are discussed in more detail in relation to a number of more pervasive variables emphasised in the literature on delinquency. The variables include socio-economic status, marital status, age; they are discussed in relation to their influences on offence reporting and detection.

Socio-economic Status

Two indicators of socio-economic status (SES) were collected in the data set, family income and the occupational status of the principal income earner in the family. The latter was categorised

according to the Zubrycki, J., Brown, L. and Lancaster Jones, F. (1965) classification. Income and occupational status were compared initially to confirm the validity of using these as SES indicators from the primary data. A chi-square analysis indicated a high degree of association between occupational status and income ($X^2 = 80.6$; $df = 16$; $p < 0.000$). For ease of analysis, occupational status categories were grouped. Cut-off points for income categories were derived after inspecting the distribution of income for the total sample population and from a knowledge of income levels indicated in census data.

TABLE 4.5 : FREQUENCY PERCENT SES AND INCOME FOR THE TOTAL SAMPLE POPULATION OF OFFENDERS

Status	Income					
	0-\$50	\$51-80	\$81-120	\$121-199	>\$200	
1. Professional-managerial	5.1	3.1	4.8	3.2	0.9	139
2. Clerical, sales and farming	6.3	3.7	3.7	1.5	0.4	126
3. Skilled and semi-skilled	10.5	11.2	10.9	2.7	0.2	290
4. Unskilled	9.6	8.6	6.5	1.5	0.1	214
5. Miscellaneous	4.2	1.3	0.2	0.0	0.0	47
Total (n)	291	227	213	72	13	816

$$X^2 = 80.64 \quad df = 16 \quad p < .000$$

(Data reduction due to data collection procedures : Chapter Three).

High SES (occupational status levels one and two) registered high income levels : those lower on the occupational status scale indicated lower income levels (Table 4.5). The strong dependency relationship between the two variables reflected in the high chi-square value ($X^2 = 80.64$) suggested that the variable occupational status could be used with confidence in further analyses of the primary data set.

It was also hypothesized that SES measured by occupational status of an offender's family would be related to offence type. The occupational status of the principal income earner in the offender's family was tested therefore for dependency on the

type of offence (Table 4.6),

TABLE 4.6 : OCCUPATIONAL STATUS FOR CATEGORIES OF OFFENCE (FREQUENCY)

Occupational Status	Category of Offence					Total
	Petty Theft	Grand Theft	Offences Against Person	Under Age Offences	Property Offences	
1. Professional-Managerial	81 (+18)*	25 (-6)	5 (-3)	10 (-9)	22 (0)	143
2. Clerical, sales and farming.	71 (+15)	17 (-10)	3 (-4)	15 (-2)	21 (+1)	127
3. Skilled and semi-skilled	114 (-13)	75 (+13)	18 (+2)	39 (0)	43 (-2)	289
4. Unskilled	74 (-20)	53 (+7)	14 (+2)	41 (+12)	32 (-1)	214
5. Miscellaneous	21 (0)	6 (-4)	5 (+2)	6 (0)	9 (+2)	47
TOTAL	361	176	45	111	127	820

$$\chi^2 = 37.92; \quad df = 16; \quad p < 0.005$$

* Difference between observed and expected frequency in brackets.

Sixty-seven percent of offenders came from families in the skilled, semi-skilled and unskilled categories of occupational status. This pattern persisted for occupational status levels within each offence category with the exception of petty theft offence. There was a relatively greater percent of petty theft offenders from families with professional-managerial status (22.4) and clerical-sales-farming status (19.7). The value of chi-square indicated an association between the occupation of the principal income earner in the offender's family and the type of offence. Although this value was significant the pattern of relationships was not always clear. Sons of professional and clerical and sales (status categories one and two) people tended to engage in petty theft while sons of skilled workers attempted grand theft. Offenders from unskilled occupation backgrounds tended to commit person and underage offences.

The figures expressed as percent frequency within each occupational status category may be compared with the mean percent for each category within the study area. This latter measure was derived from census data. Seventeen point four percent of principal income earners in families of juvenile offenders occupied professional, technical, administrative or managerial positions. This figure approximated the percent frequency of all persons in this category, (18.5 percent) in the area. In contrast, only 15.5 percent of juveniles came from families whose principal income earner was in the clerical or sales category: this was approximately half the number of persons within this category in Urban Brisbane (30.5 percent). The skilled, semi-skilled and unskilled category with 61.3 percent, exceeded the total percentage of persons with this type of occupation in Brisbane while the percent craftsmen, labourers or process workers together with the percent workforce in transport and communications equalled 37.0 percent. The category 'miscellaneous' which included unemployed, and unclassified occupations represented 5.7 percent of the workforce compared to the study area 'unemployed' figure of 1.3 percent.

The previous analysis suggested that there was some differentiation in overall recorded offence rates with a tendency to higher rates for delinquents with lower SES background. The results also indicated that although there was a relationship between SES and offence rates, this was less pronounced than might be expected.

A second proposition sought to determine whether offenders from particular occupational groups lived in areas of equivalent status. The measure of SES for each area was taken from census data and from a study by Logan et al. (1975). The association between status of occupation and status of area was marked in the expected and observed frequencies for each category (Table 4.7). Offenders resided in areas of the city which had an SES comparable to the occupational status of the principal income earner in the family.

TABLE 4.7 : DELINQUENCY RESIDENCE STATUS AND OCCUPATIONAL STATUS OF OFFENDERS

	Occupational Status					
	Professional Managerial	Clerical Sales Farming	Skilled Semi-Skilled	Unskilled	Misc.	
1.	21	14	20	11	5	71
2.	42	46	70	52	11	221
SES of area 3.	23	31	71	43	13	181
4.	22	14	53	33	7	129
5.	28	18	58	60	9	173
Total	136	123	272	199	45	775

$$\chi^2 = 32.48; df = 16; p < 0.008$$

Juvenile offenders from higher SES areas tended to have a higher socioeconomic family status. The inverse relationship was equally true.

Results from existing studies in delinquency led to the testing of a further proposition. It is well documented in the literature that the SES of offenders influences detection by and reporting to law enforcement agencies; this ultimately influences the outcome for the offender. A third proposition to-be-tested was that SES (measured by occupational status) was independent of case outcome. The initial analysis upon which the chi-square statistic was calculated used the nine categories of occupational status: the categories are combined here for purposes of presentation (Table 4.8). SES apparently had some relationship with case outcome. A closer inspection of the data indicated that offending sons of skilled, unskilled and 'miscellaneous' workers were charged more frequently in the Children's Court. Offenders from higher SES backgrounds had their cases closed relatively frequently. However there was a tendency for the J.A.O. to supervise or close cases for all levels of occupational status and the figures probably reflect the J.A.O.'s sensitive treatment

TABLE 4.8 : SES AND CASE OUTCOME

Occupational Status	Case Outcome							
	Success*	Failure*	Supervision J.A.O.	Charged: Care and Control	Indicted/ Commuted	Case Closed	Children's Court-admonished discharged	
1. Professional managerial	0	0	59	10	4	64	5	142
2. Clerical, sales and farming	1	0	55	10	8	43	4	121
3. Skilled and semi-skilled	0	0	111	46	11	100	14	282
4. Unskilled	0	2	89	38	15	58	10	212
5. Miscellaneous	0	0	23	7	8	7	2	47
	1	2	337	111	46	275	35	804

$\chi^2 = 141.72$ df = 16 p < 0.0000

* Not included in the calculation of the chi-square statistic; category based on perceptions of JAO staff.

of offenders according to circumstance and the nature of the offence. It should be noted that the high percentage of cases (41.9 percent) in the category of "supervision", could be categorized as case successes after a period of six to twelve month's (and in some cases longer) supervision. The data to support this observation may be indicated in the incidence of recidivism or repeated offence. Of all categories of outcome, only 2.4 percent (n=19) offenders could be classified as recidivist during the period of the study (1970-1975).

A chi-square analysis of *within offence categories* revealed no relationship between SES and case outcome (Table 4.9).

TABLE 4.9 : SES AND CASE OUTCOME FOR CATEGORIES OF OFFENCE

Offence Type	χ^2	df	p	n
1. Petty Theft	28.35	16	< 0.10	355
2. Grand Theft	20.93	16	< 0.18	169
3. Offences Against the Person	33.93	16	< 0.005	44
4. Under Age Offences	22.61	16	< 0.31	109
5. Property Offences	19.67	16	< 0.24	125

Although the statistic for 'Offences Against the Person' was significant no clear pattern of association between the two variables was evident. This was probably related to the small number in the sample population for this category of offence.

Marital Status

Stability of family background of juveniles has been emphasised in previous research on delinquency. An indication of the stability of juveniles families in this study is shown in Table 4.10.

TABLE 4.10 : FAMILY STATUS AND OFFENCE CATEGORY

Family Status	Category of Offence					
	Total	Petty Theft	Grand Theft	Offences Against Persons	Under Age Offences	Property Offences
Living together	78.8*	84.2	79.0	76.6	62.1	80.0
Mother or both parents deceased	12.7	10.5	14.9	12.8	18.6	13.0
Parents separated	6.0	3.1	4.4	10.6	16.9	4.5
Parents divorced	2.2	2.2	1.7	6.0	2.4	2.5
TOTAL	1030	363	181	47	124	315

* All figures are in percent

$\chi^2 = 47.76$; $df = 12$; $p < 0.001$

The majority of offenders in the sub-sample population (78.8 percent) came from families where there was a stable relationship between parents (the criteria for stability being whether parents lived together). The number of separated or divorced parents represented only 8.2 percent of the total subset. The dependency between the type of offence and marital status was confirmed in the data although the nature of the relationship was not clear.⁴

The importance of this table of results is reflected in the figure for percent "parents living together" for each offence category. Theft offences - petty and grand theft and property offences - recorded the highest percent for stable marital status. Offences against the person (76.6 percent) were significantly higher than the remaining offence category, under age offence (62.1 percent). Relatively fewer offenders in this offence category therefore originated from 'stable' parental status environments. This is probably significant and not unexpected

4. Care ought to be exercised in the interpretation of these results however since the notion of stability and 'parents living together' may be incompatible. Parents living together in an unhappy marital or home environment may in fact create instability and influence the juvenile to engage in delinquent activity. The concept of instability itself, requires careful definition.

when it is remembered that under age offences include such offence types, as uncontrollable, running away from home, habitual truancy, associating with undesirables etc. The data in this study do not permit further analysis but the relationship among marital status and these specific offence types warrants more detailed study. Marital status may be associated with previous convictions in the family. The meaning ascribed to the relationship is difficult to determine. For the data in this study however, previous conviction is defined as any indictable offence for any member of the offender's family. A 4x2 contingency table tested the relationship between marital status (Table 4.11) and previous convictions.

TABLE 4.11 MARITAL STATUS AND PREVIOUS CONVICTIONS

		Marital Status				Total
		Living together	Mother or Parents both par-ents de-ceased	Parents separated	Parents divorced and other*	
Previous convictions	Yes	162	43	20	4	229
	No	498	64	31	17	610
Total		660	107	51	21	839

$$\chi^2 = 16.25 \quad df = 3 \quad p < 0.0027$$

* includes illegitimate birth

There appeared to be an association between the two variables with the trend for juveniles from families with one or two parents deceased to have a previous history of criminal conviction. Juveniles from families where there was stability in marital status, parents living together, were dissociated from a family history of criminal convictions.

Occupational and Working Status of Mothers

The incidence of juvenile offence has been related to the working status of mothers, that is, whether working mothers are in paid full or part-time employment. The occurrence of paid working mothers has given rise to speculation about behavioural effects on children; the 'latch-key' concept for example, is a phenomena resulting from a mother's isolation from the child because of employment commitments.

A second characteristic often researched is the occupational status of those mothers of juvenile offenders who are in paid employment. The occupational groups within each category of offence is shown in Table 4.12. For the total subsample, 68.8 percent of paid employed mothers working full or part-time followed skilled, semi-skilled or unskilled jobs. Only 6.7 percent were employed in professional or managerial positions. Working status and occupational status were investigated within each offence category. This analysis revealed that the relationship between the working status and occupational status of mothers of petty theft offenders was found to be significant ($\chi^2 = 21.4$; $df = 4$; $p < 0.0003$). There was a clear tendency for mothers in the professional groups to be permanently employed. Mothers employed in skilled and unskilled occupations tended to be employed part-time.

TEMPORAL OCCURRENCE OF OFFENCE

The level of offence activity based on percent frequency for all categories of offence showed a slight variation for the months of May, August and December. The total activity for this period was 30.2 percent and occurred during the vacation period of the school year. For the total period of vacation, offence activity was 37.2 percent of the total for the year. Furthermore, the level of activity increased with the advent of each vacation period (May 9.8 percent: August, 9.9 percent: December, 10.5 percent).

TABLE 4.12 : OCCUPATIONAL STATUS OF WORKING MOTHERS AND OFFENCE CATEGORIES (PERCENT).

Occupation Category	Category of Offence					
	Total	Petty Theft	Grand Theft	Offences Against Persons	Under Age Offences	Property Offences
Professional Managerial	6.7	10.8	3.9	13.0	0	4.6
Clerical, Sales Farming	7.9	7.0	11.7	4.4	2.3	9.2
Skilled and semi-skilled	18.1	25.5	26.0	39.1	41.9	26.2
Unskilled	50.7	46.5	51.9	39.1	53.5	56.2
Miscellaneous	6.6	10.2	6.5	4.4	2.3	3.8
TOTAL (N)	430	157	77	23	43	130

$$\chi^2 = 27.83; df = 16; p < 0.025$$

The pattern of activity observed for each vacation period was repeated in the results for all months of the year. There was a tendency for increased levels of activity as the year progressed. In January, percent frequency of offence (7.0) was at the second lowest level for any month: there was a significant fall in activity for February (5.8 percent). Thereafter the general pattern was for a slight increase in activity. Forty-six point four percent of offences occurred in the first six months of the year as compared to 53.6 percent in the latter of the year. Despite this pattern of activity, there was probably no significant difference in activity levels for all offence categories considered as a whole for all months (an exception being the month of February).

The explanation of levels of incidence each month requires further investigation but a number of questions were suggested by the data. Why were offence activity levels highest during school vacation periods? What was the relationship between schooling and the increasing level of activity for each month? Was this tendency for increased offence activity related to decreased interest in school and what it has to offer its clients? Was there an

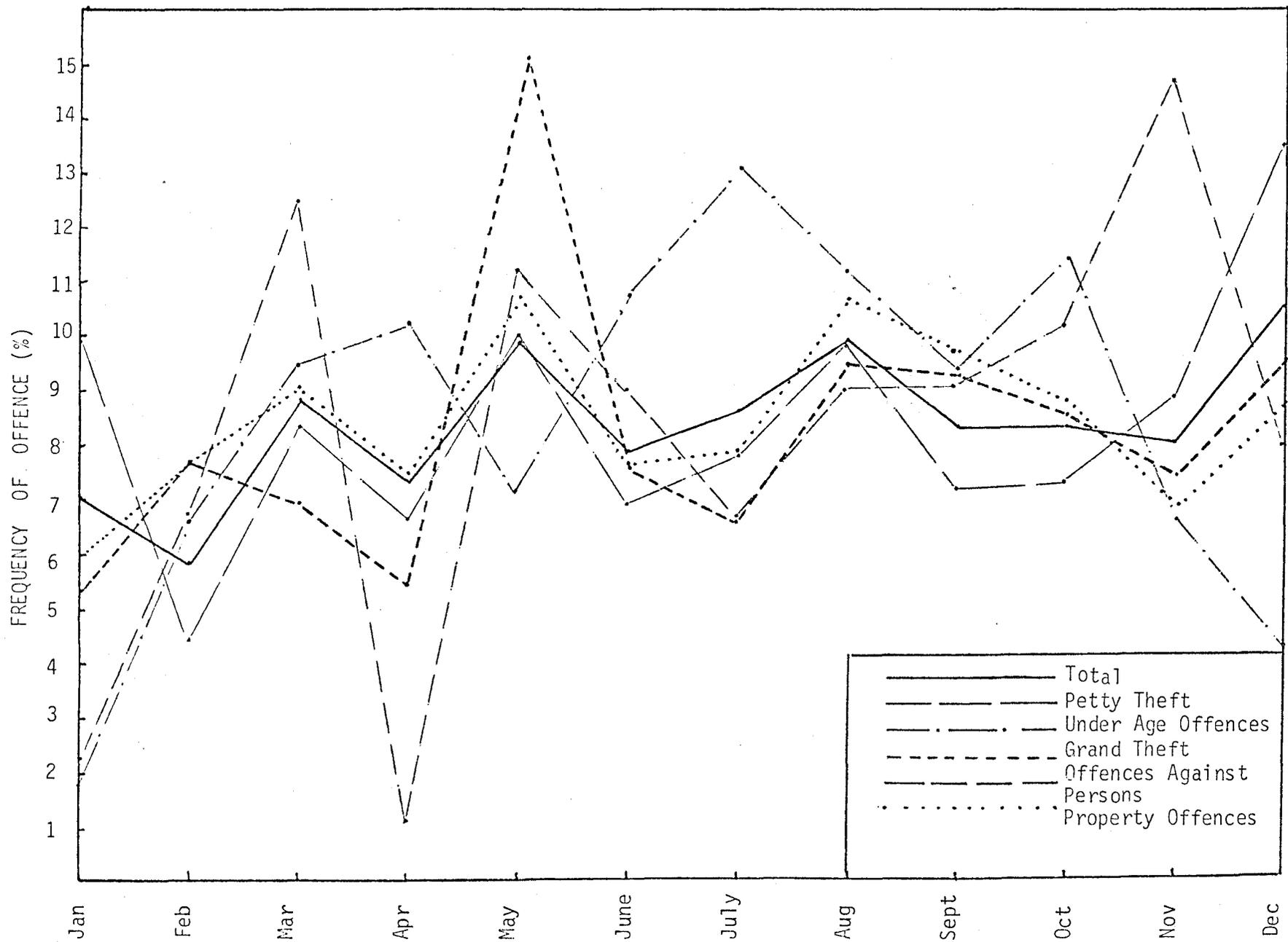


Figure 4.3 : Monthly Frequency of Offence (1970 - 1975).

association between the lower activity levels of February and school attendance when enrolments were highest? What was the effect of absenteeism on offence activity levels? Did particular categories of offence occur at specific times of the year?

An analysis of offence activities for each category in each month provided part explanation for the pattern observed in the results for the total population. The significant variation in theft activity, petty theft and grand theft, for the three vacation months explained the high levels observed for the total data (Figure 4.3). In May, August and December, theft activity occupied 25.0, 20.3 and 22.4 percent of all categories of activity for those months. The range of frequency of occurrence for other months was in the range 14.5-16.5 percent per month with February and April at 12.0 percent approximately.

For individual offence categories, there was a greater variation in grand theft activity than in petty theft activity for each month. The pattern of variation in petty theft activity varied constantly for each month. A similar pattern was observed for property offences. There was a noticeable variation in monthly activity levels for the two remaining offence categories. Monthly levels for offences against the person varied appreciably although interpretation of the results was difficult since total frequency (N=89) was low. Under age offences (N=351) showed increased levels throughout the year with minimal activity in January-December. This latter category included truancy and the relatively high truancy levels in the months of and near May and August, may provide insight into high theft activity levels for those months.

The relationship between offence categories and activity levels (frequency) for each month is shown in Table 4.13. With $\chi^2 = 133.63$ and $df = 44$, there was a significant relationship between the time of the offence occurrence and the type of offence in which juveniles were likely to engage.

TABLE 4.13 : MONTHLY LEVELS OF ACTIVITY (FREQUENCY OF OFFENCE) FOR OFFENCE CATEGORIES

Month of Year	Offence Category					
	Total	Petty Theft	Grand Theft	Person	Under Age	Property
January	155	113	25	2	6	34
February	129	51	30	6	23	50
March	196	95	27	11	33	59
April	161	76	21	1	36	48
May	217	113	59	10	25	69
June	174	79	30	8	38	49
July	191	88	26	6	46	51
August	221	112	37	8	33	69
September	184	81	36	8	33	62
October	186	83	33	9	40	57
November	178	101	29	13	23	43
December	233	155	37	7	15	56
N	2225	1147	390	89	351	647

$$\chi^2 = 133.63; df = 44; p < 0.001$$

AGE OF OFFENDERS

The number of offenders for each age group showed an increase with increasing age to thirteen years old after which the number of offenders declined (Table 4.14). Highest numbers were recorded for the thirteen to fourteen year old age groups with an average age of 12.98 years. Sixty eight percent of offenders were within the age range of +1 and -1 standard deviation from the mean.

An inspection of ages of offenders within each offence category suggested that there was little variation among age categories of offence according to the frequency of occurrence for these age groups. The lower age groups had a lower representation than the upper year groups (thirteen years or greater). The within offence category variation in age levels was similar for all categories except Under Age Offences. The mean age was 12.84 which

was similar to the grand mean (12.98) but the variation for age (S.D. = 1.59) was noticeably smaller in magnitude. In this category the thirteen year old age group was significantly overrepresented (N=103) relative to other groups. To a lesser degree a similar pattern emerged for Petty Theft where the thirteen year old group had relatively greater numbers of offenders (N=142). For all other categories the variability about the mean was less for the age groups in the twelve to sixteen range.

TABLE 4.14 : AGE OF OFFENDERS FOR OFFENCE CATEGORIES

Age (yrs)	Offence Category					
	Total	Petty Theft	Grand Theft	Offences Against Person	Under Age Offences	Property Offences
7	7	4(9)	0(10)	0(10)	2(10)	1(10)
8	21	4(9)	4(9)	1(9)	5(9)	7(9)
9	49	18(8)	8(8)	1(8)	6(8)	16(8)
10	112	31(7)	23(6)	3(7)	16(5)	39(6)
11	161	91(5)	17(4)	7(4)	15(6)	31(7)
12	287	118(2)	44(3)	5(6)	51(3)	69(4)
13	386	142(1)	42(4)	13(2)	103(1)	86(1)
14	341	117(3)	45(2)	19(1)	79(2)	81(2)
15	256	94(4)	53(1)	11(3)	20(4)	78(3)
16	135	34(6)	36(5)	6(5)	7(7)	52(5)
N	1755	653	272	66	304	460
\bar{X}	12.98	12.84	13.22	13.33	12.84	13.09
S.D.	1.83	1.78	2.03	1.80	1.59	2.02

$$\chi^2 = 172.05; df = 36; p = 0.0001$$

Rank order for within category rank in brackets.

It might be expected that the older the offender the greater the probability of a greater number of detected and recorded offences; that is, older offenders are more likely to have a record of previous convictions. A chi-square analysis (Table 4.15) indicated that some relationship existed between the age of the offenders and whether there had been a previous conviction in the family or of the offender himself. Older offenders tended *not*

to have a record of previous conviction(s) whilst the twelve to fourteen year old group had a history of past offence.

TABLE 4.15 : AGE AND PREVIOUS CONVICTION

Previous Conviction	<10	11	12	13	14	15	16	
Yes	24	14	45	69	49	36	17	224
No	70	62	104	122	111	114	55	638
Total	94	76	149	191	160	140	72	882

$$\chi^2 = 19.81; \text{ df} = 6; \text{ p} < 0.01$$

Family stability measured by the marital status of parents was also analysed with age. The proposition that particular age groups within each offence category come from identifiable family backgrounds and that older juveniles come from less stable families was tested. An association was found between family stability and age for offences against the person ($\chi^2 = 37.44$; $\text{df} = 16$; $\text{p} < 0.001$). The eleven to fourteen age groups tended to come from families with stable backgrounds, that is, parents living together. The two variables were independent for all other categories of offence.

The age of offenders did not seem to influence whether juveniles offended alone or in company. There was no relationship between the age of offenders and offence in company or alone. However, the twelve to fourteen age group for petty and grand theft offences did tend to offend in company ($\chi^2 = 42.6$; $\text{df} = 9$; $\text{p} < 0.08$).

REPORTING OF OFFENDERS

The legal definition of the law is distorted once it is implemented or invoked. This fact leads to bias in data on crime as was noted in the discussion of chapter three on the meaning of crime and delinquency and on the data collection procedures used in this study.

A number of forms of bias may operate in the sample data in relation to the above. These may result from; differential reporting *to* police in different areas; differential reporting *by* police in different areas; the influence of a parent or guardian in persuading the victim not to report the offence; the influence of a parent or guardian of the offender on police action subsequent to detection and reporting; the ability of the juvenile to avoid detection; the ability of the juvenile to avoid being reported after detection by other than law enforcement officers for example, store detectives. These are some of the many forms of bias that reduce validity of interpretation of crime statistics and the spatial expression of offence behaviour. The present study was not free of bias in the detection and reporting of offence. Unlike delinquency statistics extracted from court and police records (other than the J.A.O. and records) however, a number of clearly defined biases may be established about the reporting of offences in this study, particularly in relation to theft offence from larger commercial centres in the study area. These biases are discussed firstly from the investigator's observation of the J.A.O.'s activities and secondly from empirical analysis of the data set. Bias in reporting to the J.A.O. occurred when some larger retail stores particularly in the inner city opted to deal with theft offenders themselves. The number of these establishments was few and the large number of stores which did report detected theft offence clearly provided a data set representative of theft offence activity in the inner-city and regional centre stores. Perhaps one indicator of this was the willingness of stores to report what might be considered very minor offences (Tables 4.16). The high percentage of minor offences contrasted with offences which could be considered more serious if the criteria of value of goods stolen was considered.

Different reporting by police to the J.A.O. did occur during the period of data collection. The establishment of an alternative police enforcement section undoubtedly introduced some bias into

the data⁵. Many police officers continued to report to the J.A.O. however and there was no evidence that 'regular' reporting agents

TABLE 4.16 : VALUE OF GOODS STOLEN

Value of property	Frequency	Frequency percent
0 - \$2.50	329	27.6
\$2.51 - \$5.00	302	25.3
\$5.01 - \$15.00	308	25.8
\$15.01 - \$50.00	192	16.1
> \$50.00	61	5.2
Total	1192	100.00

demurred in reporting. An exception may have been the reporting of offence activity by principals of secondary schools. There was some anecdotal evidence to suggest that some principals were reluctant to report juveniles to the J.A.O. in 1972-1974 because of the long delay in processing of cases (due to reduced staff numbers in the J.A.O.) and the punitive measures accorded juveniles by the Police Department. Although the latter had no political or administrative ties with the J.A.O., nevertheless that organization was perceived by the public to have some ties with the Department because of its police staff personnel. Despite the distorting influences it can be claimed that the data used in this study was no less representative of delinquency in Urban Brisbane

5. The reference is to the Education Liaison Unit whose enforcement policy is précised in the words of the then Commissioner of Police.

"if a child is within the ambit of a specific law provided, that law alone should be availed of by police in the taking of appropriate action."

(Circular, March, 1973)

The reverse argument might apply that official statistics during this time *were* biased because (i) police charged all offences whereas before they had not and (ii) many victims may not have reported offenders because they were aware of harsh procedures adopted by the Police Department.

than the data obtained from official statistics and court records. Further evidence for this was observed in recorded offences reported by various groups (Table 4.17).

TABLE 4.17 : OFFENCE TYPES REPORTED BY DETECTING AGENCIES

Offence Type	Police Dept.	School Principal	Retail Store	Parent/Relative	Govt.	Pri- vate Citi- zen	Prof. e.g. Dr.	J.A.O.
1. Wilful Exposure	2	1	-	1	-	1	-	-
2. Wilful Damage	11	4	4	-	-	1	-	2
3. Unlawful Use	15	4	-	5	-	2	-	1
4. Uncontrol- table	3	13	9	39	7	3	3	3
5. Running away	4	2	1	4	1	-	-	4
6. Sexual Promiscuity	-	3	-	-	1	-	-	6
7. Stealing	103	53	848	73	11	11	8	85
8. Refusing Work	-	-	-	-	-	-	1	-
9. Receiving	8	9	2	3	-	1	-	23
10. Obscene Calls	1	-	-	1	1	1	-	-
11. Obscene Literature	-	1	-	-	-	-	-	-
12. Neglected Child	1	-	-	-	1	-	-	2
13. Truancy	11	97	18	45	2	3	1	22
14. False Pretences	2	2	6	1	-	-	1	-
15. Exposed Moral Danger	2	-	1	-	-	-	-	-
16. Drugs	1	-	-	3	1	-	-	3
17. Delinquent Prone	9	4	9	6	-	-	1	3
18. Break & Enter	70	18	10	5	3	5	1	15

TABLE 4.17 cont'd.

Offence Type	Police Dept.	School Principal	Retail Store	Parent/Relative	Govt.	Private Citizen	Ref.	J.A.O.
19. Attempted suicide	-	-	-	-	-	-	-	-
20. Assoc. with undesirables	-	1	2	1	-	-	-	-
21. Assault with harm	2	3	1	6	-	1	-	2
22. Arson	1	3	-	-	1	-	-	-
23. Indecent interference	3	10	1	1	-	-	-	11
24. Extortion	-	1	-	-	-	-	-	-
25. Discharge firearms	1	-	1	1	-	-	-	2
26. Self inflicted wounds	-	1	-	-	-	-	-	-
TOTAL	250	230	913	195	29	29	16	184

Data on reporting agencies were available for 81.9 percent of the sample population. The figures revealed immediately where some bias could be present and where it was apparently reduced. Retail stores showed the highest number of reported offences, 92.9 percent of which were for stealing or more precisely, shoplifting. This type of offence had the highest reportability for all agencies with the exception of school principals. Retail stores however were not the only reporting agency of shoplifting. Although their reports accounted for 71.1 percent of total shoplifting cases, other agents particularly the Police Department and the J.A.O., recorded high report numbers.

When all offence types reported by agencies were observed, there were some interesting patterns. Firstly, the Police Department reported a wide variety of offences. Of particular interest was the reporting of 'break-and-enter' offences; a second important pattern in the figures was the wide range of offences reported by

police to the J.A.O. The claim that police reported only certain kinds of offences cannot be substantiated: the 'under age' category of offence types, although not well represented was never-the-less represented in the data. Understandably principals reported the offence types that may be associated with deviant behaviour in schools (Hargreaves, 1975). Truancy was the principal type of offence reported by principals but the bias in reporting during 1972-1974 mentioned in previous sections may not have been severe; parents and relatives particularly, appear prepared to report this offence type. Parents and relatives tended to report to the J.A.O. those types of offence which were associated with family problems. Private citizens appeared reluctant to report to the J.A.O. perhaps because of the general public's ignorance of their activities or their policies. Government reports were low because many Government sections for example, health, tended to report many cases to Children's Services. The range and number of offence types reported by J.A.O. staff suggested that it was less involved in detection (9.9 per cent of all cases) than in reaction to report and detection by other organizations.

The data do not reveal many of the possible biases outlined in chapter three. Three observations were relevant to assessment of bias in the sample data.

(1) A number of agencies reported to the J.A.O. and this range of data sources contradicted any claim that the sample data was unduly influenced by any one source;

(2) a wide range of offence types was reported by a number of agencies to the J.A.O.; this included the Police Department. Far from multiplying bias, this fact (together with the observation in (1) probably reduced bias effects in the data;

(3) although the principal reporting agency of stealing offences was retail stores (and therefore certain bias outlined previously was undoubtedly present), approximately thirty percent of cases of this offence type was reported by other agencies;

(4) the J.A.O. appeared to be active in detecting but relied on a range of reporting agencies none of which dominated completely in reporting one type of offence.

SUMMARY

An overview of the distribution of delinquency was presented early in this chapter. It was suggested that some evidence of delinquency gradients existed for residence and occurrence but that there was less evidence of coincidence of the two distributions. Characteristics of the offenders were discussed using social and demographic data collected for the sample population. Several propositions were tested but the principal aim was to describe the character of the data particularly the sources from which it was obtained and the problems and bias involved in obtaining it.⁶ Probably the most significant finding was the not unexpected high incidence of stealing especially in regional retail centres. The high incidence of occurrence and reporting suggested that this type of offence be investigated further in the next chapter.

6. The findings of this discussion are summarised in chapter six and used in deciding the variables in the ecological analysis of delinquency.

CHAPTER FIVE

SPATIAL BIAS IN THEFT DELINQUENCY MOVEMENT PATTERNS

INTRODUCTION

It was seen in chapter four that variations in patterns of delinquency residence and delinquency occurrence were evident in the population studied. Variation in patterns of delinquency may also occur when the same residential locations are examined in relation to a specific place of offence. What now needs to be investigated in this study is the linkage between house address (delinquency residence) and theft centre (delinquency occurrence). The patterns of linkages (delinquent movement) are investigated in this chapter for the offence category of stealing which includes shoplifting as the principal form of offence.

Spatial bias in theft delinquent movements was analysed for two reasons. Firstly, the results of the analysis could illuminate or complement knowledge about patterns of delinquency residence observed in chapter four. Secondly, knowledge of spatial bias variation in distributions may be influenced by spatial access variation around each theft centre. The spatial structure of the city interacting with the relative location of residence and the place where the theft occurred may be used by the delinquent in his movement to crime. These may be the most critical factors in the delinquent's decision to effect an offence or for the offence to be executed successfully. The analysis however, did not seek to unravel the motivations underlying the juvenile's decision to offend; nor was it cast within a decision-theoretic framework as, for example, were the studies of intra-urban migration (Whitelaw and Gregson, 1972). The emphasis in this section was on the given fact that movements to offence occurred and that assuming the distribution of offenders' residences was not completely random, some form of spatial bias existed.

This emphasis on the mapping of movements of delinquents rather than on the decision process prior to movement (resulting in a map) may be justified for the offence category of shoplifting. It appeared unlikely that most offenders considered that time taken to execute the movement was a critical factor in the act of

theft¹. That is, offenders did not appear to weigh their decision to steal by seeking or by critically evaluating alternative centres prior to movement to offence². Many offences in fact appeared unpremeditated and opportunistic; for these reasons, movement patterns, and their associated spatial bias measures, formed the focus of investigation.

The general aims of this chapter were:

- (a) to establish the nature and extent of distance, direction and sectional bias in delinquent movement patterns for seven theft centres on the study area;
- (b) to describe the influence of accessibility and age on delinquent movement.

The analysis and interpretation of data is presented after discussion of methodology relevant to the particular form of spatial bias being investigated. This is followed by a discussion of results relating to several propositions derived from spatial bias analysis. Finally, the chapter concludes with a summary and comparison of results from chapters five and six.

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1. Evidence for this was based on observation of the delinquents who were interviewed by J.A.O. staff during the period of data collection. The absence of recidivism among shoplifters may be further evidence to support this observation.
 2. The decision to follow this time of investigation was in the final analysis determined by the nature of the official statistics data; this did not necessarily detract from the study but it appeared evident that in future investigations of other categories of offence using geostatistical techniques, a knowledge of underlying social, economic and environmental processes influencing decisions to offend would be critical.

DISTANCE BIAS

Distance bias has been described as 'the degree to which a single movement is more likely to end in a nearby place than one more distant' (Brown and Holmes, 1971). Morrill (1963) noted that distance bias was usually between the two extremes of complete bias and no bias. In this study, no bias existed if distance was not related to choice of a theft centre. Bias existed if movement was always to one of seven "possible" theft centres. Even greater bias existed when there was a marked increase in delinquency residence associated with proximity to a theft centre. When distributions of movement patterns around the seven theft centres were compared and the rate of decrease of probability of offender movement with distance from the centre was greater for one, that centre's pattern of offender movement was said to exhibit greater distance bias.

Several delinquency studies have investigated the relationship between offender residence locations (assumed to be the origin of movement) and theft centres. White (1932) concluded that crimes against property involved greater average travel distances than crimes against persons (suggesting that distance was a function of the type of offence). Bullock (1954) obtained similar patterns of results in his analysis of movement patterns of criminals especially in relation to offences against the person. Gibbons and Prince (1962) in a study of English juveniles showed that 74% of shoplifters stole "in some area away from home". Turner's (1969) results suggested that distance between home address and the place where theft occurred tended to be close regardless of the type of offence. More recently, geographers have studied criminal movement behaviour including the "journey to crime" (Phillips, 1972; Harries, 1974). Capone and Nichols (1975) analysed travel patterns in terms of distance concluding that robbery trip frequency declined with distance and the length of robbery trips was a function of the value of the property obtained.

Distance bias for the seven distributions in this study was measured by the mean distance and the standard distance deviation. Mean distance (MDt) was used to give an indication of the

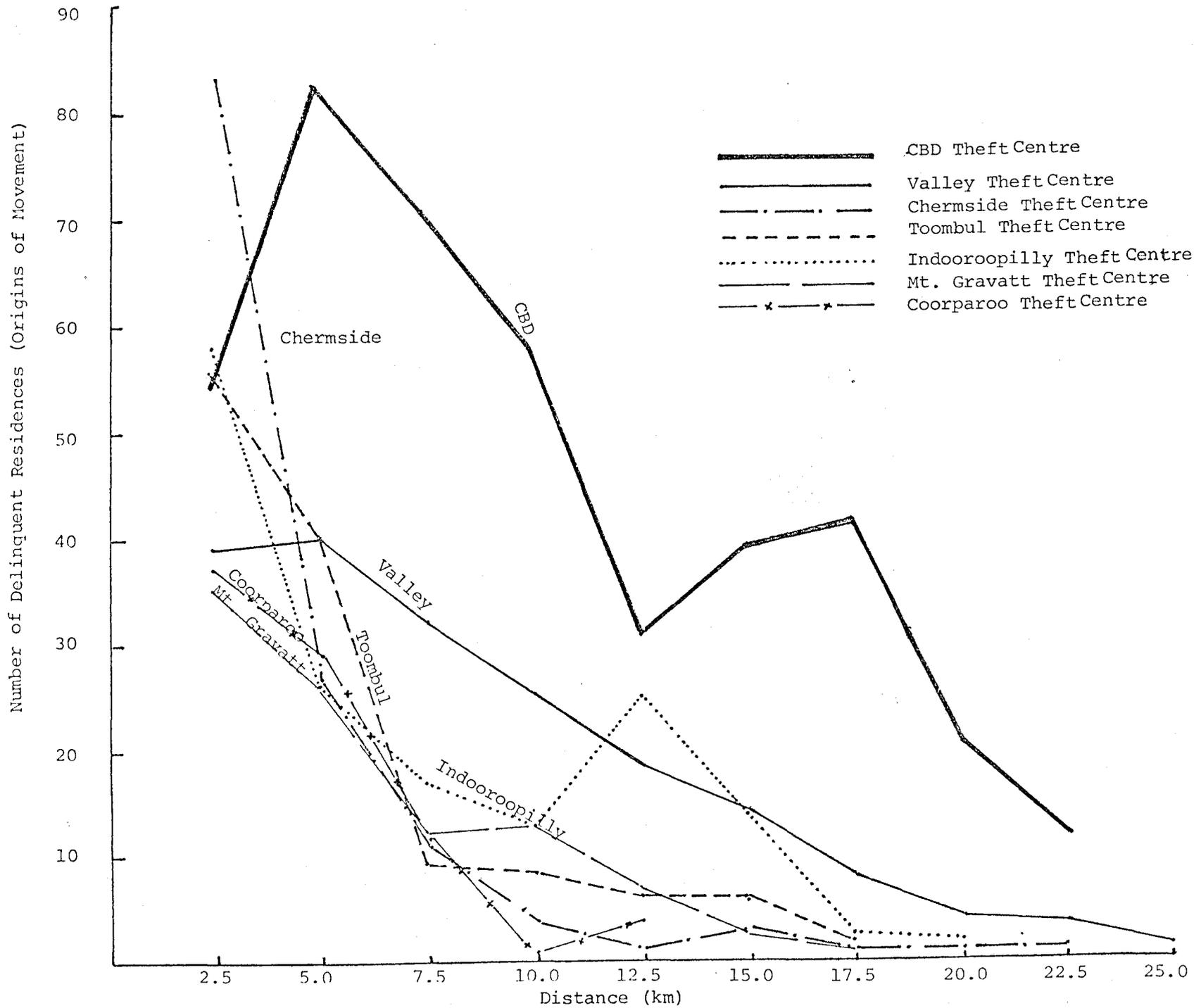


Figure 5.1: Graph of Number of Delinquent Residences at Defined Distances from Theft Centres

arithmetic average distance of the residences of delinquents from their theft centre irrespective of direction. Standard distance deviation (SDt) was a measure of the variation in the distances of delinquents' residences from the mean distance (MDt) value. A second indicator of distance bias was measured by calculating the number of offenders who moved to the nearest theft centre, the second nearest theft centre, the third nearest theft centre etc.

EMPIRICAL ANALYSIS

There was a general decrease in the number of delinquent's residences as the distance from theft centres increased. Figure 5.1 indicated that there was a distance-decay function for all sample populations around theft centres. The CBD population of delinquent residences was unusual in that between 2.5 and 5.0 km. and between 12.5 and 17.5 km. the number of residences increased. The near city increase may be explained by the presence of inner city industrialised areas reducing the population of juveniles between zero and 5.0 km. The fluctuation in the Indooroopilly theft centre population between the 10.0 and 12.5 km. distance may be explained by the frequency of offenders moving from the Inala area (the relative frequency expressed as a rate of offence was in fact, low, for this area). The frequency percent for the total population of offenders living within 5.0 km. was 53.4; within 10.0 km. 77.1 percent; within 15.0 km, 91.7 percent. 8.3 percent of offenders moved to offence at a distance greater than 15.0 km.

The distance bias observed in graphical form was supported by the centrophographic statistics. The data were analysed for the seven theft centre populations and as expected, there was disparity between mean distance (MDt) values for the populations around suburban centres and for the populations around the inner city theft centres of the Central Business District and the Valley (Table 5.1). The MDt values for the latter were 8.62 km. and 7.09 km. respectively. This contrasted with the MDt values and distance bias associated with the five suburban theft centres. The observation

TABLE 5.1 : DISTANCE BIAS IN OFFENDER MOVEMENT PATTERNS RELATIVE TO THEFT CENTRES

Theft Node	Mean Distance (km.)	Standard Error Distance (km.)	Standard Distance Deviation (km.)	Maximum Distance (km.)	Range (km.)
CBD	8.62	0.27	5.44	21.57	20.42
Valley	7.09	0.38	5.09	23.93	23.42
Toombul	5.00	0.34	3.84	16.70	16.70
Chermside	3.18	0.30	3.42	20.42	20.42
Indooroopilly	5.95	0.38	4.83	19.86	19.63
Mt. Gravatt	4.62	0.38	3.75	15.21	15.05
Coorparoo	4.37	0.46	4.34	20.37	20.21

suggested that the opportunity set provided by a theft centre closer to the residence of the offender differed from the opportunity set provided by theft centres in the Central Business District and Valley.

Distance bias for the inner city theft centres appeared similar although comparison of SDt values indicated that a similar percentage of offenders (68 percent) lived at a greater distance from the theft centre for the Central Business District population of offenders. An analysis of variance of straight line distance travelled by offenders revealed that there was a significant difference in distance variation between the two inner city groups. ($F = 7.46$; $df = 1$; $p < 0.006$). The difference between distance bias in delinquent's movements for the inner city theft centres and suburban theft centres may be gauged by the statistic derived when these two groups were contrasted. A very high F value ($F = 345.83$; $df = 1$; $p < 0.000$) for analysis of variance between groups indicated that there was significant difference in distance bias.

Although there was a similarity in MDt values for the five suburban theft centres there was significant variation in distance bias among centres. ($F = 132.01$; $df = 4$; $p < 0.000$). Toombul and Indooroopilly were similar in distance bias; similar distance bias was observed for the Mt. Gravatt and Coorparoo theft centre populations while the movement patterns around the Chermside centre exhibited greatest distance bias and clustering about this place of offence.

Analysis of distance bias for movement patterns to individual theft centres revealed distinctive characteristics associated with some centres. Indooroopilly had a relatively high MDt (5.95 km.). Offenders travelled from locations close by the Brisbane-Ipswich rail link. The home address of delinquents at a greater distance arose from the movement of offenders from Inala to the Indooroopilly theft centre. An efficient direct road transport system to the rail link and to the theft centre probably accounted for this scatter. The influence of the rail link may also be associated with delinquent locations in the Goodna area. The presence of these rail-road links apparently reduced the influence of the Brisbane River barrier and created and observed distance bias.

The distance bias observed for Toombul (MDt = 5.00km) was comparable to the Indooroopilly bias. A greater percentage of delinquent's residences or origins of movement were closer to the theft centre (SDt = 3.84km.) and bias was mainly due to the relatively fewer delinquent residences at a distance on the Sandgate-Redcliffe rail-road link.

The distance bias in offender movement patterns to the Chermside centre was significantly greater than the bias for other theft centres. The Chermside environment at the time of study was an area of high residential density : this together with the relatively greater number of juveniles in the areas surrounding Chermside may have accounted for this high bias. It may be relevant that this theft centre was further removed from the inner business area of the city. Immediately to the north of the Chermside along the principal transport route (the Northern Highway)

very little subdivision of land had been attempted at the time of data collection.

Distance may be summarised finally by calculating relative frequencies of delinquent 'moves' to the nearest centre (latter to be defined as accessibility), the second nearest, third nearest centre etc. This categorical measure of bias is shown in Table 5.2.

TABLE 5.2 : DISTANCE BIAS IN DELINQUENT MOVEMENTS TO NEAREST THEFT CENTRES

Population sample	Category of 'nearest centre'					
	First	Second	Third	Fourth	Fifth/ Sixth	Total
Total population	609 (51.1)*	199 (16.7)	152 (12.7)	163 (13.7)	69 (5.8)	1192
CBD	81 (20.1)	85 (21.1)	88 (21.8)	139 (34.5)	10 (2.5)	403
Valley	51 (27.7)	40 (21.7)	53 (28.3)	17 (9.3)	23 (12.5)	184
Indooroopilly	131 (82.4)	8 (5.0)	7 (4.4)	2 (1.3)	11 (6.9)	159
Chermside	113 (84.3)	12 (9.0)	4 (3.0)	-	5 (3.7)	134
Toombul	86 (68.3)	29 (23.0)	-	-	11 (8.7)	126
Mt. Gravatt	82 (84.5)	7 (7.2)	-	1 (1.1)	7 (7.2)	97
Coorparoo	65 (73.1)	18 (20.2)	-	4 (4.5)	2 (2.2)	89

* Percentage of sample population in brackets

The figures confirmed the relatively greater distance bias for delinquent movements to suburban theft centres than to inner-city centres. A chi-square of $\chi^2 = 559.7$ (df=3) supported the

The bias for movements patterns of inner-city populations was calculated slightly differently because the location of the theft centre and the inner city CBD were coincident or nearly coincident. It was not possible to draw a principal axis therefore, and an arbitrary vertical axis drawn through the CBD theft centre ($x=0, y=0$) on the cartesian grid) was chosen. The sector 'away from' the theft centre and 'lateral left' of the theft centre corresponded with the areas of Brisbane conventionally referred to as Brisbane North. The sector towards the theft centre corresponded with the area conventionally termed Brisbane West; while the sector, 'lateral right' corresponded with the area Brisbane South. The selection of this orientation corresponded with what has traditionally been perceived by residents as north, south and west segments of the city. The city structure itself suggested that this orientation was adequate since the principal highways into the inner-city were included in each sector. The use of this orientation was limited to comparison between directional bias for the two inner-city theft centres. For analysis of inner-city and suburban centres, the measure of directional bias was termed the modal direction (MD). This represented the percentage frequency of delinquents in a particular direction from the theft centre. The segment with the highest frequency indicated greatest bias.

The majority of delinquents' residences (58.10%) were directionally oriented lateral to the principal axis (Table 5.3). The value of 31.69 percent indicated that lateral bias was greatest left of the principal axis. There was equi-directionality in the movements of delinquents when two populations of offenders were compared.

Directional bias for the Central Business District and Valley theft centre populations considered independently was significantly different. The bias in any one direction was approximately double (according to the modal direction measure) when the two theft centres were compared; for example, directional bias west for the Central Business District theft centre (12.50%). For direction bias east ('away from the theft centre'), the converse was true.

TABLE 5.3 : MODAL DIRECTION FOR INNER-CITY THEFT CENTRE POPULATIONS

Direction	CBD	Fortitude Valley	Total
Toward theft centre (west)	24.81	12.50	20.95
Away from theft centre (east)	15.38	33.15	20.95
Lateral to right of the principal axis (south)	31.02	16.30	26.41
Lateral to left of the principal axis (north)	28.79	38.04	31.69
Total oriented to the principal axis	40.20	45.65	41.90
Total lateral to the principal axis	59.80	54.35	58.10
Total (n)	403	184	587

The Valley indicated a MD value of 33.15 while the Central Business District bias in the same direction was 15.38 percent.

The directional bias for movements of suburban populations around their respective theft centre reflected the city structure and in particular, accessibility patterns along major rail-road transport links. A very high percentage of delinquency movement from residences (78.73%) were oriented along the principal axis for Toombul. Most residences however (50.39%), were oriented away from this theft centre along the major Sandgate rail line with a main arterial road running approximately parallel to this rail link. The low value for the direction 'lateral to the principal axis' (21.27%), may be associated with the absence of main rail and arterial road links and hence limited access to theft.

Directional bias around the Chermside theft centre contrasted with the Toombul pattern. There was minimal bias with approximately equal percentages oriented along the principal axis (47.02%) or

lateral to the principal axis (52.98%). Lack of directional bias perhaps reflected the centrality of location of this theft centre in a high density residential area.

TABLE 5.4 : MODAL DIRECTION FOR SUBURBAN THEFT CENTRE POPULATIONS

Direction	Toombul	Chermside	Mt. Gravatt	Indooroopilly	Coorparoo
Toward theft centre	28.34	20.90	37.50	16.88	14.95
Away from theft centre	50.39	26.12	21.88	21.87	41.38
Lateral to right of the principal axis	11.81	16.42	20.83	44.38	37.93
Lateral to left of the principal axis	9.46	36.56	19.79	16.87	5.75
Total along the principal axis	78.73	47.02	59.38	38.75	56.32
Total lateral to the principal axis	21.27	52.98	40.62	61.25	43.68
Total (n)	126	134	97	159	89

The lateral directional bias for the Indooroopilly theft centre was related to the distance bias explained by the presence of an efficient Brisbane-Ipswich rail link was probably associated with the 44.38 percent bias 'lateral right of the principal axis'. This contrasted with the low MD value for 'lateral left' (16.87%), an area with fewer delinquent residences associated with low population numbers in the Brisbane west suburbs of Kenmore and Moggill. Fewer residences were oriented toward (16.88%) than away from (21.87%) the Indooroopilly theft centre. There may have been some association between these figures and the percentage of flats and rented dwellings in suburbs along rail-road links toward the Central Business District, and the higher percentage of middle to high class residential dwellings at lower residential densities (on either side of the river in Kenmore, Jindalee areas).

There was a marked bias in direction along the principal axis (59.38%) for Mt. Gravatt: a high proportion of movement (37.50%) was directed toward the orientation node (CBD). These areas toward the inner city are well established residential areas. The bias of residences and hence delinquent movements toward the CBD relative to the Mt. Gravatt theft centre complemented the directional bias away from the inner city observed for Coorparoo (41.38%). This bias was associated with the high density residential areas occupied by both populations. For the latter theft centre population, there was a bias in orientation 'lateral to the right' as well as the bias observed for 'away from the city centre'. This bias may be associated with the Sandgate-Wynnum road-rail link: the linearity of distribution was not pronounced and tended to make the correlation tenuous. The low 5.75 percent 'lateral left of the principal axis' may have been associated with offender movement patterns to the Valley and Central Business District. Offenders from the areas of Moorooka, Yeronga, West End, Dutton Park etc. tended to focus attention on the two inner city theft centres, hence reducing movement to Coorparoo from this direction.

SECTORAL BIAS

A third form of bias in delinquent movement patterns was described by determining the size of the sector from the CBD required to enclose the residential locations of delinquents. The bias was called sectoral bias and when used for delinquent movement patterns, it was calculated with reference to the principal axis which was a line joining the inner-city CBD with the respective theft centre. To determine sectoral bias relative to the principal axis, Whitelaw and Gregson (1972) calculated an estimate line or "line of best fit". The method used was "the least squares method": this was in effect, a regression line based on the x and y values of individual delinquent residence locations on a cartesian grid. The sectoral bias based on a sketch of the Indooroopilly population is shown in Figure 5.3. The angle θ was taken as the best measure of sectoral bias.

There are a number of assumptions underlying this procedure for measuring sectoral bias. Firstly, the 'estimate line' was assumed to be linear: the patterns of delinquency residence distributions suggested that movements would be linear rather than curvilinear. Secondly, Caesario (1975) has suggested that the method is inadequate if there is misspecification of the choice process. That is, one theft centre or many may be available from one residence and this must be taken into account in analysis which involves a choice process which underlies the movement patterns of delinquents from home to theft centre. Without recognition of this fact, unreliable estimates of "best fit" lines would be calculated. Inspection of Table 5.4 suggested that this assumption could be problematic in calculating sectoral bias for the two inner-city groups since at the origin of movement (the delinquent's home address), there were many choices of a theft centre for many delinquents. Only 20.1 and 27.7 percent in the CBD and Valley populations choose the nearest theft centre. For movement of delinquents to suburban theft centres, the pattern was quite opposite in character with high percentages of delinquents moving to the nearest centre. These simple distance bias measures provided the basis for confidence in the method of calculating sectoral bias in this study.

The most important assumption which in the Whitelaw and Gregson study was not considered and therefore makes their results suspect, relates to the accuracy of estimates of point co-ordinates. If the x co-ordinates of a cartesian plot have been measured with perfect accuracy, the "line of best fit" - the estimate line - is that which minimizes the sum of the squares of the y residuals. The same condition may be postulated that if all the errors are in the x co-ordinates, the best line is that which minimizes the sum of the squares of the x residuals. Whitelaw and Gregson assumed in their calculation of a "best straight line" that the co-ordinate along one axis only, was in error.

It usually happens in practice that both co-ordinates of any one point are in error. It cannot be assumed that all the error is in the x co-ordinate alone or the y co-ordinate alone. There are a number of methods which can be used to overcome this problem. Adcock (1978) defined a line, later called the "major axis" such that the sum of the squares of the perpendicular distances of the points from the line are a minimum: York (1966) derived the "Least Squares Cubic" to deal with the problem.

The simplest procedure and the one adequate for this study was to calculate the 'best straight line' in the data for the x and y co-ordinates of the cartesian plot (Figure 5.3) and to derive the average of these two lines. The detailed calculation of this line is quite complex and is included in Appendix E for ease of reading and interpretation of the text. The calculation of sectoral bias movements for Indooroopilly is demonstrated.

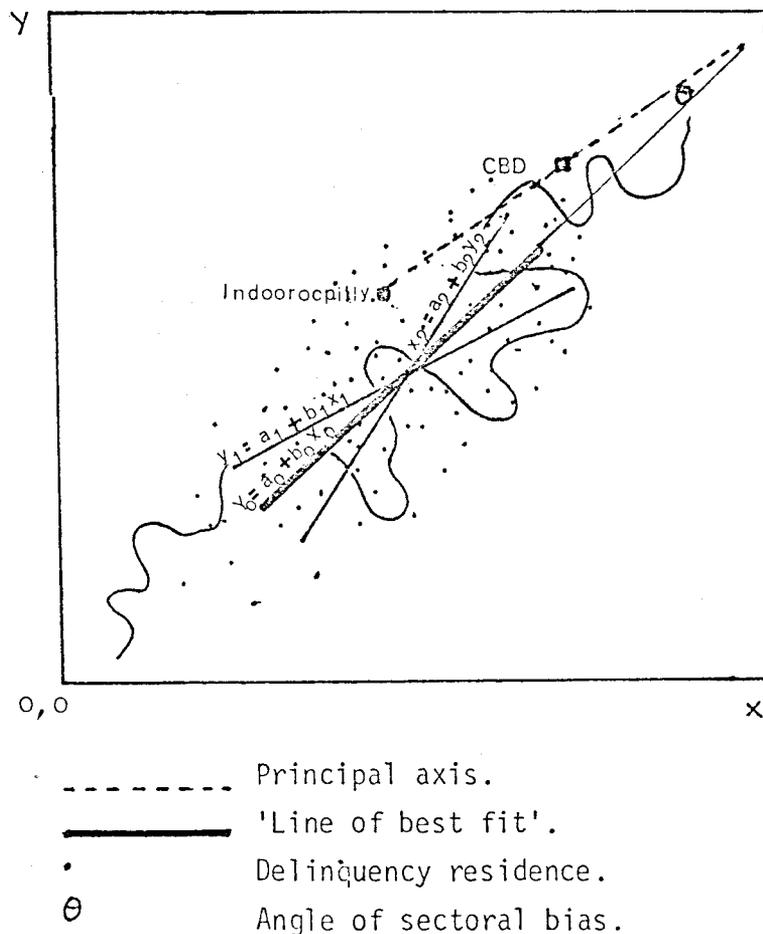


Figure 5.3: Sectoral Bias for the Indooroopilly Population Relative to the Inner-city CBD.

The "best-fit" line of the general mathematical form, $Y = a + bX$ was used therefore to estimate sectoral bias relative to the CBD used as an orientation reference point. Although it was possible to calculate this line for the total population and for the inner-city CBD population, the measures were unusable (a) for reasons suggested by Caesario (1975) and (b) because no angle between the estimate line and the principal could be calculated. Since the theft centre (CBD) and orientation reference point were coincident, no principal axis could be drawn.

TABLE 5.5 : SECTORAL BIAS STATISTICS FOR DELINQUENT MOVEMENT PATTERNS AROUND THEFT CENTRES

Population	Estimate Line	Angle of estimate line with the principal axis
Total Population	$Y = 24.03 - 0.773X$	-
CBD	$Y = 22.84 - 0.766X$	-
Valley	$Y = 31.69 - 1.286X$	$64^{\circ}26'$
Toombul	$Y = -3.75 + 1.570X$	$14^{\circ}6'$
Chermside	$Y = 35.38 - 1.268X$	$32^{\circ}15'$
Indooroopilly	$Y = -6.86 + 1.508X$	$12^{\circ}32'$
Mt. Gravatt	$Y = 30.34 - 1.248X$	$0^{\circ}13'$
Coorparoo	$Y = -4.65 + 1.006X$	$75^{\circ}12'$

Sectorality for the Valley and for each of the suburban sample populations is shown in Figure 5.4 and Table 5.5. The value for the Valley population indicated very low sectorality. The estimate however ought not be regarded with too much confidence because of the distorting effect and near coincidence of the Valley theft centre with the CBD orientation centre and because of violation of the assumption underlying choice process for this theft centre mentioned in the previous section.

The suburban patterns however indicated a range of bias in delinquents' movements. The origin of these movements for the Mt. Gravatt group were positioned along the principal axis and the angle ($\theta = 13'$) of the estimate line with this axis suggested

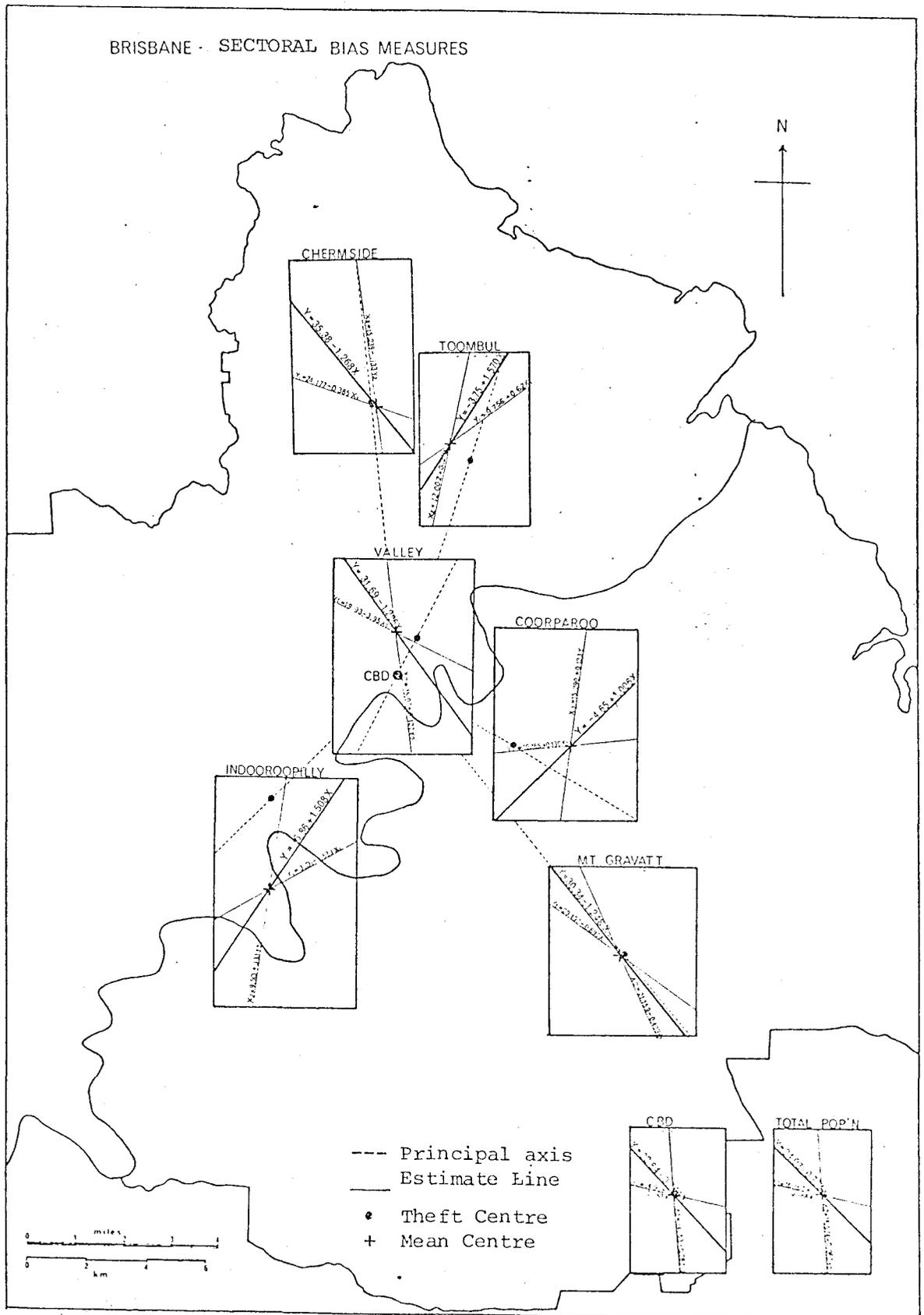


Figure 5.4: Sectoral Bias Relative to the Inner-city CBD.

near perfect sectoral bias. This measure of sectorality was probably associated with the north west - south east orientation of the principal axis, a similar orientation of the principal southern arterial highway out of the city (and directly passing by the Mt. Gravatt theft centre) and the density and proximity of delinquents' residences to this highway.

The \emptyset angles for Toombul ($14^{\circ}6'$) and Indooroopilly ($12^{\circ}31'$) suggested that a narrow wedged shape sector was required to 'enclose' the two distributions relative to the CBD. These relatively small angles indicated high sectoral bias which again was probably correlated with the transport network structure in the study areas. The principal axis for Indooroopilly followed the orientation of the Brisbane River approximately: the rail-road Brisbane to Ipswich links were themselves constrained in direction and orientation by the river. With higher residential density along these routes, it was not surprising that high sectoral bias would occur. A similar situation described the Toombul population. Linear settlement along the main northern arterial route from the city probably influenced sectorality in this area.

Considerably less sectoral bias was observed for Chermside ($\emptyset = 32^{\circ}15'$) and little to no bias for Coorparoo ($\emptyset = 75^{\circ}12'$). The clustering of delinquent origins of movement (residences) around the Chermside theft centre may have accounted for this. The 'best estimate line' was 'skewed' at a greater angle to the principal axis because of the residential density to the east and west of the theft centre and because of the absence of settlement to the immediate north. Sectorality for Coorparoo was minimal: it was probably significant that this centre was not on a principal arterial highway. Its position on a main roads four-ways junction probably influenced the movement of offenders from the east (Redland Bay, Wellington Point, Carina etc.) and from the south and south east.

SPATIAL BIAS MEASURES IN DELINQUENT MOVEMENT PATTERNS

Chapter four has looked at spatial bias in distributions which link place of residence with place of theft offence. The rank order of bias measures within each distribution is shown in Table 5.6

TABLE 5.6 RANK ORDER OF BIAS MEASURES FOR MOVEMENT PATTERNS AROUND THEFT CENTRES.

Population Statistic	Spatial Bias Relative to Theft Centre		
	Distance	Direction	Sectorality
	MDt	% frequency	$Y=ao+boX$
CBD	7	6	-
Valley	6	5	5
Toombul	4	1	3
Chermside	1	4	4
Indooroopilly	5	7	2
Mt.Gravatt	3	2	1
Coorparoo	2	3	6

The distance bias was similar in rank order for the inner-city distributions. There was greater variation in rank order of measures. Chermside, for example, with greatest distance bias had little directional or sectoral bias relative to other distributions.

The results suggested that one very important variation was operating in the spatial expression of juvenile theft movement patterns surrounding the theft centres studied. Accessibility appeared to be an important variable influencing the movement of

offenders. The concept expressed itself for a number of sample population distributions. The linear scatter of delinquents' residences around Indooroopilly (Figure 5.2) for example, suggested the strong influence of the rail-road structure on delinquents' movements. Coorparoo exhibited a relatively low distance bias and virtually no sectoral bias suggesting the overriding influence of its location on the junction of arterial roads aligned at right angles to each other. The relatively high sectoral bias for all theft centres excluding Coorparoo and Mt. Gravatt reflected the spatial structure of the city and the arterial highways in the study area. Accessibility expressed itself in the tendency for delinquent movement patterns to be directed toward the inner-city area than to be directed away from the inner city area.

The ellipses for each suburban theft centre population suggested that as many offenders tended to live nearer the inner city area as live away from the area. If a significant number of offenders moved from suburbs on the periphery of the study area, the mean centres for distributions would be displaced outward from the inner city. There was however, only a relatively slight displacement of mean centres. The exception was the scatter around the Indooroopilly centre where displacement along the Y - axis, outward from the centre, was significant compared to other suburban theft populations. These kinds of observed measures suggested that a number of propositions relating to accessibility required further inquiry. Several propositions in the form of questions related to the concepts of movement, distance and accessibility were proposed:

- (i) What was the pattern of 'nearest theft centre' (accessible) movement of delinquents in the sample population?
- (ii) How was the pattern of delinquent movement influenced by the difference between the number of offences recorded for theft centres (observed) and the number of delinquents accessible to nearest centres (expected)?

- (iii) What then was the relationship between accessibility (to the nearest centre) and the number of *nearer centres* (defined in terms of distance) actually by-passed by delinquents?
- (iv) What was the relationship between accessibility to the nearest centre and the number of theft centres *passed* by delinquents in their movement to theft?
- (v) How did age of delinquents influence overall distance travelled?
Was accessibility dependent on the age of the delinquent?

The notion of accessibility was reviewed before these questions were analysed.

ACCESSIBILITY

Movement of delinquents may be described in terms of the concept of accessibility⁴. Moore describes accessibility as simple airline distance between a point *i* and a point *j*; as travel cost or travel time; or as the number of interviewing opportunities between a point *i* and a point *j* (as used by Stouffer, 1960). The idea of opportunity structure as a basis for property crime rates was first suggested by Lottier (1938). This was later emphasized by Morris (1957) whose analysis of criminal areas focused on the distinction between the origin or residence of the offender and the place of offence. Crimes tended to be committed where practical opportunities were greatest. Boggs (1969) extended the concept of opportunity suggesting that crime occurrence rates should be based on "opportunities specific to each crime category".

Accessibility in this study was interpreted as airline or Euclidean distance; it was taken to mean "capable of being reached", thus implying a measure of proximity between two

4. The term is rarely defined. Gould states: "Accessibility... is a slippery notion ... one of those common terms that everyone uses until faced with the problem of defining and measuring it." (Gould, 1964, p.4).

points (Ingram, 1971). Proximity was always to the nearest theft centre. Although the concept of intervening opportunity at first sight appeared more useful as a measure of accessibility, little behavioural information (for example, the "attractiveness" of stores either aesthetically or as places of low security against theft) was available in the sample data to determine how the offender perceived theft centres as opportunity sets. Moreover most measures of opportunity were arbitrary and inadequate (Moore, 1970). Finally the decision to use straightline distance as a measure was influenced by the evidence that suggested there was a strong and consistent relationship within cities, between straight line distance and road networks (Nordeck, 1964)⁵. Distance as a measure of accessibility was thought to be fundamental to the understanding of spatial organisation⁶.

Most accessibility models were found to be based upon a distance relationship between two or more points (Neft, 1966). In some studies, unrefined distance was considered too crude a measure of accessibility. Travel times were substituted as more sensitive indicators of reality. Because it was not possible to extract the mode of the journey of the offending juvenile to a theft centre (for example, by car, bus or train all of which have different travel times) or the frequency percent for use of each of these modes of travel, the measure of distance was retained in the model. Straightline distance measures therefore were thought to be the most adequate measures of accessibility.

Distance as accessibility did not refer to *any* straightline measure. The overall distance a delinquent travelled to a theft centre was not necessarily a measure of accessibility: nor was distance bias necessarily equivalent to accessibility. If a

5. Ingram (1971) demonstrates a very high rank order, correlation coefficient ($r = 0.9901$; and students $t = 152.77$, $df=464$) for measures based on straight line distance and rectangular distance (based on rectangular street patterns).

6. Warntz (1959) uses the concept of distance to introduce the idea of "potential" at a point in a pattern or distribution.

delinquent moved to a centre more distant than the nearest centre relative to his home address, the distance measure was unrelated to the notion of accessibility. Accessibility was a measure of the distance a delinquent would or did travel in moving to the theft centre nearest to his home address. For each there was only one accessible theft centre. However there was a range of distances for the nearest centres relative to all delinquents' addresses. The *degree of accessibility* therefore depended on proximity and the range of distance values to nearest theft centres.

Expected Frequency For 'Nearest Theft Centre' Movements

The pattern of 'nearest theft centre' movement is indicated in Table 5.7. For the CBD sample population, 81 of a possible 403 delinquents moved to the CBD which was for them the nearest, that is, the accessible theft centre; 31 delinquents however lived nearest the Valley theft centre which was nearer than the CBD to which they travelled. Spatial bias measures in previous analyses suggested that accessibility was important. This was particularly the case for delinquents who moved to suburban centres. The results for these populations suggested that distance bias was high and this occurred because many delinquents did in fact move to their accessible theft centres. Conversely the pattern of 'nearest theft centre' movement indicated that the majority of delinquents in the CBD population, did not move to their accessible centre. The low distance bias previously observed for the Valley population (Tables 5.1 and 5.2) may be explained by the failure of delinquents in this population in the Chermside area to move to the nearest place of offence. Two hundred and fifty-three (21.2%) of the total sample population of delinquents were accessible to this centre; this relatively high number was associated with the high residential density in the immediate area around Chermside. But of the 253 delinquents, more moved to other theft centres (119) than moved to Chermside (113). The majority moved to inner-city centres with 27 delinquents travelling to an adjacent theft centre, Toombul. The latter figure represented a greater number of delinquents from the Toombul area shoplifting from Chermside, than delinquents from the Chermside population (N=14) shoplifting from

TABLE 5.7 : 'NEAREST CENTRE' FOR DELINQUENTS' MOVEMENTS
WITHIN SAMPLE POPULATIONS

Theft centre sample populations	Nearest theft centre							Total (T)
	CBD	Valley	Indooroopilly	Chermside	Toombul	Mt. Gravatt	Coorparoo	
CBD	81	31	81	57	21	69	63	403
Valley	21	51	18	50	14	20	10	184
Indooroopilly	5	4	131	4	3	9	3	159
Chermside	2	1	3	113	14	1	-	134
Toombul	4	2	4	27	86	-	3	126
Mt. Gravatt	-	4	1	-	1	82	9	97
Coorparoo	1	2	2	2	2	15	65	89
Total n of each sample population moving to res- pective theft centres (t)	114	95	240	253	141	196	153	1192
Number 'displaced' from 'nearest theft centre' (T-t)	-289	-89	+81	+119	+15	+99	+64	
Total number (t') within each pop- ulation not select- ing 'nearest theft centre'.	322 (79.9)	133 (72.3)	28 (17.6)	21 (15.7)	40 (31.7)	15 (15.5)	24 (30.0)	

Toombul. Two other theft centres had delinquents (from the total population) who were accessible to these centres than to the centre from which they actually stole. One hundred and ninety-six delinquents were accessible to Mt. Gravatt yet 50.5% (N=99) of these stole from other retail establishments. Similarly, 153 delinquents were accessible to Coorparoo but 41.8% (N=64) stole from other centres. A similar accessibility adjacency relationship existed between these two

theft centres. A greater number (16.9%; N=15) of the Coorparoo sample population stole from the adjacent but more distant Mt. Gravatt theft centre; fewer delinquents from the Mt. Gravatt sample population (9.3%; N=9) stole from the adjacent but more distant Coorparoo theft centre. The centre which had a high potential for theft according to the criterion of accessibility was Indooroopilly. However, of the 240 or 20.1% of the total sample population who were accessible to Indooroopilly, 131 or 11.0% of the total number of delinquents (equivalent to 82.4% of the sample population who actually stole from Indooroopilly) used their most accessible centre.

Relationship Between Expected and Observed Frequency For Nearest Centre Movements.

The importance of accessibility as a criterion of delinquent movement may be seen in the relationship between frequency of delinquents accessible to theft centres (expected), and frequency of delinquents actually stealing from these centres (observed). Previous measures established the difference between accessibility movements to inner-city and suburban centres. The analysis therefore was confined to these two groups. Table 5.8 indicates the relationship for suburban theft centres. The chi-square value of 9.30 (df=4) was not significant, a result which supported the

TABLE 5.8 : EXPECTED AND OBSERVED FREQUENCY FOR NEAREST CENTRE MOVEMENTS

Frequency	Theft Centre					Total
	Indooroopilly	Cherm- side	Toombul	Mt. Gravatt	Coor- paroo	
Observed in sample	159	134	126	97	89	605
Expected: most accessible	240	253	141	196	153	983
	399	387	267	293	242	1588

observation that suburban theft centres populations were similar in the emphasis delinquents placed on accessibility. It was assumed that the inner-city sample populations of delinquents placed similar emphasis on accessibility; the analysis indicated a $\chi^2 = 13.81$ (df=1) which was significant at better than $p > 0.001$. The choice of centres by delinquents who were in the inner-city and suburban sample populations was quite different ($\chi^2 = 115.22$; df=1). Accessibility interpreted as choice of nearest centre for theft appeared more important therefore to delinquents who centred their activities on suburban centres.

ACCESSIBILITY AND MOVEMENT OF OFFENDERS TO NEARER THEFT CENTRES.

The third proposition suggested that there was a dependent relationship between accessibility (to the nearest centre) and the number of *nearer centres*, in terms of straight line distance measures, at which the delinquent *could* have committed theft if he had selected one of these places.⁷ The distances between the residence of each delinquent and all seven theft centres was calculated. The distances to the nearest centre for the total sample population were ranked and categorised into four levels of accessibility.⁸ The number of theft centres with distance values to the delinquent's residence less than the overall distance travelled by the delinquent were counted. This figure was the number of nearer centres by-passed by an offender. A summary of nearer centres is shown in Appendix F. The relationship between

7. The distinction here is that the 'nearer centres' measure is a function of distance in relation to the origin of movement, the delinquent's residence. The number of centres passed depends on the direction of movement from the point of origin to the *actual* or real theft centre. A delinquent living mid-point between the CBD and Toombul who actually steals at Indooroopilly may be nearer Toombul, Chermside, CBD and Valley theft centres but he passes the latter two centres only in movement to theft activity.

8. The four levels were approximately 'quartile' measures with level 1 (N=315, 26.4%) level 2 (N=305, 25.6%) level 3 (N=304, 25.5%) and level 4 (N=268, 22.5%): the nature of the distribution determined variation in numbers in each level. A complete analysis is shown in Appendix K.

accessibility and number of nearer centres by-passed is indicated in Table 5.9.

TABLE 5.9 : ACCESSIBILITY AND FREQUENCY OF NEARER THEFT CENTRES BY-PASSED BY DELINQUENTS

		Number of Nearer Centres By-passed					Total
		0	1	2	3	4	
Accessibility (distance)	1	241 (+78)	43 (-10)	19 (-22)	10 (-34)	7 (-11)	320
	2	181 (+22)	63 (+11)	35 (-5)	22 (-21)	11 (-7)	312
	3	114 (-34)	57 (+9)	64 (+40)	33 (-13)	22 (+5)	290
	4	73 (-67)	36 (-9)	34 (0)	98 (+61)	29 (+13)	270
		609	199	152	163	69	1192

$$\chi^2 = 229.84; df=12; p > 0.000$$

Difference between observed and expected in brackets.

Clearly, accessibility was related to nearer centres by-passed. The four categories representing distances travelled to nearest centres for the total sample population were associated negatively with the number of nearer centres by-passed. The delinquents who would have travelled, or did travel, least distance to nearest centres were also those who by-passed fewer centres. That is, they did move or would have moved directly to their accessible theft centres. The delinquents who were grouped in category four at highest distances to nearest centres, were the juveniles who in reality by-passed a greater number of theft centres. While there was variation in nearest centre distance or accessibility values, this variation also reflected, in a linear

9. The number of nearer centres was in fact, a measure of overall distance travelled since a χ^2 value equal to 340.09 (df=12; 5x4; distance x centre categories; $p > 0.000$) indicated a very high dependency relationship.

fashion, the actual number of theft centres delinquents by-passed. The pattern of results observed here was similar for the inner-city and suburban centre sample populations.¹⁰

ACCESSIBILITY AND NUMBER OF THEFT CENTRES PASSED

Further analysis aimed at establishing whether the number of theft centres *actually* passed by delinquents was associated with a degree of accessibility, that is the range of distances of delinquents to their nearest theft centre. Again the importance of accessibility defined as Euclidean distance to a nearest place of theft was evident. Sixty seven point four percent (N = 804) of delinquents in the total sample population did not pass one of the seven centres in moving to theft (Table 5.10).¹¹ As the degree of accessibility decreased within this category, the number of delinquents decreased. Those delinquents who lived nearest a theft centre (suburban or inner-city) tended to steal from that centre. Those who lived at a greater distance from their nearest centre but who did not necessarily commit theft at this centre, tended to move to alternative centres and in so doing passed a number of possible places of theft.

There appeared to be operating a kind of dislocation factor in theft movement patterns. The delinquents nearest and most accessible to a theft centre were "influenced" by its proximity and tended to steal at that centre or one nearby. Delinquents

10. Inner city $\chi^2 = 94.49$, $df=9$, $p > 0.000$; suburban theft centres $\chi^2 = 24.25$, $df=2$, $p > 0.000$. The latter analysis required a 3x2 table of dependency because delinquents moving to suburban centres moved to *their* nearest centre.

11. The number of centres passed depended on the direction of movement along public transport routes. (The number of nearer centres depended on the Euclidean distance of the delinquent's home to all relevant centres in any direction). Delinquents could in effect travel long distances to a place of theft, for example Wynnum to the CBD, without effectively passing a theft centre. Nearer theft centres however could be calculated as Coorparoo, Mt. Gravatt and the Valley.

TABLE 5.10 : ACCESSIBILITY AND FREQUENCY OF THE CENTRES PASSED BY DELINQUENTS

		Number of centres passed				Total
		0	1	2	3 or >	
Accessibility (distance)	1	244 (+28)	59 (-12)	11 (-9)	6 (-7)	320
	2	235 (+25)	52 (-18)	13 (-7)	12 (0)	312
	3	199 (+3)	60 (-4)	19 (+1)	11 (0)	290
	4	126 (-56)	94 (+34)	32 (+15)	18 (+7)	270
		804	266	75	47	1192

$$\chi^2 = 78.08; \text{ df}=9; \text{ p} > 0.000$$

accessible to the same centre but living at a greater distance tended to be spatially "unattached" and hence moved to theft at a distance from their home address passing two or more possible places of theft in the process.

AGE, DISTANCE AND ACCESSIBILITY

In chapter three it was demonstrated that the chronological age of delinquents was associated with a number of correlates including age, marital status of the delinquent's parents and previous convictions in the family. The first of these three variables age, was investigated for its relationship with overall distance travelled and with accessibility. Two propositions were tested¹²:

older delinquents tended to travel greater distances to theft centres; and

12. The distinction is again drawn between overall distance travelled and accessibility which was defined as distance to the nearest centre; it has already been seen that there was variability in accessibility or distance measures to nearest centres.

accessibility was dependent on age with a great number of younger delinquents travelling to nearest theft centres.

The first proposition was supported partly by the mean distance and standard distance measures for the six age groups (Table 5.11). The younger eleven and twelve year olds travelled mean distances which were smaller in magnitude than distances covered by older juveniles. Standard distance values were relatively low. The figures were inconclusive and a contingency table relating age to distance was constructed. Initial analysis sought to determine whether the distribution of age groups in the

TABLE 5.11 : AGE AND OVERALL MEAN AND STANDARD DISTANCE TRAVELLED

Age	Arithmetic Mean Distance (km)	Standard Distance (km)	N
Eleven years*	8.56(2)*	4.74	122
Twelve years	8.35(1)	4.80	115
Thirteen years	9.96(6)	5.14	132
Fourteen years	8.93(4)	5.45	126
Fifteen years	8.57(5)	5.00	115
Sixteen years	9.23(3)	4.21	61
Total (all groups)	8.99	4.97	671

* Rank order in brackets.

study area would bias results of analysis of age and overall distance travelled. Mean ages for statistical areas indicated that age groups of offenders were randomly distributed and that no one group of juveniles with the same age could be identified with a particular distance measure.¹³

13. Where appropriate statistical areas were grouped to ensure reasonable confidence levels could be obtained with the available data.

Age appeared to be an important correlate of overall distance travelled (Table 5.12). The older the offender the greater the distance travelled to the place of theft offence. The younger the delinquent the lower the probability that he would move to a

TABLE 5.12 : AGE AND OVERALL DISTANCE TRAVELLED TO THEFT CENTRES

		Overall Distance (km)					Total
		1	2	3	4	5	
Age (years)	11	47 (+14)	34 (+3)	19 (+3)	9 (-4)	13 (-15)	122
	12	35 (+4)	33 (+4)	13 (-2)	9 (-4)	25 (-2)	115
	13	38 (+2)	40 (+7)	8 (-10)	17 (+3)	29 (-2)	132
	14	37 (+3)	21 (-11)	20 (+3)	12 (-2)	36 (+5)	126
	15	17 (-14)	25 (-4)	19 (+4)	15 (+3)	39 (+12)	115
	16	9 (-8)	17 (+2)	10 (+2)	11 (+5)	14 (+0)	61
TOTAL		183	170	89	73	156	671

$$\chi^2 = 50.59; \text{ df}=20; \text{ p} > 0.001$$

theft centre at a great distance.¹⁴ The pattern above although not too clearly defined, was repeated for delinquents grouped in the inner-city sample population ($\chi^2 = 37.6$; $\text{df}=20$; $\text{p} > 0.01$; $\text{N}=341$). The effect of age on overall distances travelled for suburban theft centres appeared random ($\chi^2 = 23.5$; $\text{df}=20$; $\text{p} < 0.546$) because a few delinquents travelled 'extreme' distances and

14. The distance categories were based on the distribution of overall distances travelled by delinquents with level 1 equal to distances up to 2.49 km, level 2 up to 4.99 km., level 3 up to 7.49km., level 4 up to 9.99 km., and level 5 up to highest. The categories varied from distance categories used to measure accessibility.

the majority appeared to move short distances to nearest theft centres.

An analysis of age by number of theft centres *actually* passed by delinquents suggested that this former analysis might have been misleading (Table 5.13). The chi-square value of 13.08 was not significant so that distance was not a good measure of spatial behaviour.

TABLE 5.13 : AGE - NUMBER OF THEFT CENTRES PASSED BY DELINQUENTS

		Age (years)						Total
		11	12	13	14	15	16	
Number of theft centres passed	0	92	74	92	84	71	39	452
	1	22	28	22	24	29	18	143
	2 or >	8	13	18	18	15	4	76
		122	115	132	126	115	61	671

$$\chi^2 = 13.08; \text{ df}=10; 0.10 < p > 0.90$$

The more relevant research question was therefore whether age influenced movement for those delinquents who actually did move to their accessible centre. This question was resolved by chi-square analysis (Table 5.14)

TABLE 5.14 : AGE - ACCESSIBILITY RELATIONSHIP FOR THEFT DELINQUENCY

	Age (years)						Total
	11	12	13	14	15	16	
Observed	83	59	76	54	38	23	333
Expected	61	57	66	62	57	30	333
	104	116	142	116	95	53	666

$$\chi^2 = 18.51; \text{ df}=5; p > 0.01$$

Expected values for each age category (N=333) were determined from the age distribution (N=671) in Table 5.13.¹⁵ Again age appeared to be an important correlate of accessibility. There tended to be more younger than older offenders who travelled to the nearest available theft centre. This result contrasted with the speculative question as to whether age would have influenced movement to accessible theft centres for all 671 delinquents. If all delinquents had travelled to their nearest centre, age would *not* have been a correlate of movement ($\chi^2 = 19.78$; $df=15$; $0.90 < p < 0.10$). The two propositions therefore tended to be supported by the data. Older delinquents travelled greater overall distances to theft; younger delinquents travelled shorter overall distances. Secondly, delinquents who moved to their accessible (nearest) centre, tended to be in the lower age range of the distribution. There was a dependent relationship between age and accessibility.

SUMMARY

Spatial bias analysis revealed several important characteristics of delinquent movement to theft at seven centres in the study area. The distance bias observed for the total sample population supported results reported in previous studies. Distance bias of offender movements was greater for suburban theft centre populations of delinquents with some centres exhibiting quite distinctive features of bias. More delinquents tended to move toward the inner-city CBD than away from it; directional bias measures suggested that city structure was important in delinquent movement to theft

15. For example, the eleven age group (N=122) represented 18.2% of total number (N=671) for which age data was available. This percentage fraction of N=333 represented N=61 in Table 6.14. The difference between N=452 (Table 6.13) and N=333 (Table 6.14) was due to the fact that a delinquent need not pass a theft centre which was the accessible centre for him (as defined in this study).

centres. The pattern of 'nearest theft centre' movement suggested further inquiry using the notion of accessibility defined as the straightline distance travelled to the delinquent's nearest theft centre. The relationship between accessibility and number of nearer centres by-passed was highly significant. But this form of analysis did not account for the directional bias observed in previous results. Accessibility and its association with the number of centres *actually* passed was considered and it was found that the degree of accessibility was dependent on the actual number of theft centres passed by juveniles. The distance bias measures and accessibility analysis suggested that delinquents who live a greater distance from their nearest theft centre tended to become 'dislocated' from that centre. They become 'exports' to alternate theft centres or 'imports' to inner-city centres. Finally, age appeared to be an important correlate of overall distance travelled by delinquents; older delinquents travelled further to theft and younger delinquents travelled shorter distances. Similarly, younger delinquents who actually travelled to their accessible theft centre tended to journey shorter distances; older delinquents travelled longer distances to their accessible centre.

CHAPTER SIX

THE ECOLOGICAL ANALYSIS OF DELINQUENCY

INTRODUCTION

"It is more important to have beauty in one's equations
than to have them fit an experiment."

Paul Dirac

Up to this stage the emphasis in the study of delinquency in Urban Brisbane has been on areal analysis (chapters five). One of the principal aims of this study has always been to juxtapose data from official JAO records with census data associated with the concept of deprivation, for the same areas. This analysis should lead to generalizations which act as guides to extending the range of questions to be answered and propositions or hypotheses to be tested.¹ These kind of generalizations are necessarily indeterminate since they cannot predict precisely what will happen in the case of a particular offender in one location or even within a specific area. The strategy does not reduce the value of specifying those dimensions which are relevant to an understanding of delinquency since it is not in the establishing of general laws but in the extension of the range of propositions and the sensitization to the possible consequences of delinquency that is of most interest in this exploratory study of Urban Brisbane. The objective of the ensuing ecological analysis is not intended to derive some facile explanation for the correlations obtained but in the words of Herbert (1977):

to regard such evidence as *indicative* (my italics)
of more general societal condition.

The analysis recognises therefore that there are rules and norms or "deep structures" (Levi-Strauss, 1976) underlying the surface structures of spatial regularities or patterns. The analysis does not pretend to penetrate the meaning of processes. It is the surface structures that are indicative of a societal condition that are of interest in this study.

1. Generalizations similar to the 'grounded' theorists statements of 'middle order' theory. (See Glaser and Strauss).

In this chapter the emphasis is placed on the offender and his residential location since as was seen for the analysis of shop-lifting data in chapters five and six, there is little to be gained from correlating offence data except in terms of specific concepts such as 'opportunity', 'accessibility' etc. The five different categories of offenders are analysed together with social data and the results are presented in this chapter.

URBAN ANALYSIS AND DELINQUENCY

The identification of socio-cultural variables which differentiate the urban environment has long been a primary aim of criminologists, sociologists and geographers. The question of research design involving social area analysis, cluster analysis etc., has been a matter of debate (Baldwin, 1974) although some form of sophisticated multivariate method has usually been adopted within that design to 'throw up' a set of variables which are then related to delinquency data. The alternative strategy of using single indices of residential and social structure of the city has been used successfully by Lee and Egan (1972), Baldwin (1976) and in a limited way by Herbert (1977). Multivariate methods using factors or dimensions representing social data and delinquency rates were discarded in this section for reasons suggested in chapter three and a single indices approaches was adopted. The problem of selection and justification for that selection of 'ecological' variables (that is, the social data to be used) immediately becomes evident. Several sources for the selection of variables may be used:

- (i) from an *a priori* conceptual schema derived from the literature on delinquency and developments in geography such as Herbert's (1975) modified model used in this investigation and described in chapter three. Such a 'loose' framework does not define the specific census variables to be used although it provides broad guidelines for choice of variables;

- (ii) from an analysis of primary data on offender characteristics;
- (iii) from a content analysis of delinquency literature to identify appropriate variables. Herbert (1977) resorted to the literature as justification for a procedure but in an arbitrary and peremptory fashion in his study of Cardiff;
- (iv) from research traditions in delinquency in urban areas. U.S. traditions following Shaw and McKay emphasise delinquency gradients and transition zones in American cities. English research tends to focus on tenure type and housing estates on the periphery of cities. Neither of these is clearly identifiable in the Brisbane study area (chapter four) although there are a number of high rate delinquency areas on the boundaries of the area;
- (v) from a discussion with law enforcement authorities. Lee and Egan appeared to use this criterion rather unsatisfactorily as the only source of justification;
- (vi) from expected relationships based on participant observation of delinquency in the area of study.

The census variables selected for the ecological analysis of delinquency in Urban Brisbane were derived from a number of sources. The first stage of selection focussed on the typology (chapter three) where data about cities were grouped according to whether environments were "*built-urban*" (physical) or "*social*". Data about the former environment described the quality of buildings or spaces in which people live; the latter comprised the "impersonal" and "personal" social environments. Attention is given here to the non-behavioural "impersonal environment" which consists of social groups, their demographic structure, social class composition and ethnic character.

DELINQUENCY AND DEPRIVED ENVIRONMENTS

Underlying these two types of environments is the recurring theme of deprivation and disadvantage. Raynor (1974) and others discuss the 'trap of poverty' with its self-perpetuating nature and the accumulated deprivations and frustrations which it could cause. Deprivation is a diffuse concept covering many different issues and problems. The concept may be interpreted under the umbrella term of deviance (which includes delinquency behaviour): the emphasis therefore is placed on society's response and values about what is considered normal and appropriate.¹ Some of the confusion associated with the term has developed because it appears to be used outside the dictionary meaning of 'dispossession' or 'loss' and instead includes circumstances which have little to do with deprivation. For example, maternal deprivation may be associated with 'loss' of mother-child contact through the necessity (or otherwise) of the mother working : it could however be interpreted as being an undesirable kind of mother-child interaction, cruelty, rejection etc. The latter sense has little meaning in this study.

Despite the problems of semantics seen in sociological literature, the concept has usefulness in this study and is taken to mean the varied aspects of a delinquent's environment and the lack of some quality or element e.g. material resources, maternal absence or loss etc. in that environment. So while one may continue to argue the usefulness of the concept (as many sociologists have) the fact remains there are many forms of personal and social disadvantage in the delinquent's environment.

The notion of deprivation is associated with poverty meaning 'loss' or 'lack of'. It is not concerned with maladjustment or with personal difficulties associated with the personal social environment. Deprivation is associated with the cycle of poverty but in this study, it is a cycle viewed in one period of time (1970-1975).

1. Ginsberg (1972) dismisses this notion as a myth based on middle-class misconceptions about poor children.

The study is not concerned with continuities of the spatial expression of delinquency over time or how delinquency persists in areas in a form of spatial reproduction. The social mechanisms underlying various influences on delinquency are not the proper object of this study although the relative importance of these influences are the focus of ecological analysis.²

Neither should the term deprivation be associated with environmental causation or determinism. Many of the disadvantages related to the concept of deprivation may be due to environmental influences: but there are other genetic and personal factors in the environment (not included in Figure 3.1) which play some part in the process of disadvantage and which can be included under the label of the personal social environment. This is not to say that this study begins with preconceptions as to which factor(s) are the most important influence in any *particular* situation. In this study factors or influences related to the physical and impersonal social environment only, are related to delinquency. The amount of variation attributable to a particular factor will vary with changing environmental circumstances and for different population groups.³ There is value however in attempting to determine (through numerical estimates) some measure of the importance of different influences and to assess how these interact in a deprived environment where there are high rates of delinquency residence.

THE SELECTION OF SOCIAL VARIABLE THEMES.

The spatial expression of delinquency residence therefore may be influenced or be precipitated in urban environments by various factors.

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2. For example the influence of social or political forces dealing with delinquency.
 3. Change in circumstance and situation for different population groups likewise suggests that no great meaning can be attached to numerical estimates of the proportion of *human* variation attributable to a particular factor.

A poor social (impersonal) environment could be associated with unemployment or low wages and this may lead to residence in a poor urban area where such factors as overcrowding, poor facilities etc. will influence codes of behaviour, values and attitudes of individuals. The composition of interacting influences among groups possibly lowers the economic status and leads to the further expression of poor impersonal social environments. The description is more simplistic than tautological but could accommodate theories of delinquency. As an ecological study, this chapter aims to determine *which themes represented by specific indicators of poverty or deprivation in the built and impersonal social environment are associated with delinquency residence*. In the first instance measures are chosen from 1971 Australian Government census data for Urban Brisbane.

The refinement of judgement for selection *and* justification of which variables to include in the analysis is attempted by using several of the sources previously outlined as well as one or two additional sources. Firstly, findings from chapters four and the analysis of characteristics of delinquents are used to guide variable selection and hypothesis formulation. Secondly, expected relationships based on social and residential differentiation studies particularly those of Urban Brisbane by Logan (1976) and MacDonald (1974) are used to support the selection of specific variables. Thirdly and finally, as far as possible those variables in the impersonal and built environments which are relevant for other cities throughout the world (reported in delinquency literature) are used to confirm the relevance of social data juxtaposed with delinquency residence data in the study area. This requires a content analysis of the literature. The process of refinement of judgement about selection of variables from three sources is akin to "triangulation" (Webb, 1966) and usefully validates what are necessarily theoretically guided but subjective decisions.

Relevant literature is discussed prior to the statement of census variables to be used and the formulation of propositions to be tested.

THE CONTENT ANALYSIS OF INTRAURBAN DELINQUENCY LITERATURE

The aim of the content analysis was to identify themes of importance in delinquency environments including physical, social and economic themes. Three principal sources provided the initial synoptic view of intraurban delinquency (Wolfgang, 1968; Scott, 1972; Harries, 1974). A number of themes related to important empirical generalizations were recorded from a preliminary review. It soon became apparent that analysis could not rely on geographical writings (much of which has been published in the past decade) alone. Earlier empirical work of social ecologists was therefore included.

Two possible methods of scoring responses were considered: scoring each time an issue was raised within any piece of material or scoring only once if that theme were mentioned, no matter how many times it was mentioned. The first method was adopted since the aim of this section of the study was to weight the degree of importance of certain themes and thus discriminate among themes for selection in future analysis.

A number of problems arose from the preliminary run. The question of number of themes to be coded was resolved by including all those derived from the journal articles. Consequently certain themes were added as articles were read. In this way parameters of delinquency literature could be defined. The two different groups of social ecology (sociology and criminology) and geography could be contrasted in the expression of empirical research into delinquency. A second problem concerned the definition of themes or concepts. Several themes were inter-related (overcrowding and density of population) whilst others were all inclusive, for example, economic status embraced such variables as owner occupied dwelling or income status. It was decided to judge as nearly as possible the author's conceptualization and group those which were clearly similar in kind.

Several objections can be raised to the coding scheme. Firstly, theme and concept definition depended on the investigator's arbitrary judgement. Secondly, this judgement could be biased by prior expectations or lack of knowledge of sociological and criminological literature. Thirdly, the number of coders was limited to the investigator himself with no reference to independent judgement. Fourthly, the geographical literature on delinquency was limited in quantity if not quality. Despite these problems, it was reckoned that the recurring themes in the voluminous literature on delinquency could best be discriminated by this method and any criticism of the objectivity of the researcher must be judged on the basis of the study itself.

A number of journals were selected for this content analysis:

Australian Geographical Studies
Canadian Geographer
South African Geographical Journal
The Journal of Geography
Occasional Papers, University of London
Resource Papers, American Association Geographers
American Journal of Sociology
American Sociological Review
Social Problems
British Journal of Criminology
Social Forces
Australian and New Zealand Journal of Criminology
Progress in Geography
Tijdschrift voor Econ. en Soc. Geografie
Transactions American Association Geographers

The analysis aimed not at description of empirical relationships between delinquency and social, economic and spatial variables: it did not account for the methodologies in each of the studies: rather it represented an attempt to assess discrete variables associated with or explanatory of delinquency. The choice of these journals was governed by: first, the availability of articles in the disciplines indicated: and second, the need for journals representing scholarly empirical studies in delinquency.

A total of fifty-two articles were available and accepted for analysis, thirty-eight from social ecology journals and fourteen from geographical journals. The occurrence of themes was coded and the frequencies estimated for each theme expressed as a percentage of the *total* frequency of occurrence and the *possible* frequency of occurrence based on the proportion of particles in each tradition. (Table 6.1). The two sets of figures enabled a comparison to be made between the real and relative emphasis of concepts or themes in empirical studies of juvenile delinquency.

The distinctive feature of geographical articles was the use of themes in developing predictive cause and effect propositions. The social ecology articles were characterised principally by associational analyses, although this kind of analysis was present in a number of geographical articles. The observation supports Georges' (1978) conclusion that geography is concerned with prediction rather than correlation analyses. Geographical journal articles which were rejected concentrated on adult crime: a relatively fewer number of articles focussed on delinquency. In contrast the social ecology journals indicated a predominance of interest in research on delinquency.

The geographical articles reflected the conceptual structure of the discipline (Cox, 1975) in their emphasis on the concepts of distance, gradient, movement, distance-decay, distribution and spatial interaction. Although several variables such as overcrowding and unemployment, indicators of social disorganization, occurred in some studies, there was generally a lack of emphasis on socio-cultural variables.

The social ecology articles placed emphasis on the concepts of population change, overcrowding, economic status, poverty, ethnicity, family status, familism, family stability and marital status. Both types of articles emphasised socioeconomic status and its correlates of income and occupation. The relatively high score on the concept of distance-decay and zonal hypothesis for social ecology literature reflected the influence of the Shaw

TABLE 6.1 A QUALITATIVE ANALYSIS OF VARIABLES ASSOCIATED WITH JUVENILE OFFENCE IN SELECTED GEOGRAPHICAL AND SOCIOLOGICAL JOURNALS (FREQUENCY PERCENT OCCURRENCE WITH ABSOLUTE FREQUENCY BRACKETED).

Concept/ variable/theme	Description of concept/ variable/theme	Frequency of occurrence in			% articles in which concept occurs in	
		social/ecological criminological	geograph- ical	total occurrence	social/ecological criminological journals (N=38)	geographical journals (N=14)
GEOGRAPHICAL variables						
1.	Distance, gradient, distance-decay	8	8	16	21.1*	57.1
2.	Intra-urban migration, mobility	5	5	9	13.2	28.6
3.	Density of population, residential density	7	3	10	18.4	28.6
4.	Overcrowding, persons per room	15	4	19	39.5	28.6
5.	Population change, rapid population change	5	4	9	13.2	28.6
6.	Air pollution	1	0	1	2.6	0.0
7.	Land use, zonal hypothesis, industrial	7	0	7	18.4	0.0
8.	Urban development	0	2	2	0.0	14.3
9.	Value of house, poor dwellings	0	1	1	0.0	7.1
10.	Owner occupied dwelling	1	0	1	2.6	0.0
11.	Government housing, rented housing area	3	2	5	7.9	14.3
SOCIOLOGICAL, ECOLOGICAL or CRIMINOLOGICAL						
12.	Socio-economic status, income, occupation	16	8	24	42.1	57.1
13.	Economic status, poverty	10	0	10	26.3	0.0
14.	Family status, familism, stability	8	1	9	21.1	7.1
15.	Ethnicity, race, non-whites, whites	15	4	19	39.5	28.6
16.	Marital status, broken homes	4	1	5	10.5	7.1
17.	Fertility	1	0	1	2.7	0.0
18.	Health	2	1	3	5.3	7.1
19.	Denomination % catholic	0	1	1	0.0	7.1
20.	Leisure	1	0	1	2.6	0.0
21.	Unemployment	3	3	6	7.9	21.4
22.	Employment of mother		1	1	0.0	7.1
23.	Truancy	2	0	2	5.3	0.0
24.	Education, school performance, dropout	7	4	11	18.4	28.6
25.	Anonymity	1	0	1	2.6	0.0

* Fraction expressed as percentage (21.1 = 8/38 : 57.1 = 8/14)

(1929) and Shaw and McKay (1942) studies. Surprisingly little emphasis was given to truancy as a factor possibly because of the complexity and unresearched nature of the issue. Another theme stressed in both groups of articles was education and school performance. The more recent focus on these issues in studies probably emphasises the need not to regard them as simple issues or concepts to be included as discrete variables in empirical studies.

The next phase of the analysis was to determine how these themes might be represented in statistical computations. Australian Government Census data (1971) was available and the variables considered most appropriate were those used in the Logan *et.al.* (1975) and McDonald *et.al.* (1974) studies. This census information (by L.G.A's) appeared to be comprehensive; according to previous research it was considered adequate for the description of residential differentiation in Urban Brisbane; and lastly, it appeared to best describe conditions in the built and social urban environment.

The appropriate census variables were then juxtaposed with the nine themes derived from the content analysis. These are indicated in Table 6.2 together with comments which would justify their inclusion or exclusion as measures of themes in the two types of environments. The next phase involved the selection of a variable index for each theme and the reduction of the number of census variables within themes to correct for multicollinearity among variables. The overall aim was to keep the seven theoretically defined themes to the forefront in the final analysis and at the same time, use reliable indices of these themes which described the urban environments.⁴

4. The reduction in number of census variables undoubtedly leads to loss of information (although not a confounding of understanding as in factorial ecology and use of factors). The strategy had a second (mathematical) purpose to validate the use of regression with the number of cases involved a consideration not recognized by Baldwin, Herbert or Lee in sections of their studies. There ought to be at least twenty cases for each independent variable in the regression analysis.

TABLE 6.2 VARIABLES USED IN THE ECOLOGICAL ANALYSIS OF DELINQUENCY

Delinquency variables	Themes in the urban and impersonal social environment	Census Variables	Comment: relationship between census variables & their occurrence in the literature	Correlation values between variables.
1. Grand Theft	<u>BUILT URBAN</u> 1.Tenure type	V18% total dwelling flats	Themes 8,9,10,11	$r_{18,21}=0.34$ $r_{18,22}=0.12$ $r_{21,22}=-0.30$
2. Petty Theft		V21 % owner occupied V22 % State housing tenanted		
3. Offences Against the Person	2.Residential density	V23 total % dwellings V24 number of dwellings V10 total population V26 crowding index	Theme 1 Themes 3,4	$r_{23,24}=0.08$ $r_{24,10}=0.08$ $r_{23,10}=-0.04$ $r_{24,28}=-.01$ $r_{23,26}=0.04$ $r_{10,26}=0.01$
4. Property Offences	3.Distance			
5. Under Age Offences	<u>IMPERSONAL SOCIAL ENVIRONMENT</u> 4.Socio-economic status (SES)	V4 % professional-technical V6 % process workers, labourers	Themes 12,13,21 High SES - variable 4 Low SES - variable 6	$r_{4,6}=-0.85$
	5.Ethnicity	V27 % Italy born V15 % resident Aust<5 yrs V14 % Eastern Europe V17 % Greek born	Theme 15,19	$r_{14,15}=0.53$ $r_{14,27}=-.01$ $r_{14,28}=0.27$ $r_{15,27}=0.06$ $r_{15,28}=0.21$ $r_{27,28}=-.24$

continued..

TABLE 6.2 VARIABLES USED IN THE ECOLOGICAL ANALYSIS OF DELINQUENCY (continued)

Delinquency variables	Themes in the urban and impersonal social environment	Census Variables	Comment: relationship between census variables & their occurrence in the literature	Correlation values between variables.
	6.Stability & population change	V25 population change 61-71 V19 % same occupants 1966 V11 fertility index V20 % built 1966-71	Theme 2,5,17	$r_{19,25} = .12$ $r_{11,25} = .03$ $r_{11,29} = 0.05$ $r_{19,20} = -.10$ $r_{11,20} = -.03$ $r_{20,25} = .65$
	7.Work Status of mother	V3 % females in workforce V13 % females now married in the workforce V12 % females now married over 15.	Themes 14,16,22	$r_{3,13} = -.53$ $r_{3,12} = -.06$ $r_{12,13} = .16$
	8.Employment status	V8 % unemployed V1 % self-employed		$r_{1,8} = -.26$
	9.Education	V9 % of population > 15 yrs with less 6 levels of school V2 % of population > 15 yrs with tertiary qualifications.		$r_{2,9} = -.76$

TENURE TYPE

Tenure type was a significant theme in the analysis of the literature especially for England cities where new council owned housing estates established on the periphery of cities indicated high levels of delinquency residence. Similar high levels were mapped (Figure 4.1) for Urban Brisbane although new housing in these areas was characterised by private ownership. Themes 8,9,10,11 (Table 6.1) were represented in the census data by variables 18,21, 22 (Table 6.2), *total % dwellings that are flats, % owner occupied and % State housing tenanted*. The three variables were represented in MacDonald's (1975) residential differentiation of Urban Brisbane by the dimension 'dwelling type' which contained six variables all told loadings on two of which were factorially complex. The absence of this factor structure in Logan's (1976) analysis emphasised the uninterpretability and lack of theoretical orientation in using factor scores.

The correlates⁵ of these three census variables suggested how the theme of tenure type was related to urban deprivation. Areas with high % *dwelling flats* showed a high % *same occupants* ($r_{18,19}=+0.61$). Similarly a high % *State housing tenanted* areas were related to *instability and population change* ($r_{22,25}=+0.47$). The variable, % *owner occupied* correlated highly with a number of indices of deprivation. *Self-employed* persons of higher socio-economic status lived in areas of high *owner occupied dwellings* ($r_{1,21}=+0.43$; $r_{5,21}=+0.52$) which were in newer housing areas where there was a rapid population increase ($r_{20,21}=+0.38$; $r_{21,25}=+0.65$). Conversely owner occupied housing areas had a low % *females in the workforce*, few residents of low socio-economic status and few residents who were recent Australian residents ($r_{3,21}=-0.64$; $r_{8,21}=-0.79$; $r_{15,18}=-0.40$). The picture is one of areas showing

5. Only correlates which are significant at the 0.1% level (Table 7.3) are included in the discussion. The high level of statistical significance required ensured that indicators representing concepts related to the themes could be discussed with some confidence.

TABLE 6.8: ZERO ORDER CORRELATIONS OF CENSUS VARIABLES USED IN THE ECOLOGICAL ANALYSIS OF DELINQUENCY.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
1. % workforce self-employed.	100																											
2. % >15 yrs with tertiary qualifications.	<u>.49*</u>	100																										
3. % females >15 yrs in workforce.	<u>.39</u>	<u>-.46</u>	100																									
4. % professional-technical.	<u>-.48</u>	<u>.96</u>	<u>-.10</u>	100																								
5. % admin-managerial.	<u>.64</u>	<u>.64</u>	<u>-.40</u>	<u>.69</u>	100																							
6. % labourers-process workers.	<u>-.31</u>	<u>-.74</u>	<u>-.8</u>	<u>-.74</u>	<u>-.37</u>	100																						
7. % process workers.	<u>-.47</u>	<u>-.76</u>	<u>.23</u>	<u>-.85</u>	<u>-.86</u>	<u>.45</u>	100																					
8. % unemployed.	<u>-.26</u>	<u>-.5</u>	<u>.42</u>	<u>-.5</u>	<u>-.35</u>	<u>-.25</u>	<u>.33</u>	100																				
9. % >15 yrs with < six levels of schooling.	<u>-.53</u>	<u>-.76</u>	<u>.30</u>	<u>-.77</u>	<u>-.71</u>	<u>.46</u>	<u>.71</u>	<u>.13</u>	100																			
10. total population.	<u>-.21</u>	<u>-.12</u>	<u>.5</u>	<u>-.3</u>	<u>.15</u>	<u>.14</u>	<u>-.12</u>	<u>.4</u>	<u>.4</u>	100																		
11. fertility index.	<u>-.5</u>	<u>-.8</u>	<u>-.1</u>	<u>-.6</u>	<u>-.2</u>	<u>.23</u>	<u>.00</u>	<u>-.11</u>	<u>.5</u>	<u>.12</u>	100																	
12. % female married >15 yrs.	<u>-.2</u>	<u>-.10</u>	<u>-.6</u>	<u>-.9</u>	<u>.1</u>	<u>.29</u>	<u>.1</u>	<u>-.17</u>	<u>.3</u>	<u>.9</u>	<u>.9</u>	100																
13. % female married now in workforce.	<u>.39</u>	<u>-.1</u>	<u>-.53</u>	<u>-.7</u>	<u>.31</u>	<u>.35</u>	<u>.5</u>	<u>-.47</u>	<u>-.42</u>	<u>-.16</u>	<u>.5</u>	<u>.16</u>	100															
14. % Eastern European.	<u>-.27</u>	<u>-.11</u>	<u>.32</u>	<u>-.12</u>	<u>-.37</u>	<u>.5</u>	<u>.36</u>	<u>.33</u>	<u>.18</u>	<u>.9</u>	<u>.4</u>	<u>.1</u>	<u>-.8</u>	100														
15. % resident in Australia 5 yrs.	<u>-.9</u>	<u>.8</u>	<u>.2</u>	<u>.4</u>	<u>-.20</u>	<u>-.11</u>	<u>.26</u>	<u>.34</u>	<u>-.27</u>	<u>-.5</u>	<u>-.3</u>	<u>-.3</u>	<u>.25</u>	<u>.53</u>	100													
16. % Catholic.	<u>-.62</u>	<u>-.50</u>	<u>.50</u>	<u>-.46</u>	<u>-.59</u>	<u>.13</u>	<u>.49</u>	<u>.28</u>	<u>.59</u>	<u>-.1</u>	<u>-.2</u>	<u>-.6</u>	<u>-.42</u>	<u>.44</u>	<u>.6</u>	100												
17. % Church of England.	<u>.35</u>	<u>.26</u>	<u>-.44</u>	<u>.25</u>	<u>.55</u>	<u>.10</u>	<u>-.50</u>	<u>-.64</u>	<u>-.42</u>	<u>.11</u>	<u>.5</u>	<u>.11</u>	<u>.44</u>	<u>-.67</u>	<u>-.43</u>	<u>-.65</u>	100											
18. % total dwelling flats.	<u>-.22</u>	<u>-.2</u>	<u>.26</u>	<u>-.1</u>	<u>-.22</u>	<u>-.7</u>	<u>.7</u>	<u>.29</u>	<u>.18</u>	<u>-.1</u>	<u>-.5</u>	<u>-.9</u>	<u>-.36</u>	<u>.8</u>	<u>-.6</u>	<u>.21</u>	<u>-.29</u>	100										
19. % same occupants 1966.	<u>-.16</u>	<u>-.22</u>	<u>-.13</u>	<u>-.23</u>	<u>-.10</u>	<u>.40</u>	<u>.6</u>	<u>-.30</u>	<u>.18</u>	<u>.00</u>	<u>.5</u>	<u>.8</u>	<u>.13</u>	<u>-.21</u>	<u>-.31</u>	<u>.2</u>	<u>.26</u>	<u>.61</u>	100									
20. % houses built 1966-71.	<u>.40</u>	<u>.11</u>	<u>-.46</u>	<u>.5</u>	<u>.35</u>	<u>.7</u>	<u>-.7</u>	<u>-.24</u>	<u>-.50</u>	<u>-.19</u>	<u>-.3</u>	<u>.6</u>	<u>.83</u>	<u>-.9</u>	<u>.38</u>	<u>-.43</u>	<u>.29</u>	<u>-.26</u>	<u>-.10</u>	100								
21. % owner occupied.	<u>.43</u>	<u>.12</u>	<u>-.64</u>	<u>.14</u>	<u>.52</u>	<u>.26</u>	<u>-.44</u>	<u>-.79</u>	<u>-.27</u>	<u>-.13</u>	<u>.8</u>	<u>.16</u>	<u>.62</u>	<u>-.34</u>	<u>-.40</u>	<u>-.46</u>	<u>.69</u>	<u>-.26</u>	<u>.34</u>	<u>.38</u>	100							
22. % State housing tenanted.	<u>.30</u>	<u>-.23</u>	<u>.14</u>	<u>-.31</u>	<u>-.22</u>	<u>.31</u>	<u>.31</u>	<u>.5</u>	<u>-.2</u>	<u>.28</u>	<u>-.2</u>	<u>.2</u>	<u>.23</u>	<u>-.7</u>	<u>.34</u>	<u>.8</u>	<u>.9</u>	<u>-.18</u>	<u>.12</u>	<u>.17</u>	<u>-.30</u>	100						
23. total % of dwellings.	<u>-.25</u>	<u>-.6</u>	<u>.36</u>	<u>-.8</u>	<u>-.39</u>	<u>-.18</u>	<u>.30</u>	<u>.48</u>	<u>.25</u>	<u>-.4</u>	<u>.00</u>	<u>-.4</u>	<u>-.33</u>	<u>.39</u>	<u>.24</u>	<u>.51</u>	<u>-.60</u>	<u>.20</u>	<u>-.28</u>	<u>-.16</u>	<u>-.49</u>	<u>-.14</u>	100					
24. number of dwellings.	<u>.29</u>	<u>-.9</u>	<u>-.12</u>	<u>-.7</u>	<u>-.1</u>	<u>-.2</u>	<u>.8</u>	<u>-.15</u>	<u>.2</u>	<u>.8</u>	<u>.1</u>	<u>.2</u>	<u>.11</u>	<u>-.3</u>	<u>.3</u>	<u>-.11</u>	<u>.1</u>	<u>-.2</u>	<u>-.8</u>	<u>.15</u>	<u>.5</u>	<u>-.3</u>	<u>.8</u>	100				
25. population change.	<u>.16</u>	<u>.3</u>	<u>-.32</u>	<u>-.1</u>	<u>.41</u>	<u>.21</u>	<u>-.16</u>	<u>-.37</u>	<u>-.36</u>	<u>.36</u>	<u>.3</u>	<u>.11</u>	<u>.67</u>	<u>-.23</u>	<u>.14</u>	<u>-.32</u>	<u>.49</u>	<u>-.29</u>	<u>.12</u>	<u>.65</u>	<u>.35</u>	<u>.47</u>	<u>-.34</u>	<u>.6</u>	<u>.100</u>			
26. crowding index.	<u>-.7</u>	<u>-.4</u>	<u>.11</u>	<u>-.2</u>	<u>-.6</u>	<u>-.3</u>	<u>.4</u>	<u>.29</u>	<u>.10</u>	<u>.1</u>	<u>.5</u>	<u>-.8</u>	<u>-.22</u>	<u>.6</u>	<u>.2</u>	<u>.14</u>	<u>-.19</u>	<u>.7</u>	<u>-.7</u>	<u>-.17</u>	<u>-.21</u>	<u>-.1</u>	<u>.4</u>	<u>-.1</u>	<u>-.21</u>	<u>.100</u>		
27. % born in Italy.	<u>.34</u>	<u>-.4</u>	<u>-.14</u>	<u>-.6</u>	<u>-.4</u>	<u>-.4</u>	<u>.11</u>	<u>-.7</u>	<u>-.1</u>	<u>-.15</u>	<u>-.2</u>	<u>.00</u>	<u>.18</u>	<u>-.1</u>	<u>.6</u>	<u>-.12</u>	<u>.00</u>	<u>-.4</u>	<u>-.7</u>	<u>.22</u>	<u>.10</u>	<u>-.5</u>	<u>.9</u>	<u>.97</u>	<u>.3</u>	<u>-.3</u>	<u>.100</u>	
28. % born in Greece.	<u>-.12</u>	<u>-.5</u>	<u>.30</u>	<u>-.1</u>	<u>-.12</u>	<u>-.2</u>	<u>.11</u>	<u>.29</u>	<u>-.16</u>	<u>.26</u>	<u>-.1</u>	<u>-.5</u>	<u>-.23</u>	<u>.27</u>	<u>.21</u>	<u>.3</u>	<u>-.46</u>	<u>.19</u>	<u>-.16</u>	<u>-.18</u>	<u>-.35</u>	<u>.9</u>	<u>.20</u>	<u>.5</u>	<u>-.26</u>	<u>.9</u>	<u>-.24</u>	<u>.100</u>

* Values underlined significant at the 0.001 level.

persistent indicators of deprivation. The intercorrelation of these indicators with tenure type variables and their association with delinquency seen in the literature analysis suggested the following proposition:

Areas with private housing tenure are associated with low delinquency residence : areas with public (government) housing tenure are associated with high delinquency residence.

The three variables measuring tenure type together accounted for a relatively high % (38.1) of explained variation in delinquency residence rates for the total sample population (Appendix M Table M1). Low % *owner occupied housing* which was related to deprivation was most closely associated with delinquency ($r=-0.53$; 28.3% variance explained). The variable % *State housing tenanted*, showed an unexpected trend with delinquency residence rates ($r=-0.14$); the latter was positively related to housing areas which contained a high % *dwelling flats* ($r = +0.25$). The explained variance for delinquency rates for the total population was not the same for all categories of offence. Under age offences (42.6%) and petty theft (35.3%) showed the highest percentages with the remaining three categories of delinquency offence. What was significant was that the direction of the simple correlation values and the order of entry of the three variables into the stepwise regression equation (21,22,18) was consistent for all categories of offence.

The regression results clearly indicated that tenure type associated with *low home ownership* and *dwelling that are flats*, both indicators of deprivation in the urban area influenced rates of delinquency residence. The proposition therefore was supported by the results. The figures also confirmed the best indicator or measure of tenure type. In all cases of offence category % *owner occupied* had high negative beta (standardized regression coefficient) values ($\beta = -0.52$ for total population). Although the beta values for grand theft, offences against the person and property offence ($\beta = -0.29, -0.23$ and -0.29) were relatively low

they were included as indicators of tenure type in later analysis of delinquency in the physical and impersonal social urban environment.

RESIDENTIAL DENSITY

Deprivation in the urban environment has been associated with high density population living and its consequences, such as overcrowding, shared facilities and reduced personal space for individuals. Social dysfunctions usually accompany or accrue from these physical disadvantages and deviance manifests itself in those areas where residential density interacting with other factors, is high. Urban Brisbane's population clusters around the city centre but is relatively dense along the main arterial road routes out of the city (Figure 1.1). The patterns results in a sectoral structure of population distribution. The census variables which theoretically were most representative of residential density (Table 6.2) were associated with a number of variables reflecting disadvantage. Areas with high residential density were characterised by lower socio-economic status ($r_{8,23}=+0.48$), lower *home ownership* ($r_{21,23}=-0.49$) and higher ethnicity measured by the % *born Eastern Europe* ($r_{14,23}=+0.39$) and the % *born Italy* ($r_{24,27}=+0.91$). Conversely, the lower the residential density the higher the socio-economic status ($r_{5,23}=-0.39$). Certain aspects of deprivation are therefore correlated with the density of populations in urban areas. From this census data and the delinquency literature analysis the following proposition was formulated:

Delinquency residence is associated with areas of high residential density : areas with low residential density have low rates of delinquency residence.

The stepwise regression analysis suggested very moderate support for this proposition for the total population. All four measures of residential density accounted for only 18.7% of explained variance in delinquency rates. *Total %*

*dwelling*s was most closely related to delinquency ($r = +0.36$; 12.7% variance explained). As expected the measure termed *crowding index* was positively associated with delinquency ($r = +0.22$) but contributed little to further explanation of variance in delinquency rates.

For the individual categories of offence there was some variation in the influence of residential density in an area on the area's rate of delinquency. For grand theft and offences against the person there was little or no support for the proposition. *Total % dwellings* ($r = +0.29$) and *crowding index* ($r = +0.24$) together explained 13.6% of variation in petty theft delinquency rates with the former contributing 8.6% of that figure. The pattern was similar for property offences with *total % dwellings* ($r = +0.27$) and *number of dwellings* ($r = +0.23$) contributing 11.3% of explained variance. There was greater support for the proposition for under age offences. For this category of offence, the four measures of density explained 18.8% (marginally greater than for the total population). The first two variables to enter, *total % dwellings* ($r = +0.36$) and *crowding index* ($r = +0.19$) together explained 15.9% of the total variance explained.

The theme of residential density was not clearly related to delinquency residence. There was some influence of this theme for the categories petty theft, property theft and under age offence but this was only moderate. The most adequate indicator of residential density for these three categories was *total % dwellings* ($\beta = +0.29, +0.27$ and $+0.36$). This variable was also most influential in influencing delinquency rates for the total population. *Total % dwellings* was therefore used in analysis of the influence of themes on delinquency.

SOCIO-ECONOMIC STATUS

Quite clearly a dominant theme in the literature on delinquency was the importance of social class and *socio-economic status*.

The two concepts are not identical in meaning : the former is interpreted in this study to have a close relationship with occupational status measured by the position one occupies in the workforce. The economic status of the principal income earner is a measure of the income he or she earns. The results in chapter four however indicated that for the sample population, the income earned and the work position one occupied in Urban Brisbane were related. Socio-economic status was measured therefore by occupational status : high status was represented by the professional and managerial groups, low status was represented by the semi-skilled and unskilled working groups. The proposition was stated:

High delinquency residence areas are characterised by low socio-economic status; low delinquency residence areas are characterised by high socio-economic status.

Knowing which groups were most representative of the theme socio-economic was problematic. The use of a legal index such as a government contrived measure was as arbitrary as the factor dimension structure of MacDonald and Logan was confusing.⁶ Only two of seven census variables conceptually related to occupational levels in the Logan study : while in MacDonald's study four of ten variables (one of which was factorially complex) were theoretically or epistemologically linked with status. The census variable, *% professional and technical* which was the highest on the occupation scale was positively correlated with level two, *% administration or managerial* ($r = +0.69$). The two census variables which represented lower socio-economic status groups, *% labourers and process workers* and *% process workers* were themselves highly correlated ($r = +0.45$). the negative correlation between the highest occupation level, *% professional and technical* and the level usually regarded as

6. The degree of status segregation in Urban Brisbane was not as great as in other major cities in Australian states according to Logan's analysis. The distinction between high status and low status areas is marked in MacDonald's study by the high positive or negative loadings within the factor structure of socio-economic status

unskilled, the % *labourers and process workers* ($r = -0.74$), together with the very positive and very negative loadings on these two variables in MacDonald's study, suggested that these two variables alone might be used. From correlational analysis of census data (Table 6.3) *socio-economic* status was related to the level of *educational* qualifications ($r_{6,9} = 0.46$ and $r_{4,9} = -0.77$) and *State housing tenanted* areas ($r_{4,22} = -0.31$). Some aspects of deprivation were therefore associated with socio-economic status.

The influence of *socio-economic status* on delinquency residence rates with the exception of under age offence was minimal for the total population and for all offence categories.

For total delinquency only 7.4% of variance in delinquency was explained by lower socio-economic status. Lower status was related to higher delinquency levels ($r = +0.27$). Variance in under age offence rates was best explained by lower status ($r = +0.49$ and $R^2 = .237$). From this analysis, the proposition can only be supported for the category of under age delinquency offences.

ETHNICITY

Ethnicity was another dominant theme in the literature on delinquency. In the American context, the focus was on non-white population in socially disorganized ghetto type areas. The theme embraced some variation in the meaning of the word and in this study it was broadly defined as the character of identifiable groups with a cultural background differing from Australian born residents of British origin. The principal groups included Australians from Italy, Greece or Eastern Europe. These groups were represented in the census data.

The factor analytic studies which defined the ethnicity dimension included religion measures. The two principal variables were % *Catholic* and % *Church of England*. While there was statistical validity in including these as correlates of ethnicity, there were fewer conceptual reasons for their inclusion. % *Catholic* might be

associated with % *Australians born in Italy* but the former would include a high percentage of non-Italian origin. The two religion variables were bipolar ($r_{16,17} = -.65$) and could produce adequate statistical indicators; but their lack of theoretical focus suggested that they ought not be included in the investigation of ethnicity and delinquency in Brisbane.

Four variables directly linked with the theme were analysed for their relationship among themselves, for their association with the notion of deprivation, and for their influence on delinquency residence rates. The relationship between variables suggested that areas with residents in Australia less than five years were likely to have more persons of Eastern European ($r_{14,15} = +0.53$) than Italian or Greek origin ($r_{14,29} = -0.01$ and $r_{14,28} = +0.27$). Areas of ethnicity within the city appeared quite distinct ($r_{27,28} = -0.14$) with a higher % of *Greek born* Australians longer established in their own ethnic area ($r_{15,28} = +0.21$) than % *Italy born* Australians ($r_{15,27} = +0.06$). The figures may represent fluctuations in foreign born immigration in Australia.

Although there were a number of correlates of these ethnicity type variables with disadvantage, only four were statistically significant. The four do point in the direction of a link between deprivation and ethnicity. Australians of Eastern European and Italian origin tended to reside in areas of relatively high residential density ($r_{14,23} = +0.39$; $r_{24,27} = +0.97$). Recently arrived Australians of less than five years residence tended to reside in *State housing tenanted* suburbs ($r_{15,22} = +0.34$) and tended not to own their home ($r_{15,21} = -0.40$). The scenario is one of housing disadvantage with its concomitant characteristics in areas of higher ethnicity. This suggested the following proposition:

Areas with a high ethnicity level will have relatively higher levels of delinquency than areas with low ethnicity level? ⁷

7. Ethnicity level in this instance being measured by the percentage of non-British born Australians of the various origins mentioned.

The results of the stepwise regression analysis clearly suggested that ethnicity had little influence on delinquency residence rates for the total population and for all categories of offence. It was evident that in all cases except the property offence category, the four variables were uncorrelated with delinquency rates and the amount of variance explained was minimal (total population, $R^2 = 0.022$). Two ethnicity variables entered the equation for property offences explaining 6.4% of variance in delinquency rates; the % *born Italy* variable was most highly associated with delinquency ($r = +0.24$) but its influence was quite 'weak'. Not one of the census variables in the equations could be considered a predictor of delinquency residence.⁸

STABILITY AND POPULATION CHANGE

This theme is associated with change and transience in areas where alteration of the physical environment, for example, the rapid increase in housing and a high increase or change in population composition leads to social disorganisation. It is associated with the theme of intra-urban migration and mobility, rapid population change and to a lesser extent, fertility which reflects population growth.

Indicators of this theme were related to a number of deprivation type census variables. Increased change in the physical environment (%houses built 1966-1971) was associated with % *employed or self employed* persons ($r_{1,20} = +0.40$), *rapid population change* ($r_{20,25} = +0.65$) and unexplainably from this data, the % *married women in the workforce* ($r_{13,20} = +0.83$). *Population change* was related to %

8. The cumulative effect of ethnicity (summing percentages for variables 14,27,28) had little effect on delinquency according to a separate bivariate regression analysis.

administration and managerial persons in the workforce ($r_{5,25}=+0.41$) which was not surprising in view of the rites of passage of people in these kinds of occupations. More significantly however, a high population change correlated highly with the number of working married mothers ($r_{13,25}=+0.67$), with a high % *State housing tenanted* areas ($r_{22,25}=+0.47$) with high *residential density* ($r_{18,19}=+0.61$) and with lower socio-economic groups ($r_{6,19}=+0.40$). Stability and population change is, from the census data, closely linked with aspects of deprivation and from the literature, levels of delinquency. The following proposition was tested:

High delinquency residence levels are characterised in the study area by instability and transient populations : low delinquency residence levels are recognised by stability in population numbers.

For the total sample population, three variables accounted for 15.1% of variance in delinquency residence rates.

The variable, *population change*, accounted for 13.0% of this figure and in fact was the most significant measure of the theme for all categories of offence. The R^2 values for all categories was not high, (0.097, 0.081, 0.065 and 0.146 for grand theft, petty theft, property offences and under age offences). The β value for population change for the total sample was -0.36 while β ranged from -0.38 to -0.25 for the four offence categories above. The most significant result was the direction of the relationship between delinquency and stability and population change. All variables indicated a negative correlation and β value. The proposition therefore cannot be supported by these results: high delinquency residence rates are characterised by population stability rather than population transience and areas with new housing development in the intercensal period.

WORK STATUS OF MOTHER

This theme was poorly represented in the literature (Table 6.1) but had indirect association with concepts such as familism and marital status. The reason for its inclusion in this analysis

hinged on its association with delinquency data in chapter four. Slightly under fifty percent of mothers in the sample population were working with a significant number working in semi-skilled or unskilled occupations.

The principal census variable of interest was the *% females now married and in the workforce*. It was positively related to areas with a high *% of selfemployment* ($r = +0.39$) and high *population change* ($r = +0.67$) and negatively associated with the *% unemployed*. Very few variables were correlated with the variable *% married females in the workforce* : most variables had little association with the concept of deprivation. The importance of this one variable alone was sufficient to include the theme in a regression analysis. Because of the results of chapter four the following proposition was formulated:

Areas with high delinquency residence will be related to areas with a high percentage of married mothers in the workforce; areas with low delinquency residence will be related to areas with a low percentage of married mothers in the workforce.

The regression analysis results indicated that the *% working mothers* in areas was related to the delinquency residence rate of the area but in a direction opposite to that proposed. For the total sample population, 19.3% of variance in delinquency rates was explained by the variable *% mothers married in the workforce*. With $\beta = -0.44$ ($r = -0.44$) the influence was relatively significant. A similar pattern of results was obtained for the offence categories petty theft ($r = -0.43$; $R^2 = 0.187$) and under age offences ($r = -0.49$; $R^2 = 0.244$). The influence of married employed mothers variable for the three remaining categories of offence was minimal. Although the proposition was not supported by these results and the theme was not related to delinquency in the expected direction, that is, supporting the notion of deprivation, the importance of *% working mothers* for further analysis of petty theft and underage offence was evident.

EMPLOYMENT STATUS

In the literature analysis, the theme of unemployment received less emphasis than might be expected. Some studies assumed unemployment was a function of lower *socio-economic status* but in Urban Brisbane this was not verified in the census data. High unemployment was related to low *percentage of married women in the workforce*, low *residential density* and low *percentage of owner occupied dwellings*. The variable *% self employed*, showed some relationship with aspects of deprivation in the urban environment. Low *socio-economic areas* were areas with low *% of employer or self employed* ($r_{1,6}=-0.31$; $r_{1,7}=-0.47$) while the latter was related to areas whose residents had *less than six levels of schooling* ($r_{1,9}=-0.53$). The census data also indicated that the self employed tended to live in areas where there was a high *% of home ownership* ($r_{1,21}=+0.43$) and new houses ($r_{1,20}=+0.40$). Because the census data showed some relationship between employment status and aspects of deprivation in areas in Urban Brisbane, the proposition was stated as:

Areas of high unemployment in Urban Brisbane record high delinquency residence levels while areas with low unemployment levels record low delinquency residence levels.

The theme of employment status was the singular and most influential theme on levels of delinquency residence.

Areas with high delinquency levels were areas of high unemployment ($r = +0.67$). This variable accounted for 44.7% of explained variance in delinquency and had the highest influence $\beta = +0.69$.

The relationship between *% employer or self employed* and delinquency was relatively low and negative. The pattern was repeated for all categories of offence although the relationship was weakened for grand theft ($r = +0.31$; $R^2 = 0.096$; $\beta = +0.35$) and for property offence ($r = +0.34$; $R^2 = 0.119$; $\beta = +0.38$). In all cases, *% unemployment* had the greatest influence on delinquency residence.

The amount of variance in delinquency levels explained by *% employer*

or selfemployed was of the order one or two percent for all categories of offence. The proposition tested had very strong support according to these results.

EDUCATION

Education or schooling was a common theme in human ecology studies of delinquency. It was represented by the concepts of truancy, drop-outs and achievement. Most of the studies in the literature were not treated as education studies in their own right, but education was treated as a single variable in the analysis of delinquency.

Two census variables were available for the analysis of education effects on delinquency. These variables were related to *socio-economic status* with low levels of schooling associated with lower socio-economic groups ($r_{6,9}=+0.46$; $r_{7,9}=+0.71$ and $r_{2,6}=-0.74$; $r_{2,7}=-0.76$) and higher levels of schooling related to higher socio-economic groups ($r_{4,9}=-0.77$; $r_{5,9}=-0.71$; $r_{2,4}=+0.96$ and $r_{2,5}=+0.64$). The pattern of associated deprivation was repeated for two other variables with low levels of schooling related to low % of people employer or selfemployed. The proposition tested was:

Areas which have residents with low levels of schooling are also areas with high delinquency residence levels; areas which have residents with high levels (tertiary) of schooling register lower delinquency residence rates.

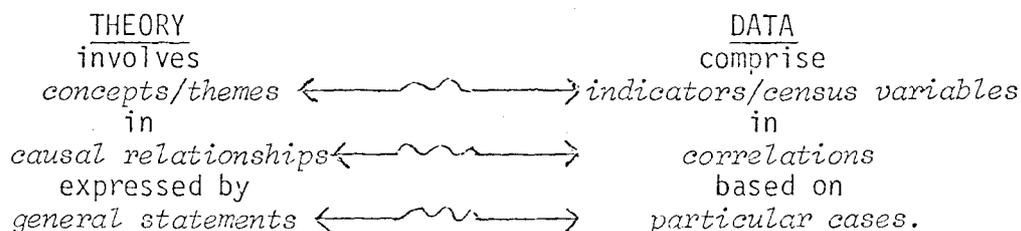
The proposition was supported for one offence category only, under age offences. Areas where residents were over fifteen years with less than six levels of schooling tended to have high delinquency levels ($r = -0.25$). The variable, % population over fifteen years with less than six levels of school, explained the greatest amount of variance in delinquency rates ($R^2 = 0.142$) with β value of 0.38. The theme of education had little influence on delinquency residence.

THE RELATIVE INFLUENCE OF THEMES ON DELINQUENCY RESIDENCE

The intent of the previous section was to develop propositions related to the social and environmental themes observed in the delinquency literature and to test these propositions for Urban Brisbane. The description for each theme was centred on measures from census data which were conceptually related to each theme being investigated. The use of regression was confined to descriptive statistical procedures. From the regression results it was possible to define the *best* indicator (that is, a single census variable) which best or validly represented a specific theme.⁹ From the set of parameters or indicator census variables conceptually representing a theme, a single parameter or indicator was chosen. This single parameter was decided by the β -value or the standardized regression coefficient value. Initial regression analysis therefore had two purposes, to test the propositions for each theme in relation to delinquency and to determine the best single indicator for each theme.

The next phase of analysis attempted to estimate the relative importance of selected themes for each offence category. The step-wise regression procedures were used again to test the broad hypothesis and aim of the ecological study of delinquency in Brisbane:

-
9. The problem was one of construct validity where the "tension" between theory (conceptualising) and data may be expressed in the diagram below



Conceptualisation of themes was operationalised empirically by the selection of measures or indicators; 'exploration' of relationships between themes by correlation technique and control of alternative explanations through regression models; particular cases are the areal units (SA's); generalisation across contexts to other populations and hence predictive generalisation is not claimed as an outcome in this study.

that themes of deprivation in both the built urban and social environment influence delinquency residence rates in urban Brisbane.

Several criteria were used to determine the inclusion of a theme in the regression equation for each offence category. It was possible therefore to include different themes in the six regression analyses for the total population and for the five offence categories. The same theme appearing in two or more equations was not necessarily represented by the same indicator or parameter.

The criteria for inclusion of a theme depended on:

- 1) the results of prior analysis where the indicator was *conceptually* related to the theme and was *statistically* the best indicator;¹⁰
- 2) the level of explained variance in delinquency residence rates by the indicator measure for each theme. A minimal five percent level was used for inclusion of a theme;
- 3) multicollinearity between indicators for each theme. Indicators with a pairwise correlation of +0.80 were not included in the regression analysis; this procedure (already adopted for the initial regression analysis) satisfied the criteria suggested by Hauser (1975).
- 4) the legitimacy of inclusion of more than three measures of themes in the regression equation. With only fifty-eight cases (areas), the maximum number of independent variables (themes) statistically permitted in a regression equation was three in number (Hauser, 1975). More than three indicators

10. The problem of apparent neglect of interaction effects among themes was disregarded since the aim in the initial analysis was to keep the measures of indicators of themes conceptually to the fore in statistical computation, thereafter to determine the relative importance of single indices. The total effect of these indices was determined from the regression equations.

TABLE 6.4 MEASURES OF THE URBAN AND THE IMPERSONAL SOCIAL ENVIRONMENTS USED IN REGRESSION FOR DELINQUENCY CATEGORIES.

<i>BUILT URBAN ENVIRONMENT</i>	Total delinquency	Grand theft	Petty theft	Offences against the person	Property offences	Under age offences
Tenure Type	% owner occupied (21)	→				
Residential density	total % dwellings (23)	total Population (10)	Total % dwellings (23)	Crowding index (26)	total % dwellings (23)	→
Distance	distance (km units)	→				
<i>IMPERSONAL SOCIAL ENVIRONMENT</i>						
Socio-economic status	% labourers & process workers (6) % prof.-Tech. (4)	→				
Ethnicity	% born Eastern Europe (14)	% born Italy (27)	% born Eastern Europe (14)	% born Italy (27)	→	% born Eastern Europe (14)
Stability & population growth	population change 1966-71. (25)	→				
Work status of mother	% females now married in workforce (13)	→				
Employment status	% unemployed (8)	→				
Education	% population >15 yrs with <6 levels of school (9)	→				

of themes was included in each of the six regression equations since it was considered highly probable that the influence (or explanatory power) of themes which entered the stepwise equation after the third step was minimal.

A summary of the themes and variable indicators of themes in the analysis for each offence category is shown in Table 6.4. The results for the total population and for each offence category are shown in Table 6.5 to Table 6.10. General observations from these results included; all themes were included in each regression equation but not all were significant to enter the stepwise equations; the overriding importance of the theme employment status was evident; other themes offered relatively little description or explanation for the relative importance of delinquency residence rates.

Total population

All indicators of nine themes accounted for 50.86 percent of variance in delinquency rates. The final six indicators to enter the stepwise equation accounted for only 1.98 percent of variance.

TABLE 6.5 STEPWISE REGRESSION RESULTS FOR TOTAL DELINQUENCY RESIDENCE (DEPENDENT) AND DELINQUENCY THEMES.

Step	Themes	R ²	Regression coefficient	s.e.*	F-value	Significance
1.	<i>Employment status</i> (% unemployed)	0.447	0.668	<u>3.51</u>	45.22	.000
2.	<i>Work status of Mother</i> (% females married and in workforce)	0.467	0.593 -0.161	<u>3.93</u> <u>0.21</u>	24.09	.000
3.	<i>Ethnicity</i> (% born Eastern Europe)	0.477	0.633 -0.151 -0.107	<u>4.16</u> <u>0.21</u> 1.05	16.43	.000
4.	<i>Socio-economic Status I</i> (% professional and technical)	0.489	0.625 -0.163 -0.119 -0.109	<u>4.16</u> <u>0.21</u> 1.05 0.27	12.67	.000

* = standard error: values underlined are significant at 5 percent level.

Employment status explained 44.7 percent of variation in delinquency rates with the remaining three themes (Table 6.5) accounting for only 4.2 percent of the variance. The theme of working status of mothers of delinquents was next in explaining the remaining variance. The significance and importance of the employment theme measured by the % unemployed, was clearly evident in the results. The importance of this theme for all delinquency areas suggested that further analysis might be pursued to determine which correlates of unemployment could be used to describe high and low delinquency residence areas. High and low delinquency residence areas were represented by the first and fourth quartile respectively (Figure 4.2).

The correlates of unemployment for ages grouped according to high and low delinquency residence are indicated in Figure 6.1.

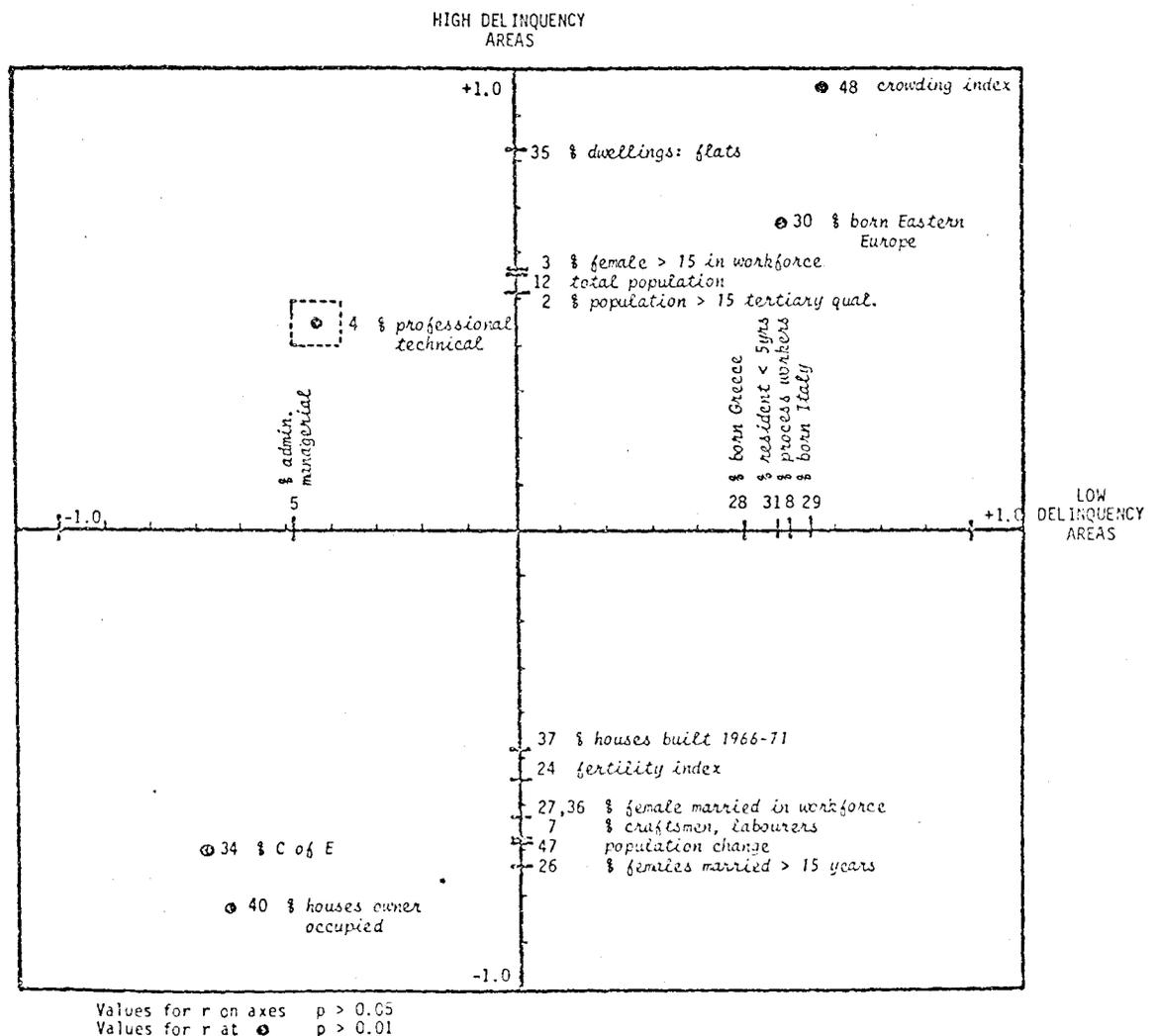


Figure 7.1: Correlates of Unemployment for High and Low Delinquency Residence Areas.

Correlate values represented along vertical (high delinquency areas) and horizontal (low delinquency areas) axes were significant at the one percent level while the five within-sector correlates were significant at the five percent level.

The r values for % *professional-technical*, indicated that high and low delinquency areas were positively and negatively associated with unemployment respectively. From these results, it was evident, that it cannot be assumed that unemployment was equivalent with or identical to low socio-economic status. This was supported by the negative r values for % *administration-managerial* for low delinquency areas and unemployment and % *craftsmen and labourers* for high delinquency areas.

The remaining results were difficult to interpret. Negative correlates (37,24,27,36,47) with unemployment for high delinquency areas tended to be associated with instability and change, while positive correlates (28,31,29) for low delinquency areas tended to be associated with ethnicity. The analysis produced tentative descriptions, the most significant of which was the relationship established between employment status and socio-economic status.

Grand Theft Offence

Of all offence types, grand theft was least described by any one theme. The pattern of results indicated that all themes accounted for 30.3% variance in delinquency rates but no one theme was important (Figure 6.6). Employment status entered the regression equation second after stability and population change but its relative importance was minimal.

TABLE 6.6 STEPWISE REGRESSION RESULTS FOR GRAND THEFT
DELINQUENCY RESIDENCE (DEPENDENT) AND DELINQUENCY
THEMES

Step	Themes	R ²	Regression coefficient	s.e.*	F- value	Signif- icance
1.	<i>Stability and Population Change</i> (population change 1966-1971).	0.097	-0.312	<u>0.001</u>	6.05	0.017
2.	<i>Employment Status</i> (% unemployment)	0.141	-0.228 0.225	0.143-02 0.868	4.52	0.015
3.	<i>Ethnicity</i> (% born Italy)	0.172	-0.227 0.237 0.176	0.141 0.862 0.321-2	3.74	0.016
4.	<i>Distance</i>	0.220	-0.366 0.268 0.237 0.272	0.161-02 <u>0.852</u> <u>0.327-2</u> <u>0.114</u>	3.73	0.009
5.	<i>Tenure type</i> (% owner occupied)	0.235	0.370 0.117 0.253 0.307 -0.204	0.161-02 <u>1.292</u> <u>0.329-2</u> <u>0.117</u> <u>0.464</u>	3.19	0.014
6.	<i>Socio-economic Status II</i> (% labourers and process workers)	0.240	-0.400 0.101 0.274 0.367 -0.277 -0.100	0.170-02 <u>1.32</u> <u>0.343-02</u> <u>0.139</u> <u>0.539-01</u> 0.461	2.69	0.024
7.	<i>Socio-economic Status I</i> (% professional and technical)	0.280	-0.465 0.119 0.289 0.427 -0.456 -0.659 -0.517	0.173-2 <u>1.290</u> <u>0.338</u> <u>0.139</u> <u>0.584-01</u> 0.105 0.156	2.78	0.016

* s.e. = standard error: values underlined are significant at 5 percent level.

Petty Theft Offence

The importance of employment status in the interpretation of delinquency rates for petty offence was comparable to the result for the total population. The six themes that are not shown in Table 6.7 accounted for only 1.78 percent of explained variance although all were significant to enter. It is significant (in the light of chapter five results) that the theme of high socio-economic status represented by the measure percent professional-technical, entered the equation last.

TABLE 6.7 STEPWISE REGRESSION RESULTS FOR PETTY THEFT DELINQUENCY RESIDENCE (DEPENDENT) AND DELINQUENCY THEMES.

Step	Theme	R ²	Regression coefficient	s.e.*	F-value	Significance
1.	<i>Employment Status</i> (% unemployed)	0.347	0.589	<u>2.03</u>	29.78	.000
2.	<i>Work Status of Mother</i>	0.378	0.495 -0.200	<u>2.26</u>	16.75	.000
3.	<i>Tenure type</i> (% owner occupied)	0.395	0.647 -0.278 0.239	<u>3.231</u> <u>0.135</u> 0.129	11.77	.000

* s.e. - standard error: values underlined are significant at the 5 percent level.

Offence Against the Person

Employment status again was important in describing the relative influence of all themes on delinquency residence. All themes accounted for the 38.1 percent explained variance in delinquency rates: of this, employment status accounted for 23 percent.

TABLE 6.8 STEPWISE REGRESSION RESULTS FOR OFFENCE AGAINST THE PERSON DELINQUENCY RESIDENCE (DEPENDENT) AND DELINQUENCY THEMES

Step	Themes	R ²	Regression Coefficient	s.e.*	F-value	Significance
1.	<i>Employment Status</i> (% unemployed)	0.230	0.479	<u>0.381</u>	16.71	.000
2.	<i>Tenure type</i> (% owner occupied)	0.284	0.777 0.377	0.601 0.021	10.90	.000
3.	<i>Socio-economic Status I</i> (% professional-technical)	0.308	0.752 0.336 0.159	<u>0.599</u> <u>0.213</u> 0.029	8.03	.000
4.	<i>Work Status of Mother</i> (% females married in workforce)	0.318	0.762 0.427 0.139 -0.129	<u>0.601</u> <u>0.024</u> <u>0.029</u> 0.026	6.19	.000
5.	<i>Education</i> (% > 15 years < 6 levels school)	0.347	0.739 0.506 -0.225 -0.394 -0.433	<u>0.596</u> <u>0.025</u> <u>0.067</u> 0.039 0.066	5.54	.000
6.	<i>Socio-economic Status II</i> (% labourers and process workers)	0.367	0.717 0.693 0.011 -0.506 -0.559 0.425	<u>0.596</u> <u>0.300-01</u> <u>0.818-01</u> 0.421-01 0.696-01 0.478-01	4.93	.000

* s.e. = standard error: values underlined significant at 5 percent level.

Property Offences

Although employment status was most influential in explaining rates for property delinquency residence the strength of association was not strong (Table 6.9). The pattern of results - ethnicity and socio-economic status I and II - suggested that apart from employment status, few other themes of deprivation could be seriously considered.

TABLE 6.9 STEPWISE REGRESSION RESULTS FOR PROPERTY DELINQUENCY RESIDENCE (DEPENDENT) AND DELINQUENCY THEMES.

Step	Themes	R ²	Regression coefficient	s.e.*	F-value	Significance
1.	<i>Employment Status</i> (% unemployed)	0.119	0.344	<u>1.425</u>	7.53	.000
2.	<i>Ethnicity</i> (% born Italy)	0.190	0.363 0.268	<u>1.382</u> <u>0.555-02</u>	6.46	.003
3.	<i>Stability and Population Change</i> (population change)	0.208	0.308 0.268 -0.145	<u>1.486</u> <u>0.554-02</u>	4.74	.005
4.	<i>Socio-economic Status I</i> (% professional-technical)	0.226	0.299 0.259 -0.150 -0.134	<u>1.486</u> <u>0.553-02</u> 0.244-02 0.107	3.87	.008
5.	<i>Socio-economic Status II</i> (% labourers and process workers)	0.256	0.414 0.257 -0.185 -0.500 -0.430	<u>1.727</u> <u>0.549-02</u> <u>0.246-02</u> 0.249 0.148	3.58	.007

* s.e. = standard error: values underlined significant at 5 percent level.

Under Age Offences

The results on this offence type were similar to those obtained for the total population. Employment status was highly influential in describing the variation in delinquency rates; the education theme accounted for 8.5 percent variance, the only occasion it could be considered of some significance in the analyses for each category of offence.

TABLE 6.10 STEPWISE REGRESSION RESULTS FOR UNDER AGE OFFENCE DELINQUENCY RESIDENCE (DEPENDENT) AND DELINQUENCY THEMES

Step	Themes	R ²	Regression coefficient	s.e.*	F-value	Significance
1.	<i>Employment Status</i> (% unemployed)	0.446	0.668	<u>1.126</u>	45.13	.000
2.	<i>Education</i> (% >15 years <6 levels school)	0.531	0.629 0.293	<u>1.055</u> <u>0.754-01</u>	31.14	.000
3.	<i>Work Status of Mother</i> (% females >15 in workforce)	0.540	0.579 0.251 -0.117	<u>1.188</u> <u>0.824-01</u> <u>0.691-01</u>	21.13	.000
4.	<i>Socio-economic Status II</i> (% labourers and process workers)	0.570	0.433 -0.041 -0.268 0.337	<u>1.446</u> <u>0.147-01</u> <u>0.824-01</u> <u>0.868-01</u>	17.56	.000

* s.e. - standard error: values underlined significant at 5 percent level.

SUMMARY

Several individual themes and propositions related to delinquency residence and urban deprivation were tested. The themes of employment status and tenure type were important in the description of delinquency. Of the remaining themes, low socio-economic status and ethnicity were minimally related to delinquency in urban areas while work status of mothers, population stability and change, and education taken separately indicated little positive or negative association. The relative influence of themes was tested and the overriding importance of employment status in the analysis for all offence categories (except grand theft) was evident. Correlational analysis suggested that this theme was not related to characteristics usually associated with deprivation in the urban environment.

CHAPTER SEVEN

CONCLUSION

INTRODUCTION

The principal objective of this study was to describe the environmental context and conditions under which delinquent behaviour occurred in Urban Brisbane. This was attempted through areal and ecological analysis using firstly, delinquency residence data for individuals and secondly, delinquency residence rates for areas with "social order" data. A broad epidemiological approach was used initially as a means to an end to map where delinquents lived and where offence occurred. Directions for research were identified and this analysis suggested that a more detailed study of spatial aspects of stealing (shoplifting) was necessary. Ecological analysis of this offence type and other categories of offence were related directly or indirectly to the theme of deprivation. The analysis was conducted at individual (areal) and aggregate (ecological) scales. Emphasis was not placed on identifying causes but on understanding general conditions under which delinquent behaviour occurred.

SPATIAL PATTERNS OF THEFT OFFENCE

Shoplifting was identified early in the study as the principal form of delinquency among juveniles. The pattern of petty theft was analysed following a preliminary analysis of characteristics of offenders. Bias measures were used to map the areal surface features which were then related to the real world city structure and demographic composition of Urban Brisbane's population. The static distribution of theft delinquency residence was related to the location where theft offence occurred, using spatial bias measures, and interpreted in terms of movement patterns. Finally, the description of theft delinquency was extended to an ecological analysis in which carefully selected 'social' variables related to the theme of deprivation in the built and impersonal environment, were associated with delinquency rates for defined areas.

Petty theft offence was found initially to have some association with socio-economic status. Offenders tended however, to come from families (and areas since it was shown that high status areas supported persons with high status occupations which were taken as the measure of socio-economic status) whose principal income earner was in a

professional-managerial-clerical occupation. The absence of a relationship between theft delinquency and low socio-economic status did not therefore wholly support social theories which are based on the assumption that delinquency is predominantly a working class phenomenon. However the results do approximate the findings of West and Farrington (1973) and Palanai (1967) and more specifically McDonald's (1969) study which suggested that there were no social class differences for serious theft. It should be noted that this trend was for theft offence only; that the trend toward an association between theft delinquency residence and high social-economic status (or low status) was not evident in the ecological analysis; and that other categories of offence tended to be associated with low socio-economic status.

The analysis of characteristics of offenders suggested that theft delinquents came from homes with stable family relationships. There was evidence to suggest that mothers of delinquents who were employed in the higher socio-economic status professions worked full time (conversely mothers who worked in lower status occupations tended to work part-time). This may have accounted for the tendency for theft delinquency to be associated with higher socio-economic in the analysis of offender characteristics since permanent employment of mothers may result in less attention and more autonomy or opportunities in terms of free time for juveniles to engage in shoplifting activity. The statement is tentative and requires more supporting evidence than this study provided. Finally the thirteen to fourteen age group was most prone to shoplifting; this pattern has been observed in several studies of urban areas.

The patterns of theft delinquency residence for populations of juveniles who focussed their activities on specific theft centres not only provided directions for research but suggested that the demographic composition of the study area was important in understanding these distributions. The local character of theft observed by Baldwin and Bottoms (1976) and other researchers was confirmed for suburban populations of delinquents.

Residential density appeared important in explaining the results of the areal analysis while the influence of city structure on theft delinquents movements was evident in the spatial analysis.

Accessibility along and to major transport links appeared to be a significant influence on offender movement patterns. This was evident in the distance, directional and sectoral bias measures for both the static areal distribution of delinquency residence and spatial movement patterns where residence was examined in relation to place of offence. Accessibility for example, expressed itself not only in nearness or access to a transport route but in the tendency for delinquent movement patterns to be directed toward the inner-city CBD (where density of transport routes was greatest) than to be directed away from the inner city area. Distance bias for most populations of theft offenders (grouped according to the theft centre from which they *actually* stole) was explained by the fact that delinquents stole from their accessible centre.

Suburban theft delinquents tended to move to their accessible (nearest) theft centre although when there was a greater range of distances travelled to accessible centres, those residing at greater distances tended to become 'dislocated' from their respective accessible centre. They tended to steal at alternative centres.

The association between age and theft delinquency observed in chapter four was extended in meaning in the spatial analysis of chapter six. Older theft delinquents tended to travel greater distances whilst younger offenders travelled shorter distances to offence. Delinquents who travelled to their accessible (nearest) centre, tended to be in the lower age groups.

More critical influences than age and distance on offender delinquency residence were recorded in the ecological analysis in chapter seven. The importance of the 'social order' variable, stability and population changes, suggested that some form of social dis-organisation factor could be operative for grand theft offence. The influence of employment status measured by % *unemployed*, also described grand theft; the influence of distance or socio-economic status on grand theft delinquency rates was minimal.

The ecological analysis indicated that for petty theft delinquency residence patterns, the singular important influence was employment status again measured by % *unemployed*. The ecological analysis of theft

offence extended the results of chapter four. Firstly, work status of a delinquent's mother although not a strong influence on delinquency residence rates, was relatively important compared to other variables related to the impersonal social environment. Secondly, high socio-economic status which only tended to be associated with theft in chapter four, had minimal influence on theft delinquency rates in the ecological analysis of chapter six. The two types of analysis confirmed the pattern and interpretation of results.

DELINQUENCY AND EMPLOYMENT STATUS

In the analysis of offender characteristics, the results showed that 5.7 percent of principal income earners in offenders' families were unemployed. This compared with the census figure of 1.3 percent for the total population: the figures reflected the importance of this variable in later ecological analysis.

In this phase of the study (chapter six) it was clear that the 'order' in social descriptors (census variables) of Urban Brisbane did not correspond with 'order' in delinquency rates for defined areas. The singular exception to this, already noted in the previous section on theft offence, was the theme of employment status, measured by the variable *% unemployed*. The analysis of data for the total population of delinquents revealed that this variable accounted for 44.7 percent of variance in offence rates. The pattern of results was similar in kind but varying in degree for other categories of offence except grand theft.

The significance of the theme of employment status was reckoned by its importance in previous research and its relationship with other themes in the built and impersonal social urban environment. Herbert (1977) in a study of Cardiff (UK), assumed that high levels of unemployment were associated with low socio-economic and low parent status. In chapter four there was some evidence of association between delinquency, and low socio-economic status (from JAO data) but any influence of this variable on delinquency rates for areas was not observed (from census data). Nor was there a significant relationship between *% unemployed* and low socio-economic status for all areas in Urban Brisbane. While employment status therefore was included in the

analysis for Urban Brisbane, its association with deprivation was tenuous.¹ There was no correlation of the variable % *unemployed*, were low or high delinquency residence rates. Unemployment was associated positively with ethnicity in low delinquency areas and negatively with stability and population change characteristics in high delinquency areas. The pattern of results suggested that delinquency was not as strongly associated with deprivation expressed by employment levels in areas and low socio-economic status as Herbert had so readily assumed in the Cardiff study.

Generally the correlation between delinquency rates for offence categories and variables other than unemployment was 'weak'. This may have been the consequence of a methodology which sought (in the ecological analysis) to determine or understand *average* rather than *variable* conditions which characterised areas and influenced delinquency rates. Alternatively, the result may have been implicit in the data. Nevertheless, the absence of deprived environmental conditions associated with unemployment in high or low delinquency areas suggested that processes other than that suggested by Herbert were operative. These results further suggested that behavioural emphases using subcultural groups in low socio-economic areas might be adopted in future studies to determine if feelings of relative deprivation existed and if so how this could stimulate delinquent activity.

While the present study has not unravelled the processes underlying the mapped features of delinquency, the significance of unemployment within a description or explanation of juvenile delinquency ought not be underestimated. Nor can the concept of social disorganisation be eliminated in future studies. Intensive case study approaches at neighbourhood scale may lead to a more adequate understanding of environmental conditions under which delinquent behaviour is observed. The cumulation of knowledge from cases may provide the evidence for more generalised statements about the spatial expression of delinquent behaviour as a variable in delinquency research.

¹Deprivation referred to as thresholds rather than average under-privilege particularly in the urban physical environment.

FUTURE RESEARCH AND POLICY IMPLICATIONS

There are a number of lines for future research other than the cumulation of case area studies. A longitudinal study within a case(s) appears a profitable approach. The relative absence of delinquency residence in The Gap area for example, may apply to the period of this study; in the past four years however, there has been a shift in population composition of residents as well as age progression of young juveniles who existed in the area. A reappraisal of delinquency using time series analysis may at the time of this study be warranted. In areas with high delinquency residence rates and high unemployment further research is required. This research might emphasize the study of residuals rather than explained variance; a focus on heterogeneity rather than homogeneity. The cumulation of studies in defined high or low delinquency areas could also illuminate the process of spatial reproduction of delinquency (if it occurs) in different areas.

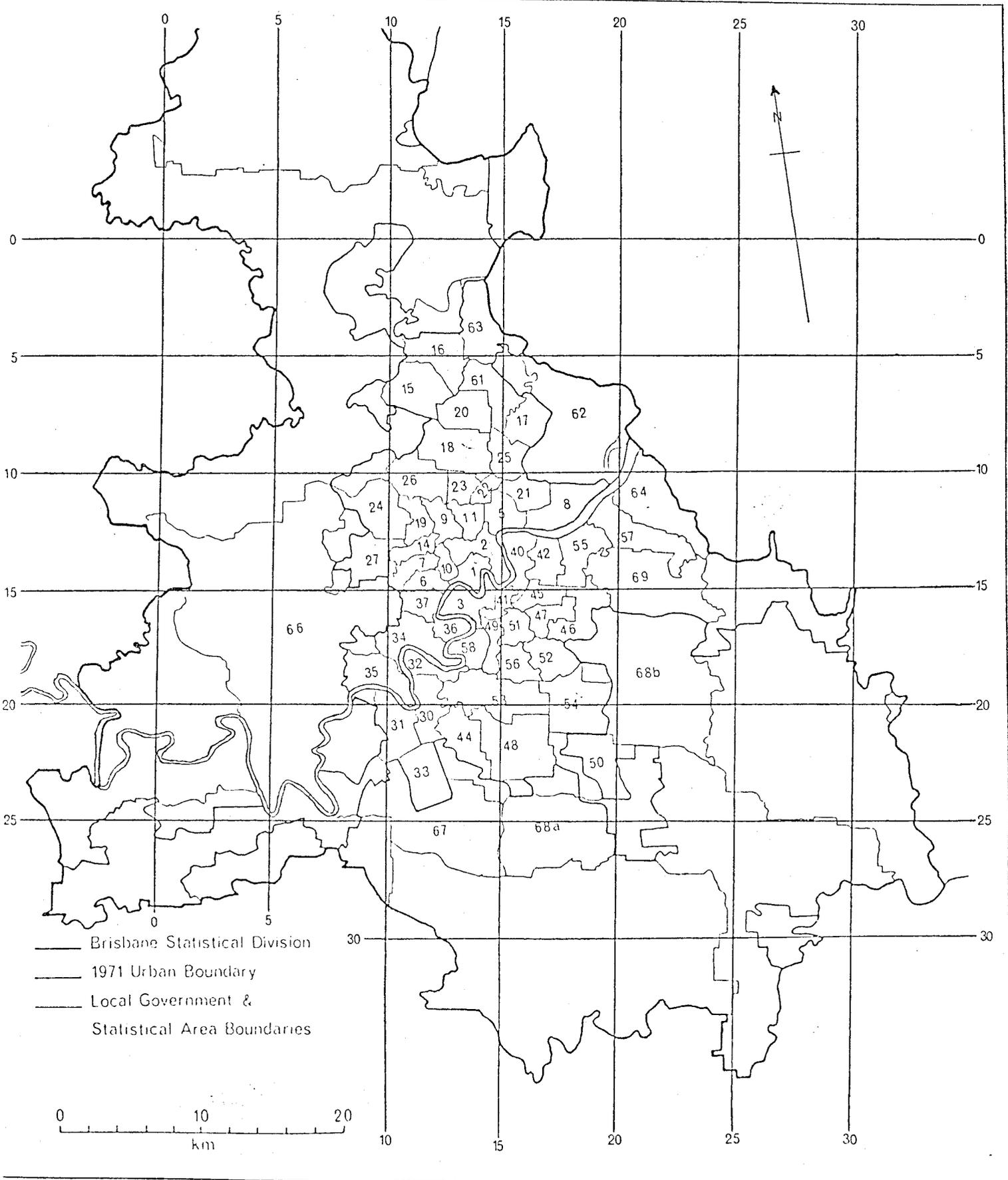
Other research developments might place a greater emphasis on opportunity as expressed by the attitudes of shopkeepers in the case of theft or shoplifting or how delinquents attach preferences, values or opportunities on individual locations (place utility) such as a theft centre, relative to the intention to commit an offence. Studies such as these may focus on "action-space" or "personal-space" of delinquents. This form of analysis may contribute to a better understanding of theft as a decision-making process and whether it has the 'rational' component claimed by Capone and Nichols.

The emphasis on environmental correlates of delinquency residence rates in this study and in future studies ought to have short term roles in terms of policy decision-taking. The variation in results in previous studies (as observed in the qualitative analysis of delinquency literature) supports the observation that research be within socio-cultural contexts leading to policy decisions specific to that context. This short term role of the spatial analysis of delinquency might be compatible with short term planning and environmental design. Change in city structure for example, is a long term condition which may or may not reduce levels of delinquency. The short term alteration of

thresholds of deprivation, for example in unemployment levels may be a necessary strategy for the reduction (without displacement) of delinquency in selected areas.

APPENDICES

APPENDIX A
KEY TO STATISTICAL AREAS



APPENDIX A (CONT'D)
KEY TO STATISTICAL AREAS

Sequence No.	Statistical Area Name	Grid Co-ord Of S.A. Centre		Sequence No.	Statistical Area Name	Grid Co-ord Of S.A. Centre	
		X	Y			X	Y
1.	City	133	139	35.	Kenmore	094	094
2.	North City	135	149	36.	St. Lucia	126	114
3.	South City	131	126	37.	Toowong	111	125
5.	Ascot	148	164	40.	Balmoral	156	143
6.	Fernberg	116	135	41.	East Brisbane	149	125
7.	Ithaca	107	142	42.	Morningside	167	144
8.	Meeandah	175	169	44.	Archerfield	132	060
9.	Newmarket	121	159	45.	Camp Hill	166	129
10.	Normanby	122	143	46.	Carina	185	121
11.	Windsor	132	161	47.	Chatsworth	169	121
14.	Ashgrove	107	148	48.	Coopers Plains	156	064
15.	Aspley	104	219	49.	Ekibin	146	106
16.	Bald Hills	116	239	50.	Fruitgrove	188	055
17.	Banyo	158	215	51.	Greenslopes	155	115
18.	Chermside	127	191	52.	Holland Park	171	102
19.	Enoggera	110	162	53.	Moorooka	146	084
20.	Geebung	150	207	54.	Mt. Gravatt	183	083
21.	Hendra	158	173	55.	Murrarie	179	147
22.	Kalinga	139	174	56.	Tarragindi	180	126
23.	Kedron	129	175	57.	Wynnum West	207	155
24.	Mitchelton	091	165	58.	Yeronga	134	105
25.	Nundah	149	187	61.	Boondall	146	205
26.	Stafford	117	176	63.	Sandgate	136	241
27.	The Gap	084	144	64.	Wynnum	218	167
30.	Corinda	117	079	66.	Western	055	105
31.	Darra	103	069	67.	Sth Western	110	028
32.	Graceville	114	097	68.	Sth Eastern	220	075
33.	Inala	116	049	69.	Eastern	212	135
34.	Indooroopilly	109	110				

APPENDIX B: JUVENILE POPULATION (7-17 YEARS) IN URBAN BRISBANE
STATISTICAL AREAS

Stat. Area	Population	Stat. Area	Population
1. City	433	35. Kenmore	1142
2. North City	977	36. St. Lucia	458
3. South City	1322	37. Toowong	704
5. Ascot	988	40. Balmoral	1209
6. Fernberg	758	41. East Brisbane	907
7. Ithaca	793	42. Morningside	1231
8. Meeandah	113	44. Archerfield	372
9. Newmarket	945	45. Camp Hill	1107
10. Normanby	783	46. Carina	966
11. Windsor	953	47. Chatsworth	1366
14. Ashgrove	706	48. Coopers Plains	2605
15. Aspley	247	49. Ekibin	854
16. Bald Hills	631	50. Fruitgrove	495
17. Banyo	920	51. Greenslopes	888
18. Chermside	3024	52. Holland Park	2526
19. Enoggera	1062	53. Moorooka	1799
20. Geebung	2532	54. Mt. Gravatt	2255
21. Hendra	570	55. Murrarie	486
22. Kalinga	547	56. Tarragindi	1504
23. Kedron	1080	57. Wynnum West	1008
24. Mitchelton	1566	58. Yeronga	1023
25. Nundah	1390	61. Boondall	821
26. Stafford	2642	62. Nudgee	319
27. The Gap	1267	63. Sandgate	2198
30. Corinda	1338	64. Wynnum	2335
31. Darra	514	66. Western	603
32. Graceville	749	67. South Western	892
33. Inala	3386	68. South Eastern	1052
34. Indooroopilly	1833	69. Eastern	737

APPENDIX C.

TABLE C1 : DELINQUENCY RESIDENCE FREQUENCY FOR STATISTICAL AREAS

Statistical Area	Total Population of Juveniles	Grand Theft	Petty Theft	Offences Against the Person	Property Offences	Underage Offences
City	433	7	30	4	12	17
North City	977	9	15	3	16	12
South City	1322	8	28	0	10	10
Ascot	998	8	22	1	10	2
Fernberg	758	7	27	3	14	5
Ithaca	793	2	15	1	3	7
Meeandah	113	0	2	0	0	2
Newmarket	945	2	8	0	4	13
Normanby	783	4	25	1	9	7
Windsor	953	7	17	0	22	4
Ashgrove	706	2	10	1	5	6
Aspley	247	3	6	1	16	2
Bald Hills	631	5	13	1	11	6
Banyo	920	3	23	0	4	4
Chermside	3024	14	85	1	31	16
Enoggera	1062	9	18	2	10	2
Geebung	2532	8	35	5	18	10
Hendra	570	6	12	0	5	1
Kajinga	547	8	16	0	13	2
Kedron	1080	12	17	0	14	8
Mitchelton	1566	12	25	0	17	7
Nundah	1390	8	37	3	15	1
Stafford	2642	13	33	3	24	7
The Gap	1267	1	19	3	4	4
Gorinda	1338	14	21	1	17	2
Darra	514	2	8	1	3	2
Graceville	749	6	12	1	7	2
Inala	3386	18	36	0	23	25
Indooroopilly	1833	14	44	2	16	1

TABLE C2: (Continued)

Statistical Area	Total Population of Juveniles	Grand Theft	Petty Theft	Offences Against the Person	Property Offences	Underage Offences
Kenmore	1142	2	9	1	3	0
St. Lucia	458	2	8	2	2	10
Toowong	704	2	13	1	5	2
Balmoral	1209	9	21	1	14	10
East Brisbane	907	3	11	0	3	6
Morningside	1231	5	11	3	11	14
Archerfield	372	4	3	1	4	3
Camp Hill	1107	8	20	2	9	4
Carina	966	5	9	5	5	8
Cahtsworth	1366	4	8	2	5	4
Coopers Plains	2605	11	27	2	21	10
Ekibin	854	4	4	3	4	5
Fruitgrove	495	5	6	0	10	1
Greenslopes	888	5	8	2	5	4
Holland Park	2526	9	19	4	14	4
Moorooka	1799	19	24	0	28	8
Mt. Gravatt	2255	10	50	3	14	4
Murrarie	486	3	5	0	5	2
Tarrabindi	1604	6	16	2	8	0
Wynnum West	1008	3	6	1	5	0
Yeronga	1023	2	17	1	5	9
Boondal	821	9	6	3	14	2
Nudgee	319	3	6	0	3	5
Sandgate	198	15	29	2	24	16
Wynnum	2385	9	10	4	10	9
Western	603	4	13	0	5	1
South Western	892	5	9	0	5	7
South Eastern	1052	8	7	0	9	1
Eastern	737	3	15	3	2	4

TABLE C3: DELINQUENCY OCCURRENCE FREQUENCY FOR STATISTICAL AREAS

Statistical Area	Grand Theft	Petty Theft	Offences Against the Person	Property Offences	Underage Offences
City	156	452	11	180	30
North City	8	2	1	15	15
South City	6	3	1	11	10
Ascot	5	2	1	6	3
Fernberg	2	1	3	5	6
Ithaca	2	1	0	4	2
Meeandah	1	1	2	2	4
Newmarket	3	0	0	10	17
Normanby	2	1	1	5	2
Windsor	4	0	1	9	2
Ashgrove	1	2	1	2	1
Aspley	2	3	1	8	1
Bald Hills	5	3	2	12	3
Banyo	2	4	0	3	2
Chermside	25	148	4	39	15
Enoggera	1	2	1	1	2
Geebung	1	2	0	7	5
Hendra	3	0	0	5	1
Kalinga	5	1	1	8	0
Kedron	4	3	1	13	10
Mitchelton	14	34	0	20	6
Nundah	13	121	2	21	6
Stafford	6	2	3	16	8
The Gap	0	1	1	2	0
Corinda	1	0	1	4	9
Darra	1	0	0	2	3
Graceville	1	0	1	3	1
Inala	10	2	0	11	25
Indooroopilly	31	134	1	33	7

TABLE C4: (continued)

Statistical Area	Grand Theft	Petty Theft	Offences Against the person	Property Offences	Underage Offences
Kenmore	1	1	1	1	0
St. Lucia	0	0	2	0	1
Toowong	1	3	3	1	2
Balmoral	3	4	2	4	12
East Brisbane	0	3	0	0	4
Morningside	5	3	1	9	9
Archerfield	1	0	1	2	2
Camp Hill	8	58	3	10	5
Carina	3	1	1	3	9
Chatsworth	1	0	1	2	3
Coopers Plains	5	5	2	17	5
Ekibin	2	0	2	3	3
Fruitgrove	2	0	4	6	0
Greenslopes	8	20	0	10	3
Holland Park	4	1	5	8	7
Moorooka	5	6	2	12	5
Mt. Gravatt	19	81	5	25	3
Murrarie	1	13	1	2	5
Tarragindi	1	1	1	2	0
Ynnum West	1	0	0	3	0
Yeronga	3	2	1	5	18
Boondal	2	0	3	7	3
Nudgee	2	1	0	4	2
Sandgate	5	7	2	15	16
Wynnum	3	2	4	4	6
Western	2	1	0	3	0
South Western	0	2	0	0	3
South Eastern	1	0	0	2	1
Eastern	2	3	2	1	1

TABLE C5 : DELINQUENCY RESIDENCE RATES ('000) AND RANK ORDER
FOR STATISTICAL AREAS.

Statistical Area	Grand theft	Petty Theft	Offences Against Person	Property Offences	Under Age Offences	Rank Order Crime Index
1. City	162(1)	693(1)	92(1)	277(1)	393(1)	5(1)
2. North City	92(12)	154(31)	31(10)	164(9)	123(5)	67(5)
3. South City	61(27)	212(12)	00(41)	76(33)	76(17)	130(23)
5. Ascot	80(15)	220(10)	10(33)	100(21)	20(44)	123(17)
6. Fernberg	92(12)	356(2)	40(6)	185(6)	66(21)	47(3)
7. Ithaca	25(53)	190(16)	13(25)	38(52)	88(9)	155(34)
8. Meeandah	00(58)	177(21)	00(41)	00(58)	177(2)	180(47)
9. Newmarket	21(54)	85(48)	00(41)	42(50)	138(4)	197(50)
10. Normanby	51(33)	319(3)	13(25)	115(14)	89(8)	80(6)
11. Windsor	74(21)	178(20)	00(41)	238(3)	42(30)	115(13)
14. Ashgrove	28(51)	142(33)	14(23)	71(34)	85(11)	152(33)
15. Aspley	122(3)	243(7)	41(4)	243(2)	81(14)	31(2)
16. Bald Hills	79(17)	206(14)	16(20)	174(7)	95(7)	65(4)
17. Banyo	33(46)	250(6)	00(41)	44(48)	44(29)	170(44)
18. Chermside	46(36)	281(4)	13(25)	103(19)	53(25)	109(12)
19. Enoggera	85(14)	170(24)	19(17)	94(22)	19(46)	123(17)
20. Geebung	32(48)	138(34)	20(15)	71(34)	40(32)	163(38)
21. Hendra	105(8)	211(13)	00(41)	88(27)	18(47)	136(27)
22. Kalinga	146(2)	293(3)	00(41)	238(3)	37(36)	85(7)
23. Kedron	111(4)	157(27)	00(41)	130(11)	74(18)	101(10)
24. Mitchelton	77(18)	160(25)	00(41)	109(15)	45(26)	125(20)
25. Nundah	58(28)	266(5)	22(14)	108(17)	7(52)	116(14)
26. Stafford	49(34)	125(37)	11(31)	91(25)	27(41)	171(45)
27. The Gap	8(57)	150(32)	24(12)	32(55)	00(54)	210(54)
30. Corinda	105(8)	157(28)	08(38)	127(12)	30(38)	124(19)
31. Darra	39(42)	156(30)	20(15)	58(39)	39(33)	149(32)
32. Graceville	80(15)	160(26)	13(25)	94(22)	27(41)	129(22)
33. Inala	53(31)	106(40)	00(41)	68(37)	74(18)	167(41)
34. Indooroopilly	76(19)	240(8)	11(31)	87(28)	6(53)	139(29)

TABLE C6 : (continued).

Statistical Area	Grand Theft	Petty Theft	Offences Against Person	Property Offences	Under Age Offences	Rank Order Crime Index
35. Kenmore	18(56)	79(50)	09(36)	26(57)	00(54)	253(58)
36. St. Lucia	44(37)	175(22)	44(3)	44(48)	00(54)	164(39)
37. Toowong	28(51)	185(18)	14(23)	71(34)	28(40)	166(40)
40. Balmoral	74(21)	174(23)	08(38)	116(14)	83(12)	108(11)
41. East Brisbane	33(46)	121(38)	00(41)	33(54)	66(21)	200(51)
42. Morningside	41(40)	89(47)	24(12)	89(26)	114(6)	131(24)
44. Archerfield	108(6)	81(49)	27(11)	108(18)	81(14)	96(9)
45. Camp Hill	72(23)	181(19)	18(18)	81(31)	37(37)	128(21)
46. Carina	52(32)	93(45)	52(2)	52(43)	83(12)	134(26)
47. Chatsworth	29(50)	59(56)	15(22)	37(53)	29(39)	220(56)
48. Coopers Plains	42(39)	104(41)	08(38)	81(31)	38(34)	183(48)
49. Ekibin	47(35)	47(57)	35(9)	47(47)	59(23)	171(45)
50. Fruitgrove	101(10)	121(38)	00(41)	202(5)	20(44)	138(28)
51. Greenslopes	56(29)	90(46)	40(6)	56(40)	45(26)	147(31)
52. Holland Park	36(45)	75(51)	16(20)	55(42)	16(50)	208(53)
53. Moorooka	106(7)	133(35)	00(41)	156(10)	45(26)	119(16)
54. Mt. Gravatt	44(37)	222(9)	13(25)	62(37)	18(47)	155(34)
55. Murrarie	62(26)	103(42)	00(41)	103(19)	41(31)	159(37)
56. Tarragindi	37(44)	100(44)	13(25)	50(44)	00(54)	211(55)
57. Wynnum West	30(49)	60(55)	10(33)	50(44)	00(54)	235(57)
58. Yeronga	20(55)	166(25)	10(33)	49(46)	88(9)	168(42)
61. Boondal	110(5)	73(52)	37(8)	171(8)	24(43)	116(14)
62. Nudgee	94(11)	188(17)	00(41)	94(22)	157(3)	94(8)
63. Sandgate	68(24)	132(36)	09(36)	109(15)	73(20)	131(24)
64. Wynnum	38(43)	42(58)	17(19)	42(50)	38(34)	204(52)
66. Western	66(25)	216(11)	00(41)	83(30)	17(49)	156(36)
67. Sth Western	56(29)	101(43)	00(41)	56(40)	79(16)	169(43)
68. Sth Eastern	76(19)	67(54)	00(41)	86(29)	9(51)	194(49)
69. Eastern	41(40)	204(15)	41(4)	27(56)	54(24)	139(29)

TABLE C7 : DELINQUENCY OCCURRENCE RATES('000)
WITHIN STATISTICAL AREAS ('000)

Statistical Area	Grand Larceny	Petty Larceny	Person Offences	Property Offences	Under Age Offences
City	3603	439	254	157	693
North City	82	21	10	154	154
South City	45	23	8	83	76
Ascot	50	20	10	60	30
Fernberg	26	13	40	66	79
Ithaca	25	13	00	50	25
Meeandah	89	89	177	177	354
Newmarket	32	00	00	106	180
Normanby	26	13	13	64	26
Windsor	42	00	11	94	21
Ashgrove	14	28	14	28	14
Aspley	81	122	41	324	41
Bald Hills	202	48	32	190	48
Banyo	22	44	00	33	22
Chermside	83	489	13	129	50
Enoggera	9	19	9	9	19
Geebung	4	8	00	28	20
Hendra	53	00	00	88	18
Kalinga	91	18	18	146	00
Kedron	37	28	9	120	93
Mitchelton	89	217	00	128	38
Nundah	94	871	14	151	43
Stafford	23	8	11	61	30
The Gap	00	8	8	16	00
Corinda	8	00	8	30	67
Darra	39	97	20	00	00
Graceville	53	67	13	00	13
Inala	44	112	30	6	00
Indooroopilly	933	240	169	731	6

TABLE C8 : (continued).

Statistical Area	Grand Larceny	Petty Larceny	Person Offences	Property Offences	Under Age Offences
Kenmore	9	9	9	9	00
St. Lucia	00	00	44	00	22
Toowong	14	43	43	14	28
Balmoral	25	33	17	33	99
East Brisbane	00	33	00	00	44
Morningside	41	24	8	73	73
Archerfield	27	00	27	54	54
Camp Hill	72	524	27	90	45
Carina	31	10	10	31	93
Chatsworth	7	00	7	15	22
Coopers Plains	19	19	8	65	19
Ekibin	23	00	23	35	35
Fruitgrove	40	00	00	121	00
Greenslopes	90	225	45	113	34
Holland Park	16	4	20	32	28
Moorooka	28	33	11	67	28
Mt. Gravatt	84	359	22	111	13
Murrarie	21	268	21	41	103
Tarragindi	6	6	6	13	00
Wynnum West	10	00	00	30	00
Yeronga	29	20	10	49	176
Boondal	24	00	37	85	37
Nudgee	63	31	00	125	63
Sandgate	23	32	9	68	73
Wynnum	13	8	17	17	25
Western	33	17	00	50	00
Sth Western	00	22	00	00	34
Sth Eastern	10	00	00	19	10
Eastern	27	41	27	14	14

APPENDIX D

TABLE D1 : STANDARDIZED DELINQUENCY RESIDENCE RATES FOR OFFENCE CATEGORIES IN URBAN BRISBANE STATISTICAL AREAS

	Grand Larceny	Petty Larceny	Offences Against Person	Property Offences	Under Age	Total Crime Index	Rank On Index
1. City	2.93	5.30	4.38	3.04	5.60	21.25	1
2. North City	0.87	-0.13	0.87	1.15	1.09	3.85	5
3. South City	-0.04	0.46	-0.91	-0.31	0.30	-0.50	30
5. Ascot	0.52	0.54	-0.34	0.09	-0.63	0.18	21
6. Fernberg	0.87	1.91	1.39	1.50	0.14	5.81	3
7. Ithaca	-1.10	0.23	-0.17	-0.95	0.50	-1.49	38
8. Meeandah	-1.84	0.10	-0.91	-1.58	1.99	-2.24	48
9. Newmarket	-1.21	-0.82	-0.91	-0.88	1.34	-2.48	50
10. Normanby	-0.34	1.53	-0.17	0.34	0.52	1.88	8
11. Windsor	0.34	0.11	-0.91	2.39	-0.26	1.67	11
14. Ashgrove	-1.01	-0.25	-0.11	-0.40	0.45	-1.32	35
15. Aspley	1.75	0.77	1.44	2.47	0.39	6.82	2
16. Bald Hills	0.49	0.39	0.01	1.32	0.62	2.83	6
17. Banyo	-0.86	0.84	-0.91	-0.85	-0.23	-2.01	46
18. Chermside	-0.48	1.15	-0.17	0.14	-0.08	0.56	20
19. Enoggera	0.55	0.03	0.18	-0.01	-0.65	0.10	23
20. Geebung	-0.89	-0.29	0.24	-0.39	-0.30	-1.63	40
21. Hendra	1.25	0.45	-0.91	-0.11	-0.67	0.01	24
22. Kalinga	2.46	1.27	-0.91	2.39	-0.35	4.86	4
23. Kedron	1.43	-0.10	-0.91	0.59	0.27	1.28	12
24. Mitchelton	0.43	-0.07	-0.91	0.24	-0.21	-0.52	32
25. Nundah	-0.13	1.00	0.35	0.22	-0.85	0.59	19
26. Stafford	-0.39	-0.42	-0.28	-0.06	-0.52	-1.67	41
27. The Gap	-1.60	-0.17	0.47	-1.05	-0.97	-3.22	55
30. Corinda	1.25	-0.10	-0.45	0.54	-0.46	0.78	16
31. Darra	-0.69	-0.11	0.24	-0.61	-0.32	-1.49	39
32. Graceville	0.52	-0.07	-0.16	-0.01	-0.52	-0.24	29
33. Inala	-0.28	-0.61	-0.91	0.45	0.27	-1.08	33
34. Indooroopilly	0.40	0.74	-0.28	-0.13	-0.87	-0.14	27
35. Kenmore	-1.31	-0.89	1.33	-1.15	-0.97	-1.99	45

APPENDIX D (CONT'D.)

	Grand Larceny	Petty Larceny	Offences Against Person	Property Offences	Under Age	Total Crime Index	Rank On Index
36. St. Lucia	-0.54	0.08	1.62	-0.85	-0.97	-0.66	32
37. Toowong	-1.01	0.18	-0.11	-0.40	-0.50	-1.84	43
40. Balmoral	0.34	0.07	-0.45	0.35	0.42	0.73	17
41. East Brisbane	-0.86	-0.46	-0.91	-1.03	0.14	-3.12	54
42. Morningside	-0.63	-0.79	0.47	-0.10	0.94	0.09	22
44. Archerfield	1.34	-0.87	0.64	0.22	0.39	1.72	10
45. Camp Hill	0.28	0.14	0.12	-0.23	-0.37	-0.06	25
46. Carina	-0.31	-0.74	2.08	-0.72	0.42	0.73	17
47. Chatsworth	-0.98	-1.09	-0.05	-0.97	-0.48	-3.57	57
48. Coopers Plains	-0.60	-0.63	-0.45	-0.23	-0.33	-2.24	48
49. Ekibin	-0.45	-1.21	1.10	-0.80	0.02	-1.34	36
50. Fruitgrove	1.14	-0.46	-0.91	1.79	-0.63	0.93	14
51. Greenslopes	-0.19	-0.77	1.39	-0.65	-0.21	-0.22	28
52. Holland Park	-0.78	-0.93	0.01	-0.67	-0.70	-3.07	53
53. Moorooka	1.28	-0.34	-0.91	1.02	-0.21	0.84	15
54. Mt. Gravatt	-0.54	0.56	-0.17	-0.55	-0.67	-1.37	37
55. Murrarie	-0.01	-0.64	-0.91	0.14	-0.28	-1.70	42
56. Tarrangindi	-0.75	-0.67	-0.16	-0.75	-0.97	-3.30	56
57. Wynnum West	-0.95	-1.08	-0.34	-0.75	-0.97	-4.09	58
58. Yeronga	-1.25	-0.01	-0.34	-0.76	0.50	-1.86	44
61. Boondall	1.40	-0.95	1.22	1.27	-0.56	2.38	7
62. Nudgee	0.93	0.21	-0.91	-0.01	1.66	1.88	8
63. Sandgate	0.16	-0.35	-0.40	0.24	0.25	-0.10	26
64. Wynnum	-0.72	-1.26	0.06	-0.88	-0.33	-2.83	52
66. Western	0.11	0.50	-0.91	-0.20	-0.68	-1.18	34
67. Sth Western	-0.19	-0.66	-0.91	-0.65	0.35	-2.06	47
68. Sth Eastern	0.40	-1.01	-0.91	-0.15	-0.82	-2.49	51
69. Eastern	-0.63	0.37	1.45	-1.13	-0.06	1.00	13

APPENDIX D

TABLE D2 : STANDARDIZED DELINQUENCY OCCURRENCE RATES FOR OFFENCE CATEGORIES FOR URBAN BRISBANE STATISTICAL AREAS.

	Grand Larceny	Petty Larceny	Offences Against Person	Property Offences	Under Age Offences	Total	Rank Index
1. City	7.46	1.93	5.85	7.44	6.20	28.88	1
2. North City	-0.04	-0.36	-0.25	0.02	0.91	0.28	11
3. South City	-0.12	-0.35	-0.30	-0.11	0.15	-0.73	23
5. Ascot	-0.11	-0.37	-0.25	-0.15	-0.30	-1.18	35
6. Fernberg	-0.16	-0.41	0.50	-0.14	0.18	-0.03	16
7. Ithaca	-0.16	-0.41	-0.50	-0.17	-0.35	-1.59	47
8. Meeandah	-0.03	0.01	3.92	0.06	2.88	6.84	2
9. Newmarket	-0.15	-0.48	-0.50	-0.06	1.17	-0.02	15
10. Normanby	-0.16	-0.41	-0.18	-0.14	-0.34	-1.23	36
11. Windsor	-0.13	-0.48	-0.23	-0.08	-0.39	-1.31	39
14. Ashgrove	-0.18	-0.38	-0.15	-0.21	-0.45	-1.32	40
15. Aspley	-0.04	0.17	0.52	0.34	-0.19	0.80	10
16. Bald Hills	0.22	-0.22	0.30	0.09	-0.12	0.27	12
17. Banyo	-0.17	-0.24	-0.50	-0.20	-0.38	-1.49	45
18. Chermside	-0.04	2.19	-0.18	-0.02	-0.10	1.85	6
19. Enoggera	-0.19	-0.37	-0.28	-0.24	-0.40	-1.48	44
20. Geebung	-0.21	-0.43	-0.50	-0.21	-0.39	-1.74	51
21. Hendra	-0.10	-0.48	-0.50	-0.10	-0.41	-1.59	47
22. Kalinga	-0.02	-0.38	-0.05	0.01	-0.59	-1.03	30
23. Kedron	-0.14	-0.33	-0.28	-0.04	0.32	-0.47	19
24. Mitchelton	-0.03	1.00	-0.50	-0.02	-0.22	0.23	13
25. Nundah	-0.01	4.27	-0.15	0.02	-0.17	3.96	3
26. Stafford	-0.16	-0.43	-0.23	-0.15	-0.30	-1.27	37
27. The Gap	-0.21	-0.43	-0.30	-0.23	-0.59	-1.76	54
30. Corinda	-0.20	-0.48	-0.30	-0.20	0.07	-1.11	31
31. Darra	-0.17	-0.48	-0.50	-0.19	-0.02	-1.36	41
32. Graceville	-0.19	-0.48	-0.18	-0.19	-0.46	-1.50	46
33. Inala	-0.15	-0.45	-0.50	-0.20	0.13	-1.17	34
34. Indooroopilly	0.15	3.5	-0.35	0.07	-0.22	3.15	4
35. Kenmore	-0.20	-0.43	-0.28	-0.24	-0.59	-1.74	51

	Grand Larceny	Petty Larceny	Offences Against Person	Property Offences	Under Age Offences	Total	Rank Index
36. St. Lucia	-0.21	-0.48	0.60	-0.26	-0.38	-0.73	23
37. Toowong	-0.18	-0.24	0.57	-0.23	-0.32	-0.40	18
40. Balmoral	-0.15	-0.30	-0.08	-0.20	0.38	-0.35	17
41. East Brisbane	-0.21	-0.30	-0.50	-0.26	-0.16	-1.43	43
42. Morningside	-0.13	-0.35	-0.30	-0.13	0.12	-0.79	26
44. Archerfield	-0.16	-0.48	0.17	-0.16	-0.06	-0.69	21
45. Camp Hill	-0.06	2.38	0.17	-0.09	-0.15	2.25	5
46. Carina	-0.15	-0.42	-0.25	-0.20	0.32	-0.70	22
47. Chatsworth	-0.20	-0.48	-0.33	-0.23	-0.38	-1.62	50
48. Coopers Plains	-0.17	-0.37	-0.30	-0.14	-0.40	-1.38	42
49. Ekibin	-0.17	-0.48	0.07	-0.19	-0.25	-1.02	29
50. Fruitgrove	-0.13	-0.48	-0.50	-0.04	-0.59	-1.74	51
51. Greenslopes	-0.03	-0.02	0.75	0.62	-0.05	1.27	7
52. Holland Park	-0.18	-0.45	0.00	-0.20	-0.32	-1.15	33
53. Moorooka	-0.16	-0.29	-0.23	-0.14	-0.32	-1.14	32
54. Mt. Gravatt	-0.04	1.48	0.05	-0.05	-0.46	0.98	9
55. Murrarie	-0.17	0.98	0.02	-0.18	0.42	1.07	8
56. Tarragindi	-0.20	-0.45	-0.35	-0.24	-0.59	-1.83	56
57. Wynnum West	-0.19	-0.48	-0.50	-0.20	-0.59	-1.96	58
58. Yeronga	-0.15	-0.37	-0.25	-0.17	1.13	0.19	14
61. Boondall	-0.16	-0.48	0.42	-0.10	-0.23	-0.55	20
62. Nudgee	-0.08	-0.31	-0.50	-0.03	0.03	-0.89	27
63. Sandgate	-0.16	-0.30	-0.28	-0.13	0.12	-0.75	25
64. Wynnum	-0.19	-0.43	-0.08	-0.23	-0.34	-1.27	37
66. Western	-0.14	-0.39	-0.50	-0.17	-0.59	-1.79	55
67. Sth Western	-0.21	-0.36	-0.50	-0.26	-0.26	-1.59	47
68. Sth Eastern	-0.19	-0.48	-0.50	-0.23	-0.49	-1.89	57
69. Eastern	-0.16	-0.25	0.17	-0.23	-0.45	-0.92	28

APPENDIX E: CALCULATION OF "BEST FIT" LINE FOR SECTORAL BIAS MEASURES¹

$Y_o = a_o + b_o X_o$ is average or best fit line of

(i) $y_1 = a_1 + b_1 x_1$ and

(ii) $y_2 = a_2 + b_2 x_2$ or $x = a_2 b_2 y = \frac{a_2}{b_2} + \frac{1}{b_2} x$
 $x_2 = a_2 + b_2 y_2$

Therefore $Y = \frac{a_1 - \frac{a_2}{b_2}}{2} + \frac{b_1 \frac{1}{b_2}}{2} x$

The slope of the estimate line $Y = a_o + b_o X_o$ becomes

$$b_o = 1/2(b_1 + \frac{1}{b_2})$$

The intercept of the estimate line $Y = a_o + b_o X_o$ becomes

$$a_o = 1/2(a_1 - \frac{a_2}{b_2})$$

The intercept of the estimate line passes through the mean centre (Sc): the co-ordinates of Sc may be used to calculate a_o in the equation:

$$b_o = \tan \alpha = \frac{y_1 - y_2}{x_1 - x_2}$$

where $y_1 = a_o$ when $x_1 = 0$.

The slope of the principal axis - the line drawn through the relevant theft node and the CBD - is calculated by using the co-ordinates of the two locations.

$$\frac{y_a - y_b}{x_a - x_b} = b_p.$$

The value b_p may be used together with the value of the slope of the estimate line (b_o) to calculate the angle α_p , the angle between the principal axis and the estimate line.

$$\tan \alpha_p = \frac{b_p - b_o}{1 + (b_p b_o)}$$

The angle α_p is the measure of sectoral bias. The angle formed by the regression being used to determine $Y_o = a_o + b_o X_o$ is a measure of possible error using this method of analysis.

1. The equations are derived by the author based on the proposition by Whitelaw and Gregson(1971) that a regression line is the best estimate of sectoral bias.

APPENDIX E: (continued).

Slope of best fit or estimate line for offender movement origin patterns around the Indooroopilly Theft Node

1. Two lines of 'best fit' are calculated based on inaccuracy in both x and y values. The average of these two lines is the required estimate line (iii)

$$y_1 = a_1 + b_1 x_1 \quad (\text{i})$$

$$x_2 = a_2 + b_2 y_2 \quad (\text{ii})$$

$$Y = a_o + b_o X_o \quad (\text{iii})$$

From (ii)

$$\frac{1}{b_2} x_2 = \frac{a_2}{b_2} + y_2 \quad \therefore y_2 = -\frac{a_2}{b_2} + \frac{1}{b_2} x_2$$

The intercept of the average or best fit line (a_o) becomes:

$$a_o = \frac{1}{2} \left(a_1 - \frac{a_2}{b_2} \right)$$

The slope of the average or best fit line (b_o) becomes:

$$b_o = \frac{1}{2} \left(b_1 + \frac{1}{b_2} \right)$$

2. b_1 (slope of estimate line y_1) = 0.589
 a_1 (intercept on y-axis) = 3.010
 b_2 (slope of estimate line x_2) = 0.133
 a_2 (intercept on y-axis) = 9.502

The angle (α_1) formed by $y_1 = a_1 + b_1 x_1$ with the x-axis is given by the slope $b_1 \equiv \tan \alpha_1$

$$\tan \alpha_1 = 0.589 = 30^{\circ}30'$$

The angle α_2 formed by $x_2 = a_2 + b_2 y_2$ with the x-axis is given by $1/b_2 \equiv \tan \alpha_2$

$$\tan \alpha_2 = 7.5188 = 82^{\circ}24'$$

Since half the tans of the two angles \neq tan of half the angles, the difference between the two values for the angles (and not the tan of the angles) is halved.

The angle formed by the best fit line (b_o) is given by the equation

$$\begin{aligned} b_o &= 1/2 (b_1 + 1/b_2) \\ &= 1/2 (30^{\circ}30' + 82^{\circ}24') \\ &= 56^{\circ}27' \\ &= 1.5079 \end{aligned}$$

3. The estimate line $Y = a_o + b_o X$, passes through the mean centre (Sc) of the distribution.

$$\text{Sc: } x = 10.75 \quad y = 9.35$$

$$\text{Since } \frac{y_1 - y_2}{x_1 - x_2} = \tan \alpha = 1.508$$

$$\text{When } x_1 = 0 \quad \text{and } y_1 \equiv a_o$$

$$a_o = \frac{y - 9.35}{x - 10.75} = 1.508$$

$$a_o = (9.35 + (-10.75 \times 1.508))$$

The estimate line $Y = a_o + b_o X$ becomes:

$$Y = -6.86 + 1.508X$$

4. Slope of principal axis

The line joining the CBD theft node and the Indooroopilly node is termed the principal axis

Let m_2 = angle of slope of the principal axis

m_1 = angle of slope of estimate line $Y = a_o + b_o X$

Let α_p = tan of angle formed by the estimate line and principal axis

$$\text{Then } \tan \alpha_p = \frac{m_1 - m_2}{1 + (m_1 m_2)}$$

and b_p (slope of principal axis) is given by the equation:

$$b_p = \frac{y_a - y_b}{x_a - x_b}$$

where x_a, y_a and x_b, y_b are the co-ordinates of the CBD and Indooroopilly theft nodes.

$$x_a = 132 \quad x_b = 105 \quad y_a = 137 \quad y_b = 111$$

$$b_p = \frac{137-111}{132-105}$$

$$= 0.963$$

$$\text{Therefore } \tan \alpha_p = \frac{1.508 - 0.963}{1 + (1.508 \times 0.963)}$$

$$= 0.2223$$

$$\alpha = 12^{\circ}32'$$

APPENDIX F: DISTANCE TO NEARER THEFT CENTRES AND NUMBER
OF CENTRES BY-PASSED BY DELINQUENTS IN
MOVEMENT TO OFFENCE

Sample Population	Distance* Category	Number of Centres				
		1	2	3	4	5
CBD N = 403	1	15	20	5	8	0
	2	38	36	23	15	0
	3	27	22	41	29	0
	4	1	7	19	92	10
VALLEY N - 184	1	21	9	11	0	1
	2	23	11	10	5	1
	3	6	11	18	8	10
	4	1	9	14	4	11
INDOOROPILLY N = 159	1	49	1	1	0	2
	2	19	1	1	1	2
	3	24	1	4	0	3
	4	39	5	1	1	4
CHERMSIDE N = 134	1	61	6	2	0	0
	2	32	4	1	0	2
	3	10	2	1	0	3
	4	10	0	0	0	0
TOOMBUL N = 126	1	40	4	0	0	2
	2	32	8	0	0	4
	3	14	7	0	0	2
	4	0	10	0	0	3
MT. GRAVATT N - 97	1	33	0	0	1	2
	2	9	1	0	0	2
	3	21	6	0	0	3
	4	19	0	0	0	0
COORPAROO N = 89	1	22	3	0	1	0
	2	28	2	0	1	0
	3	12	8	0	1	1
	4	3	5	0	1	1

* Categories for distance were based on quartiles 1(highest-most accessible to 1.20 km; 2 to 2.00 km; 3 to 3.75 km; 4 greater than 3.75 km.

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